Transportation Advisory Panel

Meeting 4

November 3, 2020

www.Climate.ny.gov

NEW YORK STATE OF OPPORTUNITY. | Climate Action Council

Agenda

- Welcome/Introductions
- Electric Vehicle Market Barriers/Opportunities
- MTA Sustainability Initiatives
- Panel Sub-Groups/Policies Under Consideration
- Logistics for Public Input
- Open Discussion

Meeting Procedures

Before beginning, a few reminders to ensure a smooth discussion:

- **Panel members should be on mute when not speaking**
- **Video is encouraged for Panel members, in particular when speaking**
- **We will not be muting individuals for this discussion; the chair will call on members individually, at which time please unmute**
- **If technical problems arise, please contact Gina McIntyre at gina.mcintyre@dot.ny.gov**

Panel Member Introductions

Transportation Advisory Panel Members

Marie Therese Dominguez, Chair
NYSDOT

Jared Snyder
NYSDEC

Paul Allen, M. J. Bradley & Associates

Dimitris Assanis, Stony Brook University

Steve Finch, AAA Western & Central New York

Albert Gore III, Tesla

Kendra Hems, Trucking Association of New York

Elgie Holstein, Environmental Defense Fund

Renae Reynolds, New York City Environmental Justice Alliance

Porie Saikia-Eapen, Metropolitan Transit Authority

John Samuelsen, Transport Workers Union of America AFL-CIO

Nick Sifuentes, TriState Transportation Campaign

Kerene Tayloe, WE ACT for Environmental Justice

Julie Tighe, NYS League of Conservation Voters

Craig Turner, Buffalo Niagara International Trade Gateway Organization

Nancy Young, Airlines for America

Bob Zerrillo, New York Public Transit Association

Electric Vehicle Market Barriers and Opportunities

www.Climate.ny.gov

Transportation Advisory Panel
Electric Vehicle Market Barriers and Opportunities

Dr. Geoff Morrison
The Cadmus Group

November 3, 2020

CADMUS

Agenda

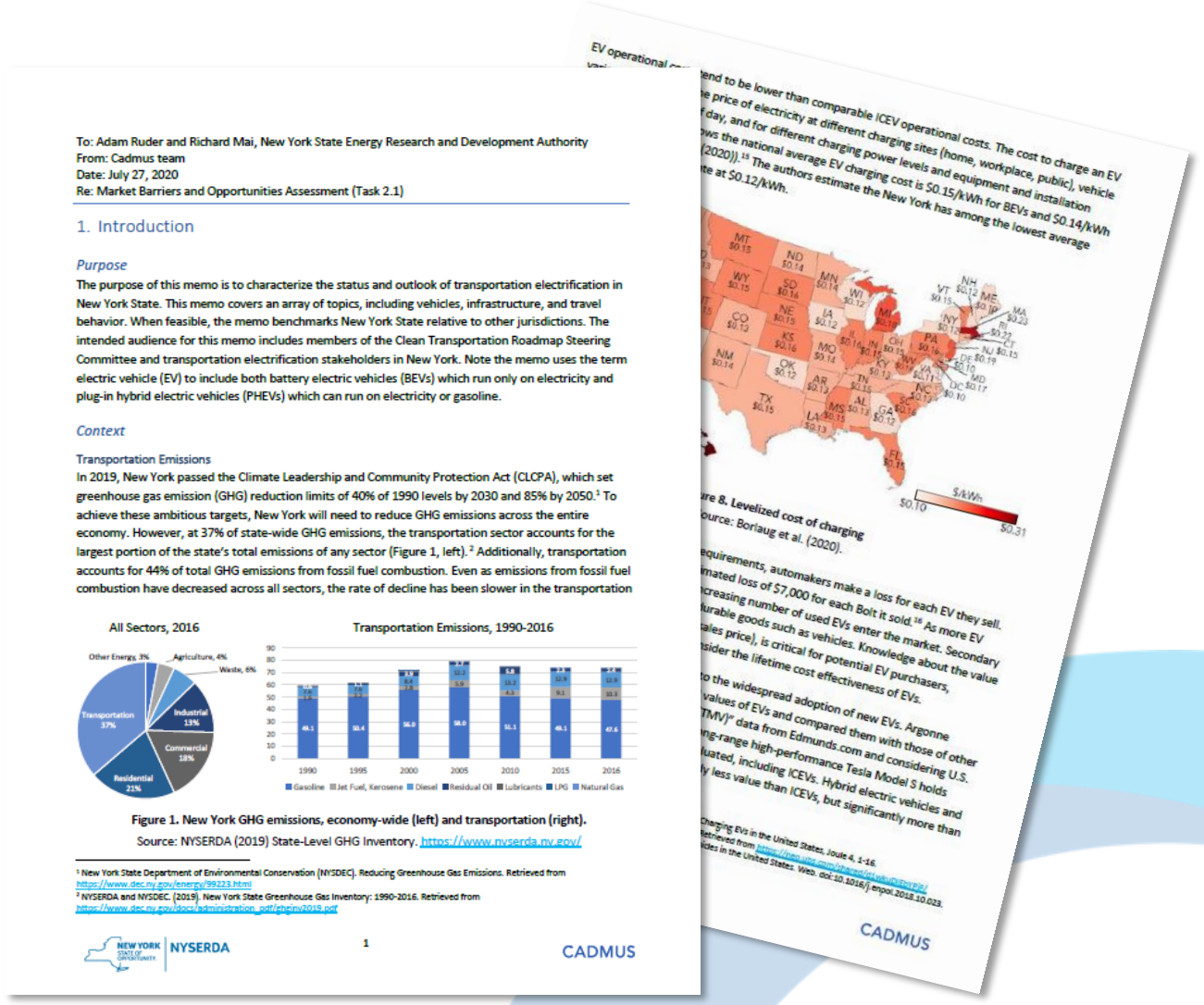
- Overview
- Electrifying Light-Duty Vehicles
- Electrifying Medium-/Heavy-Duty Vehicles
- Electrifying Aviation
- Take-Aways on Barriers to Transportation Electrification

Electric Vehicle Market Barriers & Opportunities

Memo on New York EVs

Scope: Characterize current state of EV deployment in New York, drawing on relevant literature, public data tools, and a variety of national and state sources.

- Delivered to NYSERDA in July 2020
- Summarizes all sub-sectors in transportation with most emphasis on light-duty
- Describes trends and New York-specific barriers



To: Adam Ruder and Richard Mai, New York State Energy Research and Development Authority
From: Cadmus team
Date: July 27, 2020
Re: Market Barriers and Opportunities Assessment (Task 2.1)

1. Introduction

Purpose

The purpose of this memo is to characterize the status and outlook of transportation electrification in New York State. This memo covers an array of topics, including vehicles, infrastructure, and travel behavior. When feasible, the memo benchmarks New York State relative to other jurisdictions. The intended audience for this memo includes members of the Clean Transportation Roadmap Steering Committee and transportation electrification stakeholders in New York. Note the memo uses the term electric vehicle (EV) to include both battery electric vehicles (BEVs) which run only on electricity and plug-in hybrid electric vehicles (PHEVs) which can run on electricity or gasoline.

Context

Transportation Emissions

In 2019, New York passed the Climate Leadership and Community Protection Act (CLCPA), which set greenhouse gas emission (GHG) reduction limits of 40% of 1990 levels by 2030 and 85% by 2050.[1] To achieve these ambitious targets, New York will need to reduce GHG emissions across the entire economy. However, at 37% of state-wide GHG emissions, the transportation sector accounts for the largest portion of the state's total emissions of any sector (Figure 1, left).[2] Additionally, transportation accounts for 44% of total GHG emissions from fossil fuel combustion. Even as emissions from fossil fuel combustion have decreased across all sectors, the rate of decline has been slower in the transportation

All Sectors, 2016

Transportation Emissions, 1990-2016

Figure 1. New York GHG emissions, economy-wide (left) and transportation (right).
Source: NYSERDA (2019) State-Level GHG Inventory. https://www.nyserda.ny.gov/

[1] New York State Department of Environmental Conservation (NYSDEC). Reducing Greenhouse Gas Emissions. Retrieved from https://www.dec.ny.gov/energy/99223.html
[2] NYSERDA and NYSDEC. (2019). New York State Greenhouse Gas Inventory: 1990-2016. Retrieved from https://www.dec.ny.gov/docs/administration_pdf/ghginv2019.pdf

NYSERDA 1 CADMUS

end to be lower than comparable ICEV operational costs. The cost to charge an EV
e price of electricity at different charging sites (home, workplace, public), vehicle
day, and for different charging power levels and equipment and installation
ows the national average EV charging cost is $0.15/kWh for BEVs and $0.14/kWh
(2020)).[15] The authors estimate the New York has among the lowest average
te at $0.12/kWh.

re 8. Levelized cost of charging
ource: Borlaug et al. (2020).

equirements, automakers make a loss for each EV they sell.
rnated loss of 57,000 for each Bolt it sold.[16] As more EV
creasing number of used EVs enter the market. Secondary
urable goods such as vehicles. Knowledge about the value
ales price), is critical for potential EV purchasers,
sider the lifetime cost effectiveness of EVs.

o the widespread adoption of new EVs. Argonne
values of EVs and compared them with those of other
TMV)" data from Edmunds.com and considering U.S.
ng-range high-performance Tesla Model S holds
luated, including ICEVs. Hybrid electric vehicles and
y less value than ICEVs, but significantly more than

harging EVs in the United States, Joule 4, 1-16.
etrieved from https://doi.org/10.1016/j.enpol.2018.10.023.
ates in the United States. Web. doi:10.1016/j.enpol.2018.10.023.

