New York ISO
Independent System Operator

2024 Electric Vehicle Forecast Update

Max Schuler

Demand Forecasting & Analysis

LFTF/ESPWG

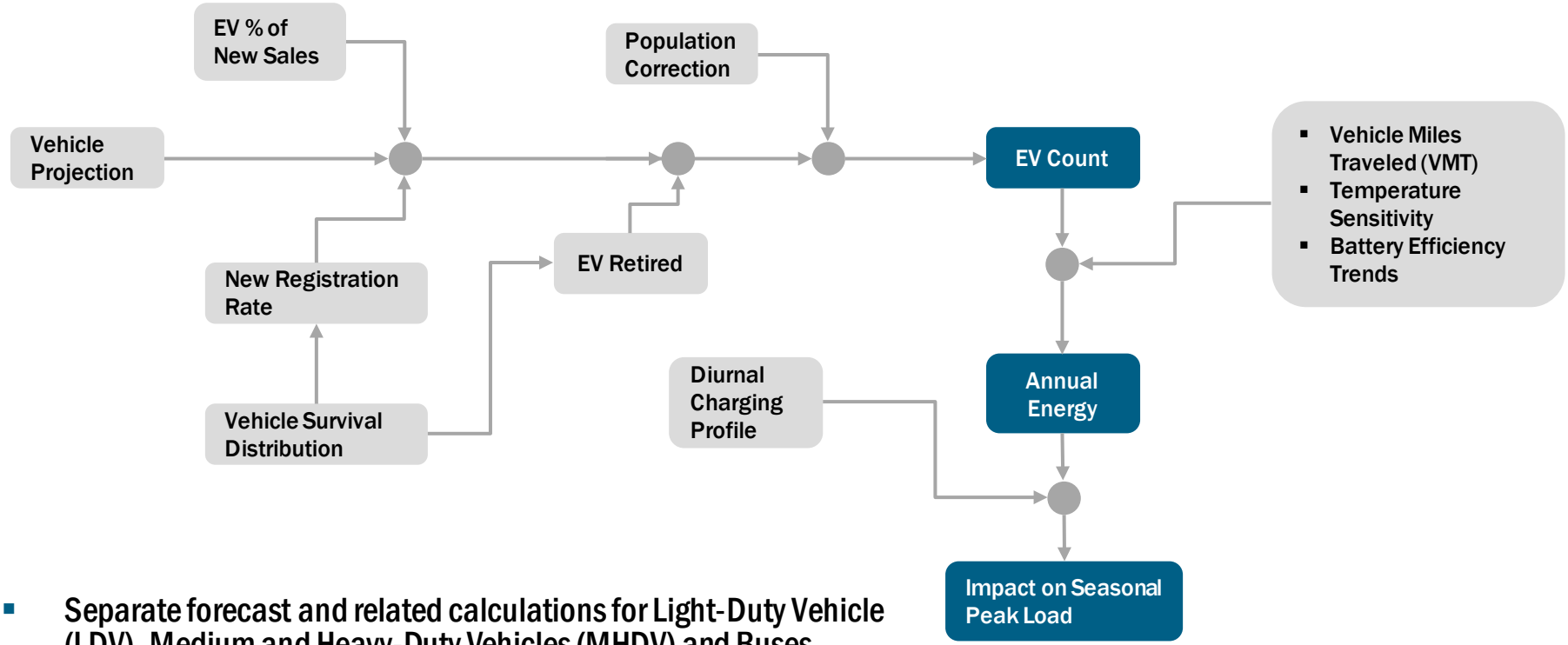
March 21, 2024

Agenda

- Electric Vehicle (EV) Forecast Methodology
- EV Stock Forecast Assumptions
- EV Stock Forecast
- EV Energy Forecast
- EV Peak Impact Assumptions

