

Electric Vehicle Forecast Impacts (Gold Book 2021)

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Electric Vehicles Forecast: Gold Book 2021

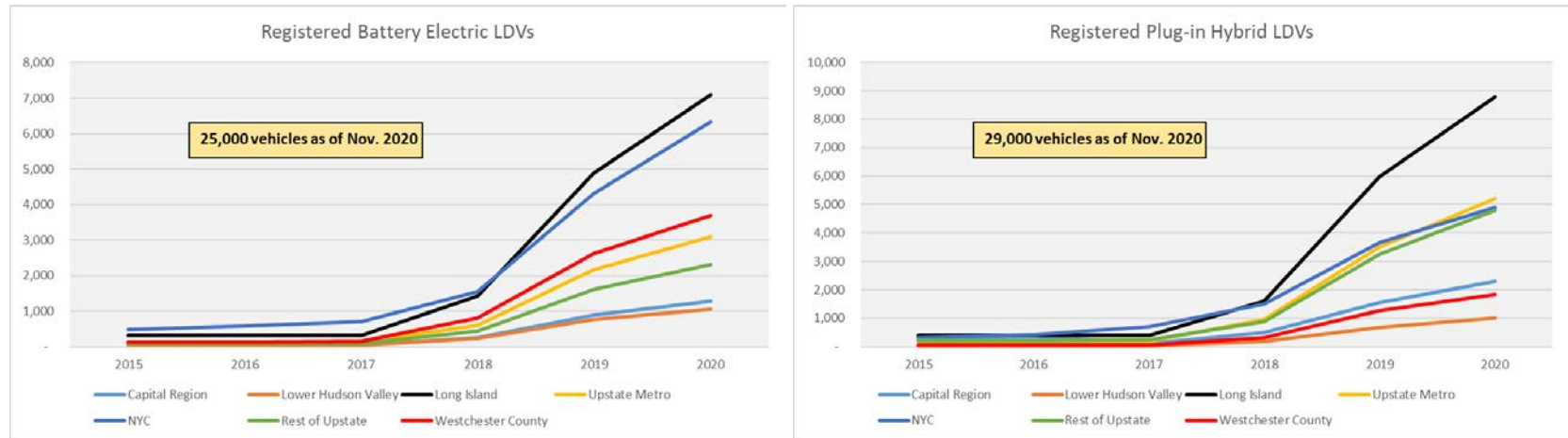
- Electrification of Transportation is a key component of the New York's decarbonization agenda as delineated in policy documents pertaining to the Climate Leadership and Community Protection Act (CLCPA);
- This presentation provides an overview of the methodology used to develop the Gold Book 2021 forecast of Electric Vehicles (EV) charging on energy and seasonal peaks in the New York Control Area (NYCA).

EV Impact Forecast Framework

- **2021 Gold Book forecast covers 3 EV categories:**
 - Light-duty passenger (LDV; eLDV: Electric Light Duty Vehicle),
 - Light-, Medium- & Heavy-duty trucks (LDT, MDT, HDTs), and
 - Transit & School buses
- **For each category, the impact calculations involved**
 - Vehicle adoption/penetration trends; i.e., annual counts,
 - Parameters including Vehicle Miles Traveled (VMT), battery efficiency (kWh/mile), efficiency trends, changing mix of charging (Residential/Public, Level 1/Level 2/High Voltage DC [HVDC]), and
 - Diurnal charging profiles modulated for weekends, seasonal variations

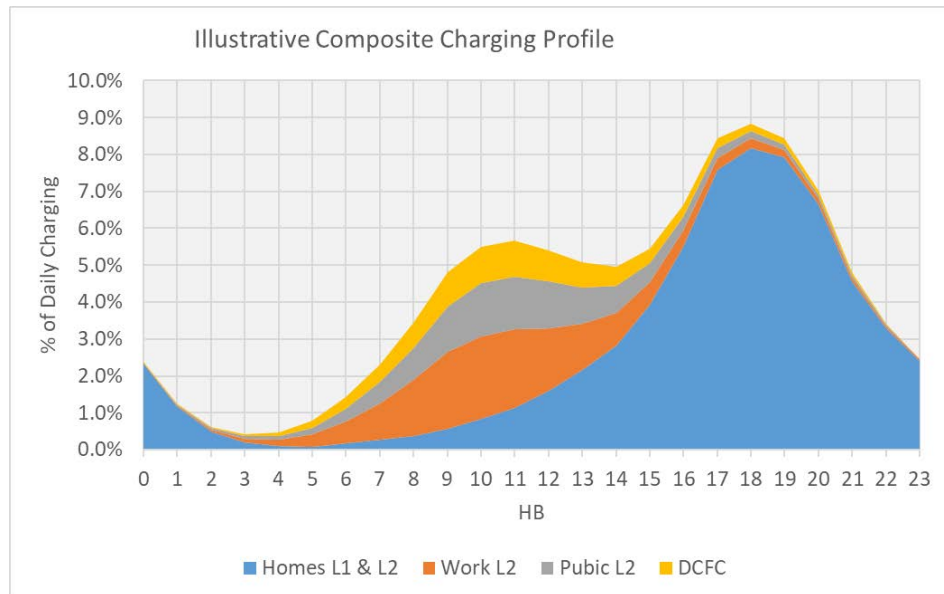
Demographic, automotive & historical vehicle stock data was obtained from a range of sources: *Cornell University's Program on Applied Demographics, NY Department of Motor Vehicles (NYDMV), Federal Transportation Authority, U.S. Bureau of Transportation Statistics, and National Renewal Energy Laboratory (NREL), etc.*

