Trash and the City

TOWARD A CLEANER, MORE EQUITABLE WASTE TRANSFER SYSTEM IN MANHATTAN

EXECUTIVE SUMMARY

environmental defense
finding the ways that work

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ENVIRONMENTAL DEFENSE
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Cover photo: Getty Images.

Our mission
Environmental Defense is dedicated to protecting the environmental rights of all people, including the right to clean air, clean water, healthy food and flourishing ecosystems. Guided by science, we work to create practical solutions that win lasting political, economic and social support because they are nonpartisan, cost-effective and fair.

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Executive summary

New York City depends on trucks to take out the trash. In fact, diesel trucks carry Manhattan's garbage 7.8 million miles every year. That's the equivalent of driving more than 312 times around the earth. In addition to garbage, each of those trucks carries huge health and economic costs: They worsen traffic congestion, add to noise and increase air pollution, exacerbating the city's already severe asthma problem. Many of these impacts hit hardest in economically disadvantaged communities, but every New Yorker suffers from the overall impact on our city's quality of life.

With its focus on Manhattan's commercial and residential solid waste, this report shows how a better, more modern system of handling the city's garbage can cut the truck miles driven by more than half, reducing congestion and providing significant air quality and public health improvements. The solutions presented here also will maximize recycling and reduce impacts on economically disadvantaged neighborhoods.

To achieve these gains, the city needs to reopen its waterfront, including in Manhattan, for marine transfer stations and recycling centers. The time to act is now. This year, the Department of Sanitation of New York (DSNY) will create a new 20-year plan for handling the city's garbage. The city is assembling ideas for how to move toward a rail- and barge-based transfer system for residential waste and to the extent possible moving commercial waste in the same way. This approach makes it possible to think what once was inconceivable: Manhattan's solid waste can be handled in large part by a clean, safe system of waterfront recycling and transfer stations, reducing the need for trucks that foul the air and clog up neighborhood streets.

Other factors combine to make this the right time to act. The latest science makes clear that diesel contributes to asthma attacks, heart disease, cancer and other illnesses. Fortunately, cleaner fuels and retrofit technologies make it possible to significantly reduce pollution from heavy-duty diesel trucks. Indeed, DSNY already has in place several pilot projects to reduce truck pollution.

In addition, New York's waterfront is undergoing a renaissance, making this the right time to plan for the mix of water-dependent uses that will need to emerge side by side. Moreover, the city has reinstated residential recycling and is creating new markets for recycled materials. Smart planning now could open these markets to the commercial waste stream, which today lacks effective recycling capacity.

Finally, waste transfer station technology and design has improved. These improvements, already implemented in other cities, could reduce the footprint of waterfront transfer stations, including eliminating queuing and odor. With strong community leadership and involvement, the city can design a forward-looking solid waste system that will improve life for every New Yorker.

The problem: An inefficient waste transfer system

New York City's waste transfer system creates three negative byproducts: traffic congestion, air pollution and environmental injustice. The root cause of all three problems is the city's reliance on trucks to move waste. Our analysis shows that moving residential waste by ship and train instead could increase efficiency and reduce these burdens by 70–80%. A similar shift in the means of transporting commercial solid waste could yield a 15–20% reduction in vehicle miles traveled (VMT). Because New York is an island city, it makes sense to consider relying on its proximity to the water to move waste more efficiently.

This report focuses on Manhattan's waste because Manhattan, unlike the other boroughs, generates about 2.5 times more commercial than residential waste. In addition, its commercial waste represents at least 50% of the total generated in the

Waste travels: a little salad container goes a long way

Imagine yourself having lunch at a desk in a lower Manhattan office. You finish the salad you bought at the corner deli and toss the plastic container into the trashcan behind your desk. You probably forget about the container after that, but it's about to embark on a remarkable journey. After dark, it gets taken down to the basement of your building, where it is mixed with paper, metal, food and other waste. Since, with the exception of paper and cardboard, there's essentially no commercial-waste recycling in New York, your container is destined for a landfill. How will it get there? First, a large, aging diesel truck comes to pick it up. That truck spews out of its tailpipe asthma-triggering fine particle pollution of the sort that today clogs air in many American cities. On the same block, three similar, half-empty trucks pick up trash at nearby office buildings, because New York lacks a system to coordinate commercial pick-ups in the same area. The trucks block the street, engines idling.

Once it has completed its collection, the truck moves up Sixth Avenue through Midtown, Clinton and the Upper West Side. It crosses Central Park and Harlem to head over the Third Avenue Bridge to the South Bronx. There, it joins hundreds of other trucks like it, chugging past schools, homes and parks. Finally, it pulls up in front of a land-based waste transfer station in Hunt's Point, a community that already bears heavy pollution burdens from many other industrial and commercial uses. The station sits just two blocks from apartment buildings. The truck carrying your container is far from the first to arrive that day, so it idles out in the street, waiting in line sometimes overnight and spewing out dangerous diesel particles not far from family homes. The health impacts of such pollution are evident: 30% of the students in the Hunt's Point schools have asthma.

When the truck finally gets into the walled-off lot, it dumps its load onto a huge pile of garbage that sits just feet from the sidewalk. It then retraces its journey back to Manhattan. Another truck, this time an 18-wheeler, picks up a load from the large pile and drives your salad container through the Bronx, across the George Washington Bridge into New Jersey, and then 600 miles to a landfill in West Virginia.

