



A Roadmap for Vehicle Electrification in New Jersey: Market Development Strategy and High Impact Initiatives

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Executive Summary

Electric Vehicles (EVs) are a transformative solution that will reshape both our energy markets and the way we travel. The widespread adoption of EVs brings significant economic benefit, including lower electricity rates and reduced vehicle operating costs, and substantial emission reductions that result in cleaner air. There are numerous other benefits especially for communities impacted by air quality in the urban core and along dense travel arteries.

ChargeVC is a not for profit coalition of automotive retailers, utilities, technology companies, local governments, environmental, community and labor advocates and manufactures, working to accelerate the transition to electrically fueled transportation in New Jersey. This Roadmap is based on the findings of a study, specific to New Jersey and to be made publicly available in October 2017. The study confirms and quantifies the wide range of benefits that apply statewide, benefits realized by EV owners and identifies key market needs to expand and accelerate growth.

Given the benefits associated with widespread EV adoption, New Jersey should launch initiatives that encourage, expand, and accelerate EV market development. The Roadmap identifies the following programs and policies for New Jersey to enact. Taken together, the recommended programs and policies can accelerate EV market growth, increase benefits to the state and transform New Jersey into a “top 3” market for EVs nationally.

Policy Action One - Set state goals for EVs and vehicle charging infrastructure

- **EVs:** A total of 330,000 plug-in EVs by 2025 with 90% of all new car sales pure electric plug-in by 2040;
- **Public Chargers:** A total of 600 public DC fast chargers throughout the state at 300 locations by 2020; 500 Level 2 public community chargers by 2025.
- **Private Chargers:** A total of 50% multifamily properties with chargers or charger ready by 2025 for use by residents; a total of 25% of commercial properties with chargers by 2025 for use by employees and fleets; a total of 50% of overnight lodging establishments with chargers by 2025 for use by guests.
- Ensure most charging happens at optimal times to maximize social benefits.

Policy Action Two - Eliminate range anxiety

No one should worry about where and how they charge their cars when away from home, and consumers cite lack of public charging infrastructure as a top barrier to buying an EV. Implement a comprehensive program to create a critical mass of public charging installations sufficient to eliminate consumer concerns about range anxiety, meeting the goals established in Policy Action One.

Policy Action Three - Address the affordability gap

The cost of EVs is declining, however today costs are still too high for many mainstream consumers. Establish a \$300M program to provide rebates that reduce vehicle purchase costs to increase adoption significantly. As an example: a \$5,000 cash rebate at the point of sale, that declines by \$500 as each \$100M block is allocated, incentivizes at least 67,000 new EVs on New Jersey's roads over approximately three-years.

Policy Action Four - Ensure widespread "Right to Charge" for routine charging

Most charging will happen where cars are parked for long periods, yet there is a lack of charging infrastructure to support those needs. Implement a program to ensure that consumers are free to choose EVs without concern about their ability to charge routinely at home or work.

- Adequate and equitable charging opportunities: Working with competitive solution providers where appropriate, authorize the utilities to support convenient and affordable access to private charging infrastructure in high priority segments, including multi-family properties, fleets, overnight lodging, and workplace solutions.
- Grid Integration: Ensure that utilities are tracking EV uptake and impacts on the distribution system, making upgrades as needed, and maximizing the benefits of those upgrades.
- Optimizing benefits: Encourage and allow the utilities to influence when EV charging occurs to ensure maximum and widespread benefit.
- Ensure buildings are EV-ready: Make changes to building codes and standards that will avoid significant retrofit costs for future EV deployment.
- Support kilowatt-hour pricing: Allowing all hosts of charging equipment to offer kilowatt-hour pricing if desired without being considered a public utility will allow for consistent and understandable price signals to drivers.

Policy Action Five - Ensure electrification reaches all communities equitably

For people that live in urban centers, where car ownership may not be an option and/or may not be desirable, electrically fueled fleets and other electrically fueled transit options are needed. Such solutions will have a direct impact on urban air quality. Pilot programs, potentially with emerging car and ride sharing companies, are needed to enable electric fleet solutions, including the required EV support infrastructure.

Policy Action Six - Ensure long term funding for the Transportation Trust Fund

After an EV grace period through 2025 as appropriate for emerging market conditions, ramp up taxes on the portion of electricity used for all private EV charging, sufficient to completely replace revenues lost from declining gasoline taxes. From 2030 forward, ensure that EVs pay their fair share of TTF requirements in full, in proportion to the fraction of total miles driven that are electric rather than fueled.

Action Seven - Build consumer awareness

Take advantage of multiple ways to engage consumers, from ride and drive events, signage, EV galleries, utility marketing programs, local government engagement, and social media campaigns in order to dramatically increase consumer awareness.

