



# sanitation

**JOHN J. DOHERTY**  
Commissioner  
125 Worth Street, Room 714  
New York, N.Y. 10013  
Tel: (646) 885-4974

March 11, 2008

Honorable Michael Bloomberg  
Mayor, City of New York  
City Hall  
New York, New York 10007

Honorable Christine Quinn  
Speaker, New York City Council  
City Hall  
New York, New York 10007

Honorable William C. Thompson, Jr.  
One Centre Street – Municipal Building  
Room 530  
New York, New York 10007

**Re: Local Law 38 of 2005, Second Annual Report**

Dear Mayor Bloomberg, Speaker Quinn, and Comptroller Thompson:

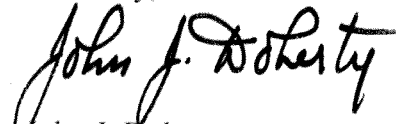
Pursuant to the New York City Administrative Code, I am pleased to submit to you the second annual report required by Local Law 38 of 2005.

Local Law 38 of 2005 added sections 24-163.1 and 24-163.2 to the New York City Administrative Code. Section 24-163.1 requires all City agencies to meet emissions and fuel economy standards for newly purchased light- and medium-duty vehicles. Section 24-163.2 provides that the Commissioner of Sanitation shall: (1) implement a program for testing the mechanical reliability and operational feasibility of alternative fuel street sweeping vehicles, and (2) collect and analyze data to further develop its initiatives for, and assess the feasibility of, incorporating new alternative fuel sanitation vehicles and technology into its fleet.

Section 24-163.2 also requires the Commissioner of Sanitation to report annually to the Mayor, Speaker of the City Council and Comptroller on the Department's alternative fuel street sweeping vehicle pilot project, and all other testing, analyses and assessments regarding its alternative fuel initiatives. The enclosed report is the second annual report on the Department of Sanitation's alternative fuel programs, including the street sweeper pilot program.

The Department of Sanitation is committed to the use of alternative fuels. As the enclosed report indicates, the Department currently has approximately 900 vehicles that operate on various alternative fuels, and will continue to expand its current fleet of alternative fuel vehicles while pursuing research and development of new technologies.

Sincerely,



John J. Doherty

c: Edward Skyler, Deputy Mayor  
City Hall

Haeda Mihaltses, Director  
Office of Intergovernmental Affairs, City Hall

Encl.



# The City of New York Department of Sanitation



---

**Report to the Mayor, Speaker of the City Council and Comptroller  
on the use of Alternative Fuel Street Sweepers and Sanitation Vehicles  
Pursuant to Local Law 38 of 2005**

---



---

**John J. Doherty, Commissioner**  
January 2008

---

## I. Introduction

In addition to fulfilling its responsibilities to the City of New York, including garbage collection, recycling collection, street cleaning and snow removal, the Department of Sanitation (DSNY) is dedicated to minimizing air pollutant emissions. To achieve this objective, DSNY uses certain state-of-the-art technology and alternative fuels for its vehicle fleet. Currently, all of the Department's light, medium and heavy-duty diesel vehicles utilize the industry's latest computer-controlled and regulated clean-diesel engines for their respective engine model years. The Department also implemented the use of ultra-low sulfur diesel fuel (ULSD) in its entire fleet over two years in advance of regulatory mandates.<sup>1</sup> The use of ULSD in turn allows for DSNY's expanding use of various advanced emission-control retrofit technologies, such as diesel particulate filters and diesel oxidation catalysts (high sulfur diesel fuel harms these devices). With the use of these new technologies, diesel emissions differ only slightly from those of compressed natural gas (CNG)-fueled heavy duty vehicles, with nitrogen oxides emissions from CNG-fueled vehicles still somewhat lower than from diesel vehicles.<sup>2</sup> Meanwhile, with the new national standards for ULSD fuel, federal standards for new on-road heavy duty diesel engines which took effect with the 2007 model year will result in a reduction in particulate and nitrogen oxides pollution by over 98%, as compared with pre-1988 engines.<sup>3</sup>

DSNY currently has over 900 vehicles that operate on alternative fuels. DSNY is the first and only city agency to use E85 ethanol fuel – a mixture of 85% ethanol and 15% gasoline – in its fleet. Currently, there are six E85 fueling facilities in operation citywide, and 476 DSNY vehicles run on E85. DSNY also has 307 hybrid electric vehicles and 134 CNG vehicles in its active fleet.

