TOMORROW’S TRUCKS
Leaving the Era of Oil Behind

An Analysis of Expanded Refuse Sector Natural Gas Vehicle Use in New Jersey, New York City, and on Long Island

A Report by Energy Vision
Energy Vision is a New York-based, national, non-profit organization that analyzes and promotes ways to make a swift transition in the U.S. to pollution-free, renewable energy sources and clean, petroleum-free transportation fuels.

Energy Vision, launched in 2006, has initially focused on exploring renewable, clean, low carbon alternative fuels for the transportation sector, especially fuels that could displace reliance on diesel in heavy-duty buses and trucks, since those vehicles have been among the heaviest fuel consumers, as well as major sources of air pollution and greenhouse gases.

Energy Vision’s research is published in reports, articles, its quarterly newsletter, EV News, and on its website. EV presents its findings at national and international conferences, conducts workshops for municipal and waste management industry officials, and collaborates with public and private sector leaders in promoting change at the local level.

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*Tomorrow’s Trucks: Leaving the Era of Oil Behind,* was written by Joanna D. Underwood, President of Energy Vision, and Matthew P. Tomich, Research and Outreach Associate at Energy Vision.
# Tomorrow’s Trucks

*Leaving the Era of Oil Behind*

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Foreword

We are pleased to release Energy Vision’s new report, *Tomorrow’s Trucks: Leaving the Era of Oil Behind*, which has looked at progress being made in this region to reduce air pollution, cut greenhouse gases, and reduce reliance on foreign oil using one key strategy: converting refuse and recycling trucks from diesel to natural gas.

Heavy-duty buses and trucks have been among the most polluting and fuel-consuming fleets in the region. But, as our new study makes clear, a remarkable transition is now underway. Natural gas, far cleaner, less carbon intensive, and available across North America is the one commercial petroleum-free fuel option available to these fleets today. And for those municipal and solid waste industry leaders considering such a shift, the communities in New York, on Long Island, and in New Jersey profiled in these pages, provide examples and contacts that may be valuable in decision-making.

Findings of This Report

Over the last five years a true fuels revolution has been in the making in the NYC, Long Island, and New Jersey region. As of 2007 there was barely a handful of refuse trucks powered by compressed natural gas (CNG) fuel anywhere on the East Coast. But, in 2007-8 four initiatives got underway. By the end of 2012, 15 cities and communities had partially or totally shifted from refuse trucks burning high-carbon diesel fuel to ones burning natural gas: a 10-fold increase – from 38 to 381 natural gas refuse trucks.

Some of these communities, appreciating the environmental, health, and economic benefits of natural gas, also began purchasing other types of CNG vehicles: snow plows, pick-up trucks, jitneys, sedans, etc. Smithtown, on Long Island, made the Township’s policy to buy only natural gas vehicles (provided they met the California standards). Overall, the number of natural gas vehicles operating in the 15 communities rose twelve-fold: from 49 to 611.

These vehicle shifts to natural gas have had a stunning impact. Use of natural gas eliminated the need for 4.52 million gallons of diesel fuel annually with related fuel cost savings of $4.5 to $6 million. The emissions of particulates (soot) were cut by 97,230 pounds a year by the end of 2012, bringing relief to those in the region suffering from asthma attacks and other respiratory diseases. Emissions of nitrogen oxides (NOx), a lung irritant and a major ingredient in smog formation, were cut by 876,800 pounds per year.

The fleet transitions to natural gas also reduced the region’s climate-changing greenhouse gas emissions. On average, every diesel-powered vehicle replaced by a natural gas model reduces greenhouse gas emissions by close to 25 percent– which translates into the elimination some 25.1 million pounds (12.5 thousand tons) of carbon dioxide (CO₂) a year.
Drivers of this Fuel Transition

A number of major changes since 2007 have driven the fuel transition.

First, while natural gas technology was considered a new, risky option in 2007, it became recognized during this period as a fully commercial choice.

Second, the increasingly stringent pollution control requirements set by the U.S. Environmental Protection Agency for heavy-duty fleets have meant that new diesel-powered trucks must be equipped with complex and costly pollution control systems not required for natural gas trucks. This has narrowed the economic advantage diesel long had over natural gas vehicles.

Third, new information on the dangers to health of diesel emissions has emerged. Not only are diesel emissions major irritants to lungs and cardio-vascular systems, but a 2012 World Health Organization study concluded that diesel emissions are also a “known” carcinogen. This makes it important to replace as rapidly as possible the more polluting pre-2009 diesel vehicles.

The biggest driver for change increasingly over the last five years has become the rock bottom price of natural gas. This has resulted from the explosion in supply caused by adoption of the drilling technology called horizontal hydraulic hydrofracking, or “fracking.” Using this technique, companies can tap the large deposits of natural gas contained in shale rock formations which have been discovered in more than 30 states. Yet the environmental impacts of this drilling technique are not clear, and opposition to “fracking” has escalated by environmental and health organizations in many parts of the country. Opposition has been most intense in New York State with concern focused on the risks it may pose to the State’s watersheds, especially the watershed serving 9 million New York City residents, and to public health.

The Path Forward

The use of natural gas as a vehicle fuel has had significant national security, environmental and greenhouse gas reduction benefits to this region and to the health of its more than 20 million residents. While the pace of change has expanded, this shift covers just a fraction of the heavy-duty buses and trucks operating in the region. What factors will determine progress in this area going forward? A few of the most important (beyond the vital factor of fuel price advantage) include the following:

A new factor that will have a growing influence going forward is concern in the region over climate change. With the devastating damage done to entire coastal
communities in New York and New Jersey by Superstorm Sandy, (for which New York and New Jersey have requested more than $80 billion in federal aid to repair) reducing the region’s greenhouse gas generation is a rising priority. Transportation today contributes 26 percent of the gases that have made this country the number two contributor to climate change in the world, just behind China. A recent authoritative study, conducted by groups of climate scientists around the world, found “black carbon” – of which diesel vehicles are a major source – to be a potent greenhouse gas, but one that is much shorter-lived in the atmosphere than CO2. (See p. 5.) Hence, cutting diesel emissions may produce faster greenhouse gas reduction results.

For this region and this country to take advantage of our cleanest fossil fuel while moving toward a sustainable energy future, whether and how the fracking industry is regulated by the Environmental Protection Agency are critical factors. The goals would be to better characterize the impacts of fracking on air and water and on the health of local residents, to create a framework of regulations ensuring state-of-the-art drilling practices, and to assure full transparency to government agencies and the public regarding planned industry operations on a site-specific basis. Having the facts on the amounts of water to be used, the specific names and quantities of chemicals, and data on geologic conditions would enable state and local leaders to better evaluate proposed projects. Only with the EPA playing a greater leadership role along with the Department of the Interior, and with greater natural gas industry responsiveness to public concerns will a framework be put in place for ensuring that fracking operations are permitted only where they will not threaten air quality, the depletion or contamination of water resources or public health.

Whether federal and state leaders provide economic incentives enabling many more communities and cities in this region to convert their fleets from diesel to natural gas fuel will also influence the rate of progress. The up-front capital costs of buying new, more expensive natural gas vehicles are a major obstacle to change, and, from 2005 through 2010, federal tax incentives were available covering up to 80 percent of these incremental costs. Such incentives deserve to be reinstated, at the state if not the federal level to accelerate the pace of change.

A related factor is whether government incentives support mainly the use of fossil natural gas or whether they also encourage the use of an even better gas fuel that is now emerging as a commercial option. This is a renewable form of natural gas, called “RNG” or “biomethane.” It is chemically similar to fossil gas, containing four hydrogen atoms and just one carbon atom. Producing this fuel involves no drilling. It is made from the biogases emitted by decomposing organic wastes: those wastes coming from millions of homes and businesses (food and yard debris); wastes in landfills or at wastewater treatment plants; wastes from many institutions such as
hospitals, universities, conference centers, etc., from food processing industries, and from dairies and other agricultural operations. Disposing of these wastes has long been an economic burden to communities and businesses. They can now be used to produce a secure, clean vehicle fuel.

The use of RNG generates virtually no soot particles. Further, according to the California Air Resources Board, RNG is close to carbon neutral. (For more on renewable natural gas, see Energy Vision’s report: *RNG: Solution to a Major Transportation Challenge.*) The communities profiled in this report that have already shifted to fossil natural gas fleets not only have the cleaner air, lower greenhouse gas benefits, as well as reduced fuel costs of using this fuel. But they have also invested in the gas-adapted engines and refueling infrastructure that will allow them to take advantage of renewable natural gas made from their local wastes, whenever local production might begin. The federal tax code at present rewards the use of waste biogases to generate power but not to produce vehicle fuel. It is time for a change here.

Other factors impacting the pace of shifting away from diesel fuel in transportation include the pressures put on the U.S. by the growing global competition for world oil (although somewhat reduced now by expanded domestic production), the pace at which fully commercial natural gas engines become available and the speed at which they are produced. Of great importance as well is the extent to which the refueling infrastructure for natural gas vehicles expands. This has proved to be the greatest obstacle in New York City.

Natural gas fuel is ripe today for use in the thousands of trucks and buses in the New York City, Long Island, and New Jersey region and in the 10 million of these workhorse vehicles nationwide. Trucks and buses provide waste removal, recycling, public transport, and many other services in U.S. cities and towns. Natural gas is also a viable choice for the larger tractor trailers that carry produce and goods nation-wide accounting for 70% of the GDP. Shifting these fleets (just 4% of all vehicles in the U.S.) away from diesel fuel would have a dramatic impact – eliminating almost a quarter of all petroleum-based highway fuel consumed a year. What this new Energy Vision report makes clear is that this shift is without any doubt underway in the New York/New Jersey Region.

Brendan Sexton, Environmental Consultant, The Sexton Group, Former Commissioner of Sanitation of New York City, and member of the Board of Directors of Energy Vision

Joanna D. Underwood, President, Energy Vision
CHAPTER I:
Introduction: Moving Beyond Reliance on Oil

The first four initiatives on the East Coast to convert heavy-duty trucks from petroleum-based diesel fuel to domestic compressed natural gas (CNG) were undertaken in 2007 and 2008. This marked the beginning of a true transportation revolution in the region among refuse collection and recycling truck fleets. It involved the purchase of 38 heavy-duty trucks. Many more refuse and recycling fleets and other types of truck, bus and jitney fleets have since followed suit.

The first four initiatives were undertaken by very different entities. The Township of Smithtown on Long Island was “first out of the gate” when it released bid specifications for a new solid waste collection contract requiring that the services for this Township be provided using only natural gas trucks. On January 1, 2007, 22 new CNG trucks were ready to go into operation. The Department of Sanitation for the City of New York (DSNY), owner and operator of the largest municipal refuse truck fleet in the country, (2,200 trucks) bought 10 natural gas trucks (plus 11 new natural gas street sweepers). In addition, Metropolitan Paper Recycling Company and Filco Carting Company, two private waste haulers and recyclers in NYC, voluntarily purchased three natural gas trucks each for their fleets. All of these pioneering projects were profiled in Energy Vision’s 2008 report, Fueling a Greener Future.

The shift from diesel to natural gas-powered trucks in the U.S. got underway first on the West Coast, where, by 2003, 23 California communities had 648 natural gas trucks in operation. Beyond the West Coast, Washington, PA had seven, and Washington, D.C. had one. A 2003 report, Greening Garbage Trucks, the first analysis ever conducted of refuse fleet alternative fuel use, documented some limited use of bio-diesel, but found natural gas to be the primary alternative fuel option being put to use. But East Coast cities and communities did not really begin to use this new fuel until five years later.

The Scope of This Report

This report looks at:

- Why the transition of refuse vehicles away from diesel fuel is important
- What the results of the first four fleets on the East Coast have been: how their 38 natural gas trucks have performed; how their use has impacted the discharge of health-threatening particulate (soot) and nitrogen oxide (NOx) emissions; how much petroleum-

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1 DSNY purchased 36 natural gas trucks in the late 1980s and early 1990s, being the first municipal fleet willing to try out what was then a brand new technology. While the trucks were cleaner and quieter, they did not perform well, so their use was gradually phased out, and these early trucks were not counted in this report.
2 Fueling a Greener Future: NYC Metropolitan Area Garbage Fleets Commit to Alternative Fuels
3 Greening Garbage Trucks: New Technologies for Cleaner Air
based diesel fuel has been displaced, and how fleet operators and drivers like the new CNG trucks

• How the economics have shifted in favor of CNG – as compared to diesel – for new refuse trucks

• How “green garbage truck” initiatives have expanded in the last five years to include other fleets and communities on Long Island, in New York City, and in New Jersey

• What policy or program drivers, incentives, and conflicts have influenced the pace of change, and a look at what new issues and factors will influence the future

• What community and state level approaches deserve consideration, to assure that the region can move more rapidly to the use of cleaner, non-petroleum fleet fuels in an effort to protect public health, to reduce the region’s greenhouse gas generation, and to create domestic jobs

Summary of Findings

The findings of this report indicate that the shift away from petroleum-based diesel fuel has been steadily advancing on Long Island and in New Jersey. But it has advanced much less rapidly in the New York City Metropolitan area. At all locations but one, the initiatives that are underway are producing significant environmental and economic benefits.

Progress of the First Four Initiatives (2008-2012)

• Three of the first four initiatives – Smithtown, the NYC Department of Sanitation, and the private waste hauler, Metropolitan Paper Recycling Company – have been very successful, according to the fleet operators, with regard to truck performance, operator and driver satisfaction, reduced air pollution, and total vehicle cost per mile. Only Filco Carting reported dissatisfaction with its three natural gas trucks. (see the Filco Profile on p. 33.) By the end of 2012, natural gas trucks at the three successful New York sites had expanded from 38 to 52, and 42 other natural gas vehicles (NGVs) had been purchased, including snow plows, street sweepers, and sedans. This brought the total number of NGVs to 94. (See Chart 1 and Graph 1 on pp. 13 and 15.)

• At all four sites: 450,000 gallons of petroleum-based diesel fuel had been displaced in 2008 (by refuse trucks and other NGVs); the number had risen to 787,500 gallons annually by the end of 2012. (See Graph 2 on p. 15.)

• At all four sites: natural gas vehicle use (refuse trucks plus others), eliminated 7,345 lbs. of particulates a year. By the end of 2012, that number rose to 14,194 lbs. a year. 209,963 lbs. of nitrogen oxides were eliminated in 2008; by the end of 2012 the number had risen to 413,622 lbs. annually. (See Graphs 3 and 4 on p. 16.)