Action Eight - Implement supportive market development efforts

ChargeVC will implement a variety of additional actions that support these seven primary initiatives. Initiatives are already underway in several areas to develop an automotive retailer education program and discussions have begun with other mid-Atlantic states to ensure regional consistency.

Introduction

Electric Vehicles (EVs) are a transformative solution that will reshape both our energy markets and the way we travel. The EV market in New Jersey is starting to grow, based on the recent availability of new vehicles with greater range and lower costs that make EV ownership feasible for mainstream consumers. To appreciate the scope of potential impact, consider the following:

Approximately 46.4% of energy related GHG emissions in New Jersey are from the transportation segment, with three-quarters of that coming from the on-road use of gasoline, predominantly in cars.¹

Every electrically fueled mile in New Jersey is at least 70% cleaner than an average gasoline fueled mile.² Widespread EV adoption results in large reductions in GHG emissions and significant improvement in air quality overall, among other environmental benefits.

Fueling cars with electricity rather than petroleum can have a large beneficial impact on electricity infrastructure and markets. Widespread EV adoption could increase electricity use by as much as 30% over current levels. If guided through proactive programs and policies, electrification of transportation has the potential to enable more robust utility infrastructure and more optimal loading patterns that reduce cost to utility customers and increase reliability.

The widespread adoption of EVs brings significant economic benefit, including lower electricity rates and reduced vehicle operating costs. There are numerous other benefits that also arise, especially for disadvantaged communities impacted by air quality in the urban core and along dense travel arteries.

¹ As represented in the 2012 New Jersey GHG Inventory from Rutgers.

² Based on the current electricity supply mix in NJ, and average gasoline vehicle efficiencies.

To date, the potential for EV adoption is almost completely untapped in New Jersey. Although initial steps have been taken, New Jersey lags other states that have acted to enhance EV adoption rates. The timing is right for action, now that new and affordable long-range EVs are becoming available and existing EV market development barriers can be addressed. There are also synergies with increasing adoption of new, clean, renewable electricity generation where New Jersey has made progress over the last decade. This Roadmap provides a comprehensive plan to make New Jersey a national leader in electric transportation.

ChargEVC was founded to identify high impact EV market development strategies for New Jersey, and provide a unified voice to advocate for effective implementation. This coalition of diverse interests, including automotive retailers, utilities, national and

local environmental NGOs, consumer and equity advocates, labor associations, power plant owners, and technology companies, including original equipment manufacturers (OEMs), are united by the common goal of expanding and accelerating EV adoption in New Jersey. Please see Appendix A for a list of current members.

Over the past year, ChrgEVC has combined comprehensive New Jersey specific market research, subject matter expertise offered by our diverse members, and consensus building to identify the actions needed to expand and accelerate EV market development in the state. The research quantifies widespread benefits (see Appendix B for a summary), identifies key market barriers, and summarizes best practices proven by other successful states. This roadmap is the result of that effort, and it outlines the high impact initiatives necessary for New Jersey to realize its vehicle electrification potential and ensure that the associated benefits will accrue to all.

A commitment to the policies and programs identified in this roadmap can contribute to New Jersey achieving the goals established by the Paris Accords, and are consistent with other international goal-setting programs such as the “EV30 by 30” initiative from the Clean Energy Ministerial.

Now is the time for state level leadership on vehicle electrification, consistent with state commitments to clean energy and building on initiatives in other states and jurisdictions. A commitment to the policies and programs identified in this roadmap can contribute to New Jersey achieving the goals established by the Paris Accord, and are consistent with other international goal-setting programs such as the “EV30 by 30” initiative from the Clean Energy Ministerial. Closer to home, expanding and accelerating the adoption of EVs will also allow New Jersey to reduce urban air pollution and contribute to attainment of federal smog standards. Widespread EV use will also be necessary to meet the goals of New Jersey’s Global Warming Response Act,¹ which requires an 80% reduction in GHG emissions by 2050.

This roadmap focuses exclusively on light duty vehicles, which are fueled mostly by gasoline (and ethanol). These vehicles are the dominant source of mobile emissions in the state. Widespread adoption is now possible since affordable new electrified alternatives with longer range are becoming available. Vehicle electrification is also maturing rapidly for heavy-duty vehicles fueled by diesel, especially buses. Such vehicles are also significant emission sources, especially particulates, in urban centers and along dense travel corridors. This roadmap will be expanded to eventually include the opportunity for electrification of heavy-duty vehicles, especially buses, in lockstep with the extremely rapid maturation of that technology.

¹ Global Warming Response Act of 2007 (GWRA), N.J.S.A 26:2C-37.