NY EV Stock as of Nov. 2020 (Corrected)



- The last 3 years has seen rapid growth in Battery LDV adoption and as more models become available, Plug-in Hybrid Electric Vehicles (PHEVs) are predicted to have a declining share;
- eTruck and eBus stocks are relatively sparse but 2021 is expected to see the start of growing penetration

Aspects of eLDV Charging Impacts

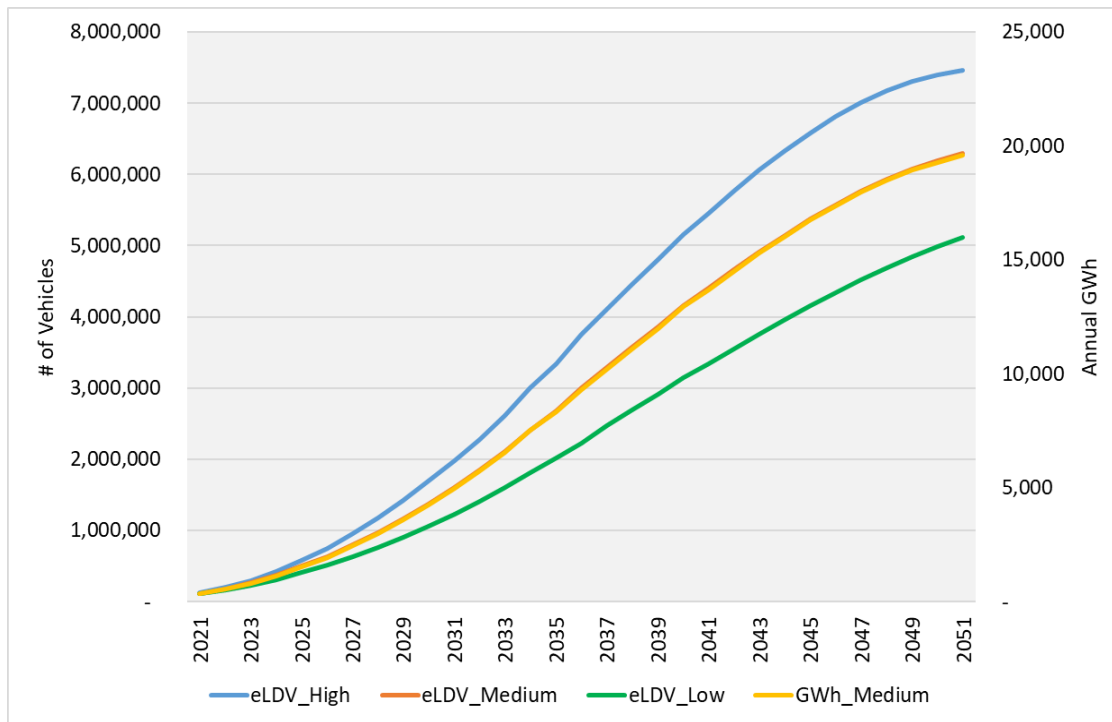


This notional profile changes over time as share of non-residential charging grows, and across space with greater reliance on non-residential in urban locales due to concentration of multi-family homes.

- VMT (NY avg. = 12,600) varies with NYC counties with the lowest and rural Upstate the highest figures;
- Charging impact higher in winter due to heating needs;
- Weekend charging is relatively lower than weekdays;
- Greater share of L2 and direct-current fast charger (DCFC) impacts hourly/peak loads but not annual energy needs;
- Socioeconomic factors affect adoption of L2 in residential charging;
- Starting at 0.28 kWh/mile for 2021, average battery efficiency improves over time;
- 75% of PHEV VMT rely on battery.

