NJTPA NORTH JERSEY TRANSPORTATION PLANNING AUTHORITY

Town of Secaucus

Alternative Fuel Vehicle

Readiness Plan

December 2017

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Disclaimer

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Acknowledgments

This plan was prepared for the NJTPA by a consultant team consisting of ICF, Greener by Design, and Fitzgerald & Halliday, Inc.

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[1] From the New Jersey Sports and Exposition Authority's (NJSEA) Municipal Map at http://arcgis5.njmeadowlands.gov/municipal/v31/.

Executive Summary

Plan Overview

This Town of Secaucus Alternative Fuel Vehicle Readiness Plan outlines actions that the town can take to reduce and resolve barriers to alternative fuel vehicle (AFV) usage. It includes 27 recommendations across five action areas for community leaders and other stakeholders interested in expanding the use of plug-in electric vehicles (PEVs) and natural gas vehicles (NGVs).

The North Jersey region, including the Town of Secaucus in Hudson County, stands to benefit from AFVs, specifically through reduced fuel costs, savings on maintenance, use of advanced technology, support of domestic industries, and promotion of environmental sustainability. The objective of readiness planning is to identify, prioritize, and implement strategies that unlock the potential for vehicle electrification and NGV deployment. If done thoroughly and thoughtfully, AFV readiness planning will set the course for municipalities to effectively accelerate the shift away from reliance on conventional vehicles to AFVs, both in the consumer and fleet markets.

The NJTPA project team, working closely with a stakeholder advisory committee (SAC) made up of municipal decision-makers, residents, and industry representatives, developed the Town of Secaucus Alternative Fuel Vehicle Readiness Plan. The readiness planning process includes data collection and analysis around the current and future market, barriers to increased adoption, regulatory framework, and existing and planned incentives and funding. The resulting recommendations focus on general plans and policies, zoning and parking codes, permitting and inspection, building codes, and fleet planning.

This study was conducted in keeping with the policies of Plan 2045: Connecting North Jersey to improve mobility, protect the environment, and take advantage of technology developments

Plug-in Electric Vehicle Readiness

As of July 2017, PEVs made up approximately 0.38 percent of all vehicles registered in Secaucus. That is approximately 50 PEVs. Given the consumer focus, the opportunity for PEVs is closely linked to several socio-economic factors, including income, hybrid electric vehicle (HEV) ownership, home ownership, and housing type. While barriers to usage exist, the number of PEVs traveling in and around Secaucus will continue to increase. Additional charging infrastructure will be needed to support this growing number of PEVs (see box).

Regulations, policies, and incentives at the municipal, state, and federal levels can play a role in facilitating PEV usage. The project team analyzed existing plans, codes, ordinances, and incentives to inform the recommendations below.

The project team organized both the charging demand analyses and readiness planning recommendations according to the charging infrastructure needs identified for Secaucus:

- **Residential:** The majority of Secaucus ranks in the medium category for residential charging demand. While the current socio-economic characteristics of households in Secaucus do not align closely with likely PEV adoption, this will change over time.
- **Multi-Unit Dwelling (MUD):** Additional and future demand for MUD charging will be driven by new developments, of which there are several in Secaucus, that may draw higher income tenants, as PEV charging may be an attractive amenity to future tenants.
- **Workplace:** Workplace charging demand is high throughout the town, which is expected given the prevalent commercial and industrial land uses.
- **Public:** Public charging is predicted to be the highest within the commercial district near Harmon Meadow and the Mall at Mill Creek. This is expected given the retail centers and other destinations, including restaurants, located in those parts of Secaucus.

Natural Gas Vehicle Readiness

Given that NGVs are typically medium- and heavy-duty vehicles, both market penetration and opportunities for municipal NGV readiness planning are more limited than for PEVs. The NGV market outlook in Secaucus is tied to both national (e.g., price differential) and local (e.g., resource constraints) barriers.

Recommendations

The plan's recommendations correlate with goals set by the SAC, as well as the demand analysis, existing municipal plans and policies, and incentives. The recommendations are organized by the type of infrastructure demand (general, residential, MUD, workplace, and public). In addition, for each recommendation, a lead organization or stakeholder is identified. The time horizon for the actions is 10 years, with actions that may be ongoing, as well as those to be implemented in the near-term (1-3 years) and medium- to long-term (4-10 years). Below is a summary of the recommendations for Secaucus:

- **General Plans & Policies:** Approximately 90 percent of Secaucus is within the New Jersey Sports and Exposition Authority (NJSEA) Meadowlands District.[2] Consequently, the town adopts and abides by the plans the NJSEA prepares for properties within the district. The NJSEA's Meadowlands District Master Plan addresses transportation issues in Secaucus. The master plan does not directly address AFVs, but does indirectly support the concept. This readiness plan includes the following recommendations to purposefully integrate AFV preparedness into local plans and policies:

[2] For more information about the district, see http://www.njsea.com/njmc/about/meadowlands-district.html.

- Integrate AFV readiness into local planning efforts, including **general plans** and **climate action plans**
- Create **cross-jurisdictional opportunities** for sharing lessons learned
- Update the **PEV infrastructure demand analysis**
- Establish **design criteria** for AFV infrastructure
- Collaborate with **utilities** to share market information and facilitate necessary electricity distribution infrastructure upgrades
- Conduct **community education and outreach** to increase awareness about the benefits of AFVs and the role they can play in decreasing transportation costs and achieving environmental goals
- Conduct **targeted outreach** to MUD managers, developers, employers, and other landowners to install chargers at high-priority locations
- Collaborate with MUDs to create and implement policies that **allow residents to install** PEV charging infrastructure
- Identify **AFV grants and other funding opportunities** for workplace and public charging infrastructure development
- Pursue **public-private partnerships** to fund publicly accessible charger installations

- **Zoning & Parking Codes:** Neither the municipal site development requirements nor Meadowlands zoning requirements directly address AFVs. However, any Special Exception use is subject to a public hearing and a more detailed site design review. This gives the NJSEA zoning authority the opportunity to examine any planned developments for inclusion of PEV parking spaces and charging stations. The plan includes the following recommendations for zoning and parking codes:
  - Amend zoning codes to **require or incentivize PEV charging stations or pre-wiring** in new MUD and commercial developments
  - Establish **preferential parking policies** for PEVs and **amend parking codes** to regulate the use of PEV charging spaces
- **Permitting & Inspection**: Municipalities are responsible for administering and enforcing New Jersey codes through the state-mandated permitting and inspection processes. The New Jersey Department of Community Affairs (NJDCA) has been working to streamline the installation of PEV charging stations, including developing guidance on when construction permits and inspections are required and expediting the permitting process. Secaucus has not yet developed processes for administering building codes or electrical subcodes specific to the installation of PEV charging infrastructure. The plan includes the following recommendations for permitting and inspection:

- **Streamline and expedite** approval processes
- **Educate** permitting officials, inspection officials, and first responders in AFV station basics
- Produce **guidance documents outlining permitting requirements** for residential and commercial PEV charging station installations

- **Building Codes:** The NJDCA establishes and enforces statewide building codes — referred to as the Uniform Construction Code (UCC). Municipalities like Secaucus are limited to the statewide UCC, and are therefore not in a position to take a more progressive approach to building codes as they are related to PEVs or other issues. To that end, the plan includes only one recommendation for building codes:
  - **Work with the state to amend the building code** to require PEV station readiness in new single-family developments
- **Fleet Planning:** While often overshadowed by the consumer focus for PEVs, fleet planning is important to AFV readiness, particularly for NGVs. The plan includes the following recommendations related to fleet planning:
  - Assess **the existing municipal fleet**, develop a **fleet management plan**, and **explore opportunities** for fleet AFVs
  - Provide **technical assistance, training, and educational resources** to local fleet managers regarding AFV and infrastructure deployment

Conclusions and Next Steps

By following the recommendations outlined here, Secaucus will be well-equipped to support AFV use within the municipality, thereby reducing fossil fuel use, supporting a healthy environment, increasing economic development, attracting residents and businesses, and demonstrating leadership.

This is a comprehensive plan, but it only provides a snapshot in time. AFV readiness planning is an iterative and ongoing process. The alternative fuel industry is dynamic and this plan should be a "living" document that the Town of Secaucus revisits and updates as goals are achieved, new challenges arise, or circumstances change. In order to accomplish this, the Town of Secaucus should continue to engage stakeholders and solicit feedback on areas that may need additional attention.

There are numerous technical assistance resources available to provide the Town of Secaucus with ongoing support and direction, including the NJTPA and other organizations. The NJTPA project team also developed an AFV readiness guidebook to assist Secaucus and other municipalities with future planning efforts.

Introduction to Alternative Fuel Vehicle Readiness Planning

With the increased availability of and attention paid to AFVs in recent years, the NJTPA is supporting local and regional efforts to deploy these vehicles and related infrastructure for both the consumer and fleet markets. This report focuses on municipal readiness planning in the Town of Secaucus in Hudson County, New Jersey.

Municipalities can benefit from AFVs, particularly PEVs and NGVs. Benefits include reduced fuel costs for consumers, savings on maintenance, supporting domestic industries, and promoting environmental sustainability. The objective of readiness planning is to identify, prioritize, and implement strategies that unlock the potential of transportation electrification and NGV deployment. More specifically, AFV readiness planning lays out the path to make municipalities "AFV ready" by identifying the barriers to widespread deployment of infrastructure and vehicles, and outlining actions that will reduce and resolve these barriers. This plan also includes recommended actions community leaders and other stakeholders can take to help expand the use of PEVs and NGVs.

The value of AFV readiness planning is highlighted by work from the U.S. Department of Energy (DOE) and the International Council on Clean Transportation (ICCT). Researchers at DOE national laboratories demonstrated a correlation between higher PEV deployments and readiness planning, even after factoring in cold weather and incentive availability.[3] Meanwhile, the ICCT assessed actions taken at the municipal level and concluded that there is quantitative support for the "ecosystem approach" as a best practice, where many stakeholders (including local municipalities) have key roles in enabling PEV growth; and that "cities are focal points for collaboration among governments, the auto industry, utilities, and advocates on electric vehicles."[4]

Most readiness planning to date has been focused at the regional or state level. For instance, DOE awarded 16 projects in 2011, referred to as the Clean Cities Community Readiness and Planning for Plug-in Electric Vehicles and Charging Infrastructure,[5] at the multi-state, state, regional, and metropolitan levels. This plan takes readiness planning to the municipal level, in an effort to accelerate the shift away from reliance on conventional vehicles to AFVs. This plan focuses on PEVs and NGVs. Both plug-in hybrid electric vehicles (PHEVs) and battery electric vehicles (BEVs) make up the broader PEV category.

To the extent practicable, this plan considers the unique attributes that influence AFV usage in Secaucus, providing customized insights and recommendations. This plan can help decision-makers in Secaucus identify and prioritize the most effective ways to catalyze AFV deployment.

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[3] DJ Santini, Electric Drive Technology Market Trends, 2015 Clean Cities Strategy, http://www.eere.energy.gov/cleancities/pdfs/2015_strategic_planning_presentation_electric_drive.pdf.

[4] ICCT White Paper, Assessment of leading electric vehicle promotion activities in United States cities, 2015, http://theicct.org/sites/default/files/publications/ICCT_EV-promotion-US-cities_20150729.pdf.

[5] More information about these projects is available online at https://cleancities.energy.gov/partnerships/projects#electric-vehicle-projects.

This effort was sponsored by the NJTPA, the Metropolitan Planning Organization (MPO) for the 13 counties of northern and central New Jersey. Working with local stakeholders and drawing on national examples, three readiness plans were developed to understand existing conditions and recommend implementation strategies related to AFV readiness. The other plans were developed for Montclair Township and Woodbridge Township.

Relevant Regional Planning Efforts

The NJTPA has been involved in developing and implementing two related northern New Jersey plans that provide long-term, regional context to the development of local readiness plans for AFV infrastructure.

Together North Jersey Plan

The Together North Jersey (TNJ) Regional Plan for Sustainable Development, completed in 2015, is the result of three years of planning activities by a coalition of diverse partners. The Plan provides detailed strategies and specific actions, serving as a technical guide for implementation.

The TNJ plan has 15 focus areas, including *Focus Area 11: Transition to a clean energy economy*. Within Focus Area 11, there are four strategies, one of which is *Strategy 11.4: Reduce transportation petroleum use*, which in turn recommends actions in two categories: *travel optimization* and *advanced vehicles* actions. The advanced vehicles actions involve regional and local governments "…working with state officials and the private sector to speed the adoption of new vehicle technologies, especially electric, hybrid and other alternative fuel vehicles by implementing incentive programs, investments and other measures to encourage the purchase and use of these vehicles by individuals and fleet owners and significantly expanding the number public and private electric vehicle charging stations and alternative fuel vehicle refueling stations available in our region and statewide."

There are nearly a dozen AFV related actions recommended. Of these, two are related directly to the development of AFV infrastructure and local readiness plans: (1) "Incentivize and support municipalities to develop and adopt alternative fuel readiness plans… Implement a variety of programs that encourage development of public charging infrastructure for electric vehicles across the region, with particular focus on the involvement of municipal governments…"; and (2) "Incentivize, support, and promote the development of private EV charging infrastructure at commercial (for employees or visitors), and residential properties…" The TNJ plan outlines several steps to implement these actions.

Source: togethernorthjersey.com

Plan 2045

Plan 2045: Connecting North Jersey is the NJTPA's Regional Transportation Plan for northern New Jersey. The plan considers how AFVs, as well as other "game changing" technologies will shape transportation while offering a long-term vision to support the region's economy and quality of life. Developed with extensive public and stakeholder input, the plan addresses infrastructure and transportation needs that ultimately will shape a positive, productive future for North Jersey.

Source: https://apps.njtpa.org/plan2045

Town of Secaucus

Located in northeastern Hudson County, one of 13 counties in the NJTPA region (see Appendix G), the Town of Secaucus is home to more than 18,170 residents and spans 5.8 square miles (see **Error! Reference source not found.**).[6] The majority (90 percent) of Secaucus lies within the Hackensack Meadowlands district, while the remaining 10 percent is primarily residential development. The New Jersey Sports and Exposition Authority (NJSEA) serves as the planning and zoning agency for the Meadowlands District. The Town of Secaucus has adopted NJSEA's master plan, zoning regulations, codes and standards; however, the town reviews and approves applications for development, construction, and redevelopment on land in the district.

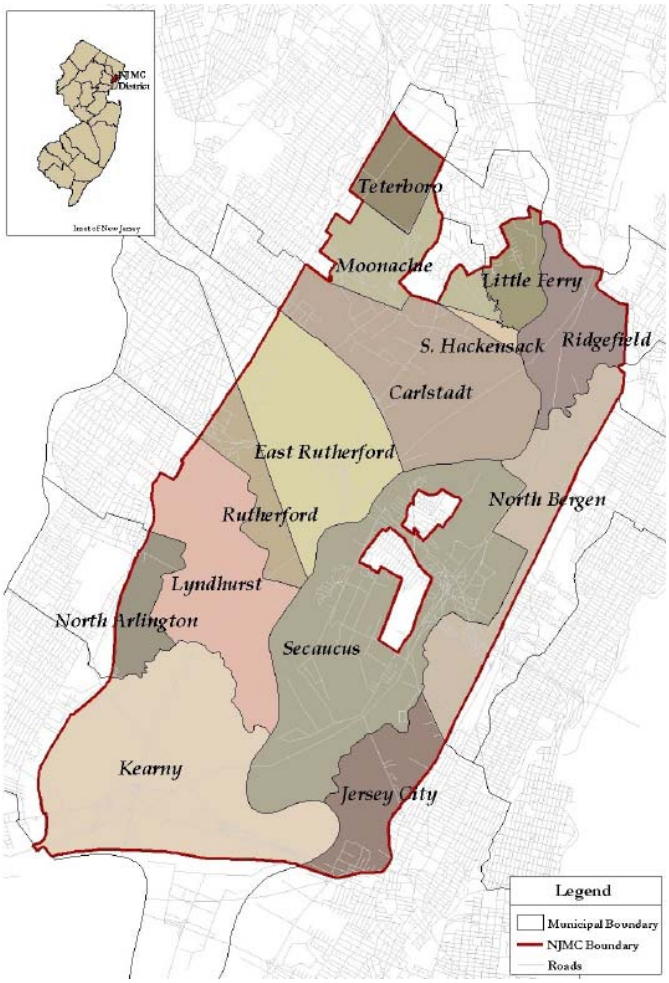


Figure 1. Map of Meadowlands District Municipalities, including Secaucus

The town is divided into four sections: the downtown/residential portion in the north, the commercial/office space to the east of the New Jersey Turnpike, the industrial area in the central section, and the Secaucus Junction Station and adjacent residential apartment complexes in the south. A large portion of land on the edge of Secaucus is open space/marsh, which constitutes the majority of the land area. Approximately 40 percent is open space and other related uses, 30 percent is industrial, 20 percent of the land is residential, and 10 percent is commercial.

There are nearly 7,400 housing units within Secaucus, 59 percent of which are owner-occupied.[7] Over half (57 percent) of the housing units are multi-unit structures, and 43 percent are single-unit.[8] Harmon Cove, a high rise and townhouse development with more than 1,300 units, accounts for large portion of

[6] U.S. Census Bureau (2011-2015). Total Population American Community Survey 5-year estimates, https://censusreporter.org/data/table/?table=B01003&geo_ids=06000US3401766570&primary_geo_id=06000US3401766570. Accessed April 14, 2017.

[7] U.S. Census Bureau (2011-2015). Tenure American Community Survey 5-year estimates, https://censusreporter.org/data/table/?table=B25003&primary_geo_id=06000US3401766570&geo_ids=06000US3401766570,05000US34017,04000US34,01000US. Accessed April 14, 2017.

[8] U.S. Census Bureau (2011-2015). Units in Structure American Community Survey 5-year estimates, https://censusreporter.org/data/table/?table=B25024&primary_geo_id=06000US3401766570&geo_ids=06000US3401766570,05000US34017,04000US34,01000US. Accessed April 14, 2017.

these dwelling units.[9] Secaucus also includes land surrounded by the Meadowlands District that consists of established one- and two-unit dwellings.[10] The town has one train station, Frank R. Lautenberg Rail Station — Secaucus Junction, which connects virtually all NJ TRANSIT rail lines serving northern New Jersey. Residents living near Secaucus Junction are mostly professionals that commute into New York City. On average, Secaucus residents spend 30.1 minutes commuting to work each day.[11] The majority (64 percent) of commuters report driving to work and 27 percent take public transit.[12]

There is a concentration of industrial and commercial complexes in the Secaucus Outlet Center, located in the County Avenue and Meadowlands Parkway areas of Secaucus. Commercial uses, predominantly in the form of retail and hotels, have also flourished along the Route 3 corridor.[13]

[9] New Jersey Meadowlands Commission (2004). Master Plan, http://www.njsea.com/doc_archive/NJMC%20Doc%20Archive/econgrow_docs/lum_docs/NJMC%20Master%20Plan.pdf. Accessed on April 14, 2017.

[10] *Ibid.*

[11] U.S. Census Bureau (2011-2015). Travel Time to Work American Community Survey 5-year estimates, https://censusreporter.org/data/table/?table=B08012&geo_ids=06000US3401766570&primary_geo_id=06000US3401766570. Accessed April 10, 2017.

[12] U.S. Census Bureau (2011-2015). Sex of Workers by Means of Transportation to Work American Community Survey 5-year estimates, https://censusreporter.org/data/table/?table=B08006&primary_geo_id=06000US3401766570&geo_ids=06000US3401766570,05000US34017,04000US34,01000US. Accessed April 10, 2017.

[13] New Jersey Meadowlands Commission (2004). Master Plan, http://www.njsea.com/doc_archive/NJMC%20Doc%20Archive/econgrow_docs/lum_docs/NJMC%20Master%20Plan.pdf. Accessed on April 10, 2017.

Alternative Fuel Vehicle Readiness Planning Goals

The project team and Secaucus staff met throughout the course of the project. Staff from the environmental department and municipal engineering, construction and zoning officials were key members of the stakeholder advisory committee (SAC). The committee also included representatives from the police department, Secaucus Middle School, Hudson County, Hudson Transportation Management Association (TMA), and local businesses. SAC members provided valuable background data and critical review throughout the project. SAC meetings helped to articulate the town's vision for AFV readiness, to provide sufficient background material to stakeholders, and to gather input about the challenges, barriers, and opportunities related to AFV readiness. Secaucus considered stakeholder input and community priorities in developing the following goals:

- Climate Change
    - Reduce community reliance on fossil fuels and reduce carbon footprint by increasing usage of low carbon fuels and PEVs.
    - Make PEVs more accessible by providing options for public charging to encourage PEV use.
- Increasing Resilience
    - Use AFVs such as electric, biodiesel, biogas, and natural gas (advanced biofuels) to diversify fuel options for municipal and fleet use.
    - Provide useful information and insight for businesses in Secaucus, especially those with fleets, to adopt AFVs for employees/visitors/customers.
- Decreasing Air and Water Pollution
    - Encourage transportation options that help to reduce air and water pollutants.

Structure of the Readiness Plan

The Secaucus readiness plan is structured as follows:

Section 1. Plug-In Electric Vehicles and Charging Infrastructure: This section begins with an overview of the PEV market today, including the type and number of PEVs registered in Secaucus; the location, quantity, and level of available charging infrastructure; a market outlook; a review of barriers to increased PEV adoption; a review of the regulatory framework in Secaucus and the region that impacts PEVs and charging infrastructure deployment; and a review of the incentives available.

Section 2. Natural Gas Vehicles and Fueling Infrastructure: This section provides an overview of the status of NGVs and natural gas fueling infrastructure in Secaucus, a discussion of barriers to increased NGV adoption, and a natural gas market outlook.

Section 3. Recommendations and Steps to Implementation: This section lays out the roadmap and recommended actions to achieve the town's AFV readiness goals. Recommendations are presented in a way that aligns with the types of infrastructure demand. Each recommendation references an entity or entities best suited to take responsibility for leading actions.