New York ISO

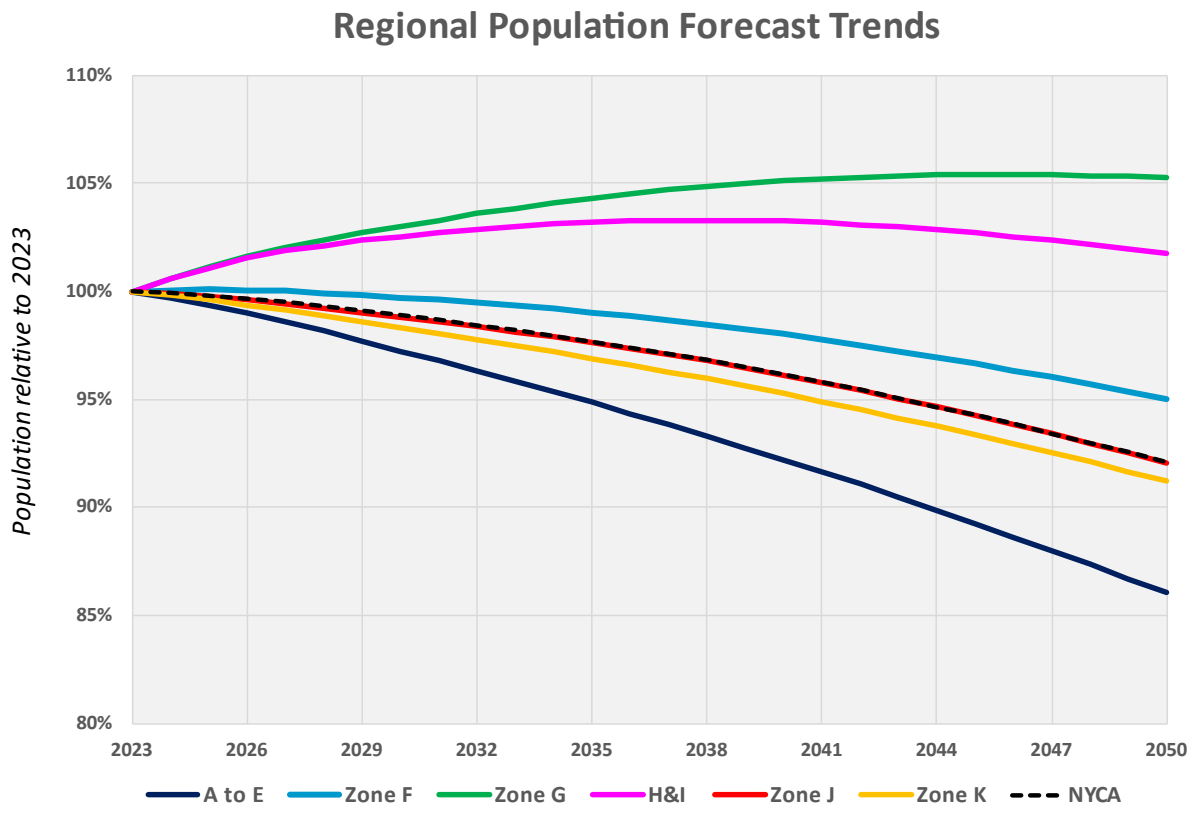
EV Forecast Methodology



- Separate forecast and related calculations for Light-Duty Vehicle (LDV), Medium and Heavy-Duty Vehicles (MHDV) and Buses
- Further separation for Transit and School buses

New York ISO

Population Projections



Population projections are derived from Moody's Analytics data delivery.

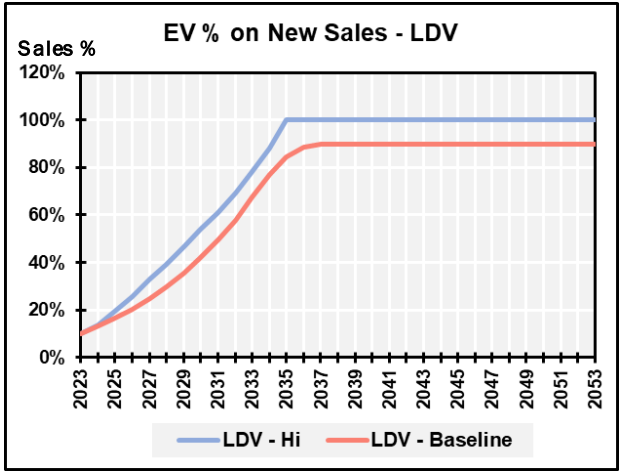
- Downward trend in population forecast. Statewide forecast drops to approximately 18 million in 2050
- Constant vehicle per capita assumption
- Downward trend in total vehicles on road over the forecast horizon
- Starting vehicles on road count estimated with data from EValuateNY and the NY DMV

