



Electric Vehicle Infrastructure Use Case Summary & Deliverables to the Pennsylvania Department of Transportation

June 11, 2025

About

The Electric Vehicle Infrastructure program was born out of the Infrastructure Investment and Jobs Act (IIJA), enacted by Congress and signed into law in 2021. The initiative was introduced to make Electric Vehicle (EV) charging more accessible to all Americans for local and long-distance trips.

The initial focus or phase one of the funding through the IIJA was for states to strategically deploy fast charging stations along designated Alternative Fuel Corridors (AFC) to help build out the national EV AFC network. I-476 and I-78 were determined to be AFCs in the Lehigh Valley. Pennsylvania's goal is to offer EV charging no more 50 miles apart along AFCs and no more than one mile from the nearest exit. Once the state's AFC network is fully planned out the state may use remaining program funds for EV infrastructure on any public road or other publicly accessible location.

With the state's phase one alternative fuel corridor build-out in the implementation phase, four remaining phases in the initiative begin in succession and include corridor connections, community charging, critical investments, and EV workforce.

Corridor Connections – Phase 2

Objective: Build upon the initial EV Phase 1 fast-charging buildout by connecting additional corridors that are not part of national AFCs but are regionally significant.

- Route 33 in Pennsylvania: Identified by PennDOT as a priority under Phase 2, serves as a vital north-south link in Eastern Pennsylvania. Enhancing EV charging infrastructure here aims to:
 - Improve regional mobility between I-78 and I-80;
 - Support tourism and freight routes through the Lehigh Valley and Pocono regions;
 - Fill gaps in long-distance travel corridors not covered in Phase 1.
- Corridor Connection Criteria utilized by PennDOT include:
 - Must close EV infrastructure gaps between existing AFCs;
 - Should serve high-traffic regional routes or support economic development zones.
 - Emphasize coordination with utilities and local governments.

Community Charging – Phase 3

Objective: Expand charging access beyond major highways to everyday destinations to improve equity and practicality for all EV drivers.

- Current Phase in Pennsylvania: As of 2025, this is the active phase focused on developing charging networks in non-AFC corridors, in community-centric areas. PennDOT has directed Planning Partners within the state, including the Lehigh Valley Planning Commission (LVPC) to develop use cases in this phase.
- PennDOT Community Use Case Guidance:
To guide investments, planners are encouraged to identify high-impact locations, such as:
 - Dense residential neighborhoods (where residents lack access to home charging);
 - Public libraries, community centers, and parks;
 - Public workplaces;
 - Healthcare centers and senior facilities;
 - Transit hubs or park-and-ride lots;
 - Retail and downtown districts with mixed-use activity.
- Goals:
 - Prioritize public/community/equitable access;
 - Enable local travel and reduce range anxiety for day-to-day use.
- Planning Process:
 - Stakeholder engagement;
 - Integration with local land use and transportation planning.

Critical Investments – Phase 4

Objective: Address remaining gaps or weaknesses in the statewide EV charging network after Phases 1–3 are substantially implemented.

- Scope:
 - Fill “last-mile” gaps in EV underserved regions;
 - Add redundancy and network resilience (e.g., backup power, dual ports);
 - Upgrade underperforming or obsolete chargers.
- Examples:
 - Areas that may have received less attention due to lower demand but are strategically necessary (e.g., rural freight corridors, tourist destinations);
 - Sites that need level 2 charging instead of just DC fast chargers

- Metrics:
 - Utilization rates, equity assessments, and network reliability scores will help determine investment priority

EV Workforce Development – Phase 5

Objective: Ensure that there is a trained labor force to install, maintain, and upgrade EV infrastructure.

- Target Workers:
 - Utility workers: Must be trained on grid impacts, transformer upgrades, and demand-side management related to EV charging;
 - Installers and Technicians: Must be certified in safe and efficient installation of electric vehicle supply equipment.
- Training Goals:
 - Support local job creation in line with federal labor and equity standards;
 - Coordinate with community colleges, trade unions, and technical programs.
- Example Certifications:
 - EVITP (Electric Vehicle Infrastructure Training Program);
 - EVSE (Electric Vehicle Supply Equipment) and other emerging credentials for electricians in clean energy sectors.