Appendix A. Acronyms: This appendix lists the acronyms used in this document.

Appendix B. Plug-in Electric Vehicle Forecasting Methodology: This appendix describes the methodology and assumptions used for the PEV forecasts presented in the plan.

Appendix C. Charging Infrastructure Demand Forecasting Methodology: This appendix describes the methodology and assumptions used for the charging infrastructure siting analysis presented in the plan.

Appendix D. Municipal Policy Examples: This appendix includes additional detail on policy examples mentioned in this plan.

Appendix E. Plug-in Electric Vehicle Community Readiness Resources: This appendix is adapted from a compilation developed by the DOE and links to relevant documents, websites, case studies, and other resources.

Appendix F. Additional Information on Parking: This appendix includes municipality-specific parking information beyond the scope of the main discussion.

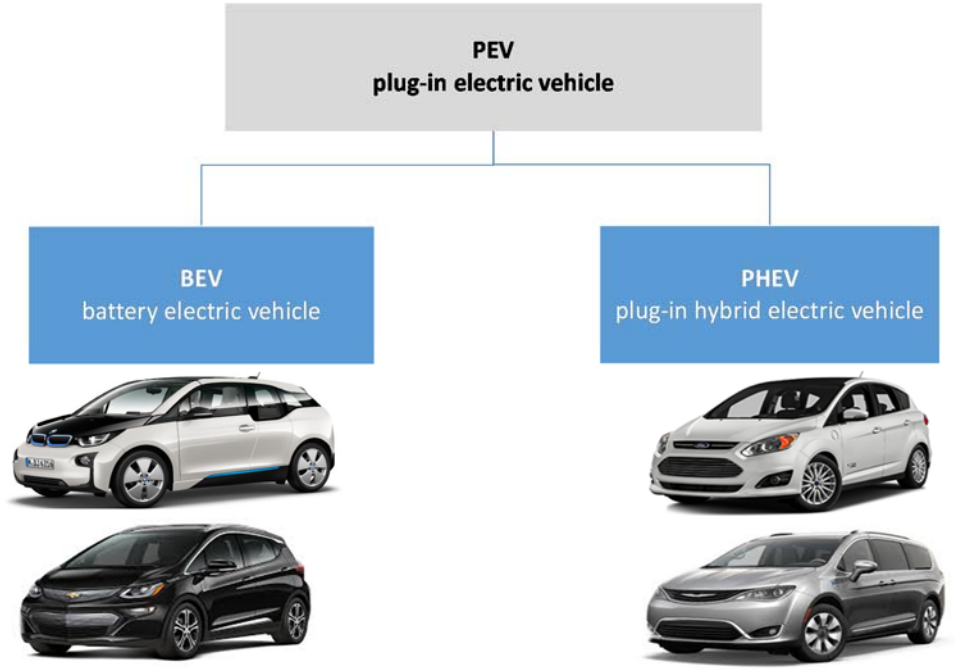
Appendix G. Regional Planning Area: This appendix provides a description of the NJTPA region.

1 Plug-in Electric Vehicles and Charging Infrastructure

Overview

The national PEV market has expanded in scale, geography, and technology since manufacturers released the first modern PEVs in 2011. Driven by incentives, mandates, investment from industry, and enthusiasm from early adopters, new PEV sales in the United States grew from approximately 17,000 vehicles in 2011 to nearly 160,000 in 2016.[14] Over that same period, charging infrastructure increased nearly 10 times.[15] While California has historically led in PEV adoption, the Northeast and Mid-Atlantic regions are quickly becoming primary markets for PEVs. However, PEVs still account for less than 1 percent of the total light-duty vehicle market nationwide. There are many potential benefits associated with an increase in PEVs on the road, including lower operating and maintenance costs, improved air quality, and economic growth.

Both plug-in hybrid electric vehicles (PHEVs) and battery electric vehicles (BEVs) make up the broader PEV category. PHEVs have both a battery-powered motor and an internal combustion engine (that uses gasoline) capable of powering the wheels; BEVs are powered exclusively by a battery-powered motor and do not use gasoline. The BMW i3 and Chevy Bolt (BEVs) and the Ford C-Max Energi and the Chrysler Pacifica (PHEVs), shown below, are examples of vehicles available to consumers



[14] Argonne National Laboratory, Light Duty Electric Drive Vehicles Monthly Sales Updates, https://www.anl.gov/energy-systems/project/light-duty-electric-drive-vehicles-monthly-sales-updates. Accessed April 3, 2017.
[15] U.S. DOE, U.S. Alternative Fueling Stations by Fuel Type, http://www.afdc.energy.gov/data/10332. Accessed April 3, 2017.

In 2017, there were upwards of 25 light-duty PEVs to choose from, and the market continues to expand as automobile manufacturers roll out additional models. Longer range BEVs – such as Tesla models and the Chevy Bolt – can drive 200 miles or more on a single charge. Other BEV models, like the Nissan Leaf and Volkswagen eGolf, have an electric range of 80-100 miles. There are a variety of PHEVs available that can travel 13-50 miles (depending on the model) in all-electric mode, after which the gasoline engine kicks in to provide additional range. Over the past several years, technological advancements (largely in batteries) have extended the electric range significantly. Continued advancements are likely to result in longer vehicle ranges and reduced purchase prices.

PEV charging infrastructure is typically differentiated by the maximum amount of power that can be delivered to a vehicle's battery. This determines the time that it takes to fully charge. Three categories of charging stations are dominating the market:

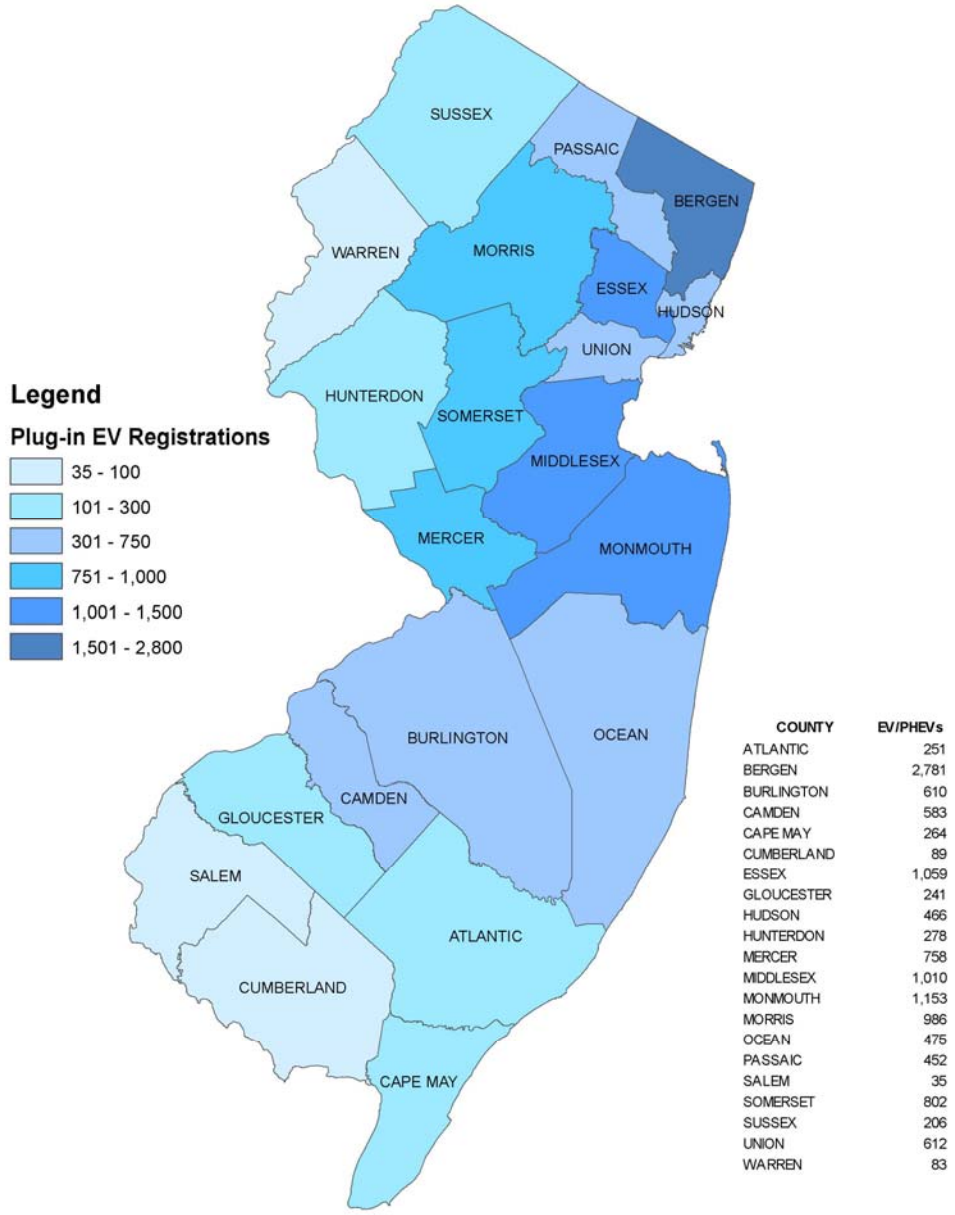
- **Level 1** chargers consist of a standard 110-volt alternating current (AC) outlet that provides 2-5 miles of range per hour of charging, depending on the vehicle and other factors. Level 1 is most commonly found in residential applications but can be suitable for some fleet and workplace charging applications.
- **Level 2** is a 220 or 240-volt AC outlet, and provides 10-20 miles of range per hour of charging. Level 2 can also be used at the home and workplace.
- **Direct current (DC) fast chargers** are more in line with the typical gas station refueling model, and provide 50-70 miles of range per 20 minutes of charging through different types of connectors – J1772 combo, CHAdeMO, and Tesla. The connectors for DC fast charging units are not standardized across vehicle manufacturers in the same way that Level 2 charging hardware is (via the J1772 standard). Furthermore, there are no PHEVs on the market today that can use a DC fast charger.[16] In other words, not all PEVs currently available can use DC fast chargers, and even those that are equipped for fast charging may not have on-vehicle hardware compatible with the charging unit.

Just as vehicle and battery technology is advancing, so is charging infrastructure technology. For example, wireless charging is gaining attention as an option in certain applications, like home and fleet charging. Higher powered DC fast charging technology, providing up to 20 miles of range per minute of charging, is also in the works.

[16] A potential exception to this is the "range extender" or REx. For the sake of simplicity, this plan refers to BEVs and PHEVs; the REx is a kind of hybridized powertrain. Range extenders typically have an engine powered by gasoline that is used to drive an electric generator, which supplies the vehicle's motor with electricity.

Vehicles and Infrastructure in New Jersey and Secaucus

Figure 2 shows PEV counts by county in New Jersey as of July 2017. Hudson County is among the bottom half of New Jersey counties, with more than 450 PEVs.



COUNTY	EV/PHEVs
ATLANTIC	251
BERGEN	2,781
BURLINGTON	610
CAMDEN	583
CAPE MAY	264
CUMBERLAND	89
ESSEX	1,059
GLOUCESTER	241
HUDSON	466
HUNTERDON	278
MERCER	758
MIDDLESEX	1,010
MONMOUTH	1,153
MORRIS	986
OCEAN	475
PASSAIC	452
SALEM	35
SOMERSET	802
SUSSEX	206
UNION	612
WARREN	83

Figure 2. New Jersey PEV Registrations by County, July 2017[17]

[17] Figure provided by the New Jersey Department of Environmental Protection (NJDEP) in August 2017. Data shown here may differ from the final version posted to the NJDEP Clean Vehicles website, http://www.nj.gov/dep/cleanvehicles/. Note that other PEV data sources exist, which may present different estimates.

Table 1 below provides data on the types of vehicles being used in Secaucus, as of July 2017. This data serves as an important baseline both in terms of tracking growth in ownership and forecasting future PEV demand in Secaucus.

Table 1. Vehicle Population in Secaucus, July 2017[18]

	PHEV	BEV	Total Vehicles	Percentage of Total
Secaucus	31	20	13,480	0.38%

PEVs make up 0.38 percent of total vehicles within Secaucus. This share is more than double the PEV percentage in Hudson County (0.16 percent), and is not significantly far off the national PEV penetration rate, which is less than 1 percent.

Providing adequate charging infrastructure can help accommodate and encourage increased use of PEVs. The DOE's Alternative Fuels Data Center (AFDC) Station Locator[19] provides data on charging infrastructure availability across the country.

As of October 2017, New Jersey had 216 public charging locations (14 Level 1, 186 Level 2, and 49 DC fast charging stations), with a combined total of 513 charging outlets (note that some locations have more than one charger type). There are an additional 45 private access locations with Level 2 charging stations, many of which are at Nissan dealership service departments.

Table 2 below includes the operational charging stations in Secaucus, according to the AFDC Station Locator, as of October 2017. The charging stations are also shown on the demand maps beginning with Figure 3. Not shown in the table or on the maps, as they are not yet operational, are Level 2 charging stations located at the Secaucus Public Library and Business Resource Center and the Secaucus Recreation Center.

Table 2. Charging Infrastructure in Secaucus, October 2017

Charging Station Host/Name	Address	Accessibility	Charging Type	Charging Stations		
				L1	L2	DC Fast
Secaucus Town Hall	1203 Paterson Plank Rd	Private	Fleet/Workplace		2	
Secaucus Municipal Lot	1535 Paterson Plank Rd	Public	Public		1	
EDISONPARKFAST	675 New County Rd	Public	Public	1	1	
Residence Inn Meadowlands	800 Plaza Dr	Public/Guests	Public		2	

[18] PEV counts were provided by the NJDEP, based on registration data from the Motor Vehicle Commission (NJMVC).
[19] U.S. DOE, Alternative Fueling Station Locator, http://www.afdc.energy.gov/locator/stations/.

Barriers to Increased Plug-in Electric Vehicle Use

While there are significant benefits to increased PEV use, certain barriers exist which could limit the market's expansion.

- **Vehicle Cost** — Upfront vehicle cost is likely one of the largest barriers to widespread PEV use. Battery costs comprise the largest percentage of a PEV's price; however, that cost has been decreasing per unit of energy and will continue to do so as manufacturers achieve additional technological breakthroughs and economies of scale in the future. Incentives are available at the federal and state levels to help reduce vehicle costs.
- **Charging Station Build-out and Range Anxiety** — The majority of PEV charging occurs at residential locations when drivers plug in their vehicles after finishing a trip. The distance of some trips require additional charging — either at work or around town when visiting shops, restaurants, and other destinations. While public charging station network development can help with this (particularly DC fast charging for long-distance trips), the perceived lack of charging infrastructure may contribute to "range anxiety," the fear that a vehicle may leave a driver stranded because it runs out of charge before reaching the intended destination.

  There are several challenges associated with the deployment of publicly accessible charging infrastructure including funding, siting, permitting, and operational costs. On the municipal side, permitting and inspection processes can be a barrier. These issues are addressed further below and recommendations to overcome these barriers are included in Section 3.

Key Consideration: Charging Infrastructure Costs

The high costs of the infrastructure to provide publicly accessible charging infrastructure make it difficult to earn a profit because the commodity (i.e., electricity) being sold is comparatively inexpensive. While highly dependent upon specific site conditions, publicly accessible installations of Level 2 charging infrastructure can cost in excess of $10,000; whereas DC fast charger installations can cost more than $150,000. A 2015 National Academies Consensus Study Report states that the high cost of installing public charging stations and the minimal revenue obtained from providing electricity present challenges for developing business models for profitable charging stations.

- **Consumer Awareness** — The introduction of new technologies such as PEVs requires continuous outreach to consumers to deliver messaging that highlights PEV availability and benefits, including long-term cost savings as well as environmental, health, and community benefits. Furthermore, it is important to communicate the direct financial and nonfinancial benefits to drivers including tax credits, grants, and the PEV driving experience (e.g., fast acceleration and quiet vehicle operation) and the differences associated with fueling from the grid rather than from a gas station.

Market Outlook in Secaucus

As part of PEV readiness planning, it is important to understand the existing deployment of PEVs and charging infrastructure, as well as the market outlook, including factors such as who is buying PEVs, what type of PEVs are likely to be purchased, and projected market growth. Tracking the market using available data and through partnerships at the local, regional, and state level are means by which the town can stay informed and in touch. The type of PEVs that are on the roads and the locations in which they are registered can help characterize the demand for the different types of charging and applications (such as residential, workplace, and public charging). For instance, a market that is dominated by BEVs is likely to need more DC fast charging than a market that is dominated by PHEVs because BEV charging demands will likely be higher as a result of the larger batteries. This section provides a summary of the potential rate of PEV adoption in Secaucus and areas within where PEV demand might be highest.

Forecasted Plug-in Electric Vehicle Populations in Secaucus

For the purposes of this plan, residential PEV ownership forecasts in Secaucus were projected over a planning horizon from 2016-2030. Projecting PEV ownership at a local level beyond 2030 is not practical given the rapidly changing nature of the technology, demographics, land use changes, and local economic conditions. The forecasts are meant to guide the planning process, to help support deployment of PEV infrastructure, and to guide local policy and regulatory changes as appropriate.

Three PEV projections for Secaucus were developed based on varying assumptions around adoption trends. Table 3 summarizes the approach used to forecast PEVs in low and high usage scenarios. It also includes a GHG stretch scenario in which the state meets the emissions reductions set forth in the New Jersey Global Warming Response Act. [20]

Table 3. PEV Forecast Scenario Descriptions

Scenario	Description
Low	Reflects usage trends comparable to the Reference Case in the Energy Information Administration's (EIA) Annual Energy Outlook (AEO) 2016, [21] adjusted slightly for increased potential indicated in the Mid-Atlantic region.
High	Assumes that PEV usage rates in Secaucus will be consistent with the Zero Emission Vehicle (ZEV) mandate in place for New Jersey, [22] with a fair-share assumption (i.e., that ZEV deployment will occur in the state on a population-weighted basis in the long-term).
GHG Stretch	The PEV strategy of the NJTPA Regional GHG Mitigation Plan calls for a 60 percent market share of PEVs by 2040 to meet state goals. The GHG stretch scenario assumes that PEV adoption rates will be slightly lower than the plan, with a 50 percent market share by 2040.

[20] Public Law 2007, c.112, N.J.S.A 26:2C-37

[21] U.S. EIA, AEO 2016, https://www.eia.gov/outlooks/aeo/pdf/0383(2016).pdf. August 2016.

[22] ZEV programs aim to increase sales of ZEVs, which include PEVs and fuel cell electric vehicles, by requiring that some portion of vehicle manufacturer sales in the state be ZEVs. More information on New Jersey's ZEV mandate is available on the NJDEP website at http://www.nj.gov/dep/cleanvehicles/LEV.pdf.

A more detailed description of the forecasting methodology, as well as corresponding graphs, are provided in Appendix B. The results of these three forecast scenarios are as follows:

- Low Scenario: Approximately 450 PEVs on the road in Secaucus in 2030 (200 PHEVs and 250 BEVs).
- High Scenario: Approximately 1,250 PEVs on the road in 2030 (875 PHEVs and 375 BEVs).
- GHG Stretch Scenario: About 8,000 PEVs on the road in Secaucus by 2040.

To provide context, forecasts project that total light-duty vehicles will increase by about 10-12 percent in Secaucus by 2030, with about 15,000 vehicles of all types registered. The forecasts indicate that PEVs will comprise 6-17 percent of registered vehicles in Secaucus by 2030, compared to the current 0.38 percent. PEV market penetration will also increase across the region, with perhaps a larger number of PEVs driven by people working in and accessing public transit from the municipality. This will likely increase demand for charging infrastructure, positioning Secaucus to be an important contributor to a regional network supporting and reinforcing PEV market growth opportunities.

It is worth noting that the AEO is the source of adoption trends for the low case. The EIA is generally conservative in its electrification outlook, and the outlook does not force compliance with regulations like the ZEV program. Despite these limitations, the AEO is a useful source because it is transparent and typically consistent with national-level assessments. Further, it is updated annually, allowing the town and others to review updates to the outlook from one year to the next. The EIA's 2017 AEO is considerably more bullish on BEVs than the 2016 version. This type of update and change to the forecast can help planning processes and reinforces the notion of a flexible planning process than a deterministic one.

Forecasted Charging Infrastructure Demand in Secaucus

As part of this plan, a charging infrastructure demand analysis was conducted to broadly identify the areas within Secaucus that are most likely to see an increased demand for charging infrastructure. This analysis complements the vehicle forecasting discussed above, and introduces an important geographic component that can guide municipal policy and investments to meet the increased demand for charging infrastructure. Appendix C includes a detailed methodology of the charging infrastructure demand analysis.

The analysis uses key PEV ownership indicators and regional travel patterns to identify areas where there is potential demand for charging infrastructure. The Town of Secaucus can use these results to identify areas where charging station deployment is projected to have the greatest potential to be cost effective, as chargers located in areas where PEV drivers are most likely to travel will be utilized more. Research by Idaho National Laboratory demonstrated that charging equipment deployed as a result of a planning process, similar to this plan, experienced nearly 90 percent greater utilization (as measured by charging events per week) compared to charging equipment deployed in a sporadic, unplanned

manner.[23] However, it is important to note that the results of the demand analysis should not exclude areas from charging as their demographics evolve.

There are four primary types of charging to consider:

- Residential Charging – Highlights areas that will likely experience high demand for residential charging. Since residential charging takes place at home, these are locations in which likely PEV owners live. Residential charging is limited to Level 1 and Level 2 charging infrastructure. Today, the average PEV driver charges at home about 70-90 percent of the time. Most residential charging occurs at Level 1, as it typically does not require any additional investment on the part of the PEV owner. Level 2 charging is more common at residences for BEVs compared to PHEVs, especially those vehicles with ranges above 150 miles.
- Multi-Unit Dwelling Charging – Highlights areas in the region that will likely experience high demand for residential charging and have high incidence of multi-family units. Like residential charging, MUD charging is expected to be a combination of Level 1 and Level 2 charging. The market for MUD charging is in very early stages, and it is unclear which level of charging is most appropriate for this application.
- Workplace Charging – Highlights areas that will likely experience high demand for workplace charging, particularly areas where likely PEV owners work and vehicles are parked for several hours during the day. Level 1 and Level 2 charging are appropriate for workplace charging; ultimately, the appropriate level of charging is something that should be dictated by the facilities management, funding, and demand.
- Public Charging – Highlights areas that will likely experience high demand for public charging (i.e., other non-home or non-work charging), also referred to as opportunity charging. This includes areas where likely PEV owners shop, dine, and travel for recreational activities. Level 1, Level 2, and DC fast charging are all options for public charging, with dwell times (i.e., how long are drivers likely to be parked) and local site conditions (e.g., accessibility to sufficient electrical power) the most important factors in determining which strategy is appropriate.

