

Driving Towards a Sustainable Future



Advanced Energy Group – New York

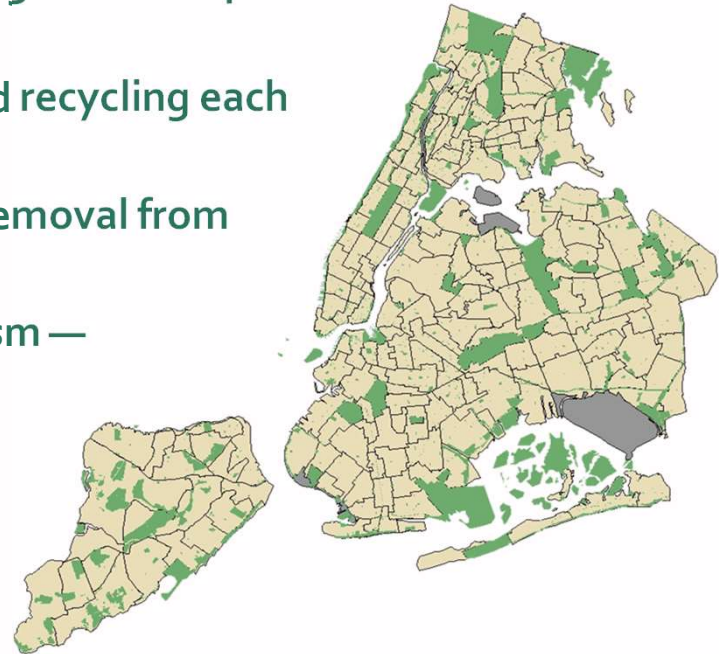
Zerega Avenue EV Planning Session for Key Fleets

January 18, 2023

About DSNY



- The NYC Department of Sanitation is one of the largest municipal refuse fleets in the world.
- DSNY collects about 24 million pounds of trash and recycling each day.
- Efficiently managing solid waste, litter and snow removal from 6,300 miles of streets.
- The Department is also a leader in environmentalism — committing to sending zero waste to landfills.



About DSNY



- **Snow Removal**
- Street Cleaning
- Residential Refuse & Recycling
- Freon Recovery (refrigerators, A/C)
- Special Events Cleanup (parades, etc.)
- Derelict Vehicle Removal (abandoned, stolen)
- Respond to Natural Disasters* (storms, etc.)



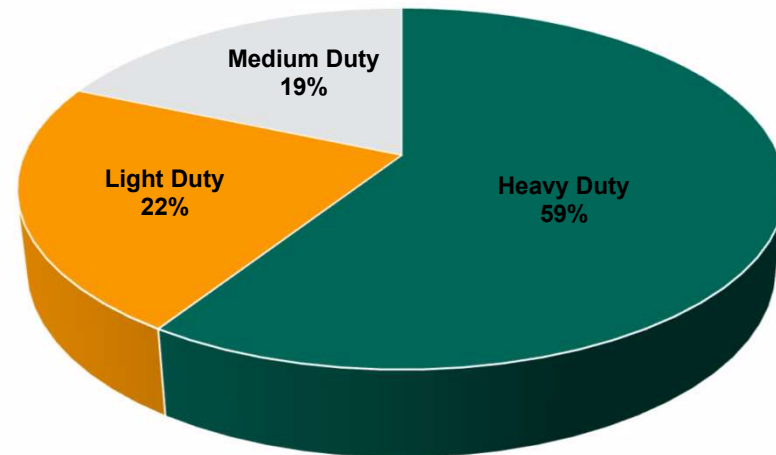
DSNY Fleet



DESCRIPTION	Class	Count
Refuse Collection (single-bin)	H	1,618
Refuse Collection (dual-bin)	H	620
Refuse Collection (front-loading)	H	107
Refuse Collection (other)	H	61
Roll On/Roll Off	H	71
Open Dump Truck	H	79
Front End Loader	H	446
HD Wrecker	H	59
Tilt Body Truck	H	19
Salt Spreader	H	458
Dual Purpose	H	128
Street Sweeper	M	435
Haulster	M	174
Other Vehicles	M	550
CFC	L	20
Passenger Cars	L	394
4 X 4	L	558
Light Trucks & Vans	L	423
Snow Melter	H	31
		<u>6,251</u>