Market Outlook: The EV Opportunity In New Jersey

The Current State of The Market

Many natural conditions already exist in the NJ EV market that makes it fertile ground for widespread EV adoption. These include a generally progressive policy stance on environmentally responsible initiatives, an educated citizenry that has a demonstrated affinity for the EV value proposition, and a relatively travel-intensive daily routine across a compact geography. Now that longer range, affordable EVs are becoming available, New Jersey has the potential to be one of the biggest and fastest growing EV markets in the country.

Current market results fall far short of New Jersey's potential. New Jersey lags far behind other leading states in terms of EV adoption rates, vehicle charging infrastructure development, and other "market readiness" factors. With approximately 10,000 plug-in vehicles on the road as of the end of 2016 (less than 0.2% of vehicles), and sub-1% market share of new car sales, the state is in the very early stage of market development. Charging infrastructure is insufficient and inadequate to encouraging increased EV adoption by mainstream customers. Consumer awareness is virtually non-existent and fleet ownership of EVs is minimal.

The current adoption rate of EVs is insufficient to achieve these strategic objectives, particularly regarding the 80% GHG emission reduction required by 2050.

Policy focus on EV market development has been extremely limited compared with other clean energy priorities established by the state for efficiency and renewable energy. Most importantly, vehicle electrification will be a critical component of achieving overall GHG (and other air quality) goals. The current adoption rate of EVs is insufficient to achieve these strategic objectives², particularly regarding the 80% GHG emission reduction required by 2050. Widespread EV adoption is also highly synergistic with continued development of new, clean, renewable energy generation.

Market Outlook – EV Growth Opportunity

The automobile industry in New Jersey represents approximately \$30B in economic activity annually, and the state is one of the largest automobile markets in the country. New Jersey has taken an important first step to stimulating the electrification of this market by opting-in (along with other progressive states) to the Zero Emission Vehicle (ZEV) program created by California and authorized for adoption by New Jersey under Section 177 of the Clean Air Act. The framework sets aggressive

² Global Warming Response Act of 2007 (GWRA), N.J.S.A 26:2C-37.

compliance goals for New Jersey, representing enormous growth compared with current sales. The ZEV requirements for NJ, which leverage extensive public policy analysis in California to establish goals that are both impactful but achievable, motivate an expansion of current EV ownership levels by approximately a factor of 30 by 2025. As demonstrated by the experience in other leading states, achieving these higher EV adoption levels will require additional programs and policies that build on the ZEV framework to address other important adoption barriers.

Market Development Needs

EV adoption in New Jersey is limited by a set of early market barriers and unmet needs. These constraints have limited the emergence of the full ecosystem of market participants needed to deliver compelling solutions to informed and motivated consumers. Investment in the state has been limited, and industry faces uncertainty about the long-term market conditions that affect investment risk. The Roadmap is designed to reduce (and eventually eliminate) these early market development constraints, providing the support that achieves the critical mass necessary for the market to grow sustainably long term. Primary focus is on ensuring EV product availability, encouraging and optimizing the development of necessary vehicle charging infrastructure, addressing early stage affordability issues, and educating consumers.

The Roadmap

New Jersey has taken important first steps, but more work is needed. The good news is that a relatively small number of high impact initiatives will make a large difference, and that within a short time period New Jersey has the potential to be a “top three” EV market in the country.

This Roadmap is intended to provide a comprehensive framework that identifies specific, high impact market development initiatives that will create a sustainable and growing EV market in New Jersey. These initiatives directly target the most critical barriers, and identify structural changes or innovations that allow an expanded market to emerge more quickly, more efficiently, and more optimally.

Roadmap Goals

The Roadmap has been designed to realize the following goals: ensure sure that market development strategy is *Proactive*; that it is based on a broad *Ecosystem* that includes a diverse range of market participants including competitive solution providers, regulated utilities, and other stakeholders; and that the resulting vehicle electrification in New Jersey is *Impactful*, *Optimal*, and *Equitable*:

Proactive: Left to develop naturally, widespread EV deployment could become harmful, sub-optimal, or expensive, creating unwanted burdens for both drivers and electricity consumers. Conversely, experience in other states has demonstrated that if the right programs and policies are in place as the market begins to grow, widespread EV adoption can have a large positive impact, ensuring that economic and environmental benefits are maximized, minimizing required public investment and avoiding negative impacts.

Ecosystem: Consistent with programs that have been successful in other states, as well as NJ’s history on competitive market development, growing the EV market in NJ will benefit from developing a diverse network of market participants, including competitive entities, regulated utilities, and other vested stakeholders. The constructive involvement of the utilities is especially critical, given infrastructure development needs and potential impact on the public grid long term.