The resulting analysis illustrates charging demand. Areas shown as warmer colors represent higher demand for charging while the cooler colored areas rank lower for charging demand. Each separate area is a traffic analysis zone (TAZ). The rankings and corresponding colors are based on the TAZ's demand score relative to the entire NJTPA region. For example, a TAZ ranked high (red) on the workplace charging demand map means that area scored in the top 5 percent for workplace charging demand across the NJTPA region. Similarly, a TAZ with a public/opportunity charging ranking of low (blue) scored among the bottom 40 percent for public charging in the region. Additional information about these percentiles can be found in Appendix C.

[23] Idaho National Laboratory, *How Does Utilization of Non-Residential EVSE Compare Between those Installed in Oregon in Planned versus Unplanned Locations?*, http://avt.inl.gov/pdf/EVProj/UtilizationOfNonResEVSEInstallationVsPlan.pdf. April 2015.

Residential Charging

The infrastructure demand analysis is based on vehicle registration data and key socio-economic indicators that are positively correlated with PEV ownership, such as income, hybrid vehicle ownership rates, and property characteristics.

Figure 3 presents the results of the residential charging demand analysis, illustrating that the majority of Secaucus ranks in the medium category for demand. While the current socio-economic characteristics of households in Secaucus do not align with likely PEV adoption, this will change over time. Residential charging demand is the most market-driven of the four charging types, as the number of chargers installed at residences throughout Secaucus will grow as more PEVs are purchased or leased. Section 3 includes recommendations to support the growth of residential charging in Secaucus, primarly through consumer education and outreach.

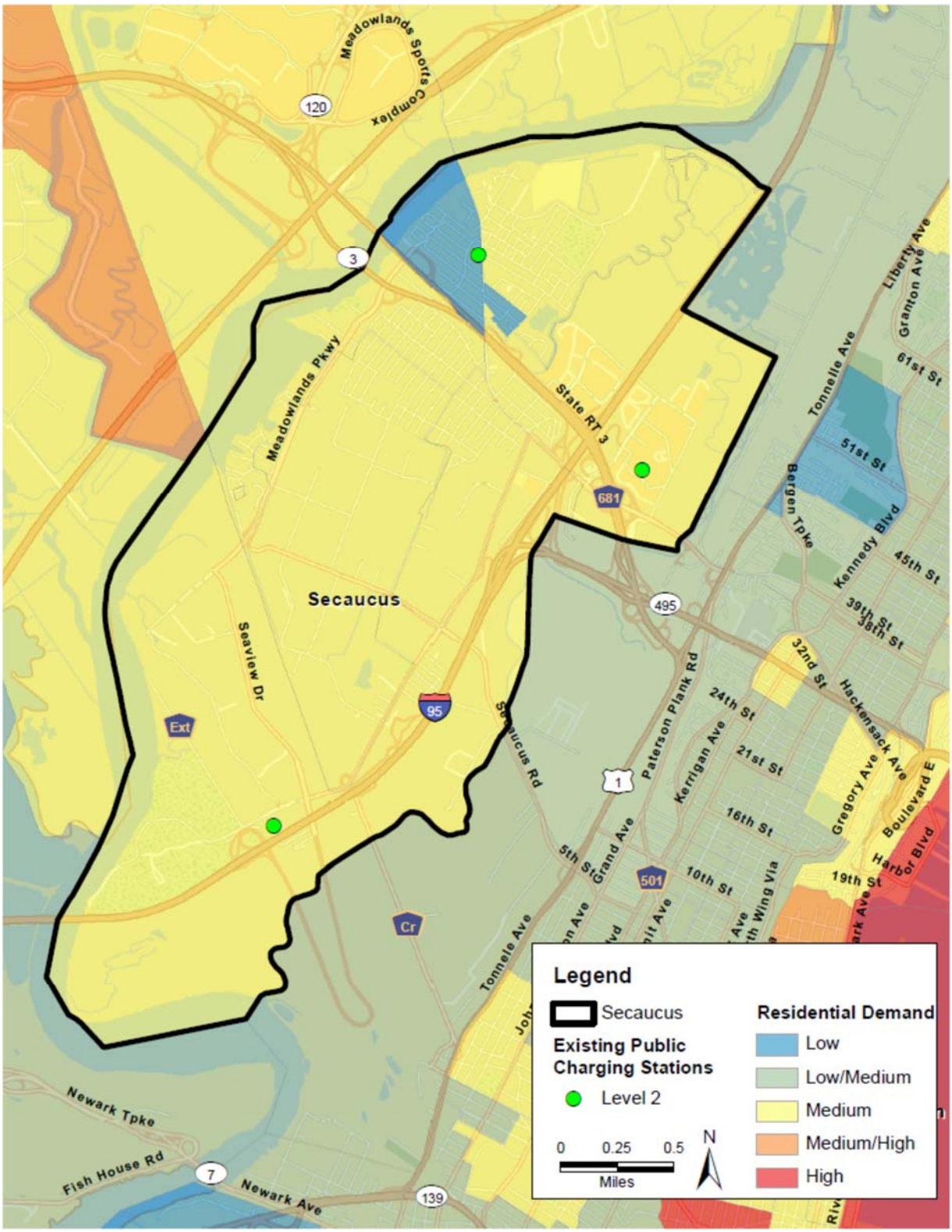


Figure 3. Residential Charging Demand Ranking

Multi-Unit Dwelling Charging

Secaucus is home to multiple large MUDs and mixed-use developments. A charging demand analysis was not conducted for Secaucus, as the locations of these buildings and upcoming developments are known by town staff. Areas include Harmon Cove and the Xchange.

Conversations with MUD management companies suggest there is limited demand for PEV charging at older, established buildings. Future demand for MUD charging will be driven by new developments and significantly renovated buildings that may draw higher income tenants who view PEV charging as an attractive amenity. Section 3 includes recommendations specific to MUD charging, including outreach to property managers to gauge demand.

Workplace Charging

Figure 4 presents the results of the workplace charging demand analysis for Secaucus. Areas likely to experience high demand for workplace charging are typically found around employment clusters or centers. For Secaucus, workplace charging demand is high throughout the town, which is expected given the prevalent commercial and industrial land uses. In contrast, the northern residential area has a low demand, as that is not a workplace destination for likely PEV owners.

While the results of this analysis confirms that there is demand for workplace charging infrastructure throughout most of Secaucus, it does not point to specific areas or employers. The high opportunity zone analysis and resulting map (Figure 6) presented later in this section will be a useful tool to help the Town of Secaucus target businesses with a corporate presence, such as Hartz Mountain Industries, Inc., and other organizations with employee charging demand. Section 3 includes specific recommendations to support workplace charging, primarily through employer outreach.

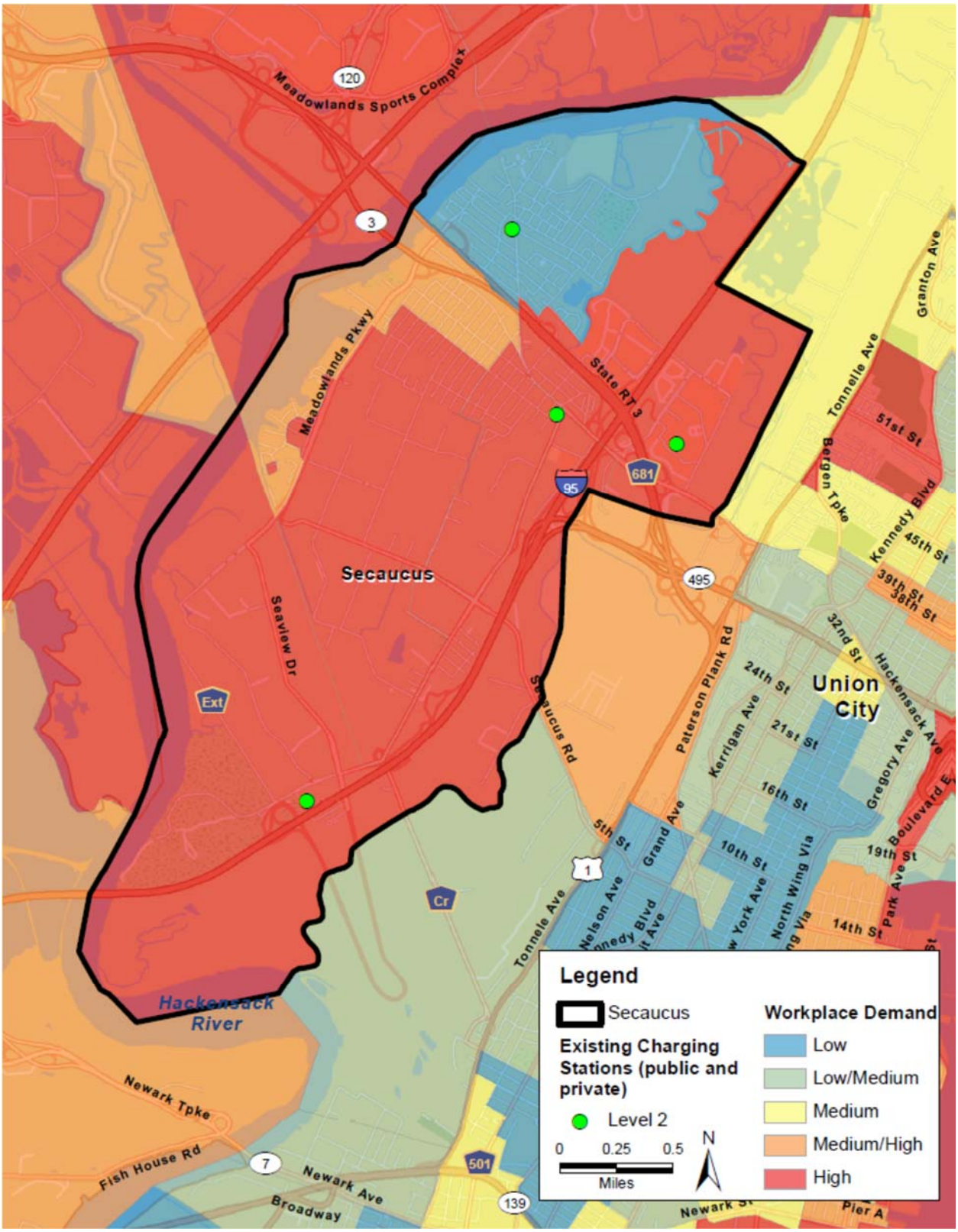


Figure 4. Workplace Charging Demand Ranking

Public Charging

Public charging, also referred to as opportunity charging, covers a wide range of potential charging situations (or opportunities) for a PEV driver away from home or work. Unlike residential and workplace charging, where vehicles are parked for long enough that they achieve a significant charge even with Level 1 charging, public charging will take place at locations where drivers are parked for varying times; therefore, it is important to consider the level of charging the stations offer. Table 4 shows the recommended charging method based on the available charging time at different venues.

Table 4. Available Charging Time and Recommended Charging Level for Different Venues[24]

Typical Venue	Available Charging Time	Charging Level (Primary/Secondary)
Shopping Centers	0.5–2 hours	Level 2/DC Fast
Other (e.g., stand-alone retail)	< 1 hour	Level 2/DC Fast
Street/Meters	1–2 hours	Level 1/Level 2
Parking Garages	2–10 hours	Level 2/Level 1
Hotels/Recreation Sites	8–72 hours	Level 2/Level 1

Public charging will consist of predominantly Level 2 and DC fast stations, as it is more convenient for drivers to spend less time charging their vehicles.[25] The Secaucus public charging analysis focuses primarily on Level 2 charging infrastructure. Figure 5 shows the location of areas that are likely to experience high demand for public charging — these are locations where likely PEV owners shop, dine, and visit for recreational activities. In Secaucus, public charging is predicted to be the highest within the commercial district near Harmon Meadow and the Mall at Mill Creek. This is expected given the retail centers and other destinations, including restaurants, located in those parts of Secaucus. In addition, the central part of Secaucus, bordered by County Avenue to the east and Meadowlands Parkway to the west, appears as high demand. Section 3 includes specific recommendations to support the deployment and use of public charging infrastructure.

[24] Source: ICF

[25] The Association of Electrical and Medical Imaging Equipment Manufacturers (NEMA), "EVSE: Powering the Electric Vehicle." https://www.nema.org/Products/Documents/nema+evse+presentation+for+communities.pdf. Accessed February 1, 2017.

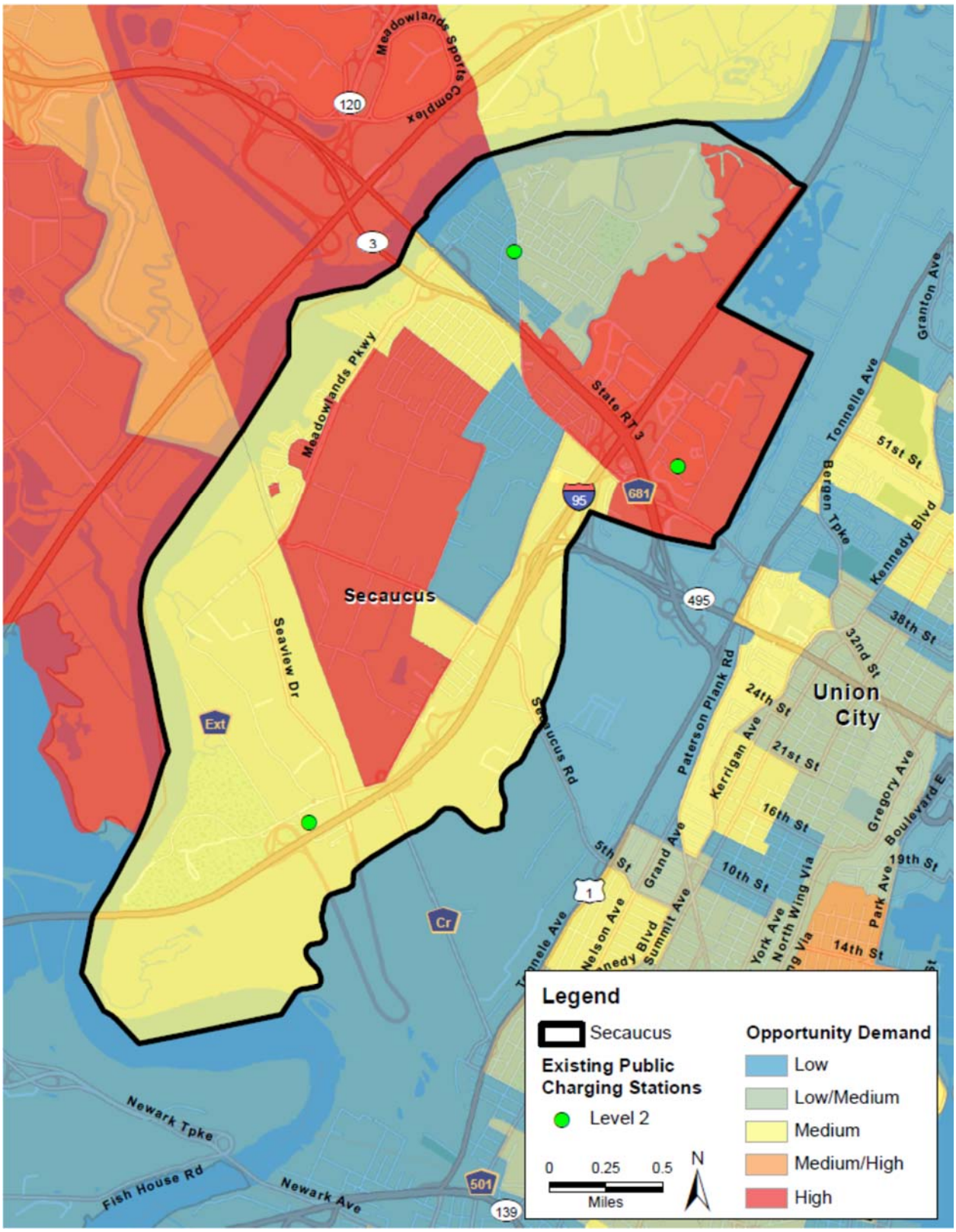


Figure 5. Public Charging Demand Ranking

While not a focus of the public charging analysis, DC fast charging is present in North Jersey and is seeing a great deal of growth in the Mid-Atlantic and across the country. DC fast charging is particularly well-suited for long-distance travel along corridors, as it provides a greater charge in a shorter period of time and correlates with the gas station way of fueling. This corridor approach has become the foundation of numerous infrastructure deployment efforts, such as the Express Charging Corridors Initiative,[26] and other private partnerships.

In late 2016, the U.S. Federal Highway Administration (FHWA) designated approximately 55 Interstate corridors as Alternative Fuel Corridors.[27] I-95 is a designated corridor, specifically for PEV charging, from Maine to Washington, DC, including the portion running through Secaucus. Both DC fast chargers and Level 2 chargers were considered during FHWA's review process for the initial designations. While this designation does not guarantee funding for projects, it may give I-95 and other Alternative Fuel Corridors priority for future funding. The FHWA also intends to provide support by facilitating cooperation and collaboration between states and within regions through convenings beginning in 2018.

High Opportunity Zones for Public and Workplace Charging

It can be challenging to select locations for public charging stations. Workplaces and homes typically have dedicated parking spaces for each worker or resident, vehicles spend the majority of time at work or at home, and commute trips are long, which means PEVs can often use a charge when they arrive at work or home. It is therefore easy to determine the right amount of charging stations at workplaces and homes; ideally these locations have at least one charger for every two PEVs. By contrast, demand for public charging, which currently accounts for less than 10 percent of all charging, is much more sporadic, and in locations where parking is either undersupplied (e.g., a bustling downtown commercial center) or oversupplied (e.g., a big-box retail store on a weekday morning). Furthermore, public charging can be expensive or labor-intensive to install, since charging stations may be in the public right-of-way, far from electrical panels, or in locations where adding a charging space means also adding a parking space in order to meet minimum parking requirements. Though public chargers can send a message to residents and others considering purchasing a PEV that charging is available, those charging stations can also end up as high-profile failures if they are underutilized or consistently occupied by non-charging vehicles.

Although public charging only accounts for a small share of the market today, this will likely change over time with increased access to DC fast charging. National and corridor-based infrastructure deployment efforts, such as Electrify America, are is likely to increase opportunities for DC fast charging, or utilities may seek to support market expansion. Together, these types of market developments may help increase access to charging for MUD residents or enable more inter-regional travel, thereby increasing the share of public charging.

All that said, public charging is a key component to PEV readiness and deployment. For this reason, it is important to be thoughtful in placing such charging infrastructure. In addition to looking at where demand for charging is likely to be located, an effective public charging analysis identifies high opportunity zones where the environment supports successful charging stations. These zones are often

[26] For more information, see ChargePoint's press release at https://www.chargepoint.com/about/news/bmw-volkswagen-and-chargepoint-announce-completion-electric-vehicle-express-charging/, as well as various news articles.

[27] For more information about the FHWA Alternative Fuel Corridors, see https://www.fhwa.dot.gov/environment/alternative_fuel_corridors/.

busy commercial areas with high demand for parking and ample turnover, which is conducive to well-utilized, highly-visible chargers. They can also be redevelopment areas or areas with public land uses where local governments have more control over development and therefore greater ability to place charging stations in the right location.

The high opportunity zone analysis for Secaucus leveraged municipal zoning data to identify commercial areas, redevelopment areas, and public land uses that could serve as an initial set of high opportunity zones. The second step was to overlay the high opportunity zones with the demand maps for workplace and public charging, confirming that the zones aligned with the demand analysis. Town of Secaucus staff reviewed the zones and provided input to help eliminate areas that may not be suitable, as well as consider additional areas not originally identified. Figure 6 identifies the resulting high opportunity zones for public charging and workplace charging. Note that some areas provide opportunities for both types of charging while others are more suitable for one or the other.

The high opportunity areas for public charging include the southern portion of the County Avenue/Route 653 corridor, Mill Creek Mall, along Wood Avenue, and multiple areas along Paterson Plank Road and Flanagan Way. Among these high opportunity zones are several municipal parking lots, specifically those located at the Secaucus Town Hall, Center Avenue, Plaza Center, and the Secaucus Public Library and Business Resource Center. Recognizing the town is already installing public charging at the town hall and library lots, these lots should be considered for expanded infrastructure that can serve residents, employees, and visitors.

For workplace charging, high opportunity areas are located north of Secaucus Junction station, along Castle Road and commercial buildings clustered near Osprey Cove. There are also several parts of Secaucus that may be ideal for charging intended to serve multiple users. The largest area is centered on the Harmon Meadow, south of I-95, which includes a large amount of retail and workplace destinations such as Hartz Mountain Industries, Inc. In addition, Meadowlands Hospital[28] may be a suitable location, as the healthcare industry has been actively installing chargers serving both employees and hospital visitors. Similarly, the area to the north of the hospital, along Meadowlands Parkway, is home to workplaces as well as retail and other commercial locations.

Section 3 includes specific recommendations for how the Town of Secaucus can use this analysis to focus effort and investment in a way that will support public and workplace charging infrastructure.

[28] The New Jersey Board of Public Utilities (NJBPU) funded a microgrid feasibility study at the same location, see http://www.state.nj.us/bpu/pdf/boardorders/2017/20170630/6-30-17-9G.pdf. According to Mike Hornsby, NJBPU, the project may incorporate PEV charging (noted during the Technical Advisory Committee meeting held October 17, 2017).