Seems like a lot for a little salad container, doesn't it? Now consider an alternative scenario: Your salad container is picked up by a clean-fuel truck, retrofitted with advanced filters that capture up to 90% of harmful pollutants. That truck drives fewer than 20 minutes to a state-of the-art transfer center on the nearby waterfront. Once it arrives, it moves quickly off the street into a facility that has been designed to store trucks without idling. Soon the truck dumps its load of garbage directly into a waiting barge. A group of school kids watches from the on-site observation deck of this clean facility. The barge slips off across the harbor, either to a recycling facility or to a rail yard on the opposite shore, where the container is either recycled or, if recycling is not yet available for that grade of plastic, loaded onto a train and shipped to a landfill. No trucks idle in city streets, and the region is spared the hordes of trucks spewing pollution that now cart garbage across all boroughs and neighborhoods.

entire city.[1] A 15–20% reduction in the number of miles traveled by Manhattan's commercial waste vehicles translates into more than half a million miles—a significant number. Switching to a marine-based system also would reduce by more than 1 million the miles traveled by long-haul vehicles within New York City limits.

TRAFFIC CONGESTION

Congestion is a major problem for New York, with traffic moving by some estimates up to 40% slower, on average, than it would under free-flow conditions.[2] Waste trucks constitute a significant part of the problem. In a year, DSNY and private collection trucks travel a total of 6.6 million miles to take Manhattan's residential and commercial waste to its intermediary destinations: waste transfer stations located mostly in South Bronx, northern Brooklyn, or Newark and Elizabeth, New Jersey.

Figure ES-1 shows how we measured the distance that residential waste collection trucks move in and out of Manhattan. The different colors identify the communities with their corresponding garages and waste sheds outside Manhattan. In the magnified sections, the dotted lines show the paths taken by trucks to and from the several intermediate destinations. For purposes of simplification, we measured only the distance from the community district garage to the center of the community district. Within the districts trucks follow numerous routes, and travel on these routes is not at all continuous because waste collection requires stop-and-go movement. Our analysis has not measured the distance traveled by trucks while collecting waste.

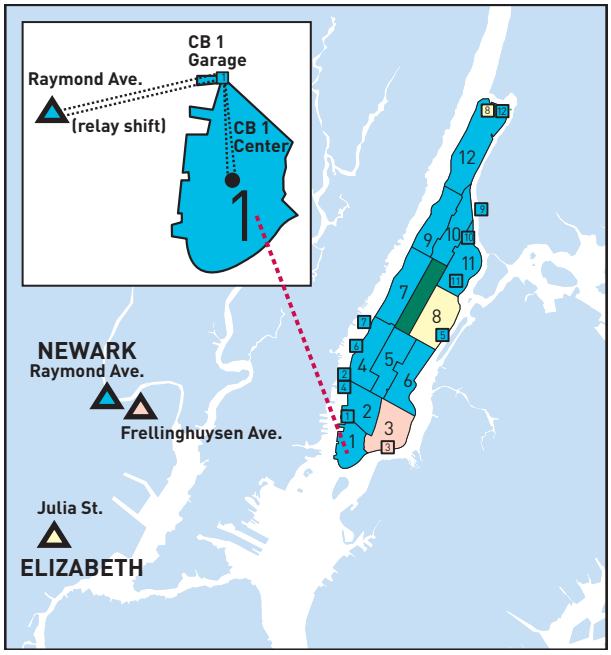
After collecting waste in the assigned district, the truck goes back to the garage for a relay shift. The next shift driver then takes the waste to its final destination (in this case, New Jersey transfer stations or incinerator). In Manhattan under the current system, 73% of the trucks use these relay shifts. This significantly increases the number

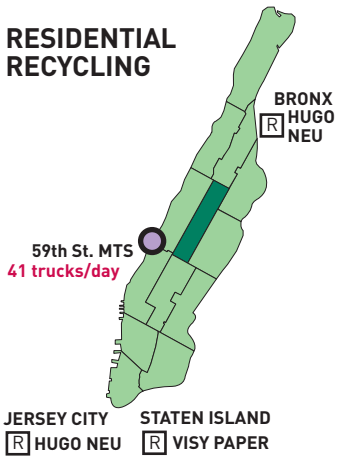
FIGURE ES-1

Current system: residential waste

DOS trucks to truck-based transfer stations.

- Existing Marine Transfer Station
- Truck-based tipping facility in current residential and commercial scenarios
- [7] DSNY garage for residential collecting trucks
- [R] Recycling facility
- Assumed garages for commercial trucks
- 7 Community District (color-coded to the transfer stations that waste goes to)





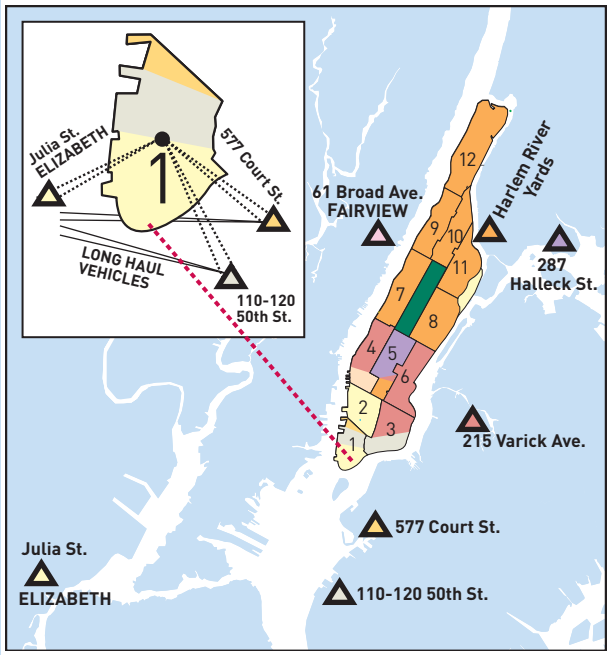
All paper goes by barge from 59th Street to Visy Paper. All metal, glass, plastic travels by truck to Hugo Neu facilities.