Local Law 38 of 2005 provides that, beginning no later than March 1, 2006, DSNY shall implement a program for testing the mechanical reliability and operational feasibility of alternative fuel street sweeping vehicles. This law provides for a pilot project where alternative fuel street sweeping vehicles are used exclusively in at least four sanitation districts, with at least one district in an area where high rates of asthma are found among residents. In addition, Local

---

<sup>1</sup> The federal mandate for using on-road ULSD took effect in September 2006.

<sup>2</sup> See Ayala, *et al.*, *CNG and Diesel Transit Bus Emissions in Review* (August 2003); Ayala, *et al.*, *Diesel and CNG Heavy-Duty Transit Bus Emissions over Multiple Driving Schedules: Regulated Pollutants and Project Overview* (Society of Automotive Engineers, 2002).

<sup>3</sup> Nitrogen Oxides levels are capped at 0.2 grams per brake horsepower-hour (g/bhp-hr), and particulate matter is capped at 0.1 g/bhp-hr. 66 Fed. Reg 5001, 5005 (Jan 18, 2001).

Law 38 requires that DSNY assess the feasibility of incorporating new alternative fuel sanitation vehicles and technology into its fleet.<sup>4</sup>

Under Local Law 38, alternative fuels include natural gas, liquefied petroleum gas, hydrogen, electricity, and any other fuel which is at least eighty-five percent, singly or in combination, methanol, ethanol, any other alcohol or ether.<sup>5</sup> DSNY is currently utilizing CNG as an alternative fuel for its street sweepers and sanitation vehicles. CNG-fueled heavy-duty vehicles emit significantly less particulate matter and nitrous oxides than pre-2007 model year diesel-fueled vehicles without retrofit technology, and make less noise.<sup>6</sup> However, it has also been noted that CNG-fueled vehicles have lower fuel efficiency and emit more methane and carbon monoxide than conventional diesel vehicles,<sup>7</sup> and the costs of CNG-fueled vehicles and CNG fueling station infrastructure are relatively high.

Local Law 38 requires the Commissioner of Sanitation to report to the Mayor, the Comptroller and the Speaker of the Council on DSNY's alternative fuel street sweeping vehicle pilot project, and all testing, analyses and assessments of the alternative fuel street sweepers and sanitation vehicles. To fulfill this mandate, this report includes:

- The number of alternative fuel street sweeping vehicles included in the pilot project;
- The districts in which alternative fuel street sweeping vehicles are located and the type of alternative fuel used by such vehicles;
- The total number of alternative fuel sanitation vehicles owned or operated by DSNY, separated according to vehicle model and type of alternative fuel used;
- A description of all testing, analyses and assessments done on DSNY's alternative fuel street sweepers and sanitation vehicles;
- Conclusions based upon such testing, analyses and assessments;
- Information regarding efforts made by DSNY to further develop initiatives for further incorporating alternative fuel sanitation vehicles into its fleet; and
- Information regarding the feasibility of incorporating alternative fuel sanitation vehicles into the DSNY fleet.

---

<sup>4</sup> NYC Administrative Code § 24-163.2(c)(1), (2).

<sup>5</sup> NYC Administrative Code § 24-163.1(a)(1). Other types of fuels, such as biodiesel, do not qualify as alternative fuels.

<sup>6</sup> INFORM, Inc., *Greening Garbage Trucks: New Technologies for Cleaner Air* (2003).