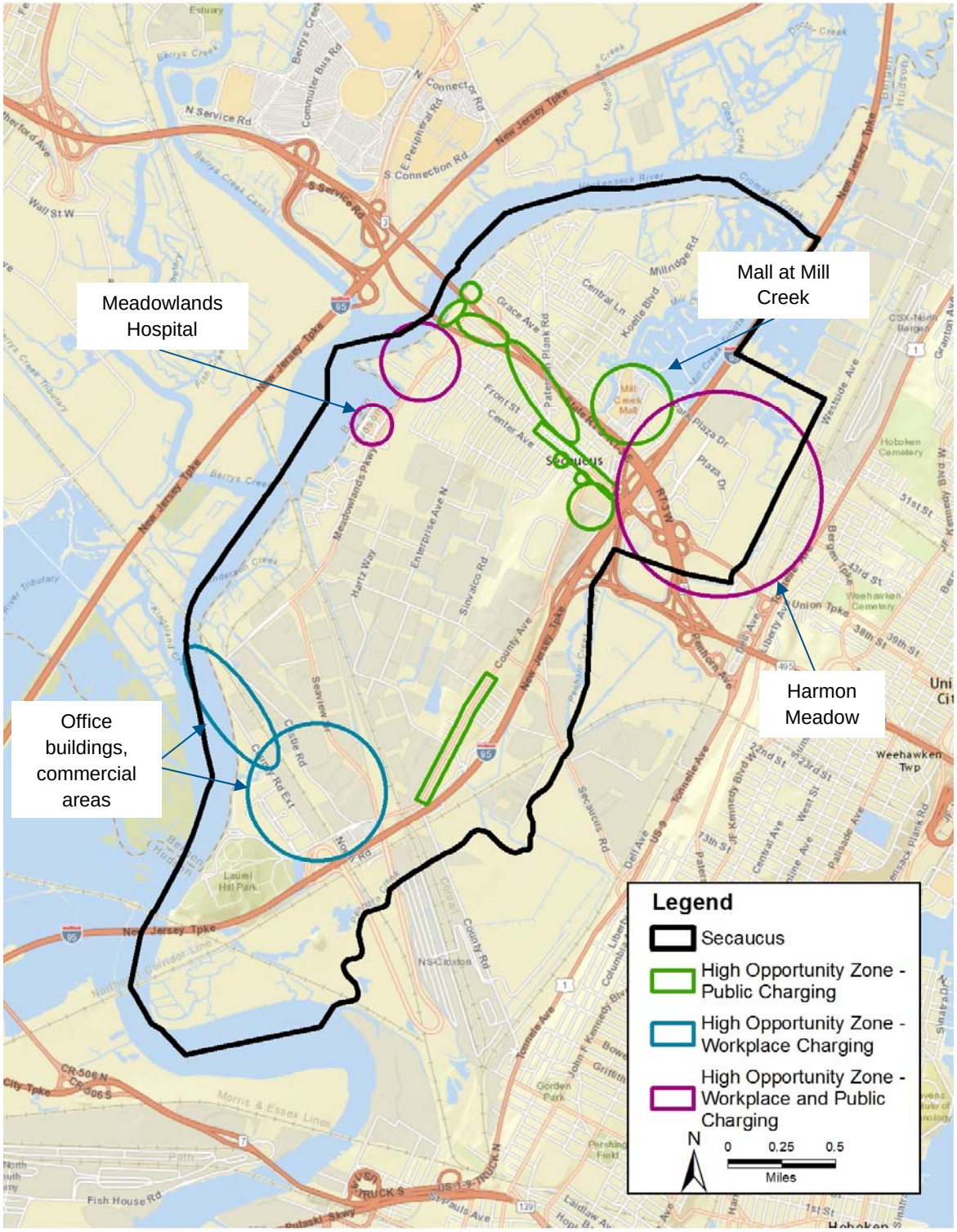


Figure 6. High Opportunity Zones – Public and Workplace Charging

Regulations

Regulations and policies at the municipal, state, and federal levels can play a role in facilitating increased PEV use. Regulations that can support the deployment of PEV charging infrastructure include building, electrical, and zoning codes; parking rules; permitting processes; and incentives.[29] This section provides an overview of the town's community plans as they relate to facilitating AFVs, PEVs in particular. It also addresses Secaucus' local zoning regulations and analyzes their potential to affect PEV charging station installation; regulations addressed include those relating to parking, site plans and site development, and environmental performance standards (noise, air quality, etc.). The relevant language and provisions related primarily to PEVs are described below. Regulatory information specific to NGVs and natural gas fueling infrastructure can be found in Section 2.

Local Community Plans

Local community plans are forward-looking documents that both define a community's vision for the future and respond to anticipated future conditions with strategies and related actions. Community plans can proactively facilitate and encourage AFV use. They can do so by establishing policies that encourage inclusion of PEV charging infrastructure in new development or that support charging stations as a key element of the local transportation system.

Secaucus is unique in that approximately 90 percent of the town is within the NJSEA Meadowlands District.[30] Consequently, the town adopts and abides by the plans the NJSEA prepares for properties within the district. Current long-range plans for Secaucus were prepared under the auspices of the NJSEA regional land use planning programs. The NJSEA plan that addresses transportation issues relative to Secaucus is the *Meadowlands District Master Plan* (2004, NJSEA). The plan's vision is focused on preserving wetlands and open space while calling for the revitalization of polluted or blighted parcels into economic and community-oriented growth. The plan does not directly address the topic of AFVs. It does, however, indirectly support the concept of AFVs. The plan notes the need to improve air quality conditions by managing traffic and congestion, to provide a healthy environment, and to provide for "rapid mobility of people and goods and imaginative use of modern design and technology."

Zoning and Parking Codes

Through zoning codes, design standards, and parking rules, local governments have the opportunity to ensure both that there are sufficient charging opportunities to meet projected PEV demand and that PEV parking spaces are effectively designed and regulated to accommodate charging vehicles. Zoning codes can allow, encourage, or require appropriate placement of charging infrastructure in certain land use designations. Zoning code provisions, design standards, and parking rules can also specify requirements for design and installation, signage, accessibility, fees, time limits, lighting, and maintenance.

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[29] Note that incentives are addressed in more depth in the Incentives and Funding section below

[30] For more information about the district, see http://www.njsea.com/njmc/about/meadowlands-district.html.

Local zoning provides for the direct implementation of land use policy in a community by setting standards and guidelines for land development. While PEV charging stations are generally not considered independent land uses in and of themselves, they have implications for site function and character. In terms of site functionality, they are a distinct element of the parking supply, impacting site circulation, including pedestrian circulation and safety and handicap access. Infrastructure for charging PEVs is, therefore, an important element of site planning and design in terms of location, scale, and relationship to overall site use. Consequently, it is to a community's advantage to address charging infrastructure in the course of zoning language in general and parking requirements and site plan review in particular. Zoning also offers an opportunity to include incentives for site design as a tool to encourage accommodations for PEV use.

Zoning in Secaucus for properties within the district is provided in accordance with the town's ordinance Adopting Meadowlands Regional Commission Master Plan, Zoning Regulations, Codes and Standards. This ordinance details responsibilities of each for development review. Neither the municipal site development requirements nor Meadowlands zoning requirements directly address AFVs. However, any Special Exception use is subject to a public hearing and to more detailed site design review, which gives the NJSEA zoning authority an opportunity to examine any planned developments for inclusion of PEV parking spaces and charging stations.

Permitting and Inspection

Streamlined permitting and inspection processes are key to PEV planning. These processes can help expedite the installation of charging stations at appropriate locations, provide the service at a reasonable cost to consumers, and maintain the safety of consumers and the public.

The New Jersey Clean Cities Coalition (NJCCC) has worked with the New Jersey Department of Community Affairs (NJDCA), the agency that oversees the statewide code, to clarify and, where possible, streamline the permitting process for PEV charging stations. In 2011-2012, the NJDCA published an article, "*Electric Vehicle Charging Stations – What you need to know,*" which is the most recent guidance available from the state on the installation of PEV charging stations at residential locations. The article includes Table 5 showing when construction permits and inspections are required for the installation of PEV charging infrastructure.

Table 5. New Jersey Permit Requirements for Charging Stations[31]

Project	Permit Required	Inspection Required	Classification
Existing outlet is sized correctly but plug configuration is not compatible with equipment plug necessitating the replacement of the outlet to one with proper configuration.	No	No	Ordinary Maintenance NJAC 5:23-2.7(e)3 http://www.state.nj.us/dca/divisions/codes/codreg/ucc.html
Upgrade circuit breaker and wire to higher rating (15 amp to 20 amp)	Yes[1]	Yes[2]	Minor Work NJAC 5:23-2.17A http://www.state.nj.us/dca/divisions/codes/codreg/ucc.html
Vehicle charging system being installed that requires new 120 or 240 volt outlet or an electrical line that will be directly connected to the system.	Yes[1]	Yes[2]	Minor Work NJAC 5:23-2.17A http://www.state.nj.us/dca/divisions/codes/codreg/ucc.html
1 - The issuance of a construction permit is not required before the work may proceed. However, the owner or electrical contractor acting on behalf of the owner must notify the local code enforcing agency before the work begins. Also, a permit application must be filed and must be delivered in person or by mail within five business days from the date of oral notice.			
2 - An inspection must be performed within 30 days of the request for inspection and is based upon what is visible at the time of the inspection with the certificate of approval stating so.			

Another NJDCA article provides more detailed information on permitting for residential PEV charging stations: *"Electric Vehicle Charging Stations – Installation and Permit Requirements"* (in NJDCA's Construction Code Communicator, Vol. 23, Number 1, Spring 2011). NJDCA provides contacts for additional information regarding the installation of PEV charging stations: NJDCA, Division of Codes and Standards, Code Assistance Unit at (609) 984-7609.

In June 2011, NJDCA announced the results of its review of applicable state codes and regulations and determined that installation of residential PEV charging equipment is considered "minor work", i.e., the homeowner or contractor need only provide verbal notification to the local code enforcement agency prior to starting the installation and submit the permit application within five days of notification, so they do not have to wait up to three weeks for permit approval.

The challenges associated with local permitting and inspection of PEV charging infrastructure vary depending on the type of property at which the infrastructure will be located. For PEV charging, factors include whether it is at a single-family residence, at a MUD, or a commercial property. Since the majority of demand for PEV charging infrastructure is likely to be at privately owned residences and workplaces, local governments can support successful large-scale deployment of PEVs by being prepared to handle

[31] NJDCA, *Electric Vehicle Charging Stations – What you need to know*, http://www.state.nj.us/dca/divisions/codes/publications/pdf_other/homeowners_guide_electric_vehicles_charging_stations.pdf. Accessed April 3, 2017.

increased volumes of permit requests for charging infrastructure installations in an efficient and safe manner.

The main approval process applicable to AFV infrastructure installation is the issuance of permits relative to the building code, and sub-codes relating to electrical, fire, etc., whose application contents and process requirements are set out in state law. New Jersey municipalities are responsible for administering and enforcing the state codes through state-mandated permitting and inspection processes.

Secaucus has not yet developed processes for administering building codes or electrical subcodes specific to the installation of PEV charging infrastructure. The list below summarizes key permitting process characteristics for Secaucus:

- **Time to Issue Permit**: Within 2-3 weeks, assuming good quality application
- **Permit Fee**: Dependent on sub-code and installation type
- **Permit Availability**: Over the counter only
- **Permit Staff Training**: None specific to AFV infrastructure

Building Codes

Building codes contain safety standards and specifications that guide new construction and renovations. NJDCA, specifically the Division of Codes and Standards, establishes and enforces statewide building codes—referred to as the Uniform Construction Code (UCC). There are two major opportunities to create building codes that support PEV deployment. The first is to specify standards for PEV charging infrastructure in the building code to ensure that any charging station installations are safe and accessible. The second is to require pre-wiring for charging stations to lower the cost of future installations. Pre-wiring refers to the practice of providing sufficient basic infrastructure, such as conduits, junction boxes, outlets serving garages and parking spaces, adequate wall or lot space for future charging infrastructure, and adequate electrical panel and circuitry capacity, to meet anticipated future charging demand.

Municipalities like Secaucus are limited to the statewide UCC, and are therefore not in a position to take a more progressive approach to building codes as they are related to PEVs or other issues. Some, municipalities have taken steps to advocate for UCC updates that incorporate PEVs where appropriate and feasible.

Incentives and Funding

There is a variety of financial support at the federal, state, and local levels for individuals and local fleets interested in investing in PEVs and charging infrastructure. These include financial incentives, such as tax credits, vehicle rebates, and insurance discounts, as well as non-financial incentives, like high occupancy vehicle (HOV) lane access. This section provides an overview of each primary form of financial support as well as who the funding is available for (consumers, businesses, non-profits, and/or public entities may be eligible for any given program).

Additional funding opportunities and incentives may emerge in the future, such as state-level programs funded through the Volkswagen Clean Air Act Settlement and auto manufacturer partnerships to offer vehicle purchase price discounts. The New Jersey Department of Environmental Protection (NJDEP) has established a website to provide more information for New Jersey.[32]

Volkswagen Clean Air Act Settlement

The Volkswagen (VW) Settlement established two funding sources that may result in AFV deployment and infrastructure support in and around the Town of Secaucus.

- ZEV Investment Plan: VW, through a newly formed entity called Electrify America, will install, operate, and maintain ZEV infrastructure nationwide, initially focusing on 11 major metropolitan areas. The New York City metro area, which includes Secaucus, will receive the following benefits:
  - Level 2 charging installation at MUDs, workplaces, and public sites
  - DC fast charging facility installation on highway and other transportation corridors
  - Education and outreach that builds or increases public awareness of ZEVs
- Environmental Mitigation Trust: The State of New Jersey is eligible to receive and use approximately $72 million in funding. While the specific program in New Jersey has yet to be established or implemented, these funds could be used to replace polluting diesel equipment with cleaner vehicles, including local freight trucks, transit buses, school buses, shuttle buses, and refuse trucks. A certain portion of these funds could also be used to install PEV charging stations.

For more information, see www.epa.gov/enforcement/volkswagen-clean-air-act-civil-settlement.

Incentives for Vehicle Purchasers

Vehicle purchase incentives typically help to reduce the upfront cost of a qualified PEV, either at the point-of-sale or later. Other variations of vehicle purchase incentives include cost reductions, fee waivers, and other special privileges associated with the vehicle. Some utilities, for example, offer reduced charging rates for eligible PEV drivers. Table 6 provides an overview of the available incentives for PEV purchasers in New Jersey.

[32] See http://www.state.nj.us/dep/vw/.

Table 6. Incentives for PEVs

Type	Incentive/Program	Funder/ Administrator	Eligible Entities	Timeline	Incentive Summary
Federal	Plug-In Electric Drive Vehicle Tax Credit	IRS	Individuals, businesses, government entities	Available, deadline not specified; phases out based on sales	$2,500-7,500, depending upon battery capacity. Tax credit can be combined with state level rebates.
Federal	Congestion Mitigation and Air Quality Improvement Program (CMAQ)	Federal Highway Administration	State DOTs, MPOs, local governments, transit agencies	As funds are available	The CMAQ program provides funding (via DOTs and MPOs, including the NJTPA) for eligible transportation projects that contribute to air quality improvement and congestion relief. Publicly owned AFVs, such as PEVs, are eligible for CMAQ funding; however, vehicles must provide a dominant transportation function.
State	ZEV Tax Exemption	NJ Division of Taxation	Individuals, businesses	Timeline not specified	ZEVs sold, rented, or leased in New Jersey are exempt from state sales and use tax. This exemption is not applicable to partial ZEVs, including HEVs.
State	HOV Lane Exemption and Toll Discount	NJ Turnpike Authority (NJTA)	Individuals, businesses, government entities	Expires September 30, 2019	The NJTA allows qualified PEVs to travel in the HOV lanes located between Interchange 11 and Interchange 14 on the New Jersey Turnpike. The NJTA offers a 10 percent discount on off-peak New Jersey Turnpike and Garden State Parkway toll rates through NJ EZ-Pass for drivers of vehicles that have a fuel economy of 45 miles per gallon or higher and meet the California Super Ultra Low Emission Vehicle standard.

Incentives for Charging Infrastructure Deployment

Incentives and financing options are available to help defray the costs of deploying charging infrastructure. Some programs aim to reduce or eliminate the cost of eligible equipment (e.g., Level 2 charging station) while others provide funding for equipment and installation costs. Table 7 includes an overview of the available incentives for PEV charging infrastructure deployment in New Jersey. In addition, programs such as the NJDEP NJ Charging Challenge provide special recognition to employers making their workplaces PEV ready.[33]

[33] For more information, see www.drivegreen.nj.gov/programs.html.

Table 7. Incentives for PEV Charging Infrastructure

Type	Incentive/ Program	Funder/ Administrator	Eligible Entities	Timeline	Incentive Summary
Federal	Congestion Mitigation and Air Quality Improvement Program (CMAQ)	Federal Highway Administration	State DOTs, MPOs, local governments, transit agencies	As funds are available	The CMAQ program provides funding (via DOTs and MPOs, including the NJTPA) for eligible transportation projects that contribute to air quality improvement and congestion relief. PEV charging infrastructure may be eligible for CMAQ funding.
Federal	Low and Zero Emission Vehicle Research, Demonstration, and Deployment Funding	Federal Transit Administration	Local, state, and federal government entities; public transportation providers; private and non-profit organizations; and higher education institutions	Not specified	Financial assistance is available for research, demonstration, and deployment projects involving low or zero emission public transportation vehicles. Funding may cover up to 80% of project costs, with a required 20% non-federal cost share requirement. Eligible vehicles must be designated for public transportation use and significantly reduce energy consumption or harmful emissions compared to a comparable standard vehicle.
State	Workplace Charging Station Grants	NJDEP and New Jersey Board of Public Utilities (NJBPU)	Businesses, nonprofits, government entities	As funds are available	Reimbursement grants are offered on a first-come, first-served basis for the cost and installation of eligible charging stations at workplaces, government and educational facilities, nonprofits, and parking facilities. Funding up to $250 is available for each Level 1 charging stations installed and up to $5,000 for each Level 2 charging stations installed. Current funding has been allocated as of January 2017, though interested applicants may be put on a waitlist in anticipation of additional funding.
Utility	Workplace Charging Station Incentives	PSE&G	Businesses, nonprofits, government entities	As funds are available	PSE&G provides free charging stations to companies in their service territory for the purpose of workplace charging. Chargers are available on a first-come, first-served basis to companies that secure a commitment from at least five employees who will use a PEV for their commute. PSE&G will own the chargers and collect usage data.
Nonprofit	Sustainable Jersey Small Grants	Sustainable Jersey	Municipal governments	As funds are available	Grants are available to help municipalities achieve progress toward Sustainable Jersey certification and general sustainability. Eligible projects must align with actions for which municipalities could score points toward certification, such as “Make Your Town Electric Vehicle Ready” and “Public Electric Vehicle Charging Infrastructure.”

2 Natural Gas Vehicles and Fueling Infrastructure

Overview

While PEVs primarily serve the light-duty consumer market, the NGV industry targets the medium- and heavy-duty fleet sectors. Following an initial surge in NGV interest in the mid- to late-1990s, natural gas fueling infrastructure increased steadily from approximately 750 stations across the country in 2007 to more than 1,800 in 2016.[34] The use of natural gas as a vehicle fuel grew by 75 percent in that same period.[35] Once again, incentives and investment from industry have been important drivers for this growth. Currently, natural gas only accounts for 3 percent of transportation fuel (based on energy content).[36] Additional development of this market is focused on strategic deployment of NGVs in appropriate fleets. For example, nationwide, CNG vehicles account for 35 percent and 55 percent of the transit bus and refuse truck markets, respectively.[37,38]

The deployment potential for natural gas vehicles is mainly linked to the medium- and heavy-duty truck fleet market sectors. For instance, as part of the American Recovery and Reinvestment Act, the NJCCC led a statewide public/private partnership — including Clean Energy, Atlantic County Utilities Authority, Waste Management of New Jersey, Atlantic City Jitney Association, Central Jersey Waste & Recycling, and others — that put more than 300 NGVs on the road in refuse and shuttle bus applications, and included the development of six CNG fueling stations. There are significant market barriers to more widespread use of natural gas in the transportation sector. These are not unique to any particular town or municipality. Rather, they are a function of issues outside the purview of local governments.

Vehicles and Infrastructure in New Jersey and Secaucus

Given that the primary market sectors for NGVs are medium- and heavy-duty vehicles, municipal NGV readiness planning is more limited than the consumer focus of PEVs. That said, NGV readiness involves close coordination with the gas utility; adopting policy language that will support natural gas (and, more broadly, alternative) fueling stations; creating a regulatory framework for NGV fueling infrastructure; and possibly incentivizing or requiring NGVs. Several locations across New Jersey, for example, have provided bid preferences for municipal contractors (e.g., trash collection) who use natural gas or other AFVs.

According to the most recent report by the NJCCC,[39] there are just over 1,000 light- and heavy-duty NGVs in New Jersey. Although this list is not exhaustive, it represents a robust estimate of the NGVs registered statewide. Of the vehicles reported, more than 85 percent are heavy-duty vehicles; and of

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[34] U.S. DOE, U.S. Alternative Fueling Stations by Fuel Type, http://www.afdc.energy.gov/data/10332. Accessed April 3, 2017.
[35] U.S. Energy Information Administration (EIA), U.S. Natural Gas Vehicle Fuel Consumption, https://www.eia.gov/dnav/ng/hist/n3025us2m.htm. Accessed April 3, 2017.
[36] U.S. EIA, Energy Use in Transportation, http://www.eia.gov/energyexplained/?page=us_energy_transportation. Accessed April 3, 2017.
[37] NGVAmerica, Transit, http://www.ngvamerica.org/vehicles/for-fleets/transit/. Accessed April 3, 2017.
[38] NGVAmerica, Refuse, http://www.ngvamerica.org/vehicles/for-fleets/refuse/. Accessed April 3, 2017.
[39] U.S. DOE, 2016 Transportation Technology Deployment Report: NJCCC, March 2017.

those heavy-duty vehicles, more than 50 percent are refuse or transit vehicles. More granular data, specifically at the municipal level, is not readily available. The NJDEP provides NGV estimates, but the counts are inclusive of propane vehicles.[40]

Of the 28 CNG fueling stations in New Jersey as of October 2017, 13 are accessible to the public and 15 are meant for private (i.e., fleet only) use. There are no liquefied natural gas (LNG) fueling stations in New Jersey.[41]

Barriers to Increased Natural Gas Vehicle Use

Deploying NGV technology offers numerous benefits as compared to gasoline and diesel vehicles, including emissions reductions and improved air quality. However, there are substantial barriers to NGV implementation that impede progress towards more significant market growth. Understanding the key barriers below can help municipalities and fleet owners plan wisely and act accordingly.

