Transportation Electrification Forecast Update

Load Forecast Committee

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Objectives

- Propose the methodology that will be used to forecast the impacts of transportation electrification on regional energy and demand
- Discuss new data sources and background information that will be used to support key forecast inputs
- Obtain LFC feedback on proposed methodology and assumptions used

Introduction

- Transportation electrification is expected to play a pivotal role in meeting state GHG reduction mandates and goals
- As part of the 2020 CELT forecast, ISO will include forecasted impacts of transportation electrification on state and regional electric energy and demand
  - ISO discussed transportation electrification at the July 27, 2018 LFC meeting
- ISO will focus its transportation electrification efforts on light-duty vehicles (LDV), including cars and light-duty trucks
  - Will include LDVs that are battery-electric vehicles (BEV) or plug-in hybrid electric vehicles (PHEV)
  - Changes in overall electrification of other, non-LDV vehicle classes (e.g., electric buses, rail, trolley) may be considered in future forecasts

Proposed Methodology

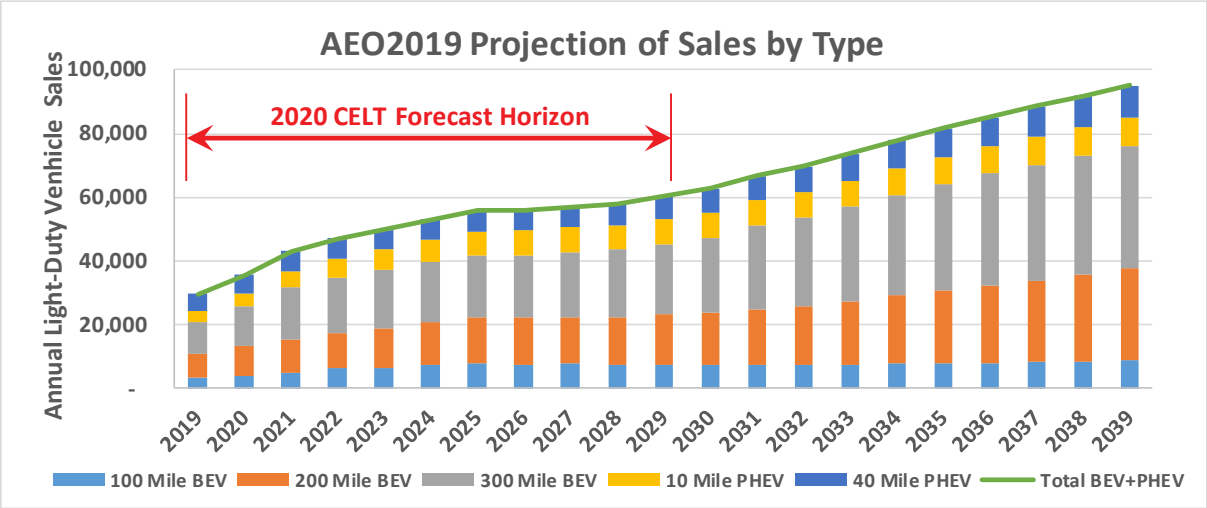
Projecting Regional EV Adoption

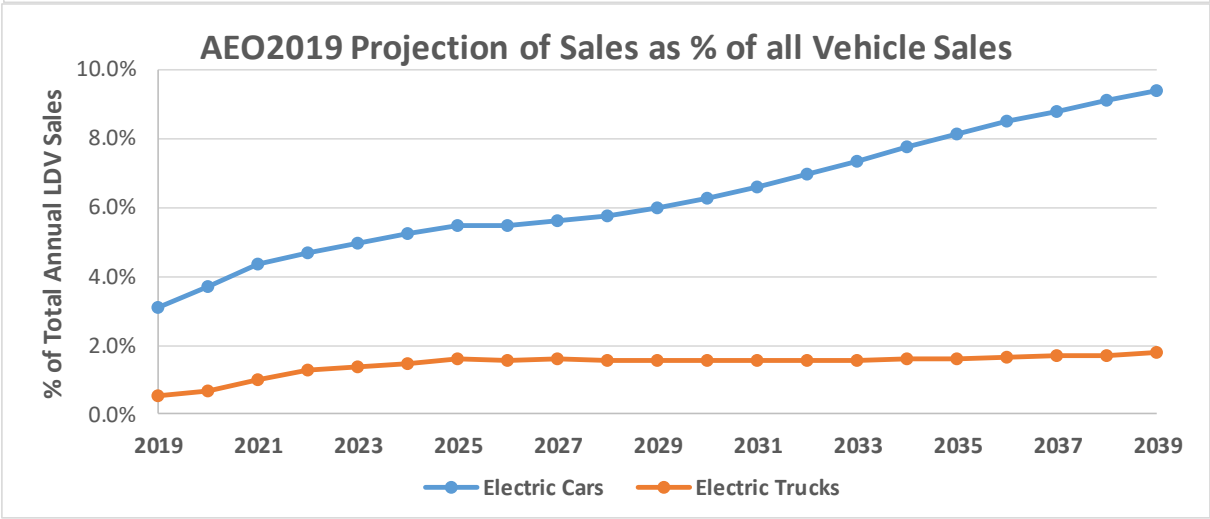
- Use Energy Information Agency's (EIA) Annual Energy Outlook (AEO) reference case New England regional forecast for light-duty vehicle sales as assumed projection of BEV/PHEV adoption across the region*
  - 2019 AEO forecast currently available
  - 2020 AEO forecast will be available in late-January 2020
- Using the state shares of regional BEV/PHEV registrations at the end of the last historical year, convert EIA's regional forecast into state-level forecasts
  - End of 2018 registration data will be used for 2020 forecast
  - Assume state shares remain fixed over the forecast horizon