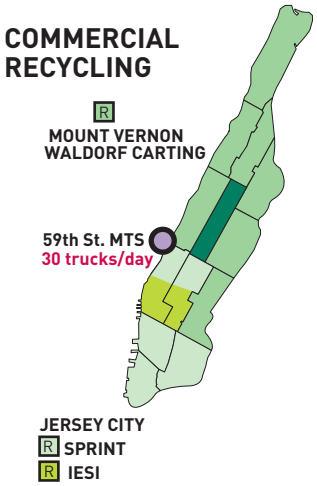
FIGURE ES-2

Current system: commercial waste

Commercial trucks to truck-based transfer stations.

- Existing Marine Transfer Station
- Truck-based tipping facility in current residential and commercial scenarios
- 7 DSNY garage for residential collecting trucks
- R Recycling facility
- Assumed garages for commercial trucks
- 7 Community District (color-coded to the transfer stations that waste goes to)





Paper travels by truck to outer-borough paper facilities or by truck to 59th St. and then by barge to Visy Paper. The trucks that go to 59th St. from CB 4 and CB 5 garage at Varick Ave. All trucks going to outer-borough paper facilities garage at those facilities as well. Color-coding matches the CBs with the facility (or facilities) that the paper goes to.

of miles each truck travels. All Manhattan residential paper-recycling trucks take their loads to one marine transfer station at 59th Street. Metal, glass and plastic recyclables are transported by truck to processing facilities in the city or Northern New Jersey.

Figure ES-2 shows the routes of commercial haulers. They contribute to the same congestion problems that trucks carrying residential waste do, but unlike DSNY trucks, the private truck fleets used for moving commercial waste often consist of older, bigger, more polluting trucks, increasing their negative impact. In addition, since commercial pick-ups are not coordinated, several trucks may serve different clients on the same block, exacerbating traffic congestion with stop-and-go movement and worsening pollution.

We assume in our analysis that trucks garage close to the land-based transfer stations that they use as tipping facilities. This was done for simplification purposes because it proved very difficult to get information about garages from the many private collection companies (over two hundred operate in the city). In fact, private collection trucks garage all over the city and even in surrounding counties. For this reason, our estimate that switching to a rail- and ship-based system would result in a 15–20% reduction in vehicle miles traveled (VMT) is conservative.

The total VMT associated with the current system is approximately 7.8 million. Table ES-1 shows the current VMT associated with the transport of different types of solid waste described in Figures ES-1 and ES-2.

HEALTH THREATENING AIR POLLUTION

New York City has serious air quality problems. The area's smog and soot pollution levels violate federal standards, creating a health hazard for residents. Diesel trucks, including waste trucks, are a major source of this pollution. Diesel pollution also

TABLE ES-1

Vehicle miles traveled (VMT) under the current waste transfer system associated with Manhattan's waste

	Residential VMT	Commercial VMT (collection only)	Commercial VMT (long-haul until reaching NJ)	Total VMT
Refuse	3,214,511	1,640,976	1,158,762	6,014,249
Paper	129,396	1,466,968	0	1,596,364
Metals, glass and plastic	173,718	0	0	173,718
Total	**3,517,625**	**3,107,944**	**1,158,762**	**7,784,331**

Source: Environmental Defense VMT estimates based on DSNY waste data and waste generation estimates based on employment data.

contains a toxic cocktail of more than 40 carcinogens. According to Environmental Protection Agency data[3] over 85% of the city's air cancer risk comes from the transportation sector, and diesel emissions are responsible for a large part of that impact.

Diesel exhaust releases fine, sooty particles that lodge deep in the lungs. Long-term exposure to this pollution results in increased hospital admissions for pulmonary and cardiovascular disease.[4] The health effects are often worse for asthmatics—particularly children—and diabetics.[5] About one in eight New Yorkers suffers from asthma, including one in four school age children in some East Harlem and South Bronx neighborhoods.

Waste collection trucks produce more than 7,000 pounds of small particles annually, a serious burden on children and an unnecessary contribution to the asthma epidemic facing New York City (see Table ES-2). Since the emission rates provided in Table ES-2 do not take into account the long periods when trucks are idling or stuck in traffic, the real numbers could be much higher. Various environmental agencies have found that in congested conditions, or while idling, cars and trucks produce significantly more volatile organic compounds and nitrogen oxides than they would at faster speeds.[6] Both pollutants contribute to smog, a particularly dire problem for New York City and a trigger of asthma.