Class Totals

Heavy Duty	3,697
Medium Duty	1,159
Light Duty	1,395



■ Heavy Duty ■ Light Duty ■ Medium Duty

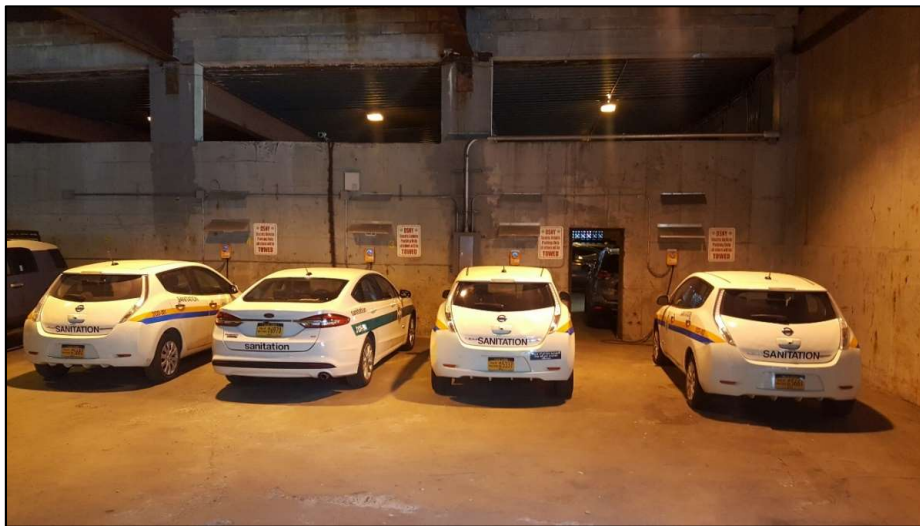


Environmental Fleet Initiatives



- **2021 – Executive Order #90**
 - **All electric non-emergency LDV by 2030**
 - **All electric remaining LDV, all MDV and non-emergency HDV by 2035**
 - **All electric specialized & emergency trucks by 2040 (if an electric option is not available sooner)**
- **2020 – Executive Order #53 (all-electric fleet by 2040)**
- **2015 – OneNYC (80% less fleet GHG by 2035)**

EO #53 & #90



22% of LD Fleet

Plug-in Vehicles	Count
Chevy Bolt	73
Chevy Volt	11
Ford Fusion (Energi)	72
Ford E-Transit	27
Ford Mustang (Mach-E)	1
Ford Transit Connect	1
Mitsubishi Outlander	113
Nissan Leaf	17
Street Sweeper	1
	316



EV Charger Connector Types

Mfg.	Type	Range	Battery	L2 Acceptance Rate	DCFC Acceptance Rate	Charge Port Type		
		Miles	kWh	kWh	kWh	J1772	CCS1	Chademo
Chevy Bolt	BEV	259	65	11		X	X	
Chevy Volt	PHEV	35	16.5	3.3		X		
Ford Fusion Energi	PHEV	21	7.6	3.3		X		
Ford E-Transit	BEV	116	68	10.5		X	X	
Ford F150 Lightning	BEV	200	130	11.3		X	X	
Ford Mach-E	BEV	230	68	10.5		X	X	
Ford Transit Connect	BEV	60	28	3.3		X		
Mitsubishi Outlander	PHEV	22	12	3.3		X		X
Nissan Leaf	BEV	73	24	6.6		X		X
Global Broom	BEV		180	19		X		