4 Over the life of the vehicle, in looking at operating and maintenance costs in addition to fuel cost savings, the economics of natural gas refuse trucks results in a significant cost advantage as compared to diesel, despite the higher incremental cost for a natural gas truck
Region-wide (LI, NYC, and NJ) Expansion of Natural Gas Vehicles (2008-2012)

- By the end of 2012, initiatives were in place in 13 new communities, bringing the total number of communities to 15. (NYC’s tally includes all three successful initiatives in the City.) Suffolk and Nassau County governments also initially planned to buy NGVs. However, as of the end of 2012, the only progress was the construction of two CNG stations for Suffolk County and three converted snowplows added to its existing fleet of 31 CNG dump truck/snow plows.\(^5\) The number of CNG refuse trucks across this region expanded ten-fold in these five years, from 38 to 381. With 235 other NGVs purchased, the total number of NGVs expanded twelve-fold from 49 to 611.\(^6\) (See Graph 5 on p. 17.) The least progress was in New York City, where by the end of 2012, DSNY had gone from 10 to 21 natural gas trucks and Metro Paper Recycling went from 3 to 9. No other operators of the 3,600 trucks in private waste hauling fleets (where most of the oldest, most polluting trucks are used) made this shift, even when federal funds were offered to cover all incremental costs under the American Recovery and Reinvestment Act in 2009.\(^7\) Filco Carting’s fleet remained at 3.

- By the end of 2012, the study region had 71 CNG refueling stations: 24 on Long Island (12 public access); 29 in New Jersey (5 public access); and 18 in New York City (9 public access). Of these stations, Clean Energy built, owns or operates the most (8 on Long Island, 8 in NJ and 5 in NYC), followed by Trillium CNG (4 in NYC and 2 on Long Island), Engineered Energy Solutions (2 on Long Island), and Air & Gas Technologies (1 in New Jersey). The remainder are primarily utility-owned and operated.

- By the end of 2012, the natural gas vehicles operating in 15 communities were displacing annually close to 4,528,000 gallons of diesel fuel (with related total fuel cost savings in excess of $4.5 million a year). (See Graph 6 on p. 18.)

- For all natural gas vehicles (refuse trucks plus others) in the 15 communities, reduction in particulate emissions went from 7,345 lbs. for the original four initiatives to 97,230 lbs. by the end of 2012. Nitrogen oxide (NOx) emission reductions went from 209,963 lbs. to 876,800 lbs. per year. (See Graphs 7 & 8 on pp. 18 and 19.)

- For each new natural gas truck, greenhouse gas emissions are cut by about 25 percent,\(^8\) for a total reduction in these climate-changing gases of 24.1 million pounds (12.1 thousand tons).

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\(^5\) Suffolk Cy. added 3 CNG snow plows in 2011 to its fleet of 31 CNG dump truck/snow plows.
\(^6\) This report’s tally does not count the Suffolk Cy. 34 NGVs, the MTA New York City Transit buses (950 of its total of 5,900 are natural gas powered), the Nassau Cy. 359 CNG buses (privately operated by Veolia) or private vehicle fleets (for ex. belonging to National Grid, Con Edison, etc.) It focuses on towns with CNG refuse trucks.
\(^7\) A lack of CNG refueling infrastructure has consistently been cited by DSNY and private refuse fleets in NYC as the primary impediment to vehicle conversion, but this may be alleviated by the end of 2013.
\(^8\) [http://www.ngvc.org/forfleets/index.html](http://www.ngvc.org/forfleets/index.html)
Impact on Air Quality and Noise

- The shift by refuse trucks and other vehicles from 2008 to the end of 2012 has improved the air quality for the 20 million residents of this region – eliminating almost 974,045 lbs. per year of particulate and NOx emissions. And each natural gas engine is from 50 – 80 percent quieter than similar diesel models. For refuse fleets, this could enable them to pick up their wastes earlier in the morning and later at night without disturbing residents.

The Economic Challenge for Each Fleet

- Solid waste management fleets bidding on contracts requiring the use of natural gas collection vehicles had to factor the added cost – as compared to similar diesel models – into their bids. Until 2010, the price differential was about $50,000 to $70,000 per truck. That differential is now considerably smaller because diesel truck purchasers have to add more expensive pollution control equipment to the new trucks to comply with the increasingly stringent air pollution standards set by the EPA. Moreover, the cost of new CNG trucks is coming down as manufacturers achieve increased economies of scale; the price differential is further reduced by the added and ongoing operation and maintenance costs for new diesel trucks since 2010. Nonetheless, 12 community initiatives out of 15 in this study received state or federal grant funds or tax incentives to reduce this burden.

- The fuel shift has benefited all 15 communities and fleets economically by ensuring lower and more stable fuel prices. Since natural gas was estimated to be between $1.00 and $1.50 per gallon equivalent cheaper than diesel (at the pump), as of the end of 2012, the 4,527,896 gallons a year of diesel displaced from the shift to 611 natural gas vehicles resulted in savings of between $4,500,000 and $6,800,000 a year – paying back the higher initial costs and ultimately generating significant annual savings over the life of the vehicles.

Five Factors Driving, Inspiring or Facilitating Change

Five factors have driven, inspired or facilitated progress in this region: 1) The most important initial driver was mandates used by The Township of Smithtown and three other communities (Brookhaven and Huntington, also on Long Island, as well as Hamilton Township, NJ) in their bid specifications for new waste service contracts – mandates that the services be provided using natural gas or the “cleanest” available trucks.

Three factors have inspired increasing change: 2) The initial power of example created by the Township of Smithtown’s 100 percent fleet conversion made a compelling case for the viability of this shift and the economic, noise, and pollution reduction advantages. 3) The distinction for communities and waste hauling companies of being “green” leaders was a matter of pride, and 4) The federal economic tax incentives and grants in combination with the American Recovery and Reinvestment Act (ARRA) stimulus funds provided by the Obama Administration in 2009, which made purchase of new CNG trucks more affordable,

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9 http://www.informinc.org/FS_ST_NYC_Refuse.pdf. However, you still have refuse truck noise from cooling fans, hydraulic pumps, etc.
10 Whereas today, and for the foreseeable future, economics are most often the biggest factor driving change.
while the precipitously falling price of natural gas fuel from 2008 to 2012 promised significant ongoing fuel cost savings.

Finally, facilitating change has been the public and private sector educational outreach to communities and waste companies introducing the differences between diesel and natural gas trucks and the benefits of a shift to CNG, and increasing technical assistance provided by “Clean Cities” organizations, the local affiliates of the U.S. Department of Energy’s outreach program, as well as utilities, corporations, or consultants to communities and waste haulers in drafting plans and seeking funds.

**New Factors Influencing Change going Forward**

During this five year period, as more and more CNG fleets and refueling stations went into operation, the feedback that Energy Vision received from fleet operators, town officials and residents was (but for one site) uniformly positive. Looking forward, a variety of new factors will likely influence the rate of progress.

Despite the fact that early adopters of natural gas trucks were largely inspired to convert by the environmental benefits of the fuel, the underlying driver today (2012-13) and for the immediate future is the extremely low cost of natural gas as compared to diesel (See Appendix B). Natural gas engine technology is not new or “experimental” but comparable to diesel models – in fact many drivers feel that the new natural gas engines perform better than their diesel counterparts. Moreover, natural gas engines are now built on the same assembly lines as diesel engines, differing from the diesel engines by only 20 percent (for the natural gas fuel and spark plug ignition systems). All told, the combined economic advantages, technological advancements and environmental benefits of a shift to natural gas in refuse (and other heavy-duty) fleets makes a compelling case for natural gas. This is evidenced by the fact that an astonishing 45 percent of new refuse truck orders in 2012 in the U.S. were for natural gas refuse trucks.  

The impetus for communities to shift their fleets away from diesel fuel may be heightened by new 2012 reports by the World Health Organization\(^\text{12}\) and a group of global climate modelers\(^\text{13}\) on the more severe public health and climate change impacts of diesel emissions.

There is little doubt that wholesale change is on the horizon, but standing in the way of fully realizing the many economic, health, and environmental benefits of using this domestically abundant, clean fuel are escalating concerns regarding the natural gas drilling technique called horizontal hydraulic fracturing, or “fracking” even though the low price of natural gas is now inextricably linked to this extraction technique. Fracking involves drilling into deeply buried shale rock formations that have been discovered in almost three dozen states and contain huge amounts of natural gas. Millions of gallons of water, plus sand and chemicals are injected at high pressure into these wells to shatter the rock (predominantly shale) and release the natural gas. These concerns center on the risks posed by “fracking” operations to water quality and quantity, air quality, and public health, as well as the destruction of landscape, decreased property values for homeowners near drilling operations, and most

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\(^{\text{11}}\) NGVAmerica

\(^{\text{12}}\) http://press.iarc.fr/pr213_E.pdf

\(^{\text{13}}\) http://www.smartplanet.com/blog/bulletin/soot-is-the-second-largest-contributor-to-global-warming/10300
recently concerns about earthquake activities.\textsuperscript{14} While the U.S. EPA has been studying these impacts, it is not close to rigorously regulating the industry and making its operations transparent. Yet doing so would provide an urgently needed context for state and local level decision-making.\textsuperscript{15}

Fourth, the response by the New York/New Jersey region to Hurricane Sandy, which devastated coastal communities in both states, provided evidence of what continued generation of climate-changing greenhouse gas emissions may mean to the region’s future (and the future of the planet). This incident, making millions of Americans aware of the new climate reality, may produce new policies at the state and federal levels promoting fleet shifts away from diesel fuel to low-carbon alternatives. For heavy-duty fleets this would promote use of fossil natural gas, cutting GHGs by 25 percent, or renewable natural gas (discussed next) cutting GHGs on a lifecycle basis by 88 percent or more as compared to diesel. Post-Sandy, more people are also realizing the need for fuel diversification to hedge against future supply shortages caused by extreme weather events.

Fifth and last, as mentioned above, has been the emergence of a renewable form of natural gas fuel – made from organic wastes – with even greater public health, greenhouse gas reduction, and economic benefits than fossil-based natural gas. This new even better gas fuel option, called biomethane or renewable natural gas (“RNG”), may lead some communities or landfill owners to pursue a direct shift from diesel to the production and use of RNG. Since RNG is nearly identical chemically to fossil based gas (CH4), it can take advantage of the same engines and refueling stations now being built for conventional natural gas fleets. Therefore, communities with fleets already powered by conventional natural gas are well positioned to add renewable natural gas to their fuel distribution system once made available through pipelines or produced locally from organic waste sources. This new but technologically viable fuel is highlighted in a 2012 EV publication, \textit{Renewable Natural Gas: The Solution to a Major Transportation Problem}.\textsuperscript{16}

\textsuperscript{14} For more on this: See Energy Vision’s White Paper on Fracking (http://energy-vision.org/pdf/HydrofrackingFactSheet3.pdf) or contact Natural Resources Defense Council, The Riverkeeper, the Catskill Mountainkeeper, or Environmental Advocates in Albany, who have opposed hydrofracking in NY State.

\textsuperscript{15} Among concerns, EPA has not stipulated best available control technology (BACT) for fracking or air emission standards for new wells nor is full transparency required regarding specific chemicals and amounts for proposed drilling sites.

CHAPTER II
Regional Background
Why a Fuel Shift by the Approximately 10,000 Refuse Trucks in the New York/New Jersey Region Matters

More than 10,000 heavy-duty refuse and recycling trucks rumble along the streets of the New York Metropolitan Region, across Long Island, and through New Jersey carrying out one of the most vital public services for every city and community – hauling the many tons of waste generated by residents and businesses and collecting recyclables. Little attention is paid to these trucks most of the time as they move along their routes. They operate almost invisibly. Yet, no community could long maintain its quality of life without these hard-working fleets.

How Many Trucks?

The total number of refuse and recycling trucks in the New York metropolitan region, on Long Island and in New Jersey, while upwards of 10,000, is not clear. Past research by Energy Vision, found there were about 6,000 refuse and recycling trucks in New York City alone. These include the 2,200 that are part of the municipal fleet owned and operated by the Department of Sanitation of New York City and the roughly 3,600 that are operated by private haulers. These private fleets collect 75 percent of the wastes generated in New York City.

For Long Island and for the State of New Jersey, there is no official tally of trucks. Public sector trucks in New Jersey total 1,360, but there is no record of private haulers’ trucks, which deliver most of the services to municipalities in the State.

The Challenges of Air Pollution and Noise

The approximately 10,000 refuse and recycling trucks in the region covered by this report, as of 2006, were virtually all powered by diesel fuel. However, as essential as the operations of these trucks have always been to communities and cities, their diesel emissions played a significant role in degrading the quality of life for the very people they serve.

Air Pollution: Standards and Health Impacts

Refuse trucks, as well as other heavy-duty diesel trucks and buses, are major emitters of air pollutants nationwide, especially of particulates (soot), well known for contributing to asthma attacks and other respiratory and cardio-vascular diseases. The diesel particulates emitted by trucks and heavy-duty buses also contain toxic substances. Strict pollution control standards were set by the U.S. Environmental Protection Agency for diesel vehicle pollutants in 2007, and they have become increasingly restrictive since then.

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19 except for an early pioneering initiative to use natural gas trucks twenty years ago by the NYC Department of Sanitation where the new and unreliable performance of its trucks soured the DSNY on this technology
20 The diesel buses and trucks that were operating prior to 2004 as well as stationary diesel engines were found to contribute 70 percent of the cancer risk in California’s South Coast Air Basin.
Heavy-duty refuse vehicles, the lifeblood of our economy, will continue to play a major role in transporting goods and waste, but a continued shift to natural gas will vastly improve air quality, especially in urban environments.

**Curbing Health-threatening Emissions of Soot and Nitrogen Oxides**

The 2010 and 2013 EPA standards have required significant emission reductions and set levels that new diesel and natural gas heavy-duty vehicles have to meet. The 2010 standards have required new diesel trucks to use expensive new pollution controls, narrowing the cost differential between diesel and natural gas trucks from between $50,000-70,000 to $30,000-40,000 as the cost and complexity of operating and maintaining new diesel trucks has increased. Yet, many pre-2006 trucks, especially those belonging to private hauling firms, remain in operation, never having been inspected or required to upgrade their equipment since they were first put into service. The 2013 EPA standards will further tighten allowable emissions of particulates and nitrogen oxides – but only for new trucks.