CADMUS

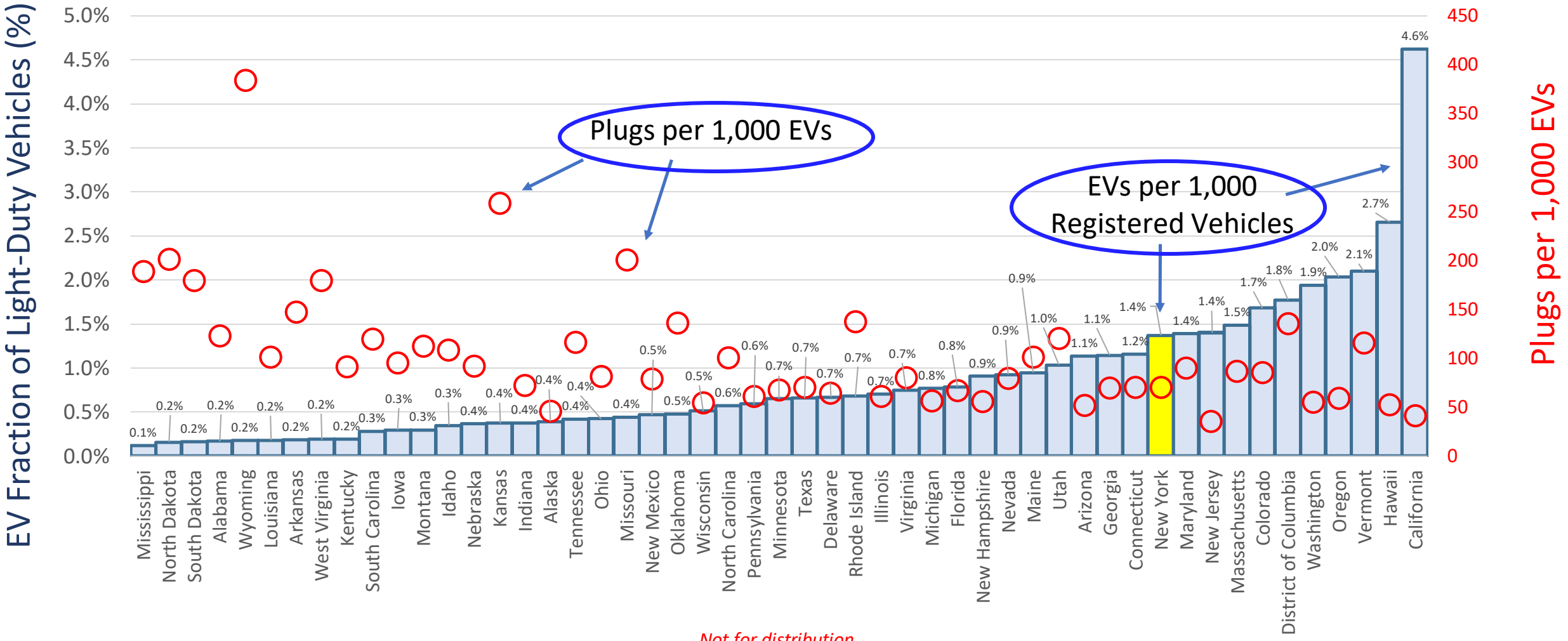
CADMUS

Electrifying light-duty vehicles

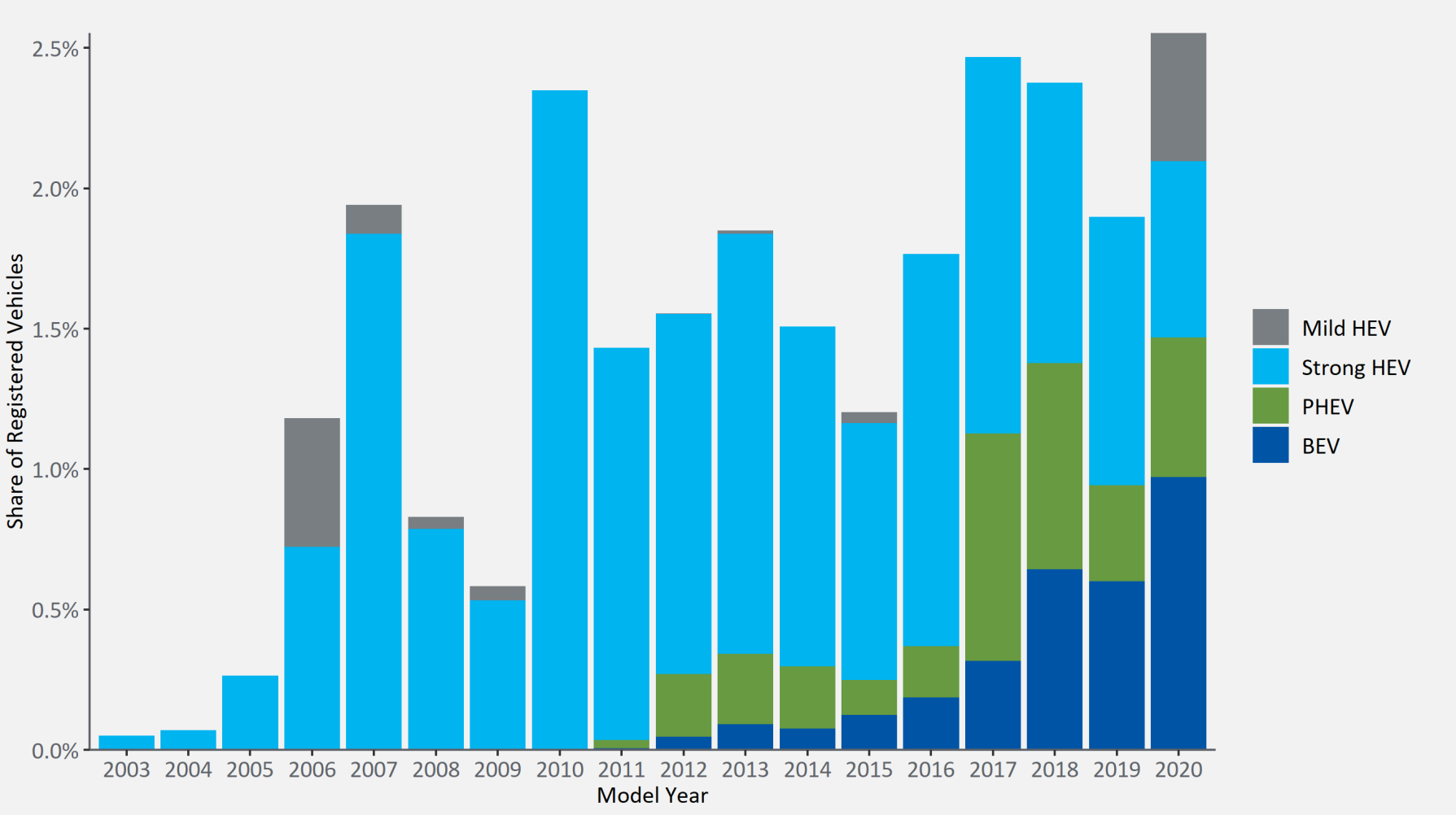
CADMUS

EV Fraction of Vehicle Stock, by State

New York is 11th in electric light-duty vehicle stock (1.4%). Similar EV charger deployment per EV as other comparable states.



Market Share by Model Year



Terms

Mild HEV: Hybrid with small battery (e.g., Honda Insight)

Strong HEV: Hybrid with large battery (e.g., Toyota Prius)

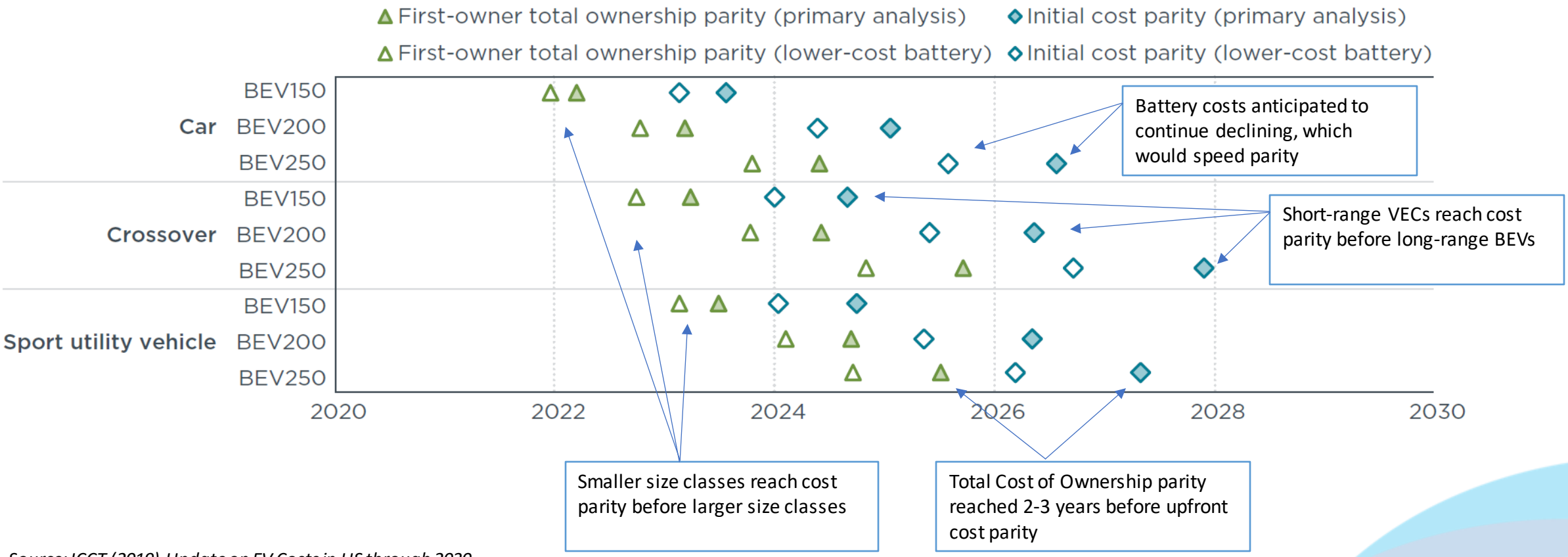
PHEV: Plug-in hybrid (e.g., Chevy Volt)

BEV: Battery electric vehicle (e.g., Tesla)

CADMUS

Electric Vehicle Cost Parity Coming Soon

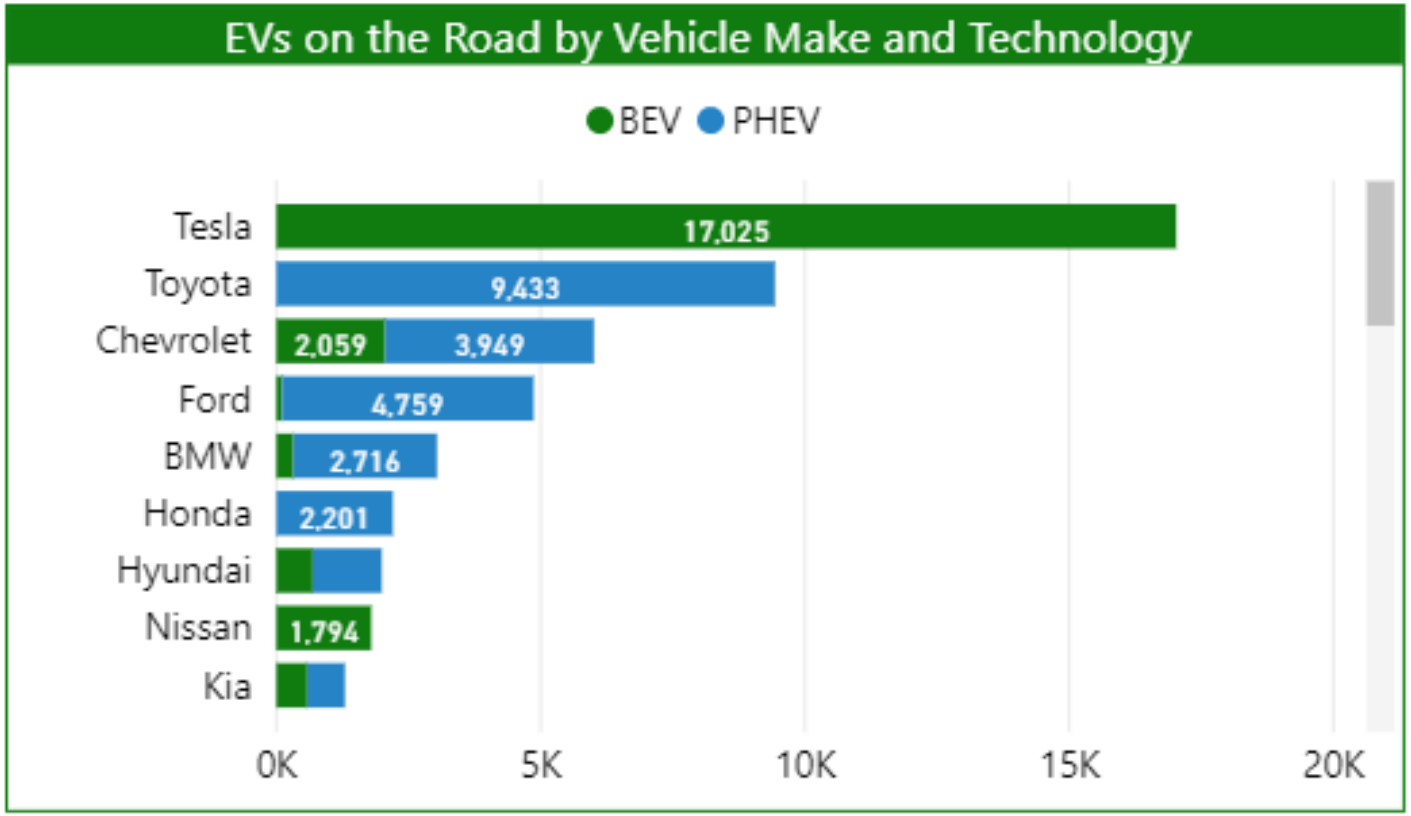
Before 2030, BEVs are anticipated to reach both total and upfront cost parity with ICE vehicles, indicating BEVs are a viable alternative technology that can be deployed today



Source: ICCT (2019) Update on EV Costs in US through 2030.
https://theicct.org/sites/default/files/publications/EV_cost_2020_2030_20190401.pdf