EV Chargers



Level 1



Level 2



DCFC

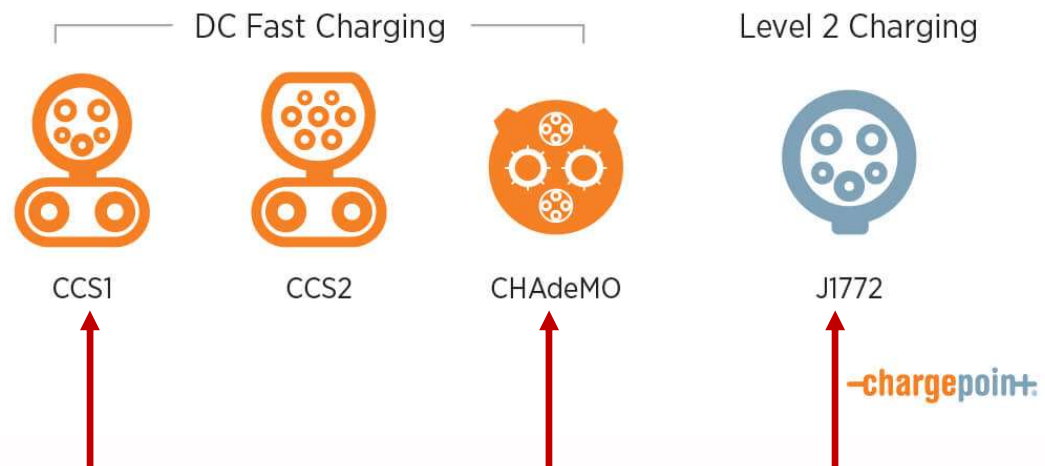


Level-2	DCFC
208 Volts	480 Volts
40 Amps	100 Amps
Single Phase	Three Phase
7.2 kW	50 kW
Dual Port	Dual Port
J1772	CCS1 or CHAdeMO
184 Ports	37 Ports



EV Charger Connector Types

Connector
Types



Charger Network



-chargepoint+



Solar Car Ports



Garage	QTY
BK11	2
Floyd Bennett Field	3
BK Enforcement-Shore Pkwy	2
Staten Island MTS	1
BK Enforcement-Flushing Ave	4
QNS-Enforcement	2
BK12	2
BK15	2
	18



10 of 18 completed

OneNYC



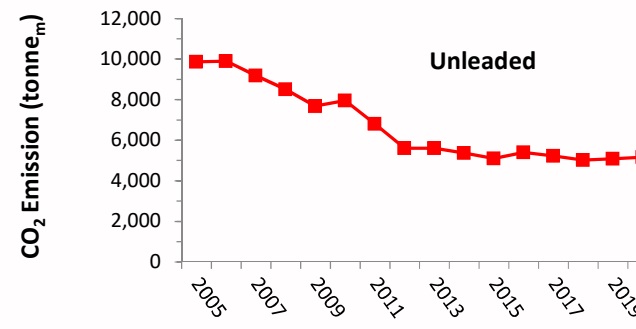
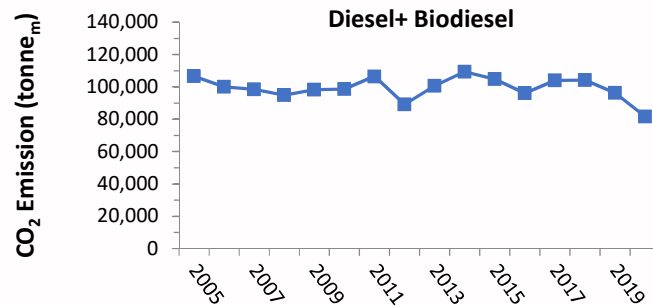
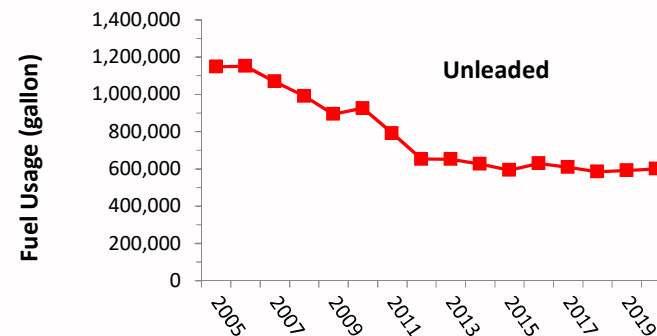
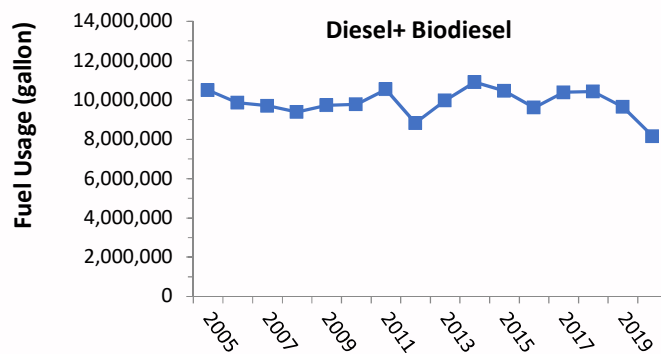
NYC's Clean Fleet Plan

- Biodiesel
- CNG
- DME
- Hybrid-Electric
- Hybrid-Hydraulic
- LED Lighting
- Mack MP7 (GHG14)
- Mack MP7 (GHG17)
- Neutral @ Stop
- Park @ Idle
- Power On Demand
- Renewable Diesel
- Stop/Start





Annual Fuel Consumption (FY)