ENVIRONMENTAL JUSTICE CONCERNS

The current waste transfer system ensures that the traffic congestion and health impacts are borne disproportionately by socio-economically disadvantaged

TABLE ES-2

Annual emissions from the current Manhattan waste transfer system

Pollutant	Tons produced annually
Volatile organic compounds	8.83
Particulate matter	3.66
Carbon monoxide	62.53
Nitrogen oxides	130.94
Sulfur oxides	3.66

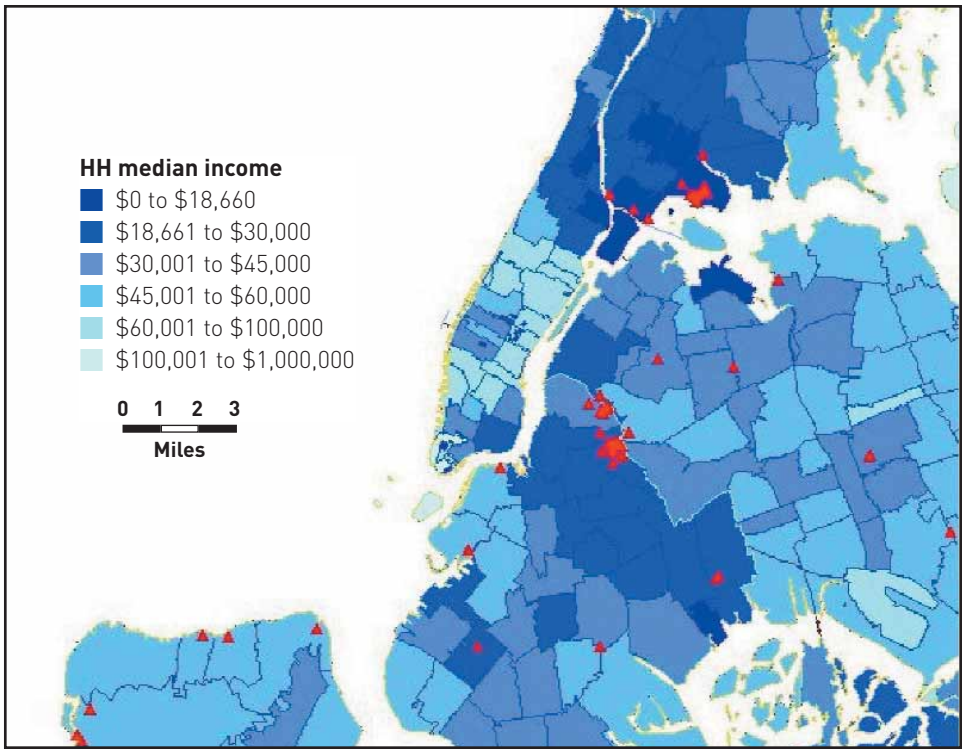
Source: Environmental Defense emissions estimates based on VMT data.

FIGURE ES-3

Distribution of land-based waste transfer stations in New York City

Most truck-dependent, land-based transfer stations (red triangles) are located in low-income communities.

Source: Environmental Defense (map), DSNY New York City Comprehensive Commercial Waste Management Study, Preliminary Report, June 2002 (data)



communities in the South Bronx and Brooklyn. Truck-dependent, land-based waste transfer stations are concentrated in four of the 59 community districts of New York City, meaning a small percentage of the population lives with 80% of the city's waste transfer stations (see Figure ES-3).

To neighborhood residents, the stations are noisy, putrid, dust-billowing eyesores that not only are unsightly but also threaten children's health. Waste station facades are designed with little concern for aesthetics or harmony with their surroundings and are accompanied by long truck queues. These problems result partly from the circumstances under which the stations were constructed. They originated as makeshift solutions devised after the Fresh Kills landfill closed its doors to commercial waste.

The solution: Scenarios for a more efficient waste transfer system

In this report, Environmental Defense has developed a solution to the city's waste transfer woes. Our solution has four goals:

- Closing the truck-dependent, land-based commercial putrescible waste facilities in the South Bronx and northern Brooklyn and converting those lands to higher value uses that meet current environmental standards;
- Minimizing truck VMT by designing a commercial and residential waste system in Manhattan that relies on water- and rail-based transfer facilities;
- Expanding commercial and residential waste recycling opportunities;

- Reducing the community impacts of transfer facilities with an emphasis on clean truck technologies and fuels, elimination of on-street truck queuing and introduction of community design concepts.

This report outlines ten waste scenarios using a combination of seven marine waste transfer points, five of them in Manhattan and two in Brooklyn, and one rail-export facility in the Bronx, which would minimize truck traffic.[7] The Iowa Department of Transportation estimates that one barge can carry as much refuse as 15 Jumbo Hopper Cars or 58 eighteen-wheeler trucks. The locations recommended in the report are:

- 59th Street at Manhattan's West Side
- 91st Street at Manhattan's East Side
- 135th Street at Manhattan's West Side
- Gansevoort Peninsula at 14th St. on Manhattan's West Side
- East River at Pier 42, just above the Manhattan Bridge on Manhattan's East Side
- Harlem River Yard in the South Bronx
- Greenpoint, Brooklyn
- Hamilton Avenue, Brooklyn

Top: Waste transfer stations are an eyesore, and a health hazard, to nearby communities. **Bottom:** Trucks line up outside a waste transfer station in the South Bronx, spewing pollution as they idle, sometimes for hours or even overnight.

