



# National ZEV Investment Plan: Cycle 2

Public Version – February 4, 2019

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## List of Acronyms

Please note – further definition of select terms found in the Glossary in Appendix 4.

BEV	Battery Electric Vehicle
CCS	Combined Charging System
CRM	Customer Relations Management
DCFC	Direct Current Fast Charger
DVMT	Daily Vehicle Miles Traveled
EV	Electric Vehicle
EVSE	Electric Vehicle Supply Equipment
FCEV	Fuel Cell Electric Vehicle
ICE	Internal Combustion Engine
kW	Kilowatt
kWh	Kilowatt-hour
L2	Level 2 Charging Station
MSA	Metropolitan Statistical Area
MUD	Multiunit Dwelling
MWh	Megawatt-hour
OCPI	Open Charge Point Interface
OCPP	Open Charge Point Protocol
OEM	Original Equipment Manufacturer
OICP	Open InterCharge Protocol
OOH	Out of Home
PEV	Plug-in Electric Vehicle (BEV or PHEV)
PHEV	Plug-in Hybrid Electric Vehicle
RFI	Request for Information
RFP	Request for Proposal
TNC	Transportation Network Company
VMT	Vehicle Miles Traveled
ZEV	Zero Emission Vehicle

## Executive Summary

Electrify America is pleased to present this National Zero Emission Vehicle (ZEV) Investment Plan for its second cycle of ZEV infrastructure, education and awareness, and access investments. As required by Appendix C to the 2.0-Liter Partial Consent Decree entered by the U.S. District Court for the Northern District of California on October 25, 2016, Volkswagen Group of America is investing \$2 billion over 10 years to support the increased adoption of ZEV technology in the United States. Of this \$2 billion investment, \$1.2 billion will be spent outside of California. This investment represents the largest commitment of its kind to date. Following conference with the Environmental Protection Agency (EPA), this plan defines the National<sup>1</sup> investments to be made or targeted in Cycle 2, from July 2019 through December 2021.

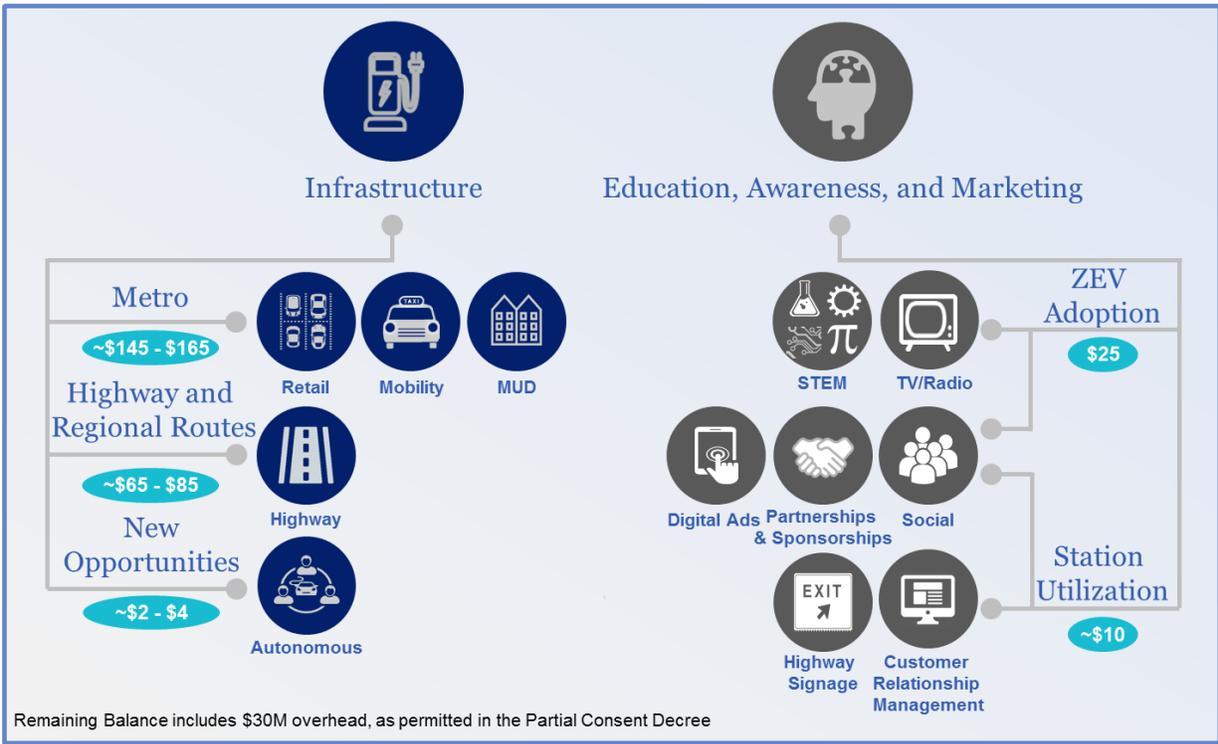
This ZEV Investment Plan is the culmination of more than a year's worth of research, analysis, and outreach efforts led by a new, dedicated infrastructure planning team. Electrify America has sought to engage stakeholders throughout the ZEV community in defining this plan, through in-person meetings, hundreds of phone calls, community conversations, webinars, and a web-based comment/submission forum. Each touchpoint yielded new ideas and recommendations for the investment, many of which complemented our own internal thinking. Electrify America has thoroughly analyzed each opportunity for its impact on ZEV adoption, and its value as an investment to help Electrify America build toward a sustainable business. The response to our outreach has been inspiring. It demonstrates the real commitment the ZEV community has to our shared mission and this transformational opportunity to drive long-term ZEV adoption. We are deeply grateful to all those who have been a part of this effort.

Electrify America's Cycle 2 investments center on two core areas: ZEV Fueling Infrastructure and ZEV Education, Awareness, and Marketing.

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<sup>1</sup> The National ZEV Investment Plan covers investment in the United States, excluding California, pursuant to Section 1.6 of Appendix C of the Partial Consent Decree. Unless noted otherwise, National or Nationally refer to the United States, excluding California pursuant to the aforementioned reference.

Figure 1: Overview of Cycle 2 Investments



## Fueling Infrastructure (~\$235 million)

In Cycle 2, Electrify America will invest approximately \$235 million (Figure 1) in fueling infrastructure for EVs across a broad set of use cases already established in Cycle 1 or newly developed for Cycle 2. Infrastructure cost ranges are Electrify America’s best estimates of projected costs, given uncertainties related to hardware, construction, and operations costs at this early stage.

- Metro Community Charging (\$145 - \$165 million):** The major focus of infrastructure investment in Cycle 2 is charging within metro areas, where research shows that EV drivers charge most often. Electrify America will invest in metro-based direct current fast charging (DCFC) stations in 18 metro areas. These metro areas are expected to account for more than 50% of expected battery electric vehicles (BEVs) in operation outside California through 2022 (Navigant, 2017). Metro DCFC stations will be placed in retail locations throughout a metro region and are intended to serve EV drivers in their daily fueling needs. Select DCFC stations will also be targeted at customers living in multiunit dwellings (MUDs), expanding access to drivers who reside in such communities. Finally, Electrify America will invest in DCFC stations specifically designed to serve shared mobility drivers (car share, taxis, and transportation network company (TNC) drivers) to ensure that these high mileage drivers and passengers are able to enjoy the benefits of ZEV adoption conveniently and cost effectively. Creditable operating expenses associated with metro charging are forecasted to be approximately \$18 million of the total spend in this category.

- **Highways and Regional Routes (\$65 – \$85 million):** Cycle 2 investments will build upon Cycle 1 efforts to develop a highway network of ultra-fast DCFC stations. This will include building new sites connecting regional destinations and filling in existing routes as station utilization of the highway network increases. Creditable operating expenses associated with highway charging are forecasted to be approximately \$26 million of the total spend in this category.
- **Autonomous Vehicle Charging (\$2 - \$4 million):** Innovative and disruptive mobility alternatives, specifically driverless/autonomous vehicles, have the potential to bring many benefits to society including significant reductions in traffic congestion and vehicle emissions (Fagnant & Kockelman, 2015; Anderson et al., 2016). However, autonomous zero emission vehicles require unique fueling solutions. To meet the emerging need presented by autonomous ZEVs, Electrify America plans to build one to two commercial autonomous electric vehicle fueling stations.
- **Renewable Generation:** To provide clean and financially sustainable power to stations in Cycle 2, Electrify America will explore investing in renewable generation where cost effective. These costs are related to station infrastructure and as such are included in the aforementioned cost estimates. In aggregate, investments in renewable generation are not expected to exceed \$5 million.

Electrify America notes that the estimated budgets represent a good faith estimate of Cycle 2 costs. Given uncertainties regarding both capital and operating costs at this early stage, it is possible that total costs may exceed or fall below targeted levels. In the event that costs fall below targets, Electrify America will deploy additional investments in other Cycle 2 ZEV Investment Plan use cases to meet the Appendix C ZEV Investment Commitment. If costs exceed budget forecasts, the number of infrastructure investments will be reduced by a commensurate amount. In addition, given the early stage of partner discussions, availability of site locations, and/or the technology itself (e.g. autonomous), each new use case involves a level of uncertainty in both cost and operational feasibility. Should investment targets in any new use case be unachievable due to practical considerations, the allocated funds will be redeployed into one or more of the other Cycle 2 ZEV Investment Plan use cases to ensure the total investment fulfills Appendix C requirements.

**Table 1: Infrastructure Investment Overview**

Use Case	Projected Technology	Estimated Spend (\$M) <sup>1</sup>
<b>Metro Community Charging</b>	150 kW DCFC	\$145 - \$165
<b>Highways and Regional Routes</b>	150 kW / 350 kW DCFC	\$65 - \$85
<b>Autonomous</b>	TBD	\$2 - \$4
<b>TOTAL</b>		<b>~\$235</b>
<sup>1</sup> Costs include creditable operating expenses, on site storage, and up to \$5 million in renewable generation where appropriate.		

Electrify America believes the investments described in Table 1 address the use cases and locations where ZEV drivers need infrastructure most, while also contributing to a sustainable long-term business for Electrify America and further improvement to air quality in the United States. The investments are projected to roll out along the following timeline in Table 2.

*Table 2: Cycle 2 National Preliminary Infrastructure Deployment Schedule – All Sites*

Quarter	Cycle 2 Infrastructure Investments		
	Pre site selection	In development	Operational
<b>Q4 2019</b>	150 - 160	20 - 30	40 – 50
<b>Q2 2020</b>	90 - 100	40 - 50	80 - 100
<b>Q4 2020</b>	40 - 50	50 - 60	120 – 140
<b>Q2 2021</b>	0 - 0	50 - 60	160 - 180
<b>Q4 2021</b>	0 - 0	0 - 0	~215

## Public Education, Awareness and Marketing Activities

Electrify America will engage in two distinctive and differentiated campaigns, targeting two distinct goals: (1) a brand-neutral campaign to drive ZEV adoption; and (2) a branded media campaign intended to drive station utilization.

### Boosting ZEV Adoption through Education and Awareness (\$25 million)

Electrify America will invest \$25 million in brand-neutral education, awareness, and outreach activities to boost adoption of ZEVs from across the marketplace.

Recent academic research shows that mass-market ZEV adoption has been significantly limited by low awareness. For example, Strategic Vision’s 2016 New Vehicle Experience Study found that just 48% of new car buyers in California and 41% of national buyers have ever heard of a ZEV. A UC Davis GreenLight blogpost by Ken Kurani and Scott Hardman entitled, “Automakers and Policymakers May Be on a Path to Electric Vehicles; Consumers Aren’t,” echoes this finding, showing that consideration of plug-in electric vehicles changed little from 2014 to 2017. During the initial phases of Cycle 2, efforts will primarily focus on increasing awareness and consideration of ZEVs by informing the public of ZEV benefits. This will likely take the form of traditional media advertising, similar to Electrify America’s Cycle 1 Jetstones TV/radio campaign, but it will also include other proven awareness building activities, such as partnerships and digital activities. After ZEV awareness has been sufficiently boosted by Electrify America’s campaign, awareness initiatives from other organizations (e.g., the Northeast States for Coordinated Air Use Management (NESCAUM)), and the introduction of new ZEV models, Electrify America will shift focus to encouraging customers to research ZEVs and test drive the vehicles. Accordingly, our marketing and media tactics will shift to more targeted digital media interactions such as paid search and web banners, as these tactics traditionally perform well given minimum levels of consumer awareness.

Given the still prevailing lack of ZEV awareness in the United States, the largest portion of the Cycle 2 budget will go toward traditional media, with TV, radio and out of home (e.g., billboards) accounting for approximately \$11 million of spending. Digital advertising will account for another approximately \$9 million of the budget. To complement these efforts, Electrify America is also planning to spend approximately \$4 to \$5 million on a range of alternative tactics to provide audiences additional touch points with ZEVs. These tactics may include collaborating with key social media influencers to promote positive aspects of ZEVs; supporting ZEV experience centers with educational materials; and

offering STEM educational programs about ZEVs and charging infrastructure for K-12, vocational schools, professional development, and community colleges. Electrify America will continue to collaborate with organizations that are consumer-oriented and create content/events/test drives to promote ZEV adoption.

To supplement these education and awareness activities, Electrify America will sponsor Learn and Drive events<sup>2</sup> to give consumers an opportunity to experience the thrill of driving a ZEV.

### Boosting Station Utilization through Marketing (~\$10 million)<sup>3</sup>

Electrify America will also invest in driving utilization of its charging network through branded events, promotions, and marketing. As outlined in Appendix C of the Partial Consent Decree, Electrify America must target sufficient utilization to demonstrate its investments are “addressing an existing need or supporting a reasonably anticipated need.” National Renewable Energy Laboratory’s 2017 ‘Consumer Views on Plug-in Electric Vehicles – National Benchmark Report’ highlights the challenge, finding that a large majority (~80%) of survey respondents were not aware of any charging stations, including at places they passed regularly, worked at, or frequented. To meet this utilization goal, Electrify America plans to spend approximately \$10 million to generate awareness of its ZEV charging infrastructure footprint and drive station utilization. These activities will use Electrify America branding as necessary, but will not feature or favor Volkswagen Group of America vehicles.

Electrify America’s marketing efforts will highlight four primary benefits for EV drivers:

- Locations: Convenient charging locations in major metropolitan areas and on national and regional highways;
- Speed: High-powered charging speeds, offering consumers a convenient charging experience (up to 350 kW, providing 200 miles of range in as little as 10 minutes);
- Affordability: Fairly priced and competitive fueling across the network, including subscription plans and charging bundles provided by automotive manufacturers; and
- Customer-centricity: Infrastructure designed considering the consumer experience first, including locations near retail amenities and credit card access at all DCFC stations.

The largest portion (approximately \$5 million) of this branded campaign budget will be dedicated to digital advertising. These efforts will be targeted toward those specific groups most likely to be able to utilize the Electrify America charging network, including new and used EV buyers, EV driver club members, and prospective EV buyers/researchers. Electrify America will use digital tools to reach

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<sup>2</sup> Under Section 2.5.5 of Appendix C, ‘Ride and Drive’ events are classified as Access investments. Due to the educational nature of these events, Learn and Drive events are described in this ZEV Investment Plan as supplementing the Education and Awareness activities. However, they will be recorded and tracked as Access investments.

<sup>3</sup> This investment, while a marketing activity, is not classified as ‘brand-neutral education and awareness’ defined in Section 1.10.2 of Appendix C of the Partial Consent Decree.

these prospects and deliver the right message (e.g., promotion of closest EV charging location) at the right time (e.g., when someone is searching for an EV charger).

The remaining ~\$5 million will be used for complementary messaging tactics. These investments may include working with established media outlets to sponsor editorial content about DCFC charging infrastructure; leveraging customer relations management tools to keep current and potential customers informed of new Electrify America charger installations; funding memberships or sponsorships likely to increase awareness and use of Electrify America’s stations; supporting key industry events; and supporting signage along roadways to identify Electrify America charging sites.

## Conclusion

Electrify America’s Cycle 2 planned investments are summarized below (see Table 3). The Cycle 2 budget focuses even more investment on DC fast charging in metro areas, where data demonstrates that the need for investment is extraordinary. The budget also continues to grow the network of highway stations started in Cycle 1. These investments will continue to establish the foundational infrastructure essential to ZEV adoption in the United States.

*Table 3: Cycle 2 Budget Breakdown*

Category	Estimated Budget (\$M) <sup>1</sup>
<b>Infrastructure</b>	<b>~\$235</b>
<b>Metro Community Charging</b>	<b>\$145 - \$165</b>
<b>Highways and Regional Routes</b>	<b>\$65 - \$85</b>
<b>Autonomous</b>	<b>\$2 - \$4</b>
<b>Brand-Neutral Efforts to Boost ZEV Adoption</b>	<b>\$25</b>
<b>Electrify America Efforts to Drive Station Utilization</b>	<b>~\$10</b>
<b>Electrify America Business Operation &amp; Organization<sup>2</sup></b>	<b>\$30</b>
<b>TOTAL</b>	<b>\$300</b>

<sup>1</sup> Costs include creditable operating expenses, on site storage, and up to \$5 million in renewable generation where appropriate.

<sup>2</sup> According section 5.1 of Appendix C-1 of the Partial Consent Decree, Electrify America is permitted to spend 10% of the total budget on these costs.

At the end of Cycle 2, Electrify America will have invested its first \$600 million in infrastructure, education, awareness, and access initiatives across the country – achieving a key ‘half way point’ milestone in its 10 year commitment to accelerate ZEV adoption for all drivers. We hope that our investments, as well as outreach and collaboration, serve as a ‘rising tide that lifts all boats’ for ZEV stakeholders in the public and private sectors, creating benefits for drivers, car companies, utilities, charging infrastructure suppliers, and the construction trades.

We take our planning, development, and deployment work seriously and recognize that the greater supplies and types of zero emission vehicles coming to market from a variety of car companies (established more than 100 years ago or new to market) can only be fully leveraged with commensurate infrastructure and initiatives related to awareness, education, and access. The entire staff at Electrify

America understands that we have an important, unique, and transformational opportunity to bring the United States into the age of electric cars.

The future can be brighter for drivers, air quality, fossil fuel independence, and reduced congestion thanks to zero emission transportation. Electrify America is honored to be a part of this important mission, and we are committed to restoring the public's trust.

# 1. Introduction

## 1.1. Background

As agreed to in Appendix C of the 2.0-Liter Partial Consent Decree entered by the U.S. District Court for the Northern District of California on October 25, 2016, Volkswagen Group of America is investing \$2 billion over 10 years in zero emission vehicle infrastructure, education and awareness, and access efforts to support the increased adoption of ZEV technology in the United States.

Volkswagen Group of America created Electrify America LLC, a wholly-owned subsidiary headquartered in Reston, Virginia, to fulfill the ZEV Investment Commitment in Appendix C. The company has grown to approximately 70 full-time employees with a diversity of backgrounds in automotive, utilities, EV infrastructure, technology, construction, and state and federal government. All employees share a passion for helping transform and electrify the transportation sector through investments to grow the market for all zero emission drivers and stakeholders.

Of the overall \$2 billion commitment, \$1.2 billion will be spent Nationally in \$300 million increments over four 30-month cycles. This report describes the \$300 million of investment that will be made in the second 30-month cycle Nationally. The Cycle 2 period is from Q3 2019 through Q4 2021 (see Table 4).

*Table 4: Investment Cycles*

	Cycle 1 (Q1 2017 Q2 2019)	Cycle 2 (Q3 2019 Q4 2021)	Cycle 3 (Q1 2022 Q2 2024)	Cycle 4 (Q3 2024 Q4 2026)	Full 10 years
<b>National Plan</b>	\$300M	\$300M	\$300M	\$300M	<b>\$1.2B</b>

The Partial Consent Decree defines those investments that qualify toward Electrify America’s ZEV Investment Commitment. Investments must include “an explanation, taking into account relevant literature from academia, industry, and government, if available, that each National ZEV Investment, to the extent applicable: increases the use of ZEVs in the United States; addresses a clearly existing need or supports a reasonably anticipated need; has a high likelihood of utilization and provides accessibility/availability where most needed and most likely to be regularly used; supports and/or advances the market penetration of ZEVs in the United States; helps build positive awareness of ZEVs; is intended for, and compatible with, ZEV technology brands that are not limited to the Settling Defendants and/or their subsidiaries; and uses non-proprietary or multiple connectors or charging protocols that anticipate technological changes.” Infrastructure investments outlined in this plan must meet Appendix C’s threshold for qualification, including expectations that infrastructure addresses an existing or reasonably anticipated need.

This document, which is certified by Electrify America leadership consistent with Partial Consent Decree requirements in Appendix 1, outlines Electrify America’s plan for the second cycle of investment. Electrify America’s mission continues to be:

- Making it easier for millions of drivers to fuel their ZEVs through economically sustainable investments, and
- Promoting sustained ZEV adoption and station utilization through education, awareness, outreach, and access programs

## 1.2. Investment Plan Overview

This Cycle 2 National ZEV Investment Plan is a comprehensive presentation of Electrify America's Cycle 2 investments, along with supporting documentation as to why each investment meets the Partial Consent Decree's requirements for investment. Chapter 1 contains background information and Electrify America's approach to its Cycle 2 National ZEV Investment Plan. Chapter 2 details Electrify America's outreach efforts to stakeholders throughout the ZEV industry, including specific efforts through the National Outreach website, consistent with the National Outreach Plan. It also includes the key learnings Electrify America has taken from these efforts that have shaped the Cycle 2 National ZEV Investment Plan. Chapter 3 lays out Electrify America's infrastructure investment plan, including the use cases selected, investment methodology, and use case specific details. Chapter 4 addresses investments in education, awareness, and marketing efforts to increase ZEV adoption and boost station utilization. Finally, Chapter 5 highlights Electrify America's impact on our local communities.

Electrify America's Cycle 2 investment represents a continuation of the largest single investment in non-proprietary ZEV fueling and education in U.S. history. The second cycle will dramatically expand ZEV fueling options across the country and support education, awareness, and ultimately, adoption by millions of drivers for years to come. Overall, it presents a substantial step toward transportation electrification, and the associated benefits of clean air and fossil fuel independence.

### 1.3. Cycle 2 Approach

Electrify America believes each new investment cycle offers the opportunity to evaluate new information, revisit past assumptions, and consider new ideas and feedback in the planning process. As such, three core principles guided the approach to Cycle 2 planning: (1) Start from the fundamentals; (2) Engage external stakeholders; and (3) Emphasize real world inputs (Figure 2).