**Diesel Emission Impacts on Workers**

It is not just the residents of cities and communities whose health is affected by the exhaust of old diesel trucks. The workers who drive and maintain these trucks and who are exposed to fumes day in and day out have been most affected. A study by the Clean Air Task Force in Washington, reported in 2008 that “study after study since the 1950s has affirmed that the particles in diesel fumes are not only unpleasant to breathe but also may cause heart disease, respiratory illness, strokes, lung, bladder and colon cancer, and DNA damage.” A 2007 Harvard study of 54,000 workers in the trucking industry found a 49 percent higher risk of heart disease among diesel truck drivers compared to the general U.S. population. The study also documented elevated rates of lung cancer. On top of this, the World Health Organization in 2012 announced that it now has rated diesel exhaust as a “known” carcinogen.

Because of the dense population in the NYC-Long Island-NJ region, more than 20 million residents are exposed to diesel air pollution. This includes the almost 9 million residents of New York City, 2.87 million in Long Island’s Suffolk and Nassau Counties, and 8.7 million in New Jersey. The greatest impacts are on children, the elderly, and those with existing respiratory ailments.

PlaNYC2030, New York City’s sustainability plan launched by Mayor Michael Bloomberg in 2007 reported that diesel-powered trucks in New York City – operated by DSNY, by private haulers, and by companies transporting and delivering beverages and other produce – were significant contributors to the City’s poor air quality. They were shown by a 2002 study to contribute 25-50 percent of the City’s local overall criteria

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22 [http://www.jstor.org/pss/4626852](http://www.jstor.org/pss/4626852)
26 [http://lwd.dol.state.nj.us/labor/lpa/dmograph/est/nj1790_2010.pdf](http://lwd.dol.state.nj.us/labor/lpa/dmograph/est/nj1790_2010.pdf)
27 [http://www.stateoftheair.org](http://www.stateoftheair.org)
emissions.\(^{28}\) The New York State Solid Waste Management Plan (SWMP) acknowledged this critical pollution problem as well, especially noting that it disproportionately affected the City’s lower income neighborhoods where private transfer stations exist: Jamaica, Queens; Greenpoint-Williamsburg, Brooklyn; and Hunts Point, Bronx. As new trucks go into operation the health threats are reduced. However, the thousands of older diesel trucks remain the heart of the problem.

**Regional Health Risks Quantified**

The *State of the Air* report, published by the American Lung Association indicated in its 2011 study that a continuing severe pollution challenge faces this region:

- The New York-Newark-Bridgeport area ranked 17\(^{\text{th}}\) for high ozone days and 21\(^{\text{st}}\) for 24-hour particle pollution in a tally of the 277 most polluted metropolitan areas in the U.S.\(^{29}\)

- Of the seven counties in New York State within the region of this study (five in New York City and two on Long Island), four (Bronx, New York, Richmond and Suffolk Cys.) had an “F” for high ozone days, and one (Queens Cy.) had a “D.” Two (Kings Cy. and Nassau Cy.) did not do consistent monitoring. In these seven counties, the American Lung Association reported 258,227 children to be at risk for pediatric asthma, 854,798 adults to be at risk for asthma, as well as 374,553 for chronic bronchitis and 183,003 for emphysema.\(^ {30}\)

- Of the 16 counties (out of 21 total) in New Jersey that reported for the 2011 American Lung Association study, 11 received a grade of “F” for their high Ozone days, one had a “D”, and four reported no monitoring. In the 16 reporting counties, 163,127 New Jersey residents are at risk for childhood asthma, 448,421 for adult asthma, 256,464 for chronic bronchitis and 129,314 for emphysema.

**Truck Noise**

Vehicle-related noise has been a pervasive problem for city dwellers. The loud noise from diesel engines, especially from trucks collecting commercial wastes at night and the equipment they use to compact their loads at every stop, has been one of the most noticeable sources.

Energy Vision’s research for the 2003 report, *Greening Garbage Trucks*, reported that diesel trucks were coming dangerously close to, and in some cases exceeded, the standards of the Occupational Safety and Health Administration which permit employees

\(^{28}\) [http://www.dec.ny.gov/chemical/37026.html](http://www.dec.ny.gov/chemical/37026.html)

\(^{29}\) State of the Air: 2011 report by the American Lung Association.

to be exposed to 90 decibels for up to 8 hours. Some older diesel engines operate at up to 100 decibels, a level associated with “serious hearing damage.”

Diesel: A Fuel Supply at Risk for Trucks and Buses

The country’s 10 million heavy-duty diesel-powered trucks and buses are the workhorses of our society. The trucks haul our wastes away, pick up our recyclables, repair our streets, deliver our produce, and much more. Refuse trucks are one of the heaviest fuel-consuming vehicles in America. (Diesel garbage trucks get on average less than three miles per gallon.) We rely on bus fleets to carry children to school and back and to provide mass transit. While heavy-duty trucks and buses make up just 4 percent of all the vehicles travelling U.S. roadways, they consume 23 percent of all highway fuel.

The diesel fuel on which these trucks and buses have relied for decades, however, has become a supply at risk. And the picture of petroleum-availability is now in flux. Up until three years ago, this fuel was largely produced from imported oil, almost half purchased from countries whose priorities are not allied with those of the U.S. This left the operations of these fleets vulnerable to price spikes from foreign suppliers, which in turn disrupted the U.S. economy and, on the local level, disrupted the budgets of municipalities and waste hauling fleets.

There have been continuous swings in the price of diesel and gasoline fuel over the last five years which are bound to increase going forward, especially with world oil supplies dwindling, and China, India and other parts of developing Asia laying claim to more and more of the remaining global oil. Should political turmoil in the Middle East, or other countries that are our key oil suppliers, lead to bombing or blocking of a major oil pipeline, this would interrupt the supply of fuel to the U.S. and wreak havoc on our economy.

Further, U.S. oil reserves peaked in 1970 and then declined by 44 percent by 2007, from 3.8 billion barrels in 1970 to 1.8 billion barrels in 2007. This was occurring even as oil production was being reported to have either peaked or plateaued in 30 out of the 42 largest oil-producing countries in the world. The Association For The Study of Peak Oil and Gas USA (ASPOUSA) forecasts, “a peak or plateau in world oil (liquid fuel) production is likely to occur in 2015.”

The U.S. is now experiencing a bit of an oil “reprieve.” Domestic oil production has increased each year since 2007 because of new extraction techniques and also because a vast amount of western land has been opened up to oil and gas drilling to give this country greater energy security. The upswing in U.S. oil production may give this country greater security for the next decade but it is not a long term fuel solution for this country’s transportation when considering the global context or the environmental dangers that accompany deeper and deeper oil extraction from the Gulf of Mexico and from Alaskan waters. The oil spill in the Gulf of Mexico in 2010, involving the death of 11 oil rig workers, more than $4.5 billion in fines against

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31 *Greening Garbage Trucks* (p. 20) Specific sources of diesel truck noise include combustion, crank shaft-to-block interaction, valve train, and position-to-cylinder contact forces (p. 21). Surveys have shown that neighborhood noise above 75 decibels is highly annoying to more than one out of 4 people in the community (p.21).
32 *Greening Garbage Trucks*, p. 12
36 http://www.eia.gov/dnav/pet/hist/LeafHandler.ashx?n=PET&s=MCRFPUS2&f=A
BP, and likely billions more in environmental destruction, set off waves of doubt in the U.S. about the extent to which extreme deep sea oil drilling can be carried out safely. So continued reliance on diesel fuel will increasingly threatens the reliable performance of fleets that every community and city count on. It will also impact the large tractor-trailer fleets that use two-thirds of the diesel supply in transporting and delivering products and goods across regions and nationwide – worth 70 percent by value of our GDP.

Ending Refuse Fleet Dependence on Diesel Fuel: A Choice Today

Just a decade ago the first report appeared analyzing the alternative fuels that were beginning to be used in the refuse fleet sector. This report, *Greening Garbage Trucks*, documented the existence of one option to diesel fuel that showed promise of becoming a commercial choice: natural gas. The study documented the exceptional development of a new heavy-duty natural gas engine by a Vancouver-based company, Westport Innovations, which was being distributed through a joint venture, Cummins-Westport. This engine enables refuse trucks to run on this cleaner and domestically plentiful fuel with 50 percent or greater reductions in engine noise.

*Greening Garbage Trucks* reported that, as of 2003, approximately 692 trucks in 26 cities in the U.S., plus trucks in Japan and in The Netherlands were fueled by natural gas. However, these trucks, while much cleaner and quieter, did not perform reliably with their first generation technology.

Three years later, in 2006, when *Greening Garbage Trucks: Vol. 2* was published, twice as many natural gas refuse trucks were in operation, and they were fast becoming reliable, high performance vehicles. The first fleets using natural gas went into operation in California where air pollution regulations were most stringent – especially in southern California, where large heavy-duty fleets of buses and trucks were required by the South Coast Air Quality Management District (SCAQMD) to use natural gas fuel, providing an assured market that stimulated refinement of natural gas vehicle technology.

Since 2006, the movement, shifting refuse and bus fleets to natural gas has spread into all corners of the U.S. For the New York-New Jersey region, the focus of the rest of this report, the movement got underway in 2007.

37 *Fueling a Greener Future: NYC Metropolitan Area Garbage Fleets Commit to Alternative Fuels*
38 In 2009 the Supreme Court ruled that a region in California could not, on its own, create standards that were more stringent than those set by the federal government, although the State of California had the authority to do so. Hence private fleets were no longer required to use natural gas although the SCAQMD could continue to apply this requirement to public fleets. (Decision of the Court was on April 28th 2004. Court ruled 8-1 in favor of ENGINE MANUFACTURERS, PETITIONERS http://www.aqmd.gov/news1/2004/scotus_opinionpr.html)
Chapter III
Change gets Underway on the East Coast

In 2007 the first four refuse fleet conversions on the East Coast got underway. That change, documented in a 2008 report by Energy Vision, *Fueling a Greener Future*, was the purchase of 38 new natural gas refuse trucks, by four public and private initiatives in the New York Metropolitan Area and on Long Island.39

The first and most significant initiative was undertaken in the Township of Smithtown on Long Island, a community of 119,000 residents, whose Director of Environment and Waterways, Russell K. Barnett, supported by Town Supervisor Patrick R. Vecchio, recommended that the next contract put out by his community mandated that private fleets apply only if they were willing to provide their service using natural gas trucks.

Smithtown’s bold initiative was launched not for environmental but for economic reasons. At that moment, when a new seven-year solid waste disposal contract with local haulers was needed, Barnett feared the rising price of diesel fuel would disrupt the Township’s budget. Since no natural gas trucks were operating anywhere in the area, Barnett also feared no haulers would apply. However, many did, and by January 1, 2007, Smithtown had contracts with four haulers, and the winners had 22 natural gas trucks ready to go into operation. A California-based company, Clean Energy, which specializes in building natural gas refueling infrastructure, contracted with Smithtown to build a large refueling station, which was ready to refuel these trucks upon their arrival. It was the largest natural gas refueling station on the East Coast.

Three other initiatives followed Smithtown’s – all voluntary. One was by the New York City Department of Sanitation, which purchased 10 new CNG trucks (plus 11 natural gas sweepers). The other two were by New York City private haulers, Metropolitan Paper Recycling Company and Filco Carting Company. Both chose to buy three CNG trucks, wanting to be recognized as “green” leaders and hoping this would help expand their businesses.

The findings on progress of the four original fleets and then of the 13 new fleet initiatives launched since 2008 are summarized below. Full profiles of each community and fleet conversion initiative are found beginning on page 30.

**Progress of the Four Original Fleets (2008-2012)**

Three out of the four pioneering alternative fuel refuse fleet initiatives taken in the 2007-2008 period have been successful in the views of the project leaders, and these three had expanded their use of natural gas vehicles considerably by the end of 2012. (*Chart 1* on p. 13.)

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39 *Fueling a Greener Future: NYC Metropolitan Area Garbage Fleets Commit to Alternative Fuels*
**Chart 1**: First Four Initiatives in the NYC/Long Island Region Converting Diesel Refuse Trucks & Other Vehicles to Natural Gas (2008-2012)

<table>
<thead>
<tr>
<th>Location</th>
<th>Fleet Operator</th>
<th>Natural Gas Vehicles</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>4 Private Operators</td>
<td>1/2008: 22</td>
</tr>
<tr>
<td></td>
<td>V. Garofalo &amp; Sons Carting</td>
<td>12/2012: 43*</td>
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<td></td>
<td>DeJana Industries</td>
<td></td>
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<td></td>
<td>Jody Enterprises</td>
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<td></td>
<td>Brothers Carting</td>
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<tr>
<td>Smithtown, NY</td>
<td><strong>Total</strong></td>
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<tr>
<td></td>
<td><strong>4 Private Operators</strong></td>
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<td></td>
<td><strong>1/2008</strong></td>
<td></td>
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<tr>
<td></td>
<td><strong>12/2012</strong></td>
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<tr>
<td>Brooklyn, NY</td>
<td>Metropolitan Paper Recycling, Inc.</td>
<td>3</td>
</tr>
<tr>
<td></td>
<td><strong>Total</strong></td>
<td></td>
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<td></td>
<td><strong>3</strong></td>
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<td></td>
<td><strong>9</strong></td>
<td></td>
</tr>
<tr>
<td>Brooklyn, NY</td>
<td>Filco Carting Corporation</td>
<td>3</td>
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<td></td>
<td><strong>Total</strong></td>
<td></td>
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<tr>
<td></td>
<td><strong>3</strong></td>
<td></td>
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<tr>
<td></td>
<td><strong>3</strong></td>
<td></td>
</tr>
<tr>
<td>New York, NY</td>
<td>Department of Sanitation of NYC</td>
<td>21**</td>
</tr>
<tr>
<td></td>
<td><strong>Total</strong></td>
<td></td>
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<tr>
<td></td>
<td><strong>21</strong></td>
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<tr>
<td></td>
<td><strong>41</strong>*</td>
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</tbody>
</table>

* 23 are refuse trucks. 20 are other vehicles
** 10 are refuse trucks. 11 are street sweepers
*** 21 are refuse trucks. 20 are street sweepers

A driver for Metropolitan Paper Recycling, Inc., Jose M. Herrera, extols the fuel shift: "I have driven both diesel & natural gas trucks, and I have especially enjoyed the fact that the CNG trucks are much quieter than diesel trucks and produce fewer fumes. It is tough to breathe diesel fumes day after day. Use of the natural gas trucks protects the drivers’ health and the health and quality of life in our communities. I also enjoy the fact that the cabs in the CNG trucks are like driving a big car. They seem to be more comfortably made."