We recommend the last three locations outside the borough of Manhattan because they represent the best opportunities to reduce vehicle miles traveled for certain areas within Manhattan. Their use would not respect the concept of borough self-sufficiency, adopted during the Giuliani administration and embraced by many community groups, in particular the ones outside the borough of Manhattan. However, the current system as it is, and for many years Manhattan's commercial waste system in particular, does not respect this concept either, and places an extensive burden on Bronx and Brooklyn communities. If we are serious about planning for a system that could responsibly handle Manhattan's huge amount of residential and commercial waste, it is appropriate to consider some scenarios that take advantage of barge- or rail-based transfer facilities just outside Manhattan, especially if they reduce VMT and air pollution. It is important to note that we recommend use of these facilities in these areas only if land-based, putrescible waste transfer stations in the same neighborhoods are closed as a result.

RAMON J. CRUZ

RAMON J. CRUZ

TABLE ES-3

Ten scenarios for a more efficient waste transfer system in Manhattan

Scenario	Features
(1)	Encompasses the mayor's long-term plan for residential waste that consists of using the three existing marine transfer stations (MTS) at 59th, 91st, 135th. Unlike the mayor's plan, however, it also transfers Manhattan's commercial waste through these same three MTSs.
(2)	Includes the marine transfer stations from (1), plus a new MTS at the East River.
(3)	Includes the marine transfer stations from (1), plus a new MTS at the Gansevoort Peninsula.
(4)	Combines (2) and (3): the three marine transfer stations from the mayor's plan, plus the two new ones.
(5)	Includes the MTSs from (1), and adds a proposed MTS at the Gansevoort Peninsula that will only handle recyclables.
(6)	Adds an expanded commercial recycling program to Scenario 4.
(7)	Adds three outer-borough facilities, the Harlem River Yard, Greenpoint and Hamilton to (1). As with scenarios (6), (8), (9) and (10), this includes an expanded commercial recycling program.
(8)	Adds the three outer-borough facilities described in (7) to the marine transfer stations described in (4).
(9)	Assumes that the 59th and 91st Street marine transfer stations will be reopened, but that the 135th Street MTS will remain closed, and that the MTS proposed for the East River and Gansevoort, along with the three outer-borough facilities, will be built.
(10)	Uses all eight facilities described in (8) with the Gansevoort Peninsula dedicated as a recycling processing and education center as described in (5).

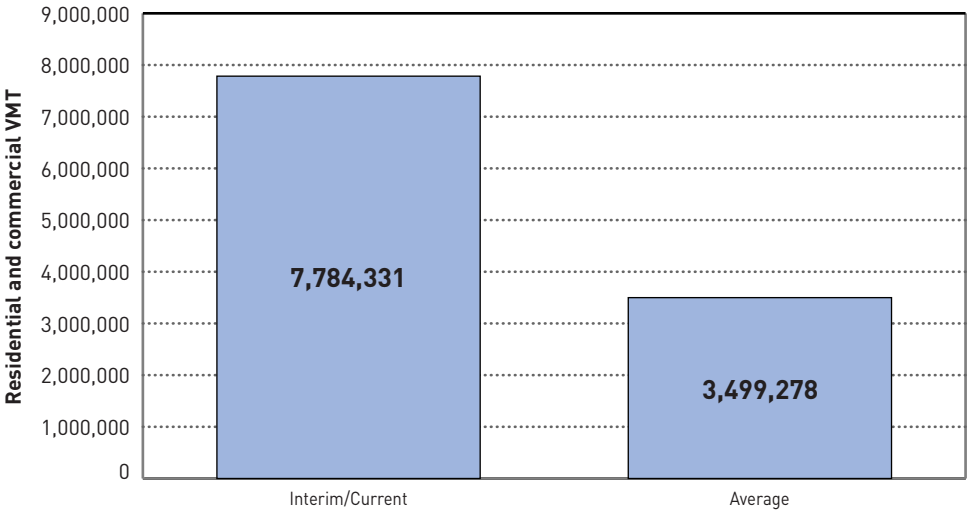
Our ten scenarios, described in Table ES-3 combine some or all of these eight facilities in various configurations in order to maximize VMT reduction. We understand that there might be more possibilities; however, the goal is to show that there are lots of alternatives to the current system that take into consideration different factors. Each scenario suggests a more efficient waste transfer system that reduces the VMT by DSNY and private trucks. Scenarios 6–10 assume a more ambitious commercial recycling program than the current program and therefore use different tonnages of refuse and recyclables.

REDUCING VEHICLES MILES TRAVELED

By adding MTSs closer to midtown and downtown Manhattan, where lots of waste is generated, the city can significantly cut the miles garbage trucks travel. Figure ES-4 compares annual combined residential and commercial VMT in the current system to the average annual VMT of the ten scenarios that we examine. Just switching to a marine- or rail-based system will cut VMT by more than half, from 7.8 to 3.5 million.

FIGURE ES-4

Benefits from different scenarios compared to current system



The mayor's plan, as modified to move Manhattan's commercial waste through MTS, (Scenario 1) involves reopening the city's three existing marine transfer stations. This would reduce vehicle miles traveled by 938,487 miles. But VMTs could be reduced 10 to 20% beyond that amount by adding more MTSs, with a more equitable distribution of the facilities. Reductions in VMT can be even greater if the city restructures its current system of garages and collection and disposal routes. The potential increased reductions in VMTs that could be achieved if alternatives to the mayor's plan were adopted are shown in Figure ES-5.