Figure 2: Cycle 2 Approach

- 1. Start from the fundamentals**
  - *Analyze both business fundamentals of existing investments (e.g., highway and metro) and new business opportunities*
- 2. Engage external stakeholders**
  - *Collaborate with stakeholders throughout planning process to strengthen thinking*
- 3. Emphasize real world inputs**
  - *Leverage operational data and customer-backed research to make data-driven decisions*

Electrify America began its Cycle 2 planning efforts more than a year ago by initiating a re-examination of the fundamentals of ZEV adoption and the ZEV fueling business. This analysis included updated vehicle sales forecasts for battery electric vehicles (BEVs), plug-in hybrid vehicles (PHEVs), and fuel cell electric vehicles (FCEVs), and reviewing the fueling characteristics of ZEVs scheduled for release up through 2022. This involved an analysis of automotive original equipment manufacturer (OEM) public announcements regarding vehicle types and range, charging connectors, and charging speeds (DC power levels). In addition, Electrify America examined fueling patterns of today's ZEV fleet, with close consideration for the subset of vehicles that more closely reflect the next generation of vehicles coming to market, which are expected to have larger batteries, longer ranges, and faster charging speeds. In conducting this analysis, Electrify America frequently conferred with academic experts at our nation's national laboratories, universities, and research institutions.

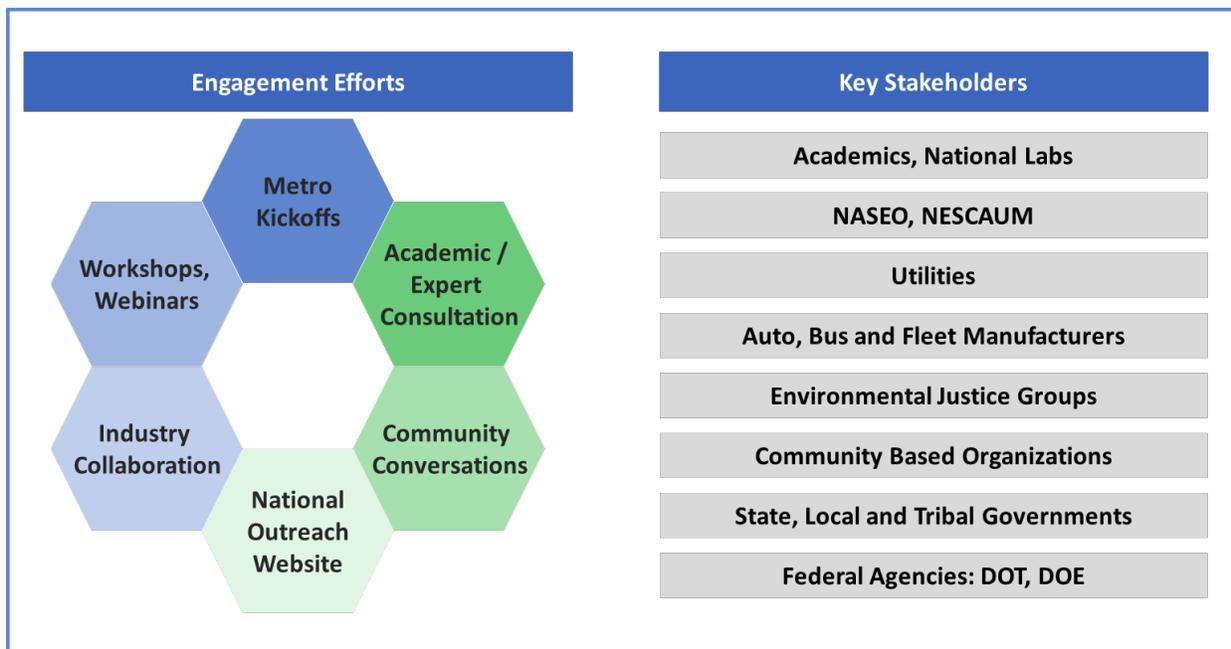
In parallel, Electrify America actively engaged with public and private sector stakeholders throughout the ZEV ecosystem to understand how ZEV investments can have the highest impact on adoption and maximize infrastructure utilization. These hundreds of inputs included conversations with car manufacturers on the technical features of the next generation of vehicles, collaborations with academics on infrastructure siting best practices and recent trends in ZEV awareness, and discussions with advocacy groups and non-profits on how to drive ZEV adoption in local communities. In addition, Electrify America solicited input and feedback from federal agencies; state, local, and tribal governments; and across the industry through its National Outreach website. The guidance from more than 700 inputs submitted online, along with subsequent follow-up conversations by Electrify America staff with submitters, has meaningfully informed and confirmed Electrify America's investment plan and specific strategies for Cycle 2.

As a data driven company, Electrify America has focused on leveraging real-world data and evidence to inform decision-making and improve investment targeting. Information on utilization of existing fueling stations, vehicle sales, local travel patterns, demographics of EV purchasers, and utility rates and programs all guided the selection of Cycle 2 investments. For infrastructure investments, particular emphasis was placed on building a data-backed business case to ensure that all investments are sustainable beyond the end of the Partial Consent Decree. For marketing, education and awareness, and access investments, the focus was on identifying and prioritizing investments with the largest impact on ZEV awareness and adoption. Additional details on the insights and findings pertinent to these investments can be found in Chapter 2: Outreach Efforts and Key Learnings.

## 2. Outreach Efforts and Key Learnings

Electrify America strongly believes that success in driving ZEV adoption will come from collaboration with the entire landscape of ZEV stakeholders including automotive companies, infrastructure suppliers, utilities, state and local governments, academics, interest groups, and beyond. As such, over the last 12 months our team has spent hundreds of hours and traveled extensively to engage stakeholders in the ZEV community to seek insights on industry trends and customer behaviors, ideas for new business concepts, to understand evolving policies and utility programs, and to collaborate with others on investment opportunities as part of a comprehensive approach laid out in our National Outreach Process. These engagements have taken many forms, including briefings with leaders in our Cycle 1 metropolitan areas, community conversations with local constituencies, workshops, webinars, and consultations with academic experts (Figure 3). Electrify America is grateful to all those who have taken the time to engage with the company in this process.

*Figure 3: Stakeholder Engagement Efforts*



In addition to the aforementioned efforts, and consistent with Electrify America’s commitment to engage in outreach as part of its investment planning process, Electrify America issued a second call for comments, data, and recommendations to inform decisions regarding Cycle 2 investments in ZEV infrastructure, education and awareness, and access programs. The request for input through the National Outreach website launched in January 2018 provided an opportunity for governments, organizations, and others to provide input for Electrify America to update analytical models, evaluate new technology and public policy developments, track evolving consumer expectations, and explore the value of new allowable ZEV Investments. To aid in drafting the Cycle 2 ZEV Investment Plan, Electrify America specifically sought the following types of input:

- Suggestions and Data Relevant to Cycle 2 Investments – Inputs from governments or organizations that are helpful to the decision-making process, including data to help locate

charging stations, ZEV infrastructure plans for individual communities, and information regarding state and local policies designed to increase ZEV adoption;

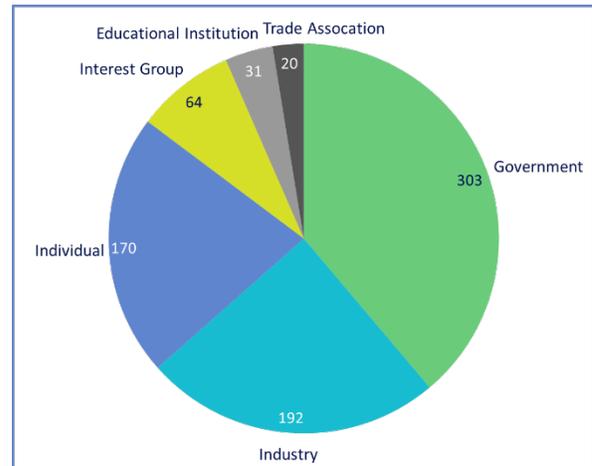
- Education and Access Suggestions – Suggestions on Electrify America’s approach to brand-neutral education and access or specific events the company should consider for participation;
- Specific Charging Site Locations – Site locations nominated for consideration in Cycle 2 infrastructure investments;
- Cycle 1 Comments and Feedback – Feedback on the Cycle 1 National and California ZEV Investment Plans, including approaches to metro selection, highways included, evaluation of use cases, and integration of new technology; and
- Other – All other comments or submissions that relate directly to Electrify America’s ZEV Investment Commitment.

As a part of this process, Electrify America received nearly 800 submissions, each of which has been carefully reviewed and considered in developing our Cycle 2 plan. The following pages detail our outreach efforts and key learnings and insights from this process.

## 2.1. Summary of National Outreach Effort

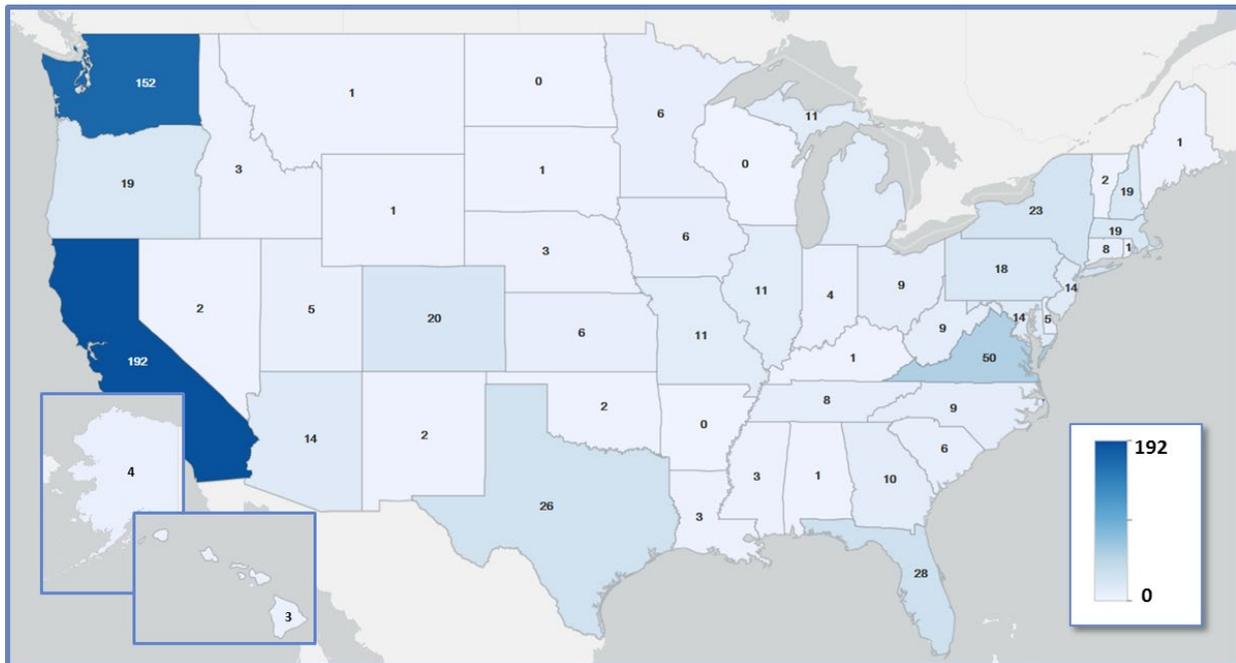
In January 2018, Electrify America launched a page on its website for comments, proposals, data, and recommendations to help define Cycle 2 investments. As of October 14, 2018, 780 submissions were received through the online portal.<sup>4</sup> Government entities made up 39% of submissions (Figure 4). Submissions came in from 47 states and the District of Columbia (see Figure 5), with the largest number of submissions from the states of California (192 submissions) and Washington (152 submissions and more than 970 site suggestions).

Figure 4: Overall Submissions by Institution Category



Electrify America’s team reviewed and summarized these submissions and assigned each to internal working teams for a secondary review and follow-up by email or phone call. Electrify America spoke individually with more than 100 submitters, and every submitter was invited to a series of webinars during which findings and lessons learned were shared.

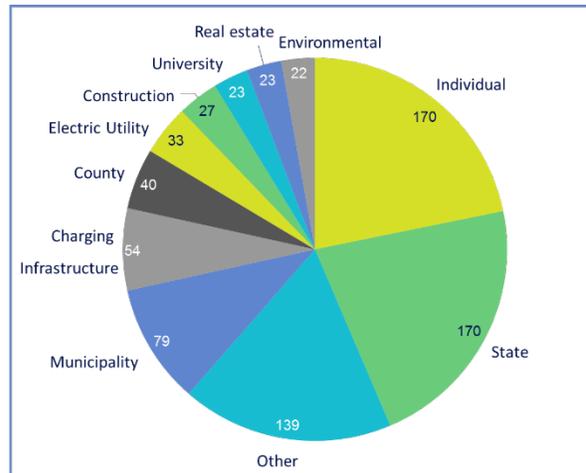
Figure 5: Submissions by State



<sup>4</sup> Electrify America encouraged stakeholders to submit suggestions for the Cycle 2 ZEV Investment Plans between January 15 and March 1, 2018. However, Electrify America has kept the submissions page open and has continued to review the submissions up to the week before this Plan is submitted.

Electrify America received submissions from a variety of stakeholders, including state, county, and local governments, private companies (including electric utilities and charging providers), and individuals (see Figure 6).

**Figure 6: Submissions by Stakeholder Category**

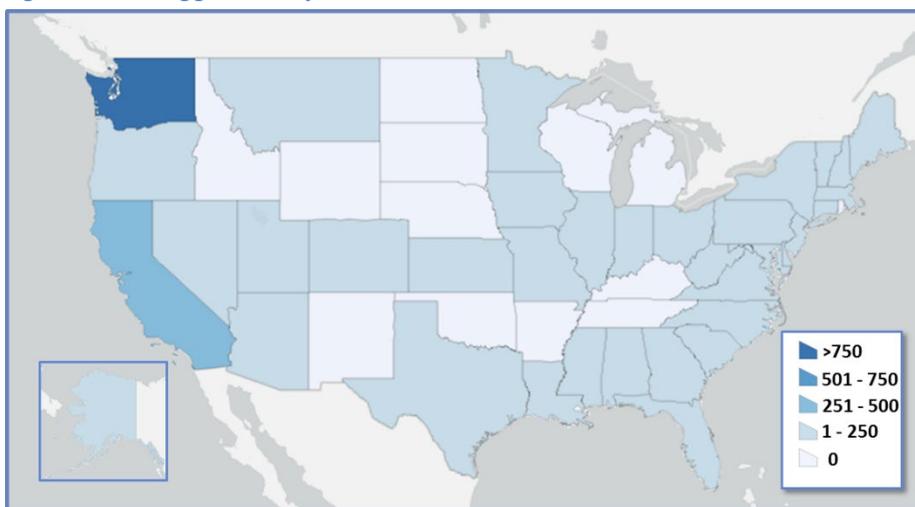


More than 1,900 sites across the United States were suggested through 345 unique submissions (see Figure 7).

Looking across the broad range of submissions, a few major trends were clear (see Figure 8). First, submitters cited a need for more DCFC stations, both in metro areas and on highways. Within metros, they noted a need for strategically placed DCFC infrastructure that can serve multiple use cases, including commuters and people without home charging options. A major American automaker suggested specifically focusing on the needs of DCFC for urban core customers such as taxi/TNC services which require charging near hotels, airports, and convention centers. Submitters commented that highway stations are also essential, suggesting that a highway network will help reduce or eliminate range anxiety. Some, including Denver, Portland, ME, the State of Maryland, and Las Vegas highlighted needs for DCFC infrastructure along key destination corridors. The NESCAUM states noted, “EV adoption in the Northeast Corridor will require robust and reliable charging networks, not only where EV drivers live, but also in nearby states where they travel regularly.” The NESCAUM states also cited the importance of connectors to Canada to support both business and pleasure travel.

Nearly 50 submissions noted charging in multiunit dwellings (MUDs) as a priority focus. However, commenters cited divergent strategies to address the MUD market, which suggests there is no single best solution for this use case. Some submissions recommended strategies for L2 installations in MUDs, including focusing on larger MUDs or new buildings to manage costs. New York City, on the other hand, suggested “[f]ast charge hubs overcome the barrier posed by lacking home charging access

**Figure 7: Site Suggestions by State**



Note: No site suggestions were received from Hawaii

by establishing highly visible and centralized access points across the city where electric drivers can top up quickly and conveniently....” Similarly, the City of Brookline, MA suggested providing curbside EVSE along a highly traveled thoroughfare in a high-

density area to meet the needs of local residents.

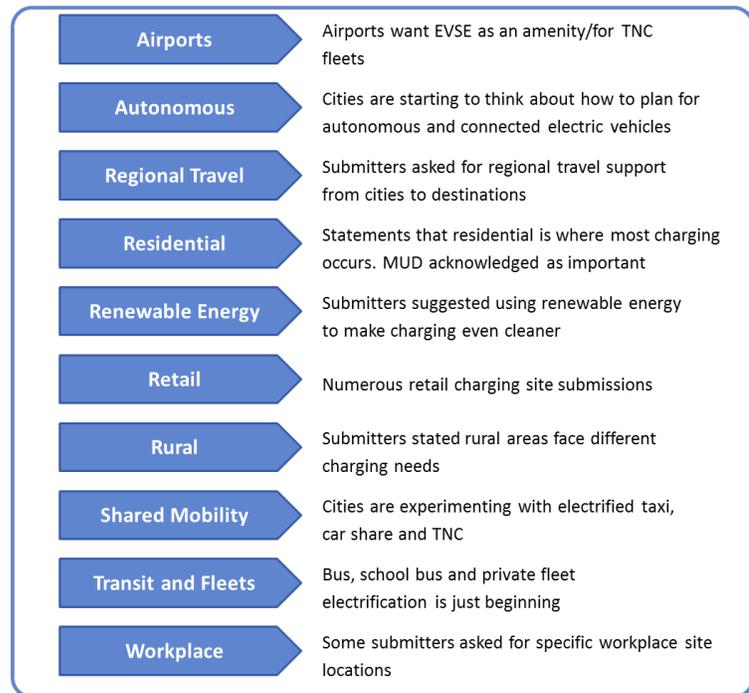
Submissions and feedback from governments and industry outside of California prioritized investment in EV charging infrastructure above hydrogen fueling infrastructure. Less than one percent of National submissions (five) recommended investments in hydrogen.

Finally, nearly 90 submissions discussed ZEV education, awareness, and access initiatives. Many mentioned brand-neutral vehicle showcases and test drives (also known as ‘Discover and Drives’) as a way to help potential ZEV customers learn about the performance and environmental

benefits of ZEVs. Some submissions mentioned using digital media/social media to spur ZEV adoption. For example, ZappyRide offered to collaborate with Electrify America to develop a web platform for prospective EV purchasers aimed at removing the most common obstacles to ZEV adoption. Nearly two dozen submissions mentioned job training or EV curriculum development for both ZEVs and ZEV infrastructure in the form of internships, job training, and career opportunities, particularly for youth. For example, Drive Electric Washington suggested Electrify America “support efforts to design curriculum to serve as a primer about electric cars for secondary students.” Similarly, the Mississippi State University Center for Advanced Vehicles Systems suggested educating a broad spectrum of individuals regarding ZEVs “which would include the American public along with specialized education programs developed for secondary, post-secondary, and engineering students.”

Overall, Electrify America’s National Outreach Process was even more successful than the Cycle 1 experience. It provided a deeper understanding of the infrastructure, education, and access priorities from state and local stakeholders, which have been incorporated alongside other insights captured below to shape the direction and tactics for this Cycle 2 National ZEV Investment Plan.

Figure 8: Themes from National Outreach Responses



## 2.2. Infrastructure Learnings and Insights

Through the outreach process, Electrify America sought to understand three core questions related to ZEV infrastructure:

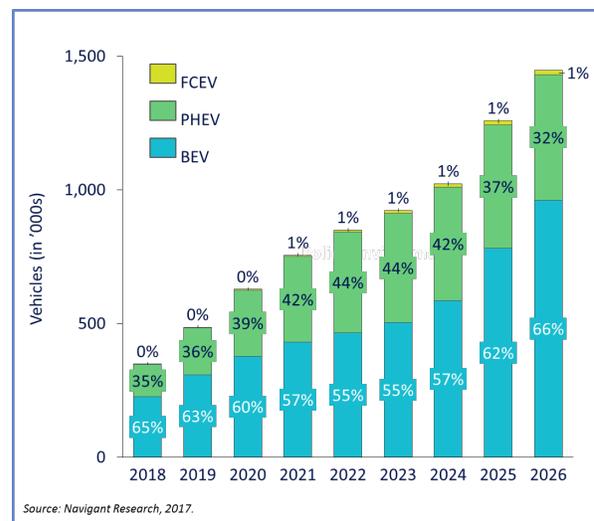
- What types of ZEVs will dominate the future?
- How will these ZEVs be used?
- How will the ZEVs be fueled?

The answer to each of these questions has a major impact on the type and locations of infrastructure required and therefore has been used to guide Electrify America’s thinking on its Cycle 2 investments.

### What types of ZEVs will dominate the future?

Based on all feedback received and analysis completed through planning Cycle 2, Electrify America believes long-range BEVs will dominate the future ZEV market. As detailed in Figure 9, Navigant Research’s 2017 forecast<sup>5</sup> shows the coming decade of ZEV sales to be increasingly represented by BEVs as falling battery prices strengthen the economic advantage of BEVs over their PHEV and ICE counterparts. Complementing this analysis, Bloomberg New Energy Finance (O’Donovan, 2018) forecasts electric car battery prices will fall 54% by 2025 based on technology improvements and scaling associating with increased demand. In contrast to BEVs, Navigant Research forecasts hydrogen fuel cell EVs (FCEVs) will continue to be less than 2% of ZEV sales through 2026, and less than 0.1% of total vehicle sales across the country (Navigant, 2017).