CADMUS

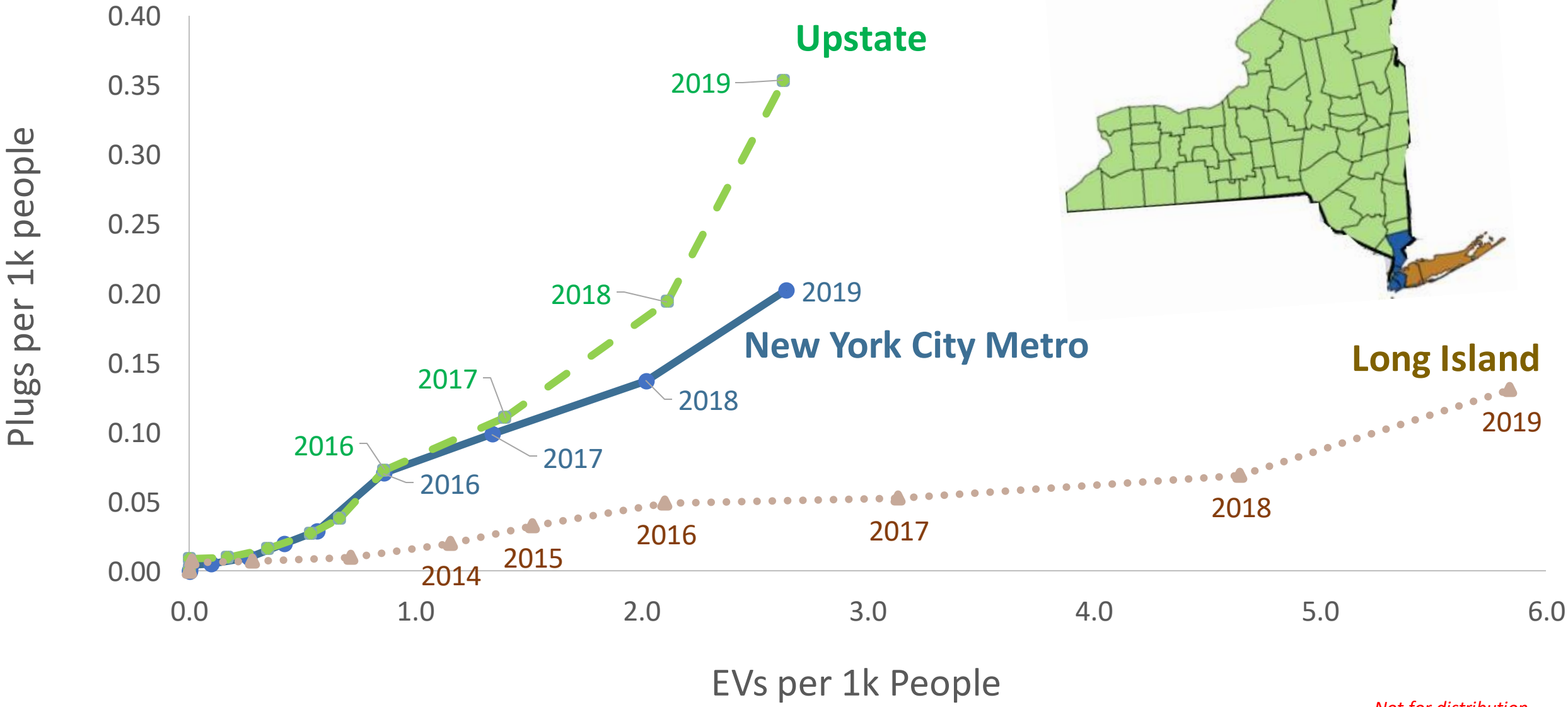
EV Quick Facts for NYS



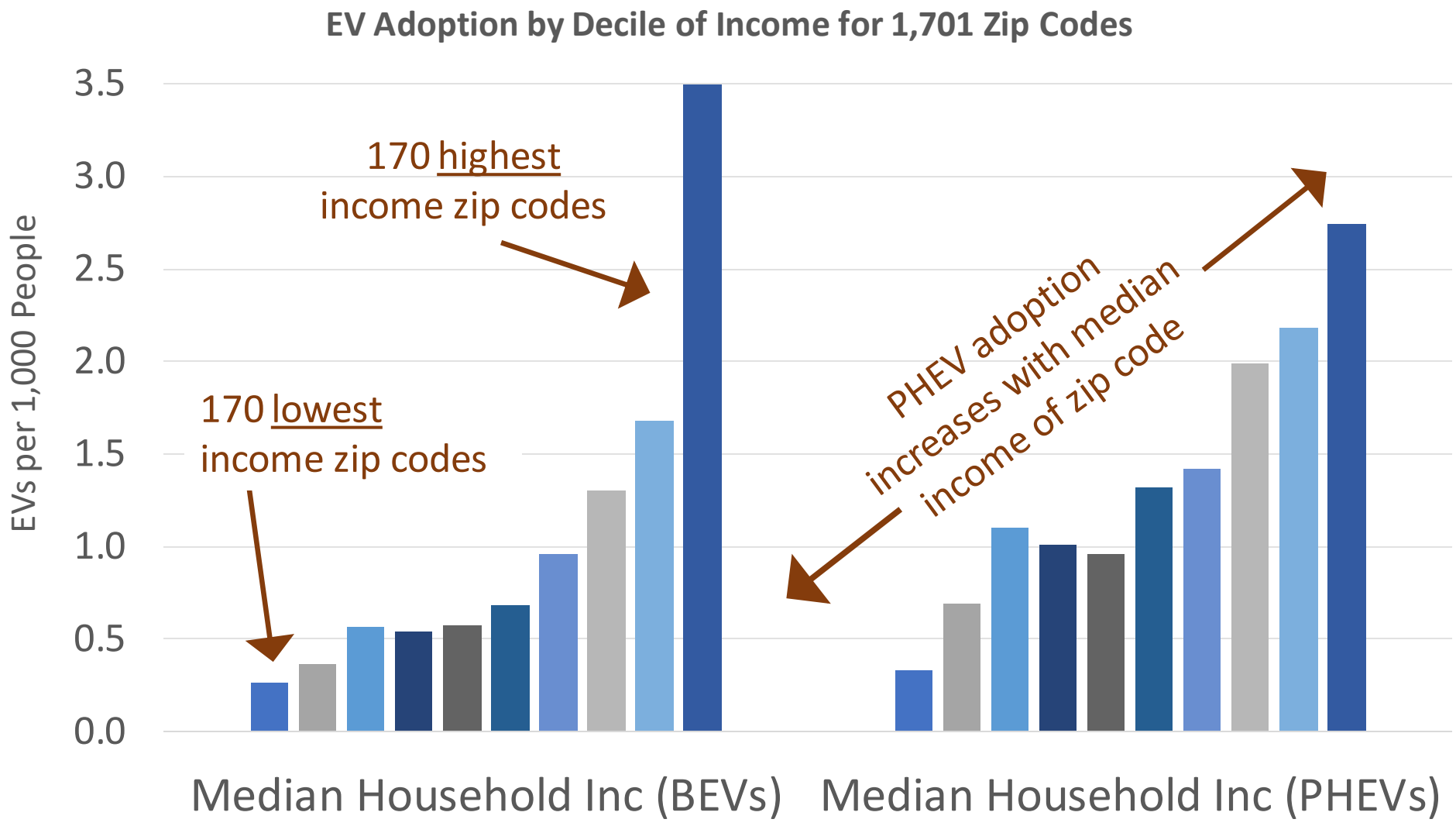
- Long Island, NYC Metro have highest EV density.
- Teslas are ~1/3 of total in the state.
- New EV registrations peaked in 2018 with release of Tesla Model 3.
- Model Year 2020 PEV sales look much stronger than 2019.
- BEV/PHEV splits is 41% / 59%.

Source: EValutateNY (2020) https://atlaspolicy.com/rand/evaluateny/

EVs vs Plugs per 1,000 People, by Region



EVs per 1,000 people, by Zip-Code Characteristic



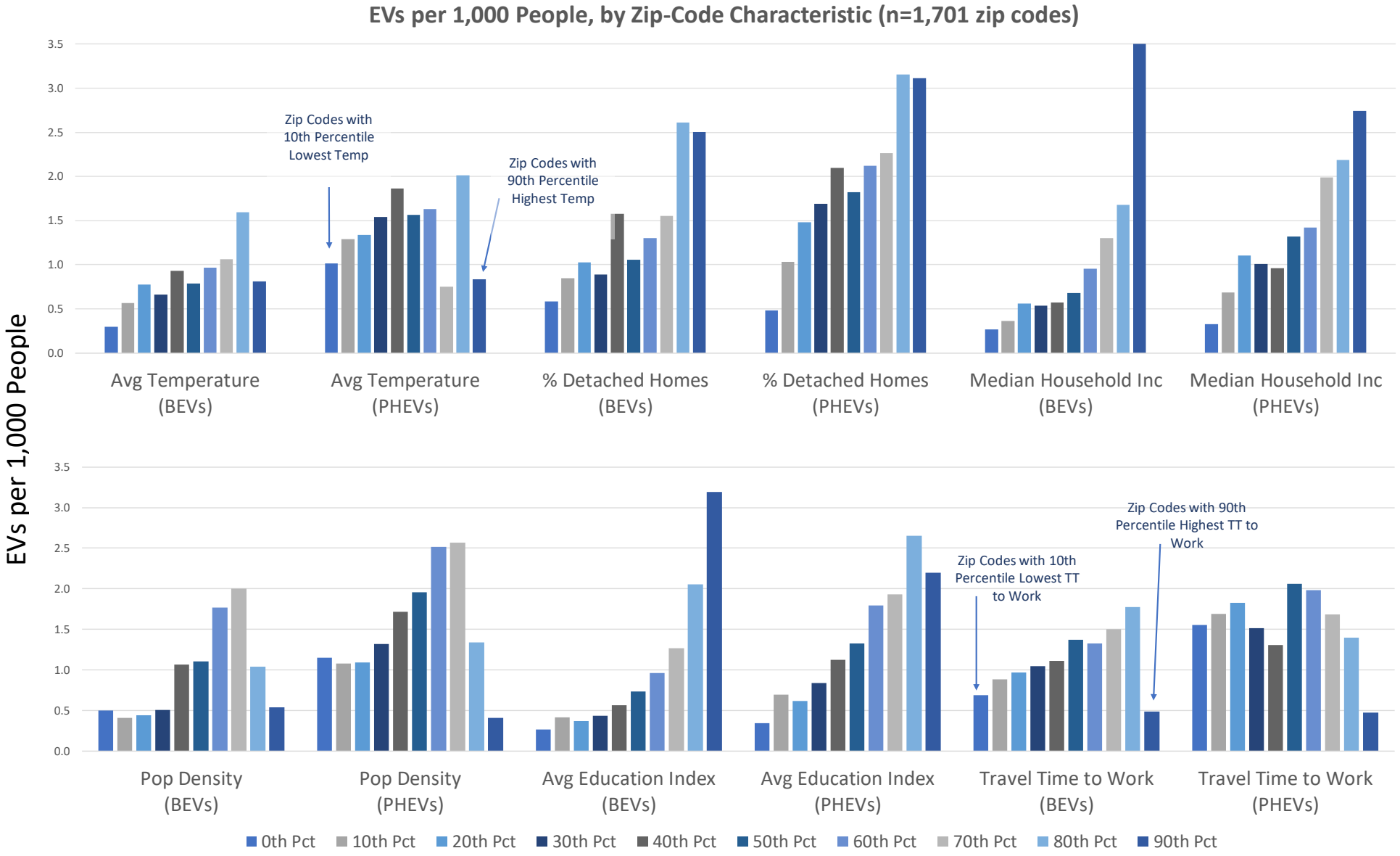
Explanation

1701 zip codes in New York were segregated by percentile based on several key factors that influence EV ownership. The EVs per 1,000 were calculated for each 10th percentile.

Insights

Some variables have strong relationships with EV ownership (e.g, median HH inc.), while others increase then decrease (e.g., pop density).

EVs per 1,000 people, by Zip-Code Characteristic



Explanation

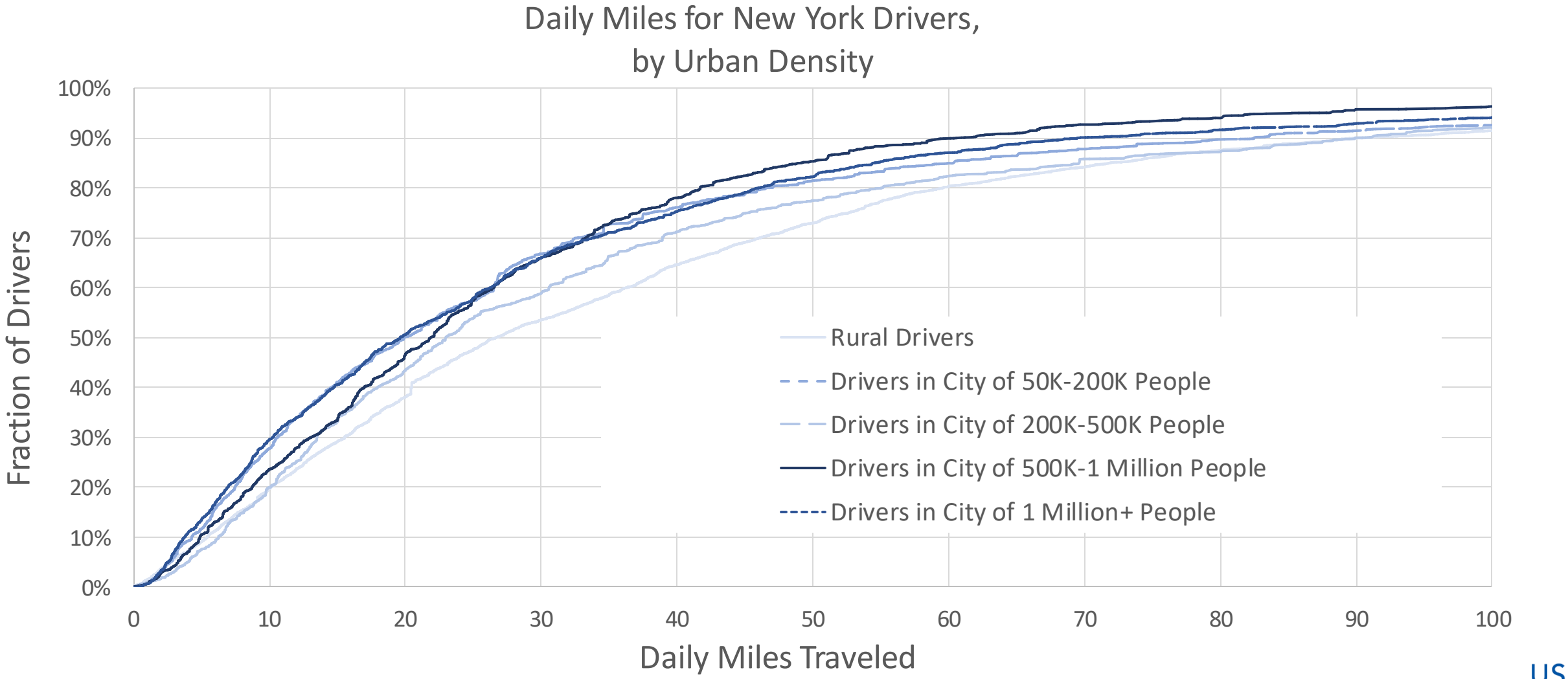
1701 zip codes in New York were segregated by percentile based on several key factors that influence EV ownership. The EVs per 1,000 were calculated for each 10th percentile.

Insights

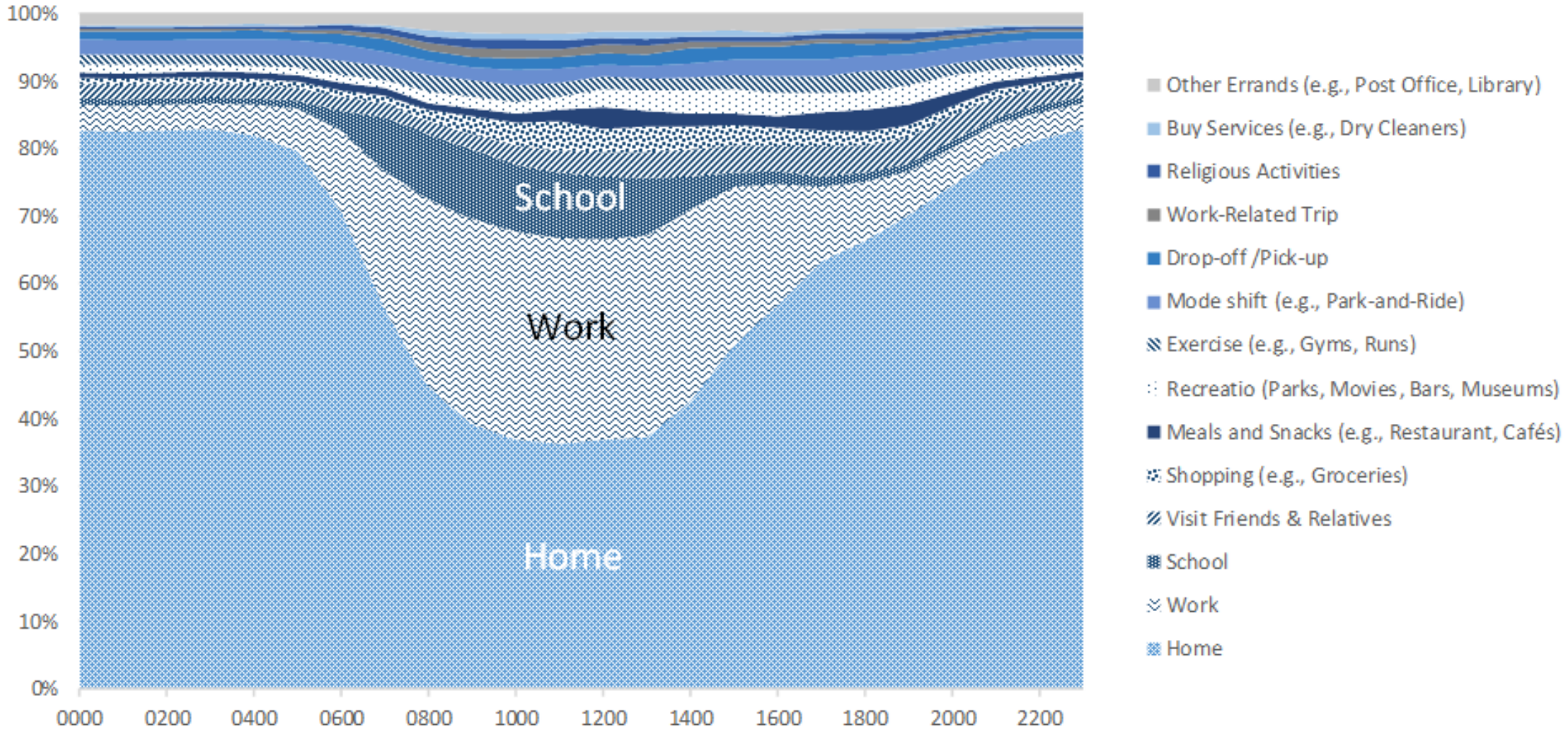
Some variables have strong relationships with EV ownership (e.g, median HH inc.), while others increase then decrease (e.g., pop density).

CADMUS

Daily miles for household vehicles in New York State, by urban size.



Location of household vehicles in New York State over typical day.