According to Russell K. Barnett, Director of Environment and Waterways for Smithtown, “We were all so pleased with the CNG trucks that were serving the Township (trucks actually purchased and used by the four contract firms that won the bids to provide refuse and recycling services to Smithtown) that the Township passed a resolution in 2009 that every new municipal vehicle purchased would be natural gas-powered unless there was no particular model that was approved under the California standards.” Since 2008, Smithtown has bought new snowplows, vans, sedans etc. almost doubling the number of NGVs serving the Town (now 39).

According to Mario Garofalo, head of V. Garofalo Carting and Sons, one of the four contract firms: “The trucks are performing well, the fleet mechanics drain the filters every day and change the filters every month. And the drivers like them. We bought eight trucks for Smithtown. But then we bought 11 more for use in Brookhaven and five more for Huntington. We plan to build our own refueling station on our property.” The fleet manager at Garofalo, Eleuterio Martinez, added, “The drivers like the trucks but the stepmen (helpers who work on the back of the trucks) like them more than anybody else!”

Metropolitan Paper Recycling Company’s CEO, Greg Bianco, purchased three more CNG trucks in 2009, doubling the number in his fleet to six. In his enthusiasm for the health-enhancing benefits of natural gas fuel, he even painted one of his new trucks pink, so he could use it to promote good health and breast cancer awareness. Bianco then bought another three in 2011, and he said that, in the longer term, he wants to convert his entire fleet and to have a refueling station.
built on his site. Bianco said, in 2011: “I hope the federal tax incentives that helped us pay for the first CNG trucks are extended. They made a big difference.”

Rocco DiRico, the Deputy Commissioner of Support Services at the Department of Sanitation of New York City, reported enthusiastically in the summer of 2011 that his 21 CNG refuse trucks (10 purchased in 2008 and another 11 in 2010) were performing well and as soon as he could get sufficient natural gas refueling infrastructure in place (his biggest remaining obstacle) he would be expanding the portion of his fleet that ran on natural gas. He also reported that 25 of DSNY’s 450 street sweepers are now powered by natural gas.

Toward DSNY’s goal of being a leader in the use of innovative equipment, DSNY has also had a model lab built to test the emissions of its trucks, and it is operating and testing seven trucks using hybrid technology, including one that is a natural gas hybrid. Spiro Kattan, Senior Engineer for the fleet commented in July 2011 that the hybrid natural gas truck was performing “very well so far.”

Only Filco Carting Company, which ordered its first three natural gas trucks in 2008, has expressed regret and disappointment with its decision. The COO, Dominic Monopoli, was so proud of the first three CNG trucks that Filco painted them with lakes and trees and painted the natural gas tanks that curve up over the cab of the trucks as the heads of birds. But Monopoli told Energy Vision in 2011: “the trucks never worked well, and I have never gotten the support we needed from the truck or engine manufacturers.” They, in turn, said they had tried to fix the trucks at first but then concluded that maintenance staff turnover at Filco was so rapid that the trucks broke down, suffering from being poorly maintained. Despite the negative experience, Filco’s trucks are still on the road as of the end of 2012.

Graphs #1 through #4 that follow show the increase in natural gas vehicles in these four original fleets by the end of 2012 and the related decrease in reliance on diesel fuel, as well as the significant reductions in particulate and nitrogen oxides emissions.
**Graph #1**
Four Original Initiatives: Increase in CNG Vehicles from 49 to 93 (2008 – 2012)

**Graph #2**
Four Original Initiatives: Diesel Displacement by CNG Fuel in Refuse Trucks and Other CNG Vehicles from 450,000 to 787,500 gallons/yr. (2008 – 2012)
Graph #3
Four Original Initiatives: Particulate Reduction from Shift to CNG in Refuse Trucks and Other CNG Vehicles from 7,345 to 14,194 lbs./yr. (2008 – 2012)

Graph #4
Four Original Initiatives: Nitrogen Oxides Reduction from Shift to CNG Refuse Trucks and Other CNG Vehicles from 209,963 to 413,622 lbs./yr. (2008 – 2012)
Expanded Use of Natural Gas Refuse Trucks and Other CNG Vehicles in 13 New Communities on Long Island and in New Jersey (2008-2012)

By the end of 2012, the trend toward natural gas refuse trucks had accelerated with thirteen new communities getting on board. The total number of CNG refuse trucks increased ten-fold (from 38 to 381) and the total number of new CNG vehicles over 12 times (from 49 to 611).

Graphs 5-8 that follow show the increase in natural gas refuse trucks plus other new CNG vehicles in all 15 communities by the end of 2012 and the related decrease in reliance on diesel fuel plus the much greater reductions in particulate and nitrogen oxides emissions. It appears that, when the communities and solid waste fleets were found to operate effectively, they began to order other types of natural gas vehicles.

**Graph #5**
Increase in Total CNG Vehicles in Region from 49 to 611 (2008-2012)
Graph #6
Diesel Fuel Displacement from Shift to CNG: Refuse Trucks and Other Vehicles in NYC, Long Island, New Jersey from 450,000 to 4,527,896 gallons/yr. (2008-2012)

Graph #7
Reduction in Particulate Emissions from Shift to CNG Vehicles in NYC, on Long Island and in New Jersey from 7,345 to 58,133 lbs./yr. (2008-2012)
**Graph #8**
Reduction in NOx Emissions from Shift to CNG from 209,963 to 837,445 lbs./yr. (2008 –2012)


**Change in Number of CNG Refuse Trucks**

<table>
<thead>
<tr>
<th>Community</th>
<th>2008</th>
<th>2012</th>
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</thead>
<tbody>
<tr>
<td>NYC (3 initiatives)</td>
<td>16</td>
<td>33</td>
</tr>
<tr>
<td>Smithtown</td>
<td>22</td>
<td>23</td>
</tr>
<tr>
<td>Brookhaven</td>
<td>0</td>
<td>67</td>
</tr>
<tr>
<td>Huntington</td>
<td>0</td>
<td>32</td>
</tr>
<tr>
<td>Oyster Bay</td>
<td>0</td>
<td>49</td>
</tr>
<tr>
<td>East Rockaway</td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>Hamilton</td>
<td>0</td>
<td>42</td>
</tr>
<tr>
<td>Atlantic City</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Atlantic County</td>
<td>0</td>
<td>15</td>
</tr>
<tr>
<td>Camden</td>
<td>0</td>
<td>48</td>
</tr>
<tr>
<td>Mt. Arlington –Blue Diamond</td>
<td>0</td>
<td>17</td>
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<tr>
<td>Newark – WM</td>
<td>0</td>
<td>25</td>
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<tr>
<td>South NJ – Earth Tech</td>
<td>0</td>
<td>14</td>
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<tr>
<td>Fairfield – Suburban Disposal</td>
<td>0</td>
<td>14</td>
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<tr>
<td><strong>Total</strong></td>
<td><strong>38</strong></td>
<td><strong>381</strong></td>
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## Change in Number of all CNG Vehicles

<table>
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<tr>
<th>Location</th>
<th>Refuse Fleet Operator</th>
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<th>2012</th>
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<tr>
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<td>Filco Carting Corporation</td>
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<td></td>
<td>Metropolitan Paper Recycling, Inc.</td>
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<td>3</td>
<td>9</td>
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<tr>
<td></td>
<td>Department of Sanitation of NYC</td>
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<td>21* (incl. 11 Street Sweepers)</td>
<td>41* (incl. 20 street Sweepers)</td>
</tr>
<tr>
<td>Smithtown, NY</td>
<td>4 Private Operators</td>
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<td>V. Garofalo &amp; Sons Carting</td>
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<td></td>
<td>DeJana Industries</td>
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<td>Jody Enterprises</td>
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<td></td>
<td>Brothers Carting</td>
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<td></td>
<td>10 Operators</td>
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<td></td>
<td>Jody Enterprises</td>
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<td>Total Collection Services</td>
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<td></td>
<td>Maggio’s M&amp;P Carting</td>
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<td>Island Waste Systems</td>
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<td>Eastern Environmental Solutions</td>
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<tr>
<td></td>
<td>Brothers Waste</td>
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<td>De Jana Industries</td>
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<td>Bianculli &amp; Sons</td>
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<td>European American</td>
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<td>Brookhaven, NY</td>
<td>Private Operators</td>
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<tr>
<td></td>
<td>V. Garofalo Carting</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Jody Enterprises</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Alpha Carting &amp; Contracting</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Bianculli &amp; Sons Sanitation</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>Island Recycling Solutions</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>M&amp;J Carting</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>National Waste</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>7 Private Operators</td>
<td></td>
<td>0</td>
<td>32</td>
</tr>
<tr>
<td></td>
<td>Oyster Bay Municipality</td>
<td></td>
<td>0</td>
<td>49</td>
</tr>
<tr>
<td>Huntington, NY</td>
<td>Village of East Rockaway</td>
<td></td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>Oyster Bay, NY</td>
<td>Central Jersey Waste</td>
<td></td>
<td>0</td>
<td>20</td>
</tr>
<tr>
<td>East Rockaway, NY</td>
<td>Village of East Rockaway</td>
<td></td>
<td>0</td>
<td>2</td>
</tr>
<tr>
<td>Hamilton Township, NJ</td>
<td>Central Jersey Waste</td>
<td></td>
<td>0</td>
<td>20</td>
</tr>
<tr>
<td></td>
<td>190*</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Atlantic City, NJ</td>
<td>Atlantic City Jitney Association</td>
<td></td>
<td>0</td>
<td>(All of them are Jitney Buses)</td>
</tr>
<tr>
<td>Atlantic County, NJ</td>
<td>Atlantic County Utilities Authority</td>
<td></td>
<td>0</td>
<td>15</td>
</tr>
<tr>
<td>Camden, NJ</td>
<td>Waste Management</td>
<td></td>
<td>0</td>
<td>70</td>
</tr>
<tr>
<td>Fairfield, NJ</td>
<td>Suburban Disposal Services</td>
<td></td>
<td>0</td>
<td>14</td>
</tr>
<tr>
<td>Mt. Arlington, NJ</td>
<td>Blue Diamond Disposal</td>
<td></td>
<td>0</td>
<td>17</td>
</tr>
<tr>
<td>Newark, NJ</td>
<td>Waste Management, Suburban Disposal, Regional Industries, and Giordano Companies</td>
<td>0</td>
<td>25</td>
<td></td>
</tr>
<tr>
<td>Ocean View, NJ</td>
<td>Earth Tech</td>
<td></td>
<td>0</td>
<td>14</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td></td>
<td></td>
<td>49</td>
<td>611</td>
</tr>
</tbody>
</table>
Emission Reductions and Diesel Fuel Displacement resulting from Use of All CNG Vehicles in Communities that Switched to CNG Refuse Trucks (2008 - 2012)

<table>
<thead>
<tr>
<th>Community</th>
<th>Nitrogen Oxides NOx (lbs.)</th>
<th>Particulate Matter PM 2.5 (lbs.)</th>
<th>Diesel Fuel Displacement (equiv. gallons)</th>
</tr>
</thead>
<tbody>
<tr>
<td>NYC</td>
<td>324,480</td>
<td>6,600</td>
<td>555,000</td>
</tr>
<tr>
<td>Smithtown</td>
<td>89,142</td>
<td>7,594</td>
<td>310,000</td>
</tr>
<tr>
<td>Brookhaven</td>
<td>86,858</td>
<td>7,930</td>
<td>700,016</td>
</tr>
<tr>
<td>Huntington</td>
<td>27,584</td>
<td>5,355</td>
<td>335,360</td>
</tr>
<tr>
<td>Oyster Bay</td>
<td>N/A</td>
<td>4,759</td>
<td>294,000</td>
</tr>
<tr>
<td>East Rockaway</td>
<td>1,724</td>
<td>222</td>
<td>10,000</td>
</tr>
<tr>
<td>Hamilton</td>
<td>17,233</td>
<td>3,754</td>
<td>249,600</td>
</tr>
<tr>
<td>Atlantic City</td>
<td>160,835</td>
<td>8,956</td>
<td>791,920</td>
</tr>
<tr>
<td>Atlantic County</td>
<td>12,930</td>
<td>1,671</td>
<td>156,000</td>
</tr>
<tr>
<td>Camden</td>
<td>60,340</td>
<td>6,125</td>
<td>567,000</td>
</tr>
<tr>
<td>Mt. Arlington</td>
<td>12,068</td>
<td>1,305</td>
<td>160,000</td>
</tr>
<tr>
<td>Newark</td>
<td>44,250</td>
<td>3,862</td>
<td>250,000</td>
</tr>
<tr>
<td>Ocean View</td>
<td>11,120</td>
<td>1,433</td>
<td>151,000</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>837,445</strong></td>
<td><strong>58,133</strong></td>
<td><strong>4,527,896</strong></td>
</tr>
</tbody>
</table>
Chapter IV  
Factors Promoting Growth in the Use of Natural Gas Vehicles

Energy Vision found five factors to be responsible for progress in this region as the natural gas fleets movement got underway. However, as the reputation and familiarity with natural gas fleets has grown over these five years, the factors are changing.

Mandates

Smithtown’s bold decision in 2007, which required in the bid specs for its new seven year solid waste collection and recycling contract that the services be provided using natural gas trucks, led other communities to follow suit: Brookhaven and Huntington on Long Island and Hamilton Township in New Jersey.

The Power of Example

The example set by The Township of Smithtown’s 100 percent fleet conversion spread and has inspired initiatives taken by virtually all the fleets on Long Island and likely many elsewhere. This initial project attracted broad national press attention, including an Op Ed article in The New York Times. Communities and fleet operators from Pennsylvania, Ohio and elsewhere in the country came to see the new trucks and the refueling station. Smithtown received a number of awards, and its Director for Environment and Waterways, Russ Barnett, has spoken at conferences nationwide on Smithtown’s program.