Figure 9: Navigant U.S. ZEV Sales Forecast ('000 vehicles)



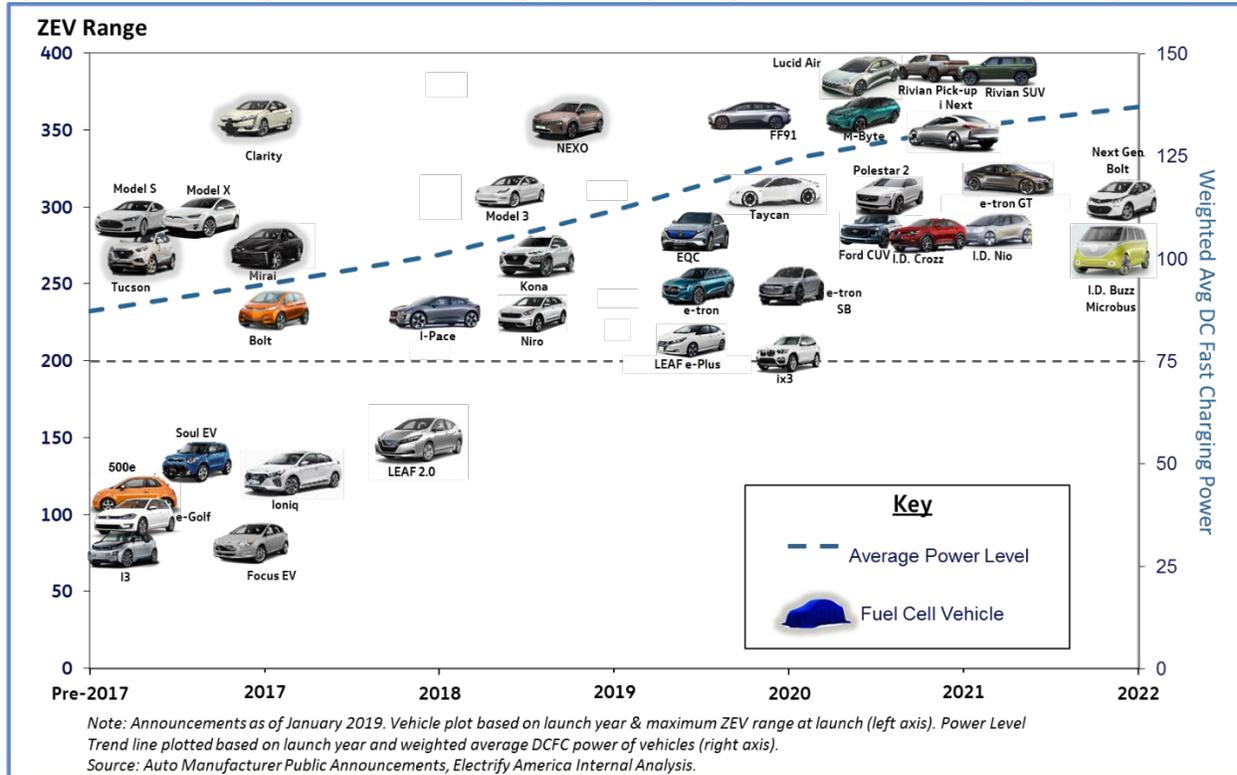
Electrify America’s analysis of automotive manufacturer announcements for vehicles slated for release throughout the next five years indicates the clear trend of larger battery, longer range BEVs, with nearly all models planned for over 200 miles of range and some even surpassing 300 miles. These vehicles will also feature higher charging speeds, with most models projected to accept charging speeds of 100 kW and above (see Figure 10). According to Strategic Vision research, “recharging time” is one of the top five reasons for BEV avoidance, and thus increasing power levels and charge speed are very important to ZEV adoption. Finally, a greater diversity of body styles and price points provide more consumer choice. Several new car companies<sup>6</sup> have announced plans to bring all new designs, technologies, and customer experiences to market. And to meet growing demand for SUVs and light duty trucks, a range of new models are planned or already released including (but not limited to) the

<sup>5</sup> Based on Navigant’s 2017 Base Case scenario.

<sup>6</sup> Examples include Faraday Future, Lucid, Byton, SF Motors, and Nio.

Hyundai Kona, Jaguar I-Pace, Audi e-tron, Lucid Air, Mercedes EQC, Byton M-Byte, Ford's upcoming all-electric BEV<sup>7</sup>, and Rivian RT1.

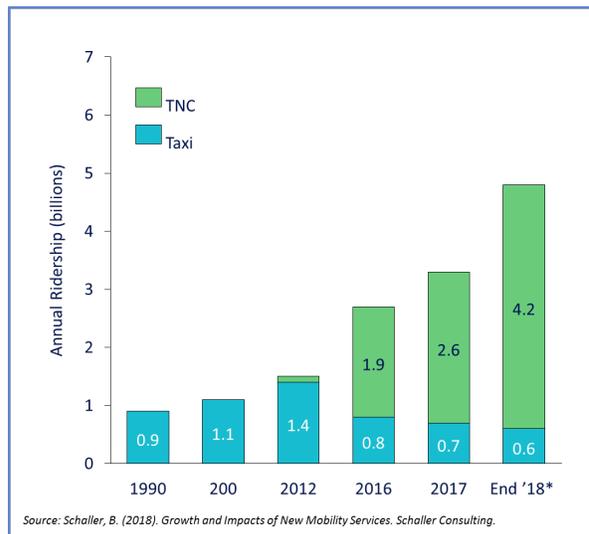
Figure 10: ZEV Models by Launch Date and Range, Including Average Power Level Trend (As of January 2019)



In addition to BEV growth in the private use vehicle market, efforts by municipalities, taxi authorities, TNCs, and utilities indicate increased use of ZEVs in shared mobility in the near future. According to Schaller Consulting (Schaller, 2018), annual ridership for ride hail grew ~37% from 2016 to 2017, and is projected to grow ~62% from 2017 to 2018 (see Figure 11). Despite a shrinking portion of ridership for taxis, these combined use cases are seeing dramatic growth and thus the high annual mileage of these vehicles presents a prime opportunity for electrification.

National Outreach submissions also demonstrated an interest in shared mobility concepts such as ride hailing, ride sharing, and car sharing in more than 30 submissions. Many cities and urban areas, including Atlanta, Chattanooga, Denver, Los Angeles, Nashville, Sacramento, San Jose, Washington, D.C., the Twin Cities, and King County, WA, noted that they are considering or actively pursuing EV car sharing fleets. Some of these

Figure 11: Annual Ridership



<sup>7</sup> The Ford BEV is unnamed at this time.

communities shared the sentiment of the City of Portland, Oregon which wrote, “[t]he number one barrier to providing electric car share services is the lack of access to electric vehicle chargers,” and asked for assistance deploying EVSE that could be partially or fully dedicated to these fleets. King County, WA wrote, “Electrify America can most effectively support ZEV adoption in the [Seattle Metro Area] by collaborating with the Metro to identify strategic locations for charging infrastructure, where high-profile workplace or public on-street charging stations could enable Metro’s transition to a ZEV commuter van fleet.”

### How will these ZEVs be used?

Early data on 200+ mile, long-range BEVs indicates that these vehicles are used by households quite differently than their shorter-range equivalents. First, buyers indicate long-range BEVs are frequently purchased as a replacement vehicle to an existing car in a household fleet (see Figure 12). Whereas short-range BEVs are often additive to a household’s fleet and seen solely as a commuter car, the coming 200+ mile BEVs are expected to replace existing household vehicles and perform similar roles as an internal combustion engine (ICE) vehicle does today (New Vehicle Experience Study, 2017).

Similarly, long-range BEVs are used on more 200+ mile trips than their short-range equivalents. Tesla Model S and X vehicles are used for over 60% of household trips that are over 200 miles compared to Nissan Leafs, which are used on fewer than 5% of long trips (see Figure 13) (Nicholas et al., 2017), although new longer range Leaf vehicles will likely reverse this trend. Electrify America expects the “EVs as primary use vehicles” trend to continue as more long-range BEVs become available and as the growing networks of fast charging stations enable this shift.

Beyond EV growth in the private use and shared mobility segments, innovations like autonomous vehicles are expected to shift how future electric vehicles will be used. KPMG’s Autonomous Vehicles Readiness Index reports autonomous technology will “transform our lives, because it will mean for the first time in history, mobility freedom will be available for everyone, everywhere” (Threlfall et al, 2018). Numerous pilot deployments of autonomous vehicles are already taking place throughout the United States by a variety of technology and automotive companies. In fact, having driven over 10 million miles on public roads in its self-driving minivans, Waymo plans to

Figure 12: ZEV Purchase Reasons for Household Fleet

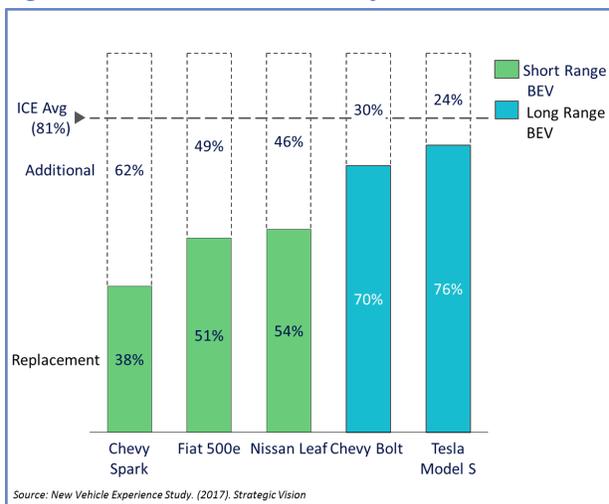
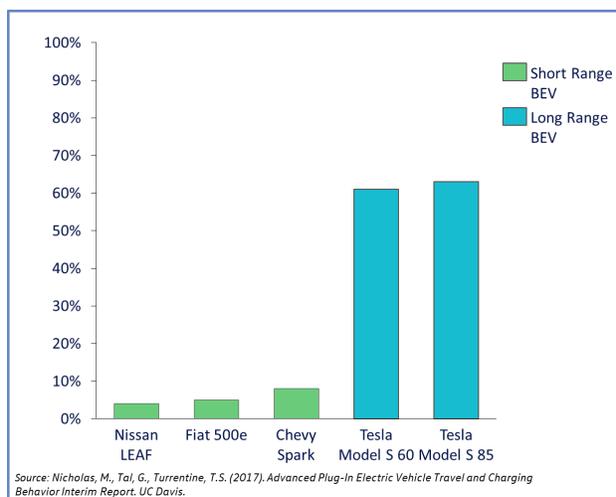


Figure 13: Percentage of Household’s 200 Mile Trips Driven in PEV vs. ICE



make its vehicles available for public use as a ride-hail service in the Phoenix area by the end of 2018 (LeBeau, 2018).

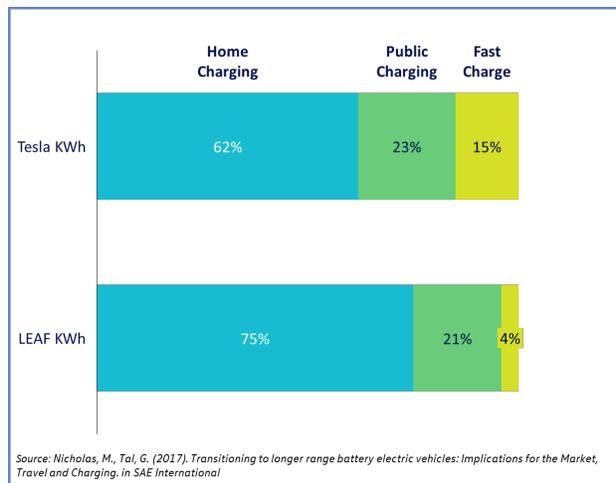
### How will ZEVs be fueled?

According to “Three Revolutions” by Daniel Sperling (2018), “most EV owners depend on overnight charging at home and only secondarily on public and worksite charging.” In fact, the U.S. Department of Energy’s Office of Energy Efficiency & Renewable Energy reports that EV drivers conduct “more than 80% of their charging at home.” The next largest segment of charging takes place at workplaces and at public L2s, and then – finally – at public DCFC stations (see Figure 14) (Nicholas & Tal, 2017).

Home charging will support most individuals in single family homes, but multiunit dwellings (MUDs) have traditionally been difficult to outfit with charging infrastructure. According to DeShazo (2017), “MUD residents face a number of obstacles to installing electric vehicle service equipment (EVSE). Foremost is the variable and often high cost of EVSE installation at a MUD site. Additionally, the renter or owner exhibits a low to nonexistent investment motivation.” Electrify America anticipates that as EVs gain market share and penetrate larger portions of the overall population, public DCFC will become increasingly important for serving those MUD dwellers.

Electrify America thoroughly investigated how hydrogen fuel cell vehicles are expected to be refueled in Cycle 2, as it explored investment opportunities in this space. Based on stakeholder and expert feedback, Electrify America anticipates that these vehicles will continue to be refueled at public stations, not in home, for the foreseeable future. The Department of Energy continues to support research and development of in-home hydrogen production and refueling. The Department recently awarded a \$1 million prize to SimpleFuel for design of what may someday be a new garage appliance (Voelcker, 2017), although current estimates put the price of an in-home station as high as \$250,000 for what would be considered a pre-commercial deployment (Blanco, 2017).

Figure 14: Charging Location Mix



### 2.3. Education and Awareness Learnings and Insights

Electrify America also sought to better understand consumer perspectives and behavior to target the Cycle 2 education, awareness, outreach, and marketing efforts. The two primary strategic questions were:

- How are ZEVs perceived today?
- What are the key barriers to EV adoption?

#### How are ZEVs perceived today?

Overall awareness and consideration of electric vehicles today remains low in the United States. According to 2017 research by Ken Kurani and Scott Hardman of UC Davis, consideration of plug-in electric vehicles by Californians has changed little from 2014 to 2017 (see Figure 15). This report, and similar data from Strategic Vision (shared in the Education, Awareness, and Marketing section) are sobering reminders of the limited consideration of ZEVs today and clearly suggest the need for more effective awareness building strategies and solutions.

Figure 15: California BEV Awareness 2014 vs 2017

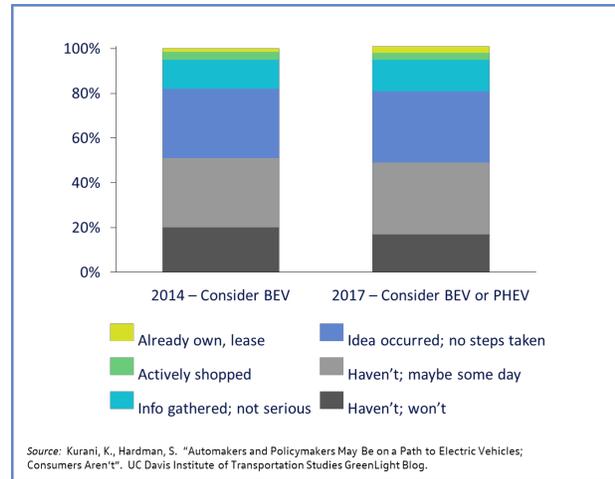
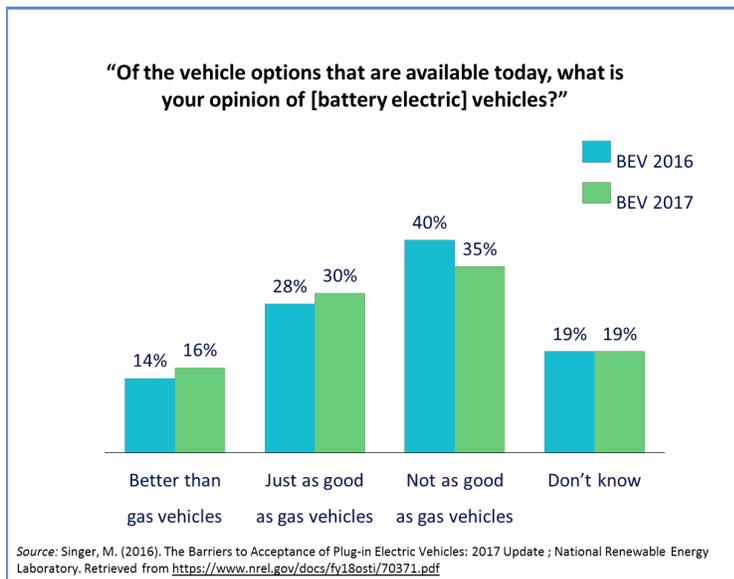


Figure 16: Opinions of BEVs vs Gas Vehicles



However, the 2017 NREL study entitled "The Barriers to Acceptance of Plug-in Electric Vehicles: 2017 Update" provides a more positive outlook on the market. Over half of consumers view BEVs as either better than, or just as good as, gas vehicles available today, and this number grew year over year compared to 2016 (see Figure 16). A large portion of the population – nearly 20% – answered "don't know" to the question "of the vehicle options that are available today, what is your opinion of [battery electric] vehicles?" which indicates that even more could be persuaded if they were educated about the advantages of ZEVs.

The NREL study also reports that consumers continue to view the primary benefits of electric vehicles as being better for the environment and offering savings on fuel costs (Figure 17). These electric vehicle opinions are correct, of course, but recent studies show that other factors – such as vehicle performance – are more important drivers of purchasing behavior.

As evidence, recent research from Strategic Vision’s New Vehicle Experience Study shows that mainstream car buyers rate comfort and performance as “Extremely Important” (see Figure 18). Fuel economy is also mentioned by respondents, but it ranks 5<sup>th</sup>, behind a balance of comfort and performance, handling and cornering, soft comfortable ride, and quiet interior. Thus, the primary messaging in promoting the benefits of ZEVs to buyers should focus on performance and handling. Since EVs already possess performance advantages, such as quick acceleration offered by their powerful motors and improved handling thanks to their low center of gravity, this communications approach will be authentic.

Figure 17: Consumer Views on PEVs

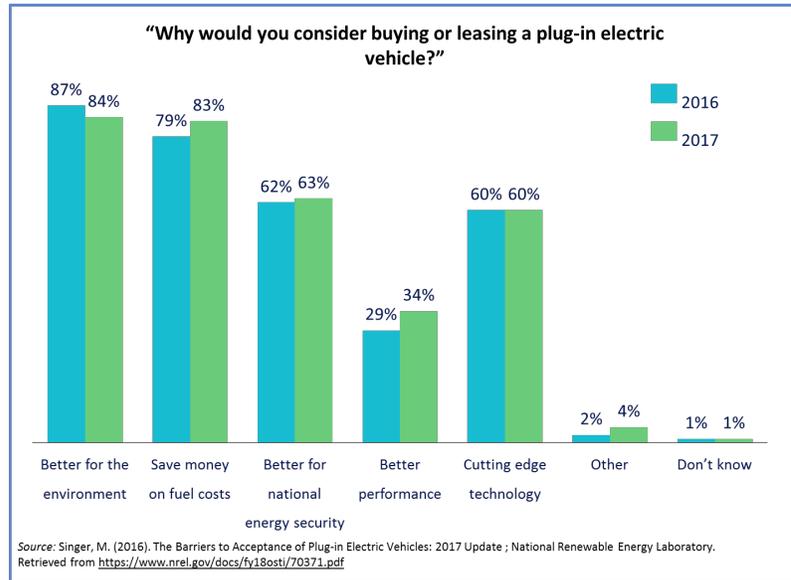
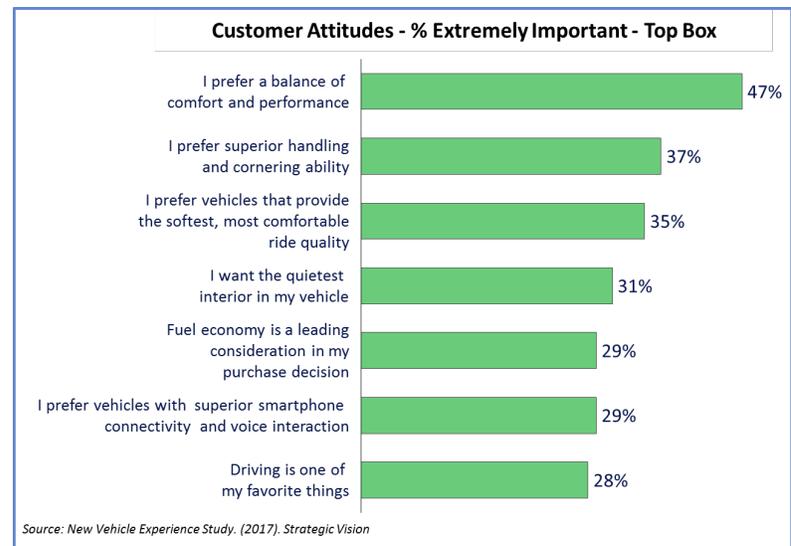


Figure 18: Consumer Attitudes When Shopping for a Vehicle



## What are the key barriers to EV adoption?

Numerous studies including NREL's 2017 "Barriers to Acceptance...", Strategic Vision's 2017 New Vehicle Experience Study, McKinsey & Company's 2017 "Electrifying Insights...", and UBS Evidence Lab's 2016 "What consumers think about electric cars..." highlight a range of barriers to ZEV adoption. While the importance of each barrier varies depending on when and how the study was conducted, five categories typically emerge (ranking is dependent on when and how the studies were conducted):

1) **Range:** Most consumers are not aware that even entry level EVs have a range of 80+ miles per charge, well within most daily commutes. Education is required to show that other models offer up to 300+ miles of range.

2) **Charging Station Availability:** Another barrier is the perception of the lack of charging infrastructure currently available. While ICE drivers can go on long trips secure in the knowledge that they will be able to refuel quickly en route, it is more complex for EV drivers; this same trip requires researching the location of charging stations along the way and setting aside time to charge up.

3) **Cost:** The purchase price of EVs is a deterrent to some buyers. Although EVs are increasingly available at lower price points, they generally remain more expensive than equivalent gasoline vehicles. This financial barrier is overcome in part by federal and state purchase incentives, which can reduce the upfront cost of the vehicle, as well as reduced operating costs (fuel, maintenance), which accumulate over the life of the vehicle. Despite these benefits, further education is necessary to establish awareness regarding these economic advantages. For example, according to NREL's 2017 study "Barriers to Acceptance..." fewer than a quarter of respondents (23%) had heard of PEV tax incentives. Furthermore, EVs typically cost less to operate than gasoline vehicles, including fuel, maintenance, and repairs, and these advantages can become education points as well.

4) **Performance:** Most people have never ridden in or driven an electric car, so the performance compared to non-EVs is one that requires education and experience.

5) **EV Model Selection:** While nearly all vehicle manufacturers already have or are developing electric vehicle models, consumers note the lack of variety in the number of vehicle models available. Currently, most electric cars are small, midsize, or compact, so consumers wanting pickup trucks or SUVs feel they do not have options. Also, many are only available in California and the other states that have adopted the zero emission vehicle mandate.

Electrify America also believes that one additional barrier to adoption, not often noted, is that the majority of people don't think about electric vehicles when they are buying a new car. For the most part, over the last 100 years, vehicles have been purchased and driven in the same way largely because the current driving culture, refueling network, and larger eco-system supporting modern transportation has been developed and well established around fossil fuels and personal use vehicle travel. Consumers typically don't enjoy changing from well-established norms unless there are clear and known advantages to the replacement approach. Fortunately, electric vehicles represent compelling reasons for change for drivers, society at large, air quality, and climate change.

## 2.4. Ongoing Outreach Efforts

All of the stakeholder engagement efforts detailed above, from the National Outreach website to the hundreds of stakeholder conversations and dozens of academic research papers carefully read, have been instrumental in shaping our understanding of the ZEV marketplace as well as what is most important to driving ZEV adoption.

We will continue ongoing outreach efforts over the course of Cycle 2, with a particular focus on stakeholder outreach specific to the metro areas where Electrify America plans to concentrate Cycle 2 investment.