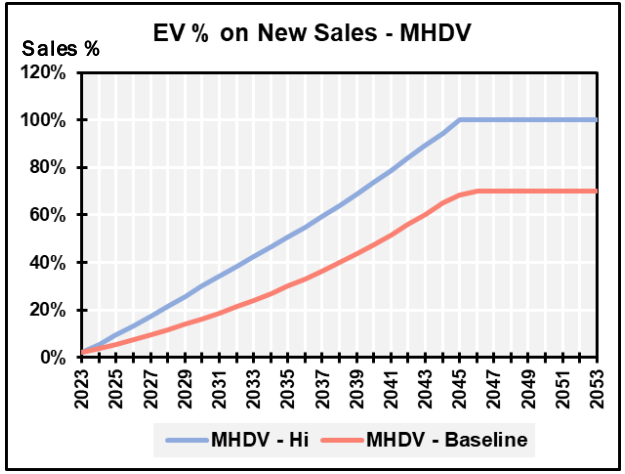
Zonal Population Change

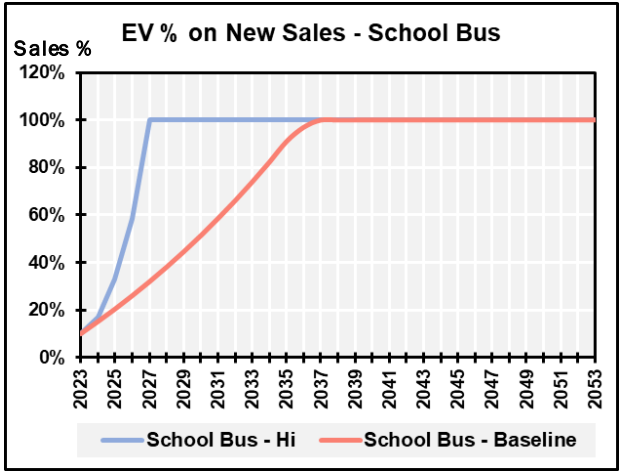
2023 to 2050

A	-15%	G	5%
B	-11%	H	2%
C	-14%	I	2%
D	-18%	J	-8%
E	-16%	K	-9%
F	-5%	NYCA	-8%

EV Sales Assumptions



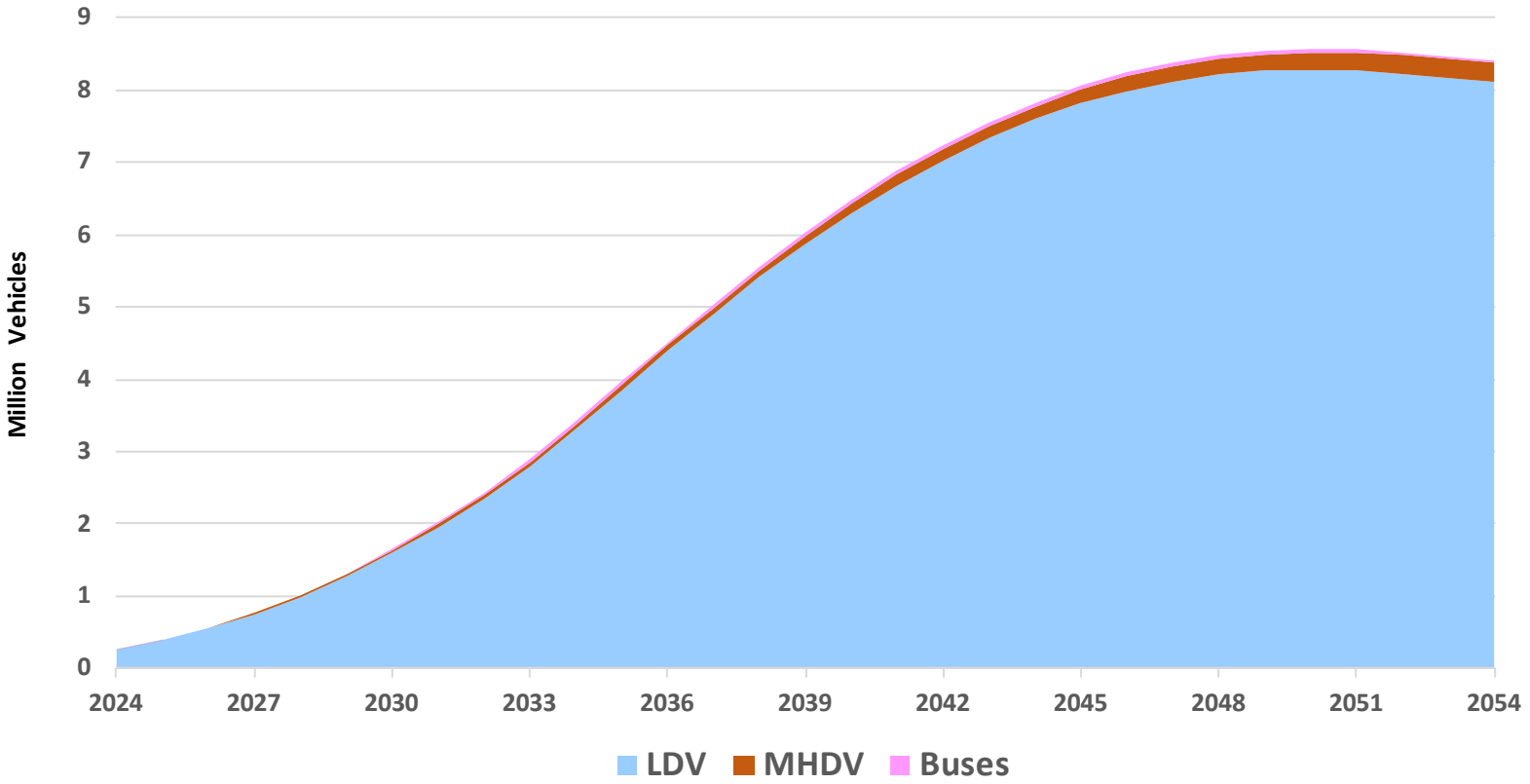




- **Primary drivers of EV sales forecast are state policy targets and recent growth trends**
- **Sales scenarios were created for different vehicle categories**
  - High and policy scenarios assume light duty vehicle (LDV) and medium & heavy duty vehicle (MHDV) policy targets are met with 100% EVs
  - Baseline allows for other technologies for all vehicle categories except for School Buses
- **School Buses:**
  - High scenario assumes 100% EV sales target by 2027 and 100% EV fleet by 2035
  - Baseline scenario assumes all EV sales by 2036 and 100% EV fleet by 2045
- **Transit Bus scenarios are similar to the MHDV category**
- **Low scenario would have slower rates of EV adoption**

New York ISO

Electric Vehicle Stock Forecast (millions)



These are preliminary estimates and subject to revision prior to Gold Book forecast