Barnett has consistently emphasized that Smithtown’s motivation was economic not environmental. The Township feared that the volatile and spiking cost of diesel fuel could wreck the town’s budget. He emphasized the success of the program – mainly the money saved by the lower price of natural gas fuel, and lower truck maintenance costs. According to Barnett, in 2008, after Smithtown’s natural gas refuse fleet had been in service for a year, he found that, with the higher cost of the solid waste contracts (because the haulers had to buy natural gas trucks) homeowners were paying $7.38 more per year. However, the fuel savings compared to the 2007 cost of diesel fuel were $10.72 per home, producing a total savings for the Town of $3.34 per home per year. For 36,000 households, the total town savings came to $120,240.

Public/ Private Sector Educational Outreach and Technical Assistance

Since 2007, communities and fleet operators have been increasingly exposed to articles and outreach programs, documenting the economic and environmental benefits of powering their fleets with CNG, as well as support in drafting plans and applying for government economic assistance. The Clean Cities groups in this study region that are part of the Department of Energy’s alternative fuels program, have played a growing role. These include: Greater Long Island Clean Cities Coalition (GLICC), Empire State Clean Cities (in NYC and the Hudson Valley region), and the New Jersey Clean Cities Coalition (NJCCC). Energy Vision co-sponsored training workshops and conferences with Clean Cities groups and published numerous articles and research on the benefits of natural gas.
Expanding Choice for Communities

The number of companies offering natural gas trucks and providing refueling services has expanded greatly, giving communities more choice. In 2007, very few truck manufacturers, outside of Mack, Crane Carrier, and Autocar, offered CNG trucks, while today virtually every major truck manufacturer has an offering. Virtually all still use the “gold standard” Cummins-Westport engines. In 2007, Air & Gas Technologies in New Jersey, the California-based Clean Energy, and Trillium, which mainly provided transit bus stations, were practically the only providers of refueling infrastructure. There are now dozens of providers.

There are also a growing number of utilities, engineering, and consulting firms involved in program planning and development.

Federal and State Economic Support

In 2009, new initiatives were undertaken voluntarily to take advantage of the Obama Administration’s ARRA funds, including projects by Waste Management (10 trucks) in Camden, NJ, and Blue Diamond (17 trucks) in Mt. Arlington, NJ. Although both companies sited multiple factors including the growing trend in the region to move to natural gas trucks, both companies, as well as others, were able to obtain significant ARRA grant funding from the NJ Clean Cities Coalition to offset the cost of the trucks.

Government support was offered in several forms during the 2008-2012 period.

- The 2005 Energy Policy Act. Two income tax credits were offered. One was for purchase of new alternative fuel vehicles and was worth 50 percent of the incremental cost of the vehicle, plus an additional 30 percent if the vehicle met certain tighter emission standards. These credits range from $2,500 to $32,000 depending on the size of the vehicle. It expired at the end of 2010. The second Income Tax Credit was worth 30 percent of the cost of natural gas refueling equipment, ranging from $1,000 for home refueling appliances up to $30,000 for large stations. It expired at the end of 2011, but then was carried forward to the end of 2013.

- The 2005 Transportation Act. An excise tax credit of 50-cents was provided per gasoline-gallon-equivalent of compressed natural gas (CNG) or per liquid gallon of liquefied natural gas (LNG) when CNG or LNG was sold for use as a motor vehicle fuel. Since this is an excise tax credit (not an income tax credit), non-tax paying entities (such as municipalities and public transit agencies) could benefit from it. In other words, the excise tax credit acts like a rebate and is not dependent on any excise tax paid. This credit has also been carried forward to the end of 2013.

- New York State’s Private Fleet Program. Administered by the New York State Energy and Research Authority (NYSERDA), private waste haulers could qualify for 80% of the incremental cost of natural gas trucks (in addition to seeking federal tax incentives.)

- The American Recovery and Reinvestment Act (ARRA). In 2009, outright grants for innovative transportation projects were administered. The ARRA provided $300,000,000 across the country. Requests for these funds, specifically for “shovel-ready” projects,
were collected and submitted by the local Clean Cities’ organizations, and the funds went to these entities to distribute. Ten of the initiatives described in this study had significant ARRA support.

Overall, New York, Long Island, and New Jersey got among the largest allocations of ARRA funds: $14,994,183 went to Long Island; $13,299,101 to New York, and $14,997,240 to New Jersey. The picture of incentives and grants for fleet conversions, shown below, is not comprehensive as only partial breakdown data was provided by companies and communities.

Summary of Grants or Economic Incentives that supported 12 out of 15 Initiatives in the NY, Long Island, New Jersey region (2008-2012)

<table>
<thead>
<tr>
<th>Community</th>
<th>Federal Tax Incentives</th>
<th>American Recovery and Reinvestment Act (ARRA) FUNDS</th>
<th>Private Fleet Program in NYC</th>
</tr>
</thead>
<tbody>
<tr>
<td>NYC</td>
<td>No applications</td>
<td>$600,000 (Garofolo 10 trucks) $48,690 for new CNG roll-off</td>
<td></td>
</tr>
<tr>
<td>Smithtown</td>
<td>$263,000 in Federal Grant Funds</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Brookhaven</td>
<td>$260,000 (8 new trucks &amp; 2 repowered trucks)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Huntington</td>
<td>$5,223,529 Station (44 trucks repower) (12 new trucks) (Garage modifications &amp; worker training)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Oyster Bay</td>
<td>$137,310 (2 trucks)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>East Rockaway</td>
<td>$12,000 per truck from the AFV Rebate Program of New Jersey; $50,000 in grants from the federal</td>
<td>Central Jersey Waste got $790,000 for 12 trucks and an additional $800,000 for their refueling station upgrade, all</td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Congestion Mitigation and Air Quality (CMAQ) grants through NJCCC</th>
</tr>
</thead>
<tbody>
<tr>
<td>Atlantic City</td>
<td>$5,488,530 ($28,887 per vehicle for 190 CNG jitneys)</td>
</tr>
<tr>
<td>Atlantic County Utilities Authority</td>
<td>$2 million (refueling station &amp; 15 CNG trucks)</td>
</tr>
<tr>
<td>Camden</td>
<td>Waste Management got $625,000 toward costs of the new refueling station</td>
</tr>
<tr>
<td>Mt. Arlington</td>
<td>$900,000 (17 CNG refuse trucks)</td>
</tr>
<tr>
<td>Newark</td>
<td>Clean Energy got $1,300,000 for new station at Covanta site</td>
</tr>
<tr>
<td>TOTAL</td>
<td>$872,000</td>
</tr>
</tbody>
</table>

**The Desire of Fleet Operators or Communities to be “Green” Leaders**

The Sanitation Department of the City of New York, with its huge fleet, has a long-stated goal of being a leader in its industry, and this goal led DSNY to buy 36 natural gas sanitation trucks back in 1989 – serving as a pioneer in this movement. Unfortunately, that first generation technology did not perform well, and DSNY, disillusioned, stopped buying these trucks. Not until 2008, when Energy Vision and a group of corporate leaders in natural gas refuse truck technology brought a new case to DSNY did the agency decide to revisit the situation. The Department is now not only a growing enthusiast for CNG trucks and street sweepers but it is testing seven hybrid and hybrid natural gas trucks and has built a sophisticated new emission testing lab to compare the performance of all these vehicles.

Metropolitan Paper Recycling’s CEO, Greg Bianco, also specifically stated that he wanted his company to be way out front in the green movement, as did Dominic Monopoli at Filco. Hamilton Township in New Jersey, the first in that state to mandate in its waste contract that it wanted the cleanest possible vehicles serving its town, was another innovator seeking to be the greenest town in the state.

All the other communities that have embraced CNG technology for their fleets have expressed pride in their green leadership and in improving the health of their communities. Since 2010, the successful experience of solid waste companies and communities with natural gas conversion of their fleets has made it clear that this is not just a “greener” path to take, but a
better business path. The CNG trucks are not just “greener” trucks; they are better trucks. They are high performance vehicles, with low-end torque equal to or better than diesel, and tanks that can carry more fuel for greater driving range than the early natural gas trucks. The trucks are much quieter, and are able to meet the evolving air quality standards with less complex (and less expensive) pollution control technologies than diesel trucks because the fuel is intrinsically cleaner.

The falling price of natural gas fuel has clinched many deals. Fuel is one of the most significant costs for a refuse fleet, and natural gas has been $1.00 to $1.50 cheaper per gallon than diesel fuel. With the excise tax credit for an alternative fuel, fleets got back $.50 per gallon, making it an even better choice. (In many states natural gas is also taxed at a lower rate than diesel). So waste-hauling companies can often save $10,000 or more per truck per year.42

The Weak Link in the Region: New York City

While Long Island and New Jersey have seen a rapid pace of change over the last five years, the least progress has been made in New York City itself, where the need is greatest. The New York City Department of Sanitation got on board with 21 trucks during this five year period, and it has 20 more CNG trucks on order for 2013, but as the largest fleet in the country, it is way behind other major cities; Los Angeles leads the pack with more than 400 CNG refuse trucks; Dekalb County in suburban Atlanta is in the process of converting their entire refuse fleet of 306 trucks to CNG;43 and a growing number of other medium-to-large cities have committed to replacing their diesel refuse and other heavy-duty vehicles with CNG.

DSNY held back after its 1989 pioneering experience with first generation natural gas trucks but has now indicated that the lack of refueling facilities is the main obstacle to expanding its CNG fleet.

Despite New York City’s sustainability plan (PlaNYC2030) launched in 2007, which aimed at making the City a national leader in many areas including pollution and greenhouse gas reduction, little focus was put by the City’s leaders on shifting the heavy-duty bus and truck fleets away from diesel fuel, despite the increasing shifts made elsewhere in the country. The City concentrated instead on “congestion pricing” of vehicles (a largely unsuccessful strategy) and the use of hybrid taxis, of which more than 6,000 are in operation.44 So almost nine million New Yorkers have been left breathing diesel emissions from thousands of waste hauling trucks and other heavy-duty vehicles. Of greatest concern are the 3,600 trucks in private fleets – most of which are old and highly polluting. Yet, not one private hauler even proposed to trade in trucks for CNG models when the American Recovery and Reinvestment Act provided generous incentives.

43 The DeKalb County project is noteworthy because the CNG fuel they will use to power their entire fleet is being produced from a portion of the biogas captured and refined at their large municipal landfill. http://www.truckinginfo.com/article/story/2012/12/dekalb-county-in-georgia-is-converting-landfill-gas-to-cng-to-run-its-fleet.aspx
44 However, these hybrids will be phased-out over the next few years as they are replaced by Nissan’s gasoline-powered “Taxi of the Future.” http://www.sustainablebusiness.com/index.cfm/go/news/display/id/24109.
Chapter V
Profiles: New York City, Long Island and New Jersey CNG Initiatives

The following profiles were compiled through the extensive research of EV and numerous phone interviews with fleet operators over the course of more than two years. The communities profiled, have all incorporated CNG refuse trucks for waste collection (whether public or private). Many of these communities have also added other CNG vehicles to their municipal fleets, due in large part to the success of their CNG refuse vehicle conversions. The information provided in the profiles was last confirmed in December of 2012, but given the growing interest in CNG garbage trucks, the number of projects and total vehicles on the road is a quickly moving target.
**New York City**

**The New York City Department of Sanitation (DSNY)**

The country’s largest sanitation department, DSNY, with a huge fleet including more than 2,200 collection trucks and 435 street sweepers, collects 10,000-12,000 tons of refuse and 2,000-3,000 tons of recyclables daily from residences and institutions.

DSNY was one of the first adopters of natural gas truck technology in 1989 and had a fleet of 26 Mack natural gas trucks bought before 2003. But, according to Rocco DiRico, Deputy Commissioner of Support Services, “this early equipment did not perform reliably leading DSNY to conclude that CNG trucks could not meet its needs.” But with encouragement in 2006 to revisit the state of this technology by Energy Vision staff and leading companies in the growing CNG field, DSNY collaborated with National Grid in reassessing the natural gas option.

In 2008, the agency secured a contract with Crane Carrier that would allow it to order CNG trucks. DSNY first ordered 20 new 25-cubic yard natural gas fueled rear loaders and one front loader. The first ten rear loaders and the front loader arrived at the end of that year. DSNY also purchased 20 sweepers running on CNG. DSNY owns and operates a natural gas fueling station in Woodside, NY where its CNG trucks fill up.

DSNY had early problems of two types which now seem to be resolved. First, the new trucks had trouble starting in below-freezing temperatures, a problem which Cummins Power Engines addressed. The other problem was related to the trucks stalling when the hydraulic system was operating. “The question was why,” DiRico said, “We did not have this problem with our diesel trucks.” It turned out that this had nothing to do with the fuel being used. It was related to DSNY’s exclusive “Pack at Idle” system, developed for the Department to reduce the noise and pollution from their trucks when they were using the hydraulics to compress the garbage. While the system worked effectively on DSNY’s diesel trucks, it created problems on the CNG trucks. The problem was resolved when both Cummins and Heil, which had supplied some truck parts, worked together.

In 2010, 10 more CNG trucks went into operation so DSNY has 21 new Crane Carrier CNG trucks on the street and a total of 20 CNG street sweepers. Spiro Kattan, Supervisor for Mechanics in DSNY’s Clean Fuels and Technologies Division, reported in the fall of 2010, “While the Crane Carriers are performing well, the important remaining test will come this winter when we see if the
trucks start right up in the cold and if they have adequate ability for plowing snow.” By February 2011, he was pleased to see they were doing both.

Use of the 21 CNG trucks has resulted in displacement of about 126,000 gallons of diesel fuel a year with reductions of 2,520 pounds of particulates (soot) and 105,420 pounds of Nitrogen Oxides annually. Life-cycle Greenhouse gas emissions for these trucks are approximately 25 percent lower than those for diesel trucks.

In 2010, DSNY also began experimenting with other new truck technologies. In addition to the 21 Crane Carrier CNG trucks and 20 CNG street sweepers now in operation, DSNY is testing a variety of hybrid refuse-collection trucks. Since DSNY’s new lab is up and running, the Department will be able to monitor the amount of fuel the trucks actually use and their emission levels.

DSNY is comparing seven new hybrid models (see table below). It has one diesel Mack TerraPro refuse truck equipped with a diesel-electric hybrid drivetrain, which Mack officials have said is the first hybrid for heavy-duty applications and meets the federal government's stringent emission standards that take effect in 2010. Also being tested are two diesel-hybrid hydraulics, three Crane Carrier diesel hybrid electrics, and finally one CNG hybrid hydraulic truck. The latter, a Crane Carrier Cummins-powered CNG hybrid, is the first of its kind in the world. This new truck has a horsepower rating of 320 and is currently being route tested to ensure against power problems. According to DSNY’s Kattan, “this truck has been performing well so far.”