During Cycle 2, Electrify America plans to conduct a similar process of outreach in order to draft our Cycle 3 ZEV Investment Plans, consistent with the approved National Outreach Plan. This process will include an evaluation of the performance of Cycle 1-2 investments to date, notably utilization statistics at highway and metro stations, and will consider feedback from stakeholders, such as automakers, EV drivers, and governments, regarding where additional station investments are needed.

### 3. Infrastructure Investments (~\$235 million)

Electrify America’s infrastructure mission is to drive ZEV adoption by reducing range anxiety and increasing charging convenience. To meet this goal, Electrify America is establishing a ZEV charging network that is comprehensive, technologically-advanced, and customer-centric with the intent of showing ZEV drivers that ZEVs can be used as a primary vehicle. To this end, Electrify America will invest approximately \$235 million in Cycle 2 in EV charging infrastructure across multiple use cases at the metropolitan community level and along highways and other regionally significant routes. Estimated budgets for each investment are shown in Table 5 and detailed in the following sections.

*Table 5: Estimated Infrastructure Investment Budgets*

Category	Estimated Budget (\$M) <sup>1</sup>
<b>Infrastructure</b>	<b>~\$235</b>
<b>Metro Community Charging</b>	<b>\$145 - \$165</b>
<b>Highways and Regional Routes</b>	<b>\$65 - \$85</b>
<b>Autonomous Vehicle Charging</b>	<b>\$2 - \$4</b>
<sup>1</sup> Costs include creditable operating expenses, on-site storage, and up to \$5 million in renewable generation where appropriate.	

These investments were selected from a much larger set of use cases that were studied, including on-street charging, hotels, transit hubs such as park and rides, fleet charging, and hydrogen fueling stations. While investment in each of these use cases shows potential to drive ZEV adoption, Electrify America was not able to establish a satisfactory business case that would justify investment during Cycle 2. Electrify America will continue to examine data and new information, however, and will potentially shift resources to creditable use cases during Cycle 2 if new opportunities demonstrate these to be good financial investments for the long-term and substantially impactful on ZEV adoption during Cycle 2. Any new investment would reduce the budget dedicated to the above described infrastructure use cases, it should be noted. Electrify America would also inform EPA staff of any reallocation of Cycle 2 funding to new ZEV infrastructure use cases not budgeted for in this Cycle 2 National ZEV Investment Plan.

#### **Guiding Principles**

Several key guiding principles were used to select infrastructure investments for Cycle 2. These principles capture Electrify America’s short and long-term goals and vision and ensure that each infrastructure investment works towards those goals and vision. The key guiding principles for selecting Cycle 2 investments included:

- **Focus on locations where access and utilization is projected to be highest:** Investments target highways and metropolitan areas with high current and projected concentrations of ZEV drivers. This will maximize potential network utilization, the clearly established goal of and success metric

for the ZEV infrastructure investments established in Appendix C of the Partial Consent Decree. This will also improve both ZEV driver convenience and infrastructure investment economics.

- **Strive to expand ZEV adoption, and meet the needs of drivers in regions:** Investing in adjacent metropolitan areas produces a network effect, where investments to support travel and tourism between cities also support the spread of ZEV adoption geographically across a region.
- **Focus on a variety of use cases based on anticipated charging behaviors of ZEV drivers:** Electrify America will build chargers to serve current and emerging driver needs – including mobility services, corridor travel, and charging in public areas (commercial/retail locations, parking garages) within a metro.
- **Incorporate anticipated changes in the ZEV industry by ‘future-proofing’ stations to maximize their usefulness in the medium-to-long-term:** Investments will include the latest technology (from L2s up to 350 kW DCFC) and operate across different charging standards (CCS and CHAdeMO) to maximize access and help ensure future compatibility in a rapidly evolving industry. Electrify America will also continually look toward new technologies, including ways to meet the needs of emerging autonomous vehicles, and work to ensure investments are optimized to incorporate these technologies in future investment cycles.
- **Focus on a sustainable business model:** Electrify America is implementing a set of ZEV infrastructure investments designed to be economically sustainable for the long-term.

### 3.1. Metro Community Charging (\$145 - \$165 million)

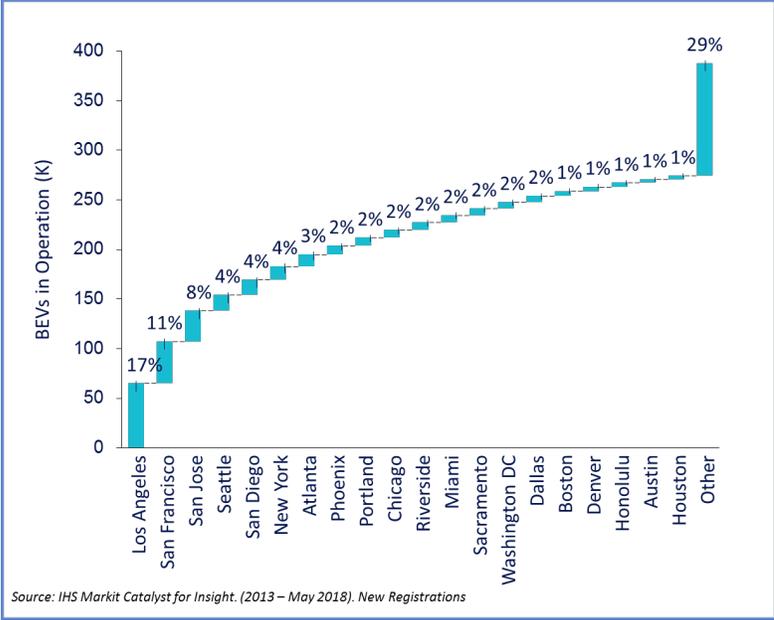
#### 3.1.1. Investment Overview

The largest portion of Electrify America’s Cycle 2 investment is dedicated to community charging within metropolitan areas. Electrify America has identified metro charging as the primary use case based on four key market factors:

1. The vast majority of BEVs are projected to be sold in top metro markets;
2. Most miles driven in these BEVs are anticipated to be driven in and around metro areas;
3. Recent research shows that the majority of public charging happens relatively close to home; and
4. New technology is shifting more vehicle miles traveled toward shared mobility options, which will require increasing charging support in and around metros.

Early adoption of BEVs in the U.S. has been concentrated principally within major metro areas, and this trend is projected to continue at least through 2022. In 2018, 71% of the nearly 400,000 BEVs in operation were concentrated in 20 metropolitan areas, and 57% were concentrated within the top 10 metros (IHS Markit Catalyst, 2018). Navigant Research (2017) forecasts this trend will continue through 2022 with over 70% of the projected two million BEVs in operation concentrated in just 20 metro areas. In addition to these forecast findings, Electrify America also considered that the

Figure 19: BEVs Sold in Top 20 MSAs



majority of the U.S. population today lives in cities. According to the U.S. Census Bureau (2015), cities are home to 62.7% of the U.S. population. In a 2016 press release discussing the U.S. Census Bureau’s American Community Survey, Census Bureau Director John H. Thompson wrote that, “rural areas cover 97 percent of the nation’s land area but contain 19.3 percent of the population (about 60 million people).”

Electrify America expects that most BEVs, similar to their ICE counterparts, will be driven in and around their metros. According to the Federal Highway Administration’s 2017 National Household Travel Survey, 95% of vehicle trips were less than 30 miles from their origin. With most trips occurring close to home, it is not surprising that most DCFC charging sessions also occur close to home. In their 2017 study “Survey and Consumer Motivations to DC Fast Charge,” Michael Nicholas and Gil Tal from University of California, Davis showed that a majority of DCFC events for Chevy Bolt drivers were recorded within 8 miles of home. Nicholas and Tal’s study “Transitioning to Longer Range Battery

Electric Vehicles” (2017) shows Tesla drivers have similar charging behavior, albeit with a wider driving radius, averaging 29 miles from home for most charging sessions.

Electrify America expects metro charging to become even more important as BEV buyer demographics evolve and a significant number of MUD dwellers and renters purchase BEVs. In today’s market, few owners of MUD buildings are willing to install chargers (Sperling, 2018). As NESCAUM described in their submission, “to increase access to EVs for residents of multiunit dwellings (MUDs), Electrify America should pilot innovative solutions for MUDs.” Placing DCFCs in sections of metro areas with high MUD density, which has been recommended by UCLA researchers, is an innovative solution to addressing the needs of future BEV drivers that live in MUDs.

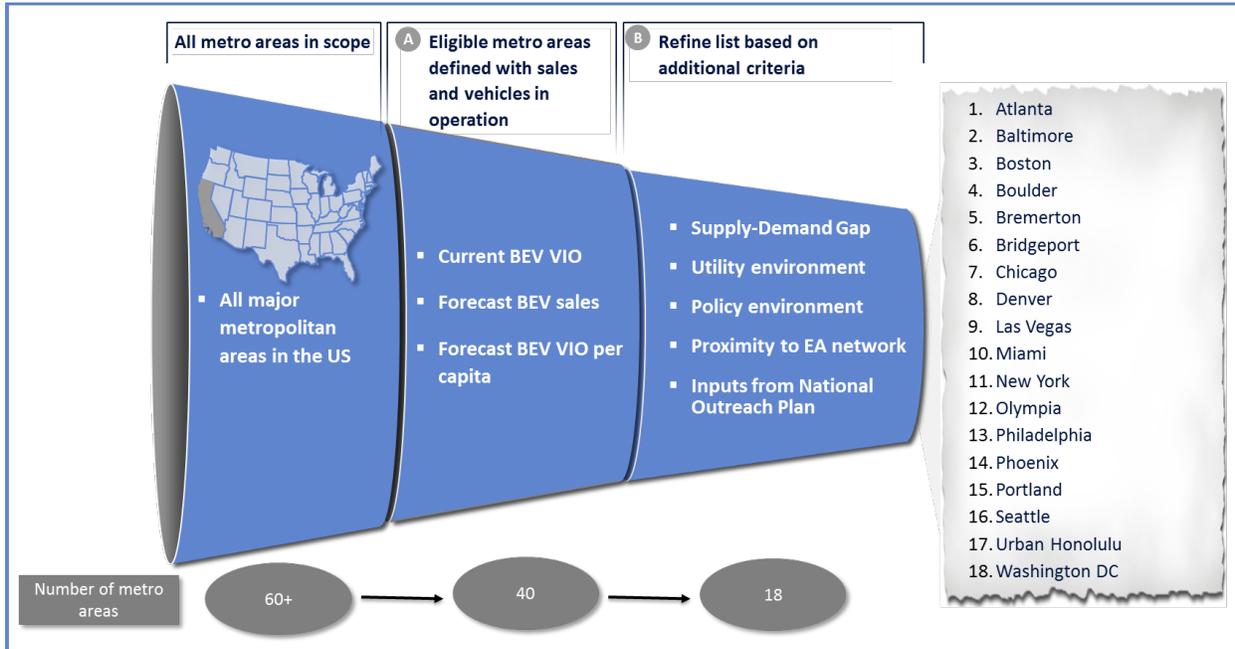
The shared vehicle economy also represents an increasingly important travel component within cities and is an attractive opportunity for early EV adoption by both drivers and passengers. The emergence of ride-sharing companies like Uber and Lyft in New York City increased the vehicle miles traveled (VMT) from shared vehicles, including taxis and black cars, by 25% between 2013 and 2016 (Schaller, 2017). According to the San Francisco County Transportation Authority (2017), in San Francisco, one of the most mature ride-sharing markets in the U.S., 15% of all weekend vehicle trips were completed through transportation network companies in 2016. This growing shared vehicle trend is expected to continue, with the Boston Consulting Group (2017) forecasting that by 2030, 25% of miles driven in the U.S. could be in shared self-driving EVs. These shared vehicles are particularly well-suited for electrification. With high annual mileage, such vehicles enable drivers to realize fuel and maintenance savings even faster than a typical ICE vehicle driver and increase their net income. Electric shared mobility vehicles displace fossil fuel vehicles, reduce household fleet vehicle needs and traffic congestion, and reduce greenhouse gas emissions. However, drivers and communities can only realize these benefits if there is sufficient public charging in the right locations to meet drivers’ charging needs.

Considering all of these factors, Electrify America will prioritize metro-based charging investments in Cycle 2. To meet the needs of these drivers, Electrify America will invest in DCFC for three primary use cases within metro areas: retail/community, MUDs, and mobility services. Retail/community stations will target the needs of EV owners as they drive around town on their daily commutes, run errands, or visit friends and relatives. MUD stations will specifically target communities with a high density of MUD dwellers, and will serve as an alternative for those who lack reliable overnight charging at their residence or workplace. Finally, shared mobility stations target the needs of taxi, TNC and car share drivers in their daily travel around a metropolitan area. Electrify America believes that – collectively – these use cases will address the most critical DCFC needs of drivers within selected metropolitan areas.

### 3.1.2. Investment Selection Methodology

In Cycle 1, Electrify America selected metropolitan areas for investment through a two-step process that featured both quantitative and qualitative filters. Electrify America built upon this two-step approach in Cycle 2, upgrading key metrics to refine the analysis (see Figure 20).

Figure 20: Cycle 2 Metro Selection Process



The two-step process for selecting metro areas in Cycle 2 has been improved and is described below:

1. Starting with the most populous 60 National metro markets, representing over 50% of the U.S. population (excluding California) (ESRI, 2016; U.S. Department of Commerce - Bureau of the Census, 2017), Electrify America assessed each market on their BEV sales today and forecasted for 2022. Sales were analyzed on both a gross and a BEV per capita perspective to not only identify large markets of potential, but to give opportunity to smaller, higher growth potential markets.

Top scoring metros on the sales metrics were passed on to the second stage of analysis. This yielded 29 metropolitan areas for further evaluation. Electrify America also passed any metropolitan areas to the second step that submitted progressive suggestions in the Cycle 2 National Outreach Process.<sup>8</sup> Combined, this yielded 40 metropolitan areas for further evaluation.

2. The 40 metropolitan areas were then evaluated on their expected needs for charging infrastructure (supply-demand gap, a cornerstone Electrify America methodology established for Cycle 1), the local electric utility costs and collaboration opportunities (utility environment),

<sup>8</sup> Note: Electrify America cannot guarantee that submitters in future cycles will be automatically passed on to the second stage of analysis or other approval processes.

state and local policies impacting EV adoption (policy environment), and the fit of the metro with Electrify America's broader network (proximity to the Electrify America network). For details, see Figure 21 and detailed descriptions of each criteria used below. Electrify America looked across each of the four metrics to determine which metropolitan areas showed the greatest potential for investment in Cycle 2. The Cycle 2 metros for investment are shown in Figure 22.

Through this process, 18 metropolitan areas were selected for metro community charging investments in the Cycle 2 National ZEV Investment Plan. These 18 metropolitan areas currently host approximately 30% of the total population (ESRI, 2016; U.S. Department of Commerce - Bureau of the Census, 2017) and are projected to account for 52% of the BEVs Nationally in 2022 (Navigant, 2017). Electrify America will continue monitoring market conditions, including ZEV sales, utility rates, and policy changes, over the course of Cycle 2. In the event that new market conditions or other information warrant investment in a metro not heretofore selected or additional investment in a selected metro, Electrify America may shift budget to those areas of highest need. Upon making budget shifts, Electrify America will notify EPA staff.<sup>9</sup>

In addition to the 18 metropolitan areas selected, Electrify America will continue to operate and maintain all Cycle 1 metro stations throughout the Electrify America network.

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<sup>9</sup> Electrify America is exploring ways to amplify the impact of its investment, including leveraging funding from private and public sources.

Figure 21: Cycle 2 National Metros Selected

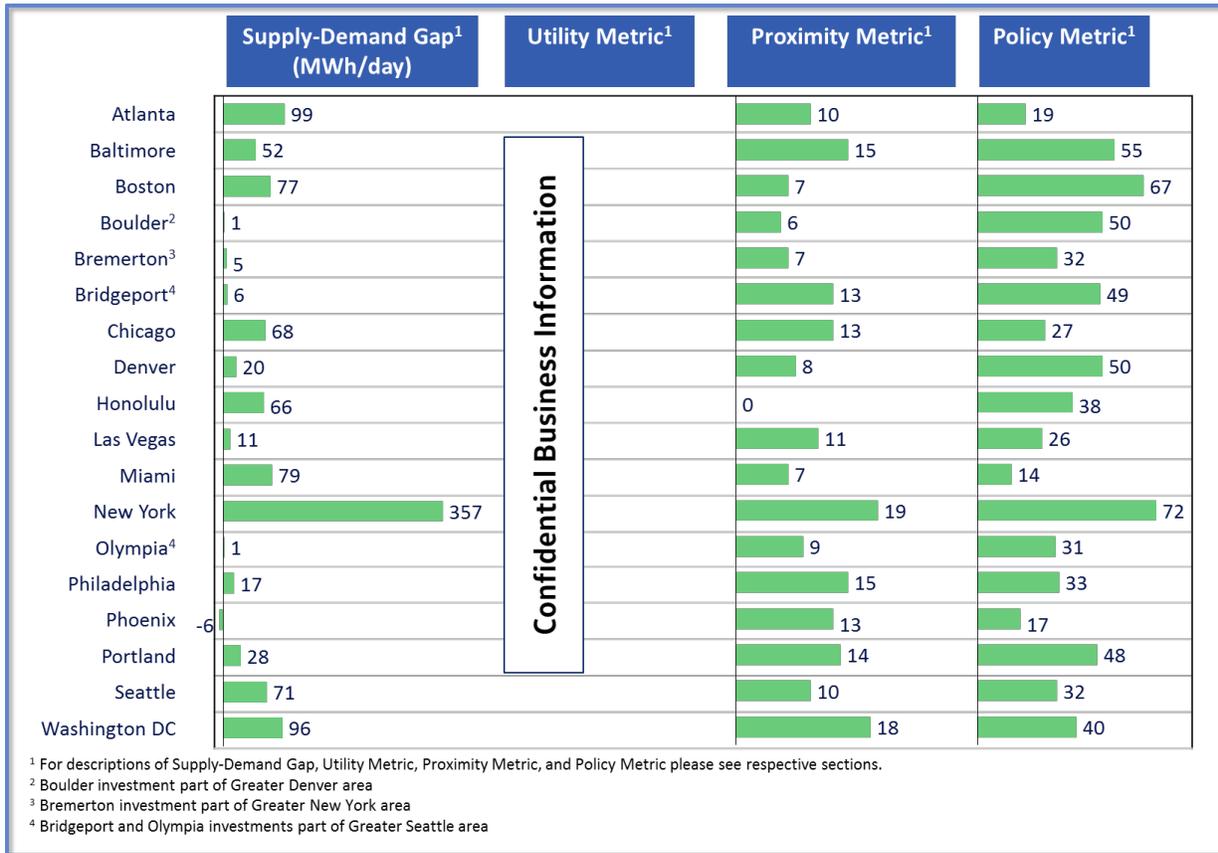
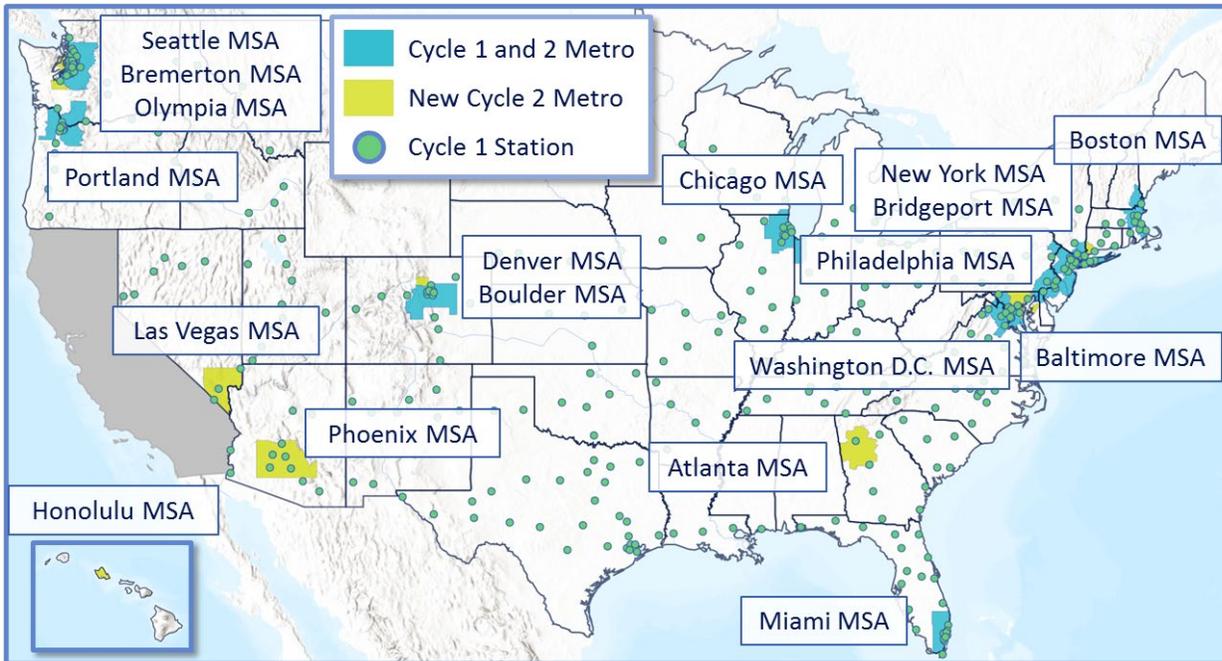


Figure 22: Cycle 2 National Metro Map



## Supply-Demand Gap<sup>10</sup>

To ensure investments address a reasonably anticipated need and have a high likelihood of utilization, Electrify America used a supply-demand gap in the metro selection process. The projected gap in supply and demand for BEV charging was determined by: (1) calculating the projected charging power demand (in MWh/day) for public charging in 2022 outside the home; and (2) subtracting the current supply of power delivered by public charging for each metropolitan area. Demand for public charging in a metropolitan area was calculated using the projected number of BEVs in operation by 2022, the average daily vehicle miles traveled as collected by the Federal Highway Administration, the mix of single-family and multiunit homes from the U.S. Census Bureau, and assumptions for vehicle efficiency and the portion of charging occurring at homes. Supply of charging power was estimated using existing charging infrastructure in Recargo's PlugShare database with assumptions made regarding the power level and utilization at each station. Electrify America stations currently under development as part of Cycle 1 were added to the charging supply calculations in each metro to provide a more complete picture of future supply.<sup>11</sup> The resulting Supply-Demand Gap is expressed in MWh/day as the projected unmet energy demand, per day, in each metro area.