Electrifying Medium/Heavy-Duty

CADMUS

Medium/Heavy-Duty Vehicle Population in NYS

Electric Vehicle	Avg Battery Size (kWh)	Avg Charge Speed for 80% Charge (hrs)				
		30 kW	50 kW	150 kW	350 kW	500 kW
Bus - Coach	336	8.9	5.4	1.8	0.8	0.5
Bus - School	143	3.8	2.3	0.8	0.3	0.2
Bus - Shuttle	101	2.7	1.6	0.5	0.2	0.2
Bus - Shuttle, Bus - Transit	150	4.0	2.4	0.8	0.3	0.2
Bus - Shuttle, Delivery	126	3.3	2.0	0.7	0.3	0.2
Bus - Shuttle, Truck	127	3.4	2.0	0.7	0.3	0.2
Bus - Transit	315	8.4	5.0	1.7	0.7	0.5
Delivery	154	4.1	2.5	0.8	0.4	0.2
Delivery, Food Truck	128	3.4	2.0	0.7	0.3	0.2
Delivery, Refuse	143	3.8	2.3	0.8	0.3	0.2
Delivery, Tractor, Truck	485	12.9	7.8	2.6	1.1	0.8
Delivery, Truck	232	6.2	3.7	1.2	0.5	0.4
Panel Van	72	1.9	1.1	0.4	0.2	0.1
Refuse	256	6.8	4.1	1.4	0.6	0.4
Refuse, Tractor, Truck	160	4.3	2.6	0.9	0.4	0.3
Truck	141	3.8	2.3	0.8	0.3	0.2

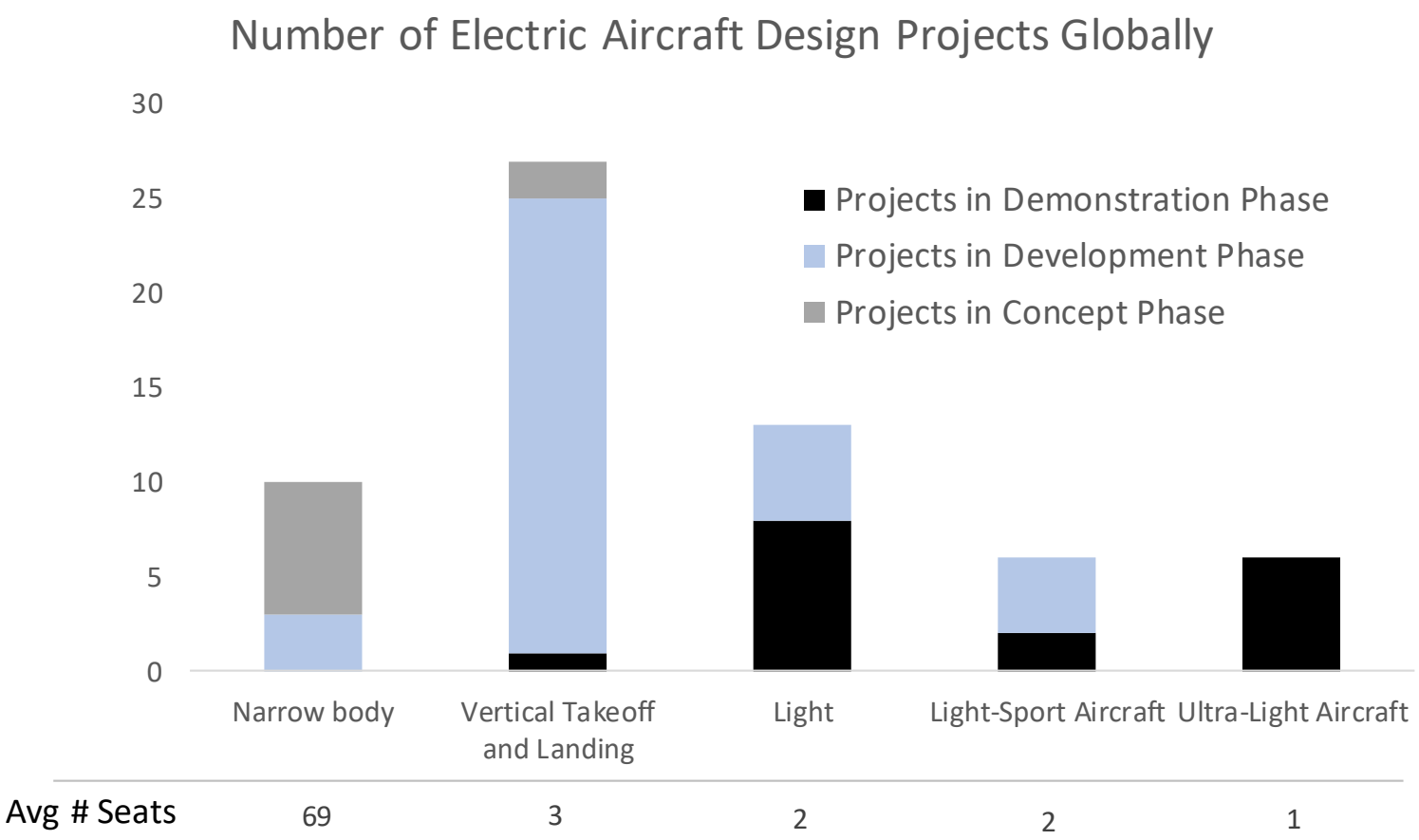
Overview

- Electrification at very early stage
- ~500 electric MHDVs registered in NY (mostly buses) out of ~1.2 million
- 27% of MHDVs in New York share home bases with 5+ other vehicles, which creates potential challenges for distribution system.
- Must pare battery size, charging speed, and range requirements
- Weight of batteries creates payload reduction on some freight trucks.

Electrifying Aviation

CADMUS

Electric Aircraft



SOURCE: Gnad, A. R. et al. Technical and environmental assessment of all-electric 180-passenger commercial aircraft, 2019

Overview

- Electrification of aircraft is gaining momentum
- Reduces emissions, reduces noise, eliminates lead, saves fuel costs
- Near-term market for all-electric aircraft is for short range, <10 passenger aircraft or drone delivery
- Focus should be on general aviation airports
- NASA project vertical takeoff and landing aircraft to be economically viable by 2028

CADMUS

Takeaways on Barriers

CADMUS

Barriers to EV Growth in NYS

	Barrier	Implication
Price and Model Availability	• Avg MSRP of light-duty EV models sold in New York in 2019 is $37,500 for non-luxury models • High fraction (70%) of light-duty vehicles in state are pickup trucks, SUVs, or crossovers	• EVs have not yet reached sticker-price parity • Preference for larger models does not align with available EVs today
Housing Stock	• Relatively high fraction of MUDs compared to US avg (51% compared to 29%) • Relatively old housing stock compared to US avg (avg construction year in NYS is 1954 compared to 1997)	• Access issues for residential charging infrastructure • Lower electrical capacity at older houses means more upgrades

CADMUS

Barriers to EV Growth in NYS

	Barrier	Implication
Public Charging	• Large spatial gaps in DCFC network (esp. Upstate) • 13 EVSPs operating in NYS means diverse user interfaces, memberships, and fees (31% of public plugs are Tesla)	• Low/Mid-range EVs may not be viable; vacation • Lack of interoperability is inefficient and reduces functional EVSE prevalence
Other	• Performance of vehicles and chargers in cold weather • 27% of MHD fleet vehicles are in fleets with 5 or more vehicles • Electric aircraft severely limited by energy density of today's batteries (14x less than jet fuel)	• Technology may not be mature as a 1:1 ICE replacement • Potential strains on distribution system • Only short-range electric air travel feasible in next decade

CADMUS

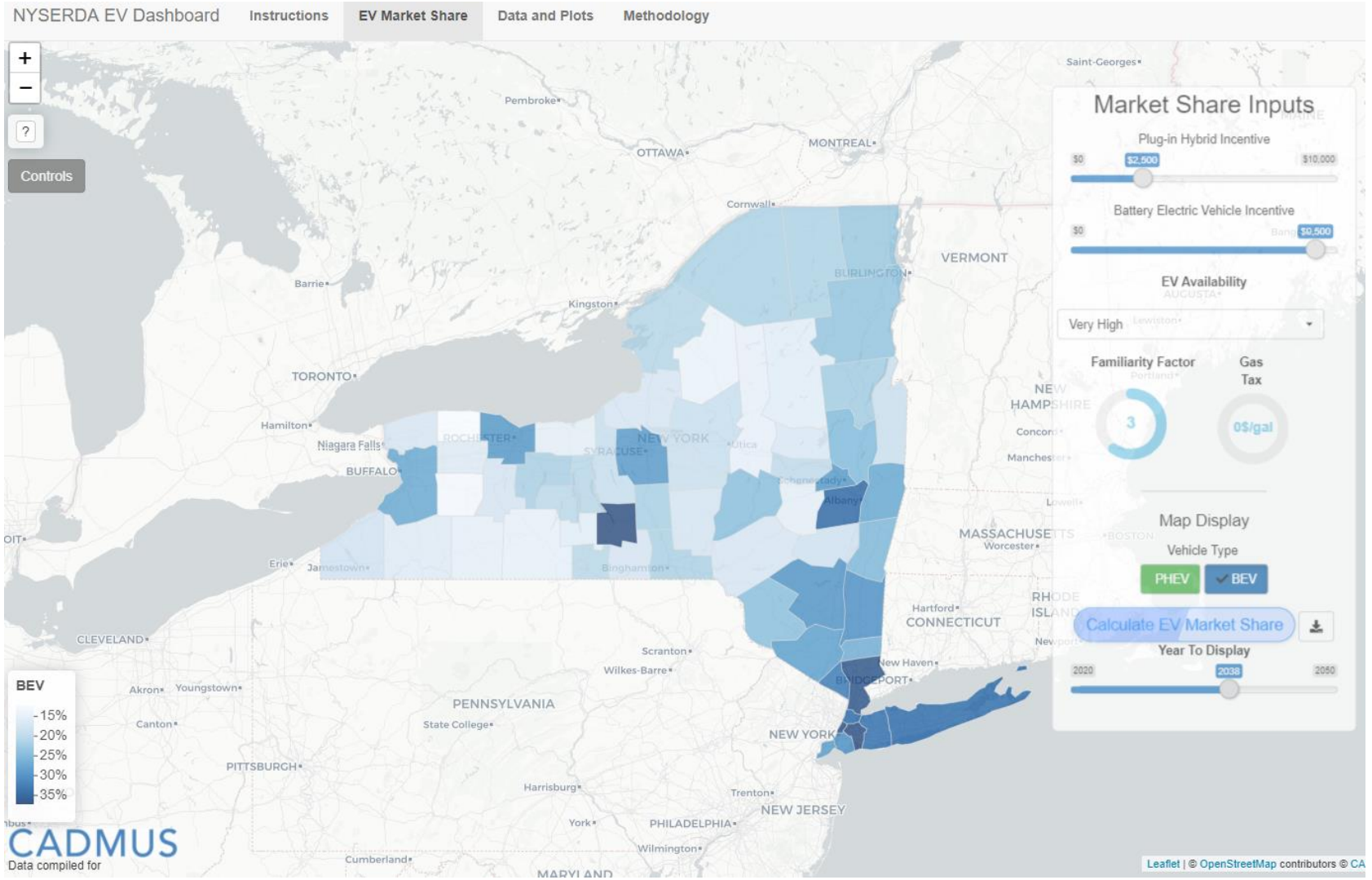
Other On-Going Work

CADMUS

Other On-Going EV Activities in Project

- Electric Vehicle Diffusion Model
- TCO modeling of chargers and vehicles
- Bottom-up load shapes, by vehicle type and charger type
- Policy analysis, including:
  - 100% ZEV sales in 2035
  - California Advanced Clean Truck rule
  - New York LCFS

Vehicle Diffusion Model



- Reflects the diverse interests of vehicle buyers by segment
- Captures preferences for non-cost factors in consumer choice
- Provides high spatial resolution adoption forecasts
- Transparent and publicly available data sources
- Underlying stock turnover model

Thank you!

Dr. Geoff Morrison
Senior Associate
Geoffrey.Morrison@Cadmusgroup.Com

CADMUS

Discussion

Transportation Advisory Panel Members

Marie Therese Dominguez, Chair
NYSDOT

Jared Snyder
NYSDEC

Paul Allen, M. J. Bradley & Associates

Dimitris Assanis, Stony Brook University

Steve Finch, AAA Western & Central New York

Albert Gore III, Tesla

Kendra Hems, Trucking Association of New York

Elgie Holstein, Environmental Defense Fund

Renae Reynolds, New York City Environmental Justice Alliance

Porie Saikia-Eapen, Metropolitan Transit Authority

John Samuelsen, Transport Workers Union of America AFL-CIO

Nick Sifuentes, TriState Transportation Campaign

Kerene Tayloe, WE ACT for Environmental Justice

Julie Tighe, NYS League of Conservation Voters

Craig Turner, Buffalo Niagara International Trade Gateway Organization

Nancy Young, Airlines for America

Bob Zerrillo, New York Public Transit Association

MTA Sustainability Initiatives

www.Climate.ny.gov

SUSTAINABLE MTA

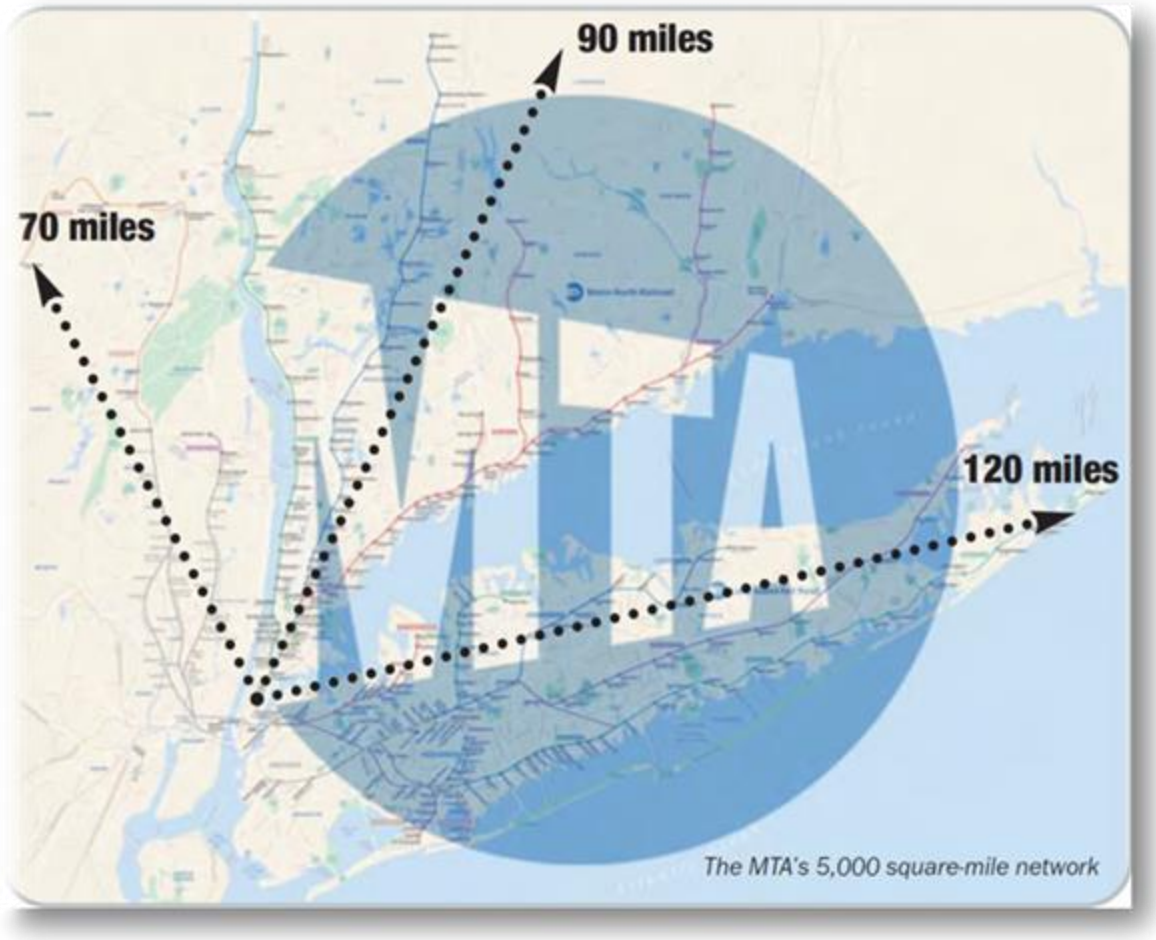
Climate Adaptation & Resiliency
Environmental Compliance & Energy Efficiency
at MTA NY