<sup>7</sup> DSNY Commercial Waste Management Study, Vol. VI, at ES-5, 23 (March 2004); Ayala, *et al.*, *Diesel and CNG Heavy-Duty Transit Bus Emissions over Multiple Driving Schedules* (indicating CNG buses emit more carbon monoxide than retrofitted diesel buses).

## II. Street Sweepers

This section reports on the number of alternative fuel street sweeping vehicles included in the pilot project; the districts where alternative fuel street sweeping vehicles are located and the type of alternative fuel used by such vehicles; and a description of all testing, analyses and assessments done on DSNY's alternative fuel street sweepers.

DSNY currently owns nineteen (19) alternative fuel street sweepers, all of which use CNG (see Figure 1), and all of which operate in the following four sanitation districts: Brooklyn North 4; Queens West 2; Queens West 4; and Queens West 5. Ten (10) of DSNY's 19 CNG street sweepers are being carefully monitored and studied, because they represent the latest CNG sweeper technology (see Figure 2). The ten pilot study street sweepers have been allocated as follows: four street sweepers in Brooklyn North 4; and two street sweepers each in Queens West 2; Queens West 4; and Queens West 5 (see Figure 3). Of the four sanitation districts selected for the pilot study, Brooklyn North 4 was determined to have high asthma rates among residents. These ten pilot study street sweepers were compared with ten diesel fuel powered street sweepers (see Figure 4).

DSNY makes every effort to keep its fleet as up to date as possible. To further this goal, DSNY made an award to Johnston in fiscal year 2008 for ten (10) new CNG street sweepers to replace the ten oldest units in the fleet. DSNY expects delivery of these units in 2008.

Figure 1: Total DSNY alternative fuel street sweepers

<b>Vehicle</b>	<b>VIN #</b>	<b>Vehicle Type</b>	<b>Alternative Fuel</b>
20CNG-401	1J9VM4L961C172002	Street Sweeper	CNG
20CNG-402	1J9VM4L981C172003	Street Sweeper	CNG
20CNG-403	1J9VM4L9X1C172004	Street Sweeper	CNG
20CNG-404	1J9VM4L911C172005	Street Sweeper	CNG
20CNG-501	MJ9VM4L903C172001	Street Sweeper	CNG
20CNG-502	1J9VM4L323C172002	Street Sweeper	CNG
20CNG-503	1J9VM4L943C172003	Street Sweeper	CNG
20CNG-504	1J9VM4L963C172004	Street Sweeper	CNG
20CNG-505	1J9VM4L983C172005	Street Sweeper	CNG
20CNG-601	1J9VM4L956C172001	Street Sweeper	CNG
20CNG-602	1J9VM4L976C172002	Street Sweeper	CNG
20CNG-603	1J9VM4L996C172003	Street Sweeper	CNG
20CNG-604	1J9VM4L906C172004	Street Sweeper	CNG
20CNG-605	1J9VN4L926C172005	Street Sweeper	CNG
20CNG-606	1J9VM4L946C172006	Street Sweeper	CNG
20CNG-607	1J9VM4L966C172007	Street Sweeper	CNG
20CNG-608	1J9VM4L986C172008	Street Sweeper	CNG
20CNG-609	1J9VM4L9X6C172009	Street Sweeper	CNG
20CNG-610	1J9VM4L966C172010	Street Sweeper	CNG

Figure 2: DSNY Alternative Fuel Street Sweepers Used in Pilot Study

Vehicle	VIN #	Fuel	Make / Model	In-Service date
20CNG-601	1J9VM4L956C172001	CNG	Johnston 4000	08/28/06
20CNG-602	1J9VM4L976C172002	CNG	Johnston 4000	10/02/06
20CNG-603	1J9VM4L996C172003	CNG	Johnston 4000	08/25/06
20CNG-604	1J9VM4L906C172004	CNG	Johnston 4000	10/26/06
20CNG-605	1J9VN4L926C172005	CNG	Johnston 4000	09/07/06
20CNG-606	1J9VM4L946C172006	CNG	Johnston 4000	08/31/06
20CNG-607	1J9VM4L966C172007	CNG	Johnston 4000	08/28/06
20CNG-608	1J9VM4L986C172008	CNG	Johnston 4000	09/18/06
20CNG-609	1J9VM4L9X6C172009	CNG	Johnston 4000	08/29/06
20CNG-610	1J9VM4L966C172010	CNG	Johnston 4000	08/28/06