For example, in one scenario, Scenario 10 as described in Table ES-3 and shown in Figure ES-6 and ES-7, eight different facilities are used to transfer Manhattan's

FIGURE ES-5

Residential waste collection VMT reductions relative to Mayor's plan

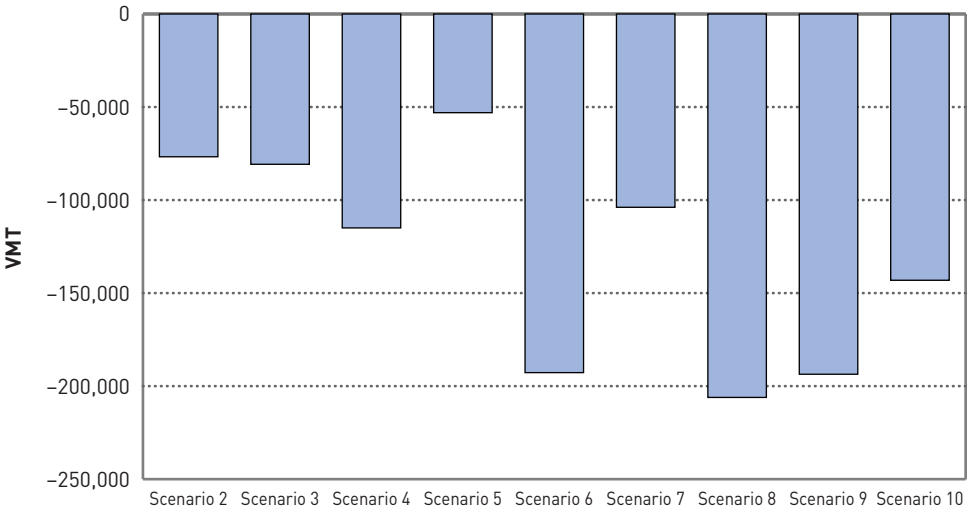
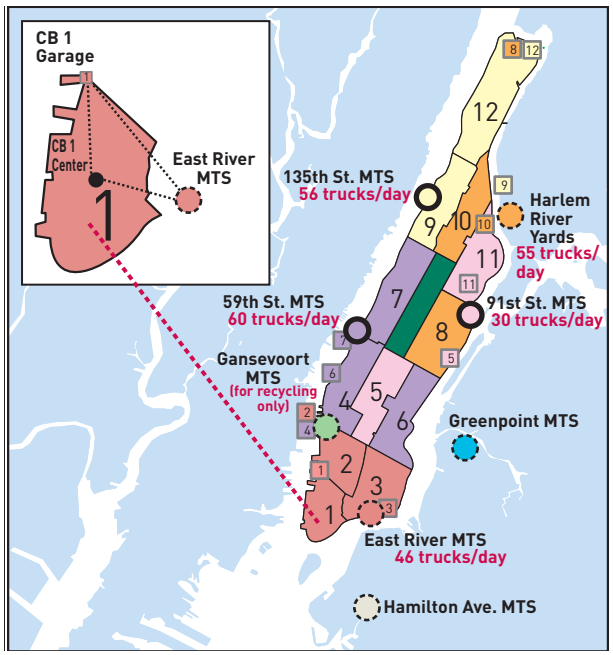


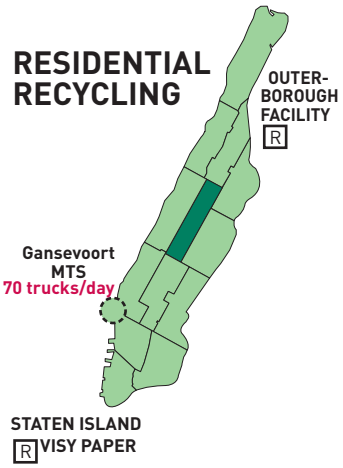
FIGURE ES-6

Scenario 10: residential waste

Three MTSs (59th, 91st, 135th), East River, three outer-borough facilities, and Gansevoort (for recycling.

- Existing Marine Transfer Station
- Potential Marine/Rail Transfer Station for Manhattan's waste handling
- Truck-based tipping facility in current residential and commercial scenarios
- 7 DSNY garage for residential collecting trucks
- R Recycling facility
- Assumed garages for commercial trucks
- 7 Community District (color-coded to the transfer stations that waste goes to)





All paper and MGP travels by barge from Gansevoort to Visy Paper and an outer-borough facility.

waste.[8] These figures, ES-6 and ES-7, also show the routes taken for Manhattan's residential and commercial recyclables. In this case, the Gansevoort MTS is used only for the transfer of paper and metal, glass and paper (MGP) recyclables. Using the MTS at Gansevoort to accept recyclables from both residential and commercial sectors would allow the relocation of the Visy paper barge from the 59th Street MTS to Gansevoort and would then free up the 59th Street MTS to accept refuse from the major commercial waste generation area of Midtown.

From the Gansevoort MTS, recyclable paper would be barged to the Visy paper plant on Staten Island, and MGP recyclables would be barged to processing facilities outside the borough of Manhattan with barge access, such as one of Hugo Neu's existing facility or a new waterfront facility.

Table ES-4 summarizes the VMT information for the Manhattan residential and commercial waste and recyclables system as reflected in Scenario 10.