## Utility Environment

The local utility (or utilities) for each Electrify America metropolitan area plays a major role in the stations' long-term success. To date, utilities across the U.S. have been crucial partners in deploying their distribution systems to bring Electrify America's charging network to drivers. To further optimize Electrify America's infrastructure investments in Cycle 2, this metric identifies the most EV-focused utility environments. An EV-focused utility environment, with utility infrastructure support (such as make-readies), DCFC specific energy rates, and lower or non-existent demand charges, can have a significant impact on the economics of the station. In addition, streamlined utility processes can accelerate site construction and dramatically lower both capital and operating costs. Metro areas where these same conditions are not as positive, especially those with high demand peak charges, can make the economics of owning and operating DCFC stations over the long-term particularly challenging. This metric evaluates both the utility costs to operate DCFC stations within a utility territory, as well as the collaboration potential of the local utility.<sup>12</sup>

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<sup>10</sup> In Cycle 1, Electrify America developed a megawatt-hour supply-demand gap analysis methodology to assess the infrastructure needs for any given geographic area. Through the Cycle 2 planning process, Electrify America shared this methodology with academics and researchers across the ZEV space, including teams from UC Davis, UCLA, NREL, Argonne National Laboratory, Idaho National Laboratory, and more. The methodology largely stood up to academic questioning, and thus Electrify America has elected to use this approach again for Cycle 2. However, specific assumptions and data sets have been adjusted based on stakeholder feedback. For example, during a review in October 2017, the UC Davis team noted that our Cycle 1 methodology used commuting data (travel to and from work) to gauge vehicle miles traveled within a city, but that commuting miles represent just a fraction of total miles. As a result, Electrify America has selected a new dataset that provides a more comprehensive set of miles traveled within a metro area.

<sup>11</sup> Proposed/planned stations from other EVSE providers were not included due to the uncertainty of location, quantity, and timing of these stations.

<sup>12</sup> For metro areas with more than one primary utility, Electrify America uses a blend of the two utility scores (e.g., Washington, DC MSA has multiple electric utilities and is largely based on scores from PEPCO and Dominion Energy).

## **Policy Environment**

State and local policies can have a major impact on ZEV adoption, especially as vehicle technologies mature. In Cycle 1, Electrify America captured the impact of such policies on ZEV adoption within a given metropolitan area by counting the number of policies enacted in each metro. However, policies can have varying impact. For example, purchase incentives and vehicle mandates can have a much larger impact than non-binding sales ‘targets.’ To better address these nuances, Electrify America collaborated with the National Association of State Energy Officials (NASEO) and The Cadmus Group LLC to develop an updated policy metric. NASEO and Cadmus used existing analysis and the input of a panel of ZEV policy experts and practitioners to create a policy tool that ranks and weighs each policy’s effectiveness. Policies for each metropolitan area were then aggregated, producing a score which reflects the policy environment in each metro area, and its relative impact on ZEV adoption. For more information on the policy metric, see inset.

## **Proximity Metric**

When considering the purchase of a new vehicle, many buyers look not only at the fueling options within their own metro area, but also on key routes to nearby regional destinations. Over 70% of Tesla drivers cite the existence of the Tesla Supercharger Network as a ‘very important’ factor in their decision to purchase (Recargo, 2015). Therefore, it is important that Electrify America support not only the local charging needs, but also charging within a reasonable driving radius from home. This metric reflects how many Electrify America highway stations are located within a 120 mile radius of the metropolitan area’s borders.

## Policy Metric

Electrify America commissioned the National Association of State Energy Officials (NASEO), in partnership with The Cadmus Group LLC, to develop the Plug In Electric Vehicle Policy Tool to evaluate the impact of state and local policies on plug in electric vehicle (PEV) adoption in states and cities across the United States. The Tool was designed for Electrify America to use when considering potential metro areas for Cycle 2 investment and allows the user to evaluate the combined strengths and weaknesses of all PEV related policies in a given metro area on a scale of 1-100 and compare the result with other metro areas.

The Tool provides a unique, evidence based method to evaluate the ZEV investment climate of a metro area. The Tool's main feature—the Policy Evaluation Rubric—categorizes all PEV policies into six policy categories and 14 policy subcategories. Each policy subcategory is assigned a weight, based on its strength to spur PEV adoption relative to other policies. These weightings were assigned after an exhaustive review of peer-reviewed journal articles, publications from government, non-governmental organizations (NGOs), and the National Academies of Sciences, as well as rounds of expert input from an external Technical Advisory Committee (TAC). Members of the TAC provided input on the project's Policy Tool Methodology and Policy Evaluation Rubric, however, the TAC was not shown the proposed Cycle 1 and Cycle 2 investment jurisdictions and did not partake in reviewing the draft rankings of candidate jurisdictions. TAC members included:

- Jeff Allen, Forth
- Samantha Bingham, Chicago Department of Transportation
- Austin Brown, University of California Davis
- Tonia Buell, Washington State Department of Transportation
- Stephen Capanna, U.S. Department of Energy
- Gregory Dotson, University of Oregon School of Law
- Robert Jackson, Michigan Energy Office
- Dave Reichmuth, Union of Concerned Scientists
- Michael Samulon, City of Los Angeles
- Christian Williss, Colorado Energy Office

The NASEO team assigned the highest weight to vehicle purchase incentives, followed by PEV deployment targets (including the ZEV mandate) and policies that incentivize EVSE installation and reduce EVSE operational costs. While there is some debate in the literature around the relative effectiveness of these policies, it is the project team's conclusion that these four types of policies represent the most effective policies at advancing PEV adoption.

This Tool was designed for Electrify America in its Cycle 2 investment planning, but may also be used by policymakers at the state and local level to evaluate their jurisdiction's current PEV policy environment. The Tool, as well as a detailed report on the methodology behind it, are available online here: [https://naseo.org/news\\_article?NewsID\\_3321](https://naseo.org/news_article?NewsID_3321)

### 3.1.3. Investment Details

Electrify America’s metro charging infrastructure investments are forecasted to account for \$145 - \$165 million of the infrastructure investment budget.

#### Metro Allocations

To split metro funds between the selected Cycle 2 metros, Electrify America considered a combination of factors to appropriately meet the charging needs of communities and ensure the economic viability of the stations. These factors included the supply-demand gap, policy and utility environment, and the overall connectivity of the metro with other significant BEV markets. Electrify America also weighed operational constraints and challenges including real estate availability in areas where they could be identified. Finally, while the size of the supply-demand gap in the largest metro is more than 10 times the size of the gap in the smaller metro areas selected for investment, Electrify America rebalanced its investment to the smaller, emerging EV markets where necessary to provide sufficient charging services in these markets and to support ZEV growth. Table 6 shows the allocation of the Metro Community Charging investment across the 18 metros.

*Table 6: Cycle 2 National Metros*

Metro <sup>1</sup>	Estimated New Station Count
Atlanta	8 – 12
Baltimore	3 – 6
Boston	8 – 12
Chicago	8 – 12
Denver – Boulder	8 – 12
Honolulu	3 – 8
Las Vegas	3 – 6
Miami	6 – 10
New York – Bridgeport	12 – 18
Philadelphia	4 – 6
Phoenix	3 – 6
Portland	4 – 6
Seattle – Bremerton – Olympia	12 – 18
Washington, D.C.	12 – 18
<b>Total</b>	<b>105 – 125</b>

<sup>1</sup> Electrify America defines a “metro area” as a Metropolitan Statistical Area, except in a limited set of circumstances where Electrify America determines that the MSA arbitrarily excludes a community that is part of the metro area or includes extremely rural areas within its border. In such cases, Electrify America exerted discretion on metro area boundaries.

#### Cycle 2 Metro Community Charging Use Cases:

##### Retail/Community

The primary use case for metro community charging in Cycle 2 will be retail/community stations. These stations will be sited to primarily serve drivers around town. Within each metro area, specific site selection and station characteristics require integration of multiple inputs.

First, Electrify America uses a proprietary geospatial model for identifying “target zones” that require DCFC infrastructure. While the specific geospatial and demographic criteria used are confidential, Electrify America’s framework is generally consistent with those factors identified by Fitzgerald and Nelder in Rocky Mountain Institute’s ‘From Gas to Grid’ (2017) and includes high-traffic retail areas in locations with strong ZEV adoption potential. In addition, Electrify America takes into consideration the distance between existing Electrify America charging stations to ensure its network meets the needs of ZEV drivers throughout a metro region.

Once target zones have been identified, Electrify America will use a combination of desktop research and on-the-ground resources to identify and screen specific locations within each target zone as leads. Electrify America, like other industry players deploying charging infrastructure, will use site location criteria to optimize charging locations where they are most likely to be highly utilized. While Electrify America’s Cycle 2 site location criteria are proprietary and are still being revised, Electrify America anticipates using criteria similar to those used by Pacific Gas and Electric (PG&E) in their “2016 Electric Program Investment Charge” effort, including:

- Minimum siting conditions (e.g., ADA compliance, paved and level, safe and visible);
- Siting to increase EV adoption (e.g., food for purchase, premium spaces, future capacity); and
- Siting to minimize cost (e.g., transformer capacity, distance from transformer, surface materials)

### **Multiunit Dwelling**

As discussed in Section 2.2 Infrastructure Learnings, MUDs present numerous challenges to charging electric vehicles. Electrify America will support drivers living in MUDs in Cycle 2 through placement of DCFC sites within close proximity of groups of MUDs. Many of the same criteria from the retail/community use case will be used to site these stations; however, in addition to these data points, Electrify America will analyze MUD proximity and density to target stations at convenient locations to meet the needs of drivers living in MUDs.

### **Shared Mobility**

As discussed in Section 2.2. Infrastructure Learnings, in some metro areas of the U.S. there is an emerging need for charging of electrified shared mobility vehicles. Approximately 30 submissions received through the National Outreach website discussed the topic. For example, the City of New York, stated, “a rapid expansion of public charging infrastructure can enable an increase in the share of ZEVs in the high-mileage taxi and [for-hire vehicle] fleet.” The transition of shared mobility to electric is not only driven by stakeholder support and potential emissions reductions, but also by the potential cost savings realized by drivers and passengers – where an EV deployed for shared mobility can provide a lower total cost of ownership than a comparable ICE vehicle today (Fitzgerald & Nelder, 2017). The benefits of these lower-cost and emission-free vehicles are poised to most directly benefit disadvantaged drivers and passengers, who may not have easy access to cars (Sperling, 2018). While the transition of these vehicles to electric presents numerous benefits, one of the key issues identified when interviewing electric shared mobility drivers is the availability and accessibility of DCFC (House & Fitzgerald, 2018).

Electrify America believes it is crucial that the transition to electric shared mobility comes without compromise to cost or convenience for the driver. To better understand how to conveniently (and economically) serve the needs of these drivers, Electrify America conducted numerous interviews with drivers, discussed challenges and approaches with shared mobility companies and taxi cab commissions, and contributed to focus groups of current and potential electric shared mobility drivers. This collaboration, outreach, and research revealed that these vehicles often require chargers in specific areas of a city not necessarily aligned with considerations for light duty private use EVs, and thus need differentiated site location considerations.

To site stations supporting these drivers, Electrify America will continue to collaborate with the shared mobility industry, including drivers, taxi companies, airport authorities, city governments, regulatory bodies and digital platform providers, such as Lyft and Uber, to select metros for investment in shared mobility targeted infrastructure. Metros will be selected based on a combination of factors designed to identify where the need for these investments is emerging, including local regulations, incentives, and support for electrification of shared mobility vehicles. Many drivers and cities are interested in having their shared mobility vehicles convert to electric, but, the most attractive metros for investment are those where policies or partnerships actually assist, accelerate, or require the conversion of the shared mobility fleet.

Shared mobility vehicle charging stations will be sited using a geospatial model that considers some of the same key factors as retail/community stations, including frequently traveled routes and 24/7 access. However, shared mobility vehicles require locations specifically targeted to their unique routes, including stations near transportation hubs and high traffic areas. As a result, Electrify America will work with shared mobility vehicle entities (e.g., drivers, taxis, TNCs) to optimize charging locations for these drivers. At this time, Electrify America plans to dedicate these sites to shared mobility drivers. Electrify America will aim to maximize ZEV adoption for all and will monitor usage to determine whether to allow for partial or complete public access while maintaining an optimal charging experience for all drivers.

### **Station Design Details**

Stations in metro/community charging use cases will typically employ five ultra-fast EV charging dispensers. In areas with particularly high traffic, willing site hosts, and electrical supply, stations may have up to 10 dispensers; in areas with real estate constraints, sites may be limited to three dispensers. The typical power level of each station will be 150 kW, but DCFC levels will range between 50 kW and 350 kW depending on site constraints (e.g., utility interconnection limitations, available real estate) and expected usage. All public facing fast charging locations will support both CCS and CHAdeMO connectors. Some Electrify America metro stations may include L2 charging where the site host prefers, and where the business case can be justified. The decision to include L2 charging will be made on a case-by-case and site-specific basis.

Table 7 identifies the expected number of stations by use case.

*Table 7: Cycle 2 Metro Investments by Use Case*

Metro Use Case	Average Ultra Fast DCFC Charger Count Per Station	Estimated Number of National Stations
<b>Retail/Community</b>	5	105 - 125
<b>MUD</b>	5	8 – 12
<b>Shared Mobility<sup>1</sup></b>	5	15 – 20
<b>Upgrades to Support Highly Used Locations<sup>2</sup></b>	5	8 - 12
<b>Total New Stations</b>		<b>136 – 169</b>

<sup>1</sup> If Electrify America is unable to identify a sufficient number of metro areas for the total expected shared mobility charging investments, funds will be invested in other metro charging use cases in Cycle 2 metros.

<sup>2</sup> Electrify America will continually monitor the utilization of the existing metro stations and invest a portion of the metro budget towards either adding additional capacity (including additional chargers and/or energy storage) at an existing metro station or adding an additional site nearby to support BEV drivers’ needs in Cycle 2. These site decisions will be made based on utilization data from Cycle 1 through the early phase of Cycle 2. This funding may also be used to upgrade stations not originally built by Electrify America.

Select Electrify America sites will also include investments in renewable generation<sup>13</sup> and storage to support long term economic sustainability of the infrastructure investments.

<sup>13</sup> The primary goal of Electrify America’s ZEV investments is to support increased adoption of ZEVs in the United States. Fueling BEVs with electricity from renewable sources represents the next step toward zero emissions and would reduce pollution. In addition to providing cleaner fuel, renewables can improve the customer experience (i.e., they can shade customers from the elements when canopies are used) and support the long-term economic sustainability of a charging site. Electricity costs, especially demand charges, can account for over 40% of DCFC operating costs. Ensuring public DCFC is affordable for all consumers is a key to attracting potential buyers and ultimately driving mass adoption. Electrify America plans to invest up to \$5 million in renewable generation to power its DCFC stations. Electrify America expects that approximately 1-2 MW of renewable generation will be installed, resulting in approximately 1,600-3,800 MWh of electricity produced annually.

## 3.2. Regional Routes and Highway Investments (\$65 - \$85 million)

### 3.2.1. Investment Overview

Electrify America will also invest in infrastructure on regional routes and highway corridors in Cycle 2. In Cycle 1, Electrify America prioritized the build out of a cross-country network of charging infrastructure focused on highly traveled corridors between major metropolitan areas. As a result, when the Cycle 1 network is complete, approximately 96% of Americans will live within 120 miles of an Electrify America charging station. In Cycle 2, Electrify America will further enhance the highway corridors outlined in the Cycle 1

National ZEV Investment Plan, while also developing new corridors to support the regional travel needs of drivers in top BEV markets.

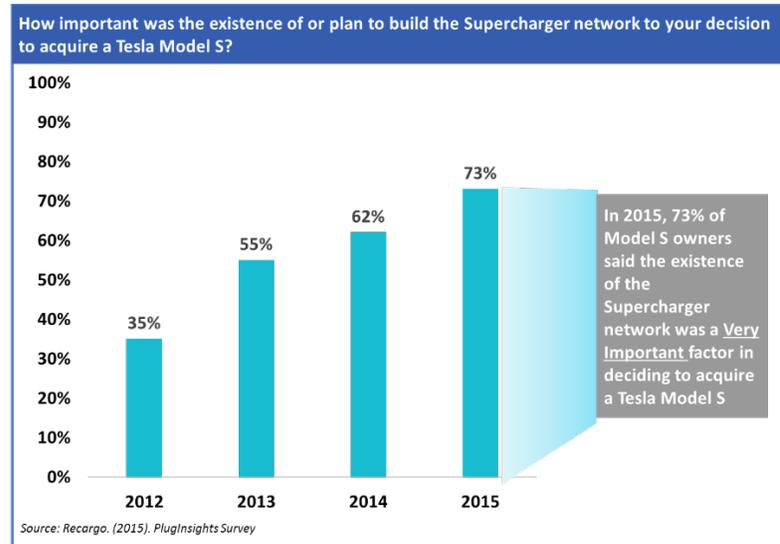
A key consideration when purchasing a primary household vehicle is whether it will meet the consumer's long-distance travel needs. When surveyed, over 70% of Tesla drivers cited the existence of the Tesla Supercharger Network as a 'very important' factor in their decision to purchase the vehicle (see Figure 23) (Recargo, 2015). Empirical data also shows that

vehicle range and supporting infrastructure have an effect on how a vehicle is used – the Tesla Model S is utilized for 63% of household trips over 200 miles, compared to much lower rates for other smaller battery EVs currently available (Advanced Plug-In Electric Vehicle Travel and Charging Behavior Interim Report, 2017). Considering automotive manufacturers' announcements, which indicate that the majority of future BEVs will have ranges greater than 200 miles (according to Electrify America analysis), a suitable long distance network is needed to support adoption.

While a nationwide long distance fueling network is critical for supporting ZEV adoption, regional routes address the more realistic driving habits of most drivers. Federal travel data suggests that over 50% of long distance trips (trips greater than 100 miles) are completed within a 200 mile radius of home, and that nearly 80% of all long distance trips are within 300 miles of home (U.S. Department of Transportation, 2016). Several National Outreach Process submissions also mentioned the importance of placing DCFC stations along regional routes. In Cycle 2, Electrify America will focus on building out new regional routes to support the travel needs of drivers in selected metro areas on more localized corridors.

Finally, Electrify America's Cycle 1 investments were intended to meet ZEV driver needs out into the future. However, in the case that existing stations show higher utilization than originally expected and/or queuing during Cycle 2, Electrify America will add capacity to existing highway routes to ensure sufficient capacity for the growing set of BEV drivers.

Figure 23: Importance of Supercharger Network to Tesla Drivers



### 3.2.2. Investment Selection Methodology

In Cycle 1, Electrify America proposed a nationwide high-speed DCFC network as a way to drive ZEV adoption. As a first order of business in Cycle 2, Electrify America reviewed the Cycle 1 network and identified routes planned in Cycle 1 but requiring further investment in Cycle 2. These routes were prioritized for build out in Cycle 2.

Next, Electrify America leveraged a data driven approach to select regional routes for new stations and ensure its investments meet the anticipated needs of BEV drivers. Electrify America started by identifying the top BEV markets based on Navigant's BEV forecast. These top markets were prioritized to ensure that investments support the needs of the highest number of existing and future EV drivers possible. Electrify America then used federal and state/local travel data (where available from our National Outreach Process) to analyze the long distance travel patterns of drivers from these metros and to identify the most popular travel destinations.<sup>14</sup> The number of vehicles traveling to each destination was then converted to a forecast of BEV travel using Navigant's forecasted BEV penetration at the origin point (see Figure 24, Figure 25, and Figure 26). Finally, forecasted BEV travel to common destinations from MSAs within a single region (e.g., Portland & Seattle; Boston, New York, Philadelphia, Baltimore and Washington, D.C.) were aggregated to identify the most important routes for EV charging. To finalize the regional routes selected for investment in Cycle 2, destinations were compared to those submitted by states and municipalities in the National Outreach Process to ensure the geospatial analysis matched local needs.

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<sup>14</sup> Travel data allowed visualization of trips from county to county. Specific destinations within each county were identified using National Outreach Process submissions and discussions with local experts.