*Source: U.S. Energy Information Agency: https://www.eia.gov/outlooks/aeo/

2019 Annual Energy Outlook Forecast

Energy Information Agency – Reference Case





2018 Registration and New Sales Data

Light-Duty Vehicles

- Tabulated to the right is 2018 total LDV registrations and new LDV sales data from Alliance of Automobile Manufacturers
- Based on these data, below are related state-level statistics on BEV/PHEV registrations and new sales
  - Registration data/calculations is shaded blue
  - Sales data data/calculations are shaded orange

State	2018 Registrations			2018 New Purchases		
	BEV	PHEV	Total LDVs	BEV	PHEV	Total LDVs
CT	4,453	5,346	3,052,626	1,844	1,571	169,074
MA	9,763	11,495	5,382,570	4,959	4,031	355,731
ME	748	1,781	1,287,077	254	545	70,462
NH	1,125	1,974	1,306,353	579	544	97,069
RI	599	1,139	859,116	276	343	49,166
VT	1,057	1,869	564,886	355	469	42,913
NE	**17,745**	**23,604**	**12,452,628**	**8,267**	**7,503**	**784,415**

State	BEV+PHEV Registrations (2018)	State Share of Region	State Share of Total LDV Registrations	BEV+PHEV New Purchases (2018)	BEV+PHEV Share of Total New LDV Purchases
CT	9,799	23.7%	0.32%	3,415	2.0%
MA	21,258	51.4%	0.39%	8,990	2.5%
ME	2,529	6.1%	0.20%	799	1.1%
NH	3,099	7.5%	0.24%	1,123	1.2%
RI	1,738	4.2%	0.20%	619	1.3%
VT	2,926	7.1%	0.52%	824	1.9%
NE	41,349	100.0%	0.33%	15,770	2.0%

Proposed Methodology

Assumptions to Estimate Energy & Demand

- Assumptions that will be used to convert adoption to energy and demand impacts include the following:
  1. Consumers purchase EVs that suit their driving habits
     - Ignore trends in EV range and shifts in shares of EV types over time
  2. Average driver travels 31.5 miles/day*
     - Total mileage of 11,500 miles per year
  3. Miles per KWh = 3.0 (ITRON)
  4. Data-driven charging coincidence factors (see next slide)
     - Need to further investigate differences in Level 1 (1.4 kW), Level 2 (~7kW), and fast-charging (up to 250kW) behavior as informed by actual data, and potential implications on demand (will discuss further at November 18, 2019 LFC meeting)
  5. 50% of new EV fleet turnover after 8 years

*Source: AAA, American Driving Survey, 2014-2017, February 2019: http://aaafoundation.org/wp-content/uploads/2019/02/18-0783_AAAFTS-ADS-Brief_r8.pdf

Using Regional EV Charging Data for Insights

- To better understand EV impacts on regional electricity consumption patterns, ISO has licensed EV charging data from ChargePoint, Inc.
  - Data are from ChargePoint® Network charging stations within New England
  - Total charging electric energy consumption included in the dataset is tabulated to the right by state
- ISO will use these data to improve its understanding of EV charging patterns, especially with respect to the following:
  - The extent of weather sensitivity, which may lead to seasonal differences in energy impacts
  - Charging coincidence with summer and winter peaks

State	EV Charging Energy (MWh)
CT	769.3
ME	47.8
MA	5,557.9
NH	340.0
RI	472.2
VT	926.3
Total	8,113.4

Potentially Impactful Developments to Monitor

- Policy developments that may impact trends in electric vehicle adoption include (but are not limited to):
  - Federal Corporate Average Fuel Economy (CAFE) standards
  - Federal Plug-In Electric Drive Vehicle Tax Credit
    - Refer to: https://www.irs.gov/businesses/plug-in-electric-vehicle-credit-irc-30-and-irc-30d
  - State policy support
    - For example, the MA Department of Energy Resources (DOER) is not extending the "MOR-EV" program beyond September 30, 2019
  - Utility programs supporting charging infrastructure
- It is assumed that any important changes to (at least) federal policy implications will be factored into successive EIA forecasts
- ISO will continue monitoring the relevant policy landscape and may consider it more explicitly in future forecasts

Next Steps

- ISO will present a draft transportation electrification forecast for the region and states at the November 18, 2019 LFC meeting
  - Will be based on 2019 AEO input data
- A finalized transportation electrification forecast will be included in the 2020 CELT gross load forecast
  - Will be updated to reflect 2020 AEO input data, which will be available in late January 2020

Questions