CHARGEVC

BETTER TRAVEL, STRONGER GRID.

New Jersey Electric Vehicle Market: Current Conditions and Projections

Prepared For ChargEVC By Gabel Associates, Inc.

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Acknowledgements

Study and Report Prepared By:

Gabel Associates, Inc.:
417 Denison Street
Highland Park, New Jersey, 08904
732-296-0770
www.gabelassociates.com

Lead Investigator:

Mark Warner
VP, Gabel Associates, Inc.

Study Team:

Gabel Associates: Steve Gabel, Pam Frank, Anthony Fiumano, Eve Gabel-Frank

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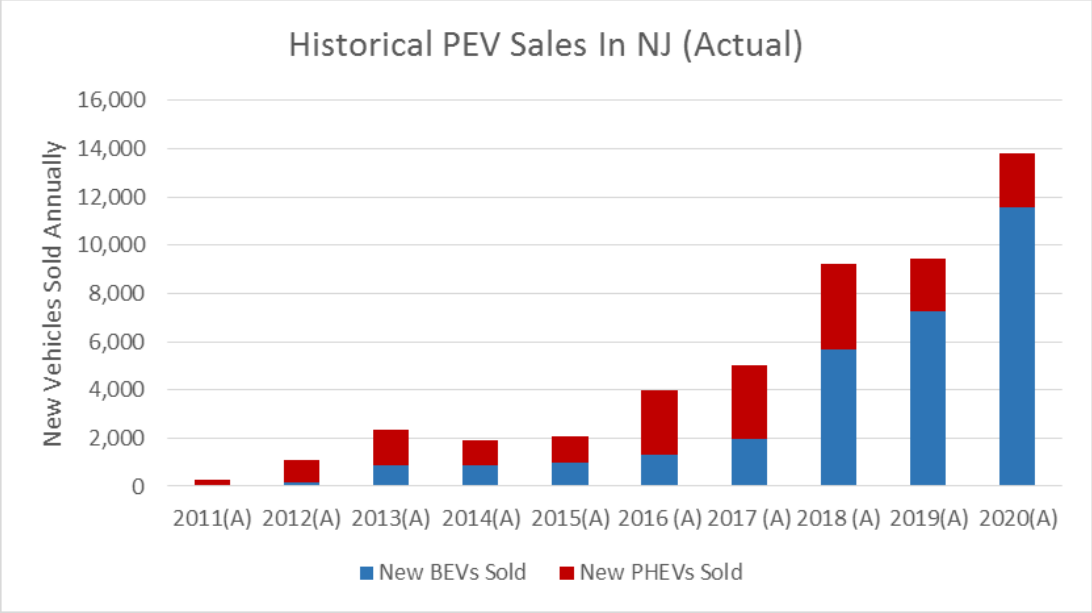
1 Executive Summary

ChargEVC, a coalition of stakeholders that support vehicle electrification in New Jersey, has commissioned Gabel Associates to publish an annual update on the Plug-In Electric Vehicle (PEV) market in New Jersey. See the current list of ChargEVC members in Appendix A. This analysis builds on the full-market study issued in October of 2020, and reflects significant new information about the New Jersey market that has recently become available. This report provides an update on key market statistics, a new projection of PEV adoption (for the light-duty vehicle (LDV) segment), and a more in-depth characterization of the Medium- and Heavy-Duty Vehicle (MHDV) segment.

Despite the wide-ranging impacts the global COVID-19 pandemic had on the economy, the second half of 2020 saw strong sales that were likely encouraged, at least in part, by the mid-year launch of programs intended to help stimulate PEV adoption in New Jersey, especially the BPU's vehicle purchase rebate (i.e. the "Charge Up New Jersey" incentive program).

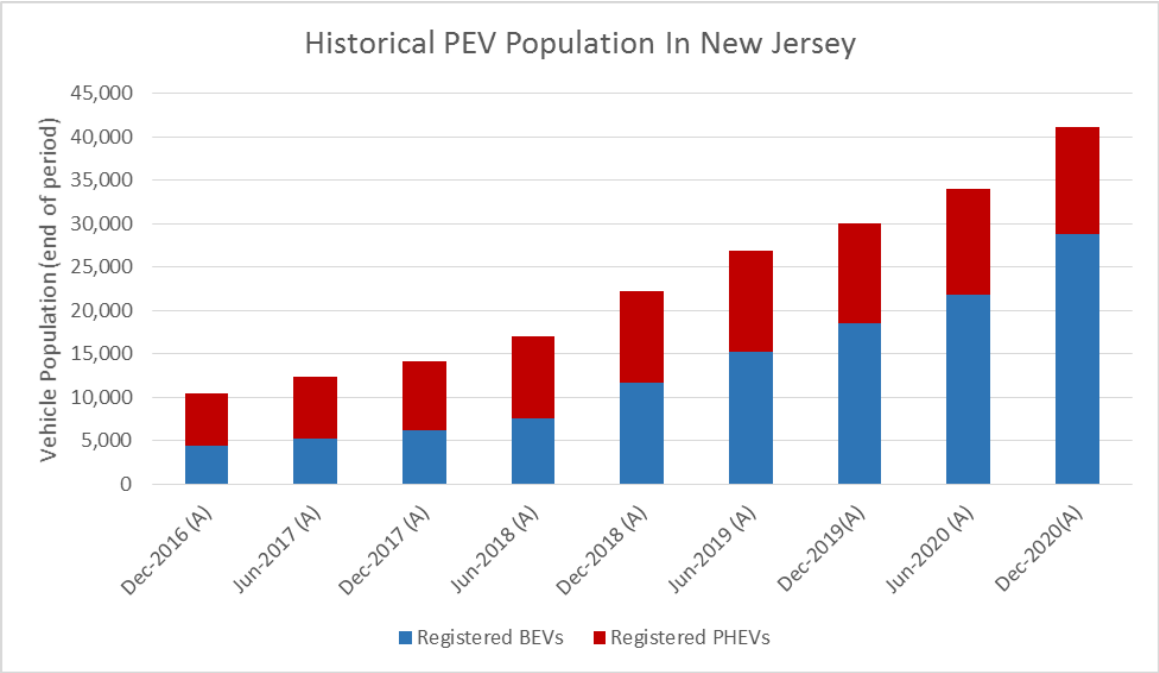
There were **13,797 PEVs sold in New Jersey in calendar year 2020**, including 11,547 BEVs and 2,250 PHEVs. This represents significant Y/Y sales growth compared with 2019, and a continuation of the trend toward BEVs making up the dominant share of sales (83.7%). This represents about **46% Y/Y growth compared with sales in 2019**. As seen in previous years, almost all PEV sales were in the LDV segment.

Figure 1 – 1: Historical PEV Sales in New Jersey



Sales trends since 2015 suggest the early stages of exponential PEV sales-growth in New Jersey, resulting in substantial growth in the number of registered EVs on the road throughout the state. That trend is summarized in the chart below, based on snapshots of vehicle registration data developed by the NJ-DEP.

Figure 1 – 2: PEV Registrations in New Jersey (YE 2020)



Assuming second-order growth based on the PEV population trend, extrapolation of the trend since Dec-2016 leads to ~122K PEVs registered in New Jersey by the end of 2025. This suggests that the sales growth rate in New Jersey needs to increase to reach the 2025 goal of 330K electrified LDVs. Continued and consistent availability of the BPU vehicle rebate should contribute to this increased adoption rate, along with an increasingly diverse and attractive selection of electric models (including new models in the very popular SUV and "crossover" segments), the growing availability of vehicle charging infrastructure from the utility programs, increased public charging (especially DCFC), and increasing consumer awareness.

Based on the most recent snapshot of vehicle registration data by the New Jersey DEP, there are 41,096 PEV on the road as of the end of 2020, including 28,869 BEVs and 12,227 PHEVs. **New Jersey has therefore achieved 12.5% of its 2025 goal of 330K LDV-PEVs by 2025**, a significant improvement over the 9.1% attainment achieved by the end of December 2019. It took 4 years to attain 12.5 % of the goal, and **the state must achieve the remaining 87.5% of the goal in five years** (including 2021). Given the substantial Y/Y sales growth demonstrated in 2020 (even during the pandemic), **reaching the 2025 goal is possible** if strong growth can be sustained over the next five years. For calendar year 2020, PEVs represented an estimated 2.7% of new LDV sales, and approximately 0.7% of the LDV population (i.e. vehicles "on the road").