Presentation to
NYS Climate Advisory Council
Transit Advisory Panel
Nov 3, 2020

Porie Saikia-Eapen
MTA NY

The MTA at a Glance

- 8-9M Riders/weekday
- 5000 Sq. Mile Operating Territory
- Assets & Infrastructure:
  - ✓ 2000 Miles of Track
  - ✓ 9000 Train Cars
  - ✓ 6000 Buses
  - ✓ 700 Stations
  - ✓ 7 Bridges
  - ✓ 2 Tunnels



MTA Operating Agencies

1	2	3	4	5
MTA Bus	NYCT Subways & Buses	Long Island Rail Road	Metro-North Railroad	Bridges & Tunnels

MTA MISSION →

Keep Employees Safe
Keep Customers Safe
Keep the System moving

MTA and *Livable* NY

Public Transit Fosters

Regional economic strength

- A flexible network that fosters continued growth
- A resilient network that insulates the region's economy from extreme weather events

Social equity

- Low-cost fares for all residents with reliable service service

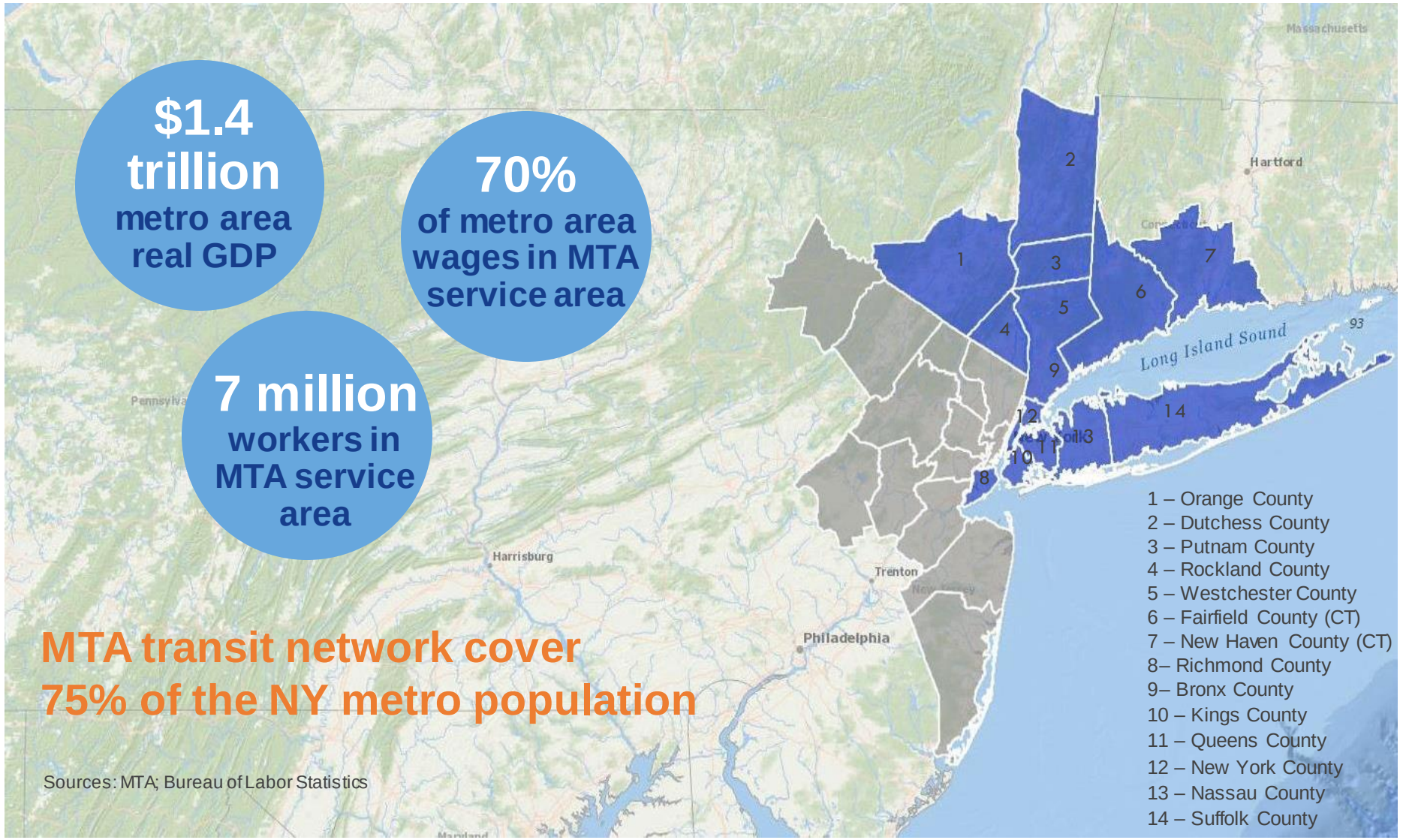
Revitalization/rebirth of urban & suburban neighborhoods

- Reliable service with low-cost fares
- Expanded affordable housing in emerging neighborhoods

Lowest per capita energy consumption & GHG emissions

- Moves the masses translating to fewer cars avoiding CO2 emissions

MTA and *Smart* NY



MTA and *Regenerative* NYC

MTA Contributes More Than 400,000 Jobs to Local Economy (2016 Data)

	Annual	Total 5 Year Program		
Region	Employment	Employment	Labor Income (Millions)	Output (Millions)
North Country and Capital Regions	2,465	12,327	$733	$1,916
Southern Tier Region	275	1,375	$52	$204
Western NY & Finger Lakes Regions	77	383	$23	$67
Mid-Hudson Region	9,801	49,006	$2,887	$6,625
NYC Region	60,007	300,037	$21,562	$36,940
Long Island Region	8,051	40,257	$2,290	$5,623
Central NY & Mohawk Valley Regions	68	341	$13	$56
Total NYS*	**81,351**	**406,755**	**$27,632**	**$51,846**
Out-of-State	64,077	320,383	$20,594	$57,455
Total National Impact	145,427	727,137	$48,226	$109,301

MTA and *Sustainable* NY

Lowest per capita Carbon Footprint

700,000 cars off CBD-NYC Every Weekday

~17 million metric tons of Transit Avoided Carbon

Congestion/ Environment/ Energy /Time/Quality of Life

MTA's Carbon Foot Print -

Contributing to a Sustainable, Regenerative and Livable New York

~17 million metric tons of Transit Avoided Carbon

~2 million metric tons of Transit Impacted Carbon

Ten Pounds of GHG avoided for choosing a ride on the MTA network in NY

Emissions Produced by Transit

Emissions from Transit

Tailpipe emissions from transit vehicles

Electricity use for traction

Maintenance yards, offices and other stationary sources

Debit

Emissions Displaced by Transit

Avoided Car Trips

Mode shift from private autos

Land-Use Multiplier

Compact land-use-> shorter trips, more walk/bike trips

Trip chaining

Lower car ownership

Congestion Relief

Improved fuel efficiency from reduced congestion

Credit

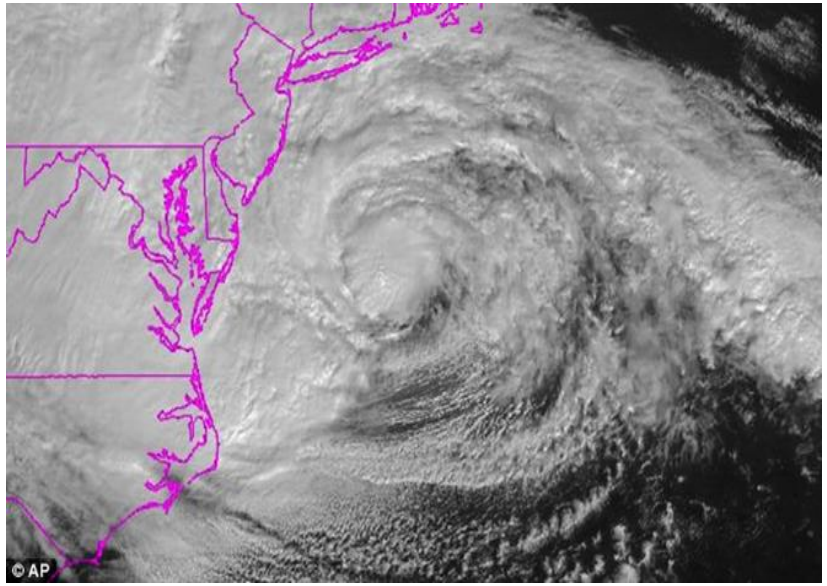
Greenhouse Gas Impacts of Transit

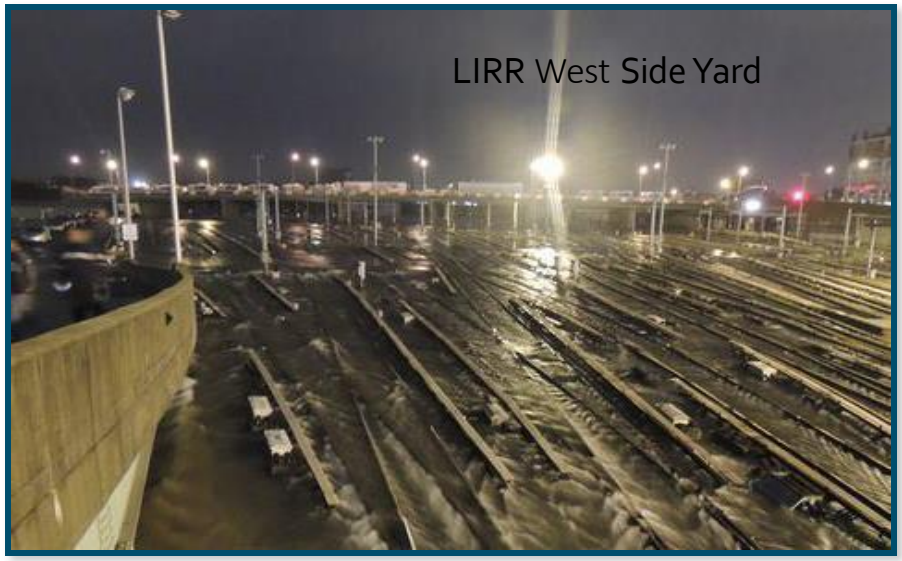
Urban Sustainability
Adaptation & Resiliency

Fortify new buildings against the ravages of climate change or risk rebuilding as global warming worsens

Enhanced building standards that will make our built environment more resilient to extreme weather and climate change while promoting the health, safety, and prosperity of all New Yorkers.