But even as DSNY has kept its options open and explored natural and new hybrid trucks, as of the summer of 2012, the Department, according to Kattan, leaned further toward a commitment to natural gas and put in an order for 23 new Mack CNG refuse trucks with Cummins Westport ISL G engines. When these are delivered in 2013, DSNY will have 44 CNG refuse trucks and 20 street sweepers, for a total CNG fleet of 64 vehicles. DSNY is now pressing forward with its search for new refueling sites in the City.
Contact:

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Metropolitan Paper Recycling, Inc., Brooklyn, NY

While New York City uses its municipal fleet to collect refuse and recyclables from its residents and institutions, private haulers collect wastes and recyclables from the commercial sector. One of the largest is Metropolitan Paper, which collects wastes and recyclables from more than 1,800 customers in New York City, Nassau and Suffolk Counties. The company recycles 660 tons daily of mixed paper and also handles metals, plastics, and glass. The recycling facility that Metro owns and operates, located in Brooklyn, processes over 15,000 tons of recyclables monthly.

Metropolitan Paper Recycling Company was one of the first two private haulers in New York City to voluntarily purchase natural gas trucks. Its fleet in 2006 consisted of 36 vehicles: specifically 14 packers, eight roll offs, six flatbeds, five tractors, and three shop trucks. But in 2008 Greg Bianco, Chairman and CEO of Metro, decided to try “green” trucks. Finding the packers easiest to replace with available natural gas models, he traded in three 10-year old diesel trucks for ones powered by natural gas: one from Autocar and two from Crane Carrier.

Bianco said he made this decision “because the company was doing well financially at the time (2007), oil was selling for $100 a barrel, the purchase cost of a CNG truck, after grants and credits, was comparable to diesel.” He said that CNG “would enhance Metro’s image as an environmental leader.” At the time, a diesel truck cost about $230,000 and a CNG truck about $290,000. According to Bianco, “the combined federal tax credits and the excise tax credit making natural gas much cheaper than diesel made a big difference.”

Despite early problems, especially with the two Crane Carrier trucks, he was sufficiently satisfied with the trucks’ performance to purchase three more in 2009 (all Autocars) which, he said, are all performing well. In 2012, Metro Paper bought another three, also Autocars. His goal is to have 100 percent of Metro Paper’s fleet powered by natural gas within seven years.

The nine CNG trucks currently in operation have reduced Metro’s diesel use by about 180,000 gallons a year. They have reduced NOx emissions by 117,840 pounds and its particulate emissions by 1,620 pounds. While Bianco hopes to acquire land on which to build his own refueling station, he is currently refueling his trucks at two stations in Canarsie and Maspeth, Brooklyn.

“I am pursuing many other ideas,” Bianco told Energy Vision, “to become more of an environmental leader.” First, Bianco had one of his new CNG trucks painted bright pink so that it
would not only be cleaner than diesel trucks but would be eye catching in NYC and would publicize the importance of finding a cure for breast cancer.

He has invested $3 million in rooftop solar panels equipped with photovoltaic cells at Metro’s corporate offices, which will reduce the company’s energy consumption by 33 percent. Metro has also invested in a business called “Waste to Water” which is using a new technology, “BIO-EZ” which, he said, will enable companies in NYC to process their organic wastes on site instead of sending them offsite. The resulting water can be discharged to the sewage system. Greg Bianco reported that Three Guys in Brooklyn, which has been testing it, said the system is processing 10,000 pounds of waste a year successfully. Among other users of this system are the Fairmont Hotel in Pittsburgh, PA, and the Emory Hotel Conference Center in Atlanta, GA.

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Filco Carting Corporation, Brooklyn, NY

In 2008 Filco, a private refuse hauling firm with headquarters in Brooklyn, NY, which operates a fleet of 40 refuse and recycling trucks throughout New York City, decided to become one of the first haulers to step forward and voluntarily buy natural gas trucks. According to Filco’s CEO Dominic Monopoli, the company was established by his great grandfather in 1910, and he wanted to carry on a green tradition. Monopoli’s original vision was to continue buying CNG trucks so that his company could have a refueling station on its site.

But Filco’s experience with its first three CNG trucks, according to Monopoli, was “terrible.” He reported to Energy Vision in late 2010 that “the trucks just don’t work well.” “Two of the CNG trucks,” he said, “are working, but they only get 35 and 40 miles an hour which raises my labor costs. The third truck is sitting on my site with its engine disassembled.” He reached out for help to Autocar, which manufactured the trucks, to Cummins Power Systems, which handles the engine, or to Hallahan Trucks, which he relied on for support.

The perspectives of these other players that were involved in Filco’s original decision to buy the trucks and that made some continuing efforts to solve Filco’s problems, all ultimately identified the source of Filco’s problems as the company’s need for better maintenance of the CNG equipment. One pointed to the air filters needing to be changed more regularly to avoid getting clogged up with dust going into the engine. Another observed oil leaking in too many places. At first, Autocar, Hallahan, and Cummins Power Systems all pitched in to help and got Filco a “demo” truck to use while one of the CNG trucks was being repaired, new filters were put in, etc. But the maintenance problems did not improve and several visits to Filco found a turnover of maintenance engineers and supervisors, requiring orientation of new people. Cummins Power Systems offers training courses for natural gas engine systems, (Keith Wortman 718-892-2400 or 551-655-6503) but as of this writing, Filco has not signed up for these courses.

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Long Island

Brookhaven, Long Island, New York

The Town of Brookhaven, the largest Town in Suffolk County with a population of about 490,000, made a decision in 2008 to follow the model set by its neighbor, Smithtown, and require that all waste collection and recycling services in its jurisdiction be provided by natural gas trucks. The time had come to put out a bid for Brookhaven’s new waste hauling contract, and the bid specs included this requirement as had Smithtown’s a year before. The process went smoothly, and contracts were ultimately awarded to 10 waste hauling and recycling companies.  

Beginning January 1, 2009, these haulers had 67 new CNG trucks, bought from Peterbilt, Autocar and McNeilus, in operation.

In January 2009, Brookhaven hosted the opening of its new CNG fueling station on a one-acre site at the Brookhaven Landfill. The station was built and is now maintained and operated by Clean Energy under a ten-year contract with two five-year renewal options. The gas utility, National Grid US, supplied the pipeline extension for the new fueling station. The station serves the town’s 10 contracted waste and recycling collectors. It is also open to the general public.

At the opening of the new fueling station, Brookhaven Councilman Timothy Mazzei hailed the CNG conversion, saying, “By using CNG to fuel our town fleet of 67 trucks… our residents will enjoy important environmental and quality of life benefits with no appreciable additional investment on the part of the Town.” The new trucks are estimated to displace almost 700,000 gallons of diesel fuel per year (about 10,400 gallons per truck). They are reducing smog-causing nitrogen oxides by 86,859 pounds a year and particulates (soot) by 3430 pounds a year. CNG trucks also generate about 20 percent fewer GHG’s.

As of September 2010, Michelle DiBrita at the Department of Waste Management in Brookhaven reported there seem to be no major problems with the CNG trucks. “They break

45 Jody Enterprises, Total Collection Services, Maggio's M&P Carting, Island Waste Systems, Eastern Environmental Solutions, V Garofalo and Sons Carting (10 trucks), Brothers Waste, De Jana Industries, Bianculli & Sons, European American
down from time to time,” she said, “and require daily maintenance, but some of the minor problems are merely due to people adjusting and learning on how to work the new CNG trucks.”

For the fleet operators themselves, Mario Garofalo, of V. Garofalo and Sons noted that it takes somewhat longer to get repairs done on the CNG trucks. Joseph Carillo, from Total Collection Services commented that “their CNG trucks perform well but have a little less torque than the diesel trucks,” and Frank Ozpolat, of European American Waste Disposal, said of their new trucks, “They took a bit of getting used to, but I think they are better than diesel trucks.”

“As for community residents,” DiBrita added, “they love them. There used to be complaints regarding the noise of the old diesel trucks. There are far fewer grievances today. The trucks are much quieter, they don’t squeak or wake people up in the morning. Only one citizen has complained saying, ‘I run my garbage out when I hear the trucks but I miss the garbage pick up in the morning because I don’t hear them anymore,’ which isn’t a bad thing.”

**Private Haulers Contracted with Brookhaven**

<table>
<thead>
<tr>
<th>Company Name</th>
<th>Phone Number</th>
<th>Contact Name</th>
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<tbody>
<tr>
<td>DeJana Industries</td>
<td>516-944-3100</td>
<td>Anthony Yetkofsky</td>
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<tr>
<td>European American Waste Disposal</td>
<td>631-484-2270</td>
<td>Frank Ozpolat</td>
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<tr>
<td>Jody Enterprises</td>
<td>631-447-0510</td>
<td>Giustino Gallone</td>
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<tr>
<td>Island Environmental Group, LLC</td>
<td>631-702-2770</td>
<td>Cory Weissglass</td>
</tr>
<tr>
<td>Total Collection Services, Inc</td>
<td>516-449-3703</td>
<td>Joseph Carillo</td>
</tr>
<tr>
<td>Easter Environmental Solutions</td>
<td>631-928-4242</td>
<td>Joseph Litterello, Jr.</td>
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<tr>
<td>V. Garofalo and Sons Carting Inc.</td>
<td>631-231-0999</td>
<td>Mario Garofalo</td>
</tr>
<tr>
<td>Bianculli &amp; Son Pvt Sanitation, Inc</td>
<td>631-968-4822</td>
<td>Paul Bianculli</td>
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<td>Brothers Waste Services, Inc</td>
<td>631-567-2332</td>
<td>Francisco Flores</td>
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</tbody>
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Village of East Rockaway, Long Island, NY

As part of late Mayor Edward T. Sieban's "Green Village Initiative," the Village of East Rockaway, a community of only 10,000, decided in 2009 to replace its municipally-owned fleet of six diesel fueled trash collection trucks with CNG refuse haulers. The Village of East Rockaway replaced the two oldest and most polluting diesel trucks in their fleet with CNG trucks, and they planned to replace the remaining four trucks over the next two years. The Village was awarded $137,310 of stimulus funding to cover the incremental costs of the first two CNG trucks.

The one garbage hauling truck and one recycling truck that have been in operation since June 2010, according to Michael Boller, the former superintendent of the Department of Public Works, were running well. He added that the garbage truck, a McNeilus rear packer, was “really built well.” The first two CNG trucks displace 10,000 gallons of diesel a year and reduce the emissions of nitrogen oxides and particulates by 1,724 pounds and 22.2 pounds respectively a year. The trucks refuel at a Clean Energy refueling station located in Greenfield Cemetery, in the neighboring town of Hempstead.

New village officials who took over after Mayor Sieban died, are much less enthusiastic about the natural gas trucks. Supervisor of Public Works, Kevin Conklin, said that because a separate refueling station hasn’t been built in East Rockaway, he felt that the two CNG trucks had too far to go to refuel every day. It is not clear if or when any efforts will be made to build a new station or to trade in the other four diesel refuse trucks for CNG models.

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Huntington, Long Island, New York

Huntington, one of ten towns in Suffolk County, located on the north shore of Long Island, is a community of 195,289, which, in June 2009, became the third in the County (following Smithtown and Brookhaven) to stipulate in its new waste hauling contract specifications that waste haulers applying for contracts with the town would have to provide this service using natural gas trucks. By January 2010, Huntington had contracts with seven private waste haulers46 who went into operation there with 30 new CNG trucks. Ten more were ordered.

The town announced this mandate in June 2009, with town leaders expressing their optimism for the program. Huntington’s supervisor, Frank Petrone, said, “We estimate that over the life of our contract that we’ll displace two million gallons of foreign oil, and we’ll do that while achieving major air quality improvements in our neighborhoods and protecting our residents from the costs of an unstable oil market.” Councilwoman Susan Berland and Councilman Stuart Besen co-sponsored the resolution. According to Berland, “We have a great relationship with the Greater Long Island Clean Cities Coalition, and would eventually like to see our entire fleet of trucks run on compressed natural gas.” Besen commented: "By retrofitting our refuse vehicles with compressed natural gas, this program encourages and promotes the residents of the Town of Huntington to think and act green."

Huntington has long worked with neighboring Smithtown on solid waste disposal issues, and the towns got together again, finding that the need for fuel of both their fleets was sufficient to justify contracting with Clean Energy, which built Smithtown’s first refueling facility, to build a new refueling station for them to share. The station was built in Kings Park, which is in Smithtown but is close to the Huntington Resource Recovery Facility. Clean Energy now maintains and operates the station, which was inaugurated in June 2010, and provides natural gas at a fixed price, as stipulated by its contract, relieving the haulers of worry about skyrocketing diesel prices. The station serves the haulers from both Smithtown and Huntington and the municipal trucks in Huntington as well.

As of the end of 2011, Huntington had 27 CNG trucks operated by seven private haulers collecting its wastes and recyclables as well as 5 CNG trucks owned by the municipality. Audrey Gallo, Assistant Recycling Coordinator in Huntington’s Department of Environmental Waste Management, reported that the only questions regarding the trucks were that they refuel more slowly in the colder weather and they had to make some adjustments in estimating mileage.

It was up to the private haulers to apply for the federal tax credits covering 80 percent of the incremental costs of their trucks. However, the Town received a grant of $260,000 in stimulus

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46V Garofalo and Sons Carting, Inc. (5); Bianculli & Sons Sanitation (3); Jody Enterprises (2); Alpha Carting & Contracting (2); Island Recycling Solutions (6); National Waste (4); and Total Collection Services (5)
funds from the American Recovery and Reinvestment Act to acquire 8 new natural gas trucks, and to have two diesel trucks repowered with natural gas engines over the next three years.

When all 40 trucks in Huntington (27 belonging to private haulers and 13 owned by the municipality) are operating on natural gas fuel, they will have displaced about 416,000 gallons of diesel fuel a year, and eliminated 34,480 pounds of nitrogen oxides, 444 pounds of particulates (soot) and 88,804 pounds of greenhouse gases per year.

In addition to its CNG trucks, Huntington has purchased 14 hybrid vehicles, 11 flex fuel vehicles, a new hybrid street lighting truck, and six mini E electric vehicles.