27% reduction in CO2

40% Reduction in CO2

Heavy Duty BEV Milestones



BEV Refuse Truck



Launched on November 18, 2020

BEV Street Sweeper



Launched on May 7, 2021

Specs at a Glance



Same Make/Model as diesel counterpart

BEV Collection Truck	
Make	Mack Trucks
Model	LR
Fuel	Electric
Body	25 Cubic Yards
GVW	72k
Front Axle	20k (Mack FXL20)
Rear Axle	52k (Mack S522R)
Suspension	Mack mRIDE (52k)
Batteries	266 kWh
Electric Motors	AC Type (334kW continuous)
Transmission	2-Speed Mack Powershift
Charging System	Up to 150 kW
Site Charger	ChargePoint (CPE250)
NYC Vision Zero Compliant	

BEV Street Sweeper	
Make	Global Environmental Products
Model	M4
Fuel	Electric
Body	5.6 Cubic Yards
GVW	22.6k
Front Axle	12k
Rear Axle	21k
Suspension	Dana
Batteries	180 kWh
Electric Motors	AC Type (120 kW peak)
Transmission	Direct Drive
Charging System	20 kW
Site Charger	Clipper Creek (CS100)
NYC Vision Zero Compliant	

First DCFC



- DC Fast-Charger
- ChargePoint CPE 250
- 50 kW output
- CCS1 Connector
- 480 Volts
- 3-Phase
- 100 Amps



Installed our first DCFC August 2020

37 Total DCFC (13 complete + 24 near completion)



Preliminary Shakedown Testing

25,000 lb. Payload



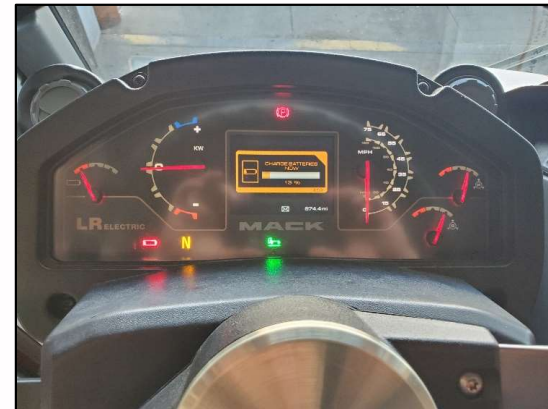
House to House Simulation



Gradeability



State of Charge (range)



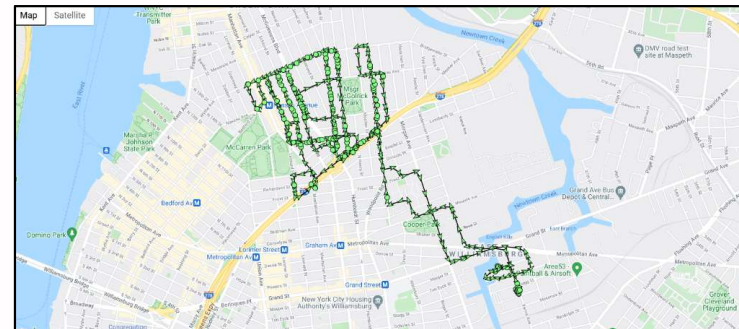
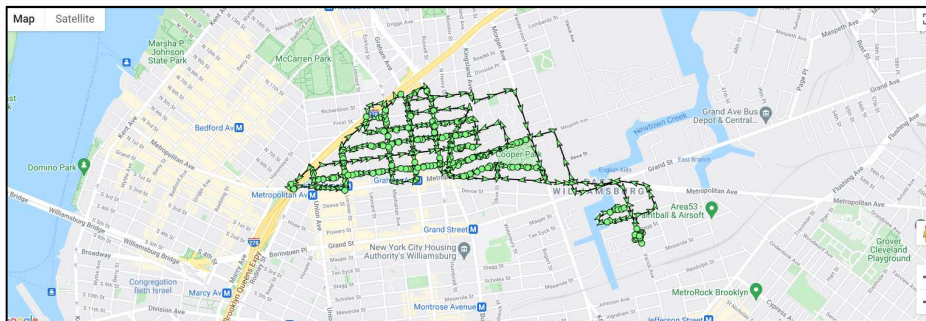
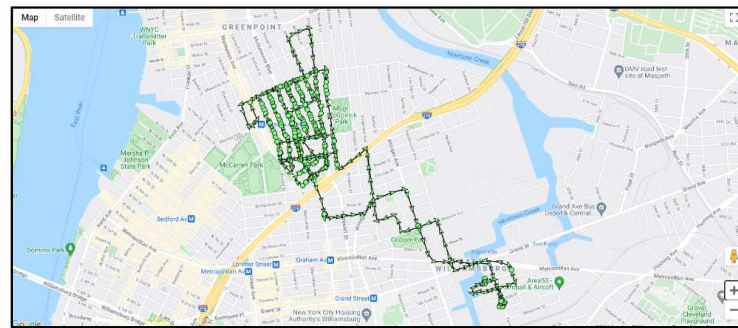
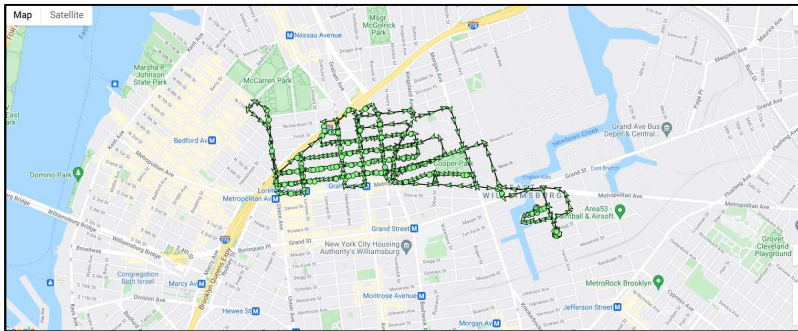
Training