PEVs require charging infrastructure in a variety of segments, including home, work, and in public places. Strong PEV adoption growth depends on consumers: a) having convenient access to a routine charger (typically L2 at home, or sometimes at work), and b) comfort that there are enough public chargers available that their risk of being stranded is minimal. While most charging (80% or more on an energy

basis) will be done in those routine settings (mostly at home), the availability of public charging – preferably DC fast charging (DCFC) that minimizes charging time – is critical to getting consumers over the "range anxiety" barrier. For that reason, New Jersey has established a goal of having at least 400 DCFC plugs at no less than 200 locations, with "full service" equipment capable of serving all PEVs on the road.

Based on the latest metrics, New Jersey has attained 14% of its DCFC location goal. However, the New Jersey DCFC market is evolving rapidly. The recent NJ-DEP Corridor DCFC grant program will fund 27 additional "full service" locations (and in compliance with the requirements in law), nearly doubling the current level of availability. Expansion of that program, as reinforced by the new utility public DCFC make-ready programs, will help New Jersey attain its DCFC goals.

Based on the historical baseline and strategic consideration of New Jersey market conditions, a detailed projection of BEV and PHEV adoption in New Jersey was developed through 2035. This projection estimates that PEVs will represent approximately 21% of LDV sales in 2025, and just over 5% of the LDV population. By 2035, PEVs will account for 57% of LDV sales, and just over 30% of the LDV population (full projections follow in Section 4).

The Medium- and Heavy-Duty segments are now a primary focus for market development in New Jersey, and understanding the opportunity for electrification depends on understanding the existing segmentation of traditional (fossil-fueled) vehicles. The MHDV segment is very diverse compared with the LDV segment, as illustrated in the chart below.

Figure 1 – 3: Registered Fossil-Fueled MHDVs in New Jersey (YE 2020)

All MHDVs (Personal and Fleet, All Fuel Types) - SUM OF ALL SEGMENTS								
Source Type	**Class 2b**	**Class 3**	**Class 4**	**Class 5**	**Class 6**	**Class 7**	**Class 8**	**Total**
Passenger Truck	17,721	229	0	0	0	0	0	**17,950**
Light Commercial Truck	207,617	1,146	0	0	0	0	0	**208,763**
Intercity Bus	0	0	3	7	23	232	761	**1,026**
Transit Bus	315	308	1,489	217	435	644	3,123	**6,531**
School Bus	1,852	4,205	2,036	188	1,139	9,819	39	**19,278**
Refuse Truck	0	0	30	34	33	127	2,999	**3,223**
Single Unit Short-Haul Truck	12,039	65,354	23,013	28,277	28,544	1,800	160	**159,187**
Single Unit Long-Haul Truck	0	82	22	131	729	552	4	**1,520**
Motor Home	22	934	1,735	746	1,510	804	303	**6,054**
Combination Short-haul Truck	0	0	0	12	53	11,813	24,159	**36,037**
Combination Long-haul Truck	0	0	1	13	13	5,578	44,299	**49,904**
Total	**239,566**	**72,258**	**28,329**	**29,625**	**32,479**	**31,369**	**75,847**	**509,473**

As a result of this analysis, a key implication emerged: the feasibility of attaining state goals in 2035, and even more importantly the strategic goals for 2050, depend heavily on the momentum established prior to 2025. If growth remains modest through 2025, exceptionally high (and probably un-attainable) growth levels would then be required to meet the goals in 2035 and 2050. **The State therefore faces a unique opportunity since early action to build momentum now makes long term electrification success much more likely.**

2 Introduction

ChargEVC, a coalition of stakeholders that support vehicle electrification in New Jersey, has commissioned Gabel Associates to publish an annual update on the Plug-In Electric Vehicle (PEV) market in New Jersey. See the current list of ChargEVC members in Appendix A. This analysis builds on the full-market study issued in October of 2020[a], and reflects significant new information about the New Jersey market that has recently become available. This report provides an update on key market statistics, a new projection of PEV adoption (for the light-duty vehicle (LDV) segment), and a more in-depth characterization of the Medium- and Heavy-Duty Vehicle (MHDV) segment.

Terminology: This report is focused on vehicles powered exclusively by electricity. This category includes pure Battery Electric Vehicles (BEVs) that do not have a petroleum fueled engine of any kind, and Plug-In Hybrid Electric Vehicles (PHEVs) that make use of both an electric motor and a fueled engine for motive power. Both vehicle types are collectively called Plug-In Electric Vehicles – i.e. all vehicles with a plug. **Throughout this document, the term Plug-In Electric Vehicles (PEVs) and Electric Vehicles (EVs) are used synonymously and interchangeably.** This vehicle group purposefully does not include traditional hybrid vehicles (without a plug for charging), or other alternative fuel vehicles such as compressed natural gas (CNG), hydrogen, or liquefied petroleum gas (LPG).

3 Historical Market Statistics

This section summarizes the latest statistics on PEV adoption in New Jersey, and the conditions that contributed to that growth in registered PEVs. The year 2020 was an anomaly due to the global COVID-19 pandemic, but globally PEV sales continued to be strong – weak sales in the first half of the year were followed by a robust rebound in the second half. In addition, programs intended to help stimulate PEV adoption in New Jersey launched in the second half of the year, especially the BPU's vehicle purchase rebate (i.e. the "Charge Up New Jersey" incentive program). An overview of the many factors that influence PEV adoption can be found in Appendix B.

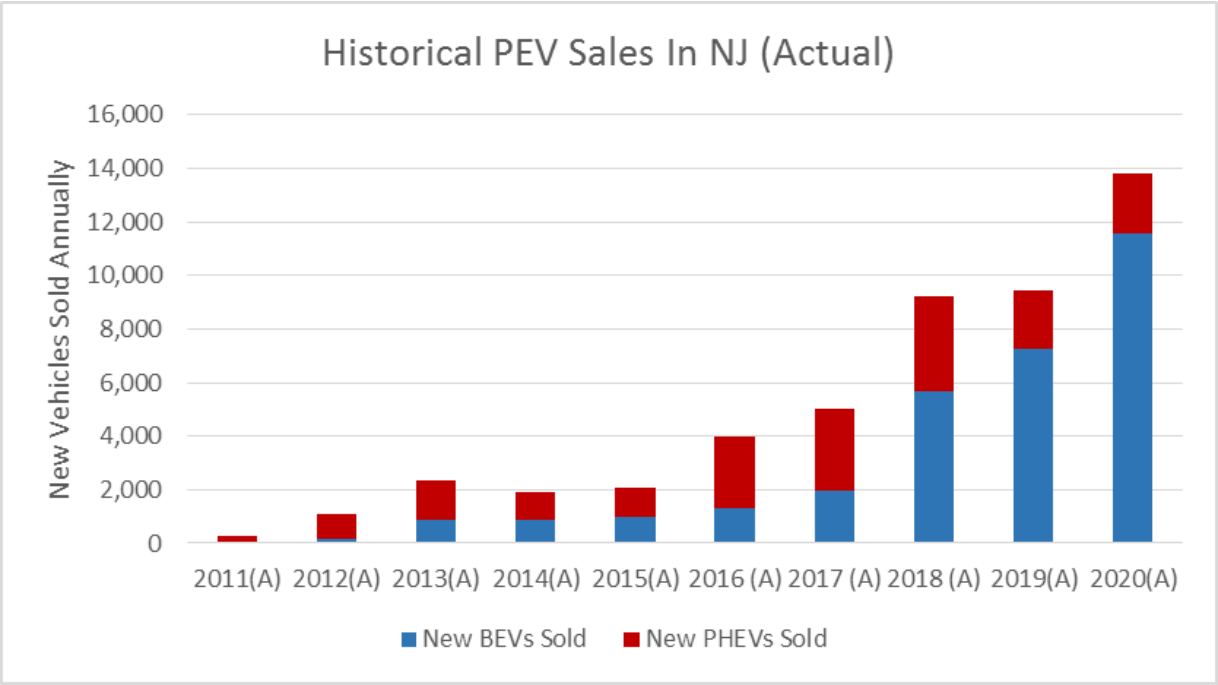
3.1 PEV Sales And Population In New Jersey

There were 13,797 PEVs sold in New Jersey in calendar year 2020, including 11,547 BEVs and 2,250 PHEVs[b]. This represents significant Y/Y sales growth compared with 2019, and a continuation of the trend toward BEVs making up the dominant share of sales (83.7%). This represents about 46% Y/Y growth compared with sales in 2019. Almost all of these vehicles were LDVs since, as of the end of 2020, electrification in the MHDV segment was virtually non-existent. The following figure summarizes historical PEV sales in New Jersey.