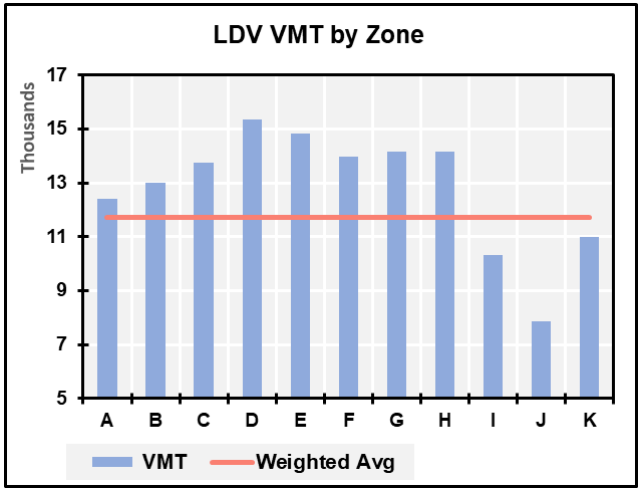
New York ISO

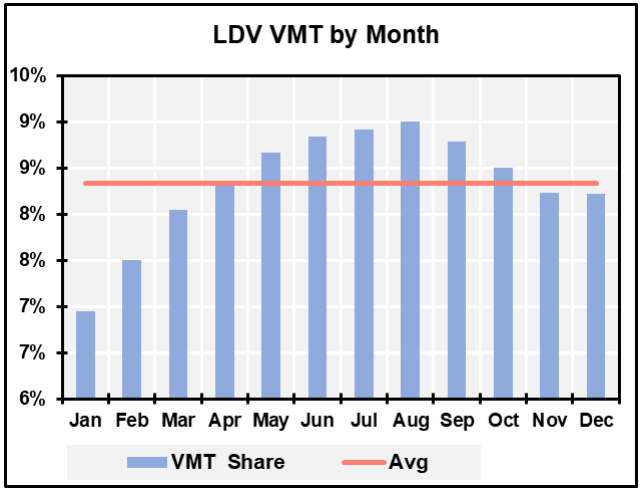
Energy Forecast Assumptions

- **EV count was converted into energy using:**
  - Vehicle Miles Traveled (VMT)
    - For LDVs, VMT varies by month and location
    - VMT per vehicle is constant over the forecast horizon
  - kWh/mile at rated conditions
  - Temperature sensitivity
    - Decreased performance at cold and hot temperatures
  - Battery efficiency trends – offsetting impacts:
    - Battery age – reduced efficiency
    - New battery technologies – increased efficiency
  - Increasing share of BEVs relative to hybrids over time

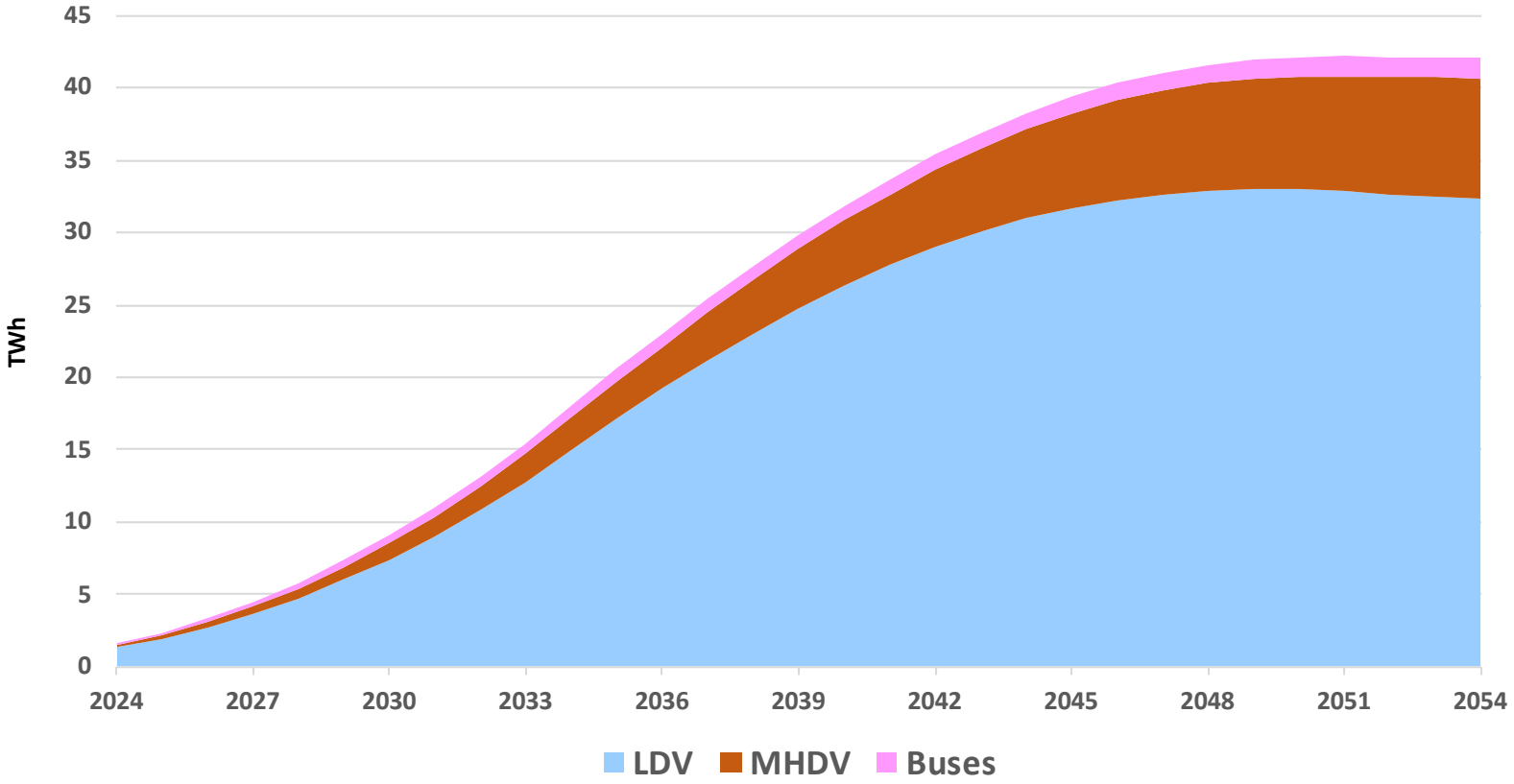
	NYCA Level			
	LDV	MHDV	School Bus	Transit Bus
Annual VMT	11,712	21,300	8,900	43,647
Nominal kWh / mile	0.32	1.4	1.3	2.5
Effective Annual Efficiency	93.2%			