Impactful: There is benefit to augmenting natural market evolution so that more consumers choose to adopt electric vehicles, sooner and to a wider degree. In the short term, New Jersey should strive for at least market parity with other leading EV adoption states while laying a solid foundation to sustainably accelerate market adoption. In the medium term, New Jersey should achieve an adoption trajectory that complies with the Global Warming Response Act goals and other strategic objectives established by the State’s Energy Master Plan.

Optimal: Ensure that vehicle charging happens in a way that avoids harmful peak load conditions on the electric grid, and instead shifts load to off-peak times to increase utilization of electricity infrastructure, exert downward pressure on electricity rates, and stimulate investments that result in robust distribution infrastructure. Actions taken should stimulate and leverage private investment in EV charging infrastructure and ensure consumer choice and host-site flexibility to the greatest extent possible. Adoption strategies should also consider optimal public charging infrastructure distribution and use, including measures that ensure premium-hosting locations are developed to maximize public benefit. Finally, there should be recognition that what is considered optimal today will likely shift as the grid changes, in particular with the proliferation of additional renewables and storage.

Equitable: Make sure that the advantages of vehicle electrification accrue to all citizens, including affordable access to vehicles, convenient and timely access to charging infrastructure, and equitable participation in economic, environmental, and other benefits. Large benefits specific to urban areas should be recognized in policy decisions.

Recommended Policy Actions

The following represent recommended policy actions for New Jersey.

Policy Action 1: Set State Goals

Action: Set goals for the number of EVs in New Jersey

- At least 330,000 plug-in vehicles registered in NJ by the end of 2025.³
- At least 2 million plug-in vehicles registered in NJ by the end of 2035.
- At least 90% of new car sales are pure zero emission (non-fossil-fueled) plug-in vehicles by 2040.⁴
- Lead by example: goal for state light duty fleet - 40% by 2025, 100% by 2035 are plug-in vehicles.

Action: Establish public charging infrastructure goals

- Ensure extensive, statewide marketing of public charger availability, including standardized signage to improve awareness and way finding.

³ This goal brings NJ on par with other leading ZEV states when vehicle adoption goals are scaled by population, and is also consistent with what the ZEV compliance framework requires by 2025. Although the ZEV framework set credit-based goals, this goal is consistent with what that framework requires when translated to physical vehicles.

⁴ This goal is consistent with the New Jersey Global Warming Response Act of 2007 (GWRA), N.J.S.A. 26:2C-37, which establishes a goal for an 80% reduction in GHG emissions by 2050 (relative to 2006).

- At least 100 fast chargers at corridor locations and a total of 200 community locations suitable for short charge durations, with at least two standardized high power Direct Current Fast Charge (“DCFC”) units per location by 2020.
- A total of at least 500 public L2 chargers at community, locations, including municipal, retail, entertainment, and tourist destinations where longer charge durations are appropriate, distributed by county according to population, by 2025.
- Ensure the economics that enable the necessary scale and geographic coverage of DCFCs.

Action: Establish private charging infrastructure goals

- At least 50% of multi-family properties are equipped with chargers for their residents, or are “charger ready,”⁵ by 2025, increasing to 100% by 2035.
- At least 25% of commercial properties have chargers available for use by their employees by 2025.
- At least 50% of overnight lodging establishments (hotels, etc.) have chargers available for use by their guests by 2025, increasing to 100% by 2035.

Action: Recognize the need for managed charging to ensure widespread benefits

- Set a goal and establish policies and utility ratemaking that ensure that most EV charging happens at times and in ways that maximize public benefit, especially optimal loading on the utility grid (primarily residential charging at off-peak times).

Action: Reinforce New Jersey’s participation in the ZEV program

- Formally endorse the ZEV program and associated adoption goals, and continue New Jersey’s opt-in participation in that framework.

Rationale: Setting formal market development goals for New Jersey is important to provide the framework for other steps we will need to take. Note that similar goals have been set by all market leading states, especially the other ZEV-states.

⁵ “Charger ready” means pre-wired and ready for easy charger installation at multi-family locations, with signage that indicates charger ready.

Policy Action 2: Expand Public Charging Infrastructure to Eliminate Range Anxiety

The rapid advancement of DCFC technology now allows most vehicles to be fully charged in 30 minutes or less, and within a few years, an electric “fill up” will take less than 10 minutes. New Jersey is in a unique position to leverage this new technology because the state is geographically compact, and most travel is accomplished on a relatively small number of roads. Approximately 67% of daily miles driven are supported by only 50 federal and state roads. That means that a relatively small number of publicly available⁶ fast chargers can have a large impact on consumer range anxiety. Stimulating the EV market with a comprehensive DCFC network that establishes a critical mass of geographic coverage directly addresses range anxiety concerns. With such action, the state lays the foundation for subsequent natural growth of public charging infrastructure dictated by demand. Public/private partnerships, and the use of public support (potentially through utility programs) and private investment, will be necessary for both phases of public charging infrastructure growth.