Figure 3: Pilot Study Sanitation Districts & Vehicles

District	Vehicles
Brooklyn North 4	20CNG-601; 20CNG-602; 20CNG-605; 20CNG-609
Queens West 2	20CNG-607; 20CNG-608
Queens West 4	20CNG-604; 20CNG-606
Queens West 5	20CNG-603; 20CNG-610

Figure 4: Diesel fuel powered Street Sweepers used for comparison

Vehicle	VIN #	Fuel	Make / Model	In-Service date
20AY-039	1J9VM4LD26C172039	Diesel	Johnston 4000	06/02/06
20AY-040	1J9VM4LD96C172040	Diesel	Johnston 4000	05/25/06
20AY-041	1J9VM4LD06C172041	Diesel	Johnston 4000	05/25/06
20AY-042	1J9VM4LD26C172042	Diesel	Johnston 4000	06/08/06
20AY-043	1J9VM4LD46C172043	Diesel	Johnston 4000	07/18/06
20AY-044	1J9VM4LD66C172044	Diesel	Johnston 4000	06/12/06
20AY-045	1J9VM4LD86C172045	Diesel	Johnston 4000	06/16/06
20AY-046	1J9VM4LDX6C172046	Diesel	Johnston 4000	12/08/06
20AY-047	1J9VM4LD16C172047	Diesel	Johnston 4000	12/19/06
20AY-048	1J9VM4LD36C172048	Diesel	Johnston 4000	12/08/06

DSNY's alternative fuel street sweepers were tested for operability and reliability and their performance was compared to the performance of conventional diesel sweepers (see Figure 5). Their days in service were tracked and compared to their "down" incidents (i.e., incidents of required repairs) over the period from their in-service date through January 1, 2008. Each CNG sweeper was in service for between 431 and 493 days; the overall average was about 477 days of service. Each diesel sweeper was in service for between 377 and 585 days; the overall average was about 513 days of service. The CNG sweepers each experienced at least nine down incidents, with a high of 20 incidents and an average of 13 incidents; in comparison, diesel

sweepers had at least two down incidents, with a high of 19 incidents and an average of 9 incidents. The CNG sweepers' down incidents amounted to between 27 and 125 days out of service, with a total of 600 days out of service and an average of 60 days out of service per vehicle; diesel sweepers' down incidents amounted to between seven and 160 days out of service, with a total of 457 days out of service and an average of 45 days out of service per vehicle. The percent of time CNG sweepers spent down ranged from 5.5% to 26%, with an average of about 12%, whereas the percent of time diesel sweepers spent down ranged from 1.8% to 28.4%, with an average of about 8%.

Figure 5: CNG Sweepers Reliability Statistics By District

<b>Brooklyn North 4</b>		<b># Days In-Service</b>	<b># of Down Incidents</b>	<b># of Down Days</b>	<b>% of Down time</b>
20CNG-601	1J9VM4L956C172001	490	12	42	8.5%
20CNG-602	1J9VM4L976C172002	455	11	74	16.2%
20CNG-605	1J9VN4L926C172005	480	11	125	26%
20CNG-609	1J9VM4L9X6C172009	489	9	38	7.7%

<b>Queens West 2</b>		<b># Days In-Service</b>	<b># of Down Incidents</b>	<b># of Down Days</b>	<b>% of Down time</b>
20CNG-607	1J9VM4L966C172007	490	19	51	10.4%
20CNG-608	1J9VM4L986C172008	470	17	62	13.2%

<b>Queens West 4</b>		<b># Days In-Service</b>	<b># of Down Incidents</b>	<b># of Down Days</b>	<b>% of Down time</b>
20CNG-604	1J9VM4L906C172004	431	20	72	16.7%
20CNG-606	1J9VM4L946C172006	487	14	27	5.5%