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Oyster Bay, Long Island, New York

The Town of Oyster Bay, a community of 293,925 people, pioneering a commitment to green technology in its region, was the first in Nassau County to sign on to the U.S. Mayor’s Climate Protection Agreement. The Agreement represents a pledge to reduce the town’s carbon footprint. One of the effective green initiatives used has been the switch from diesel to natural gas (CNG) fuel in the Town’s refuse truck fleet.

With a $5,223,529 grant in 2009 stimulus funding from the Federal ARRA, Oyster Bay was able to repower 44 of the trucks used for sanitation collection and for snow removal. Working with the Texas-based company, Emission Solutions Inc., the diesel engines in these trucks were replaced with International CNG engines. The grant also covered the purchase of five additional new International CNG sanitation trucks using International engines, which meet the 2010 emission standards. The 44 repowered trucks cost about $68,000 apiece, which was approximately the incremental cost of buying each new CNG truck. With the repowering of many trucks that were purchased in 2005, they will have a good decade of service left with their new engines,” said Michael Cipriano of the Department of Public Works, Central Vehicle Maintenance.

Stimulus funding also covered construction of a new CNG refueling station, located at 150 Miller Place in Syosset, New York, but which is owned and operated by the Town of Oyster Bay. The station has three fast-fill pumps with six hoses and 50 time-fill posts. It was designed by a New York engineering firm, P.W. Grosser, constructed by Engineered Energy Solutions of Long Island. Currently, the station serves only the Oyster Bay refuse trucks, but when it is completed, it will also provide service to other nearby fleets.

The Town of Oyster Bay has calculated that the CNG initiative has reduced the Town’s diesel fuel usage by 294,000 gallons per year, reduced its greenhouse gas emissions by 27 percent and saved 74,759 pounds of particulates from being released when compared to a similar gasoline or diesel fleet. It is too early to report nitrogen oxide emissions reductions, but the town expects the reduction to be significant.

Oyster Bay Town Supervisor John Venditto expressed satisfaction with his town’s CNG project, saying, “With $300 million in stimulus funding available nationwide, it was a very competitive program, which makes it extra gratifying to the Town to receive such a significant grant to fund this project.”
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**Smithtown, Long Island, New York**

Smithtown, a community of about 117,000 located on Long Island, made headlines in 2006 when it mandated in the bid specs for its new solid waste collection contract that haulers bidding for this work with the town, provide the service only with trucks powered by compressed natural gas (CNG). Area haulers, having no familiarity with these trucks, were resistant at first, according to Russ Barnett, Director of Environment and Waterways for the Township. But by January 1, 2007, four contractors (V. Garofalo & Sons Carting, DeJana Industries, Brothers Carting, and Jody Enterprises) had signed contracts and bought and put into operation 22 new CNG trucks. Smithtown became the first community on the East Coast with 100 percent CNG refuse truck service.

The refueling station built (and now maintained and operated as a public access station) by Clean Energy in the neighboring town of Hauppauge to serve this fleet was the largest refueling facility in the eastern US. Smithtown trucks at this station have a locked-in price of fuel, ($2.25 a diesel gallon equivalent for 2011). Fuel prices for all seven years were set during the contract bidding process, giving waste haulers assurances about future fuel costs.

Russell Barnett, the inspiration behind the shift to CNG trucks, said: “We have calculated that the dedicated contract fleet of natural gas fueled trash trucks, in its first seven years of operation, will reduce emissions of nitrogen oxides (NOx) by 50,286 pounds a year and the emissions of particulates by 4,285 pounds a year. These 22 CNG trucks have displaced the need for 165,000 gallons of diesel fuel per year.” Smithtown has received several awards for its alternative fuels leadership, including Energy Vision’s 2010 Leadership Award.

Mario Garofalo, owner of V Garofalo Carting and Sons and one of the four Smithtown contract holders, bought seven of the CNG trucks now serving the Township. All were manufactured by Autocar and came equipped with Cummins Westport L Gas Plus engines. “At first,” he said, “We had the problem of oil leakage into the engine from the new Clean Energy refueling system which fouled the spark plugs so the engines weren’t working well. But now, that problem has been resolved. The trucks are performing well, the fleet mechanics drain the filters every day and change the filters every month. And,” added Garofalo, “the drivers like them.”

Smithtown has continued its pioneering example for other communities looking to convert their municipal fleets from diesel to natural gas. Patrick Vecchio, Smithtown’s Town Supervisor, reported to Energy Vision that, “the conversion of our garbage truck fleet to CNG went so well that we have been steadily converting other parts of our municipal fleet to run on CNG rather than diesel fuel or gasoline.”

By late 2010, Smithtown was operating with a natural gas vehicle fleet consisting of 39 vehicles. Two municipally-owned CNG snow plows converted from diesel to CNG fuel by Emission
Solutions Inc., an Oklahoma-based company, six new freightliner dump trucks, one street sweeper, a bi-fuel (CNG and gasoline) pickup truck, and seven Honda Civic GX natural gas sedans were added to the original 22 refuse vehicles. With the number growing, Smithtown got together with a neighboring town, Huntington, which had decided to convert its refuse fleet to CNG as well. Together, the two towns contracted with Clean Energy to build a new CNG refueling station on Smithtown land. It was opened during the Spring of 2010. The new public access station has two heavy-duty pumps and four fill points.

Russ Barnett expressed great satisfaction with the town’s CNG vehicles so far and is eager to continue using them. The Town obtained a new CNG refuse truck and two new CNG shuttle buses in mid-2011. A new CNG roll-off truck was also delivered in March 2012. The first CNG roll-off truck on Long Island, it is a Freightliner M2 112, with 320 horsepower and an ISL G Cummins Westport engine. It will carry 75 diesel gallon equivalents. Its total cost was $198,680 of which $48,690, covered by an ARRA grant, is the incremental cost for CNG.

As of the end of 2012, the town fleet included a total of 43 CNG vehicles. The total displacement of diesel fuel exceeds 310,000 gallons per year, with total NOx reductions of 89,142 pounds a year, and particulate reductions of 7,594 pounds per year. Mr. Barnett said, “we would be glad to provide specs on our natural gas vehicles to any who would find that useful. We get many requests now.” He said he has begun exploring the possibilities for turning Long Island’s organic wastes into the “renewable form” of natural gas, called biomethane.

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Atlantic City, New Jersey

Atlantic City, a community of 39,958, had no natural gas vehicles in its public fleet in 2008. But in March, April, and May of 2010, the privately owned Atlantic City Jitney Association began replacing its 190 diesel jitney buses with buses fueled by natural gas. The new jitneys were Starcraft All-star buses on the Ford E-450 chassis with the 6.8L engine, converted to use compressed natural gas (CNG) by California’s Creative Bus Sales. Creative Bus Sales used CNG conversion systems certified by the California Air Resources Board and US EPA that were provided by BAF Technologies. The incremental cost of these buses compared to diesel models was $42,525 per vehicle, and the fleet conversion was supported by $5,488,530 in funds from the NJ Clean Cities Coalition’s ARRA grant program ($28,887 per vehicle).

According to Tom Woodruff, President of the Atlantic City Jitney Association, “This project is significant to Atlantic County and the State because it advances a simple public policy goal: To reduce America’s dependence on foreign oil while consuming a fuel source that is cleaner, cheaper, and domestic. CNG is a viable alternative fuel in terms of fuel savings and environmental efficiencies.” Residents also enjoy the jitneys, saying they are quieter and cleaner.

Each new CNG jitney bus is estimated to displace 4,168 gallons of diesel fuel a year, or total diesel fuel displacement of approximately 791,920 gallons per year. Additionally, the CNG jitneys reduce emissions of nitrogen oxides by 160,835 pounds and particulates by 2,071 pounds a year as well as cutting greenhouse gas emissions by 414,219 pounds a year. The jitney buses were refueled at the Atlantic County Utilities Authority’s Haneman Environmental Park station in Egg Harbor, NJ until the new station, located on Delilah Road in Egg Harbor Township – also funded in part by the NJCCC – was built for the fleet by Clean Energy.

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Atlantic County, with a population of 253,000, has a 60-truck refuse/recycling fleet. It began replacing its biodiesel collection fleet with CNG refuse trucks in the spring of 2010. It first replaced its five oldest and most problematic trucks, which were about ten years old, with new Crane Carrier trucks, and the Authority added an additional 10 CNG trucks in 2011. Thereafter, ACUA will continue to substitute its existing vehicles with CNG per its fleet replacement schedule.

Each truck displaces approximately 10,000 gallons of diesel fuel per year, so the 15 trucks mean a total diesel fuel displacement of 150,000 a year. Greenhouse gas reduction has totaled 290 metric tons of CO\textsubscript{2} equivalent per year.

ACUA was awarded $2 million in federal stimulus funding through the NJ Clean Cities Coalition to build its CNG fueling station, to offset the cost of purchasing 15 CNG refuse collection trucks (with an incremental cost of $42,525 each), and to make necessary changes in the ACUA Maintenance Center where the new CNG vehicles are serviced. These changes, to ensure the safety of workers, include sensors to detect gas leaks, lighting and ventilation equipment.

The refueling station, built and maintained by Clean Energy Fuels is located at ACUA’s environmental park in Egg Harbor Township, has two fast fill fuel dispensers and two compressors. But it can be expanded to accommodate more vehicles. The station, which opened in October 2010, serves not only the ACUA’s growing fleet of CNG trucks, but also other public and private fleets.

The Vice President of Customer and Distribution Operations for South Jersey Gas, a company that works closely with the ACUA, said “South Jersey Gas is excited to see the growing acceptance and availability of natural gas as a smart alternative to gasoline and diesel fuels…We’re pleased to work with the ACUA to develop and promote this clean technology throughout South Jersey.”

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47 The Crane Carrier Trucks have 29 cubic yard Leach 2R-III rear-load packer body, a LET 2 chassis, and a Cummins ISL-G 320 horsepower engine. They are dual drive, meaning that the driver can steer from either side of the street. They have a larger cab that can seat 3 people. The trucks, on average, can hold between 10 – 15 tons of solid waste.

48 ACUA release October 12, 2010
49 ACUA release October 12, 2010
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The City of Camden, New Jersey

Camden County, which has suffered from one of the highest rates of particulate and nitrogen oxides pollution in New Jersey, has had exceptional reasons to take steps to reduce its air pollution. For the 80,000 residents of The City of Camden, its decision to move away from diesel refuse trucks promised healthier air. The City’s new waste hauling contract in 2010 required haulers to use trucks powered by cleaner natural gas fuel.

Waste Management of New Jersey won the contract for The City of Camden and its first 14 CNG trucks went into operation in late 2010. The refuse trucks are all Peterbilt with McNeilus bodies except for one with a Mack body. Six vehicles are roll off trucks with Amrep bodies. By the end of 2011, according to Jim Pryor, New Jersey area fleet manager for Waste Management, the company had a total of 48 CNG trucks in Camden, including ten that were partially funded by the NJ Clean Cities Coalition. And as of summer of 2012, all 70 trucks in operation were powered by CNG, displacing about 567,000 gallons of diesel fuel per year and reducing particulate and NOx emissions by 777 pounds and 60,340 pounds respectively, with greenhouse gases also cut by 155,400 pounds.

The refueling station was constructed by Clean Energy, with funding from Waste Management, PetroCard, and New Jersey Clean Cities Coalition. It was the first CNG refueling station in Camden County to include a public access facility, which is operated by PetroCard. It can be used by commercial fleets or individuals with natural gas vehicles. Since the fuel price is at least one-third lower than gasoline, this provides an incentive for other fleets or residents to buy CNG vehicles.

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Suburban Disposal Services, a New Jersey provider of refuse and recycling services, contracted with the New Jersey-based company, Air and Gas Technologies, to design, build, and maintain a new compressed natural gas (CNG) fueling station at its headquarters in Fairfield, New Jersey.

By the end of 2012, the new CNG station will be fueling Suburban Disposal’s fleet of 15 new CNG vehicles: 13 refuse trucks (Autocar) and two roll-offs (Peterbilt). These vehicles will support its commercial, industrial, municipal and residential customers within a 75-mile radius of Fairfield, in the Northern and Central regions of New Jersey. The 15 trucks, which were funded in part by a grant from the NJ Clean Cities Coalition, will avoid the need for about 23,400 diesel gallons a year with natural gas. Suburban’s total fleet of more than 50 trucks will be converted going forward and will use approximately 1.1 million diesel gallon equivalents of natural gas annually. Development of the new Suburban Disposal CNG station began in April 2012 and was completed in the end of July 2012. Suburban Disposal’s future plans include development of additional CNG truck fueling capacity as needed to match the growth of the company’s business.

Kerry Roselle, Vice-President of Suburban Disposal, said, "Our company is committed to acquiring and deploying fleets comprised of CNG-powered trucks. Together with many of our refuse and recycling service customers, we are anxious to secure the cost-saving and clean-air benefits offered by natural gas. Another important goal for us is helping reduce America's need for foreign oil imports, and natural gas fuel is sourced domestically."

Vincent Tomasso, Air & Gas Technologies’ President, said, "With the availability of new OEM natural gas-powered trucks from several major manufacturers, independent regional refuse and recycling operators are now deploying natural gas fleets in increasing numbers. Their goals include conserving costs, adding fuel diversity, curtailing harmful emissions, and reducing America's dependence on imported oil. We commend Suburban Disposal for its pace-setting commitment to powering its truck fleet with natural gas fuel."

According to Suburban Disposal’s Vice President Roselle, “the payback time to recoup the monies invested in this change will be about two to three years. From then on, the fleet will have significant fuel cost savings.”
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In 2008, Hamilton Township, a community of 92,000 residents, took a bold step when it solicited bids on its waste hauling contract. It required that garbage truck fleets submitting bids must be powered by natural gas. As a result of this requirement, Hamilton Township became the first community in New Jersey to be served by a 100 percent natural gas fleet. The winning bidder was Central Jersey Waste (CJW).

Because Central Jersey Waste made this move during the year when federal stimulus funds were available through the NJ Clean Cities Coalition, these funds could be used to cover 100 percent of the higher cost of each new natural gas truck ($42,000). The waste hauler not only purchased the ten trucks it needed for Hamilton Township and surrounding communities but 10 more, replacing in total 20 of its 80 trucks. It chose Autocar trucks equipped with Cummins Westport ISL G engines.