Low Gas Quality for Transportation Applications

Natural gas in common carrier pipelines has a variety of end uses — space heating, industrial processes, electricity generation, and as a transportation fuel (after compression). Natural gas quality in the pipeline transmission system can vary depending on a number of factors. In the northern PSE&G territory, including Secaucus, there have been gas quality issues linked to the presence of refinery gas in the pipeline, a function of an agreement between PSE&G and the Bayway Refinery (Phillips 66) in Linden, New Jersey. Furthermore, during periods of peak gas demand (i.e., extremely cold winter days), PSE&G often supplements its natural gas supply by adding propane to the distribution system. Both of these issues hinder the use of pipeline natural gas as a transportation fuel since higher quality gas is required for combustion in heavy-duty CNG vehicles. Similarly, the combustion engines in CNG vehicles are not designed to manage the potential blend of propane and natural gas.

As of September 2017, PSE&G no longer accepts Bayway Refinery gas into its system.[42] However, it is unclear if this alone will resolve the gas quality issue hampering NGV adoption in the region.

Lack of Incentives

Although there are certain applications of NGVs that provide attractive payback periods compared to their diesel counterparts (after accounting for fuel and operational savings), the incremental cost of purchasing an NGV compared to a diesel or gasoline vehicle remains an impediment to increased use. Part of this is due to the lack of sustained state incentives for the purchase of cleaner-burning NGVs. Across the country, states are encouraging increased use of AFVs and AFV infrastructure through incentives, such as vouchers, rebates, and grants. In addition, many jurisdictions allow preferences in public procurements for those bidders that use, or pledge to use, AFVs in executing their contract.

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[40] NJDEP, Natural Gas Vehicle Distribution, http://www.nj.gov/dep/cleanvehicles/Alt-Fuel%20Vehicles%20&%20Stations%20-%20Natural%20Gas.pdf. Accessed October 20, 2017.

[41] U.S. DOE, Alternative Fuels Data Center, Station Locator, http://www.afdc.energy.gov/locator/stations/. Accessed April 10, 2017.

[42] Kenny Esser, PSE&G, via email communication, September 6, 2017.

Funding resulting from the VW Environmental Mitigation Trust mentioned previously may be used for NGVs and fueling infrastructure, depending on the state's implementation approach. The NJBPU has also provided grants for commercial NGVs in specific counties, including Hudson County.[43]

Fuel Price Differential

The increase in accessible supply of natural gas in the 2010-2011 timeframe contributed to a significant price differential between diesel and natural gas. Because NGVs have a higher incremental cost due to the expense of specialized fuel systems and fuel tanks, the payback period is greatly dependent upon the lower cost of natural gas relative to diesel and gasoline. While the low price of diesel has extended this payback period, as diesel prices rise, the price differential will help improve deployment potential. The diesel fuel tax increase in New Jersey, enacted in October 2016, gives a further advantage to NGVs. One clear economic advantage of natural gas is the relative price stability, which is an important factor to consider for a fleet manager or business owner. The commodity price for natural gas makes up a relatively small portion of the price for CNG at the pump. For example, an increase of $1.50 per million British thermal units (MMBtu) in the cost of natural gas translates to only a $0.25 increase per diesel gallon equivalent (DGE) at the pump. Diesel, on the other hand, suffers price spikes because the raw commodity makes up a much larger portion of the price at the pump. Although the price of natural gas is much more stable than that of petroleum fuels, the price differential is often not sufficient to offset the higher upfront cost. Absent incentives and improved accessibility to fueling infrastructure, truck owners and fleets have been reluctant to convert to CNG vehicles.

Market Outlook in Secaucus

The NGV market outlook in Secaucus is inextricably tied to the three barriers outlined above. Further, these three issues are linked to market forces beyond the purview of municipal governments: Local governments like Secaucus have no control over gas quality (this is under the purview of the gas utility); resource constraints at the local level limit the ability of municipalities to incentivize NGVs to spur adoption; and lastly, local governments have no influence over commodity energy prices. Until these issues are addressed by other market actors, Secaucus, and communities like it, will likely be best served by relying on local partners, such as the NJCCC, for relevant information and updates.

Potential for Renewable Natural Gas

Renewable natural gas (RNG) is produced over a series of steps — namely collection of a feedstock (such as waste or manure), delivery to a processing facility for biomass-to-gas conversion, gas conditioning, compression, and injection into a common carrier pipeline. RNG can be combusted to generate on-site electricity and be used to fulfill renewable energy goals and requirements. Over the last several years, however, there has been considerable growth in the use of RNG in the transportation sector. This is linked in large part to the U.S. Environmental Protection Agency's (EPA) determination in 2013 that RNG

[43] NJBPU. CNG Vehicle Grant Program. http://www.nj.gov/bpu/commercial/cng.html. Accessed October 23, 2017.

is an eligible fuel under the federal Renewable Fuel Standard (RFS).[44] Feedstocks for RNG include, but are not necessarily limited to landfill gas, municipal solid waste, animal manure, agricultural residue, and forestry or forest product residues.

The introduction of RNG into the transportation sector has the potential to allay some of the local and regional concerns linked to the GHG emissions and other potential environmental impacts from fossil natural gas use. The GHG footprint of RNG is linked to the feedstock, location of the facility relative to the end user, and the type of vehicle in which the fuel is used. RNG from landfill gas, for instance, reduces GHG emissions by about a factor of two to three when compared to conventional diesel fuel on a lifecycle basis. RNG from animal manure can reduce GHG emissions even more by capturing methane—a GHG pollutant with 25 times the global warming potential of carbon dioxide—that would have otherwise been vented into the atmosphere.

The NGV industry and the RNG industry are advocating around the prospects of pairing the low carbon fuel with a recently certified engine for medium- and heavy-duty vehicles from Cummins Westport, the ISL G 8.9 liter engine. This engine is appropriate for many applications in the goods movement sector, including short and regional haul applications, as well as in refuse hauling applications. This engine received certification from the EPA at levels 90 percent lower than the current standard for nitrogen oxide (NOx) emissions of 0.20 g/bhp-hr.[45] In other words, pairing RNG with the so-called low NOx engine has the potential to reduce criteria pollutant emission reductions, reduce GHG emissions, and decrease petroleum consumption.

Regulations

This section provides an overview of Secaucus's community plans as they relate to facilitating AFVs in the community and to identify any language that supports the use of AFVs — NGVs in particular. It also reviews provisions in Secaucus's local zoning regulations for their potential to affect installation of AFV infrastructure, such as parking, site plans and site development, and environmental performance standards (noise, air quality, etc.). The relevant language and provisions relate primarily to PEVs and were described in Section 1. None are specific to NGVs and natural gas fueling infrastructure.

[44] In 2015 the EPA determined that RNG from landfill gas (LFG) is eligible to generate renewable identification numbers (RINs; the currency of the federal RFS program) in the category labeled as cellulosic biofuels or D3 RINs. These are the highest value RINs in the RFS market.

[45] The NOx emission standards for engines are established in units of grams of pollutant per brake horsepower hour (g/bhp-hr).

3 Recommendations and Steps to Implementation

This section recommends actions the Town of Secaucus can take in order to facilitate AFV use and meet the future infrastructure demands.

Each recommendation correlates with the demand for charging or fueling infrastructure discussed throughout the previous sections of this plan. In the case of PEVs, recommendations are distinguished by their role in residential charging, MUD charging, workplace charging, and public charging. The recommendations are similarly distinguished by planning areas — general plans and policies, building codes, zoning and parking codes, permitting and inspection, and fleet planning. Furthermore, for each recommendation, a lead organization or stakeholder has been identified, distinguishing largely between local government, regional agencies, and utilities.

The time horizon for the recommended actions is 10 years, with actions that may be ongoing, as well as those to be implemented in the near-term (1-3 years) and medium- to long-term (4-10 years). The town and its stakeholders should refer to their AFV readiness goals as they determine which activities are priorities now and in the future.

Technical Assistance Resources

New Jersey is home to several established organizations that are well-versed in AFVs, community planning, sustainability, and other topics relevant to AFV readiness. These groups can provide technical assistance to support many of the recommended activities. They include:

New Jersey Clean Cities Coalition – a fuel neutral, nonprofit organization promoting partnerships that advance the use of alternative fuels. See www.njcleancities.com.

Sustainable Jersey – a nonprofit organization supporting community sustainability efforts through tools, training, and incentives. See www.sustainablejersey.com.

The Town of Secaucus is limited in its authority over planning decisions, adhering to a two-tiered zoning application review and approval process that involves both the town and the NJSEA. The town's opportunities, particularly related to zoning, are framed by that arrangement. It is important to note that changes would need to occur in the NJSEA zoning district ordinance to fully integrate consideration of AFVs.

Several recommendations appear multiple times, though with different steps to implementation depending on the targeted infrastructure. These recommendations include the identification of grants and other funding opportunities, and conducting targeted outreach to install charging infrastructure at high-priority locations.

Stakeholder input has helped to shape the recommendations in this section. During the interactive portion of Secaucus' second SAC meeting, participants provided input on and discussed a series of strategies that could be included in the readiness plan. This exercise aimed to:

- Broaden stakeholders' understanding of the strategies available to enhance AFV readiness;
- Gather feedback on the AFV strategies that may be best suited to the community; and
- Help determine priority areas and areas of emphasis to be highlighted in the Secaucus readiness plan.

Stakeholders considered five groups of strategies, described in detail below. Prior to voting, participants were asked to briefly evaluate the strategies based on the following three criteria as they pertained to Secaucus:

- The strategy is/strategies are feasible.
- The strategy/strategies could be implemented in a timely fashion.
- The strategy/strategies could be effective at increasing AFV opportunities in the community.

The Secaucus SAC input can be summarized as follows:

1. Conduct Community Education and Outreach – Most stakeholders thought these strategies generally met all three criteria, as education and outreach comes naturally to the Secaucus Environmental Department
2. Adopt Community-wide Policies – Stakeholders agreed these strategies generally met all three criteria.
3. Facilitate Municipal Infrastructure and/or Public-Private Collaboration – Stakeholders were unanimous in indicating these strategies met all three criteria, and pointed to several large developers and developments as targets.
4. Amend the Zoning Code to Include Requirements or Incentives for AFV Infrastructure – Stakeholders did not have sufficient knowledge of existing zoning requirements and procedures to provide feedback, but indicated the Town Council may be interested in pursuing innovative incentives.
5. Modify Approval Processes – Stakeholders indicated these strategies could meet several criteria.

The priorities, opportunities, and challenges identified and discussed helped determine the recommendations presented in this section.

Whenever possible, recommendations point to specific resources that are available to help guide and assist the town's implementation. See the examples mentioned throughout this section, as well as Appendix E, which is a collection of PEV readiness resources developed by or in partnership with the DOE. The forthcoming NJTPA guidebook on AFV readiness will serve as a key resource for the Town of Secaucus and other municipalities throughout North Jersey.

General Market Support

Due to the myriad considerations involved in PEV adoption — consumer behavior, gasoline pricing, vehicle pricing, etc. — deployment will be linked to factors beyond the purview of local and regional governments, utilities, and other stakeholders. Similarly, NGV adoption is closely linked to fuel prices and vehicle cost. However, Secaucus has an opportunity to support infrastructure development through planning, coordinating education and outreach efforts, collaborating with utilities, and leading by example. Table 8 highlights the recommendations that will provide general market support to AFVs.

Table 8. General Recommendations to Support the Market for Secaucus AFV Readiness

Action Area	Recommendation	Timeframe	Responsible Stakeholders
General Plans & Policies	Create cross-jurisdictional opportunities for sharing lessons learned	Ongoing	Town of Secaucus in partnership with neighboring municipalities
	Update the PEV infrastructure demand analysis	Ongoing	Town of Secaucus
	Collaborate with PSE&G to share market information	Ongoing	Town of Secaucus, PSE&G
	Conduct community education and outreach to increase awareness about the benefits of AFVs and the role they can play in decreasing transportation costs and achieving environmental goals	Near-term	Town of Secaucus
	Establish design criteria for AFV infrastructure	Medium- to long-term	Town of Secaucus
	Integrate AFV readiness into local planning efforts, including general plans and climate action plans, to support AFV infrastructure development	Near- to medium-term	Town of Secaucus
Permitting & Inspection	Streamline and expedite approval processes	Medium- to long-term	Town of Secaucus
	Educate permitting, inspection, and first responders in AFV station basics	Medium- to long-term	Town of Secaucus
Fleet Planning	Assess the existing municipal fleet, develop a fleet management plan, and explore opportunities for fleet AFVs	Medium- to long-term	Town of Secaucus
	Provide technical assistance and training to local fleet managers	Medium- to long-term	Town of Secaucus

General Plans & Policies

Create cross-jurisdictional opportunities for sharing lessons learned

The NJTPA region encompasses many local governments, each with its own challenges and experiences with AFV adoption. Secaucus stands to benefit from sharing best practices and lessons learned from stakeholders. Successful collaboration and information-sharing will require Secaucus to invest the time and resources necessary to actively engage with its neighbors, and creating and sustaining a network of stakeholders who work on AFV-related issues will help strengthen AFV readiness in both the municipality and throughout the region. Sustainable Jersey provides one such forum; the town can leverage Sustainable Jersey's network and engage with other communities and county organizations.

Town staff have already engaged with other municipalities in the region as a result of publicity regarding the grant funding Secaucus received for PEV charging stations.

There are two broader initiatives of which Secaucus and its partners should be aware related to AFVs and AFV readiness, namely:

- At the state level, ChargEVC was recently formed as a coalition of car manufacturers, technology companies, utilities, consumer advocates and non-governmental organizations to promote PEV use in New Jersey.
- The NJCCC formed the New Jersey Natural Gas Vehicle Workgroup committee. Participating members include representatives from gas distribution utilities, vehicle and engine manufacturers; fuel infrastructure providers; transit, refuse haulers and other fleet users of natural gas; and others interested in increasing and strengthening the deployment of low-emission NGVs throughout New Jersey.

Both initiatives provide Secaucus with a means to stay updated on developments and opportunities related to complementary activities at the state and regional level, such as alternative fuel corridor planning and utility rate filings.

Update the PEV infrastructure demand analysis

The goal of a demand analysis is to help guide and coordinate future PEV charging infrastructure placement efforts based on anticipated or projected demand for charging infrastructure. The demand analysis included in this plan combines various parameters such as characteristics of PEV ownership and usage, land use, and regional travel patterns. As these characteristics change over time, the Town can work with the NJTPA, the NJDEP, and other stakeholders to regularly update (every three to five years) the analysis with the latest vehicle registration, demographic, and travel demand data so the results remain current and relevant in the context of the likely demand for residential charging, workplace charging, MUD charging, and public charging.

AFV Registration Data

The NJDEP maintains AFV registration data, coordinating with the NJMVC to provided updated statistics twice a year (January and July). A spreadsheet containing this data is available upon request by sending an email to drivegreen@dep.nj.gov, using the subject line "Vehicle Registration Data Request."

Collaborate with PSE&G to share market information

Secaucus can take a leading role in the support of PEVs and charging infrastructure by collaborating with the local utility to share relevant market information. In particular, the town can seek more proactive ways to engage and collaborate with PSE&G. The regional impacts on the electrical grid (in terms of greater demand for electricity as more vehicles are charging) will likely be negligible for many years. However, unmanaged charging station installations and increased regional PEV ownership in specific areas could negatively affect local electrical distribution systems. One of the primary causes of concern for PEVs is clustering of the load associated with vehicle charging. Utilities generally have a transformer replacement program to regularly target transformers that have reached the end of their useful life or have been identified as grossly overloaded. However, the adoption of PEVs may occur faster in some

areas, thereby potentially altering the utility's transformer replacement program target areas and schedule.

The Town of Secaucus should maintain open lines of communication with the utility as it evaluates its electricity distribution infrastructure and provide insights wherever helpful. When PSE&G upgrades or adds distribution infrastructure, it should consider potential PEV charging demand impacts as part of the analysis and, where possible, make strategic and cost-effective investments. The town can assist in this process by providing valuable perspective and advanced notice regarding anticipated PEV clustering, new construction, and DC fast charging corridors along the way.

Conduct community education and outreach to increase awareness about the benefits of AFVs, PEVs in particular, and the role they can play in decreasing transportation costs and achieving environmental goals

Secaucus should develop and distribute educational resources that target the range of relevant audiences: residents, multi-family building owners, employers, fleet owners and managers, and commercial and other developers. Residents of multi-family units are often overlooked for targeted awareness and education activities related to PEVs because it is not often within a resident's power to install charging infrastructure. Secaucus should therefore consider creating materials to inform developers and/or property managers about the benefits and costs of installing AFV fueling infrastructure during construction as well as the overall benefit of providing the spaces. Additionally, Secaucus should consider developing resources that target younger residents, such as student drivers, to teach them about AFV options, particularly PEVs. Even basic information about how much it costs to fuel a PEV can be helpful to start the conversation with any audience.[46] Housing all of these resources in one place online will also enable residents to seek out the information on demand beyond active outreach events.

Executing this recommendation would require some financial resources and staff time to prepare materials, conduct outreach, and maintain the online resource database, but it would be relatively low cost to build upon existing outreach efforts and could be highly impactful over the long-term. The town can leverage the Environmental Department's established distribution practices, including e-blasts, newsletters, and community events such as the annual Secaucus Green Festival.

Separate recommendations introduced later in this section provide additional detail about more targeted education and outreach specific to MUD, workplace, and public charging.

Establish design criteria for AFV Infrastructure

Adopting AFV infrastructure design guidelines that address the many unique considerations associated with them can go a long way to help charging station and fueling station hosts determine the best configuration for their installations and ensure that installations are safe, follow industry-recommended standards, and are consistent with other community development goals.

The New Jersey code includes a streamlined permitting process and definitions for PEV charging stations, which the Town of Secaucus could adapt based on local conditions. Design guidelines will likely

[46] One simple yet useful tool is the U.S. DOE's eGallon calculator, which shows the cost of fueling a PEV compared to a similar gasoline vehicle. See https://energy.gov/maps/egallon.

vary depending upon the configuration of parking and upon the context in which parking is located, so the town will likely need to create multiple sets of PEV parking guidelines that apply to a variety of scenarios.

At a minimum, charging station design criteria should address the following issues:

- Minimum dimensions of PEV parking spaces
- Parking configurations, including guidance on whether it is preferable to locate chargers in perpendicular, parallel, or angled parking spaces, and on the location of wheel stops, guard posts, and signage
- Adopted technical standards that apply to PEV charging stations
- Regulatory signage and signs directing drivers to available PEV parking
- Area lighting
- Clearances, including minimum clearances around chargers to maintain access to controls, as well as on adjacent walkways to maintain pedestrian access. Pedestrian clearance guidelines should include recommendations for keeping sidewalks and walkways clear of cords and cables. Clearance recommendations should also address needs for snow plowing during the winter months.
- Landscaping
- Location relative to other spaces, adjacent land uses, and electrical infrastructure. For example, guidance on locating on-street parking could include language such as "the last space on the block in the direction of travel will usually minimize cord management issues, and places user closer to crosswalks and curb ramps."
- Additional considerations that apply in overlay zones, such as flood control zones
- Design of disabled access spaces, including requirements for the number of spaces in areas that must be accessible in areas with multiple PEV parking spaces and design standards for accessible spaces.

Integrate AFV readiness into local planning efforts, including general plans and climate action plans, to support AFV infrastructure development

Secaucus should integrate AFV readiness policies and goals into local planning efforts, including general plans or similar documents. These plans are broader and less detailed than building codes and zoning ordinances, so policies calling for increased charging opportunities typically do not contain specific details on where chargers are needed or on how much charging should be provided. However, even voluntary or broad policies can provide a basis for local governments to negotiate with developers to install chargers during discretionary review, as well as set the stage for more detailed implementation through building codes or zoning ordinances. Secaucus could consider Woodbridge Township's *Sustainable Community Plan and Climate Action Plan*, included in Appendix D, as a model. Secaucus should also consider incorporating this plan and follow-up efforts into its Sustainable Jersey participation, both for recognition and to provide an example to other municipalities.

Taking steps to amend municipal general plans and codes to encourage PEV deployment can be an important step in building consensus among policymakers and the public to support more specific PEV

readiness implementation measures. The exact policies that local governments choose to include can range from broadly encouraging increased adoption of PEVs to requiring charging stations at specific land uses or sites where local agencies see development opportunities or anticipate high demand for charging. These policies can also help pave the way to fund plans and capital projects that accelerate the deployment of PEVs. The incremental cost of PEV readiness planning is lower if it is part of a larger-scale effort. For example, tying PEV readiness to local policies can make it easier to allocate different funding streams toward PEV plans and projects. Secaucus should identify and pursue opportunities to incorporate explicit language that encourages PEV and charging infrastructure deployment, as well as natural gas. Refer to Appendix D for example language relevant to pre-wiring and redevelopment plans.

Permitting & Inspection

Streamline and expedite approval processes

To remove barriers to charging station installation, Secaucus should create approval processes that are easy to navigate, fast, and affordable. In the case of commercial and workplace charging stations, reducing permitting fees is particularly effective to incentivize installations by property owners and employers. For both residential and non-residential installations, minimizing permit requirements will reduce the amount of staff time devoted to permit review, which will enable the town to expedite permits and levy lower fees to recover costs.