<b>Queens West 5</b>		<b># Days In-Service</b>	<b># of Down Incidents</b>	<b># of Down Days</b>	<b>% of Down time</b>
20CNG-603	1J9VM4L996C172003	493	11	35	7.1%
20CNG-610	1J9VM4L966C172010	490	9	74	15.1%

<b>Total # Days In-Service</b>	<b>Total # of Down Incidents</b>	<b>Total # of Down Days</b>	<b>Total % of Down time</b>
4775	133	600	12.64%



**Figure 6: Diesel Sweepers Reliability Statistics**

Vehicle	VIN #	# Days In-Service	# of Down Incidents	# of Down Days	% of Down time
20AY-039	1J9VM4LD26C172039	577	9	43	7.5
20AY-040	1J9VM4LD96C172040	585	12	42	7.2
20AY-041	1J9VM4LD06C172041	585	13	44	7.5
20AY-042	1J9VM4LD26C172042	571	7	13	2.3
20AY-043	1J9VM4LD46C172043	531	8	12	2.3
20AY-044	1J9VM4LD66C172044	567	6	95	15.7
20AY-045	1J9VM4LD86C172045	563	19	160	28.4
20AY-046	1J9VM4LDX6C172046	388	10	23	5.9
20AY-047	1J9VM4LD16C172047	377	5	18	4.7
20AY-048	1J9VM4LD36C172048	388	2	7	1.8

Total # Days In-Service	Total # of Down Incidents	Total # of Down Days	Total % of Down time
5132	91	457	8.33

### **III. Sanitation Vehicles**

DSNY currently owns 26 dedicated CNG sanitation collection trucks (see Figure 7). This is an older fleet (2001-2003 vintage) that has been problematic. CNG-fueled trucks are longer than conventional sanitation vehicles, preventing them from accessing narrower streets because of their wider turning radius.<sup>8</sup> DSNY ordered 10 new collection trucks from Crane Carrier Corporation equipped with the new generation of the Cummins L-gas CNG engines to replace 10 of the oldest trucks in the fleet. DSNY expects delivery in 2008. Additionally, DSNY purchased one front-loading Crane Carrier Corporation collection truck equipped with a Cummins L-gas CNG engine; DSNY expects delivery in 2008. The total number of CNG sanitation collection vehicles in DSNY's fleet will be 27 by year-end.

Under a federal consent order, DSNY has built a fully-operational, heavy-duty vehicle CNG fueling station in Woodside, Queens, at a cost of approximately \$2,950,000.<sup>9</sup> This station went into service in May 2007 and provides better fueling times and increased efficiency of the CNG vehicle fleet.

<sup>8</sup> Testimony of DSNY Assistant Commissioner Rocco DiRico to City Council Committee on Environmental Protection (September 23, 2004).

<sup>9</sup> This project was undertaken as part of a settlement of a lawsuit brought against the City and the New York City Department of Sanitation by the United States for violations of the Clean Air Act. *United States v. City of New York*, 99 Civ. 2207 (LAK) (S.D.N.Y.).