Data sources include:
Bureau of Transportation Statistics, US Department of Energy, Federal Highway Administration, NY DMV, NREL, Alternate Fuel Data Center, Geotab, Battery University, National Grid Electric Highway Study, NYISO weather data





Electric Vehicle Annual Energy Forecast - TWh



These are preliminary estimates and subject to revision prior to Gold Book forecast

New York ISO

EV Forecast Assumptions Data Table

Category	2025	2030	2035	2040	2045	2050
LDV Sales Share	17%	42%	85%	90%	90%	90%
LDV Stock Share	4%	16%	39%	65%	82%	89%
Hybrids as Share of LDV EVs	33%	19%	10%	6%	3%	2%
LDV Stock (thousands)	390	1,591	3,853	6,294	7,811	8,277
LDV Energy (TWh)	1.9	7.4	17.1	26.4	31.7	33.0
MHDV Sales Share	6%	16%	30%	48%	68%	70%
MHDV Stock Share	1%	5%	14%	25%	39%	50%
MHDV Stock (thousands)	4	27	70	128	192	242
MHDV Energy (TWh)	0.2	1.1	2.6	4.5	6.5	7.8
Buses Sales Share	29%	87%	89%	92%	95%	96%
Buses Stock Share	8%	47%	78%	86%	89%	92%
Buses Stock (thousands)	5	29	48	53	54	54
Buses Energy (TWh)	0.2	0.6	0.9	1.0	1.2	1.3
Total Stock (thousands)	399	1,647	3,971	6,475	8,057	8,573
Total Energy (TWh)	2.4	9.1	20.5	31.9	39.4	42.1

These are preliminary estimates and subject to revision prior to Gold Book forecast

New York ISO

Peak Impact Assumptions

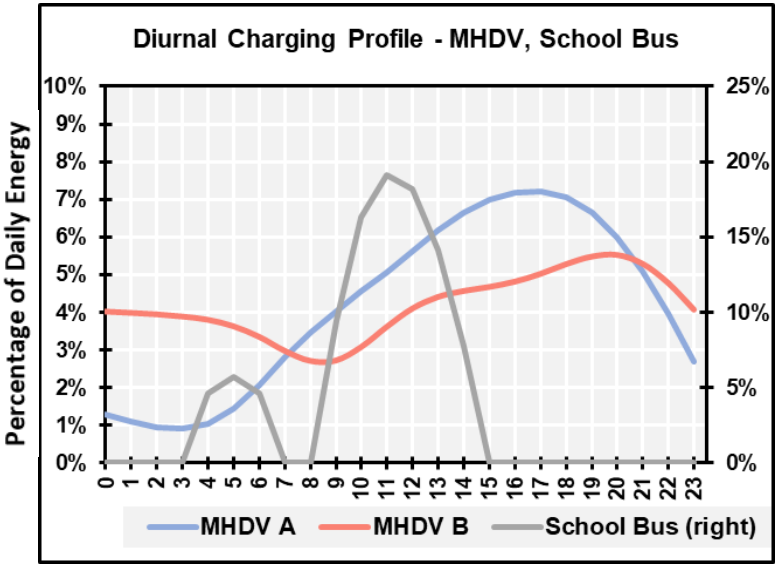
To estimate peak impact

- Convert annual energy into daily consumption by vehicle category and by month
- Apply per unit charging profile to the daily energy consumption to determine hourly EV MW impacts