In particular, the following actions will streamline and expedite the charging station approval process:

- Make permits available online or over-the-counter;
- Issue required permits within 48 hours;
- Reduce fees for both residential and non-residential installations;
- Issue supplementary guidance, such as residential and non-residential-specific permitting checklists, to help applicants through the permitting process, and post it online for easy access;
- Limit the number of required inspections to one;
- Focus requirements for supporting materials that provide information about the PEV charging system itself (i.e., level of charger, compliance with national standards, proposed location) and electrical service (i.e., existing electrical panel service information, load calculations, whether panel upgrades or a new meter installation are required);
- Do not require site plans for PEV charging station installations in single-family residences;
- Integrate permits with a utility notification protocol to help PSE&G understand where PEVs are being deployed and how they are being charged.

Where possible, the Town of Secaucus should work together with neighboring municipalities to make their processes, fees, and requirements consistent with the rest of the region. Consistency between municipalities will also make it easier and faster for electrical contractors who work throughout the region to permit and install charging stations.

Educate permitting officials, inspection officials, and first responders on the basics of AFV station installation

Providing permitting staff with basic information about PEV charging stations and installations will help them process permits more efficiently and ensure staff can provide property owners with additional information about safety practices and other requirements. Similarly, inspectors would benefit from access to factual information and relevant details specific to the town (e.g., public charging locations) since they interface with residents, businesses, and others. Secaucus may consider organizing an educational session focused on codes, safety, standards, site assessments, electric load calculations, permitting processes, and utility notification. Training first responders will ensure that safety procedures are in place in the case of any AFV or fueling/charging station-related emergencies.

Secaucus could work with organizations such as the Electric Vehicle Infrastructure Training Program (EVITP)[47] to organize training sessions on charging station installations and outreach to share local best practices among staff. Secaucus should also collaborate with neighboring communities, the county, the NJTPA, and others to create an ongoing region-wide schedule of training and outreach events so that stakeholders can stay informed on educational opportunities across the region.

Fleet Planning

Assess the existing municipal fleet, develop a fleet management plan, and explore opportunities for fleet AFVs

The town has expressed interest in increasing their use of AFVs in the fleet, particularly PEVs given existing charging infrastructure. The Secaucus Police Department's parking enforcement vehicles may be the ideal application for PEVs.

Secaucus should develop a comprehensive fleet management plan that can provide a framework for decision making and investments. The fleet management plan should pull together relevant goals and activities (e.g., Sustainable Jersey Green Fleet actions) and include meaningful metrics for measuring progress toward goals. If the town reaches the point of vehicle procurement, it should be aware of aggregated purchase options for both vehicles and infrastructure, including the Mid-Atlantic Region initiative under Fleets for the Future as well as EV Smart Fleets.[48]

Provide technical assistance and training to local fleet managers

Fleet managers often require assistance navigating and weighing the various considerations associated with AFV ownership as compared to conventional vehicle ownership. Local governments can take part in trainings offered by Clean Cities coalitions, such as the NJCCC. Beyond providing educational materials, Secaucus could also organize technical assistance and training workshops in collaboration with the NJTPA and other partners.

[47] For more information, see http://evitp.org/training/.
[48] For more information, see http://www.fleetsforthefuture.org/ and http://evsmartfleets.com/.

Residential Charging

In the near- to mid-term, most PEV charging will occur at drivers' residences. Today, for instance, about 70-90 percent of charging occurs at home. Furthermore, the majority of residential charging occurs at Level 1 charging, which is particularly attractive because it requires little to no consumer investment. However, as the market evolves, there are a variety of factors that will likely increase the need for more investments in residential charging. For instance, as batteries in vehicles become larger and as utilities seek to play an increased role in managed charging, higher level charging equipment will likely be required. As a result, the Town of Secaucus should monitor and coordinate with PSE&G and other relevant agencies on the electricity demands and potential impacts to the local grid. Table 9 includes this and other key actions the town can take to help support the expansion of residential charging.

It is worth restating that residential charging demand is very market-driven, so Secaucus' role in increasing this demand will be limited, allowing the town to focus its efforts on MUD, workplace, and public charging.

Table 9. Recommendations to Support Residential Charging for Secaucus AFV Readiness

Action Area	Recommendation	Timeframe	Responsible Stakeholders
Permitting & Inspection	Produce guidance documents outlining permitting requirements for residential PEV charging station installations	Medium- to long-term	Town of Secaucus
Building Codes	Work with the state to amend the building code to require PEV station readiness in new single-family developments	Medium- to long-term	Town of Secaucus
General Plans & Policies	Collaborate with PSE&G to facilitate necessary electricity distribution infrastructure upgrades	Ongoing	Town of Secaucus

Permitting & Inspection

Produce guidance documents outlining permitting requirements for residential PEV charging station installations

Providing information to local residents about the requirements to permit their residential charging station installation will both make the installation/permitting process more accessible and streamline the process. The Town of Secaucus should consider developing a permitting checklist that helps applicants through the process and post it online for easy access. While this will require some staff time and resources up front, the time savings down the road will be significant, and NJDCA's "Electric Vehicle Charging Stations – What you need to know" can serve as a starting point for the checklist.[49] The NJTPA can also provide support in this area by creating a template that municipalities can adjust for particularities in their towns.

[49] NJDCA, *Electric Vehicle Charging Stations – What you need to know*, http://www.state.nj.us/dca/divisions/codes/publications/pdf_other/homeowners_guide_electric_vehicles_charging_stations.pdf. Accessed April 3, 2017.

Building Codes

Work with the state to amend the building code to require PEV station readiness in new single-family developments

Amendments to the UCC can only be made at the state level. Therefore, Secaucus should consider coordinating with other municipalities to work with the state to amend the building code to require that new single-family residential developments with off-street parking include pre-wiring for PEV charging station installations. The town should also collaborate with its neighboring municipalities to work with the state to amend the New Jersey State Residential Site Improvement Standards (RSIS) to apply this requirement to property redevelopment.

General Plans & Policies

Collaborate with PSE&G to facilitate necessary electricity distribution infrastructure upgrades

Although sales of PEVs are forecasted to grow, regional impacts on the electrical grid (in terms of greater demand for electricity as more vehicles are charging) will likely be negligible for many years. However, unmanaged charging station installations and increased regional PEV ownership in specific areas could negatively affect local electrical distribution systems.

One of the primary causes of concern for PEVs is clustering of the load associated with vehicle charging. Utilities generally have a transformer replacement program to regularly target transformers that have reached the end of their useful life or have been identified as grossly overloaded. However, the adoption of PEVs may occur faster in some areas, thereby causing gaps in the information that utilities would generally use to inform their replacement programs. Utilities need to know where the vehicles are being used and how they are being charged (e.g., Level 1 vs. Level 2) so that they can evaluate whether the local distribution system is adequate to serve PEV charging needs. One simple, but not always utilized, solution to this potential challenge is for utilities to establish a clear notification protocol so that utilities are aware of new chargers being added to the grid.

Multi-Unit Dwelling Charging

Most PEV charging is likely to occur at home. However, with more than 60 percent[50] of the Secaucus population living in MUDs without dedicated garages like single-family homes, the purchase of a PEV may not make sense without easy access to charging. Further, MUD owners and management companies will need to respond to tenant interest as the number of PEVs on the road increases. The recommendations in Table 10 represent the key actions the town can take to help address current and future demands for MUD charging.

As noted in Section 1, much of the opportunity to expand charging infrastructure at MUDs will be through new developments or possibly as part of renovations to upgrade existing buildings. MUD decision makers are not likely to pursue PEV charging infrastructure unless residents express an interest

[50] Estimate from Hudson County Division of Planning, based on 2010 U.S. Census data, via email correspondence, October 23, 2017.

or the management company recognizes charging as an amenity to attract tenants. Therefore, it will be necessary for Secaucus to be proactive with regard to targeted outreach and education.

Table 10. Recommendations to Support MUD Charging for Secaucus AFV Readiness

Action Area	Recommendation	Timeframe	Responsible Stakeholders
General Plans & Policies	Conduct targeted outreach to MUD managers and developers to install chargers at high-priority locations	Near-term	Town of Secaucus
	Collaborate with MUDs to create and implement policies that allow residents to install PEV charging infrastructure	Medium- to long-term	Town of Secaucus
Zoning & Parking Ordinances	Amend zoning codes to require or incentivize PEV charging stations or pre-wiring in new MUD developments	Medium- to long-term	Town of Secaucus

General Plans & Policies

Conduct targeted outreach to MUD managers and developers to install chargers at high-priority locations

Property owners and developers, and home owner associations (HOA) can have a tangible impact on PEV deployment in the region by providing charging for multi-family residents. In the case of MUDs, decision makers will need to consider the logistics of providing charging equipment, including who pays for the electricity and charging station upkeep, how to determine resident access/parking space sharing between resident PEV owners, and particular zoning and permitting considerations. They will also need to understand the approval process for new development versus existing development installations, and what activities would require a permit/approval versus being done independently. The Town of Secaucus can facilitate this discussion by providing targeted outreach and educational materials that address the specific questions and challenges these communities will face in the context of PEV and charging station deployment.

The Town of Secaucus is proactive in its environmental and sustainability outreach, so it would be feasible and require little additional cost to build upon that foundation by developing a variety of situation- or user-specific PEV materials for distribution. Strategic outreach can take additional time, but it can also be highly impactful, particularly given the large MUD developments in Secaucus. The high opportunity zone map provided in Section 1 (Figure 6) will be helpful as the town prioritizes target developments and areas. The town should also make educational information available to companies developing new or enhancing existing MUDs. See the resources in Appendix E, particularly the link to an AFDC web page providing case studies, guidelines, and other information.

Collaborate with MUDs to create and implement policies that allow residents to install PEV charging infrastructure

Secaucus has many residents that own or rent property in MUDs, where they might have a dedicated parking space but do not technically own the property on which they park. This presents unique challenges for PEV owners seeking to access a charging station at their home. Given the proportion of population that might face such issues, the town can have a very tangible impact on PEV deployment by working with multi-family developments, such as Harmon Cove, to develop policies that allow residents to install PEV charging infrastructure or provide shared charging for residents. Refer to Appendix D for an example of "right to charge" language. The town might also consider accompanying these policies with education materials for landlords about the benefits (i.e., added property value) of providing PEV charging infrastructure for tenants.

Zoning & Parking Ordinances

Amend zoning codes to require or incentivize PEV charging stations in new MUD developments

Zoning codes, if developed thoughtfully, can facilitate PEV and charging infrastructure deployment. The Town of Secaucus should consider taking steps to amend zoning codes to require or incentivize pre-wiring or charging station installations at new MUD developments, including guidance on locating and installing PEV charging stations in such settings. Ideally, requirements should specify the number of chargers or pre-wired spaces to be provided at developments of different sizes. Pre-wiring can help developers avoid unnecessary costs later on. Anecdotal industry experience indicates the cost to pre-wire a space during construction is several hundred dollars compared to thousands of dollars if the required upgrade is done once construction is completed.

Workplace Charging

The PEV charging infrastructure market has focused considerable attention on workplace charging—through funding, outreach, and pilot programs. Although most PEV charging occurs at home, and is expected to for the next several years, PEVs are still parked for many hours as part of regular commuting. The availability of charging as part of a regular commute can help increase the electric vehicle miles traveled by PHEVs, while also helping demonstrate to potential drivers that there is sufficient infrastructure to maintain driving habits in a BEV (i.e., overcome range anxiety). Table 11 highlights the key recommendations to help meet the demand for workplace charging, as well as private fleet AFV adoption, as part of Secaucus' AFV readiness planning.

Table 11. Recommendations to Support Workplace Charging for Secaucus AFV Readiness

Action Area	Recommendation	Timeframe	Responsible Stakeholders
General Plans & Policies	Identify AFV grants and other funding opportunities for workplace charging infrastructure development	Ongoing	Town of Secaucus
	Conduct targeted outreach to employers to install chargers at high-priority locations	Near-term	Town of Secaucus, Hudson TMA
Fleet Planning	Provide educational resources to local fleet managers regarding AFV and infrastructure deployment	Near-term	Town of Secaucus, Hudson TMA
Permitting & Inspection	Produce guidance documents outlining permitting requirements for commercial PEV charging station installations	Near-term	Town of Secaucus
Zoning & Parking Ordinances	Amend zoning codes to require or incentivize PEV charging stations or pre-wiring in new commercial developments	Medium- to long-term	Town of Secaucus

General Plans & Policies

Identify AFV grants and other funding opportunities for fueling infrastructure development and other opportunities

The Town of Secaucus can play an important role in accelerating regional AFV adoption by helping stakeholders identify and pursue grant funding, both for AFVs and for workplace and fleet fueling/charging infrastructure. Table 6 and Table 7 (in Section 1) summarize available incentives for PEVs and charging infrastructure, respectively. Each opportunity varies in terms of eligibility and timelines, though several are suitable for employers and fleets in Secaucus. The town itself has been successful in pursuing grant funding through NJDEP to install multiple public chargers to date.

In terms of electrification, Secaucus has significant commuter and workplace traffic, meaning the town can maximize the number of electric miles traveled by identifying grant funding opportunities for the purchase and installation of workplace charging stations. Secaucus is a particularly strong candidate for grant funding if it can show that it has identified particular facilities that are well suited for charging stations. The high opportunity zone map in Section 1 (Figure 6) provides Secaucus employers with a starting point to identify specific areas best suited for workplace charging. This analysis is backed by the workplace charging demand illustrated in Figure 4.

While PEVs and charging infrastructure apply to the broader population, natural gas technology is still predominantly applicable only to fleets since commercially available vehicles are medium- to heavy-duty. Given the number of fleets based in Secaucus, including UPS, the town can also have an impact on the region's shift to alternative fuels by supporting the implementation of NGVs and natural gas fueling stations. Area fleets may be interested in funding for NGVs and natural gas fueling stations, should it become available in the future. The town can point fleet managers and other stakeholders to the NJCCC and other organizations closely tracking funding solicitations and other incentives.

Funding could also be used for workshops, trainings, outreach campaigns, and events that support workplace charging and fleet use of AFVs. These may be specific to Secaucus, or coordinated with other municipalities in the region to conserve costs and increase the reach and impact. Depending on resource

availability, the town might also consider participating in an information sharing process in order to assist – and receive assistance from – neighboring municipalities in these efforts. Organizations such as Sustainable Jersey are in an ideal position to facilitate information sharing among engaged municipalities.

Conduct targeted outreach to employers and commercial developers to install chargers at high-priority locations

Building on the previous recommendation, the Town of Secaucus should leverage the high opportunity zones and workplace charging demand maps in Section 1 as resources to target workplace charging station development outreach. The town is demonstrating leadership by installing multiple public access charging stations, and it is important for local landowners to contribute to a growing charging network. In Secaucus, employers are high-priority targets, particularly those that may have sustainability goals or initiatives. Commercial property owners and developers can have a tangible impact on PEV deployment in the region by providing charging for employees. Employers will need to gauge demand and consider the logistics of providing charging equipment, including the etiquette for moving vehicles once the charging session is complete. They will also need to understand the approval process for new development versus existing development installations, and what activities would require a permit/approval. The town can facilitate this discussion by providing targeted outreach and educational materials that address the specific questions and challenges employers may face in the context of PEV and charging station deployment.

In Secaucus, the opportunity presented by AFV infrastructure may manifest itself by attracting and retaining more industrial and commercial development and make it easier to recruit and accommodate staff, supply chain partners, etc. Strategic outreach can take additional time, but it can also be highly impactful. This is an area in which the Hudson TMA can serve a key role, reaching out to its network of employers to provide factual and relevant information. The workplace charging demand map provided in Section 1 (Figure 4) will be helpful as Secaucus prioritizes target employers and areas. The Town should also make educational information available to companies developing new or enhancing existing commercial properties.

Fleet Planning

Provide educational resources to fleet managers

Public and private fleets can provide opportunities for AFV introduction. However, fleets often require assistance navigating and weighing the various considerations associated with AFV ownership as compared to conventional vehicle ownership. For this reason, information sharing can encourage investment in AFVs among corporate and government fleets alike.

Secaucus should consider providing educational resources (e.g., toolkits or guidebooks) to fleet managers and employers to educate them regarding the total cost of AFV ownership, operating considerations, and fueling/charging station installation costs and guidelines. Secaucus can also work with the Hudson TMA to effectively reach employers in the area. Hartz Mountain, for example, is represented on the TMA board.

In the case of electrification, since most PEVs available today are passenger cars, the town's near-term focus should include fleets with light-duty vehicle applications. As more medium and heavy-duty PEV technology develops, Secaucus can provide additional resources that draw upon best practices and lessons learned from local and regional case studies of fleets deploying such vehicle models. The opposite is true with NGVs: most natural gas technology is available for medium- and heavy-duty vehicles. Secaucus should therefore focus on fleets with these applications in the near-term, which may include shuttle buses/vans and trash collection and recycling fleets that serve commercial entities throughout the municipality. Should light-duty NGVs become more readily available in the future, the Town can provide additional resources that draw upon best practices and lessons learned in light-duty scenarios in order to support further expansion of the technology.

Permitting & Inspection

Produce guidance documents outlining permitting requirements for commercial PEV charging station installations

Providing information to employers and other site hosts about the requirements to permit charging station installation will streamline the process. The Town of Secaucus should consider developing a permitting checklist that details the process and post it online for easy access. While this will require some staff time and resources up front, the time savings down the road will be significant, and NJDCA's "Electric Vehicle Charging Stations – What you need to know" can serve as a starting point for the checklist.[51] The NJTPA could also provide support in this area by creating a template for municipalities to use.

Zoning & Parking Ordinances

Amend zoning codes to require or incentivize PEV charging stations in new commercial developments

Zoning codes, if developed thoughtfully, can facilitate PEV and charging infrastructure deployment. Secaucus should consider amending zoning codes to require or incentivize pre-wiring or charging station installations at new commercial developments (e.g., office buildings or mixed use), including guidance on identifying locations for and installing charging stations in such settings. Ideally, requirements should specify the number of chargers or pre-wired spaces to be provided at new developments of different sizes and land-use types. Pre-wiring can help developers avoid unnecessary costs later on. Anecdotal industry experience indicates the cost to pre-wire a space during construction is several hundred dollars compared to thousands of dollars if the required upgrade is done once construction is completed.

Incentives, which may be more effective based on Secaucus Town Council's historical decision making, may include density or floor-to-area ratio bonuses or reduced application/design review fees. In terms of requirements, Secaucus could look to Montclair Township as an example, as redevelopment plans

[51] NJDCA, *Electric Vehicle Charging Stations – What you need to know*, http://www.state.nj.us/dca/divisions/codes/publications/pdf_other/homeowners_guide_electric_vehicles_charging_stations.pdf. Accessed April 3, 2017.

include installed PEV charging stations and their necessary infrastructure. For sample language, see Appendix D.

Because much of Secaucus is flood-prone, zoning ordinances currently require structures to be installed elevated by one foot.[52] The town should determine whether this requirement applies to PEV charging stations, and whether a charging station installation would require site plan approval. Clarifying and simplifying this process will help make station installation more feasible for employers.

Public Charging

Public charging refers to away-from-home charging that does not occur at the workplace, and is part of a non-work trip. These stations are typically accessible to the public or specific drivers, and as noted previously can include Level 1, Level 2, and DC fast charging. Public charging typically takes place at locations where drivers are parked for varying times; the actual demand for public charging is difficult to predict. In some regards, the likely utilization of public charging infrastructure will vary considerably depending on factors including but not limited to driving patterns and the fee charged. Although there is an opportunity for public entities to provide public charging at recreational and other sites, this plan assumes that site hosts will generally be private or commercial entities working with a PEV charging infrastructure provider. Site hosts may be keen to support public charging infrastructure for a variety of reasons, including demonstrating a commitment to sustainability, attracting new visitors to a site, or increasing the time that visitors spend at a site.

As the demand for public charging becomes clearer, it is important that Secaucus provide technical and policy support where possible, and seek opportunities to conduct targeted education and outreach. Table 12 below highlights the key recommendations for consideration by Secaucus as they relate to opportunity charging.

[52] Jennifer Modi, Town of Secaucus Engineering Department, Stakeholder Advisory Committee meeting, September 12, 2017.

Table 12. Recommendations to Support Public Charging for Secaucus AFV Readiness

Action Area	Recommendation	Timeframe	Responsible Stakeholders
General Plans & Policies	Identify AFV grants and other funding opportunities for infrastructure development	Ongoing	Town of Secaucus
	Conduct targeted outreach to landowners to install chargers at high-priority locations	Near-term	Town of Secaucus, Hudson TMA
	Pursue public-private partnerships to fund publicly accessible charger installations	Near-term	Town of Secaucus
Zoning & Parking Codes	Establish preferential parking policies for PEVs	Medium-term	Town of Secaucus
	Amend parking codes to regulate the use of PEV charging spaces	Medium-term	Town of Secaucus
	Amend zoning codes to require or incentivize PEV charging stations or pre-wiring in new commercial developments	Medium- to long-term	Town of Secaucus

General Plans & Policies

Identify AFV grants and other funding opportunities for fueling infrastructure development

The Town of Secaucus has already taken important steps toward accelerating regional AFV adoption by identifying and pursuing grant funding for the purchase and installation of multiple municipality-owned public fueling stations. Other stakeholders, including businesses, can follow the town's lead. Table 6 and Table 7 (in Section 1) summarize the available incentives for PEVs and charging infrastructure, respectively. Each opportunity varies in terms of eligibility and timelines. Some are opportunities the town can apply for, possibly to procure AFVs for the municipal fleet. Others are more suitable for private businesses in Secaucus to expand the use of AFVs and the network of supporting infrastructure.

Secaucus and its businesses should actively seek support in developing a robust charging station network that will ensure visitors and residents can access nearby charging options. This will both ease range anxiety and maximize the number of miles driven in electric mode. The high opportunity zone map in Section 1 (Figure 6) provides Secaucus with a starting point to identify specific areas of the best suited for public charging. This analysis is backed by the public charging demand illustrated in Figure 5.