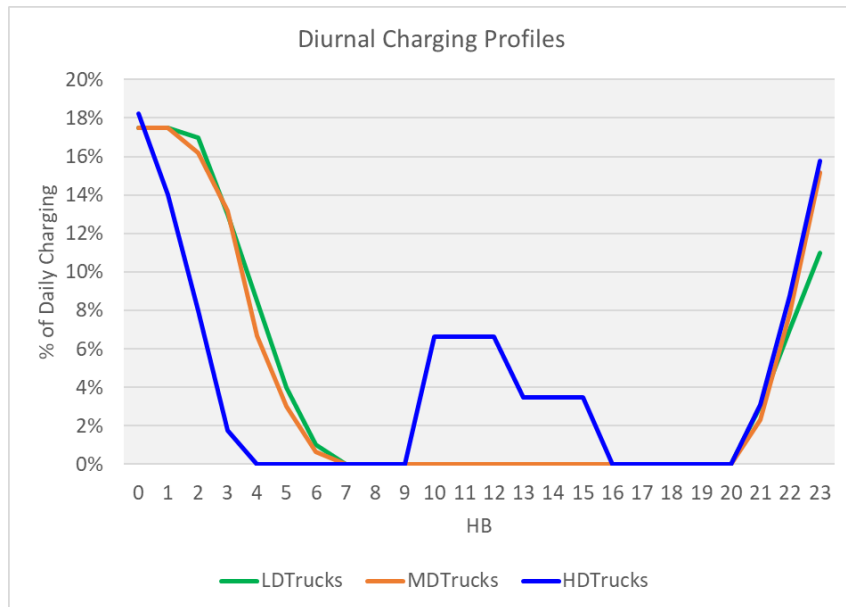
Level 1 (L1): 1.4 kW; Level 2 (L2): 7.1 kW

NYCA eLDV Stock & GWh Forecast



- Forecast based on a stock-replacement method;
- NY's Stock of LDVs – currently a bit over 9 million – is projected to decline due to population trends;
- Energy impacts reflect a 'grossing up' to capture Transmission and Distribution losses

Aspects of eTruck Forecast



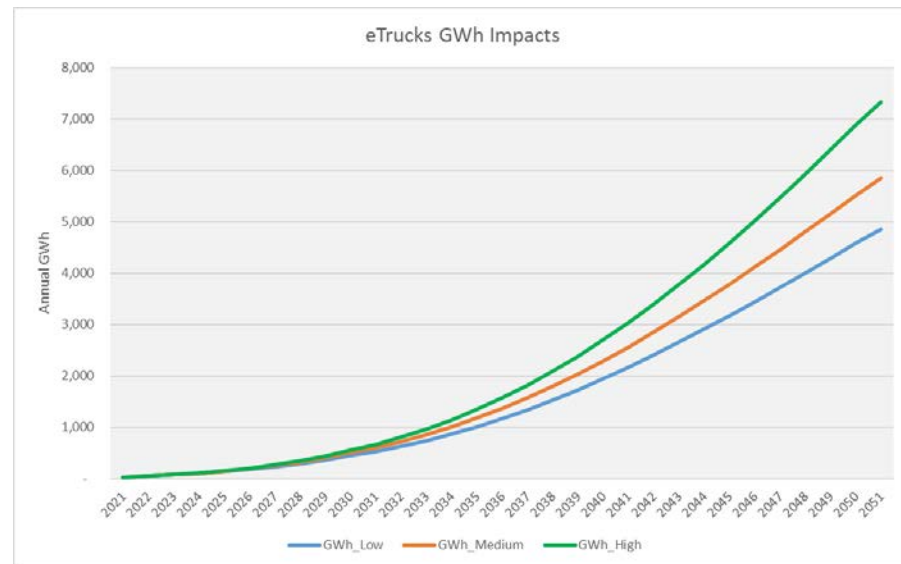
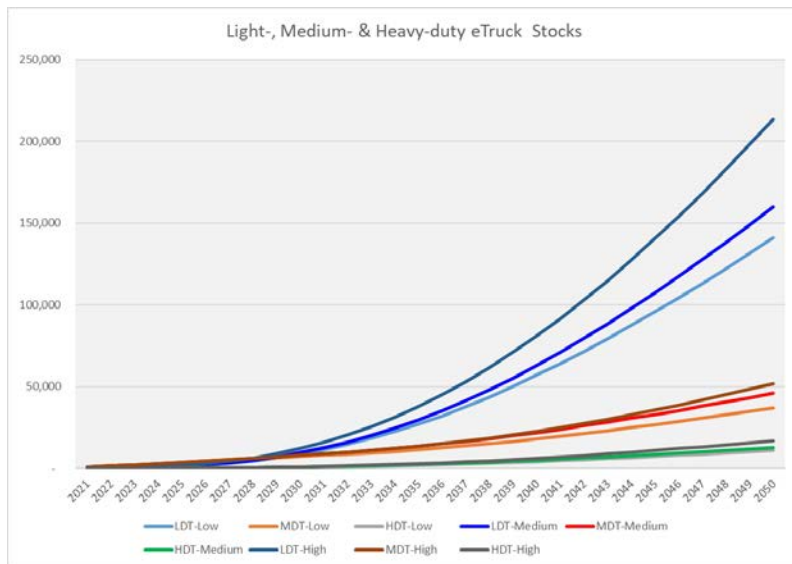
	LDT	MDT	HDT
VMT	23,725	36,500	62,900
kWh/mile ₂₀₂₁	0.50	0.83	1.80