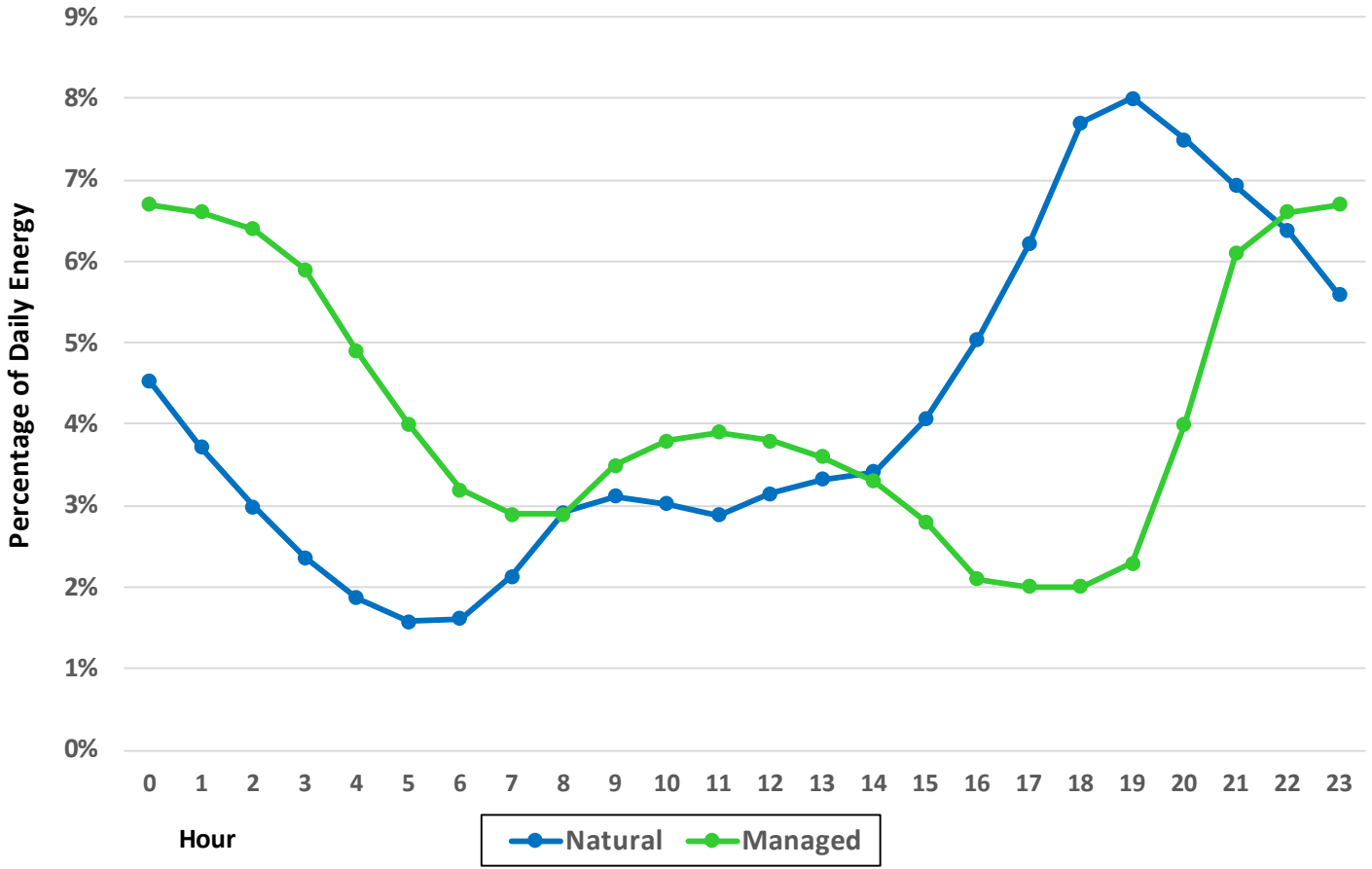
Diurnal charging profiles

- LDV charging profiles were developed for managed and unmanaged charging
- Increasing share of LDV managed charging assumed over the forecast horizon
- No managed charging assumed for MHDVs and Buses