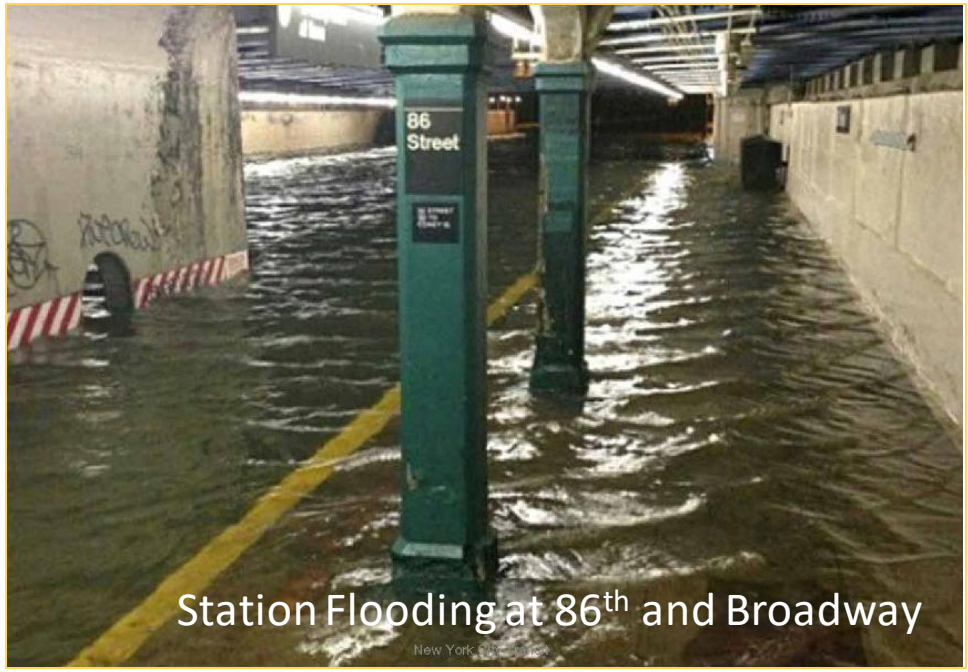
Superstorm Sandy Damage Across the MTA System *Oct 29, 2012*

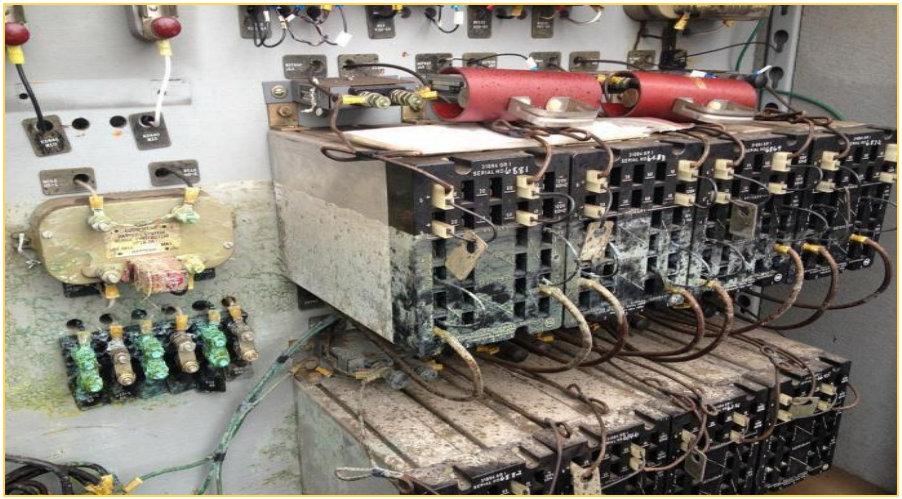




Superstorm Sandy Damage Across the MTA System *Oct 29, 2012*

Superstorm Sandy Damage Across the MTA System *Oct 29, 2012*





Superstorm Sandy Damage Across the MTA System *Oct 29, 2012*

South Ferry Station
Lower Manhattan

ADAPTATION & RESILIENCY

Post SANDY Lessons Learned

Steps	Opportunities to Integrate Climate Vulnerability and Risk
Establish Vision, Goals & Performance Measures	• Consider resilience to climate change in each element of policy framework for statewide and regional long range plans, transportation improvement programs, risk-based transportation asset management plans, and mode-specific plans. • Establish regional and statewide performance measures related to climate change, resilience, and sustainability.
Assess Tradeoffs Between Modes and Programs	• Include climate risk as one key element of an agency's broader risk management framework. Include climate-related risks in agency risk register. • Test implications of various funding allocation decisions at the level of program areas and modes. How do investments in adaptation strategies vs. safety vs. pavement/bridge maintenance vs. mobility affect a state's or region's ability to meet short-term and long-term performance targets?
Formulate and Evaluate Policies, Strategies, and Investments	• Propose specific adaptation strategies based on assessment of regional, subarea, and asset level vulnerability and risk. • Consider cost and feasibility of options. Some adaptations may be relatively expensive (perhaps requiring additional sources of revenue or outside financial support).
Apply Practical Design, Prioritize & Implement	• Make changes to assumptions about climate stressors, particularly for asset classes that have longer useful life and are in high-risk areas. • Conduct "bottom up" prioritization of adaptation investments to complement "top down" program-level tradeoff analysis. • Program adaptation strategies at appropriate time frames given understanding of pace of climate change (including timing of risks) and key milestones.
Monitor Performance Results & Outcomes	• Monitor changing climate conditions and keep abreast of latest climate projections and models to inform design and prioritization decisions. • Amass database of weather events that cause damage or disruption to the transportation system. Archive operational data and damage reports, including costs and duration of closure. • Conduct "plan vs. actual" analysis to measure effectiveness of adaptation investments in reducing or mitigating damage and disruption.

Establish Vision/Goal/Measures

Assess Risks/Trade offs

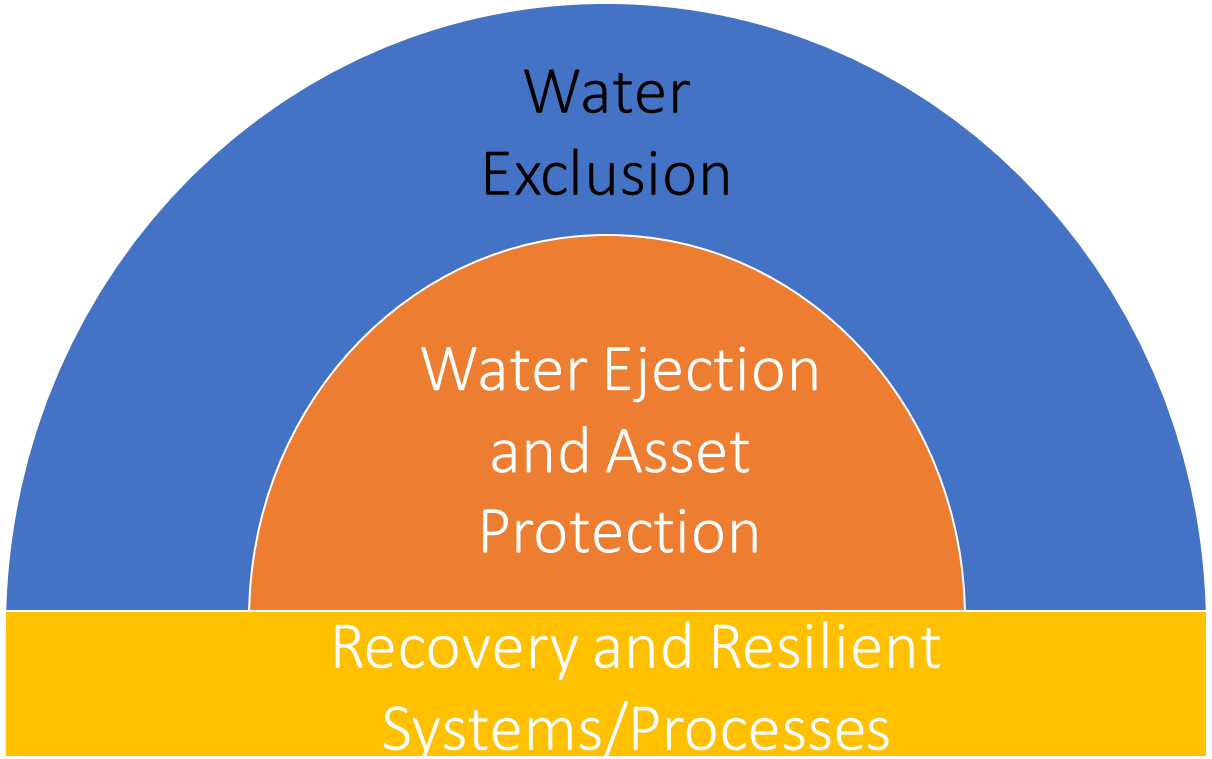
Formulate & Evaluate Policy/Strategy/Investment

Apply Design/Implementation

Monitor Performance/Outcome

MTA's Resiliency Approach

Protective Measures - keep water out
Asset Protection - minimize damage if water enters system
Recovery - expedite service restoration



MTA Climate Policy & Prioritization

- Internal MTA-wide **Climate Adaptation Task Force** & Forums
- Improved **enterprise asset management** which includes location data and vulnerability and criticality metrics
- Coordinated geospatial analyses and the use of **geographic information system (GIS)** and mapping technologies
- Access to **early detection warning systems** including weather sensors and tide gages
- Incorporation of future climate projections into **engineering design standards** (temperature, precipitation, sea-level rise)

MTA Climate Adaptation Task Force

NYC + NE USA Alliance since 2015

MTA CLIMATE ADAPTATION TASK FORCE

Update on agency-wide climate resiliency projects.