- Starting with a 2020 stock of 735,000 trucks (per New York Department of Motor Vehicles), the sub-zonal forecast is based on a stock-adjustment approach that incorporates industry scrappage rates and a relationship between commercial fleet and demographics;
- Dynamics of eTruck penetration differ from that of eLDVs due to anticipated fleet-level decisions to retrofit drive-trains and acquire battery vehicles.

LDT reflects Class 2 Vans; MDT includes Class 3-4 Vans, Walk-ins, Shuttles & Urban Delivery ; HDT includes Drayage, Short- & Long-haul, Construction & Refuse.

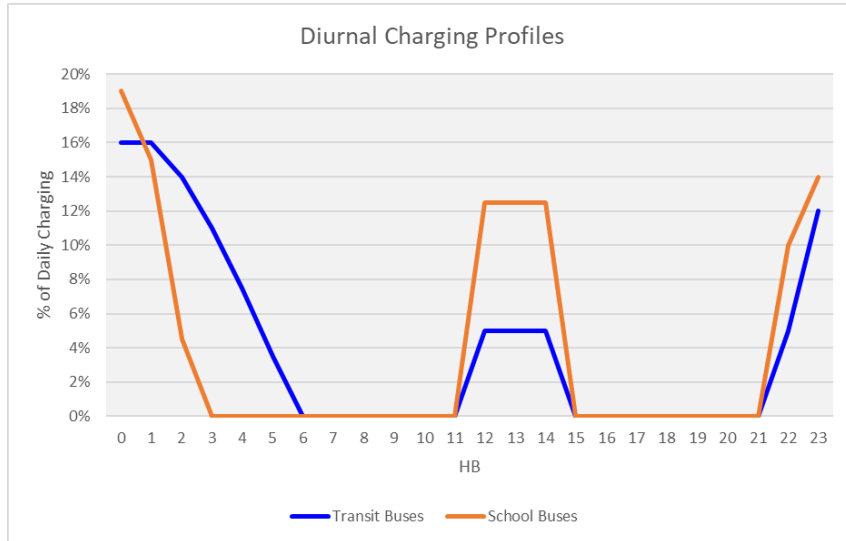
Source: Comparison of Medium- and Heavy-Duty Technologies in California, prepared by ICF for California Energy Commission (CEC), Dec. 2019.

NYCA eTrucks Stock & GWh Forecast



NYS Medium- & Heavy-duty Zero Emissions Vehicle MOU calls for 30% of new truck and bus sales to be zero-emission by 2030. The 'High' case of this forecast reaches that goal by 2034 for trucks.