- First Responder
(FDNY)
- Mechanics
- Operators



Various BEV Refuse Routes



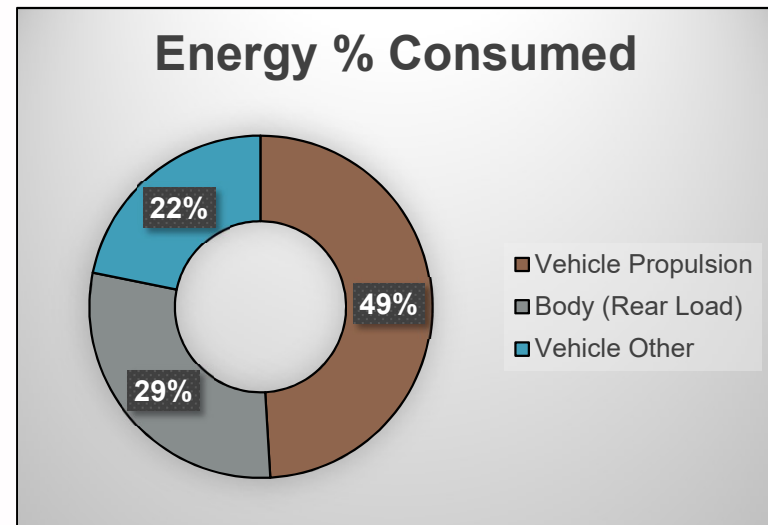


Data Collection (11 months)

	Ambient Temp (°F)	Daily Battery Usage (%)	Daily Number of		Payload (ton)	DAILY (average)			Charge Time* (hr:min)
			Pickups	Hopper Cycles		Miles Driven	kWh	kWh / Ton	
Nov-20	54	38%	213	61	10	9.1	79	7.7	1:36
Dec-20	41	42%	183	68	8.1	9.6	86	8.5	1:45
Jan-21	37	39%	207	63	8.5	8.6	83	8.2	1:41
Feb-21	35	34%	183	70	9.4	13	127	7.8	2:36
Mar-21	45	45%	154	66	9.0	8.9	92	8.0	1:58
Apr-21	54	42%	203	83	9.4	9.2	84	7.8	1:43
May-21	63	35%	194	98	9.5	9.2	72	7.8	1:27
Jun-21	75	32%			9.7	8.9	67	7.7	1:22
Jul-21	77	29%			9.4	8.6	60	7.9	1:13
Aug-21	79	27%			8.3	9.7	61	8.4	1:15
Sep-21	72	33%			12.3	8.6	67	7.0	1:23
Average for 11 months	35 - 79	39%	191	73	9.4	9.4	80	7.9	1:38