Should the town choose to pursue additional municipally-owned charging infrastructure, there are several public parking lots that would provide highly visible locations serving residents and visitors. These were mentioned earlier and include lots at Secaucus Town Hall, Center Avenue, Plaza Center, and the Secaucus Public Library and Business Resource Center.

Conduct targeted outreach to landowners to install chargers at high-priority locations

Building on the previous recommendation, Secaucus should leverage the high opportunity zone and public charging demand maps in Section 1 (Figure 6 and Figure 5, respectively) as resources to target outreach. Retailers, in addition to workplaces and MUDs, are particularly high-priority targets. Property owners, developers, and other decision makers at these locales can have a tangible impact on PEV deployment in the region by providing charging for residents and visitors. Hudson TMA is in a position to bring businesses to the table, leveraging their regional network. PEV charging stations can be amenities that help draw customers, and ultimately, pose opportunities to grow the local economy through increased visitor traffic and community spending.

Pursue public-private partnerships to fund publicly accessible charger installations

There are various opportunities for Secaucus to acquire funding for public charging station installations outside of current grants. The town should consider fostering public-private partnerships and partnering with businesses that have a local presence (e.g., UPS, other cargo/hauling companies); retail centers (e.g., the Secaucus Outlets, The Plaza at Harmon Meadow); and mixed-use developments (e.g., the Xchange development) to finance such installations. In the realm of public-private partnerships, there are display advertising opportunities for companies that sponsor charging stations. In both this case and that of partnerships with business improvement districts, the town will need to provide information supporting the business case for installing PEV charging stations, including customer attraction, dwell time, etc. For example, one consideration is that the average length of customer stay at outlet malls aligns well with Level 2 public charging. Prospective station hosts should consider the potential increased revenue, as well as upfront costs.

Zoning & Parking Codes

Establish preferential parking policies for PEVs

Secaucus should consider offering additional incentives for drivers to purchase PEVs, by creating dedicated parking spaces or waiving parking fees for these vehicles. If Secaucus provides PEV parking that exceeds immediate demand, the town can consider specifying interim regulations that allow conventional vehicles to use these spaces in order to avoid under-utilization.

Amend parking codes to regulate the use of PEV charging spaces

After establishing policies and strategies to encourage the deployment of PEVs, the next step for Secaucus is to amend parking ordinances to specify the regulations that apply to parking spaces designated for PEVs. The goal of these amendments is to ensure that PEVs have unobstructed access to PEV charging and to ensure the town can recoup the costs of public charging at the stations it owns and operates.

When designating PEV parking, Secaucus should consider applicable definitions, restrictions, enforcement policies, time limits, and fees. In general, it is a best practice to restrict the use of PEV charging stations to vehicles that are actively charging to ensure that the equipment is available for drivers who need them. For example, the City of Raleigh's Code of General Ordinances requires that

vehicles parked in designated PEV spaces be connected to the charging station or be subject to a $50 fine.[53] See Appendix D for an example ordinance from Montclair Township.

Amend zoning codes to require or incentivize PEV charging stations in new commercial developments

Zoning codes can facilitate (or, if not developed thoughtfully, prevent) PEV and charging infrastructure deployment. Secaucus should consider amending zoning codes to require or incentivize pre-wiring or charging station installations at new commercial developments, including guidance on identifying locations for and installing EV charging stations in such settings. Ideally, requirements should specify the number of chargers or pre-wired spaces to be provided at new developments of different sizes and land-use types. Pre-wiring can help developers avoid unnecessary costs later on. Anecdotal industry experience indicates the cost to pre-wire a space during construction is several hundred dollars compared to thousands of dollars if the required upgrade is done once construction is completed.

Incentives, which may be more effective based on Secaucus Town Council's historical decision making, may include density or floor-to-area ratio bonuses or reduced application/design review fees. In terms of requirements, Secaucus could look to Montclair Township as an example and case study, as redevelopment plans include installed PEV charging stations and their necessary infrastructure. For sample language, see Appendix D.

Because much of Secaucus is flood-prone, zoning ordinances currently require structures to be installed elevated by one foot.[54] The town should determine whether this requirement applies to PEV charging stations, and whether a charging station installation would require site plan approval. Clarifying and simplifying this process will help make station installation more feasible for commercial developers and landowners.

[53] City of Raleigh, NC, *Raleigh City Ordinance 11-2174(c) Electric Vehicle Parking FAQs*, http://www.raleighnc.gov/content/PWksParkingMgmt/Documents/EVParkingFAQ's.pdf. Accessed April 10, 2017.

[54] Jennifer Modi, Town of Secaucus Engineering Department, Stakeholder Advisory Committee meeting, September 12, 2017.

Appendix A. Acronyms

Acronym	Stands For
AC	alternating current
AFV	alternative fuel vehicle
AEO	Annual Energy Outlook
AFDC	Alternative Fuels Data Center
BEV	battery electric vehicle or all-electric vehicle
CNG	compressed natural gas
DC	direct current
EIA	U.S. Energy Information Administration
EVSE	electric vehicle supply equipment
GHG	greenhouse gas
HEV	hybrid electric vehicle
MUD	multi-unit dwelling
NGV	natural gas vehicle
NJBPU	New Jersey Board of Public Utilities
NJDCA	New Jersey Department of Community Affairs
NJDEP	New Jersey Department of Environmental Protection
NJSEA	New Jersey Sports and Exposition Authority
NJTPA	North Jersey Transportation Planning Authority
PEV	plug-in electric vehicle
PHEV	plug-in hybrid electric vehicle
SAC	stakeholder advisory committee
TAZ	traffic analysis zone
TMA	Transportation Management Association
UCC	Uniform Construction Code
ZEV	zero emission vehicle

Appendix B. Plug-in Electric Vehicle Forecasting Methodology

For the purposes of this plan, residential PEV ownership forecasts for Secaucus were projected over a planning horizon from 2016-2030. PEV projections for Secaucus were developed as a range based on varying assumptions around adoption trends. Estimates of new vehicle sales included in this plan were developed using the following assumptions:

- The total annual sales of light-duty vehicles in New Jersey has been about 550,000 to 600,000 over the last several years, based on data from the National Automobile Dealers Association.
- New sales in Secaucus are proportional to the share of total vehicles in Secaucus relative to the entire state.
- New vehicle sales increase at a rate similar to the forecasted new vehicle sales reported by the Energy Information Administration (EIA) in the Reference Case of the Annual Energy Outlook (AEO) 2016, for the Middle Atlantic Region.[55]

The increased deployment of PEVs coincides with increased deployment of more efficient conventional vehicles, driven largely by federal fuel economy and tailpipe greenhouse gas (GHG) emissions standards. Broadly speaking, the total stock of vehicles on the road is forecast to increase by about 10-12 percent between 2015 and 2030, and the stock of conventional vehicles is going to become more efficient, with efficiencies ranging from 40-50 miles per gallon (up from an average of around 25-30 miles per gallon today).

The table below summarizes the approach used to forecast PEVs in Secaucus in low and high adoption scenarios. It also includes a GHG stretch scenario in which New Jersey meets the emissions reductions set forth in the New Jersey Global Warming Response Act.

[55] U.S. DOE Energy Information Administration, *Annual Energy Outlook: 2016*, http://www.eia.gov/outlooks/aeo/pdf/0383(2016).pdf. August 2016.

PEV Forecast Scenario Descriptions

Scenario	Description
Low	Reflects adoption trends comparable to the Reference Case in the EIA's AEO 2016, adjusted slightly for increased potential indicated in the Middle Atlantic region.[56]
High	Assumes that PEV adoption rates in Secaucus will be consistent with the ZEV mandate in place for New Jersey,[57] with a fair-share assumption (i.e., that ZEV deployment will occur in the state on a population-weighted basis in the long-term).
GHG Stretch	The PEV strategy of the NJTPA Regional GHG Mitigation Plan calls for a 60 percent market share of PEVs by 2040 to meet state goals. The GHG stretch scenario assumes that PEV adoption rates will be slightly lower than the plan, with a 50 percent market share by 2040.

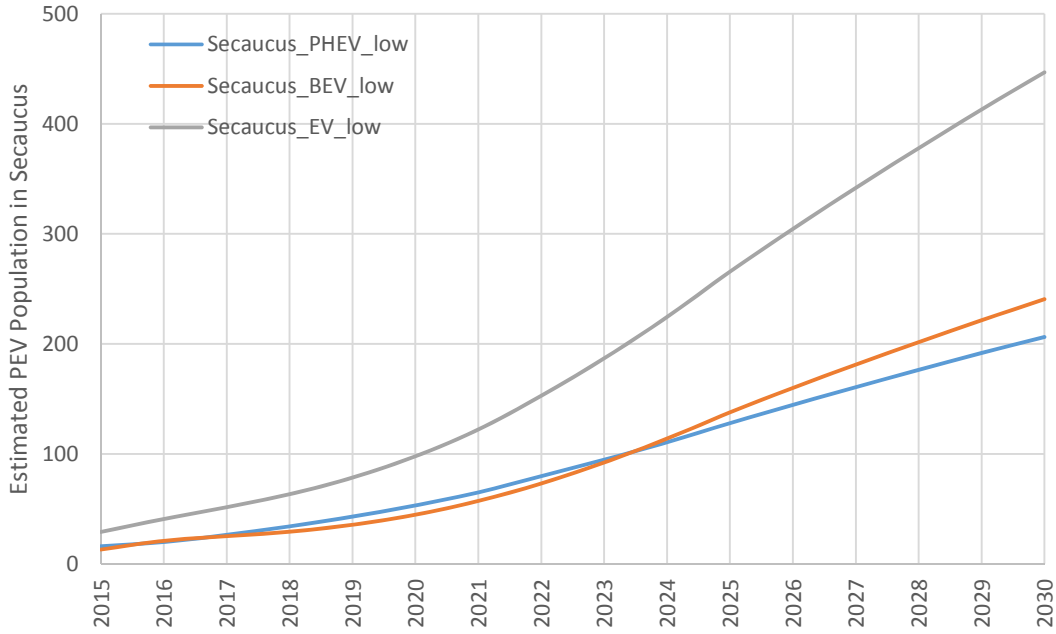
The figures that follow present the three PEV demand scenarios for Secaucus based on the forecast descriptions in the table above. In the low scenario, approximately 450 PEVs (200 PHEVs and 250 BEVs) are expected to be on the road in Secaucus in 2030. In the high scenario, the forecast is approximately 1,250 PEVs (875 PHEVs and 375 BEVs). The GHG stretch scenario yields about 8,000 PEVs on the road by 2040 in Secaucus. To provide context, total light-duty vehicles are expected to increase by about 10-12 percent in Secaucus by 2030, with a population of about 15,000 vehicles. The forecasts indicate that PEVs will make up to 6-17 percent of the vehicle fleet by 2030.

Additionally, note that the shape of each of the curves in the low scenarios and the shape of each of the curves in the high scenarios are similar. This is because both scenarios come from the same root functions, modified slightly based on the characteristics assumed in each case.

[56] AEO forecasting is typically used as a base for forecasts because it provides the benefit of transparency and consistency with national-level assessments. Further, the amount of data that is required to conduct a locally specific forecasting exercise is generally prohibitive. Lastly, the data are something that can be updated annually and modified by stakeholders easily, rather than relying on some proprietary methodology.

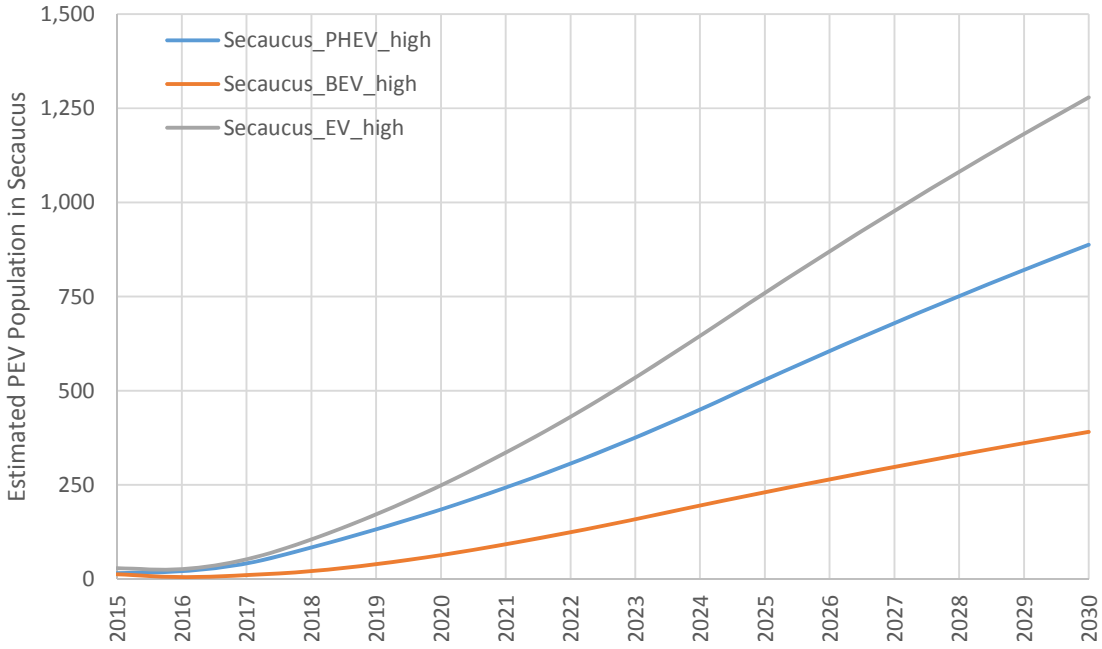
[57] ZEV programs aim to increase sales of ZEVs, which include PEVs and fuel cell electric vehicles, by requiring that some portion of vehicle manufacturer sales in the state be ZEVs. More information on New Jersey's ZEV mandate is available online at http://www.nj.gov/dep/cleanvehicles/LEV.pdf.

Low Scenario



Forecasted PEV Adoption in Secaucus, Low Scenario

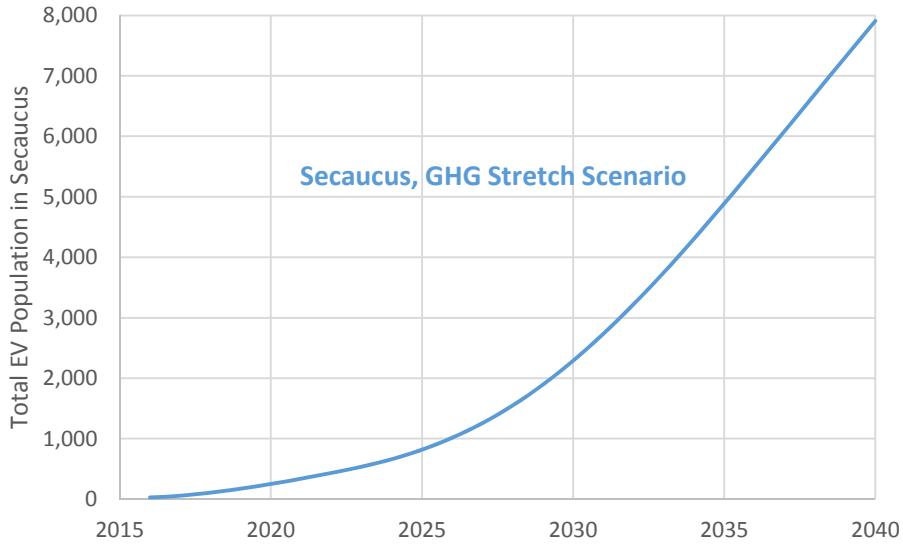
High Scenario



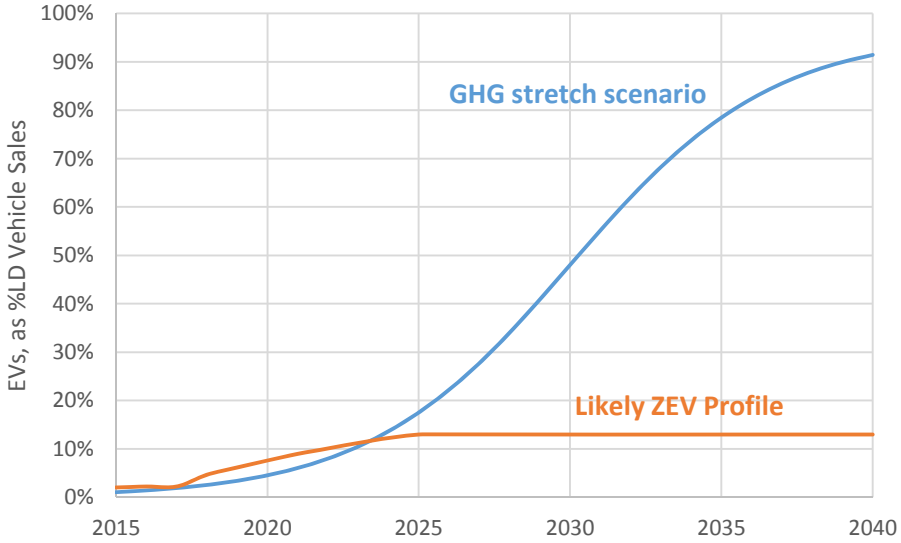
Forecasted PEV Adoption in Secaucus, High Scenario

GHG Stretch Scenario

The New Jersey Global Warming Response Act requires a statewide reduction in emissions of 80 percent from a 2006 emissions baseline by 2050. In the NJTPA Regional GHG Mitigation Plan, a PEV strategy is included with the myriad strategies designed to reduce GHG emissions from on-road transportation. The EV Plan Implementation and Clean Fuels strategy calls for a 60 percent market share of PEVs by 2040. This level of penetration of PEVs by 2040 would effectively require PEVs to capture 50 percent of all new vehicle sales by 2028, and increase rapidly to greater than 90 percent of new vehicle sales by 2040. The GHG stretch scenario assumes PEVs will capture 50 percent of the light-duty market by 2040. The first figure below compares the GHG stretch scenario with the likely compliance outlook for the ZEV program, which plateaus post-2025. As shown in the second figure below, the ZEV program will help PEVs with an initial trajectory, but much higher sale volumes will be needed post-2025 to achieve a 50 percent market share by 2040. In fact, in order to achieve the 50 percent market share by 2040, PEVs will have to make up 80 percent of new sales by 2035 and 90 percent by 2040.



Forecasted PEV Adoption in Secaucus, GHG Stretch Scenario



GHG Stretch Scenario vs Likely ZEV Profile

Appendix C. Charging Infrastructure Demand Forecasting Methodology

Overview

The infrastructure demand analyses are largely based upon the foundational data points of the NJTPA region's current and likely PEV ownership.[58] Socio-economic data were extracted from the 2014 American Community Survey (five year estimates). These data are available at the Census Block Group (CBG) level and include income, tenure or property ownership, and dwelling type. The analysis also relies on vehicle registration, particularly of HEVs.[59] The key socio-economic indicators used to develop the charging infrastructure siting analysis were:

- **Income.** Market research on early adopters of PEVs suggests that households with higher incomes are more likely to purchase a PEV. Because these vehicles tend to have higher upfront costs, income can be a limiting factor and individuals with a low income might not be able to afford the upfront cost of a PEV. Furthermore, higher income households generally buy a disproportionate share of new vehicles across all market segments and vehicle types.
- **HEV Ownership.** There can be long-term fuel savings associated with HEV (and PEV) ownership, which is one of the main reasons some might invest in such a vehicle. However, research shows that households who value the non-economic (e.g., environmental) benefits of HEVs are more likely to purchase PEVs, particularly in the early adoption phases. Many HEV owners have shown a willingness to pay to reduce gasoline use that goes beyond the economic benefits of using an HEV. A Ford Motors representative noted that typical Focus Electric buyers have purchased HEVs in the past.[60] Research from the University of California, Davis (UC-Davis) supports this assumption: 68.3 percent of PEV owners surveyed either own or have owned an HEV and locations of HEV owners correlate with locations of PEV owners.[61]
- **Property Ownership.** Households who own their property are more likely to purchase a PEV than those who rent, according to market research by Nissan and Chevrolet and surveys by UC-Davis and California's Clean Vehicle Rebate Project recipients. Home ownership reduces both financial and non-financial barriers to charging infrastructure deployment.

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[58] There are multiple overlapping geographies considered in the charging infrastructure siting analysis. For instance, vehicle ownership data are provided at the ZIP code level; socio-economic indicators are provided at the CBG level; and trip data are generated for TAZs. These overlapping geographies can lead to uncertainty in the analysis; however, the analysis typically relies on values as percentages rather than absolute numbers. Through iterative analyses in other jurisdictions, the consultant team (ICF) has found that this approach minimizes uncertainty. Furthermore, this makes the analysis less sensitive to changes on a time scale less than a year. For instance, if a municipality obtains PEV ownership at six-month intervals, and seeks to update the analysis, it is unlikely it will observe substantive changes in the results.

[59] Data provided by the NJDEP, based on NJMVC registration data.

[60] Mike Tinsky, Associate Director, Sustainability and Vehicle Environmental Matters, Vehicle Electrification and Infrastructure, Ford Motor Company. Phone interview, April 9, 2012.

[61] Gil Tal, Michael Nicholas, Justin Woodjack, Daniel Scrivano, Tom Turrentine, Plug-in Hybrid and Electric Vehicle Research Center of the Institute of Transportation Studies, University of California, Davis. Plug-In Vehicles in the San-Diego Region: A Spatial Analysis of the Demand for Plug-In Vehicles. Presented by Gil Tal, May 9, 2012, at EVS 26, Los Angeles, CA.

- **Dwelling Type.** Dwelling type (e.g., single-family detached, single-family attached, or multi-unity dwelling) can help indicate PEV ownership. Consumers with a single-family detached home generally have fewer barriers to PEV adoption as they usually have access to a garage or driveway. Consumers living in MUDs are more likely to encounter barriers to installing chargers (e.g., limited space for infrastructure installation, home owners' association restrictions, installation costs for trenching, additional metering requirements, power availability).[62]

The charging infrastructure demand analysis leverages origin-destination trip tables from the NJTPA, which indicate the number of trips from an origin traffic analysis zone (TAZ) to a destination TAZ.[63] Trip types include home-based work (HBW), home-based other (HBO), and non-home non-work (NHNW) trips.