[a] This most recent study was a significant update to the original study published in 2018, please see the ChargEVC.org website for a copy of the study, as well as the recently updated Market Development Roadmap 2.0.

[b] Based on data from the Alliance for Automotive Innovation: https://www.autosinnovate.org/resources/electric-vehicle-sales-dashboard, using data provided by HIS Markit.

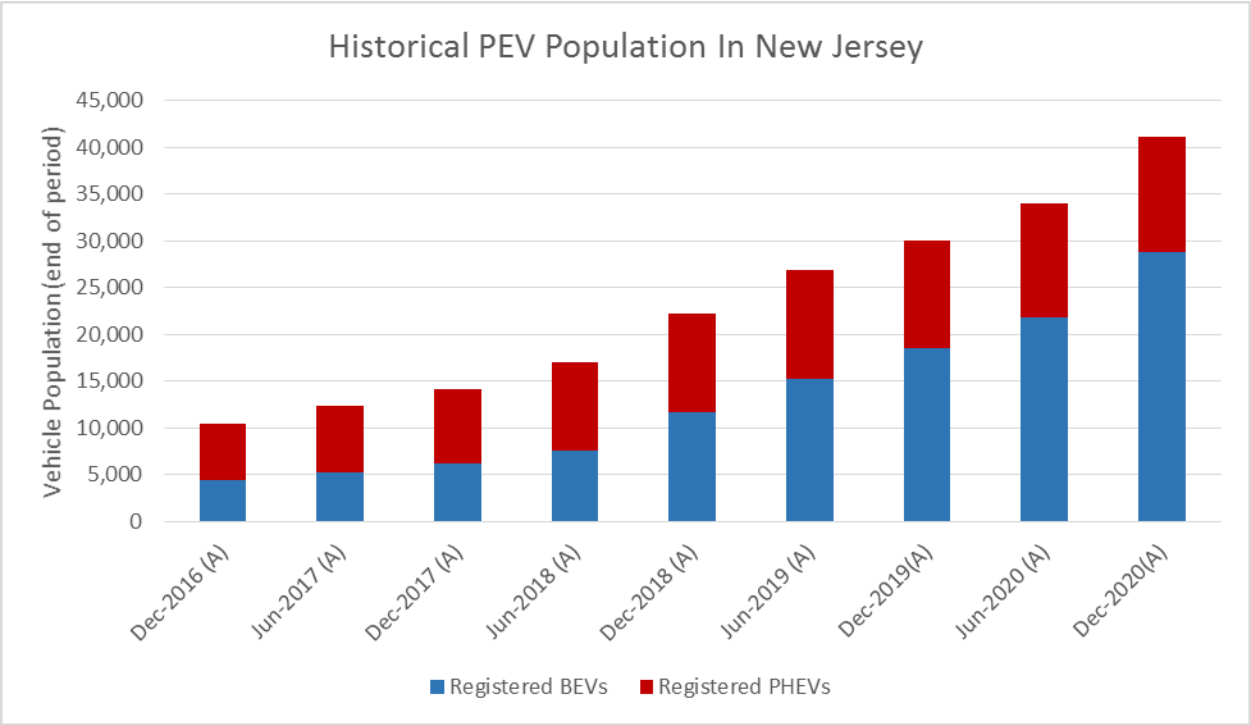
Figure 3.1 – 1: Historical PEV Sales in New Jersey



The trend since 2015 suggests the early stages of exponential growth, with 2018 being a slight outlier (i.e. exceptionally strong Y/Y growth) due to the massive ramp-up of Tesla Model 3 sales that year. The BPU Incentive Program launched mid-year, but with a somewhat constrained budget due to highly unusual impacts on the State's fiscal year resulting from COVID-19. The program proved to be extremely popular, however, and was forced to cease taking new applications in mid-December due to the exhaust of available funding. Based on the latest reporting from the BPU, over $11M in incentives were disbursed, supporting the acquisition of 2,290 new PEVs (leased or purchased).

These sales, after accounting for retirements and the net impact of vehicles entering or leaving the State, have resulted in substantial growth in the number of registered EVs on the road in New Jersey. Note that these numbers represent the PEV population, not annual sales. As with the sales figures reported above, the PEV population in New Jersey is almost exclusively LDVs, with the most notable electrified vehicles from the MHDV segment being several electric buses being piloted by New Jersey Transit in Camden. However, recent grants from DEP (funded from the VW settlement) will jump start sales of electrified MHDVs in New Jersey, and start the development of operating experience that will help drive future sales. These grants cover a range of electric MHDV options, including school buses, refuse trucks, local delivery vehicles, and more. The overall PEV population growth is summarized in the chart below, based on snapshots of vehicle registration data developed by the NJ-DEP (year-end 2016 is the first year for which there is data available under the current methodology).

Figure 3.1 – 2: PEV Registrations in New Jersey (YE 2020)

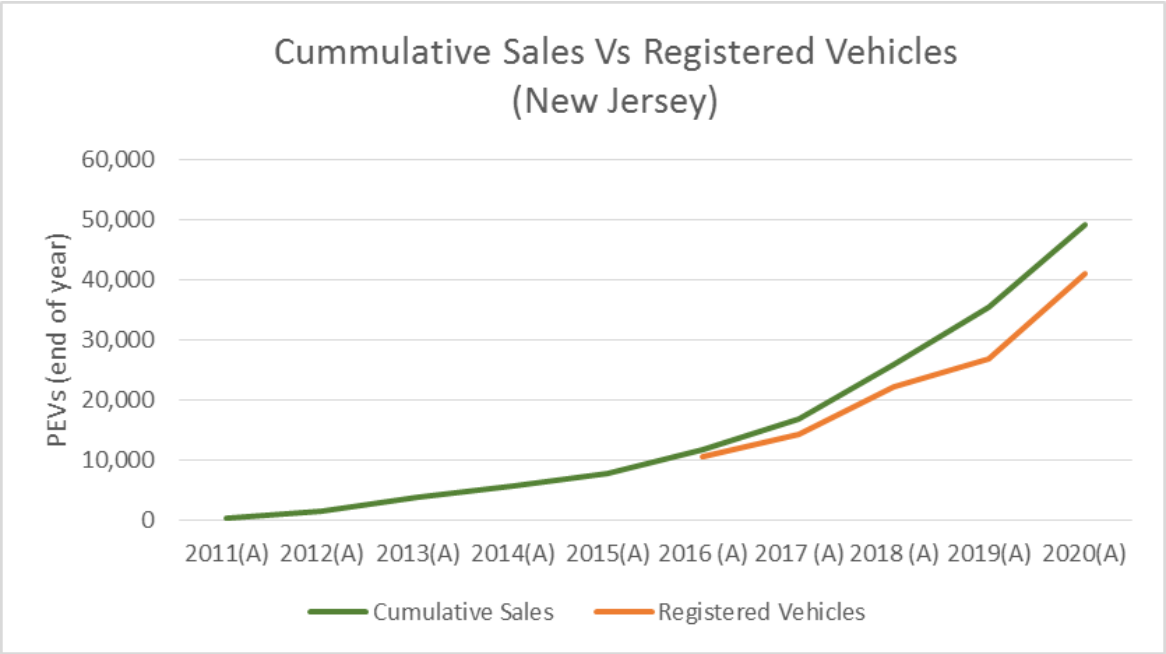


Assuming second-order growth based on the PEV population trend, extrapolation of the trend since Dec-2016 leads to ~122K PEVs registered in New Jersey by the end of 2025. While this is strong growth, it is less than half of the current LDV target of 330K electrified LDVs. This suggests that the sales growth rate in New Jersey needs to increase to reach the 2025 goal. Continued and consistent availability of the BPU vehicle rebate should contribute this increased adoption rate, along with an increasingly diverse and attractive selection of electric models (including new models in the very popular SUV and "crossover" segments), the growing availability of vehicle charging infrastructure from the utility programs, increased public charging (especially DCFC), and increasing consumer awareness.

The following chart summarizes cumulative sales over the period, compared with the registered PEV population. The difference between the curves represents the impact of vehicle retirement and the net impact of vehicles moving into or out of the state (as of the end of each year). PEVs have now been on sale in New Jersey long enough that the vehicle retirement patterns evident in the general market are beginning to emerge – i.e. the PEV population is now longer just "brand new vehicles". Accounting for this retirement rate[c] is critical in making long term projections of the PEV population.

[c] The "retirement rate" represents the aggregate impact of multiple market realities: a) vehicles being lost to damage or theft, b) vehicles being "turned in" at the end of a lease and leaving the state, c) customers that own PEVs moving to another state. This rate is also the net of other factors, such as new residents that own PEVs moving into the state (which wouldn't show as a "sale" in New Jersey).