Action: Develop A DCFC Network In New Jersey

- Establish goals and standards for creation of the critical mass of DCFC infrastructure sufficient to significantly reduce range anxiety concerns. Consistent with state goals, target at least 100 travel corridor locations (with a density goal of no more than 25 miles between locations) on named high-traffic roadways, and at least 200 community locations, with at least two DCFC chargers at each location (600 DCFCs total).
- Establish standards for technology, access, and payment methods to ensure maximum public benefit, and create a framework for public private partnerships that empower hosting sites (especially public sites) to participate, set goals for allocation of space at rest stops, and encourage partnerships between competitive solution providers and regulated utilities to deliver the necessary solutions. Draw from experience in other states, where supportive of New Jersey goals and market development strategies, to create consistency across states and leverage lessons learned.
- Ensure a strong promotion and education campaign to maximize the impact on consumer perceptions. Consumer education can highlight both the availability of public charging and its benefits, while also emphasizing the proper use of public charging facilities.

⁶ “publicly available” refers to charging infrastructure that may be owned by a variety of entities, but which is generally available to the public with minimal limitation.

Action: Authorize electric utilities to provide infrastructure for the DCFC network

- Enact new law (or encourage utility filings) that directs the utilities to submit program filings to offer future-proofed infrastructure investments or incentives recovered through rates, for a critical mass of public DCFC installations that meet standardized requirements. The law (or filings) could also allow inclusion of additional incentives such as on-bill financing of DCFC installation, rates designed with EVs in mind to supply electricity to site hosts offering electric transportation fueling services, incentives, tariffs and other mechanisms that ensure that DCFC network coverage goal is achieved.

Such utility filings should leverage the contribution of competitive solution providers where appropriate, and ensure consumer choice, host-site flexibility, and a convenient and reliable driver experience.

Rationale: It is well established that the fear of running out of charge, known as range anxiety, acts as a barrier to the purchase of an electrified vehicle. Recent studies confirm that range anxiety is one of the top, and for many consumers the most important concern that limits their willingness to purchase an EV. Some drivers address this concern by driving an electrified hybrid, PHEV, that runs on battery charge most of the time, but has a gasoline-fueled engine that provides backup power if needed (i.e. a range extender). Note that even PHEV drivers take advantage of public charging to minimize their fuel use. Others are comfortable choosing an electric vehicle if they have a second traditional vehicle available for their occasional use. These hybrid strategies are primarily a transition phase for the electric market. Many consumers desire pure electric vehicles that avoid fuel use altogether. Even today, pure electric vehicles based on batteries, BEVs (with no fossil-fueled back-up engine) are a large and rapidly growing part of the overall EV market. For all EV consumers, confidence in the availability of public charging infrastructure is absolutely essential – without that confidence, they will defer their EV decision.

Policy Action 3: Address the Affordability Gap to Help Achieve Scale

Action: Implement a \$300M grant program to reduce the price premium associated with early electric vehicles and accelerate adoption and increase industry scale.

- Funding for the grant program may come from allocation of the Societal Benefits Charge already being collected, other revenue sources (like RGGI), or as a recoverable incentive provided by the electric utilities. Program design details should focus on making the incentive easily available at the point of purchase, and build-in reductions of the incentive over time. For example, a \$5,000 cash rebate per qualified vehicle, declining by \$500 as each \$100M block is allocated, would incentivize at least 67,000 new plug-in vehicles on New Jersey's roads over an approximate three-year period. Program design

should vary incentive amount based on electric range, whether the vehicle is a BEV or a PHEV, tests for income and/or vehicle cost, and other design factors that maximize benefit and ensure equitable use. The initial \$300M program should be extended if certain success criteria are met.

Rationale: A new generation of EVs are now available that offer reasonable range (over 200 miles per charge) at prices within reach of some mainstream consumers. EV prices will continue to decline given advances in technology and achievement of industry scale. Still, today there exists a premium for 200+ mile EVs, making them more expensive for mainstream buyers when compared with cars that have equivalent features and trim level. While the federal tax credit currently mitigates the higher cost, this credit will expire soon and it is not sufficient to achieve the NJ expansion goals. Just as the state's Renewable Portfolio Standards (RPS) works in conjunction with the solar federal tax incentives, state level incentives, appropriately structured, are necessary and an efficient way to jump start the New Jersey EV market. The effectiveness of incentives has been shown to work in a number of markets over the last several years. Close to home, New York and Connecticut have recently implemented such incentive programs. The incentives more than pay for themselves given the benefits realized by all utility customers.