2019 Resiliency Report

RESILIENCY & PREPAREDNESS

Rapid Mitigation Measures- Now

Sidewalk Vent Cover

Manhole Inserts

RESILIENCY & PREPAREDNESS

Rapid Mitigation Measures

Water filled Cofferdam

NoFlood Barrier

RESILIENCY & PREPAREDNESS

Rapid Mitigation Measures

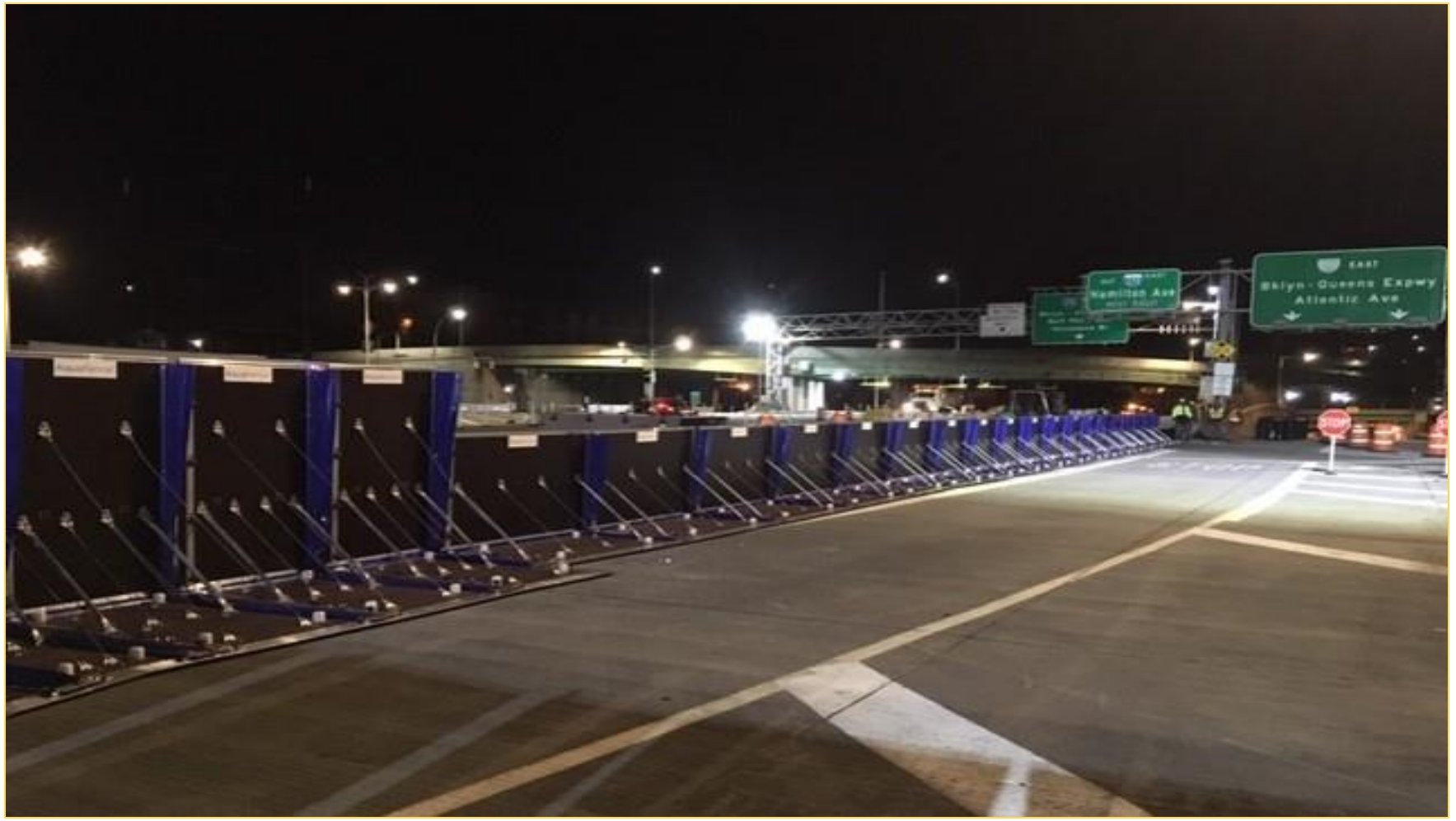
Flex Gate at subway Entrance

RESILIENCY & PREPAREDNESS

Rapid Mitigation Measures

Deployable AquaFence barriers @ tunnel Entrance

Brooklyn Battery/HCLT Tunnel



RESILIENCY & PREPAREDNESS

Mitigation Measures – Then

RESILIENCY & PREPAREDNESS

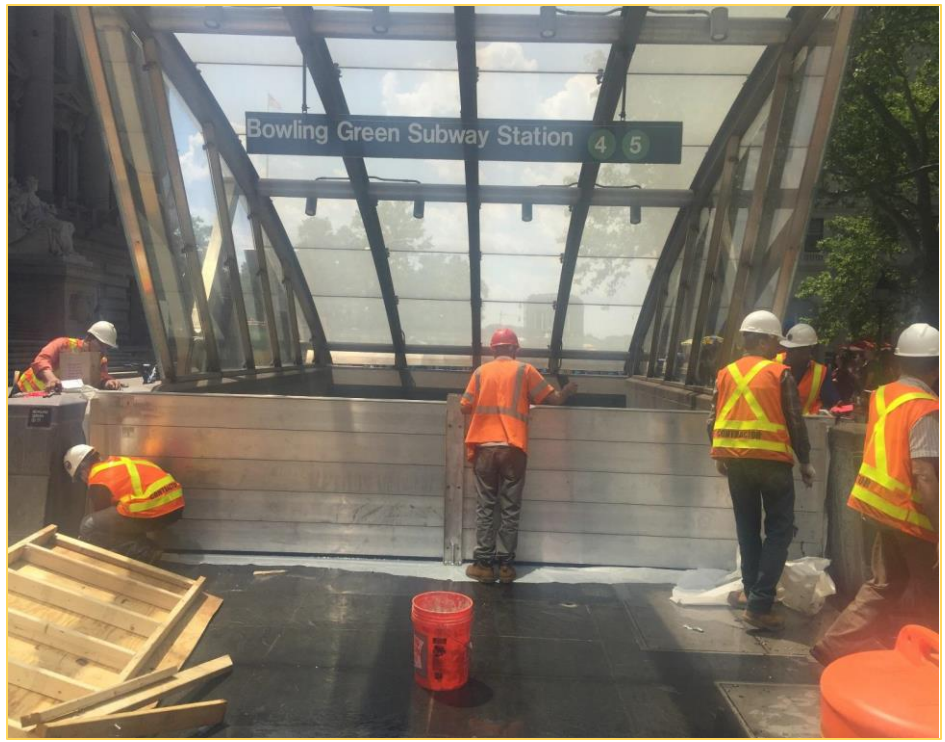
Rapid Mitigation Measures

Portal flood gate @ HCLT Tunnel Entrance

Marine Door @ South Ferry

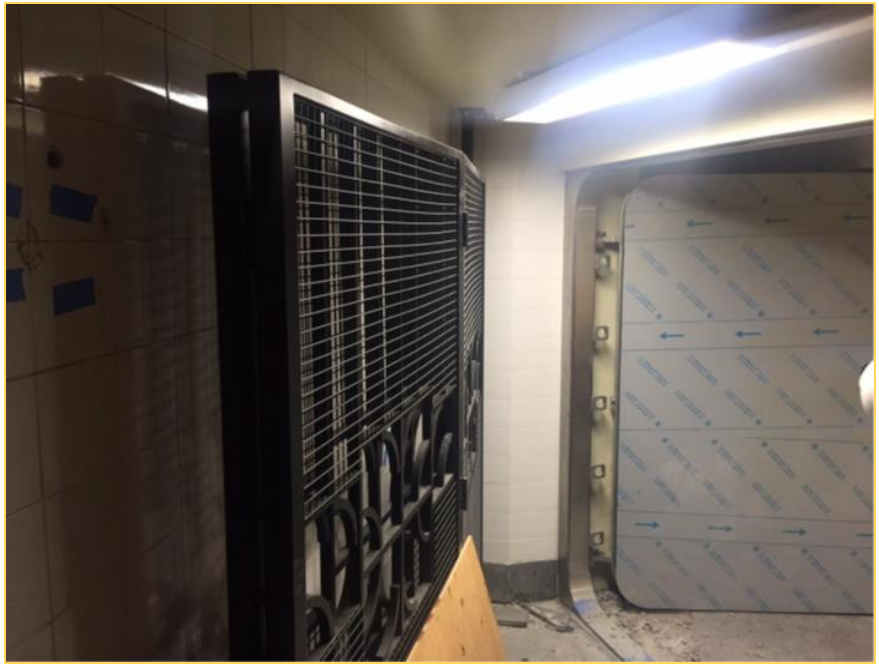
RESILIENCY & PREPAREDNESS

Rapid Mitigation Measures



Flood Logs @ entrance/Bowling Green

Inflatable Marine Door @ Whitehall St



RESILIENCY & PREPAREDNESS

Rapid Mitigation Measures

Entrance Mitigation at South Ferry /Lower Manhattan

Flood panels for doors and windows

RESILIENCY & PREPAREDNESS

Long Term Measures

RESILIENCY & PREPAREDNESS

Long Term Measures

RESILIENCY & PREPAREDNESS

Long Term Measures

LIRR

Elevated Substations

Long Term Measures

LIRR

Long Beach Signal Switch

Emergency back up batteries

MNR

Tarrytown Substation

Croton Harmon Substation

MNR

30 Mile Hudson Line Power and C&S Infrastructure Restoration (Phase I + Phase II): $300 M

30+ Miles Damaged Cables/Splices

Damage

- Power components damaged and failed or with useful life reduced due to salt water intrusion
- C&S cable plant compromised

Scope

- Replace 30+ miles flooded and damaged railroad infrastructure from the Bronx to Croton-Harmon (Phases 1 and 2)
  - 30 miles of communications and signal cable plant
  - Traction power cables and components

Status

- In Procurement Phase
- Preliminary design completed: 9/2014
- Risk Assessment conducted
- Award Design-Build contract (Phase 1) 5/2015; duration 24 months
- An option for the Phase II is anticipated to be awarded in 5/2017, with a duration of 26 months

RESILIENCY & PREPAREDNESS

Long Term Measures

B&T

Sea Wall at Gov. Is Ventilation Bldg

RESILIENCY & PREPAREDNESS

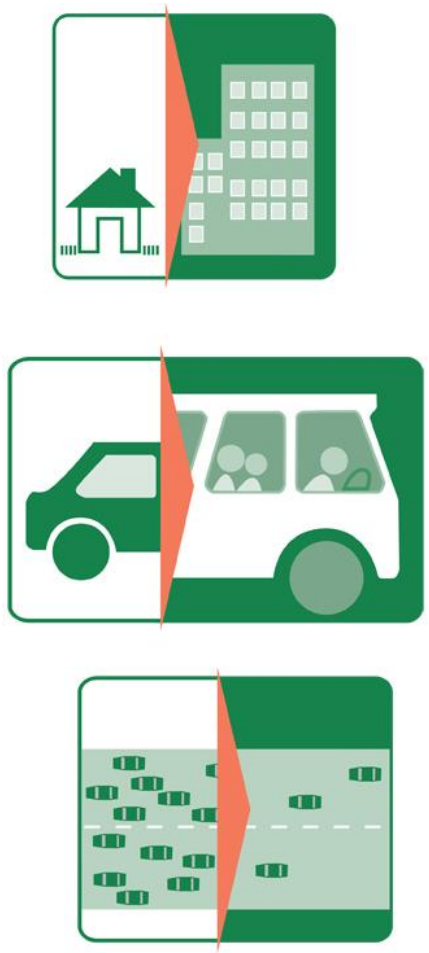
Long Term Measures

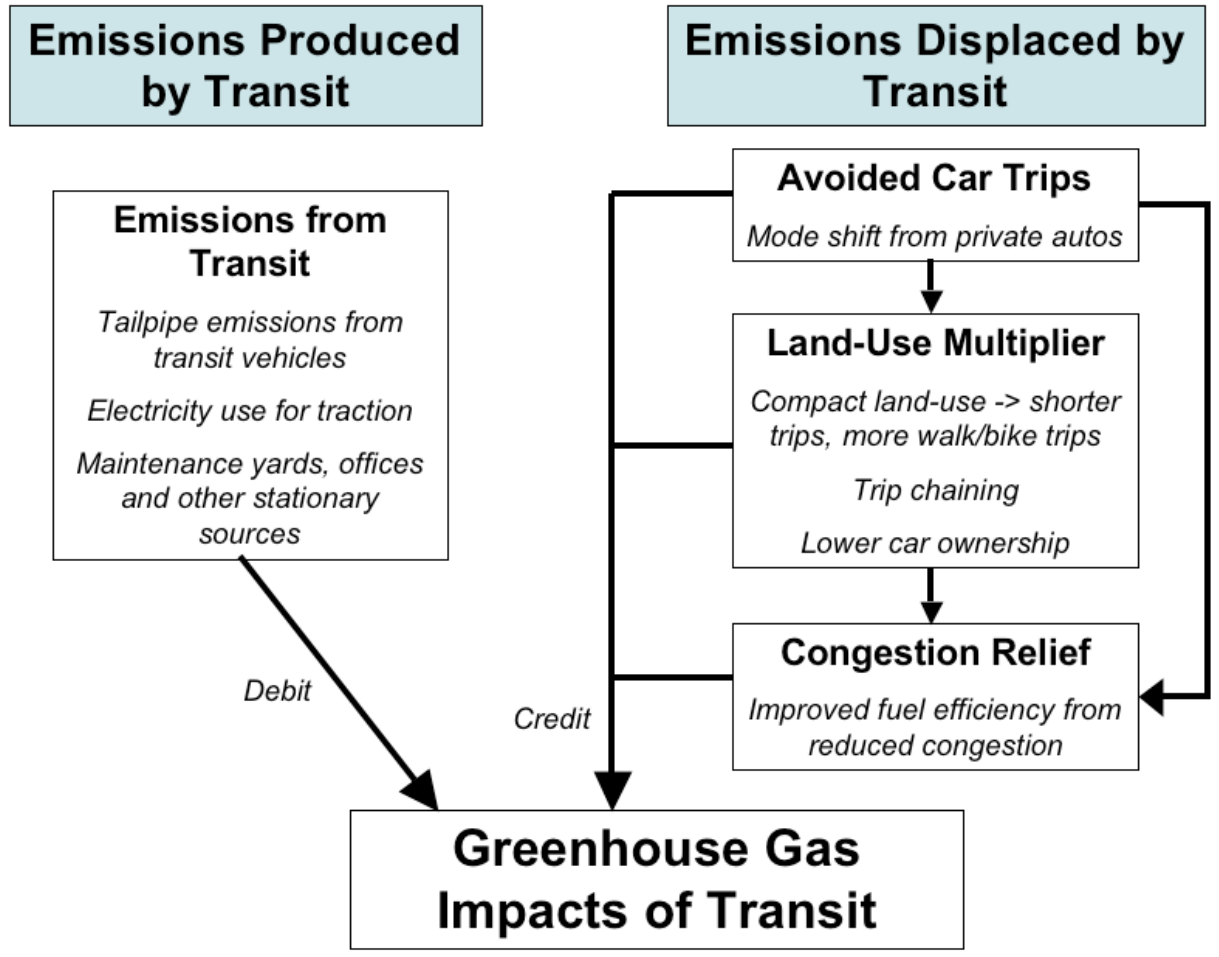
B&T

Restored abutment at Cross Bay Bridge

GHG & Energy Efficiency

Transit GHG Emissions Typology





Per APTA GHG Calculation Format/Standards

ENERGY EFFICIENCY

We are making our facilities, infrastructure, and rolling stock more energy efficient. We're doing this in partnership with the New York Power Authority.

- We are replacing lighting, heating, and cooling systems with energy efficient models. These are paid for through energy savings. They have no impact to capital or operating budgets.

Completed Projects as of March 2019: 168

Avoiding 102,000 metric tons of CO_2 emissions

Annual Energy savings:
208 million kWh
282,000 kW
299,000 gallons of fuel oil
1.6 million therms of natural gas

Active Projects: 42,

Avoiding 24,800 metric tons of CO_2 emissions

Annual energy savings:
30.8 million kWh
45,000 kW
36,900 gallons of fuel oil
1.9 million therms of natural gas

ENERGY EFFICIENCY

Demand response

- We participate in the New York State Independent System Operator (NYISO) and ConEd's demand response programs. The demand response programs pay large consumers to reduce their electrical usage during times of peak demand. This improves the performance and reliability of the electrical grid.
- The MTA has 35 facilities enrolled in Demand Response programs. In addition, the Department of Subways substations are enrolled as a single account. We are working on expanding enrollment and performance. 2018 Annual Demand Reduction Revenue: $1.95 million.

ENERGY EFFICIENCY

Carbon accounting

The MTA is a founding member of The Climate Registry. By reporting our emissions, we work to reduce our greenhouse gas emissions and educate the public in the role that mass transit plays in avoiding carbon emissions.

Reducing Carbon Foot Print

Natural side-lighting at the Corona Maintenance Facility

Natural sky-lighting at the New Corona Car Washer and Maintenance Facility

ENERGY EFFICIENCY

Fuel Cell

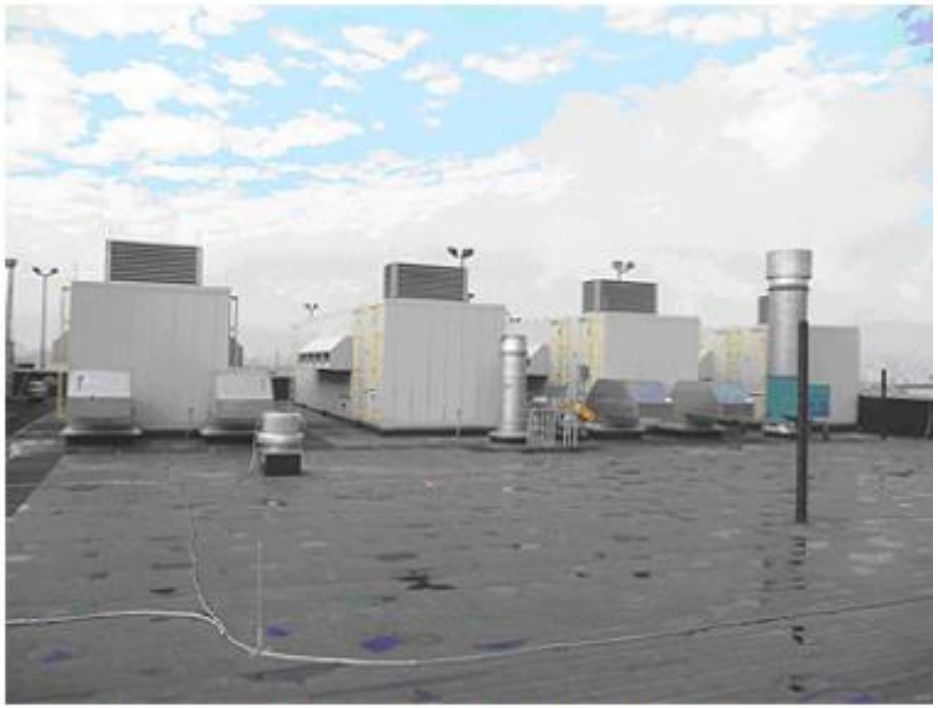
One of the renewable energy sources at the New Corona Car Maintenance Facility in Queens is a 200 kW Fuel Cell unit installed with support from the New York Power Authority. The Corona Maintenance Facility is expected to exceed the New York State code for energy efficiency by 36 percent, and is the first NYC Transit facility certified under the Leadership in Energy and Environmental Design Standard, LEED™, created by the US Green Building Council.

This fuel cell (background) converts hydrogen and oxygen into electricity and heat to save energy.

ENERGY EFFICIENCY

Heat Recovery Units Ventilation systems use a great deal of energy and are costly because they require bringing air from outside a building and adjusting its temperature to maintain an indoor environment.

The roof of the Grand Avenue Bus Depot and Central Maintenance Facility in Maspeth, Queens, has 34 ventilation and heating units. The facility's heat recovery application runs warms air exhausts past the cold winter air that the ventilation system must constantly bringing because of bus fumes and exhausts.



Heat Recovery Units on the roof of the Grand Avenue Bus Depot

Heat conductors warm the fresh air enough to save approximately 48 percent in heating energy costs

ENERGY EFFICIENCY

Regenerative Breaking

- MNR and LIRR have implemented Regenerative Breaking.
- NYCT- The fleet of New Technologies subway cars (also called New Millennium Trains) has regenerative braking- braking action that feeds energy back into the Third Rail that would otherwise be lost as heat when the train stops. These R-142, R-142A, R-143, and R-160 subway car-models run on the 2-3-4-5-6-L-N routes.

ENERGY EFFICIENCY

Aluminum Rail

Since aluminum is a better conductor of electricity than steel, NYC Transit is experimenting with two kinds of aluminum third rails to save energy:

- an all-aluminum rail with a stainless steel cap on its contact surface; and
- a steel-and-aluminum hybrid rail that has a steel base and aluminum cladding on its sides.

Aluminum is also lighter than steel, which means aluminum-component rails are easier to handle, install, and replace than conventional steel rails.