Figure 3.1 – 3: Cumulative Sales Vs Registration



PEV ownership varied widely across the four electric utilities as summarized in the following chart (reflecting year-end (YE) 2020 data). Note that the rate of PEV adoption does not scale strongly with the residential population in a given territory, probably reflecting significant differences in demographics across the counties. Key potential factors include degree of private vehicle ownership, building stock variations (single family vs. multi-family), typical travel characteristics, and differences in median household income. These percentages are expected to converge toward the fraction of LDV ownership in each territory as the PEV market matures.

Figure 3.1 – 4: PEV-Registration by Utility (YE 2020)

Registered-PEV Break-Out By Utility (YE 2020)	Total BEV	Total PHEV	Tota PEV	Utility PEV%
PSE&G	19,456	7,732	27,188	66.2%
JCP&L	7,625	3,397	11,022	26.8%
ACE	1,148	831	1,979	4.8%
RECO	353	144	497	1.2%
Municipal and Other	270	123	393	1.0%

3.2 EV Adoption Scorecard

New Jersey has a goal of 330K LDV-PEVs on the road in New Jersey by the end of 2025. Based on the most recent snapshot of vehicle registration data by the New Jersey DEP, there are 41,096 PEVs on the road as of the end of 2020, including 28,869 BEVs and 12,227 PHEVs. **New Jersey has therefore achieved 12.5% of its 2025 goal**, a significant improvement over the 9.1% attainment achieved by the end of December 2019.

The Alliance For Automotive Innovation ranks **New Jersey sixth in the country in cumulative PEV sales** as of the end of 2020, and **New Jersey is fifth in cumulative PEV sales on a per capital basis**. The latest data, through YE2020, is summarized in the chart below.

Figure 3.1 – 1: PEV Sales Leaders By State (YE 2020)

State	Cum Sales (YE 2020)	Population	PEV/Capita	Per Capita Rank
California	772,421	39,538,223	1.95	1
New York	79,219	20,201,249	0.39	7
Florida	77,397	21,538,187	0.36	8
Washington State	65,611	7,705,281	0.85	2
Texas	54,288	29,145,505	0.19	10
New Jersey	49,175	9,288,994	0.53	5
Georgia	44,480	10,711,908	0.42	6
Massachusetts	39,194	7,029,917	0.56	4
Illinois	38,048	12,812,508	0.30	9
Colorado	36,821	5,773,714	0.64	3

While that benchmark makes New Jersey a national PEV adoption leader, an increase in sales growth will be needed to reach the 2025 goal, as noted above. It took 4 years to attain 12.5 % of the goal, and **the state must achieve the remaining 87.5% of the goal in five years** (including 2021). Given the substantial Y/Y sales growth demonstrated in 2020 (even during the pandemic), **reaching the 2025 goal is possible** if strong growth can be sustained over the next five years (see the projection below). Note that Colorado, although a relatively small state (by population), has attained high levels of cumulative PEV sales on a per capita basis, driven by its strong vehicle rebate program. The New Jersey rebate program is similar to that originally offered in Colorado, which serves as a leading indicator that the program in New Jersey could enhance the state's position as a leading PEV market.

For calendar year 2020, PEVs represented an estimated 2.7% of new LDV sales, and approximately 0.7% of the LDV population (i.e. vehicles "on the road").

3.3 Public Charging Infrastructure

PEVs require charging infrastructure in a variety of segments, including home, work, and in public places (see further details in the original ChargEVC New Jersey Study). Strong PEV adoption growth depends on consumers: a) having convenient access to a routine charger (typically L2 at home, or sometimes at work), and b) comfort that there are enough public chargers available that their risk of being stranded is minimal. While most charging (80% or more on an energy basis) will be done in those routine settings (mostly at home), the availability of public charging – preferably DC fast charging (DCFC) that minimizes charging time – is critical to getting consumers over the "range anxiety" barrier. For that reason, New Jersey has established a goal of having at least 400 DCFC plugs at no less than 200 locations, with equipment capable of serving all PEVs on the road.

Based on a snapshot of public fast charging available in New Jersey (as of April 1, 2020):

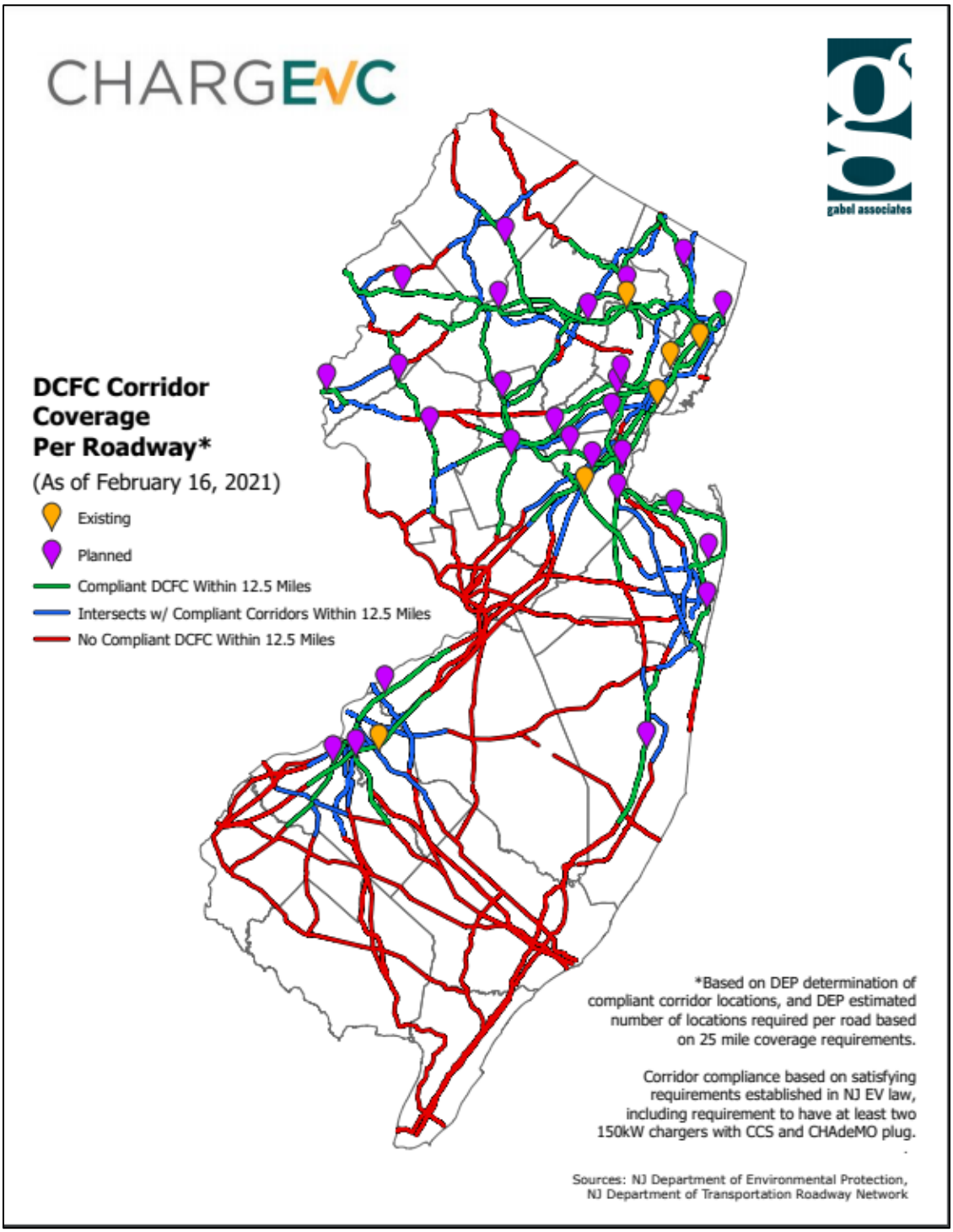
- There are 285 Tesla DCFC plugs at 31 locations
- 128 standards-based DCFC plugs (CCS or CHAdeMO) at 63 locations
- There were 28 "full service" locations supporting 94 plugs; these "full service" locations can deliver charging for all vehicles on the road, are available for public use, but some do not meet the requirements in law for the 400 plug/200 location goal.

Based on the latest metrics, New Jersey has attained 14% of its DCFC location goal. However, the New Jersey DCFC market is evolving rapidly. The recent NJ-DEP Corridor DCFC grant program will fund 27 additional "full service" locations (and in compliance with the requirements in law), nearly doubling the current level of availability. Expansion of that program, as reinforced by the new utility public DCFC make-ready programs, will help New Jersey attain its DCFC goals.