Figure 24: Northeast Top BEV Travel Destinations

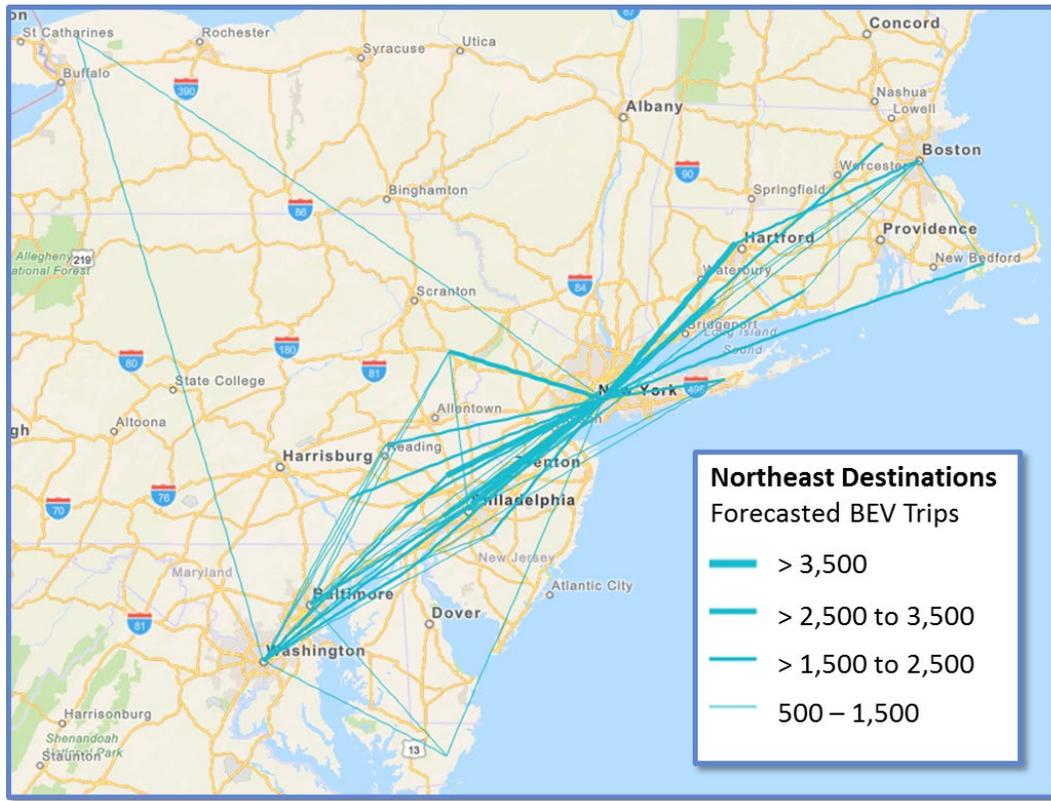


Figure 25: Southeast Top BEV Travel Destinations

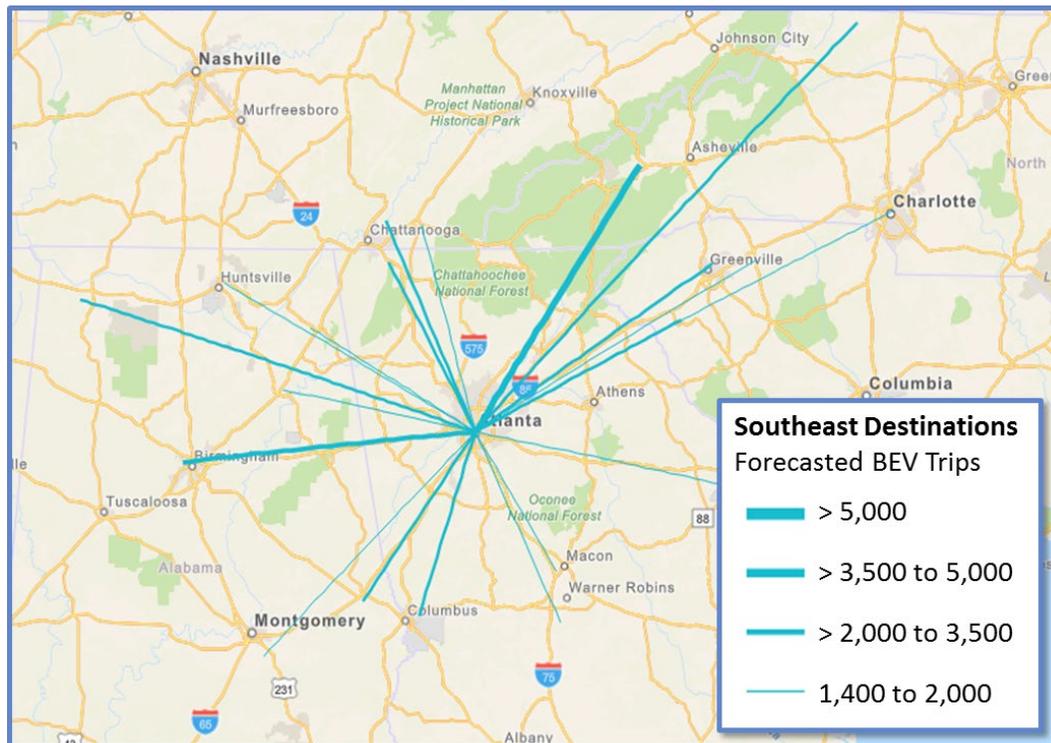
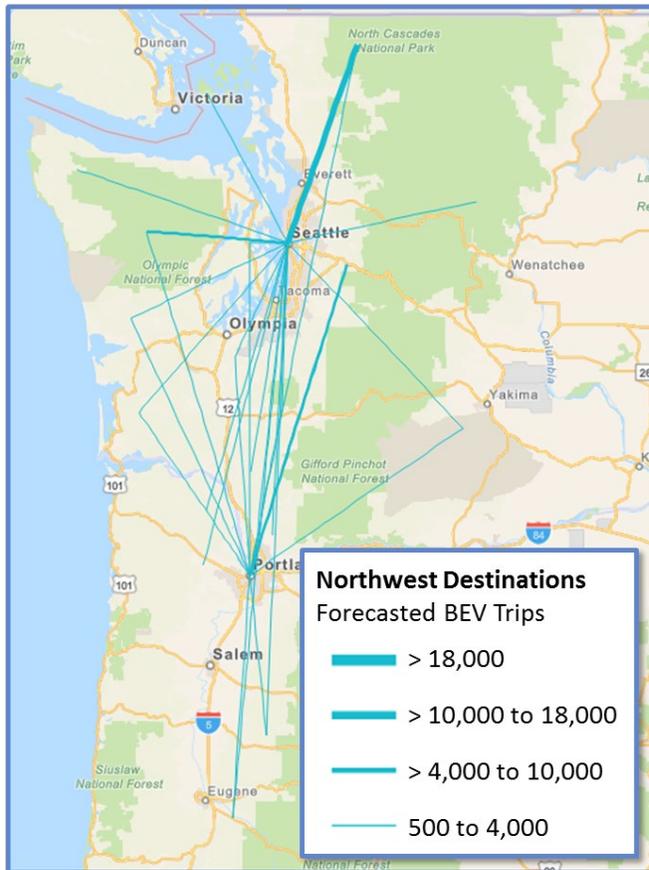


Figure 26: Northwest Top BEV Travel Destinations



Several submissions from the National Outreach website noted the importance of travel to/from Canada. For example, Vermont Public Service suggested placing DCFC on Vermont highway corridors to enable travel to Canada. Similarly, Drive Electric Washington offered specific site locations that include heavy travel to/from Canada. Electrify America also reviewed daily border traffic across numerous major U.S. Canadian borders, and analyzed traffic data at these border crossings. Considering this stakeholder feedback and data supporting heavy travel to/from Canada, Electrify America identified routes to key Canadian border crossings in Washington, Michigan, and Vermont as part of the regional route and highway investments in Cycle 2 (these stations will be placed in the United States).

The regional routes for highway investment are spread throughout the country (see Figure 27, Figure 28, Figure 29,

and Figure 30). These include numerous highways in Connecticut, Maryland, New Hampshire, New Jersey, Pennsylvania, and New York in the northeast; several highways in the southern states connecting Atlanta, Birmingham, Mobile, Montgomery, and Nashville; a route to Aberdeen and Port Angeles on the Olympic Peninsula in the northwest; routes connecting Portland with the Oregon coast and to Bend, OR; and a route from Denver to Fort Collins in Colorado. In order to ensure that these investments have the greatest impact on ZEV adoption, Electrify America will continue to analyze long-distance travel data during Cycle 2 and may expand or modify the list of prioritized regional routes to address emerging needs.

In addition to the regional routes being built in Cycle 2, Electrify America will continually monitor the utilization of the existing highway stations and invest a portion of the highway budget towards expanding, or adding, station infrastructure and/or storage/renewable generation where high utilization and optimal conditions are evident.

Figure 27: Northeast Cycle 2 Regional Routes



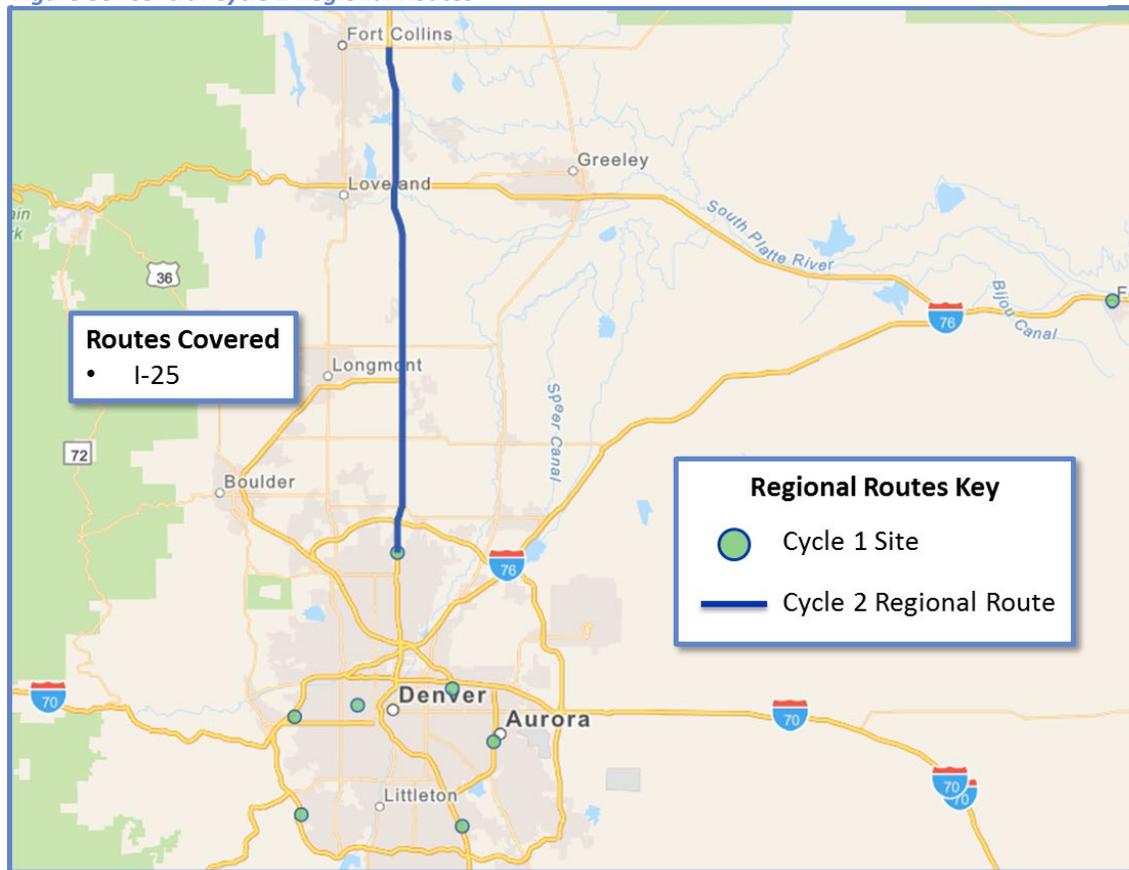
Figure 28: Southeast Cycle 2 Regional Routes



Figure 29: Northwest Cycle 2 Regional Routes



Figure 30: Central Cycle 2 Regional Routes



### 3.2.3. Investment Details

Electrify America's highway investments, including any generation and storage assets, are projected to account for approximately \$65 - \$85 million of the infrastructure investment budget. These stations will be designed with light duty vehicle drivers in mind, but much like liquid fueling stations today, some stations may also be able to accommodate the space requirements of medium and heavy duty vehicles.

#### **Enhancing the Cycle 1 Nationwide Highway Network**

In Cycle 1, Electrify America laid out a plan to develop a nationwide highway network of high-speed charging stations. The Cycle 1 plan anticipated approximately 90 stations of this network would begin development in Cycle 1, but would be partially funded and completed in Cycle 2. Electrify America has achieved substantial cost efficiencies over the course of Cycle 1 and anticipates being able to fund a significant portion of the 90 stations with the Cycle 1 budget. In Cycle 2, Electrify America is committed to further building its nationwide highway network. As of the drafting of this plan, Electrify America anticipates it will spend \$20 million in Cycle 2 and finish up to 28 additional stations for its highway network.

#### **Regional Route Allocations**

Funding allocations towards regional routes are based on the number of sites needed to provide travel from Cycle 2 metros to identified destinations. Most sites serving regional routes in Cycle 2 will consist of four chargers, two 150 kW and two 350 kW.<sup>15</sup> The number of sites is determined based on the length of the route, location of existing Electrify America stations, the likely origin of BEVs traveling on the routes, and maintaining a distance of less than 120 miles between stations with consideration for significant changes in elevation.<sup>16</sup> Specific regional routes are identified in Table 8. The total budget for these sites is approximately \$20 - \$30 million.

#### **Supporting the Highway Network with Additional Investments**

Electrify America anticipates some routes in its highway network will demonstrate utilization which requires additional investment to meet driver needs and avoid crowding or queuing. Approximately \$7 - \$12 million will be dedicated to supporting the existing highway network by either adding additional capacity (including additional chargers and/or energy storage) at an existing highway station or adding an additional site along an existing highway route to support BEV drivers' needs in Cycle 2. These site decisions will be made based on utilization data from Cycle 1 through the early phase of Cycle 2.<sup>17</sup> This funding may also be used to upgrade stations not originally built by Electrify America, consistent with limitations on creditable cost previously established.

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<sup>15</sup> The high powered chargers Electrify America is currently deploying are a mix of 350 kW and 320 kW, but Electrify America anticipates being able to increase power levels through upgrades over time. Maximum charging power levels are limited by vehicle capabilities, safety protections, and the charging protocols' technical specifications.

<sup>16</sup> On rare occasion, Electrify America must extend the distance slightly beyond 120 miles to account for significant siting constraints including available real estate, utility connections, etc.

<sup>17</sup> If utilization at stations on Cycle 1 and Cycle 2 routes does not demonstrate sufficient utilization to warrant additional investment, this budget will be reallocated to other Cycle 2 ZEV Investment Plan use cases.

*Table 8: Cycle 2 Regional Route and Corridor Investments*

Regional Route Highway	Estimated Station Count
I-93 Boston to Concord, NH	1
I-89 Concord to Burlington, VT Border	2
MA-6 Boston to Cape Cod	1
I-84/I-684 New York to Hartford	1
CT-15 New York to New Haven	1
I-476/I-81 Philadelphia to Syracuse	2
I-78 New York to Harrisburg	1
Garden St. Pkwy	2
Canada Connector in Detroit	1
MD-295 D.C. to Baltimore	1
I-20 Atlanta to Birmingham	1
I-85 Atlanta to Montgomery	1
I-65 Nashville to Birmingham	1
I-65 Birmingham to Mobile	2
I-5 Seattle to Canada Border	1
WA-101 Seattle Area to Port Angeles	1
WA-12/8 Seattle Area to Aberdeen	1
OR-26 Portland to Pacific Coast	1
OR-26/97 Portland to Bend	2
I-25 Denver to Fort Collins	1
Stations Supporting Existing High Utilization Routes	8 - 10
<b>Total</b>	<b>33 - 35</b>
<b>Enhancing the Cycle 1 Nationwide Highway Network</b>	<b>~28</b>

Select Electrify America sites will also include investments in renewable generation and storage necessary to support long term economic sustainability of the infrastructure investments.

### 3.3. Autonomous Vehicle Charging (\$2 - \$4 million)

#### 3.3.1. Investment Overview

The automotive industry is in transition as vehicle ownership models are being challenged by disruptive mobility alternatives. The next generation of potential automotive buyers are taking advantage of new mobility services (ride hail, car share, public transit), and the industry is becoming focused on the potential of new mobility choices. These trends can be summarized as Autonomous, Connected, Electrified, Shared (ACES) (INRIX, 2018), or as vehicle electrification, vehicle automation and pooling, and sharing (Sperling, 2018). In addition, recent announcements regarding autonomous vehicle deployments in Phoenix, San Francisco, and Sacramento are examples of how quickly charging for autonomous vehicles could emerge as a new infrastructure need (Rodd, 2018; Knight Foundation, 2018).

Accordingly, in Cycle 2, Electrify America is looking to partner with autonomous vehicle service providers to support their programs with autonomous charging solutions.

#### 3.3.2. Investment Selection Methodology

Electrify America plans to partner with an existing autonomous vehicle company or companies to build an autonomous vehicle charging station(s) in a market where such a station(s) is necessary to serve emerging needs. As the autonomous fleet providers are subject to legal limitations as to where they are able to operate their programs, Electrify America investment in this area will be subject to such location-based limitations.

#### 3.3.3. Investment Details

Electrify America anticipates that two separate stations can be supported by this \$2 to \$4 million infrastructure investment. Hardware deployed at the station (e.g., robotic arm or other approach) will depend on the available charging technology as well as the OEM vehicle capabilities in the market during Cycle 2.

Please note: if for any reason Electrify America is unable to identify sufficient investments to meet the \$2 to \$4 million budget by June 2020, or if this emerging need is being met by Electrify America's investment in California, any remaining funds will be redistributed to other Cycle 2 ZEV Investment Plan use cases in order to ensure Electrify America meets the spending requirements of the Partial Consent Decree.

### 3.4. Infrastructure Investment Timeline and Milestones

Through implementation of the Cycle 1 ZEV Investment Plans, Electrify America has acquired extensive experience deploying DCFC and L2 stations across the country. In Cycle 2, Electrify America will leverage this experience to ensure an efficient and effective roll-out of the infrastructure investments outlined in this plan. Developing any charging site, and especially a high-powered DCFC site with multiple chargers, is an extensive and time intensive process involving numerous steps, processes, and the coordination of multiple parties including real estate owners, hardware vendors, construction contractors, utilities, and permitting agencies. The key steps necessary to deploy each DCFC charging location, once a site has been secured, are outlined below, but are not necessarily in order given variable circumstances:

- Ordering equipment
- Negotiation and signing of lease or license agreements (or, where appropriate, purchasing property)<sup>18</sup>
- Development of permitting/pre-construction packages
- Filing permits
- Warehousing equipment and quality assurance/quality control
- Permit approval
- Site preparation
- Equipment delivery to site
- Completion of site construction
- Landscaping
- Utility connection to the grid/inspection and any additional utility preparation including new transformers or upgraded substations
- Commissioning

The length of time needed to develop a charging location can vary significantly based on available real estate, site characteristics, utility capacity, local permitting agencies, easements, and other geographic and business factors. Electrify America has already established an extensive list of major real estate partners, which will help reduce the overall time necessary to identify charging sites in Cycle 2. In addition, Electrify America has established relationships with many local utilities and permitting agencies, allowing both parties to become more familiar with Electrify America's infrastructure approach, while also improving Electrify America's understanding of local processes. These relationships and learnings can make station development more predictable and streamlined over time.

Considering learnings from Cycle 1, Electrify America has submitted the Cycle 2 National ZEV Investment plan considerably in advance of the beginning of the Cycle. Electrify America will begin development of the first Cycle 2 stations as soon as the Cycle 2 National ZEV Investment Plan is determined to be consistent with the Partial Consent Decree by the EPA. An expeditious determination will enable Electrify America to initiate new RFPs, negotiate contracts, place orders for equipment, secure sites, and begin other key development activities in advance of the beginning of Cycle 2 and

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<sup>18</sup> Electrify America's real estate acquisition practices have been developed to ensure that the investment helps the entire EV charging industry grow. For example, Electrify America has not signed exclusive leases that exclude other EV charging companies from building at our sites or working with our partners, and Electrify America also has not signed multiple leases in the same DCFC target zone.

avoid any gap in infrastructure investment. Based on this schedule, by the end of 2019, if not sooner, the first Cycle 2 sites are expected to be online, with many additional Cycle 2 sites well on their way through construction. Table 9 illustrates the preliminary planned rollout of Cycle 2 DCFC infrastructure to support regional routes and highways and metro community charging during Cycle 2.

*Table 9: Cycle 2 National Preliminary Infrastructure Deployment Schedule – All Sites*

Quarter	Cycle 2 Infrastructure Investments		
	Pre site selection	In development	Operational
<b>Q4 2019</b>	150 - 160	20 - 30	30 - 40
<b>Q2 2020</b>	90 - 100	40 - 50	70 - 80
<b>Q4 2020</b>	40 - 50	50 - 60	110 - 120
<b>Q2 2021</b>	0 - 0	50 - 60	150 - 170
<b>Q4 2021</b>	0 - 0	0 - 0	200 - 230

Electrify America’s Cycle 2 DCFC roll-out strategy includes two major phases. In Cycle 1, Electrify America deployed the first UL Certified 150 kW and 350 kW DCFC stations in the United States. These first-of-their-kind stations provide drivers the capability to refuel up to 20 miles of range for every minute charging,<sup>19</sup> along with universal driver access through credit/debit card readers, and a simplified and intuitive charging experience presented by a 15-inch touch screen display. In Phase 1 of the Cycle 2 roll-out, Electrify America will leverage this existing station design to increase the coverage of the Electrify America network. In Phase 2, Electrify America will monitor emerging technology developments and will consider adjusting hardware design and components, taking into account lessons learned, technology improvements, and customer feedback. This two-phase approach will allow Electrify America to rapidly increase the convenience of EV charging, while also allowing lead time to upgrade station designs or accommodate specific site requirements not aligned with current hardware configuration and design.

In Cycle 2, Electrify America will continue to rely upon the capabilities and innovations of an extensive group of experienced suppliers to support the deployment of charging infrastructure. Electrify America will engage in a competitive procurement process to select vendors as necessary to meet the build-out schedules for Phase 1 and Phase 2 of the Cycle 2 schedule. This process will consist of issuing inclusive Requests for Information (RFI) and Requests for Proposals (RFPs) to support activities, such as site identification, site development, and procurement of both current and newly designed charging equipment. This procurement process is expected to begin by Q1 2019 and run through Cycle 2.

<sup>19</sup> Assumes 3.5 miles per kWh.

### 3.5. Maintenance Plan for Infrastructure

Electrify America's mission to build a comprehensive, technologically-advanced and customer-centric charging network requires that equipment be maintained to industry-leading standards, customer support is available when needed, and stations are repaired in a timely manner when issues occur. Regardless of whether maintenance is performed in house or by a contractor, Electrify America has ensured contractual requirements to reasonably resolve issues with all stations within a maximum of 72 hours.

To meet these expectations, Electrify America conducted a competitive bid process and selected a vendor to provide maintenance for all Electrify America DCFC stations nationwide. This agreement includes routine preventative, campaign, and emergency maintenance for all stations through the contract period. Prior to the conclusion of the contract, or as necessary, Electrify America will solicit competitive bids to ensure no lapses in maintenance coverage for 10 years from the Partial Consent Decree effective date. In addition, all Cycle 2 stations will be marked with a toll-free customer service hotline. Should a customer encounter any issues fueling at an Electrify America station, the 24/7 Customer Contact Center will be available to provide support. Agents and operators have access to real-time station status information and can perform tasks such as reviewing unit performance history, initiating a charge, resetting a charger, or other issue resolution tasks.

### 3.6. Pricing, Interoperability, and Open Access

Broadly speaking, Electrify America intends to own and operate most of its ZEV infrastructure investments, though some investments may be handled under different ownership/operating structures as required for specific locations and use case needs. At those stations for which Electrify America operates the infrastructure, pricing will be a function of inputs including utility costs, station capital and operating costs, competitor pricing for subscription and rack rate products, and gasoline equivalent prices. Electrify America will set and adjust prices as required to reflect these inputs and drive toward a sustainable business model that always offers fair and reasonable value given our optimal charger utilization targets.

To maximize public access to its network of charging stations, Electrify America stations will continue to have the ability to charge plug-in EVs using a mix of non-proprietary connectors used by multiple automakers. Specifically, public facing DCFC stations will utilize CCS and CHAdeMO non-proprietary charging standards, while any new L2 stations will utilize the universally accepted J1772 connector. Throughout Cycle 2, Electrify America will continue to monitor the developing market of non-proprietary connectors to determine which types of connectors and mix should be deployed as technology and sales evolve.

Electrify America will also support open protocols including Open Charge Point Protocol (OCPP) that allow more standardized communication between different chargers and networks. Electrify America will work to maintain OCPP compliance and other measures to help maximize interoperability, a term that describes the ease of communication between the charger and the network it is on. Electrify America's public DCFC stations are all equipped with credit/debit card readers, and Electrify America believes that true access to charging stations is best guaranteed through credit card readers. In addition, Electrify America's public stations will be equipped with back end systems that can use Open Charge Point Interface (OCPI) 2.1 to communicate with other networks and Open InterCharge Protocol (OICP) to be able to connect to roaming platforms, when a business agreement is secured, in a manner that does not require use of any particular firm's intellectual property. Electrify America's network of ultra-fast chargers will also have the ability to accept multiple payment methods (e.g., subscriptions through our app, mobile pay, RFID, credit and debit cards, and "Plug&Charge" standardized in IEC/ISO 15118) to simplify usage as much as possible across a range of buyers. Through the support of multiple charging standards, the ability to accept multiple payment methods, and a strong focus on publicly-accessible infrastructure, Electrify America will be building a highly interoperable network that provides comprehensive access to all EV drivers.