For this project CJW obtained $12,000 per truck from the AFV Rebate Program of New Jersey, $50,000 in grants from the federal Congestion Mitigation and Air Quality Improvement (CMAQ) Program and $790,000 in stimulus funding from NJCCC for 12 vehicles and an additional $800,000 for upgrades to their refueling station. The CNG trucks currently service Hamilton and Trenton. Central Jersey Waste hopes to eventually convert its entire fleet to natural gas.

California-based Clean Energy first built a “time-fill” refueling station on CJW’s property in nearby Trenton to refuel the Hamilton trucks overnight. But it is now upgrading the station with fast-fill pumps using $300,000 in stimulus funding support, it built a second fast-fill station on the same site, which can fuel an additional 50 to 100 trucks. The public availability of fuel at this station may inspire nearby towns, companies, as well as transit bus and taxi fleets to consider natural gas vehicles. CJW’s 20 CNG trucks displace 249,600 gallons of diesel, 12,480 gallons per truck, 17,233 pounds of nitrogen oxides, 222 pounds of particulates (soot), and 44,384 pounds of greenhouse gases.
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Mt. Arlington, New Jersey & Blue Diamond Disposal

In December of 2011, the small community of Mt. Arlington, New Jersey, with a population of 18,411 became the first site in Morris County to have a CNG refueling station for commercial vehicles. Blue Diamond Disposal, with a total fleet of 60 trucks, contracted with Clean Energy Fuels Corporation to build, operate and maintain the station. New Jersey Natural Gas is providing the distribution infrastructure to support delivery of natural gas to the station. The project was partially funded by a grant of $894,000 in ARRA funding from the NJ Clean Cities Coalition. The grant covered the total incremental costs of buying the first 17 CNG trucks.

President of Blue Diamond Disposal, John Shortino Jr., explained, “Our decision to adopt natural gas transportation solutions will generate a host of financial advantages for Blue Diamond including the immediate reduction in fuel costs and streamlined maintenance packages – all while positively benefitting the environment.” He said that Blue Diamond Disposal hopes one day to convert its entire fleet to natural gas. Shortino also reported that, “the drivers love the new CNG trucks. They are much quieter. They are performing well and the engines don’t have any power loss. The only thing is that the drivers took some time to adjust to a slight delay when they hit the accelerator. But they are now acquainted with the trucks and very pleased.”

When asked why Blue Diamond decided to buy natural gas trucks, John replied “there was not a single dominant driving force. It was a combination of fuel cost savings, funds being available through ARRA and DOE. Blue Diamond did extensive internal research on the topic. Once we were convinced that this was a good choice, we spoke to Clean Energy, Clean Cities, New Jersey Natural Gas, and others about logistics, etc.” He added, “we were very interested in becoming a green hauler because we’ve seen others in the region do it and felt it was a smart choice for them as well.” Blue Diamond currently has 17 CNG refuse trucks. By the end of 2013 the company expects to have 4 more bringing the total to 21.

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Newark, New Jersey: Clean Energy - Covanta Energy Collaboration

Clean Energy Fuels Corp., with approximately $1.3 million in ARRA grant funds from the NJ Clean Cities Coalition, built a CNG station at Covanta Energy’s Resource Recovery facility in Newark, NJ. The station, located on property owned by the Port Authority of New York and New Jersey and operated by Covanta Energy, will be officially unveiled in mid-2013.

The refueling station, open and fully operational since early 2013, currently fuels around 25 CNG refuse trucks owned by four different private waste haulers: Waste Management, Suburban Disposal, Regional Industries, and Giordano Companies. These trucks will reduce greenhouse gas emissions by about 25 percent. Their use will also displace close to 250,000 diesel gallons a year.

According to Mike Cecere at Clean Energy, there are about 350 to 400 refuse trucks that tip at the Covanta Essex facility each day. The initial capacity of the Clean Energy/Covanta CNG Station will be capable of fueling close to half of these vehicles. Clean Energy will make investments to upgrade this station and expand capacity as future demand warrants. In part due to the success of their current collaboration in New Jersey, Clean Energy and Covanta Energy have also agreed to partner in co-developing additional compressed natural gas stations at other select Covanta Energy locations throughout the country.

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A fast-fill pump at the Clean Energy/Covanta CNG Station in Newark, NJ.
Ocean View, New Jersey and Earth Tech Contracting

Earth Tech Contracting, Inc., a private hauler serving 1,500 commercial customers and more than 1,000 residences throughout southern New Jersey, was the first in the state to convert refuse trucks to CNG from diesel beginning in 2008. Of its fleet of 40 vehicles, Earth Tech now has 14 CNG trucks, including some which were converted to run on both diesel and CNG (bi-fuel) and more recently, the company has replaced some of its older diesel vehicles with new front-load Mack trucks equipped with Cummins ISL G natural gas engines.

 Doug Fagerstrom, Operations Manager at Earth Tech, said “drivers are very happy with CNG vehicles because they have more power and are quieter than traditional diesel trucks.” He also said an added benefit is that “drivers no longer have to worry about no-idle zones which had always been a big complaint with the old diesel vehicles.” The company has been very impressed with the advancements in natural gas engine technology over the last few years and sees the current CNG models as superior to diesel trucks in terms of performance.

The company prides itself on being a “green” leader and unlike most other private waste haulers, Earth Tech financed all its CNG vehicles privately and built its own on-site CNG refueling station. They plan to continue converting or replacing its diesel vehicles with CNG to capture the economic and environmental benefits of the cleaner burning, domestic fuel.

To educate its customers and the general public, Earth Tech has painted some of its CNG trucks with decals highlighting the use of natural gas and its environmental benefits. Fagerstrom added, “we want to promote the use of this domestic fuel and see this as a wonderful opportunity to reduce our dependence on foreign oil.” Based on Energy Vision’s calculations, Earth Tech’s use of CNG trucks displaces approximately 151,000 gallons of diesel per year and reduces emissions of nitrogen oxide by 11,720 pounds and greenhouse gas emissions by 20 percent. Earth Tech hopes that state and federal support for natural gas vehicles will increase and that more customers will begin to realize the “green” benefits of CNG when making choices about their waste contracts.

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Appendix A – Fleet Conversions by Corporate, Utility and Non-Profit Organization Fleets

While this Energy Vision report focused on the 15 communities that converted their refuse fleets to compressed natural gas and that, subsequently purchased other natural gas vehicles, it did not include: corporate, utility or non-profit organization fleets. A sampling of these other CNG vehicles, and additional CNG refuse vehicles that have gone into service since completion of the research phase for this report is listed below.

**New York:**

**MTA/NYCTA**
4300 full sized buses/1000 CNG buses (various manufacturers)

Paratransit: 1970 Access-A-Ride vehicles (mixed fleet); 10 CNG MV-1 handicapped accessible vehicles. There were originally 15, but 5 were flooded in Staten Island during Superstorm Sandy.

**NICE Bus (Nassau Inter-County Express)**
300 full-sized buses. All are CNG, Daimler Buses North America (Orion).

**Middle Country School District (Long Island)**
30 CNG school buses, transitioning to 70 CNG school buses

**Long Beach School District (Long Island)**
38 CNG school buses – entire fleet is CNG

**Family Residences and Essential Enterprises**
15 CNG Retrofitted Vans and 5 New CNG Buses

**Rides Unlimited of Nassau/Suffolk Counties**
15 New CNG Buses and 18 Retrofitted CNG Buses and Vans

**CENTRO (Central New York Regional Transportation Authority)**
Syracuse: The entire fleet of 100 full-sized buses run on CNG.

**New Jersey:**

**New Jersey Transit**
2400 full-sized buses: 76 CNG with 84 CNG buses on order; 160 in total MCI Coach

**The Parking Spot Group**
12 CNG Shuttle Buses

**Wally Park**
4 CNG Shuttle Buses
Courtyard Marriott Newark
2 CNG Shuttle Buses

Regional Industries
5 CNG Refuse Trucks

Casworth Enterprises, Inc.
5 CNG Refuse Trucks

Township of Voorhees
3 CNG Refuse Trucks

Township of Franklin
2 CNG Refuse Trucks

Giordano Companies
2 CNG Refuse Trucks

City of Linwood
1 CNG Refuse Truck
Appendix B – U.S. Average Retail Fuel Prices (2000-2013)

Source: DOE Energy Efficiency & Renewable Energy Alternative Fuels Data Center
Appendix C. References


http://www.sustainablebusiness.com/index.cfm/go/news.display/id/24109

New York State Department of Environmental Conservation, Section 4.0 Emission Inventories.


Vocational Energy, Dispelling the Myths About CNG, Tampa, FL.


Appendix D. Report Authors

Matthew P. Tomich

Matt Tomich joined Energy Vision in January 2012 as Research and Operations Associate. His focus has been on the preparation of this and other reports, and on the advancement of renewable natural gas (also known as RNG or biomethane) as a vehicle fuel. His work has included gathering research on major RNG initiatives in the U.S. in the dairy, landfill gas, wastewater treatment plant, residential and commercial waste sectors – research published on Energy Vision’s website and in its recent publication: Renewable Natural Gas: The Solution to a Major Transportation Challenge.

Tomich has been instrumental in coordinating Energy Vision’s various regional and national education and outreach initiatives and he has appeared as a speaker at multiple venues across the country. Tomich earned a B.A. in Geology from Haverford College, where he focused on Geochemistry, and an M.B.A. from Kansas State University with an emphasis on Technology and Entrepreneurship.

Joanna D. Underwood

Joanna Underwood is the founder and President of Energy Vision. In launching Energy Vision, Ms. Underwood drew on research that she guided for over a decade examining alternative vehicle fuels. This research produced nine alternative fuel-related studies, which became widely used references in the U.S. and elsewhere, including two widely publicized reports by James. S. Cannon, entitled Greening Garbage Trucks (2003 and 2006). These were the first analyses of the alternative fuel options for this sector. Having compared all available fuel options, these studies concluded that the primary opportunity for refuse fleets was to shift from diesel to cleaner burning and domestically plentiful natural gas.

EV’s research since 2009 has explored the potential of biomethane fuel, the renewable and carbon-neutral “twin” of fossil natural gas, for heavy-duty fleets. EV participated in planning the Department of Energy’s first “Clean Cities” workshop in 2010, introducing Clean Cities affiliates to renewable natural gas (RNG). Energy Vision prepared the follow up summary report, Waste to Wheels, and in 2012, The City of Surrey, Setting The Pace for Sustainable Development, and Renewable Natural Gas: The Solution to a Major Transportation Challenge.

A graduate of Bryn Mawr College, Ms. Underwood, in 1999, also received an honorary doctor of science degree from Wheaton College. She has served on advisory boards for the U.S. Department of Energy, and as a board member of The Rocky Mountain Institute, the New York State Energy Research and Development Authority and the Keystone Center. Research lead by Ms. Underwood has received numerous awards, including several from the U.S. Environmental Protection Agency. In 2000 and 2002, Ms. Underwood was chosen by The Earth Times as one of the world's 100 most influential voices in the global environmental movement.
For information on ordering this or other Energy Vision transportation reports, see below.

Tomorrow’s Trucks: Leaving the Era of Oil Behind (2013)*

Renewable Natural Gas: The Solution to a Major Transportation Problem (2012)*

Waste to Wheels: Building for Success (2010)*

Fueling a Greener Future: NYC Metropolitan Area Garbage Fleets Commit to Alternative Fuels (2008)*

*Price per copy: $25 plus $3.50 postage and handling

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For annual memberships, publications, speakers, and reprint requests, please email: tomich@energy-vision.org
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EV is a national non-profit 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.
“Energy Vision’s report documents the experience gained by local governments with alternate fuel vehicles. Expanding use of cleaner fuels by heavy trucks and buses is especially important in urban areas where people are in close contact with vehicle traffic. Switching from diesel fuel to compressed natural gas (CNG) can deliver important benefits for public health, the environment, and government budgets. Other communities can apply lessons learned by New York City, Long Island, and New Jersey when they convert their vehicle fleets from diesel to CNG. Diversifying our fuel supply and thinking outside the oil barrel will move forward when other communities are confident that the transition can deliver tangible results.”

Congressman Paul D. Tonko

“Energy Vision’s valuable new report documents the rapid adoption and transition of refuse fleets in the New York, Long Island, and New Jersey region to natural gas fuel over the past five years. The region’s move to natural gas refuse trucks played a significant role in today’s nation-wide deployment of natural gas vehicles in the solid waste industry. Clean Energy appreciates the hard work and advocacy of Energy Vision in support of natural gas-powered refuse trucks, and we look forward to the solid waste industry’s natural gas successes translating to other areas of the transportation sector.”

Andrew J. Littlefair, President and Chief Executive Officer, Clean Energy Fuels Corp.

“The Long Island Region and the Greater Long Island Clean Cities Coalition are proud of the accomplishments over the past several years in combining the fields of CNG and Solid Waste Collection. More importantly, it is proud of the cooperative efforts of those leaders who wish to make a difference in securing the future of this country’s energy needs. Energy Vision’s efforts to promote, educate and support the use of alternative fuels, as evidenced in this report, is an invaluable tool for all. GLICCC is grateful for our association with this wonderful organization.”

Dominick A. Longobardi, Chairman, Greater Long Island Clean Cities Coalition, Inc.

“Metropolitan Paper Recycling was introduced to Energy Vision in 2008, which first brought to light the environmental and economic benefits natural gas vehicles could provide to the communities we serve. These trucks have been quieter, they have saved us a lot of money on fuel, and as this terrific report indicates, I believe these are the trucks for tomorrow.”

Gregory Bianco, CEO, Metropolitan Paper Recycling

“We converted one hundred percent of our contract refuse truck fleet from diesel fuel to compressed natural gas, or CNG, back in 2007. We’ve never looked back. We got off of the diesel price rollercoaster with long term fixed fuel prices consistently a dollar to a dollar and a half per gallon cheaper than diesel fuel. The CNG trucks are better for the environment, quieter and use a cheaper domestic fuel at predictable prices. It’s a great combination. In fact, our original seven-year contract is about to expire. We’re soliciting bids for new contractors ...CNG trucks required!”

Russell K. Barnett, Director of Environment and Waterways, Town of Smithtown, New York

“Energy Vision’s research confirms the amazing strides New Jersey has made in five years from literally no natural gas refuse trucks in 2007 to more than 180 today.”

Chuck Feinberg, Founder and Chairman of the Board, New Jersey Clean Cities Coalition

For further information:

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