Within the DCFC market are two types of locations: Corridor locations that directly serve heavily traveled roadways (both local and long-distance drivers) and Community locations that serve local drivers near where they live or work. New Jersey's EV law establishes goals and criteria for each type of DCFC facility, intended to help guide market development so as to overcome consumer range anxiety barriers. The following map shows the significant impact the recent DEP Corridor DEP Grant program will have, increasing from six complaint corridor locations, to 33 locations[d]. The color coding represents the targeted major roadways, and how close DCFC corridor-class charging is to PEV drivers at each point along the roadway. The goal is that Corridor DCFC in New Jersey be no more than 25 miles apart. When that target is achieved, all roadways on the map will be green.

[d] The EV Law requires at least 75 full-service Corridor locations, but analysis by DEP indicates that at least 118 Locations will be required to meet the geographic density requirement in law (no more than 25 miles between corridor locations).

Figure 3.3 – 1: DCFC Corridor Coverage Per Roadway (As of February 16, 2021)



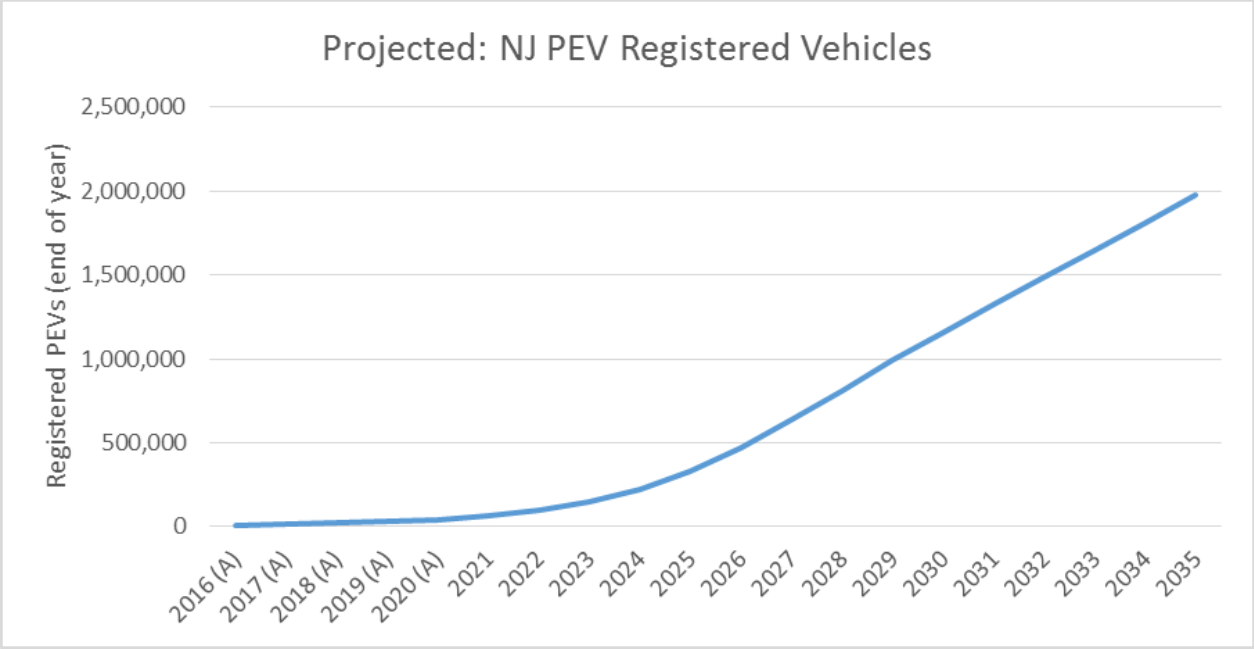
4 PEV Adoption Projection for The LDV Segment

Based on the historical baseline summarized in Section 3, and strategic consideration of New Jersey market conditions (see Appendix B), a detailed projection of BEV and PHEV adoption in New Jersey was developed through 2035. A projection was developed only for the LDV segment, since there is no historical PEV-adoption within the MHDV segment yet.

4.1 PEV-LDV Projection

Annual sales for both LDV-BEVs and LDV-PHEVs were computed, with aggregation into overall PEV population per year (after accounting for retirement and vehicles entering or leaving the State). These trajectories represent the curve that a) starts with the registered PEV population at the end of 2020, b) strongly reflects recent sales results in the State for the next three years, as calibrated by consideration of relevant market trends, but c) transitioning to the lowest-risk adoption profile necessary to achieve the targets of 330K PEVs by YE-2025, and 2M PEVs by YE-2035. This projection should therefore be consisted the adoption needed to meet the state goals in 2025 and 2035, tied to recent sales results and making the lowest-risk assumptions about growth.

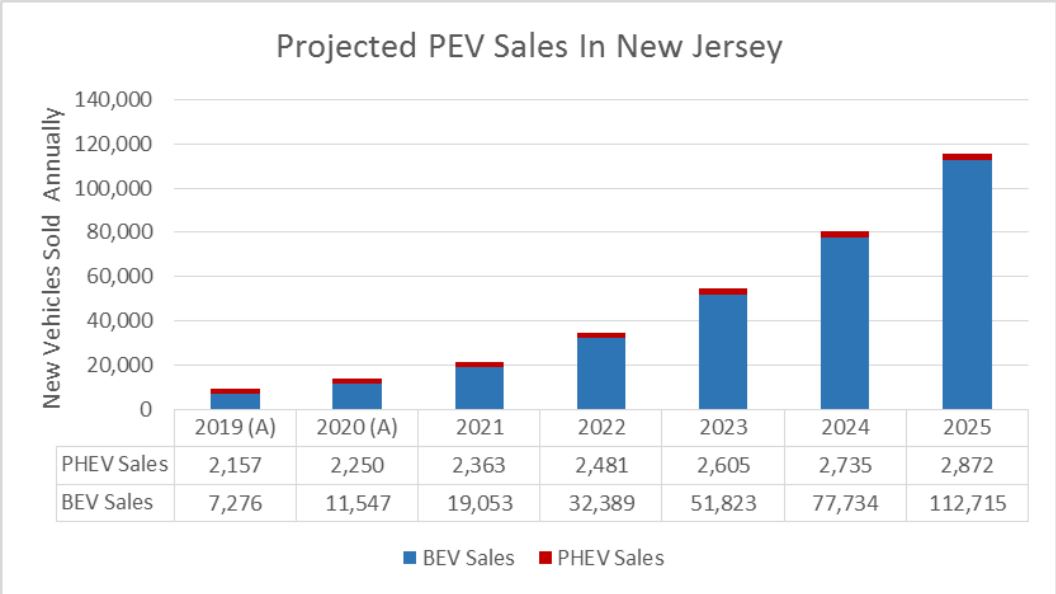
Figure 4.1 - 1: Projected PEV Registration Through 2035



This projection estimates that PEVs will represent approximately 21% of LDV sales in 2025, and just over 5% of the LDV population. By 2035, PEVs will account for 57% of LDV sales, and just over 30% of the LDV population. This benchmark is approximately aligned with global leaders (mostly in Europe) that are targeting 30% PEV penetration within the 2030 – 2035 timeframe.

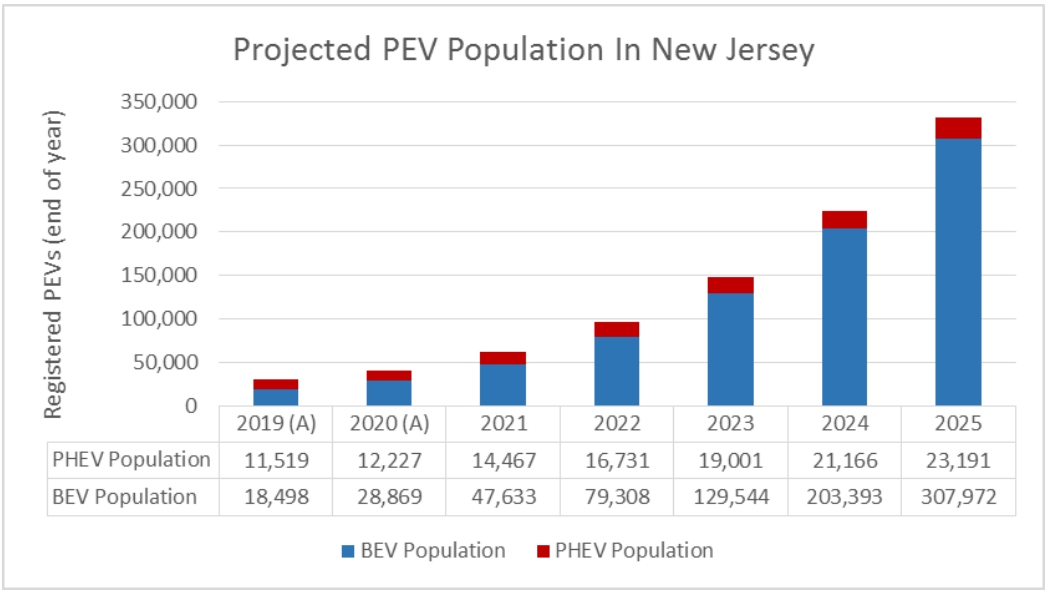
The following chart provides a more detailed view of projected LDV-PEV sales through 2025, and the resulting LDV-PEV population, including the break-out between BEVs and PHEVs. Consistent with recent market trends, BEVs are expected to become a more dominant share of the market, especially given expected BEV price reductions in the medium-term.