RECYCLE/REUSE/WASTE MANAGEMENT

Construction Waste MTA has diverted thousands of tons of traditionally landfill-bound construction waste for recycling. The Grand Avenue Bus Depot and Central Maintenance Facility in Maspeth Queens; and the rehabilitated Stillwell Avenue Terminal, Brooklyn; and Subway Station Roosevelt Avenue-74th Street, Queens, rehabilitation projects recycled up to 85 percent of construction debris, including concrete, metal, glass and paper.

EO 4 and Beyond MTA is looking at various initiatives for its internal (agency wide) paper use thereby reducing waste by implementing technology/Apps to encourage its employees and vendors to minimize paper printing.

Source Separation Recycling
From train yards, bus depots and other facilities. Apprx 750 tons per year.

Post-Collection Recycling
From public facing areas of the system. Apprx 6,800 tons of recyclables/year

Bales of recyclables from subway platform refuse

RECYCLE/REUSE/WASTE MANAGEMENT

Retiring of rail cars into the sea at the end of its useful life to serve as artificial reef.

These subway cars, going underwater instead of underground, will serve as artificial reefs.

An erstwhile subway car, now a habitat for underwater travelers.

CONSERVATION

Water Conservation for Subway Car and Bus Washing

The Grand Avenue Bus Depot and Maintenance Facility has a bus washing reclamation system with a 200,000-gallon underground tank that stores rainwater collected from the roof of the building. The system uses the water to wash buses, and recycles 80 percent of the wash water for non-potable uses.

The Corona Car Washer and Maintenance Facility has a rainwater collection system to drain rainwater into a 40,000-gallon underground storage tank, then sends this water to a subway car washer. Read more about the bus and car washer under Water Conservation.

A bus enters the washing system at the Grand Avenue Bus Depot and Maintenance Facility in Maspeth, Queens. The facility uses rainwater.

After the wash, the now "gray" rainwater goes into this blue bin. The white tanks filter the water.

STORM WATER MANAGEMENT

Storm Water Management Program MTA created a Storm Water Management Program (SWMP) in accordance with United States Environmental Protection Agency requirements for storm water regulations under the Federal Clean Water Act.

The program establishes procedures to reduce pollutants caused by storm water runoff at MTA facilities. Pollution control measures include construction-site runoff controls, spill response and prevention, and waste management. Click here for more information:

United Nations C4C

MTA's Participation in the Global Climate Agenda & COP21

May 2015

MTA becomes a Signatory Participant at UN's Caring for Climate Program.
MTA's C4C Commitment Goals were:

- 20% Energy Reduction at all MTA Facilities
- Develop MTA wide Climate Adaptation Guidelines
- Continue to Develop and Implement Sustainable Strategies in Capital Projects

November 2015

MTA is Featured by UNFCC at COP21 in Paris for Post Sandy Strategies.

December 2016

MTA Meets C4C Goal #1

ENERGY EFFICIENCY

Extensive coordination with multiple stakeholders to successfully scale up Electric Bus deployments

ENERGY EFFICIENCY

AEB- PILOT to Test & Evaluate 25 buses
Scale-up based on results

- MTA has 25 electric buses in operation (10 standard + 15 articulates).
  - The 10 standard buses are leased and were delivered January 2018. Five are in Manhattan, the other 5 in Brooklyn.
  - The 15 articulates run out of Manhattan along the M14A/D SBS routes and along the M60 SBS that goes to LGA, so it operates in both Manhattan and Queens.

- **Scale up** to **500** buses
  - 2020-2024 Capital Program

An electric articulated bus saves about 7,600 fewer gallons of diesel per year.

ENERGY EFFICIENCY

Charging Infrastructure - Williamsburg Bridge Plaza Brooklyn, New York

RENEWABLE ENERGY/ MTA Solar

Photovoltaic (PV) Panels

- The 300kW system on the roof of the Gun Hill Road Bus Depot in the Bronx is one of the largest PV facilities on the East Coast.
- The New Corona Car Washer and Maintenance Facility, Queens, has a 100kW rooftop system.
- The 60,000-square-foot photovoltaic canopy over the Stillwell Avenue Subway Terminal (Coney Island-Stillwell Avenue Station, Brooklyn) produces 250kW of clean power.
- The Roosevelt Avenue-74th Street Station, Queens, produces 65 kW of power using two PV systems: a "conventional" system is on the roof; the second system, comprised of thin-film solar panels, is mounted to the metal standing seam canopy on the elevated subway platform.

RENEWABLE ENERGY/ MTA Solar

Digital representation of Solar Panel installation at Coney Island Yard Facility

On Earth Day 2019, MTA Launched MTA Solar Initiative identifying more than 100 million sf roof space suitable for solar development.

The Paris Agreement's central aim is to strengthen the global response to the threat of climate change by keeping a global temperature rise this century well below 2°C above pre-industrial levels and to pursue efforts to limit the temperature increase even further to 1.5°C.

The transport sector accounts for 20% of global carbon emissions

Science Based Targets (SBT)

Emissions Pathway for Paris Climate Agreement Alignment

SCIENCE BASED TARGETS

An initiative by

CDP DISCLOSURE INSIGHT ACTION

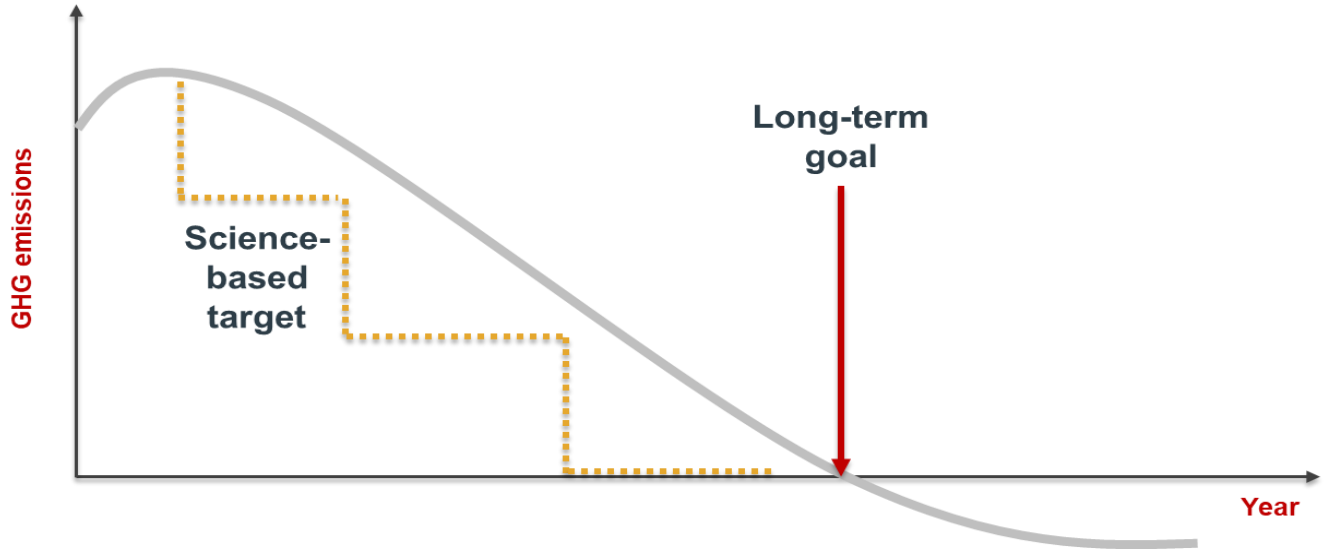
UN GLOBAL COMPACT

WWF

WORLD RESOURCES INSTITUTE

What are Science Based Targets?

- Align global economy with Paris Agreement emissions reduction targets to limit global warming well below 2°C, with a target limit of 1.5°C.
- SBT are consistent with long-term goal of net-zero emissions in 2nd half of 21st century.



How are Science Based Targets Developed?

Targets are compliant with absolute reductions in GHG emissions required for a well-below 2°C warming scenarios

Targets are itemized based on Concept of Scope (areas where ACTON ITEMS/TARGETS/INITIATIVES come from):

Scopes identify high level GHG inventories and emissions, divided three ways.

SCOPE 1 - DIRECT- emissions from sources that are owned or controlled by the reporting organization. (Facilities, Vehicles)

SCOPE 2- INDIRECT- emissions from the generation of electricity heater steam that's been purchased and consumed by the reporting entity. *(Purchased Electricity, Steam, Heating & Cooling for use)*

SCOPE 3- INDIRECT- emissions from all other sources that are owned or controlled by some other third party - a broad category encompassing emissions from the manufacturer of purchased goods and services, (*vendor emissions while manufacturing rail car, bus, equipment etc).*

MTA Setting Target for SBTI by 2021

MTA Emissions Pathway for Paris Climate Agreement Alignment

MTA sets three separate targets, using 2015 as our baseline, on a 15-year goal:

Weighted average reduction in emissions per passenger mile across all revenue-generating transportation modes

Reduction in absolute emissions from non-revenue activities

Reduction in absolute emissions from supply chain, supported by Carbon Disclosure Project (CDP


© Simon Velu 2011
7

Discussion

Transportation Advisory Panel Members

Marie Therese Dominguez, Chair
NYSDOT

Jared Snyder
NYSDEC

Paul Allen, M. J. Bradley & Associates

Dimitris Assanis, Stony Brook University

Steve Finch, AAA Western & Central New York

Albert Gore III, Tesla

Kendra Hems, Trucking Association of New York

Elgie Holstein, Environmental Defense Fund

Renae Reynolds, New York City Environmental Justice Alliance

Porie Saikia-Eapen, Metropolitan Transit Authority

John Samuelsen, Transport Workers Union of America AFL-CIO

Nick Sifuentes, TriState Transportation Campaign

Kerene Tayloe, WE ACT for Environmental Justice

Julie Tighe, NYS League of Conservation Voters

Craig Turner, Buffalo Niagara International Trade Gateway Organization

Nancy Young, Airlines for America

Bob Zerrillo, New York Public Transit Association

Panel Sub-Groups/ Policies Under Consideration

Sub-Group Policies Under Consideration

Electrification and Low Carbon Fuels/Renewables

- Sub-Work Group Members
  - Julie Tighe
  - Nick Sifuentes
  - Kendra Hems
  - Nancy Young
  - Elgie Holstein
  - Albert Gore
  - Paul Allen
  - Renae Reynolds
  - Steve Finch
  - Jared Snyder
  - Adam Ruder (staff lead - electrification)
  - Nathan Putnam (staff lead - fuels)

Sub-Group Policies Under Consideration

Market-Based Policies/Finance and Funding

- Sub-Work Group Members
  - Nick Sifuentes
  - Paul Allen
  - Kendra Hems
  - Julie Tighe
  - Elgie Holstein
  - Jared Snyder
  - Jason Pandich (staff lead)

Sub-Group Policies Under Consideration

Smart Growth/System Optimization

- Sub-Work Group Members
  - Porie Saikia-Eapen
  - Kendra Hems
  - Renae Reynolds
  - Bob Zerrillo
  - Paul Beyer, DOS (staff lead)

Sub-Group Policies Under Consideration

Public Transportation

- Sub-Work Group Members

  - Porie Saikia-Eapen
  - Bob Zerrillo
  - Nick Sifuentes
  - Kerene Tayloe
  - John Samuelsen
  - Ron Epstein, DOT (staff lead)

Sub-Work Groups Assignments

- Develop policy options for consideration by TAP
- Identify additional research/analysis needs necessary to progress potential policies
- Identify core experts/stakeholders to inform Sub-Work Group deliberations
- Coordinate with other Sub-Work Groups on areas of mutual interest/overlap (e.g., land use, finance)

Transportation Advisory Panel Members

Marie Therese Dominguez, Chair
NYSDOT

Jared Snyder
NYSDEC

Paul Allen, M. J. Bradley & Associates

Dimitris Assanis, Stony Brook University

Steve Finch, AAA Western & Central New York

Albert Gore III, Tesla

Kendra Hems, Trucking Association of New York

Elgie Holstein, Environmental Defense Fund

Renae Reynolds, New York City Environmental Justice Alliance

Porie Saikia-Eapen, Metropolitan Transit Authority

John Samuelsen, Transport Workers Union of America AFL-CIO

Nick Sifuentes, TriState Transportation Campaign

Kerene Tayloe, WE ACT for Environmental Justice

Julie Tighe, NYS League of Conservation Voters

Craig Turner, Buffalo Niagara International Trade Gateway Organization

Nancy Young, Airlines for America

Bob Zerrillo, New York Public Transit Association

Logistics for Public Input Meeting

www.Climate.ny.gov

Public Input

- **E-mail:** Transportation.publiccomment@dot.ny.gov
- **Letter**

  Transportation Advisory Panel
  C/O Abigail Schultz
  6th Floor, Room 6N23
  50 Wolf Road
  Albany, New York 12232

- **Public Comment Period during Panel Meeting – Date TBA**

Transportation Advisory Panel Members

Marie Therese Dominguez, Chair
NYSDOT

Jared Snyder
NYSDEC

Paul Allen, M. J. Bradley & Associates

Dimitris Assanis, Stony Brook University

Steve Finch, AAA Western & Central New York

Albert Gore III, Tesla

Kendra Hems, Trucking Association of New York

Elgie Holstein, Environmental Defense Fund

Renae Reynolds, New York City Environmental Justice Alliance

Porie Saikia-Eapen, Metropolitan Transit Authority

John Samuelsen, Transport Workers Union of America AFL-CIO

Nick Sifuentes, TriState Transportation Campaign

Kerene Tayloe, WE ACT for Environmental Justice

Julie Tighe, NYS League of Conservation Voters

Craig Turner, Buffalo Niagara International Trade Gateway Organization

Nancy Young, Airlines for America

Bob Zerrillo, New York Public Transit Association

Next Steps/Open Discussion

Transportation Advisory Panel Members

Marie Therese Dominguez, Chair
NYSDOT

Jared Snyder
NYSDEC

Paul Allen, M. J. Bradley & Associates

Dimitris Assanis, Stony Brook University

Steve Finch, AAA Western & Central New York

Albert Gore III, Tesla

Kendra Hems, Trucking Association of New York

Elgie Holstein, Environmental Defense Fund

Renae Reynolds, New York City Environmental Justice Alliance

Porie Saikia-Eapen, Metropolitan Transit Authority

John Samuelsen, Transport Workers Union of America AFL-CIO

Nick Sifuentes, TriState Transportation Campaign

Kerene Tayloe, WE ACT for Environmental Justice

Julie Tighe, NYS League of Conservation Voters

Craig Turner, Buffalo Niagara International Trade Gateway Organization

Nancy Young, Airlines for America

Bob Zerrillo, New York Public Transit Association