The readiness plan includes the mapped results of each infrastructure demand analysis – residential, workplace, and public/opportunity charging. Each map includes five levels of shading, based on the percentile of each TAZ's score relative to the entire NJTPA region, and ranked as shown in the table below.

Scoring	Percentile	Demand
1	0—40%	Low
2	40—60%	Low/Medium
3	60—80%	Medium
4	80—95%	Medium/High
5	95—100%	High

Residential Charging

The residential charging demand analysis (associated with both HBW and HBO trips) relies exclusively upon socio-economic data for each TAZ. This data determined a General Residential Charging (ResGeneral) Score, which is directly correlated with residential charging infrastructure demand. As such, no trip data was incorporated into this assessment.

The socio-economic indicators explained above were scored with different weighting factors, which were linked to survey and market research of PEV owners and based heavily on California's extensive PEV ownership data. These factors contributed to a ResGeneral Score:

$$ResGeneral\ Score = \sum \propto Income, \beta HEV\_Ownership, \gamma Tenure, \delta DwellingType,$$

where

$$\alpha + \beta + \gamma + \delta = 1.$$

Each weighting factor was based on the level of correlation associated with PEV ownership to date, and each factor is skewed towards the first two parameters: income and HEV ownership. The latter two factors – tenure and dwelling type – were used to differentiate amongst areas with higher potential.

[62] Graham, R.L., J. Lieb, J. Sarnecki, R. Almazan, B. Neaman. Wise Investment in Electric Vehicle Charging Infrastructure through Regional Planning. EVS26 International Battery, Hybrid and Fuel Cell Electric Vehicle Symposium, 2012.

[63] The socio-economic data are scored at the CBG-level and the trip data are available at the TAZ level. NJTPA staff provided a look-up table linking each CBG with a TAZ.

The most critical parameter in this infrastructure demand analysis is income, which accounts for 60 percent of the scoring. To integrate this factor, CBGs were scored against one another by comparing the share of different income groups. This provides more granularity to the analysis than simply comparing median incomes.

The second most prominent parameter in the analysis is HEV ownership, which accounts for 30 percent of the scoring. This analysis compared the percent of HEVs owned in each CBG against the percent of HEV ownership in that CBG's municipality and against the entire state of New Jersey. CBGs scored higher in the analysis if they had HEV ownership higher than the state median.

The tenure parameter represents the rate of home ownership relative to the median rate of home ownership for the state of New Jersey. Based on survey data and PEV market research, home ownership as a percent of the number of residential units available in a given area are short- to mid-term indicators for PEV ownership but are less effective indicators over the long-term. For this reason, the tenure parameter accounts for 5 percent of the total score. Additionally, these parameters were used exclusively to differentiate amongst areas with better than median income and HEV ownership profiles. In other words, if an area did not have a higher than median income but did have a higher than median rate of home ownership, the home ownership factor would not impact the ResGeneral Score. However, for areas with a similar median income or HEV ownership profile, a higher rate of home ownership would yield a higher ResGeneral Score.

For the final parameter, dwelling type, areas were scored based on the rate of single-family units relative to the median rate of single-family units. This parameter also accounts for 5 percent of the total score and a higher rate of single-family units yields a higher ResGeneral Score.

Workplace Charging

To forecast the likely demand for workplace charging infrastructure, the results of the residential demand analysis were combined with regional travel demand data to determine the TAZs within the Town of Secaucus that have the highest number of trips originating from TAZs with the highest likelihood of PEV ownership. The analysis relied upon an output matrix from the NJTPA's travel model, referred to as origin-destination trip tables for home-based work trips. The trip originating from TAZ_O was multiplied by the score determined in the residential analysis, $ResGeneral\ Score_O$. The likelihood of workplace charging is simply correlated with the number of trips concluding at the workplace destination TAZ_D. The letters O and D represent origin and destination.

Public Charging

In the long run, public charging will consist of predominantly Level 2 and DC Fast charging, with Level 2 being the charging type most feasible for Secaucus to install and support. For this reason, the forecast for public charging focuses on Level 2 charging, using a methodology similar to the workplace charging analysis. However, instead of multiplying the ResGeneral Score by HBW trips, it is multiplied by HBO trips, which served as a proxy for public charging.

Appendix D. Municipal Policy Examples

Sustainability/Climate Action Plan

Woodbridge *Sustainable Community Plan and Climate Action Plan*,
http://www.twp.woodbridge.nj.us/DocumentCenter/Home/View/2813

- Transportation and Circulation objectives include:
  - "Use fuel-efficient and alternative-fuel vehicles to reduce energy consumption, fossil fuel use, and associated air pollution emissions, including greenhouse gas emissions"
  - Continue to track alternative technologies such as electric, CNG or hybrid."
- Includes indicators and targets specific to AFVs in the municipal fleet:
  - "Year 1 target: add at least five alternative fuel or high efficiency vehicle to the fleet
  - Further target: at least 25% of fleet using alternative fuels and/or high efficiency vehicles within 10 years."
- Energy Conservation and Green Buildings action steps include:
  - "Adopt ordinances to change zoning to become electric vehicle friendly
  - Create a program that encourages work place and multifamily charging
  - Hold an event that promotes electric vehicle awareness"
- Other specific actions outlined in detail include:
  - "Create a Carpool Board for Municipal Employees and Promote Carpooling/Alternative Fuel Vehicles," which seeks to provide information resources and explore the possibility of extending incentives to municipal employees.
  - "Create and Implement "Anything But Cars" (ABC) Program," which aims to "provide choice and interconnectivity among sustainable transport modes and measures."

PEV Parking Ordinance

Chapter 230: Parking Lots
Article I: Parking Permits
[Adopted 4-15-1980 by Ord. No. 80-12 as Art. I of Ch. 161A of the 1979 Code]

§ 230-3.1 Reserved parking for recharging electric vehicles.
[Added 8-12-2013 by Ord. No. O-13-42]
A. It shall be unlawful for any person to park or leave standing a vehicle in a stall or space designated for the recharging of electric vehicles unless the vehicle is connected for electric charging purposes.

B. It shall be unlawful for any person to obstruct, block, or otherwise bar access to parking stalls or spaces described in Subsection A except as provided in Subsection A.

C. Notice of reserved parking for recharging of electric vehicles shall be posted on a sign not less than 17 inches by 22 inches in size with lettering not less than one inch in height that clearly and conspicuously states the following: "Unauthorized vehicles not connected for electric charging purposes may be towed away at owner's expense. Towed vehicles may be reclaimed at designated towing facility

or by calling Montclair Police Department - 973-744-1234." The sign shall be posted in both of the following locations:

(1) Immediately adjacent to, and visible from, the stall or space.

(2) In a conspicuous place at each entrance to the parking facility.

New Construction Pre-Wire Requirement

New York City requires that newly constructed and upgraded parking garages and open lots include the necessary hardware for charging infrastructure in at least 20 percent of the parking spaces. See the General Administrative Provisions for Construction Codes, Section 28-101.4.3, as well as the Building Code, Sections 406.2.11 and 406.7.11 (https://www1.nyc.gov/site/buildings/codes/2014-construction-codes.page).

Redevelopment Plan Language

Montclair, NJ Seymour Street Redevelopment Plan,
http://www.montclairnjusa.org/dmdocuments/SEYMOUR-Rdv-Plan-FINAL.pdf

> **ELECTRIC CAR-CHARGING FACILITIES:** All parking facilities within the Redevelopment Area shall include at a minimum two electric car charging stations as well as the infrastructure necessary to support additional car charging facilities to accommodate future demand. The car-charging facilities shall be the responsibility of the redeveloper.

"Right to Charge" Language

While it exists at the state level, rather than as a municipal ordinance, California's "right to charge" policy is summarized as follows:

> A common interest development, including a community apartment, condominium, and cooperative development, may not prohibit or restrict the installation or use of electric vehicle supply equipment (EVSE) in a homeowner's designated parking space. These entities may put reasonable restrictions on EVSE, but the policies may not significantly increase the cost of the EVSE or significantly decrease its efficiency or performance. If installation in the homeowner's designated parking space is not possible, with authorization, the homeowner may add EVSE in a common area for their use. The homeowner must obtain appropriate approvals from the common interest development association and agree in writing to comply with applicable architectural standards, engage a licensed installation contractor, provide a certificate of insurance, and pay for the electricity usage associated with the EVSE. Any application for approval should be processed by the common interest development association without willful avoidance or delay. The homeowner and each successive homeowner of the parking space equipped with EVSE is responsible for the cost of the installation, maintenance, repair, removal, or replacement of the station, as well as any resulting damage to the EVSE or surrounding area. The homeowner must also maintain a $1 million umbrella liability coverage policy and name the common interest development as an additional insured entity under the policy. If EVSE is

installed in a common area for use by all members of the association, the common interest development must develop terms for use of the EVSE. (Reference California Civil Code 4745 and 6713)

Source: http://www.afdc.energy.gov/laws/9579

Appendix E. Plug-in Electric Vehicle Community Readiness Resources

This information was adapted from a collection of resources compiled by the DOE's Clean Cities program, focusing on tools, documents, websites, and other information available via DOE's Office of Energy Efficiency and Renewable Energy.

DOE EV Everywhere Electric Vehicles: Stakeholder Solution Center

States and Municipalities

States and municipalities are key players in increasing PEV readiness. The best way for states and municipalities to improve their PEV readiness is to partner with their **local Clean Cities coalition**, which can connect them to specific regional resources and other relevant stakeholders.

- **Plug-in Electric Vehicle Readiness Scorecard**: Hosted on the DOE's Alternative Fuels Data Center, the Scorecard allows communities to assess their readiness, receive feedback about ways to improve, read about best practices, and record progress.
- **Guide to the Lessons Learned from the Clean Cities Community Electric Vehicle Readiness Projects**: This guide, which is on the DOE Clean Cities' website, summarizes the best practices in streamlining permitting processes, revising codes, training emergency personnel, developing incentives, and educating the public based on the experiences of 16 PEV readiness projects across the country.
- **Reports from the Clean Cities' EV Community Readiness Projects**: These are individual reports and community readiness plans from each of the projects, hosted on the Clean Cities' website. (See list of projects in chart, below).
- **Zoning, Codes and Parking Ordinances**: This page on the DOE's Alternative Fuels Data Center links to relevant NIST codes for electric vehicle charging.
- **Handbook for Public Charging Station Hosts**: This handbook on the DOE's Alternative Fuels Data Center provides an overview for what cities hosting public charging stations need to know before installation.
- **Creating EV-Ready Towns and Cities**: A Guide to Planning and Policy Tools: Published by the Transportation and Climate Initiative, this guide provides information on the steps to create, administer, and amend planning processes, rules and regulations, including in zoning, parking, and permitting.
- **EV-Ready Codes for the Built Environment**: This guide, published by the Transportation and Climate Initiative, provides an overview of building and electrical codes as relating to PEVs, as well as providing recommendations specific to jurisdictions in the Northeast and Mid-Atlantic.
- Training on PEVs for First Responders through the **National Alternative Fuels Training Consortium** and the **National Fire Protection Association** provides essential education to firefighters, police officers, EMTs and others that may need to respond to accidents involving PEVs.
- **Drive Electric Vermont Case Study**: This case study examines the opportunities and barriers to enabling small and midsize communities to partake in the PEV market and benefit from the economic and environmental advantages of the vehicles.

Employers

Providing charging at the workplace can encourage employees to purchase PEVs, be an attractive employee benefit, and maximize all-electric miles driven by PEV owners. The EV Everywhere **Workplace Charging Challenge** was a DOE program to encourage and recognize employers providing workplace charging.

- **Resources to Install and Manage Workplace Charging**
- **Handbook for Workplace Charging Hosts**

Fleets

Like consumers, fleets can benefit from the low operating costs and other benefits associated with PEVs. **Local Clean Cities coalitions** can help fleets decide which technologies and models will be most appropriate to meet their needs.

- **Handbook for Fleet Managers**: This handbook on the DOE's Alternative Fuels Data Center provides fleet-specific information on the basics of PEVs, including issues like maintenance and charging.
- **Plug-in Electric Light, Medium and Heavy-Duty Vehicle Search**: This tool on DOE's Alternative Fuels Data Center provides information on PEVs that can be filtered by class/type and manufacturer.
- **AFLEET Tool**: Argonne National Laboratory's Alternative Fuel Life-Cycle Environmental and Economic Transportation Tool allows fleet managers to calculate the cost of ownership, petroleum use, greenhouse gas emissions, and air pollutant emissions of alternative fuel vehicles.

Electrical Contractors and Inspectors

The installation of residential, workplace and public charging is essential to establishing a PEV market.

- **Electric Vehicle Infrastructure Training Program**: This program provides training and certification at community colleges and electrical training centers across the United States for people installing electric vehicle supply equipment for residential and commercial markets.
- **EVSE Residential Charging Installation Video**: A series of segments on the Clean Cities TV YouTube channel walk electricians through the basics of installing PEV charging infrastructure in homes, including an overview of the equipment, the relevant National Electrical Codes, inspection, and best practices.

Utilities

Through a partnership with the Edison Electric Institute, DOE is developing a suite of tools for utilities to support the use of PEVs.

- **The Utility Guide to Plug-in Electric Vehicle Readiness**: A guide from the Edison Electric Institute, this document covers structuring your company to support PEVs, adding PEVs to utility fleets, enhancing the customer experience, working with state and local governments, and managing the electrical grid with PEVs.
- **Utilities Power Change** – This case study showcases how New Jersey's Public Service Electric and Gas Company, and Southern Company's unit Georgia Power are launching workplace charging programs for their commercial customers.

Additional Resources

At A Glance: Electric-Drive Vehicles

Charging Plug-In Electric Vehicles in Public

Charging Plug-In Electric Vehicles at Home

Resources for Electrical Contractors and Inspectors

Developing Infrastructure to Charge Plug-In Electric Vehicles

Plug-In Electric Vehicle Deployment Policy Tools: Zoning, Codes, and Parking Ordinances

Signage for Plug-In Electric Vehicle Charging Stations

Plug-In Electric Vehicle Handbook for Consumers

Workplace Charging: Charging Up University Campuses

Electric Vehicle Charging for Multi-Unit Dwellings (webpage with links to resources and case studies)

Massachusetts Plug-in Electric Vehicle and Charging Infrastructure Case Study

Rolling Down the Arizona EV Highway (case study)

San Diego Prepares for Electric Vehicles in Multi-Unit Dwelling Communities (text version and video)

Houston Energizes Deployment of Plug-In Electric Vehicles (case study)

Seattle Rideshare Fleet Adds EVs, Enjoys Success (case study)

Alternative Fuels Data Center Publications (search by keyword for additional resources)

Appendix F. Additional Information on Parking

Secaucus has the power to designate a Parking Enforcement Officer under Chapter 23, Article XXXI (Secaucus Town Code; http://clerkshq.com/default.ashx?clientsite=Secaucus-nj); their power and duties are explained in sections 23-128 through 23-132. The Office of Inspections under Chapter 22 governs Residential Parking Permits. Commercial parking requirements are categorized by the type of business under site-specific ordinances. However, none of the ordinances mention AFV infrastructure or parking. It should also be noted that under Chapter 98 of the Town Code under the section on "Parking Tax," the town collects a tax of 15 percent on moneys collected by most providers of paid parking spaces. It also states that no tax shall be imposed with respect to any parking or garaging on vehicle storing fees charged by any religious, charitable, or educational institution. Therefore, any future AFVs parking areas not exempted will also be subject to the tax.

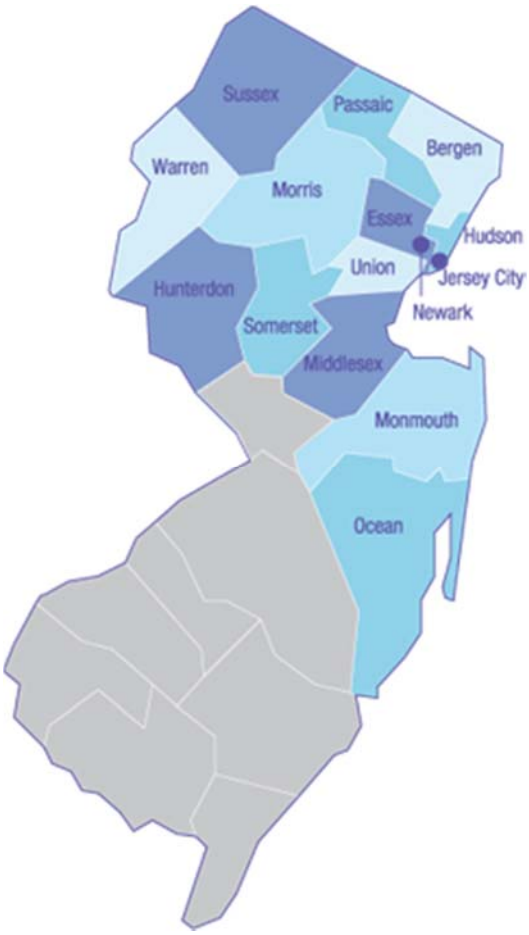
Chapter 127 governs overall Vehicles and Traffic. Article II under this chapter oversees parking in general. Additional articles reference parking in the specific areas of Snipe's Park, Kane Stadium, Municipal Parking Areas, and Restricted Parking Zones. Residential Parking is governed by Chapter 127A with the purpose to establish a residential parking program and to alleviate unfavorable parking conditions and other dangerous situations and conditions. This chapter also covers parking zones, time limits, and parking permits. Vehicles and Traffic regulations regarding Board of Education Property is governed by Chapter 128 and designates specific areas and the type of vehicle that may park in such areas. As mentioned before, none of the ordinances above cite AFVs, but future consideration should be given to adding language relating to AFVs.

Finally, zoning consideration is covered under Chapter 135, "Zoning" with Article IV of this chapter overseeing parking requirements. The Zoning Officer has the general duty and authority to administer and enforce the provisions of this chapter and may be assisted by the Construction Code Official and Department of Police. Zoning ordinances usually outline the amount of parking spaces required for a given building, and the type of spaces needed. It should be noted that the definition of a "structure" under this chapter is "a permanent piece of equipment, or item that is installed on concrete, a concrete pad or footings or which cannot be readily moved and which may or may not be attached to the residence through electrical or plumbing or other utility," which may cover future alternative fuel vehicle infrastructure. Parking requirements for commercial, industrial, and other uses can be found in a table under Article IV. Parking design standards are governed by ordinance § 135-12.1. A minimum requirement for the amount of AFV spaces can be added to the table, while the design of AFVs spaces would be governed by the latter ordinance.

Appendix G. Regional Planning Area

The NJTPA regional planning area consists of 13 counties within North New Jersey; Bergen, Essex, Hudson, Hunterdon, Middlesex, Monmouth, Morris, Ocean, Passaic, Somerset, Sussex, Union, and Warren; and its two largest cities, Newark and Jersey City. The region spans 4,200 square miles, about half of the state's land area. It is the fourth largest MPO in the nation in terms of population, serving more than 6.7 million people and over 3.1 million jobs. [64]

The region has a robust multi-modal transportation network, including 26,000 miles of roads, 255 local and express bus routes, and 13 commuter/light rail lines with 228 stations, and 18 ferry routes from 19 piers.[65] Situated between New York and Philadelphia, the area is a regional corridor for both intra- and inter-state transportation. According to the American Community Survey (ACS), 34 percent of regional residents work outside their county of residence and 14 percent work outside of the state. The ACS found that the majority (70 percent) of commuters report driving alone, a rate that is significant but lower than most major metropolitan areas. In 2015, the region had 149.1 million miles of vehicle travel. [66]



NJTPA Region

The NJTPA's regional transportation plan – Plan 2045: Connecting North Jersey – outlines the principles that guide project selection and provide policy and planning direction. [67] These include:

- Help Northern New Jersey Grow Wisely — Transportation investments should encourage economic growth while protecting the environment and minimizing sprawl in accordance with the state's Smart Growth plan, Energy Master Plan, and environmental plans.
- Make Travel Safer — Improving safety and security should be explicitly incorporated in the planning, design, and implementation of all investments.
- Fix It First — The existing transportation system requires large expenditures for maintenance, preservation, and repair, and its stewardship should be the region's highest priority.

[64] NJTPA, Plan 2045: Connecting North Jersey, https://apps.njtpa.org/plan2045.
[65] New Jersey Transit, *Facts at a Glance – Fiscal Year 2016*, http://www.njtransit.com/pdf/FactsAtaGlance.pdf.
[66] New Jersey Department of Transportation, New Jersey's Roadway Mileage and Daily VMT by Functional Classification Distributed by County, http://www.state.nj.us/transportation/refdata/roadway/pdf/hpms2015/VMTFCC_15.pdf.
[67] NJTPA, Plan 2045: Connecting North Jersey, https://apps.njtpa.org/plan2045.

- Expand Public Transit — Investment to improve the region's extensive transit network should be a high priority, including strategic expansions to serve new markets.
- Improve Roads but Add Few — Road investments should focus on making the existing system work better and road expansion should be very limited without compromising the tremendous accessibility provided by the existing highway system.
- Move Freight More Efficiently — Investments should be made to improve the efficiency of goods movement because of its importance to the region's economy and quality of life.
- Manage Incidents and Apply Transportation Technology — Investments should be made to improve information flow, operational coordination, and other technological advances that can make the transportation system work smarter and more efficiently.
- Support Walking and Bicycling — All transportation projects should promote walking and bicycling wherever possible.
- Increase Regional Resiliency — Investments should be made to mitigate risks associated with sea level rise, extreme weather, homeland security, and other potential threats. Investments should consider criticality of infrastructure, vulnerability, and level of risk.

While the expansion of transit and smart land-use planning work to reduce single occupant travel, the adoption of AFVs within the region will help reduce the environmental impact of the remaining vehicle trips by reducing oil consumption and transportation-related emissions, thus supporting the NJTPA's goal of protecting the environment.