Figure 4.1 - 2: Projected LDV-PEV Sales Through 2025



	2019 (A)	2020 (A)	2021	2022	2023	2024	2025
PHEV Sales	2,157	2,250	2,363	2,481	2,605	2,735	2,872
BEV Sales	7,276	11,547	19,053	32,389	51,823	77,734	112,715

Figure 4.1 - 3: Projected LDV-PEV Population Through 2025



	2019 (A)	2020 (A)	2021	2022	2023	2024	2025
PHEV Population	11,519	12,227	14,467	16,731	19,001	21,166	23,191
BEV Population	18,498	28,869	47,633	79,308	129,544	203,393	307,972

4.2 Goal Attainment Implications

To attain the growth trajectory defined above, PEV sales will need to average at least 53% growth Y/Y. The Y/Y sales growth in 2020 for New Jersey was 46.3% - although that was a) during the highly unusual conditions that existed during the global COVID-19 pandemic, and b) was the launch of the BPU vehicle rebate program, which was only available for part of the year. That suggests that the required growth rates are feasible, but it will require significant market development effort to sustain that growth over the next five years.

As part of assessing the historical baseline and other strategic market trends, the team considered a wide variety of growth assumptions to assess the feasibility of different scenarios. The team considered low growth followed by high growth, high growth followed by low growth, fairly consistent growth over the period, and numerous other permutations. Several dozen growth trend scenarios were evaluated.

As a result of this analysis, a key implication emerged: the feasibility of attaining state goals in 2035, and even more importantly the strategic goals for 2050, depend heavily on the momentum established prior to 2025. If growth remains modest through 2025, exceptionally high (and probably un-attainable) growth levels would then be required to meet the goals in 2035 and 2050. **The State therefore faces a unique opportunity since early action to build momentum now makes long term electrification success much more likely.**

5 Characterizing The Existing Vehicle Market

To understand the opportunity (and challenges) associated with PEV adoption in New Jersey, it is necessary to understand the existing vehicle population, including both LDVs and MHDVs. This section summarizes the existing vehicle population in New Jersey, including a detailed characterization of the MHDV segment.

5.1 Registered Vehicles In New Jersey

The study team cross-referenced new highly granular vehicle registration data for YE 2020, as summarized in the following chart. This segmentation maps vehicles into both MOVES[e] source types and Weight Class[f]. This summary includes both gasoline and diesel vehicles, and vehicles that are both privately owned and part of a fleet.

Figure 5 - 1: Vehicle Population In New Jersey (YE 2020)

Source Type	Class 1 & 2a	Class 2b	Class 3	Class 4	Class 5	Class 6	Class 7	Class 8	Total
	Light Duty	Medium- and Heavy-Duty							
Passenger Car	2,728,461	0	0	0	0	0	0	0	2,728,461
Passenger Truck	3,433,500	17,721	229	0	0	0	0	0	3,451,450
Light Commercial Truck	0	207,617	1,146	0	0	0	0	0	208,763
Intercity Bus	0	0	0	3	7	23	232	761	1,026
Transit Bus	0	315	308	1,489	217	435	644	3,123	6,531
School Bus	0	1,852	4,205	2,036	188	1,139	9,819	39	19,278
Refuse Truck	0	0	0	30	34	33	127	2,999	3,223
Single Unit Short-Haul Truck	0	12,039	65,354	23,013	28,277	28,544	1,800	160	159,187
Single Unit Long-Haul Truck	0	0	82	22	131	729	552	4	1,520
Motor Home	0	22	934	1,735	746	1,510	804	303	6,054
Combination Short-haul Truck	0	0	0	0	12	53	11,813	24,159	36,037
Combination Long-haul Truck	0	0	0	1	13	13	5,578	44,299	49,904
Total	6,161,961	239,566	72,258	28,329	29,625	32,479	31,369	75,847	6,671,434

Note that 92% of the vehicles on the road in New Jersey are LDVs, and another ~5% are in the Medium-Duty segment.

5.2 Focus on the MHDV Segment

Market development focus for the last four years in New Jersey has been on the LDV segment, leading to the landmark EV law (in January 2020) and launch of a group of resulting policies and programs (BPU vehicle rebate, DEP Corridor DCFC Grants, approval of key utility charging infrastructure programs, etc). Attention is now turning to the MHDV segment, as triggered by directive in the EV Law to establish similar goals, policies, and programs for that segment. The new and highly granular data developed by the NJ-DEP, as analyzed for this study, allow for a more in-depth understanding of the existing Internal Combustion Engine (ICE) MHDV market.

[e] MOVES is a federal EPA emissions framework that characterizes the type of vehicle and its primary use.

[f] The federal Highway Agency segments vehicles by weight, from class 1 (the smallest and lightest), up to class 8 (heavy duty vehicles).

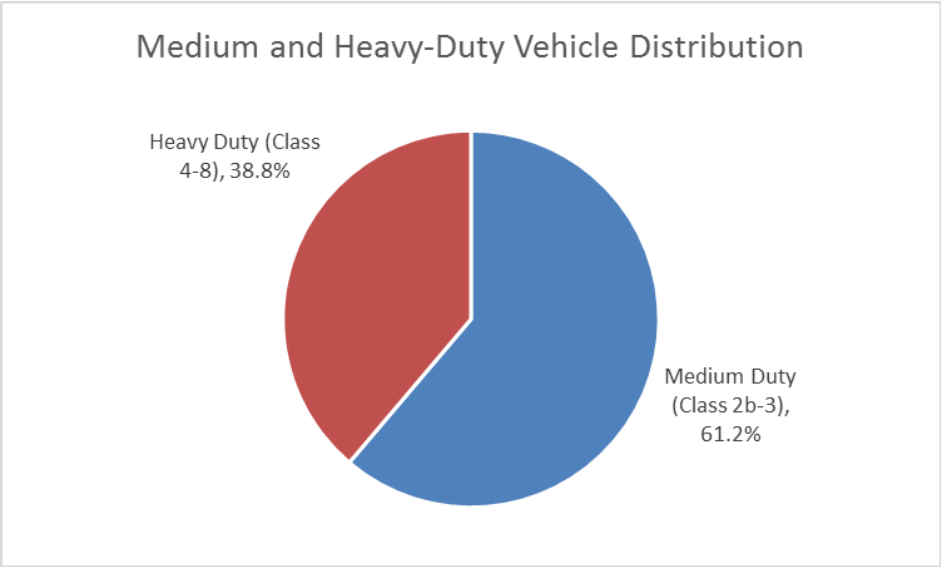
The following chart summarizes the MHDV segment as of the end of 2020, representing 509,473 vehicles, mapped into 11 MOVES categories and 7 weight classes (WCs). Note that the LDV segment is interpreted to include WCs 1 and 2a, including both passenger cars and light trucks (which includes CUVs, SUVs, pick-up trucks, mini-vans, etc). The MHDV segment therefore includes WCs 2b – 8. The following data represents both gasoline and diesel vehicles, and both privately owned and fleet vehicles.