Figure 7: DSNY's CNG Sanitation Trucks<sup>10</sup>

Vehicle	VIN #	Vehicle Type	Make / Model	Fuel
25CNG-301	1M2AC12CX1M005222	Collection truck	Mack LE 613	CNG
25CNG-302	1M2AC12C51M005225	Collection truck	Mack LE 613	CNG
25CNG-303	1M2AC12C31M005224	Collection truck	Mack LE 613	CNG
25CNG-304	1M2AC12C51M005225	Collection truck	Mack LE 613	CNG
25CNG-305	1M2AC12C71M005226	Collection truck	Mack LE 613	CNG
25CNG-306	1M2AC12C91M005227	Collection truck	Mack LE 613	CNG
25CNG-307	1M2AC12C01M005228	Collection truck	Mack LE 613	CNG
25CNG-308	1M2AC12C21M005229	Collection truck	Mack LE 613	CNG
25CNG-309	1M2AC12C91M005230	Collection truck	Mack LE 613	CNG
25CNG-310	1M2AC12C01M005231	Collection truck	Mack LE 613	CNG
25CNG-401	1M2AC07C03M008004	Collection truck	Mack LE 613	CNG
25CNG-402	1M2AC12C23M008005	Collection truck	Mack LE 613	CNG
25CNG-403	1M2AC12C43M008006	Collection truck	Mack LE 613	CNG
25CNG-404	1M2AC12C63M008007	Collection truck	Mack LE 613	CNG
25CNG-405	1M2AC12C83M008008	Collection truck	Mack LE 613	CNG
25CNG-406	1M2AC12CX3M008009	Collection truck	Mack LE 613	CNG
25CNG-407	1M2AC12C63M008010	Collection truck	Mack LE 613	CNG
25CNG-408	1M2AC12C03M008011	Collection truck	Mack LE 613	CNG
25CNG-409	1M2AC12CX3M008002	Collection truck	Mack LE 613	CNG
25CNG-410	1M2AC12C13M008013	Collection truck	Mack LE 613	CNG
25CNG-411	1M2AC12C33M008014	Collection truck	Mack LE 613	CNG
25CNG-412	1M2AC12C53M008015	Collection truck	Mack LE 613	CNG
25CNG-413	1M2AC12C73M008016	Collection truck	Mack LE 613	CNG
25CNG-414	1M2AC12C93M008017	Collection truck	Mack LE 613	CNG
25CNG-415	1M2AC12C93M008017	Collection truck	Mack LE 613	CNG
25CNG-416	1M2AC12C23M008019	Collection truck	Mack LE 613	CNG

DSNY is further developing its clean air efforts by implementing a biodiesel pilot on a small portion of the fleet and participating in a national Hybrid Truck Working Group<sup>11</sup> to accelerate the commercial availability of hybrid-electric and hybrid-hydraulic sanitation vehicles. The working group issued a request for proposals for test vehicles in the first quarter of 2007. DSNY awarded the contract to Crane Carrier Corporation in order to build three hybrid electric diesel rear-loading refuse trucks. DSNY expects delivery by the first quarter of 2009. DSNY also initiated a biodiesel (B5) pilot in one district location (South Bronx) with a seven month trial from August 2006 to February 2007 utilizing 5% biodiesel and 95% ultra low sulfur diesel (ULSD). The B5 pilot resulted in no change in vehicle performance, no operator or mechanic complaints, no increase in down rate, and good winter operability. Based on these positive results, in March 2007, DSNY launched a B5 initiative citywide on all diesel-powered

<sup>10</sup> Vehicles 25CNG-301, -302, -303, -304, -305, -306, -307, -308, and -309 were purchased as part of a settlement of a lawsuit brought against the City and the New York City Department of Sanitation by the United States for violations of the Clean Air Act. *United States v. City of New York*, 99 Civ. 2207 (LAK) (S.D.N.Y.).

<sup>11</sup> See <http://www.weststart.org/programs/htuf/?p=programs>.

equipment (on-highway and off-highway); to date, DSNY consumed 4,884,054 B5 gallons. In August 2007, DSNY implemented its B20 pilot in one district location (Queens 6) and testing is on-going; to date, DSNY consumed 29,619 B20 gallons. DSNY intends to conduct further studies on the economic and operational feasibility of incorporating more alternative fuel sanitation vehicles into its fleet.

#### **IV. Conclusions**

It is too early to tell whether CNG or other alternative fuel street sweepers and sanitation vehicles can meet the reliability standards necessary for efficient operations. The preliminary data gathered after more than one year in service indicates that diesel street sweepers have a better report card. At this time, it would be premature to make any final conclusions regarding the mechanical reliability and operational feasibility of alternative fuel street sweepers and sanitation vehicles. DSNY will continue to study its current fleet of alternative fuel sweepers and sanitation vehicles, while participating in research and development of new technologies.