* @ 50kW charge rate

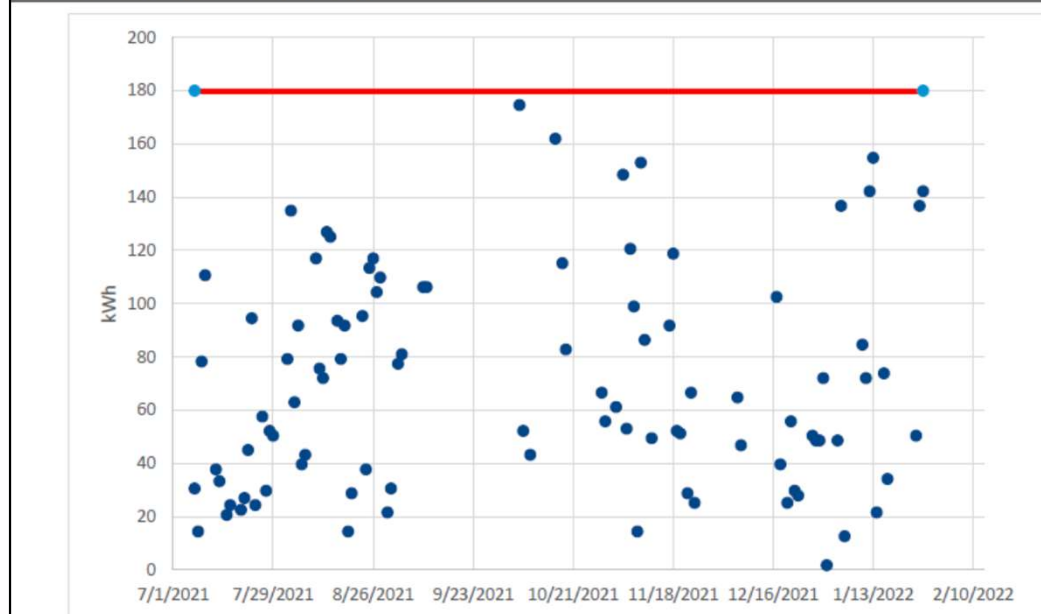
Energy Consumption (snapshot)



BEV Street Sweeper



Figure 3: eSweeper Daily Energy Consumed



The BEV Sweeper used an average of 70.8 kWh per day which is well under the total battery capacity of the vehicle

Next Steps...



Test one of
each in every
Zone of
operation

1. Brooklyn North
2. Brooklyn South
3. Queens East
4. Queens West
5. Staten Island
6. Manhattan
7. Bronx



Variations in terrain
& duty-cycle



What to Consider (BEV)

1. Budgeting & Planning
2. Vehicle lifecycle
3. How much battery (kWh)
4. Performance (payload, range, gradeability)
5. Lead-times (production/delivery)
6. Snow plowing (NYC...)
7. Training (operator, mechanic)
8. Local dealer network (service/support)
9. Warranty (what is covered/how long)
10. BEV cost (incremental \$)
11. Incentives/funding (CMAQ, DERA, VW)





What to Consider (EVSE)

1. Budgeting & Planning
2. How many chargers (**Level-2, DCFC**)
3. Who will install?
4. Who will Maintain?
5. Charger networking (**Wi-Fi, cellular service**)
6. Charge management (**avoid Peak Load Demand charges**)
7. How much power (**Megawatts?**)
8. Floor Plan (**parking/charging**)
9. \$ Electrical service upgrade
10. \$ Electricity (**kWh**)
11. \$ Charger installation
12. \$ Network fee (**cellular**)



Mission Critical Considerations...



1. Budgeting & Planning
2. Fleet assessment (**fleet composition**)
3. Site assessment (**electric service upgrades**)
4. Industry ability to deliver product (**BEV**)
5. Can the **GRID** support DEMAND
6. The need for backup generators
7. **Transition Plan...**

Mission Critical Considerations...



1. Majority of DSNY fleet is HD
2. HD vehicles require Large batteries
3. Large batteries require DCFC
4. DCFC require lots of power
5. BEV refuse trucks **MUST** have ability to **PLOW SNOW**
6. Short fueling (**charging**) window in the midst of snow storm!



DSNY Fleet Awards



2020 – CalStart “Blue Sky Award”

2014 – Green Fleet Magazine 2014 “Fleet Sustainability Award”

2013 – U.S. EPA Northeast Diesel Collaborative “Breathe Easy Leadership Award”

2010 – Government Fleet Magazine “#16 Government Green Fleet”

2010 – Motor Week Magazine “Clean Cities Success Stories”

2009 – Fleet Owner Magazine “Vocational Fleet of the Year”

2005 – EPA Region 2 “Environmental Quality Award”

Citywide Initiative!



City of New York
Parks & Recreation



Thank you!



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