Figure 5.1 - 1: Registered Fossil-Fueled MHDVs in New Jersey (YE 2020)

All MHDVs (Personal and Fleet, All Fuel Types) - SUM OF ALL SEGMENTS								
Source Type	**Class 2b**	**Class 3**	**Class 4**	**Class 5**	**Class 6**	**Class 7**	**Class 8**	**Total**
Passenger Truck	17,721	229	0	0	0	0	0	**17,950**
Light Commercial Truck	207,617	1,146	0	0	0	0	0	**208,763**
Intercity Bus	0	0	3	7	23	232	761	**1,026**
Transit Bus	315	308	1,489	217	435	644	3,123	**6,531**
School Bus	1,852	4,205	2,036	188	1,139	9,819	39	**19,278**
Refuse Truck	0	0	30	34	33	127	2,999	**3,223**
Single Unit Short-Haul Truck	12,039	65,354	23,013	28,277	28,544	1,800	160	**159,187**
Single Unit Long-Haul Truck	0	82	22	131	729	552	4	**1,520**
Motor Home	22	934	1,735	746	1,510	804	303	**6,054**
Combination Short-haul Truck	0	0	0	12	53	11,813	24,159	**36,037**
Combination Long-haul Truck	0	0	1	13	13	5,578	44,299	**49,904**
Total	**239,566**	**72,258**	**28,329**	**29,625**	**32,479**	**31,369**	**75,847**	**509,473**

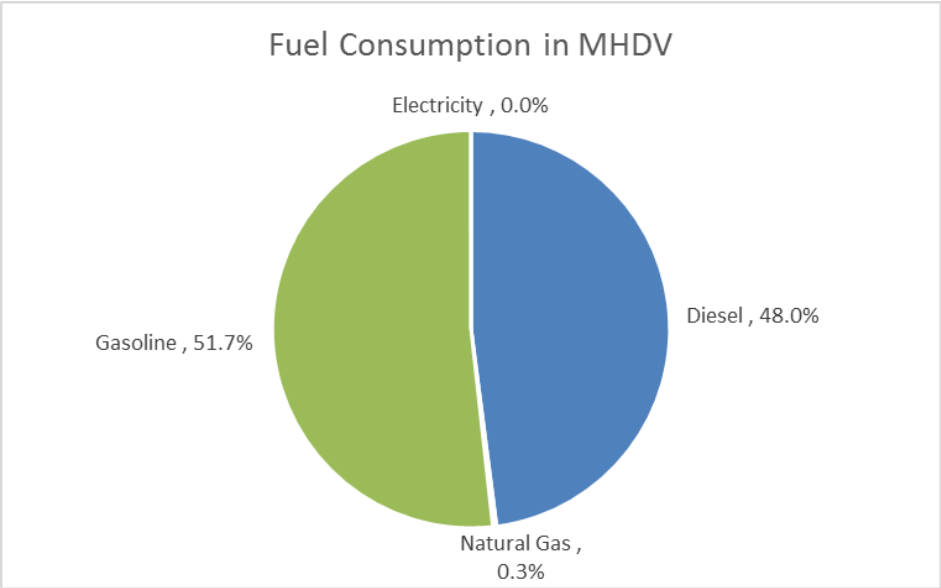
Although discussion of the MHDV segment often focuses on heavy duty vehicles such as buses and tractors, in fact most of the MHDV segment is medium-duty vehicles. This segment is therefore a strategic part of the electrification opportunity for the MHDV segment, since it includes the majority of vehicles, there are strong electrification options available for many vehicles in this segment, and these electrified options are approaching cost parity on a total cost of ownership basis. The following graph summarizes the break-down of the MHDV segment into “medium-duty” (WC 2b and 3) and “heavy-duty” sub-groups. Many of the vehicles in this medium-duty segment are local delivery, shuttle services, and tradesman work trucks that are prime candidates for electrification.

Figure 5.1 - 2: Medium-duty and Heavy-duty Break-Out, YE 2020



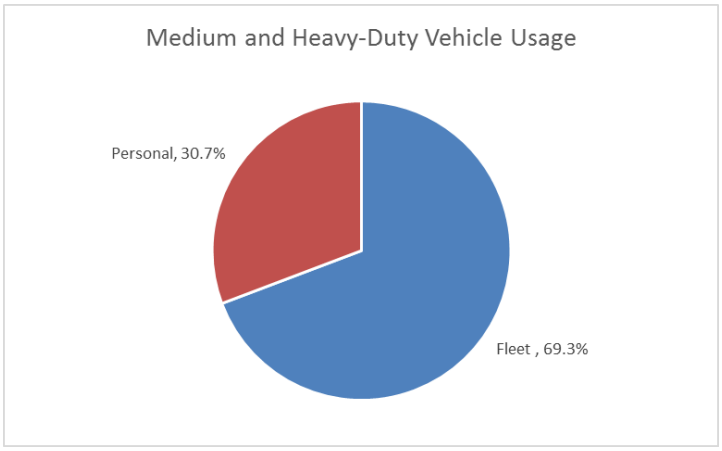
Although many of these vehicles are fueled by diesel, many of them are fueled by gasoline, especially (but not exclusively) in the Medium-Duty segments. This reality is significant since many gasoline-vehicles are fueled at public gas stations (not at a depot), which has significant implications for the development of charging infrastructure for this segment.

Figure 5.1 - 3: Fuel Use In The MHDV Segment, YE 2020



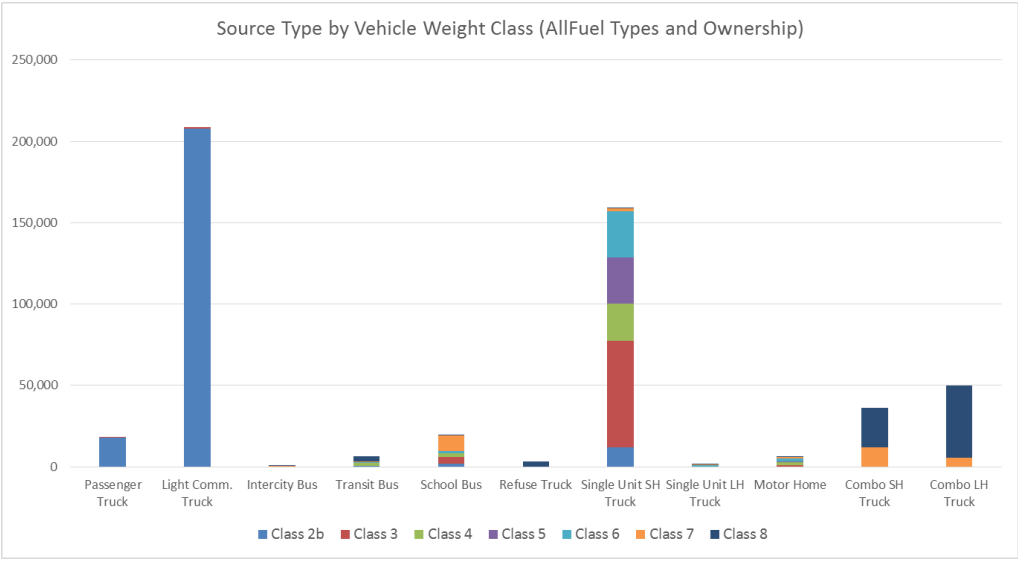
Many of the vehicles in the MHDV segment are part of a (typically commercial) fleet – but not entirely. As illustrated in the following chart, just over 30% of the MHDV fleet are privately owned. Targeting electrification of fleet-MHDVs is a good starting point, but high levels of electrification will eventually depend upon penetration in the privately-owned segment as well.