IMPROVING AIR QUALITY WITH CLEANER TRUCKS

EPA regulations require trucks to use ultra low-sulfur diesel fuel by mid-2006. By 2007, particulate matter (PM) and NO_x standards will kick in, further restricting

TABLE ES-4

Vehicle miles traveled in Manhattan under Scenario 10

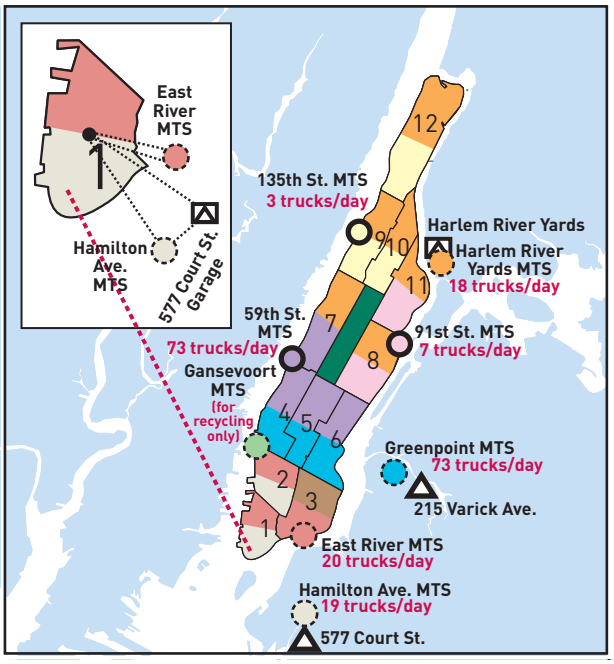
	Residential VMT	Commercial VMT	Total VMT
Refuse	545,072	510,061	1,055,133
Paper	143,043	2,068,510	2,211,553
Metals, glass, and plastic	107,032	245,688	352,720
Total	**795,382**	**2,824,258**	**3,619,640**

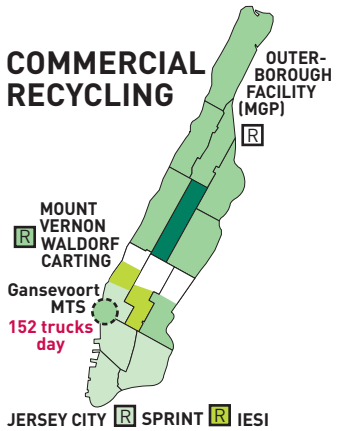
FIGURE ES-7

Scenario 10: commercial waste

with expanded commercial recycling program

- Existing Marine Transfer Station
- Potential Marine/Rail Transfer Station for Manhattan's waste handling
- Truck-based tipping facility in current residential and commercial scenarios
- DSNY garage for residential collecting trucks
- Recycling facility
- Assumed garages for commercial trucks
- 7 Community District (color-coded to the transfer stations that waste goes to)





Paper travels by truck to outer-borough paper facilities or by truck to Gansevoort and then by barge to Visy Paper. The trucks that go to Gansevoort from CB 4, 5, and 6 garage at Varick Ave. All trucks going to outer-borough paper facilities garage at those facilities as well. All MGP travels by truck to Gansevoort, then by barge to an outer-borough facility. Color-coding matches the CBs with the facility (or facilities) that the paper goes to.

emissions from new trucks. Cost-effective opportunities are already available to reduce diesel emissions from existing trucks, as well as new trucks, in anticipation of the new regulations, with immediate benefits for congested, polluted areas. Ultra low-sulfur diesel fuel, when used in conjunction with aggressive after-treatment technologies like diesel particulate filters, can reduce NO_x, hydrocarbon and carbon monoxide emissions by 60%, and diesel particulate matter by 90%.

In order to reduce pollution further, DSNY and private waste collection fleets should require drivers to minimize idling. They also should improve maintenance and inspection to ensure that equipment is in good repair and that the emissions-reduction technologies are working.[9] City contracts with private fleets should require the fleet owners to retire or retrofit old equipment and use cleaner fuels.[10] In addition, truck routes and collections schedules should take advantage of state-of-the-art positioning technology to minimize queuing on open streets close to transfer facilities.

MAKING MARINE TRANSFER STATIONS COMMUNITY ASSETS

Contemporary waste transfer stations offer potential important environmental benefits and have gained acceptance in communities that were involved in their design and construction. One example is the 27th Avenue Waste Recycling and Transfer Station in Phoenix, Arizona, designed by Michael Singer, Inc. That project, designed with community participation, incorporated a state-of-the-art facility that harmonizes with its landscape. The New York Times chose it as one of the top ten design events of 1993. The station also convinced other communities, which were previously opposed, to accept such facilities.

Obviously, the geography of Manhattan differs vastly from that of Phoenix, but the design principles remain the same. Waste transfer stations should be designed

in partnership with surrounding communities. The design should be aesthetically pleasing and should minimize noise and air pollution impacts. Environmental Defense has been working with Michael Singer, Inc., to develop concepts and guidelines for generic marine transfer station designs. These concepts will be presented in a subsequent report.

To improve community attitudes toward marine transfer stations, community needs and preferences must be taken into account. Past reasons for community dissatisfaction with MTSs, such as vehicle queuing and bad odors, should be candidly recognized and used as the guide. Fortunately, contemporary MTS designs offer an opportunity to address these concerns. State-of-the-art MTS capabilities include improved truck access, odor control, efficient water and energy usage, better and longer ramps, and use of staging technologies to avoid street queuing. Also, providing garaging and maintenance options on site or close to the MTS facilities will reduce VMT and release valuable property around the city where current garages are located.