Policy Action 4: Right to Charge - Ensure Sufficient Private Charging Infrastructure

Action: Allow utilities to support high priority private charging infrastructure

- Enact new law or regulations (or encourage filings) that directs the utilities to submit program filings to offer future-proofed infrastructure investment or incentives, recovered through rates, for private use (by authorized users) of Level 2 installations that meet standardized requirements in multi-family residential, overnight lodging (hotel), public and private fleet, and workplace (for employee) settings.
- Such utility filings should leverage the contribution of competitive solution providers where appropriate, and ensure consumer choice, host-site flexibility, and a convenient and reliable driver experience.

Action: Allow utilities to offer managed charging programs

- Enact new law or regulations (or encourage filings) that direct the utilities to submit program filings to offer programs that influence when EV charging occurs, especially in residential settings where most charging will take place, so as to direct load to optimal (typically off-peak) periods. Utilities may provide rates designed for EV charging, or other tariffs, programs, or incentives that influence when charging occurs.

- In the short term, focus on “one-way” smart charging of the vehicle, but longer-term support more advanced vehicle-grid integration solutions that provide tightly integrated two-way transactions that optimize grid loading conditions.
- Recognize that what is determined to be optimal charging will likely shift over time with the proliferation of additional renewables and storage technologies.

Action: Ensure utility infrastructure upgrade efforts as needed long term

- As the EV market begins to achieve significant adoption, ensure that the electric utilities track market development and EV uptake, assess evolving infrastructure requirements, plan for and implement necessary infrastructure upgrades, and maximize the broader benefit of those upgrades.

Action: Support EV Ready building codes and standards

- For new and existing construction, changes to the building codes and standards will be necessary to ensure widespread and equitable charging infrastructure access, and to avoid significant retrofit costs when deploying EV chargers in the future.

Action: Support kilowatt-hour pricing

- To promote consistent and understandable price signals to drivers, allow all hosts of charging equipment to offer kilowatt-hour pricing if desired without being considered a public utility. Where consistent with New Jersey goals and market development strategies, strive for consistency with other states, and leverage lessons learned. To the greatest extent possible, promote consumer choice and a driver experience that is convenient, reliable, and transparent.

Rationale: The public DCFC program addresses range anxiety (Policy Action 2), however, we also need to ensure that all drivers have routine access to private chargers for their vehicles at home, at work, and around town. While many drivers are in situations where their routine charging needs can be easily met, many New Jersey drivers, especially those in multi-family or rental situations are excluded from EV ownership due to limitations on home charging infrastructure. In addition, since most vehicle charging energy will be delivered in residential settings, it is critical to ensure that those transactions happen at optimal times to minimize negative impacts on the public grid, and ensure maximum economic benefit for all utility customers. As EV adoption grows, it will be crucial that electric utilities are proactive in upgrading the distribution system infrastructure to keep pace with greater electricity use, which brings broader benefits related to a more robust public grid.

Policy Action 5: Ensure Electrification Solutions Reach All Communities Equitably

Action: Create pilot programs in urban centers for electric fleets, taxis, and public buses and school buses

- Enact law or regulations or support filings that provides for pilot programs to enable the purchase of electric fleets and buses to be utilized in urban areas, and construct the required EV support infrastructure. Pilot programs should consider working with car and ride sharing companies to incentive electric vehicle use.

Rationale: The four Policy Actions outlined above focus on electrification of the light duty vehicle fleet, under traditional vehicle ownership models and travel practices. However, for people that live in our most densely populated urban centers, car ownership may not be an option and/or may not be desirable, especially given that the ownership model is changing as a result of car sharing and ride sharing. This necessitates the need for electrically fueled fleets and other electrically fueled transit options to move people through and around our cities, which will have a direct impact on urban air quality.

Policy Action 6: Ensure Long Term Funding for the TTF

Action: After a Grace Period, Introduce Electricity Taxes to Support the TTF

- Provide a grace period for EVs through 2025 that exempts them from taxation (above current electricity sales tax levels) related to fueling with electricity. From 2025 through 2030, ramp up taxes on the portion of electricity used for all private EV charging (but not public), sufficient to completely replace revenues lost from declining gasoline taxes due to vehicle electrification. Ensure that EVs pay their fair share of TTF requirements in full, from 2030 forward, in proportion to the fraction of total miles driven that are electric rather than fueled.

Rationale: A stable and secure source of funding for the Transportation Trust Fund (“TTF”) is a high priority for New Jersey. Current gasoline vehicles contribute to New Jersey’s TTF to support transportation infrastructure development and maintenance. As petroleum use is displaced by electricity, this funding mechanism will decline. While the initial priority is to be supportive of the early EV market, enabling it to establish critical mass and scale, it is important to ensure that EVs eventually pay their fair share to support the roads they use.