Figure 5.1 - 4: Vehicle Ownership In The MHDV Segment, YE 2020



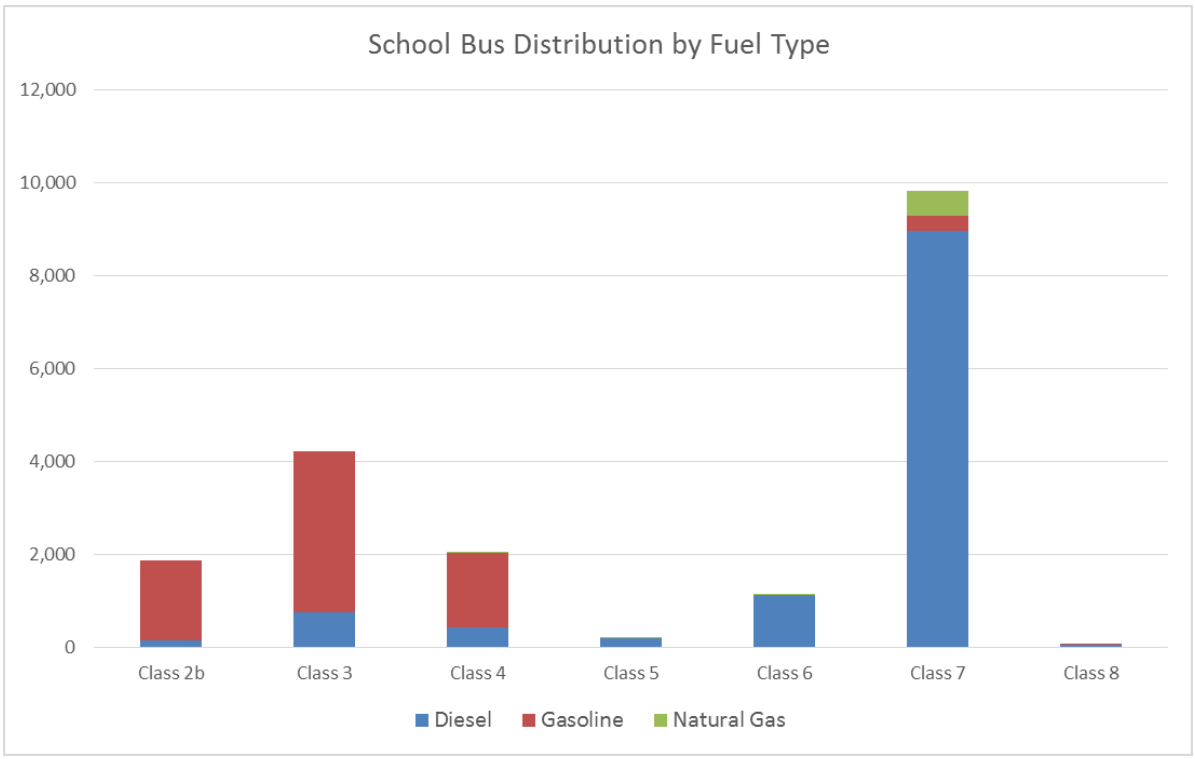
As might be expected, the Heavy-Duty segments are dominated by the higher weight classes (WC 7 and 8). Similarly, the Medium-Duty segment is dominated by WC 2b (light trucks). The single-unit short-haul segments is very diverse, with sub-groups across most weight classes as illustrated in the chart below.

Figure 5.1 - 5: Weight Class Distribution By Vehicle Type, YE 2020



School buses are a segment of particular interest, but also a segment of significant diversity across both weight class and fuel type. The graph below shows the make-up of the school bus segment across both those dimensions. There is a natural correlation with gasoline use for lower weight class vehicles, and diesel use for heavier weight class vehicles.

Figure 5.1 - 6: Weight Class and Fuel Use Distribution Of School Buses, YE 2020



Appendix A: ChargEVC Members

The following list summarizes all ChargEVC members as of the date of this study. Please go to www.chargevc.org for more details.

ARRIVAL
Association of NJ Environmental Coalitions (ANJEC)
Atlantic City Electric
BYD
Center for Sustainable Energy
Clearview Energy
Climate Change Mitigation Technologies
Environment New Jersey
Environmental Defense Fund
EV Box
EVgo
Fuel Force
Greenfaith
Greenlots
Independent Energy Producers of NJ (IEPNJ)
Isles, Inc.
Jersey Central Power & Light
Natural Resources Defense Council
New Jersey Coalition of Automotive Retailers
New Jersey Clean Cities Coalition
New Jersey League of Conservation Voters
New Jersey State Electrical Workers Association
NJR Clean Energy Ventures
NRG
Plug-In America
Princeton eBikes
Proterra
PSE&G
Rockland Electric
Sierra Club NJ Chapter
Sussex Rural Electric Cooperative
Tesla
Union of Concerned Scientists
Utilidata
Wave
Work Environmental Council
Zeem Solutions

Appendix B: Current New Jersey Market Conditions

Plug-in Electric Vehicles have been available in New Jersey since the introduction of first-generation vehicles in 2010 and sales have generally increased year-over-year. In 2020, a comprehensive "EV Law" passed in New Jersey established a goal of 330,000 PEVs on the road in the state by the end of 2025 and 2 million PEVs by 2035. The most recent snapshot of vehicle registration data by the New Jersey DEP reports 12,227 PHEVs and 28,852 ZEVs, for a total of 41,079 PEVs on the road as of the end of 2020.

The EV Law has also established a goal for construction of at least 200 "full service" DCFC locations by 2023, including at least 75 high power (at least 150KW) corridor charging locations and 100 community charging locations. However, the DEP has estimated that approximately 118 high power corridor charging locations will be required to satisfy the EV Law's geographic density requirements (no more than 25 miles between locations). There are 6 compliant locations in operation as of the end of June 2021,

In January 2021, the DEP approved $5.4M in grants to fund 27 new locations for high power corridor charging for a total of 33 total high-power charging locations. This positions New Jersey to reach 28% of its goal of 118 high-power charging locations. The EV Law also establishes goals for development of community fast chargers, but the DEP has not yet published an assessment of the number of compliant community chargers. The study team estimates that roughly 10 such locations are currently in operation.

The following section summarizes the current policies, programs and market development initiatives that help reflect the current market conditions in New Jersey:

- **ZEV Memorandum of Understanding (MOU) and State Goals:**
  This MOU outlines a variety of EV market development policies and programs intended to encourage accelerated adoption of EVs in participating sates.

- **New Jersey's "EV Law"**
  On January 17, 2020, Governor Murphy signed Senate Bill S-2252 into law, creating one of the most comprehensive and progressive vehicle policies in the country.

- **Inter-Agency Partnership (Partnership to Plug-In):**
  The NJBPU, NJDEP and the EDA have formed the "Partnership to Plug-In" to coordinate agency activities on EV market development, specifically regarding charging infrastructure.

- **Vehicle Electrification in the Energy Management Plan and Integrated Energy Plan:**
  For the first time in a New Jersey Energy Master Plan (EMP), transportation electrification has been identified as a primary strategy for realizing GHG reductions and meeting the state's climate goals. The Integrated Energy Plan (IEP) which informs the EMP models the most cost-effective strategies towards the state's goals.

- **Sales Tax Exemption**
  New Jersey law provides for a state sales tax exemption for Zero Emission Vehicles as defined under the California Zero Emission Vehicle Program. The NJDEP maintains a list of eligible vehicles.

- **"Charge Up New Jersey"**
  To bring electric vehicles closer to price party with traditional ICE models, a fund of at least $300M has been authorized for a BPU vehicle purchase rebate program, known as the "New Jersey Charge Up" program.

- **It Pay$ to Plug In:**
  The NJ DEP manages a program that provides grants to offset the purchase and installation costs of publicly available vehicle charging stations. The DEP has supported a special solicitation to provide grants for new corridor DCFC projects compliant with the EV Law.

- **Section 177 Waiver (ZEV Compliance Program):**
  New Jersey has opted into the California Zero Emission Vehicle compliance program. This framework requires large volume automobile manufacturers to ensure a certain percentage of new vehicle sales are ZEVs or TZEVs (such as PHEVs). The percentage increases each year.

- **Utility Program Filings:**
  The BPU has approved PSE&G and ACE to provide substantial incentives for a charging infrastructure in a variety of segments. The other two regulated utilities have submitted similar filing which are currently under review. The BPU is issue a minimum filing order for the MHDV segment, with proposed utility filings in that segment to follow.

- **Consumer Awareness:**
  Multiple efforts are underway to expand main-stream consumer awareness of PEV options and benefits, especially through participation by the NJ DEP in regional marketing efforts.

- **MHDV Vehicle Segments:**
  In July 2020, New Jersey joined 14 states and Washington D.C. by signing a Memorandum of Understanding (MOU) with the aim of collectively advancing the market for electric Medium and Heavy Duty Vehicles. The aim of the MOU is to reach 30% zero-emission vehicle sales by 2030, and eventually 100% by 2050.

- **Adoption of California's Advanced Clean Truck (ACT) Rule**
  The DEP has proposed that New Jersey adopt California's Advanced Clean Truck (ACT) Rule, which increases the percentage of electric Medium and Heavy Duty Vehicles manufacturers are required to sell each year through 2035. The rule uses a mechanism

that assigns “deficits” for sales of traditional vehicles and “credits” for electric vehicle sales that must offset the total deficits each year to maintain compliance.

- **PEV Availability:**
  Vehicle manufacturers are allocating PEV products to the state of New Jersey because of the state’s increasingly attractive market environment. Compact/mid-sized SUVs are the fastest growing vehicle segment in the US, and a wide array of fully electric crossovers in this style are already available, with more expected in the coming years. Traditional dealers are being trained (and certified) to sell EVs, encouraging widespread EV adoption in the state.

- **Market Planning and Development Efforts:**
  The NJ Clean Cities Coalition, Sustainable Jersey, ChargEVC, several local environmental groups and metropolitan planning authorities, all make up a variety of loosely coupled organizations that have been working over the last decade to improve the EV market in New Jersey.