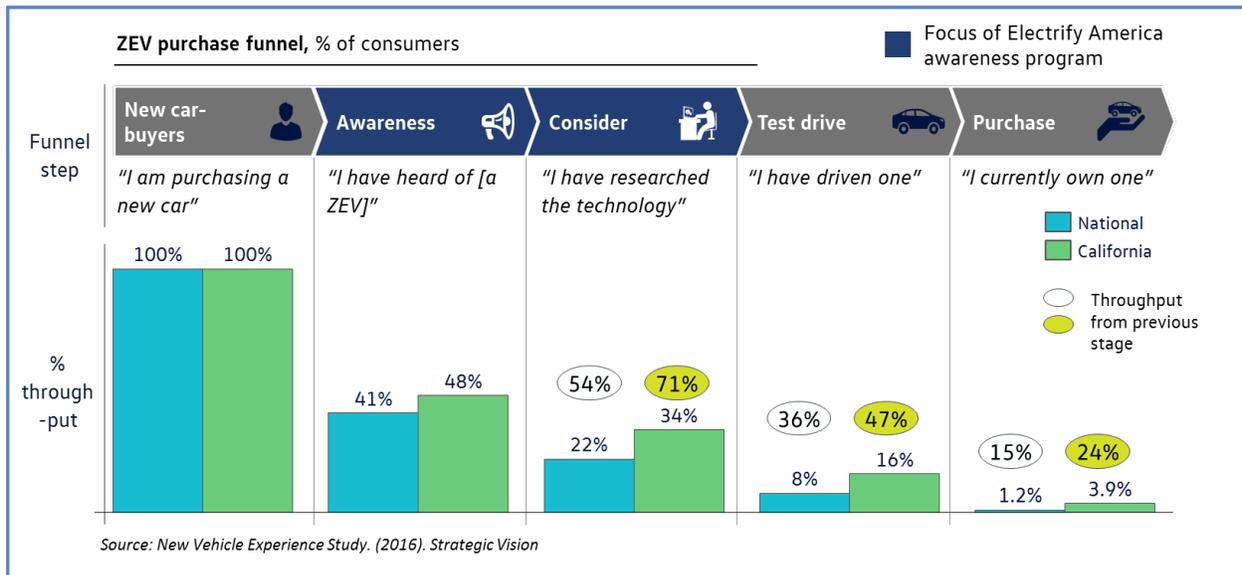
## 4. Public Education, Awareness, and Marketing Activities

To complement the infrastructure portion of its ZEV investments, Electrify America will also roll out a broad set of education, awareness, and marketing programs in Cycle 2. The effort consists of media and tools from across the marketing spectrum including traditional media (e.g., TV, radio, billboards) as well as more targeted efforts and ‘new media,’ such as social media messaging and paid search. This effort will include campaigns intended to support two distinct themes of Appendix C of the Partial Consent Decree: increasing the use of zero emission vehicle technology and driving utilization of Electrify America’s zero emission infrastructure.

Recent research shows that mass-market ZEV adoption has been significantly limited by low awareness. Strategic Vision’s 2016 New Vehicle Experience Study found that just 41% of new car buyers have ever heard of a ZEV (see Figure 31). Similarly, a 2017 Cox Automotive EV consumer study showed that the first electric vehicle that comes to mind for consumers is not actually a battery electric vehicle – it is a Toyota Prius hybrid. And, perhaps not surprisingly, awareness is a major driver of consideration and ultimately of purchasing EVs. As UC Davis’ Ken Kurani found in his 2018 State of the Plug-In Electric Vehicle Market: Report 1, “awareness, knowledge, experience, familiarity and assessments of ZEVs” are some of the most powerful predictors of ZEV consideration, far exceeding general socio-economic and demographic statistics.

Stakeholders and academic scholars repeatedly cite education and awareness as a critical input for ZEV adoption. Electrify America’s National Outreach website received more than 40 submissions from stakeholders highlighting the importance of these efforts, including many invitations to participate in specific events or programs. A major American auto manufacturer highlighted that “outreach to customers for awareness of products available in the market, convenience of EV driving and the benefits of owning EVs are adoption enablers.” Arizona State University identified Education and Marketing as one of the three major elements required to achieve its ZEV adoption goals. The Leadership Counsel for Justice and Accountability strongly supports Electrify America developing “meaningful education and outreach programs,” while state level stakeholders at in-person meetings in Portland, Atlanta, and Olympia stressed the importance of combining education and awareness efforts with infrastructure installations.

Figure 31: ZEV Awareness and Consideration



Electrify America also recognizes the importance of driving optimal utilization across its network of stations. Station utilization is a key metric by which our infrastructure investments are judged and will become financially viable, and thus Electrify America’s branded marketing funding will be dedicated to building awareness of Electrify America’s network, brand, and helping drivers find Electrify America stations.

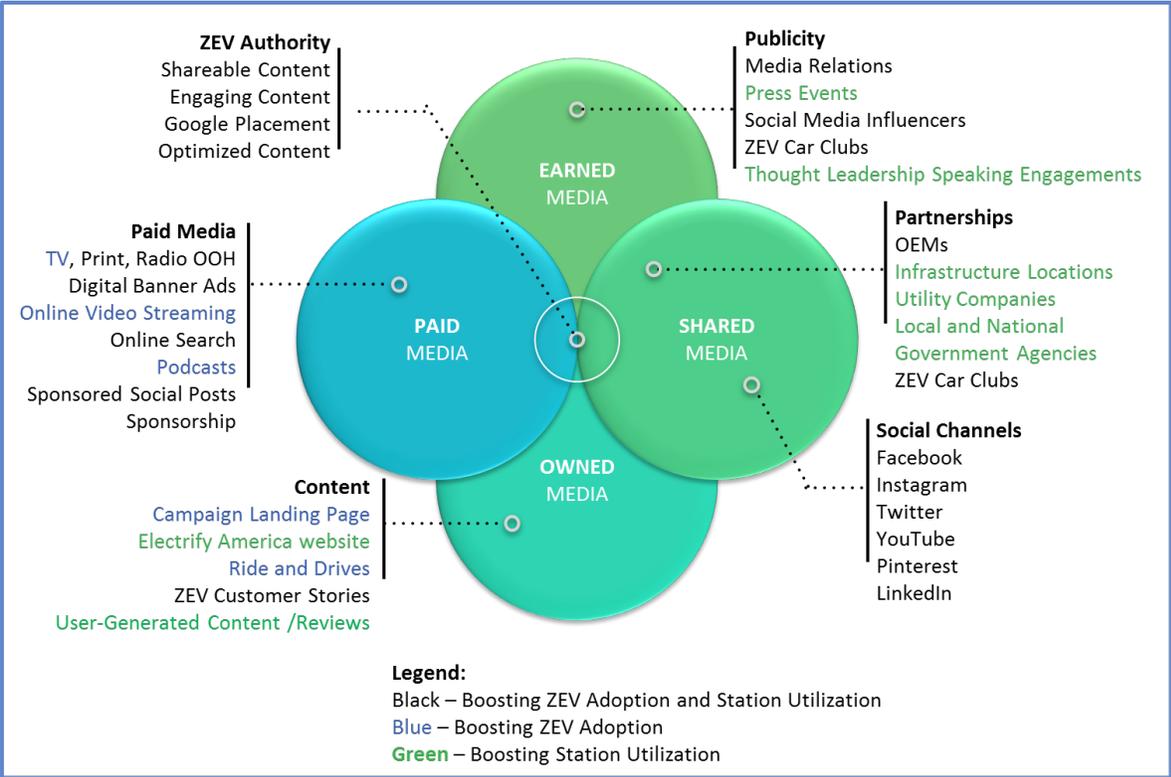
### 4.1. Public Education, Awareness, and Marketing Framework

Electrify America has developed two holistic marketing campaigns to educate and inspire likely buyers about ZEV technology, vehicle models, financial incentives, and fueling availability. The campaigns together leverage all four corners of the marketing sphere - Paid, Earned, Shared, and Owned (PESO) content (Robinson, 2016) – and are designed to deliver a consistent message across media types.

- **Paid Media** is content that is distributed based on financial compensation to place the message, and control its distribution, including traditional TV, radio, and out of home (billboard) advertising and sponsored content on social media.
- **Earned Media** is the published coverage of a company, cause, or person's message by a credible third party, such as a journalist, blogger, trade analyst, or industry influencer. Examples of this include press release content published in newspapers or magazines.
- **Shared Media** is the practice of distributing content through an entity's own loyal user base or audience. Examples of shared media include posts on Twitter, LinkedIn, and Instagram.
- **Owned Media** is the aggregation and dissemination of content from loyal customers/followers and then redistributing this content. Examples include customer/employee stories published on a company's website.

Electrify America's efforts to boost ZEV adoption in a brand-neutral manner and to drive Electrify America station utilization will both use this model because it allows for amplifying the message across platforms and targeting spend to the most effective channels. The breakdown of activities, by channel, is shown in Figure 32.

Figure 32: PESO Model Overview



## 4.2. Boosting ZEV Adoption through Education and Awareness (\$25 million)

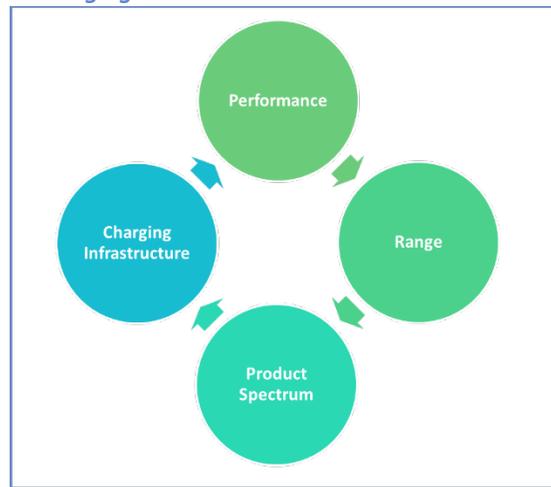
Electrify America will spend \$25 million in Cycle 2 to boost ZEV adoption through informing mainstream car buyers on the key benefits offered by ZEVs in a brand-neutral manner. Of this funding, \$24.5 million will be spent on brand-neutral education and awareness funding defined in Section 1.10.2 of Appendix C, while \$0.5 million will be spent specifically on Learn and Drive sponsorships, which are categorized as an access program defined in Section 1.10.3 of Appendix C.

In its 2017 New Vehicle Experience Study, Strategic Vision found that drivers identify performance (handling and cornering) and comfort (ride quality and quiet interior) as two of the top four ‘Extremely Important’ characteristics when shopping for a vehicle. As such, Cycle 2 efforts to drive ZEV adoption will focus on four messaging pillars around ZEVs: performance, range, product spectrum, and charging infrastructure (see Figure 33).

Performance messaging will highlight the acceleration, ride quality, and quietness offered by ZEV technology. Range will focus on the fact that the range of today’s fleet of ZEVs meet the needs of the overwhelming majority of drivers. Product Spectrum will describe the diversity of ZEV makes and models, from SUVs to sports cars and luxury vehicles. Finally, Charging Infrastructure will help instill range confidence while highlighting the convenience offered by both public charging infrastructure and home charging today.

The majority (~\$20 million) of spending on this effort is dedicated to advertising aimed at the top of the ‘sales conversion funnel’ (see Figure 34). The ‘sales conversion funnel’ describes a typical customer’s journey from complete unawareness of a product, through awareness, consideration, test drive, and ultimate adoption. Figure 35 provides additional details on the contents of each category in the sales conversion funnel.

**Figure 33: ZEV Education and Awareness Messaging Pillars**



**Figure 34: ZEV Sales Conversion Funnel and Primary Paid Media Categories**

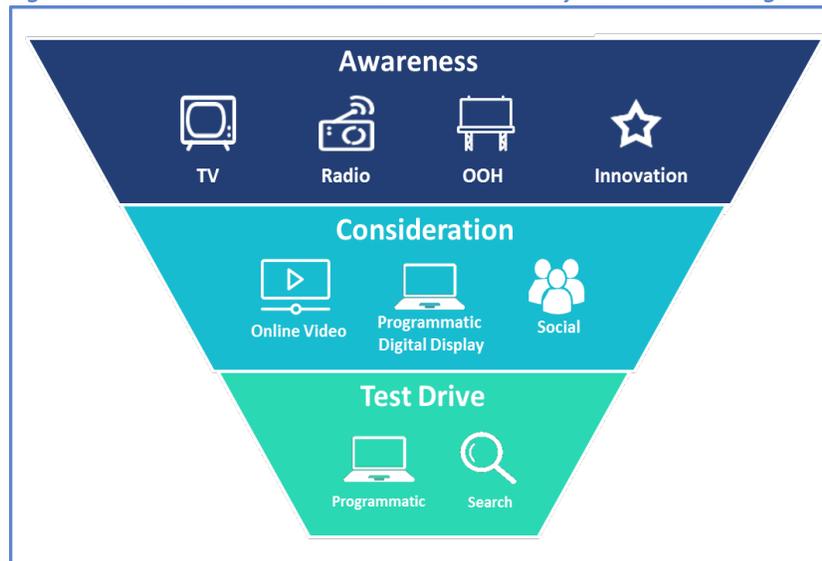
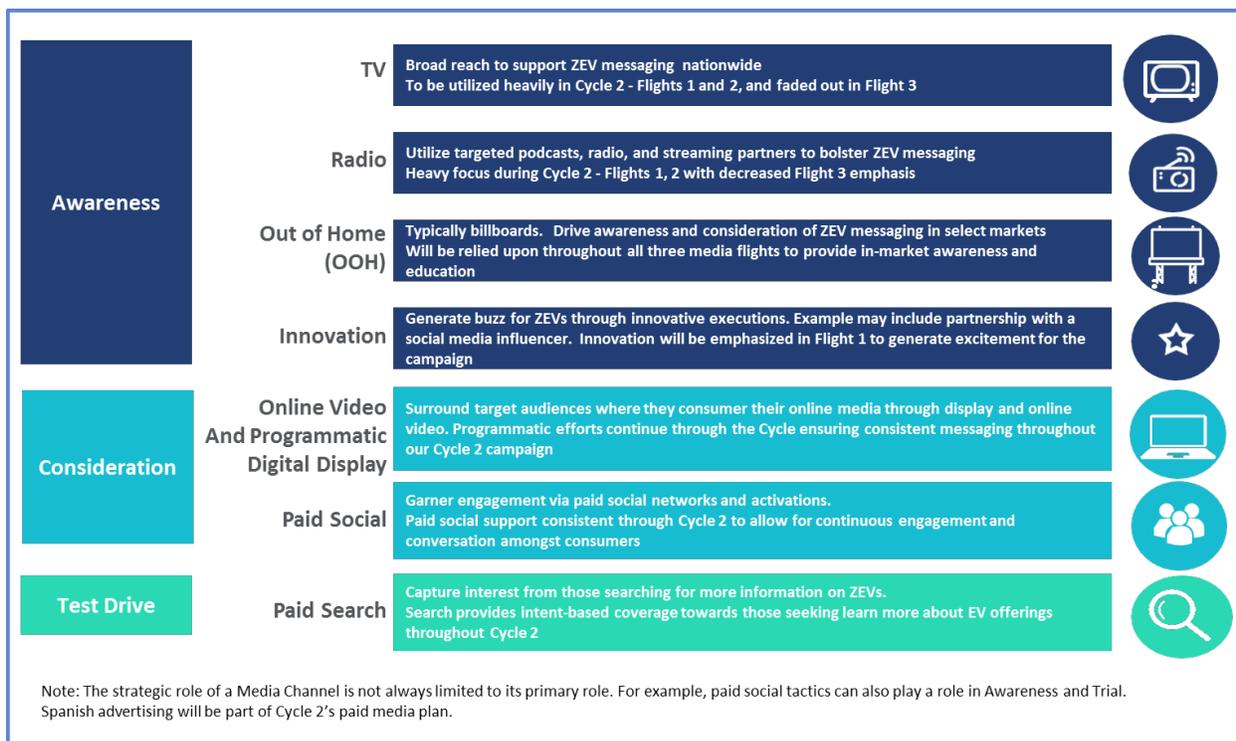


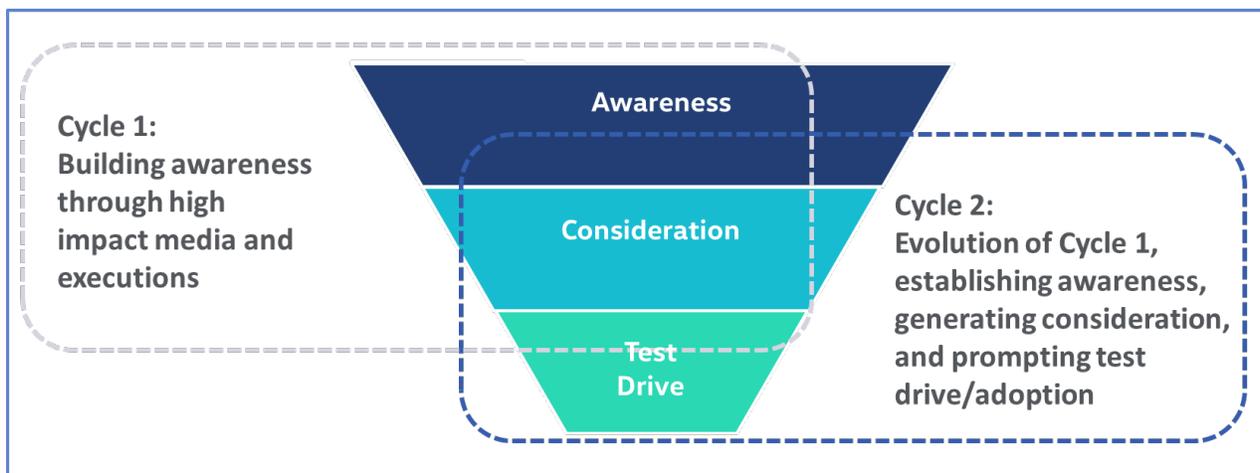
Figure 35: Additional Details on Paid Media Categories



In Cycle 1, Electrify America has focused on building awareness through high impact media executions, with limited emphasis on consideration and test drives. For example, Electrify America created a TV and radio spot called the 'Jetstones' which highlights that ZEVs are available, fun to drive, and more affordable than ever. The spots can be seen and heard at [www.plugintothepresent.com](http://www.plugintothepresent.com).

Over the course of Cycle 2, Electrify America expects consumer awareness to improve as a result of multiple factors. First, Electrify America's hope is that its early efforts, in combination with the activities from many others in the EV community, will boost awareness in the market. In parallel, new EV models will come to market, and Electrify America expects their associated launch campaigns to help drive increased awareness. If successful, these combined efforts should drive a bump in overall market awareness.

Figure 36: Comparison of Cycle 1 vs Cycle 2 Education and Awareness Messages



As awareness improves, Electrify America will shift its focus down the ‘sales conversion funnel’ to tactics that drive ZEV consideration (see Figure 36).

Electrify America’s Cycle 2 media strategy will be broken into three flights: Flight 1 will run from July 2019 through mid-2020; Flight 2 will run from mid-2020 through mid-2021; and Flight 3 will run through the end of Cycle 2. The focus of each successive flight will shift further down the sales conversion funnel using those media tactics appropriate for the targeted messaging.

This media plan is subject to informed revision, based on market impacts and evidence of effectiveness. The shift in focus laid out in the plan below from awareness building to consideration and test drives will be evaluated based on learnings, results, market conditions, and evidence of general consumer awareness on an ongoing basis. Electrify America may make adjustments to maximize impact on ZEV adoption as necessary and appropriate during Cycle 2.

**Cycle 2 – Flight 1 Paid Media Plan:**<sup>20</sup>

Our approach to the Flight 1 media plan is to continue the momentum of Cycle 1 messaging and continue driving overall ZEV awareness. Specifically, Electrify America will focus the bulk of spending on ‘upper funnel’ media such as TV, radio, and out of home (OOH). Electrify America will leverage the momentum of ZEV vehicle launches in 2019 and 2020 to establish additional awareness among car buyers (see Figure 37).

Figure 37: Proposed Cycle 2 - Flight 1 Paid Media Plan

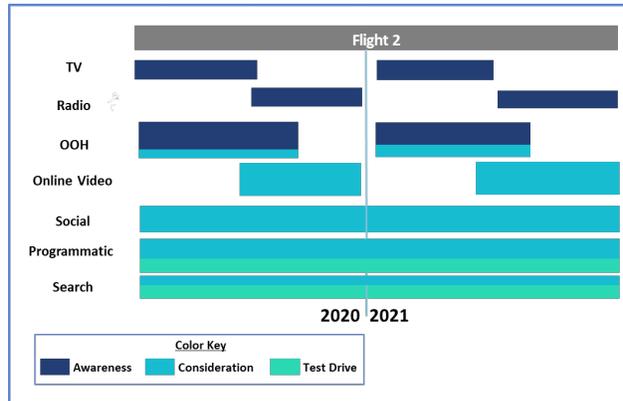


<sup>20</sup> This plan reflects Electrify America’s best projection of Cycle 2 media spending at the time of plan drafting. Due to economic, political, and societal shifts in the market, media costs of each component may change, and therefore shift the optimal mix of investments. Electrify America will work with a competitively-selected media agency to optimize media spending for maximum impact on ZEV adoption.

### Cycle 2 – Flight 2 Paid Media Plan: <sup>21</sup>

In 2020, ZEV penetration is anticipated to rise and as a result, consumer awareness is expected to be stronger. Flight 2 will evolve by increasing media efforts to drive an already educated audience towards consideration and trial. To capture these audiences, Electrify America will refine our investment<sup>22</sup> towards channels that allow for advanced targeting, such as online video, social, and in-stream audio (see Figure 38).

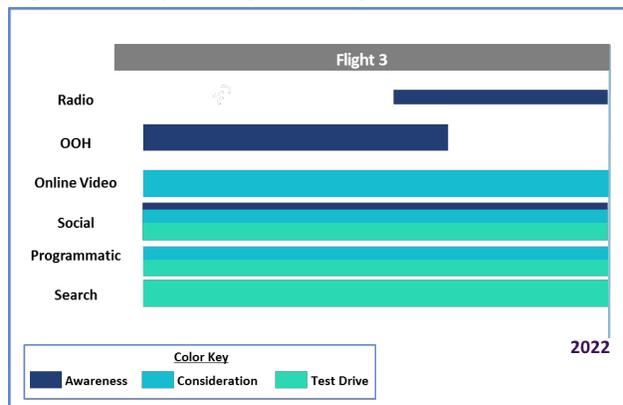
Figure 38: Proposed Cycle 2 - Flight 2 Paid Media Plan



### Cycle 2 – Flight 3 Paid Media Plan: <sup>23</sup>

By the latter stage of Cycle 2, Electrify America will focus on driving consumers toward ZEV test drive opportunities at their local dealers and ultimately to purchasing ZEVs. To promote test drives, Electrify America will utilize channels that capture consumer intent, including social, search, and programmatic display (see Figure 39).