Action 7: Build consumer awareness

Getting the word out effectively about the many benefits of driving an electric vehicle is a must. To ensure this message sticks, take advantage of the multiple ways to engage consumers, from ride and drive events, signage, EV galleries, utility marketing programs, local government engagement, and social media campaigns. A coordinated campaign with a consistent message can dramatically increase consumer awareness. Multiple messengers, including ChargeEVC members and government agencies like DEP and BPU, should also be tapped as part of a coordinated campaign to broaden consumer awareness.

Action 8: Supportive Market Development Efforts

The policy initiatives outlined above directly target key market barriers or unmet needs. In addition, there are a variety of supporting efforts, programs, and action by other stakeholders that reinforce the primary initiatives. ChargeEVC recognizes the mutually supportive roles for utilities and competitive technology providers with a competitive market structure being utilized where applicable, and utilities providing infrastructure, incentives and services to achieve the critical mass necessary to expand and accelerate EV adoption sustainably long term.

ChargeEVC, in collaboration with members and others will:

- Continue research on benefits and learn from other states;
- Work in partnership with NJ Coalition of Automotive Retailers (NJ CAR) and dealerships on education and support of these goals;
- Advocate directly for the six key policy initiatives;
- Engage and create opportunities for competitive technology providers and utilities to deliver solutions cooperatively;
- Advocate with New Jersey Department of Environmental Protection, the State Legislature and the California Air Resource Board for a change in regulations that require vehicles to be “placed in service” or “retailed” before automakers receive full credit for vehicles delivered for sale in New Jersey under the ZEV framework.
- Pursue research into the opportunity for heavy-duty vehicle electrification in NJ, with buses being a top priority. Expand the roadmap to include benefits and strategies for the transition of heavy duty vehicles to electrified alternatives.
- Identify and collaborate with other market participants that can support market development, including Clean Cities Coalition, the regional transportation planning organizations, Sustainable Jersey, etc.;
- Encourage accelerated adoption of new, clean renewable electricity generation, which has high synergy with transportation electrification.
- Take action on consumer awareness and education;
- Create public awareness for all public charging opportunities;

- Partner with the auto and bus industries to ensure vehicle availability and strong consumer experience;
- Coordinate with state agencies and other entities to implement this roadmap;
- Attract investment to the state;
- Ensure a strong foundation for long term growth through codes and standards;
- Encourage regional synergy;
- Encourage state leadership, especially through EVs in state fleets;
- Actively engage local government support and participation;
- Explore broader technical implications (storage, grid integration and “smart grid” implications, V2G, etc).

Conclusion

This Roadmap identifies initial market development efforts, focusing on the light duty fleet, needed to bring New Jersey to parity with other EV-leading states. Once this foundation is in place, the Roadmap will be updated to outline additional measures that may be needed to achieve higher levels of adoption, and take advantage of new research and lessons from other states.

Appendix A: Current ChargeVC Members

AAA New Jersey Automobile Club
A.F. Mensah
Association of NJ Environmental Coalitions (ANJEC)
Atlantic City Electric
ChargePoint
Clean Water Action
Electric Spokes
Energy Initiatives Group (EIG)
Environment New Jersey
Environmental Defense Fund
EVgo
GreenLots
Independent Energy Producers of NJ
Isles, Inc.
Jersey Central Power & Light
Natural Resources Defense Council
New Jersey Clean Cities Coalition
New Jersey State Electrical Workers Association
NJ Coalition of Automotive Retailers (NJ CAR)
Plug-In America
Proterra Inc.
PSE&G
Rockland Electric
Sierra Club NJ Chapter
Work Environmental Council (WEC)

Appendix B: Summary of EV Adoption Benefits

1. Lower operating costs for vehicle owners and associated economic multiplier benefits throughout the economy as those funds are directed to other goods and services.
2. Reducing electricity rates for ALL consumers through reductions in wholesale energy costs, reduced capacity transmission and distribution costs per unit due to increased asset utilization. These benefits accrue to utility customers, not just EV drivers.
3. Absolute reduction in CO2 emissions.
4. Absolute reduction in all other emissions (NOX, SOX, particulates, etc).
5. Reduced environmental impacts from fuel extraction.
6. Numerous public health benefits from reduced emissions (especially smog) and other environmental impacts.
7. Concentrating where emissions occur, which makes further remediation more feasible.
8. Strategic diversification of primary energy supplies for transportation.
9. Addressing social inequity related to vehicle emissions in urban centers.
10. Increased vehicular safety.
11. Reduced vehicular noise.
12. Resiliency benefits, mostly for residential sites, from V2H “Stored On-Site Power” (i.e. powering the home from the car during an outage).
13. Reduced petroleum use: trade deficit.
14. Reduced petroleum use: geopolitics.
15. Increased utility financial and operating health due to increased use of electricity.
16. Increased grid reliability thru related distribution system upgrades.
17. Synergies with increased renewable energy use.
18. Synergies with smart grid technology and storage integration.
19. Using vehicle charging as a “managed load” that can level load, reduce peaks, and enable more optimal grid management.
20. Strong market development programs increase consumer choice and competition by attracting more EV products into the state.
21. A great driving experience.