Lehigh Valley Planning Commission's (LVPC) Role

Our mission as the LVPC is to determine where in the Lehigh Valley electric vehicle infrastructure needs to be expanded based on need and general infrastructure viability. Once the locations are selected, LVPC can work towards the implementation and development of the electric vehicle infrastructure throughout the Lehigh Valley with private and public sector partners. Public stakeholders are anticipated to be involved in the process.

Existing Initiatives

LVPC has been working on Electric Vehicle infrastructure planning and implementation for quite some time. LVPC has many plans that mention and support the deployment of alternative fuel vehicles and infrastructure including *FutureLV: The Regional Plan*, *The Priority Climate Action Plan for Transportation Decarbonization*, and our upcoming Regional Climate Action Plan, anticipated to be adopted by the LVPC later in 2025.

In *FutureLV: The Regional Plan* under Goal 2, Connected Mixed-Transportation Region, Policy 2.5 specifically, supports the expansion of technology, communications and utilities to reduce travel demands, optimize traffic flow and prepare for the next generation of jobs. Additionally, this goal supports the advancement of autonomous, artificial intelligence, and alternative-fueled vehicle technologies and deployment of alternative fueling infrastructure.

In the *Priority Climate Action Plan (PCAP) for Transportation Decarbonization* two goals support the overarching transition to clean (low carbon) or zero emission fuels. Specifically:

Goal 3 – Supporting deployment of alternative fuel vehicles (AFVs) of all types.

Increased investment in low carbon fuel and vehicle technologies is a critical component of transportation decarbonization. Transitioning to clean and sustainable fuel options/vehicles such as electric vehicles, fuel cell electric vehicles (powered by hydrogen generated from low carbon sources) and biomass fueled vehicles is expected to drive the majority of transportation emissions reductions in US (DOE, 2023). The region aims to support federal and state initiatives to ease the cost burden of AFVs and switch fleets, such as the Bethlehem Area School District, which received a grant to operate electric school buses.

Goal 4 – Increase alternative fueling infrastructure and stations.

Innovations in fueling technologies need to be paired with supporting alternative fueling infrastructure that is readily available and accessible to all users. As more vehicles transition to these low carbon alternatives, supporting fueling/recharging infrastructure must similarly be scaled up to match new demand and be widely accessible and convenient to users. There are federal initiatives to expand fueling infrastructure, . However, additional public and private sector efforts will likely be needed to meet fueling demand.

Public Engagement Process

Following the state EV guidance for public engagement for the community charging program, the LVPC hosted two workshops and created a survey to gather public input on where residents, businesses and community at large would anticipate seeing EV infrastructure in the Lehigh Valley.

Survey

The EV survey was open from April 14th, 2025 – May 23rd, 2025, and received 52 responses. The survey takers were asked six questions related to electric vehicle infrastructure.

The first question was open-ended and asked the respondent to provide details on where they would like to see electric vehicle charging stations throughout the Lehigh Valley.

The second question inquired if a respondent currently owns or plans to own an electric vehicle in the near future.

In question three respondents were given a choice of likeliness to purchase an electric vehicle if there were more accessible EV charging stations in their community.

Respondents were then asked which factors influence their decision to use EV charging stations. Six choices for answer included, the availability of charging stations, proximity to their home or workplace, cost of charging, speed of charging, reliability and maintenance of charging, or non-use of EV charging stations.

The fifth question referenced community use-cases identified by the Pennsylvania Department of Transportation, asking which EV charging initiatives respondents think should receive the most funding in their community. Respondents were given 17 choices: on-street charging, public parking lots, destination charging (parks & recreation spaces), public transportation hubs, sports

venues (e.g. Coca-Cola Park), tourism/entertainment/event venues (e.g. Dorney Park, ArtsQuest), hotel and lodging facilities, educational institutions, medical facilities, grocery stores, retail shopping locations, dense residential neighborhoods (i.e. residential areas without private driveways), publicly accessible workplace charging, municipal buildings, community centers, libraries, and an Other option for individuals to provide a use-case that we have not included.

The final EV related question asked was for respondent zip code.