Figure 39: Proposed Cycle 2 - Flight 3 Paid Media Plan



### Additional Education and Awareness Tactics

In addition to paid media efforts that will be conducted in the three flights described above, Electrify America plans to leverage additional tactics to drive ZEV adoption throughout the cycle. These represent a much smaller slice of the overall Education and Awareness budget, but provide consumers another touch point and unique interaction with ZEVs. These investments are highly dependent on specific projects or opportunities, and thus are difficult to identify in advance. However, some ideas under consideration include:

- **Social Influencers:** Working with key social media influencers, such as bloggers or tech reviewers, to develop ZEV-related content. Influencers could be provided with a range of ZEV technologies to review, educate, and boost awareness around the “fun to drive” aspect of ZEVs. The goal of this activity will be to promote ZEV awareness in social media channels using trusted influencers to spread positive reviews of living with a ZEV on a regular basis. Electrify America and its media agency will work together to vet possible social media influencers based on multiple criteria including overall ZEV alignment and affinity, frequency of ad posts, location and context, and engagement rates. This digital activity is included within the Digital budget.

<sup>21</sup> See footnote 20.

<sup>22</sup> According to Appendix C, budget items related to education, awareness, access, and marketing are defined as a category of “ZEV investment.” Traditional accounting practices categorize these items as spending due to their lack of a forecastable rate of return.

<sup>23</sup> See footnote 20.

- Memberships and Sponsorships: As proposed by numerous submitters to Electrify America’s National Outreach Process, including the Sierra Club, Plug In America, and a number of local National Drive Electric Week chapters, establishing partnerships with consumer-oriented organizations to create content/events that promote ZEV adoption.<sup>24</sup>
- Experience Centers: Including refueling infrastructure and education materials at a ZEV experience center with high visibility and public exposure such as Forth’s Electric Showcase or the Smart Columbus Experience Center.<sup>25</sup>
- STEM Education: As referenced in more than 20 National Outreach Process submissions, potential concepts include providing curriculums to Kindergarten through 12th grade classrooms, vocational schools, community colleges, vehicle dealerships, and professional training on ZEVs and charging infrastructure. Other education activities may include sponsoring programs to “certify” qualified dealers that have dedicated and trained staff that are fully versed in ZEVs and their associated purchase considerations (e.g., wall box installation, discounted utility offers, local/state/federal incentives, public charging subscriptions). All STEM education will be specific to ZEVs and/or ZEV infrastructure, and made publically available whenever feasible.

To supplement these brand-neutral education and awareness activities, Electrify America plans to sponsor Learn and Drive activities in Cycle 2. In comments from Plug In America, NESCAUM, and many other organizations, the impact of these activities to increase awareness and ZEV adoption was well demonstrated. These activities, which are classified as an “access” activity under sections 1.10.3 and 2.5.5 of Appendix C of the Partial Consent Decree, will be accomplished by sponsoring the events or programs of other organizations, and the \$0.5 million budgeted for this activity in Cycle 2 will not be considered an investment that meets minimum or maximum spending requirements specified in Section 2.5.6 of Appendix C. For detail on this request, see Appendix 3.

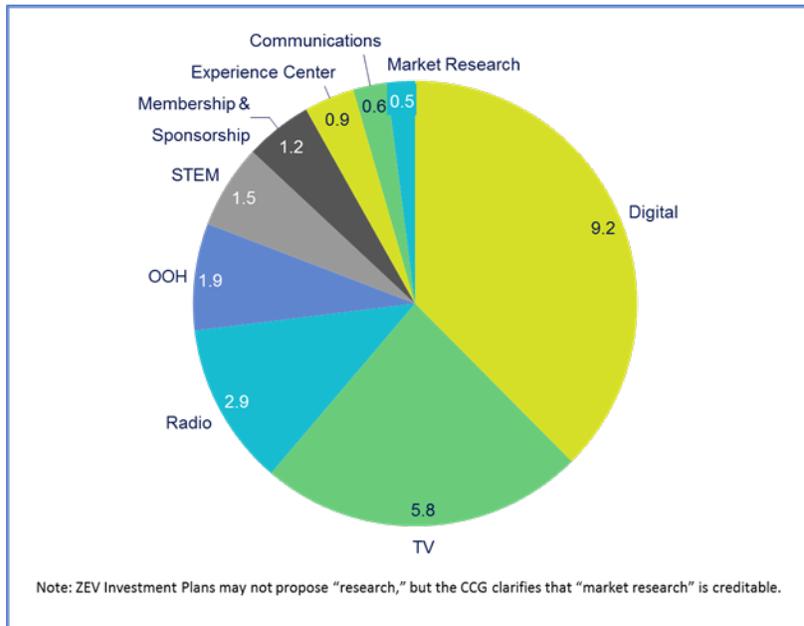
The \$24.5 million Education and Awareness budget breaks down as shown in Figure 40.

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<sup>24</sup> For further details on creditability of memberships and sponsorships, please see Appendix 2.

<sup>25</sup> This budget will not be used to support learn and drive activities at experience centers. All learn and drive activity is categorized as access as defined in Section 1.10.3 of Appendix C.

Figure 40: National Education and Awareness Budget (\$ million)



### 4.3. Boosting Station Utilization through Branded Marketing (~\$10 million)

One of the core metrics by which Electrify America investments are measured is station utilization. Specifically, Electrify America must drive utilization to demonstrate its investments are “addressing an existing need or supporting a reasonably anticipated need,” and Electrify America must demonstrate that a charging station “has a high likelihood of utilization and provides accessibility/availability where most needed and most likely to be regularly used,” as outlined in the Partial Consent Decree. To address this, Electrify America is targeting \$10 million of spending on marketing and will communicate four key pillars:

- **Location:** Highlighting the locations of Electrify America’s chargers to customers and instilling range confidence.
- **Speed:** Conveying the high-powered speeds at which Electrify America chargers can charge a BEV, offering consumers a more convenient charging experience.
- **Affordability:** Promoting the affordability of charging offered by Electrify America’s network, including subscription plans and charging bundles provided by automotive manufacturers that will be available to customers.
- **Customer-centricity:** Showcasing that Electrify America’s infrastructure is designed with the consumer experience first – stations are located near retail locations and amenities, accept nearly all payment methods, and the charger and app interfaces are user friendly.

Electrify America’s messaging goal is to change range anxiety to range confidence by generating awareness of Electrify America charging stations including convenient metro and highway locations, customer-centric charging experience (credit card access/no membership required to access Electrify America chargers), and high-powered offerings of up to 350kW that will allow for 200 miles of charging in as little as 10 minutes (depending upon vehicle capacity to access such fast charging).

The largest portion of Electrify America’s activities will be digital advertising targeted at specific groups that are most likely to be able to utilize the Electrify America charging network. Electrify America will use digital tools including online search and programmatic digital display to reach these prospects and deliver the right message (e.g., promotion of closest EV charging location) at the right time (e.g., when someone is searching for a EV charger). Examples of potential targeted audiences include: new and used ZEV buyers, EV driver club members, and prospective ZEV considerers/researchers.

In addition to digital advertising, Electrify America will leverage alternative tactics with a much smaller portion of the overall budget. These tactics include:

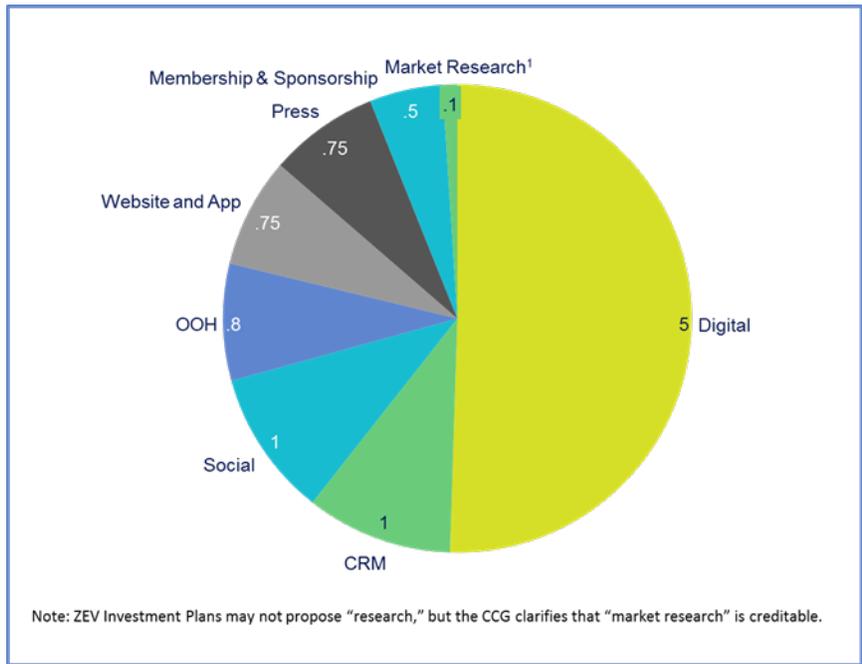
- **Partner Marketing:** Exploring the opportunity to work with OEMs and site hosts to promote Electrify America’s ever-expanding network of locations.
- **Social Media:** Monitoring feedback and engaging consumers through social media (e.g., Twitter, Plugshare). Electrify America has found social media to be a valuable tool for listening to the EV community, identifying needs and pain points, and ultimately improving the consumer experience for our drivers.
- **Customer Relations Management (CRM):** As charger utilization increases, it is important to keep customers and prospects informed of the new charger installations. Electrify America will establish

a cadence of electronic communications to keep our customers and prospects informed. Additionally, leveraging online video, Electrify America may create a video series that showcases how to use our DCFC and the customer benefits of charging at our stations.

- **Memberships and Sponsorships:** Support trade groups and conferences promoting the adoption of EV technology. Such membership dues and sponsorship fees would be associated with the Electrify America brand.<sup>26</sup>
- **Events:** Support key industry events by providing promotional charging sessions and branded materials to encourage charging adoption and membership enrollments.
- **Highway Signs:** Brand state and national highway exit signage for Electrify America charging sites.
- **Public Relations:** Conduct media campaigns that are designed to feature Electrify America metro and highway charging stations. For example, press activities can focus on living with a ZEV on a daily basis without access to a dedicated L2 charger using metro DCFC infrastructure and/or conducting a cross country media program that uses the company’s highway DCFC locations to highlight that “road trips” to popular destinations in a “one car” ZEV family can be easily managed.

In total, the \$10 million budget breaks down as shown below in Figure 41.

*Figure 41: National Station Utilization Budget (\$ million)*



<sup>26</sup> For further details on creditability of memberships and sponsorships, please see Appendix 2.

## 5. Community Impacts

Electrify America is committed to making a difference through our investments across the United States. The impacts take many forms.

### **Economic Impacts**

The \$2 billion ZEV Investment Commitment is already having a big impact on businesses. To date, Electrify America has contracted with more than 100 firms for a total contract value of \$380 million. In addition, based on figures from the Council of Economic Advisors and U.S. Department of Transportation related to highway and transit investments, the \$300 million being invested Nationally in Cycle 2 is estimated to support up to 2,500 jobs over the 2.5 years of the Cycle.<sup>27</sup>

### **Recruiting and Hiring Underrepresented Groups**

Electrify America believes diversity in backgrounds and experiences within our team is an important part of our cultural fabric and a key to driving ZEV adoption for all Americans. Electrify America has implemented a set of recruiting practices that promote career openings to many traditionally underrepresented groups. Volkswagen Group of America, which provides human resource services to Electrify America, participates in INROADS, an organization that prepares young people from disadvantaged backgrounds for careers in corporate America. We also partner with Out and Equal and exhibit at their conference focused on workplace fairness for the LGBT community. We recently launched a Veterans Employee Resource Group and plan to use this group for outreach and recruiting of veterans. Finally, we plan to partner with WorkplaceDiversity.com to promote Electrify America careers across a range of diversity-focused recruiting sites including HispanicDiversity.com, DisabilityConnect.com, VeteransConnect.com, and AllDiversity.com.

### **Supporting a Rich Supplier Base**

Electrify America is committed to ensuring that investment under its ZEV Investment Commitment reflects the rich and diverse characteristics of the United States and its people. To meet this commitment, Electrify America staff conducts outreach efforts and activities: to ensure potential new suppliers and contractors are aware of Request for Proposal (RFP) opportunities resulting from the ZEV Investment Commitment; to encourage greater participation by underrepresented groups, including certified veteran-, women-, and minority-owned businesses; and to assist applicants in understanding how to participate in the RFP process.

### **Advancing ZEV Awareness at Public Events**

Electrify America executives and staff are frequently asked to speak or participate in dozens of meetings, conferences, and other events regarding electric vehicles, charging technology, and ZEV mobility. Electrify America does not accept most invitations received, in order to focus resources on ZEV infrastructure and investment executions. However, Electrify America attempts to participate in events

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<sup>27</sup> The Council of Economic Advisors estimates that every \$1 billion in federal highway and transit investment would support 13,000 jobs. This total count includes direct, indirect, and induced jobs. The estimate here is for the number of jobs created by infrastructure investments, and it does not include jobs created through education, awareness, and outreach or Electrify America overhead. The estimate assumes that ZEV investments create a similar number of job-hours per dollar spent as highway and transit investments.

which are specifically focused on ZEV technology, are likely to grow ZEV awareness, or are consistent with Electrify America's obligations and the spirit of the National Outreach Process. These forums have allowed Electrify America to increase general awareness of ZEV technology, to introduce audiences to the ZEV Investment Plans, and to collaborate with the growing movement focused on increasing ZEV adoption.

## 6. Closing

Electrify America once again thanks the hundreds of stakeholders and EPA staff for providing input, guidance, suggestions, and insights in support of the development of this plan. Building out the largest high-powered, non-propriety ZEV refueling network in the United States is a monumental task. It would not be possible without the support of the ZEV community – from consumers to utilities, suppliers, and government entities. Electrify America looks forward to continued collaboration in pursuit of ZEV adoption across the United States through the ZEV Investment Commitment and beyond. While this investment is ambitious in its size and impact, it is also a pivotal and transformational opportunity to increase the mass-market adoption of ZEVs in America.

We are excited and motivated to continue our ZEV investment commitment into Cycle 2, while complimenting similar investments from the private and public sectors. And we look forward to continuing collaboration with other passionate stakeholders in the ZEV eco-system that are helping achieve this collective vision for ZEV transformation.

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# Appendix

## 1. Certification of Activities

Electrify America certifies that none of the activities described in the ZEV investment plan described above was/is:

- approved by the Board of Management prior to September 18, 2015
- required by a contract entered prior to the date of lodging of the Partial Consent Decree
- a part of a joint effort with other automobile manufacturers to create ZEV infrastructure
- required to be performed by any federal, state, or local law, or anticipate will be required to perform during the planned 30-month period

## 2. Memberships and Sponsorships

The Settlement documents do not specifically address memberships or sponsorships. There may be occasions where it would be reasonable for Electrify America to further education and awareness of ZEVs or to market Electrify America infrastructure by joining an industry or non-profit organization or by supporting the programs, activities, or events of an industry or non-profit organization. Under some circumstances, it is reasonable for Electrify America to join entities or sponsor their activities as brand-neutral education and awareness activities from the \$24.5 million education and awareness budget. Under other circumstances, joining the organization or sponsoring its activities may be considered branded marketing and fall within the \$10 million budget for branded marketing. Annual reports to EPA with creditable cost schedules for the given year will include the total cost of memberships and sponsorships.

### **Brand-neutral education, awareness, and outreach memberships and sponsorships:**

Electrify America will follow the criteria in the Creditable Cost Guidance to assess whether a membership or sponsorship may be creditable as a brand-neutral education, awareness, and outreach activity as defined in Section 1.10.2 of Appendix C.

### **Branded marketing memberships and sponsorships:**

Electrify America plans to market charging services and drive station utilization through branded membership and sponsorship, where cost effective. All spending associated with branded marketing memberships and sponsorships will support marketing activities that are directly public facing. In Cycle 2, until Electrify America reaches agreement, in writing, with EPA on the terms and conditions under which intermediary-facing efforts would be creditable, Electrify America will not market its product via memberships and sponsorships that communicate to intermediary audiences (e.g. thought-leaders and industry partners) who, if informed and aware of Electrify America charging services, are likely to be effective at driving station utilization.

Electrify America will follow the criteria in the Creditable Cost Guidance to assess whether a membership or sponsorship may be creditable as branded marketing.

### 3. Request for Exception to Education and Awareness Requirement

According to Section 2.5.6 of Appendix C, “Unless otherwise agreed to in writing by EPA, Settling Defendants shall spend no less than \$25 million and no more than \$50 million on such activities during each 30-month investment cycle....” For this Cycle 2 National ZEV Investment Plan, Electrify America formally requests an exception to this clause that would allow \$24.5 million to be spent on Education and Awareness activities and \$0.5 million to be spent on Learn and Drive events.

Under Section 2.5.5 of Appendix C, ‘Ride and Drive’ events are classified as Access investments. However, these events are highly educational in nature and are shown to have a high impact on ZEV awareness. As a result, Electrify America requests this amendment to allow for the funding of National Learn and Drive events.

## 4. ZEV Glossary

### **AC Charging**

The majority of ZEV charging is done with alternating current (AC) Level 1 (120 volts or normal household current) or Level 2 (208-240 volts or an electric dryer power equivalent). AC charging is typically more cost effective for the equipment and installation and takes advantage of longer dwell times to provide lower power to a ZEV over a longer period of time. AC charging is an excellent solution for residential, workplace, multiunit dwelling, and other longer-term parking situations like hotels and municipal or airport parking garages.

### **DC Fast Charging (DCFC)**

Direct current (DC) charging for electric vehicles allows for higher charging speeds, as DC current can be supplied directly to the electric vehicle's battery at power levels normally higher than AC charging. The higher the DC power supplied, the faster the electric vehicle can be charged, provided the vehicle is designed to handle such power. A common DC power level accepted by BEVs on the market today is 50 kW. By 2019, it is expected that 150+ kW DC fast charging will be available on a number of vehicles, and speeds of up to 320 kW (at 350 amps of current at 200V to 920V power source) will be available on a limited basis. To illustrate the charging power difference between Level 2 AC and DC fast charging, a Level 2 7.2 kW AC charger will deliver about 27 miles of ZEV range per hour of charging, whereas a 150 kW or 320 kW DC fast charger can deliver 90 or 200 miles of electric range per 10 minutes respectively.

### **CHAdeMO**

A DC fast charging standard first developed in Japan for the Japanese market and capable in the U.S. of charging several EVs including the Nissan Leaf and Kia Soul.

### **CCS (Combined Charging System)**

CCS is a DC fast charging protocol that is SAE certified and featured on vehicles produced by GM, BMW, Volkswagen Group, Ford, Honda, Hyundai, Proterra and a number of other vehicle manufacturers. The "combined" term designates the CCS capability to incorporate the level 2 (J1772 standard) plug and DC fast charging connector into the same larger plug.

### **OCPP, OCPI, and OICP**

Open Charge Point Protocol (OCPP), Open Charge Point Interface (OCPI), and Open InterCharge Protocol (OICP) are communications standards that have been developed by numerous public and private ZEV infrastructure leaders. OCPP enables standardized communication between charging hardware and the charging station networks that support them, while OCPI enables communication between different charging station networks. OCPP makes it possible to change the network supporting an individual charging station at some future time if desired. OCPI on the other hand is the communications standard that enables commercial entities such as charging networks or automotive OEMs to transfer charging station data between each other such as charger availability or customer information to enable roaming. Finally, OICP is the communication standard for the transfer of data between electric mobility providers and charge point operator systems via a central roaming platform.

## **Out of Home (OOH) Advertising**

In contrast to television advertising, out of home advertising or media refers to advertising that communicates to customers while they are not at home. This type of advertising is intended to reach consumers while they are in public and on the go. Out of home advertising categories can include billboards, street furniture (e.g., bus shelters and benches, or in stores, kiosks, and shopping malls), and transit (buses, metro systems, taxis) to name a few.

## **“Plug&Charge”**

“Plug&Charge” is part of the latest revision of the CCS standard, featuring the IEC/ISO 15118 standard which prescribes the means by which a charger and network can identify and authenticate a specific vehicle to allow for a charging session automatically, by simply “plugging in,” without the need for supplemental membership cards or fobs.

## **Proprietary/Non-Proprietary Charging Connector and Protocol**

A non-proprietary connector is not privately-owned or controlled and is thus easily available as a standard and does not require extensive development to be ready for application. Both CHAdeMO and CCS combo are non-proprietary DC fast charging protocols. A proprietary charging connector is a connector and charging network that is exclusively accessible to one brand of vehicle or type of user.

## **Traditional Media vs. ‘New Media’**

Historically, advertising to consumers has taken the form of broad messages on television, radio, in print, or messages on physical items such as billboards or street furniture. These platforms are typically referred to as traditional media. Though this method has been generally effective at communicating messages to consumers, these platforms have limited ability to target specific audiences based on their interests and preferences compared to newer media platforms today. In the 21<sup>st</sup> century and age of the internet, numerous additional platforms for communicating messages have emerged that allow much more direct and effective communication to customers about products and services such as social media advertising and paid search. These are considered ‘new media.’

## **Zero Emission Vehicle (ZEV)**

Under Appendix C, the following three vehicle types are considered Zero Emission Vehicles:

1. An on-road passenger car or light duty vehicle, light duty truck, medium duty vehicle, or heavy duty vehicle that produces zero exhaust emissions of all of the following pollutants: non-methane organic gases, carbon monoxide, particulate matter, carbon dioxide, methane, formaldehyde, oxides of nitrogen, or nitrous oxide, including, but not limited to, battery electric vehicles (“BEV”) and fuel cell vehicles (“FEV”);
2. An on-road plug-in hybrid electric vehicle (“PHEV”) with zero emission range greater than 35 miles as measured on the federal Urban Dynamometer Driving Schedule (“UDDS”) in the case of passenger cars, light duty vehicles and light duty trucks, and 10 miles as measured on the federal UDDS in the case of medium- and heavy-duty vehicles; or
3. An on-road heavy-duty vehicle with an electric powered takeoff.

ZEVs do not include: zero emission off-road equipment and vehicles; zero emission light rail; additions to transit bus fleets utilizing existing catenary electric power; or any vehicle not capable of being licensed for use on public roads.