Appendix C: Glossary of Terms

DC Fast Chargers (DCFC): In DC fast charging, the charger supplies direct current electricity to the battery at a much higher rate. This allows for faster charging times. High powered charges at 150 kw and above can recharge 80% of the battery in 15 minutes or less.

Electric Vehicles: Electric vehicles use one or more electric motors for propulsion. These vehicles can be fully electric or plug-in hybrids. They do not include traditional hybrids, such as the Prius, that do not have the ability to charge the battery from an outside source via a plug.

Greenhouse Gases: These are gases, which contribute to the greenhouse effect by absorbing infrared radiation. These include, but are not limited to, carbon dioxide and methane.

Level Two Chargers (L2): Level 2 charging stations typically supply about 26 miles of range per hour of charging. Unlike DCFCs, which use direct current (DC), level 2 charging stations use alternating current (AC) that is sent to the vehicle, and converted to DC to recharge the battery. Level 2 charging stations are most commonly found at homes and workplaces. Overnight charging using a level 2 charging station will fill up a battery with 200-300 miles of range.

NJ Transportation Trust Fund: P.L. 2016, Chapter 56, signed into law on October 14, 2016, reauthorized the Transportation Trust Fund program. An accompanying piece of legislation, P.L. 2016, Chapter 57, increased the petroleum products gross receipts tax on highway fuel from 2.75% to 12.85%, which converts to a cents-per-gallon rate increase of 22.6 cents (as of November 1st, 2016), and increased the tax on non-motor fuel petroleum products from 2.75% to 7%. The effective gas tax at the retail level, including both the motor fuels tax and the petroleum products gross receipts tax, increased from a base of 14.5 cents to 37.1 cents per gallon. All of the revenue from motor fuels taxes are constitutionally dedicated to transportation purposes in accordance with the voter-approved amendment of Article VIII, Section 2, paragraph 4 of the New Jersey Constitution. In addition, the Constitution continues to provide an annual dedication of no less than \$200 million from the Sales and Use Tax.

Non-Governmental Organizations (NGOs): A non-governmental organization (NGO) is a not-for-profit organization that is independent from states and international governmental organizations.

Plug-In Vehicles: A plug-in hybrid electric vehicle (PHEV) is a hybrid electric vehicle that uses rechargeable batteries, or another energy storage device, that can be recharged by plugging it in to an external source of electric power. A battery electric vehicle (BEV) is a pure electric vehicle that uses rechargeable batteries. Both PHEVs and BEVs are plug-in vehicles and referred to as EVs for the purpose of this Roadmap.

Regional Greenhouse Gas Initiative (RGGI): RGGI is a cooperative effort among the states of Connecticut, Delaware, Maine, Maryland, Massachusetts, New Hampshire, New York, Rhode Island, and Vermont to cap and reduce CO2 emissions from the power sector. States sell nearly all emission allowances through auctions and invest proceeds in energy efficiency, renewable energy, and other consumer benefit programs.

Renewable Portfolio Standard (RPS): A renewable portfolio standard (RPS) is a regulation that requires the increased production of energy from renewable energy sources, such as wind, solar, biomass, and geothermal.

Section 177 of the Clean Air Act: This provision allows other states to adopt California's stricter standards. States that have adopted California's compliance framework include: Connecticut, Delaware, Georgia, Maine, Maryland, Massachusetts, New Jersey, New Mexico, New York, North Carolina, Oregon, Pennsylvania, Rhode Island, Vermont, and Washington.

Societal Benefits Charge (SBC): A ratepayer charge that provides funding for programs, such as low-income programs, nuclear decommissioning, and funding for energy efficiency and renewable energy programs.

Vehicle-to-Grid (V2G): Vehicle-to-grid (V2G) describes a system in which EVs communicate with the power grid to sell services.

Zero Emission Vehicles: A zero-emissions vehicle, or ZEV, is a vehicle that emits no tailpipe pollutants from the onboard source of power, such as particulates (soot), hydrocarbons, carbon monoxide, ozone, lead, and various oxides of nitrogen.