Public Community Use Case Workshops

The LVPC held two EV infrastructure workshops. The first workshop, Community Electric Vehicle Charging Network Planning, was a publicly-advertised and accessible in-person meeting at Lehigh Valley Planning Commission's conference center on May 22nd, 2025. Twenty people participated in the workshop and were divided amongst five tables, made-up of different stakeholders from throughout the Lehigh Valley including local environmental advisory committees members, utilities, local governments, trade unions, and interested community members.

The first workshop was divided into three segments, Part one was a presentation on the background, benefits, and concerns of the EV infrastructure program, as well as, EV implementation as a whole.

Part two was an interactive activity where LVPC staff asked each workshop participant what they believe their role is as an individual in the implementation of EVs in the Lehigh Valley is? And, what the organization they were representing's role in EV implementation may be? Once LVPC understood the participant's thoughts and backgrounds, participant groups discussed at each table which community use cases they felt were most important in the list we provided through the survey.

The third part of the workshop consisted of a short reflection from each table about which use-cases they felt were the most viable/important.

The LVPC staff then gave a short update about what the next steps of the EV infrastructure program process are and how information the stakeholders contributed during the workshop and survey is intended to be used.

The second workshop was held during a Lehigh Valley Planning Commission Transportation Committee monthly meeting on May 22nd, 2025. The workshop was run in the same way as the first but on a virtual platform. LVPC staff discussed how EV infrastructure can help drive the economy, how charging solutions can serve community needs, and the benefits and concerns participants had.

Developing materials for the Community Charging Program

Utilizing the answers from our community stakeholders and quantitative analysis LVPC can determine which locations should be prioritized for EV infrastructure upgrades. The prioritization of the use-cases was created based on the responses we received in the survey, as well as, the discussion from the two workshops. Using that data and local planning knowledge, LVPC was able to determine priorities. Priority communities could be considered downtown neighborhoods of cities, central districts of boroughs, or business districts in suburban townships. The locations were determined based on the results from the workshop and alignment with *FutureLV: The Regional Plan*.

A priority scale for the communities was established based on the regional traffic generator map. Priority Level 1 was assigned to the central business districts (downtowns) of the region's three core cities, as these areas represent the highest concentration of activity. Priority Level 2 was designated for major regional destinations and transportation hubs—such as the Lehigh Valley International Airport and the Lehigh Valley Mall—that generate significant traffic volumes. Priority Level 3 was applied to suburban town centers and densely developed urban neighborhoods located near major interchanges, interstates, or primary transportation corridors. Finally, Priority Level 4 was assigned to less densely developed town centers and small borough centers with lower traffic generation potential.

Community Use Cases & Priority Locations:

ID	Community Charging Use Case	Priority Scale
LVPC - U0001	Gas Stations	1
LVPC - U0002	Retail Shopping Locations (Grocery Stores)	1
LVPC - U0003	Public Parking Lots/Decks	1
LVPC - U0004	Public Transportation/Transit Hubs	2
LVPC - U0005	Parks & Recreation Areas	3
LVPC - U0006	On-Street Charging	4
LVPC - U0007	Tourism/Entertainment/Event Venues/Sports Venues	5
LVPC - U0008	Community Centers	6
LVPC - U0009	Medical Facilities	7
LVPC - U0010	Hotel and Lodging Facilities	8
LVPC - U0011	Publicly Accessible Workplace Charging	9
LVPC - U0012	Public Buildings	10
LVPC - U0013	Educational Facilities	11
LVPC - U0014	Libraries	12
LVPC - U0015	Car Dealerships	13
LVPC - U0016	Gyms	13
LVPC - U0017	Fleet Locations	13
ID	Community Locations	Priority scale considering traffic generators
LVPC - C0001	Downtown Bethlehem	1
LVPC - C0002	Downtown Easton	1
LVPC - C0003	Downtown Allentown	1
LVPC - C0004	Whitehall Township (LV Mall)	2
LVPC - C0005	Lehigh Valley International Airport	2
LVPC - C0006	Upper Macungie	3
LVPC - C0007	Lower Macungie	3
LVPC - C0008	Near major routes – 22, 222, 33, 412, 309, 512, 476	3
LVPC - C0009	South Whitehall Township	3
LVPC - C0010	Upper Saucon Township (Promenade Shops)	3
LVPC - C0011	Emmaus - Main Street	4
LVPC - C0012	West End, Allentown	4
LVPC - C0013	Southside Allentown	4
LVPC - C0014	Allentown - East of Route 145	4
LVPC - C0015	Hanover Townships	4
LVPC - C0016	Walnutport	4
LVPC - C0017	Nazareth	4
LVPC - C0018	Bethlehem Township (Park and Ride off of Route 33)	4
LVPC - C0019	South Mall	4
LVPC - C0020	I-78/Golden Key interchange	4