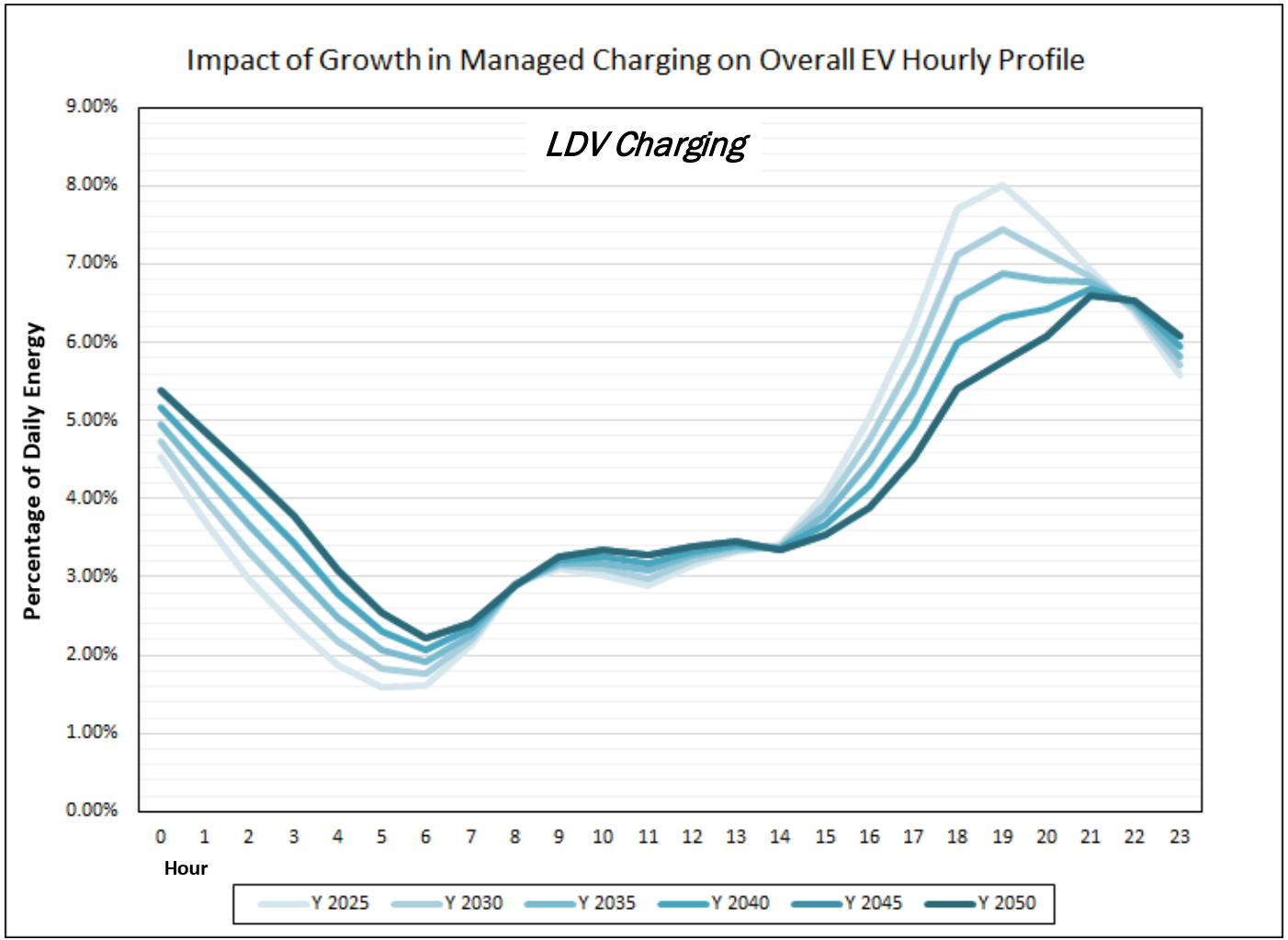
Data sources for charging profiles include:
EVI-Pro Lite tool (Alternate Fuel Data Center), National Grid Electric Highway Study, NREL, California DOE, Transmission Owners



LDV Charging Profile Assumptions - Natural and Managed



New York ISO



New York ISO

Questions?

New York ISO

Our Mission & Vision

Mission

Ensure power system reliability and competitive markets for New York in a clean energy future

Vision

Working together with stakeholders to build the cleanest, most reliable electric system in the nation

New York ISO