New marine transfer stations in New York could be community assets. The facilities might include an educational component that allows the public to learn what happens to garbage and recyclables once the waste leaves their homes and workplaces. The stations also could enrich communities by providing an opportunity to improve the surrounding waterfront. However, such advances will require transparent planning on the part of city government and DSNY involving affected communities.

Recommendations

Now is the time to act. The traffic congestion, air pollution and environmental injustices created by the current system demand that leaders consider serious reforms to the way commercial and residential solid waste is moved in New York. A network of new and renovated, state-of-the-art marine transfer stations could solve many of the system's current problems.

The city has been receiving comments on the scoping document of its residential *Solid Waste Management Plan* (SWMP), its draft environmental impact statement is due out for public comment in the early fall, and the final SWMP is scheduled to be released before the end of 2004. The SWMP includes a commercial waste study, which provides an opportunity to plan for a system that efficiently integrates commercial and residential waste transfer. The process of drafting this plan is crucial. Planners and policymakers should be urged to devise green, community-friendly methods of transporting the city's and, in particular, Manhattan's commercial and residential solid waste.

Air quality and other environmental performance must be placed at the center of the city's solid waste policy and operations, from siting and collection to recycling and disposal facilities. The following recommendations are key steps toward these goals:

1. Integrate commercial and residential solid waste transfer systems into a single marine- and rail-based system. The drafting of the 20-year SWMP is the optimal opportunity to begin this process in the right direction.

2. Cut truck traffic in the residential and commercial collection systems by at least 50%. Further reduce diesel truck pollution through advanced engine retrofit technologies and facility design.

3. Adopt and enforce increasingly stringent environmental standards for all existing, rebuilt and new solid waste facilities. City and state agencies must work together to ensure that standards for new and existing transfer facilities are modified to require state-of-the-art environmental performance measures.

4. Develop a plan for the gradual closure of truck-dependent, land-based putrescible waste transfer stations and their replacement with a marine and rail based system. Neighborhoods with disproportionate impacts from such stations should receive priority attention.

5. Make community representatives and advocates early and active partners in decision-making about siting, design and operation of facilities.

6. Maximize recycling in residential and commercial sectors by expanding MTS capacity for recyclable materials, and study the possibility of dedicating a particular MTS entirely to the transfer of recyclables.

7. Ensure that marine transfer facilities and operations are fully integrated into the city's waterfront revitalization efforts, so that they become positive contributors to plans for increased parks, recreation and education at the water's edge. MTS design should comply with the highest standards for sustainability and efficiency, in order to help achieve clean air, water quality, noise reduction, open space and other community benefits.

Notes

[1] The April 2004 DSNY *Commercial Waste Study* indicates that Manhattan produces 42% of New York City's commercial waste. However, the 1992 Solid Waste Management Plan suggests that Manhattan produces 60%. For the purposes of this study Environmental Defense relied on employment data for the 2002 fiscal year. These data suggest that Manhattan produces at least half of the City's commercial waste.

[2] Schrank, David, and Tim Lomax. 2003. *2003 Urban Mobility Study.* College Station, TX: Texas Transportation Institute.

[3] See www.scorecard.org.

[4] Janssen, N. A. H., Schwartz, J., Zanobetti, A., and H. H. Suh. 2002. "Air conditioning and source-specific particles as modifiers of the effect of PM10 on hospital admissions for heart and lung disease." *Environ. Health Perspect.* 110: 43–49.

[5] Vedal, S., Petkau, J., White, R., and J. Blair. 1998. "Acute effects of ambient inhalable particles in asthmatic and nonasthmatic children." *Am. J. Respir. Crit. Care Med.* 157: 1034–1043. Zanobetti, A., and J. Schwartz. 2001. "Are diabetics more susceptible to the health effects of airborne particles?" *Am. J. Respir. Crit. Care Med.* 164: 831–833.

[6] U.S. Environmental Protection Agency. 1998. *Technical Methods for Analyzing Pricing Measures to Reduce Transportation Emissions.* EPA 231-R-98-006. Available at http://www.epa.gov/otaq/transp/anpricng.pdf.

[7] There are several assumptions we included in this analysis. (a) Hypothetical waste transfer destinations, such as Gansevoort Peninsula or Pier 42 on the East River, which have both involved DSNY operations in the past, were used in the analysis in order to assume potential sites that are outside the marine system as we knew it before the closure of Fresh Kills. Mentioning them in this traffic analysis serve the purpose of providing a physical address for Environmental Defense to measure distance and VMT and not for advocating the use of any of the particular property for waste transfer purposes. (b) The containerization aspect of the mayor's long-term waste export plan is not taken into consideration. Containerization would reduce the throughput capacity of the Manhattan MTSs unless the current footprint is expanded. In order to move the 8,000 tons of waste every day through MTSs their current capacity should be maximized. The containerization stage of the process could be done at an Enclosed Barge Unloading Facility at an area where there is more space available. (c) The final assumption is that we could move these quantities of waste through new MTSs.

[8] See note 7.

[9] Greater enforcement of the city's existing anti-idling laws would help in this regard.

[10] The city has begun to take steps in this direction, for example by introducing some filters and cleaner fuels into sanitation and bus fleets, and by adopting Local Law 77, the first in the country to retrofit heavy diesel construction equipment used in public construction contracts. These are important steps in the right direction. A report published by Environmental Defense in 2004 shows how a rail and barge system also can cut dependence on freight trucks (see www.environmentaldefense.org/go/railfreight). This report shows how to do so for solid waste.

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