Community Benefits of EV Charging

Increased Charging Opportunities -

Expanding access to EV charging infrastructure enhances the ability of residents to adopt and use electric vehicles. This effort is particularly vital in addressing current gaps in charging availability, especially within high-density urban areas and underinvested communities. By improving the accessibility of charging stations, communities are better positioned to support the growing demand for EV usage.

Enhanced Convenience and Cost Savings -

Strategically located and user-friendly EV charging stations offer greater convenience for both local daily commutes and long-distance travel. Reliable and well-maintained facilities improve the overall user experience and reduce operational burdens. Increased access to public charging also lowers the cost of EV ownership by reducing dependence on high-cost or less efficient alternatives.

Improved Air Quality and Public Health -

The transition to electric vehicles, supported by accessible charging infrastructure, significantly reduces tailpipe emissions that contribute to air pollution. These environmental benefits also translate into improvements in public health, particularly in urban areas with high traffic volumes. Furthermore, investment in EV infrastructure can stimulate local economies through job creation and related business growth.

Economic Development and Economic Impact -

Robust EV infrastructure development provides economic benefits to all sectors of the community. By addressing the needs of multi-unit housing, low-income neighborhoods, and underserved populations, the initiative ensures greater and consistent access to clean transportation options. In addition, EV infrastructure supports broader economic development by connecting residents to employment centers and attracting investment.

Energy Diversification and Sustainability -

A more resilient transportation network is achieved by diversifying energy sources and reducing dependence on fossil fuels. Investing in EV infrastructure lays the foundation for a sustainable future and better prepares communities for evolving transportation and energy demands. These investments also align with long-term environmental and hazard mitigation goals, and energy independence strategies.

Economic Impact Highlights -

- Serves a wide range of users, including individuals and businesses;
- Enhances connectivity to employment hubs;
- Stimulates job creation in installation, maintenance, and support services.

Expanded Access and Regionwide Consistent, Quality Access -

- Fills critical infrastructure gaps, ensuring broad geographic coverage;
- Promotes inclusive access in rural, urban, and underserved communities.

Scalability and Investment Potential -

- Encourages cost-effective expansion through public-private partnerships;
- Builds a scalable foundation for future EV growth.

Key Considerations and Challenges in the Transition to Electric Vehicle Transportation

As we advance toward a more sustainable transportation future through electric vehicles (EVs), it is critical to acknowledge and address several challenges that have surfaced at both local and national levels. These concerns impact consistency, quality access, infrastructure reliability, and long-term scalability of EV adoption.

Cost of Charging -

While electric vehicles are often promoted for their long-term cost savings, disparities in charging costs are emerging as a significant barrier to community-wide adoption. Home

charging remains the most affordable and convenient option for most EV owners, particularly when using lower-cost overnight electricity rates. However, this presumes that all individuals have access to private garages or driveways with installed chargers. Many urban and lower-income residents live in apartments or homes without this capability, forcing reliance on more expensive public charging stations. Pricing structures at public chargers vary widely—some charge per kilowatt-hour, others per minute—and lack the standardized pricing transparency consumers expect from traditional fuel stations. These inconsistencies create confusion and potential financial burdens, disproportionately affecting those already facing housing or transportation insecurity.

Understanding Classes of Chargers -

Electric vehicle charging stations come in three classes—Level 1, Level 2, and DC Fast Charging (Level 3)—each offering different charging speeds, costs, and practical use cases. Level 1 chargers, which plug into standard outlets, are the slowest, providing only 3.5 to 6.5 miles of range per hour. Level 1 chargers are generally impractical for daily driving needs or cold-weather use. Level 2 chargers offer moderate speeds (14–25 miles per hour) and are common for home installations or workplace charging, but setup costs, particularly for upgraded electrical panels, can be substantial. DC Fast Chargers provide rapid charging of over 200 miles per hour but come with high usage fees, limited availability, and can reduce vehicle battery lifespan with frequent use. Furthermore, not all EVs are compatible with DC fast chargers, creating limitations in accessibility and usability depending on the vehicle make and model.