Aspects of eBus Forecast

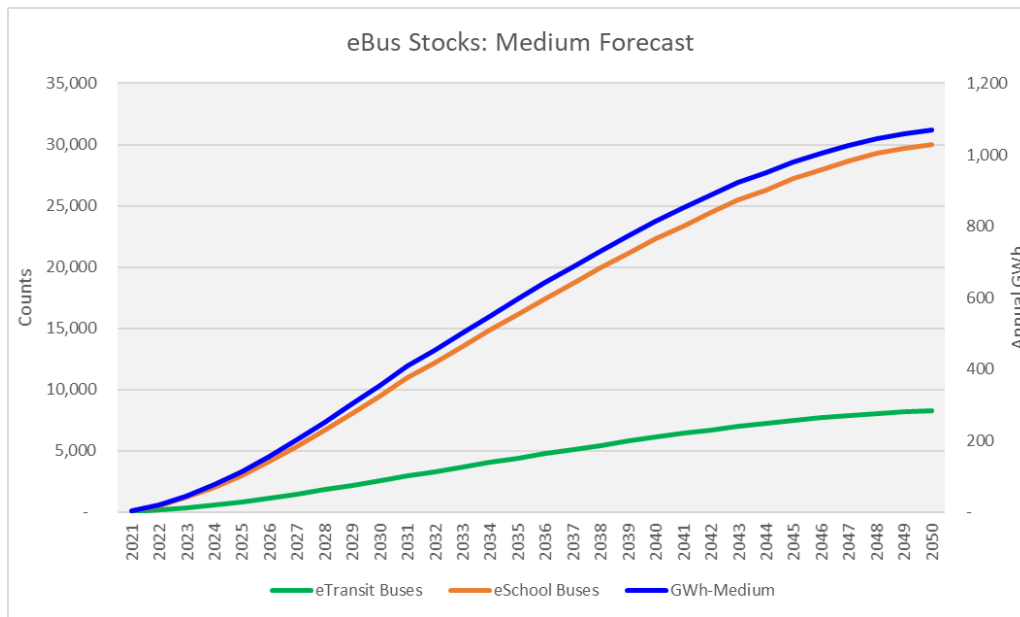


- Starting with 2020 stocks of 8,250 Transit Buses and 35,700 School Buses (per Federal Transit Authority & NYDMV, respectively), the sub-zonal forecast is based on demographic trends– with School Bus forecasts modeled as driven by projections of the 5-19 year-old cohort;
- Statewide pilots of eBuses across municipal areas and school districts have been in progress since 2019;
- Unlike LDVs and eTrucks, the speed of penetration of eBuses is dependent on state and local funding.

Statewide average VMT for Transit Buses and School Buses are 32,200 and 11,500, respectively – with Downstate figures relatively lower than Upstate ones. Average battery efficiencies are 2 kWh/mile and 1.9 kWh/mile, respectively.

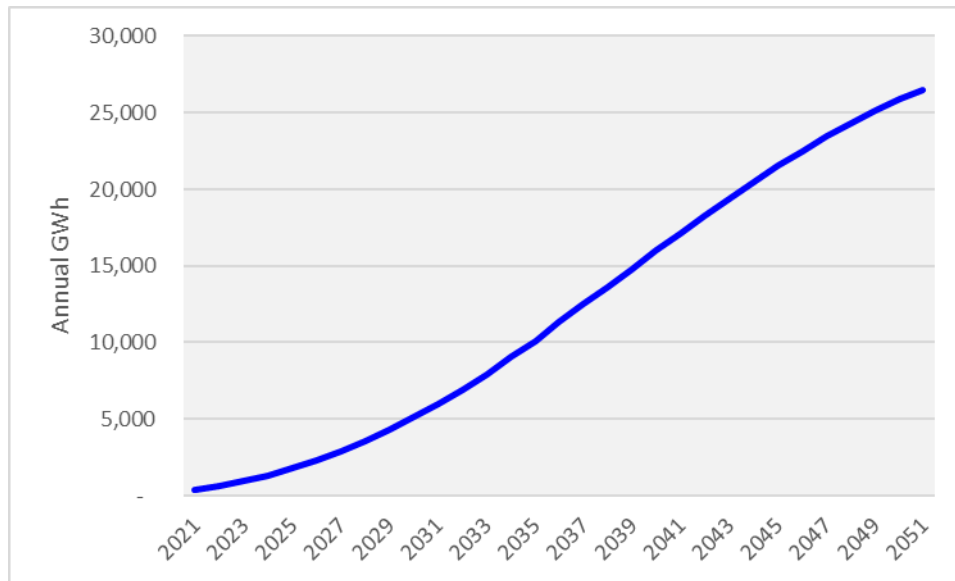
Source: see Slide 8

NYCA eBus Stocks & GWh Forecast



Consistent with NYS Medium- & Heavy-duty Zero Emissions Vehicle MOU, this 'Medium' forecast reflects the goal that 30% of new bus sales be zero-emission by 2030.

NYCA EV GWh Forecast



This Gold Book 2021 forecast reflects the combined charging impact of electric Light-duty Passenger Vehicles, Light-, Medium- and Heavy-duty Trucks, Transit Buses and School Buses.

Questions?

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- Operating open, fair and competitive wholesale electricity markets
- Planning the power system for the future
- Providing factual information to policymakers, stakeholders and investors in the power system