Charging Station Access and Parking Dynamics -

Access to EV chargers is not only about the number of stations but also how and when they can be used. A growing concern is that gasoline or diesel vehicles often occupy EV-designated parking spaces, either inadvertently or due to limited enforcement. Additionally, some EV owners leave their vehicles plugged in long after charging is complete, blocking access for others. These behaviors reduce station availability and efficiency. For drivers with disabilities, charging stations often lack accessible design or clear pathways, compounding mobility challenges. As EV adoption scales up, communities are also faced with reallocating valuable curbside or lot parking space to accommodate chargers. This can lead to conflicts with other land use priorities, particularly in densely developed settings where space is already at a premium.

Land Uses & Energy Demand -

As cities and regions plan for EV expansion, they must also contend with other high-demand users of energy and land. Industrial facilities, data centers, and large commercial HVAC systems all require significant electrical loads and physical infrastructure. These uses can compete with EV charging stations for grid capacity and physical space, especially in communities developed long ago and in urban environments where infrastructure is already strained. Without proper coordination, this competition could result in grid instability, delayed infrastructure projects, or lost opportunities to improve public access to charging. In addition, rural areas can lack system capacity to support the broader deployment of EVs and consumers are more likely to have higher charger installation costs in these areas. Planning agencies must balance the growing demand for energy across sectors while modernizing systems to support diverse land uses equitably.

Electricity Generation and Distribution -

The transition to EVs increases overall electricity demand and places added strain on generation and distribution systems. Utilities must prepare for higher peak loads, particularly during evening hours when many EVs are charged. This can lead to transformer overloads, voltage drops, and potential outages if the system is not adequately upgraded. Rural and remote areas are especially vulnerable, often lacking the infrastructure needed to support high-capacity chargers. Moreover, to align EV expansion with broader environmental and hazard mitigation goals, utility providers must increase the energy generation distributed to the power grid, energy generation, diversification, and security improvements, as well as involve long-term investment, regulatory coordination, and public buy-in. Strengthening grid resilience and diversifying generation sources will be critical to supporting clean transportation at scale.

Network Reliability -

Reliability remains a significant concern among current and prospective EV drivers. Too often, public charging stations are found to be out of order, poorly maintained, or lacking essential features such as lighting, signage, or customer support. This creates frustration and anxiety among users, especially during longer trips or in less populated areas where alternate charging options are limited. Reliability issues can undermine public confidence in the EV system and slow adoption, particularly among first-time users. For infrastructure to be effective, it must be consistently operational, user-friendly, and properly maintained through coordinated oversight by public agencies and private operators alike.

Infrastructure Lag and Charging Deserts -

The pace of EV adoption often outstrips the development of supporting infrastructure. This results in "charging deserts" where access to EV stations is extremely limited or nonexistent, particularly in rural communities, small towns, and lower-income urban neighborhoods. This disparity mirrors other historical patterns of underinvestment in transportation infrastructure and risks furthering inconsistent access during the EV transition. Expanding infrastructure consistently requires forward-looking planning, targeted investment, and a willingness to work with community stakeholders to address localized barriers. Strategic deployment of chargers, especially in underserved areas—is essential to ensure that everyone can participate in and benefit from the EV transition.

Next Steps

As the LVPC continues to do important work in the Lehigh Valley continuation of information gathering, sharing and advocacy for innovations and the implementation of EV technologies and infrastructure is essential. EV's are everywhere now and more are expected. Preparing for and supporting a diversified vehicle charging future will continue to grow in need.

While the promise of electric vehicles is significant, particularly for reducing emissions and improving public health and increasing energy independence, it comes with a complex set of infrastructure challenges. Consistent deployment of EV charging is also extremely complex and an elevated challenge for the Lehigh Valley. Policymakers, planners, utilities, and private sector partners must collaborate to ensure that the EV transition is not only safe and sustainable but, inclusive and resilient. Addressing cost disparities, improving charger reliability, expanding grid capacity, and ensuring fair access to infrastructure will be vital steps toward achieving a cleaner, safe and whole-community supportive transportation future.

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