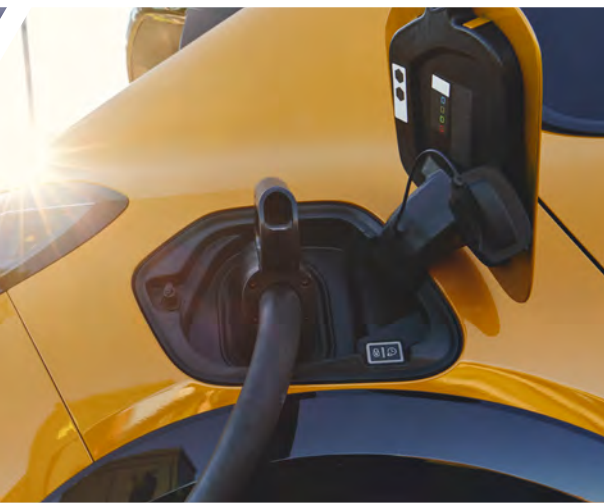


Kentucky's Electric Vehicle Infrastructure Deployment Plan

Better Kentucky Plan



JULY 2022



TEAM
KENTUCKY



BETTER
KY
PLAN

EXECUTIVE SUMMARY

Kentucky's Electric Vehicle Infrastructure Deployment Plan (EVIDP) was developed in accordance with the National Electric Vehicle Infrastructure (NEVI) Formula Program Guidance that was issued by the Joint Office of the U.S. Department of Transportation and U.S. Department of Energy (Joint Office). The process included robust stakeholder engagement and a thorough technical and policy analysis. Combined, these efforts resulted in a plan that provides a thoughtful and flexible framework for developing a statewide charging network across the Commonwealth.

INTRODUCTION

Kentucky's EVIDP was developed by the Kentucky Transportation Cabinet (KYTC) in close coordination with Kentucky's Energy and Environment Cabinet (EEC). The agencies established a steering committee that included the Public Service Commission (PSC) and the Federal Highway Administration (FHWA) to provide oversight and direction for the plan. Work on the plan began in January 2022 and the plan was submitted to the Joint Office in July 2022. The plan included three major elements: engagement, technical analysis, and policy and plan development.

STATE AGENCY COORDINATION

In addition to coordinating with EEC, PSC, and FHWA, KYTC also involved the following Cabinets: Economic Development, Finance and Administration, Tourism, Arts and Heritage, and Education and Workforce Development. KYTC also regularly communicated with other states. Per the **Chapter 2** guidance, KYTC is committed to the "Buy America" requirements of the NEVI program.

PUBLIC ENGAGEMENT

Outreach to the public was central to the development of the plan. KYTC participated in over 80 stakeholder meetings, events, or presentations between February and July 2022, resulting in engagement with over 800 stakeholders (**Figure ES.1**). Representatives included government agencies, municipalities, utilities, manufacturers, advocacy groups, private firms, and non-profits. The resulting themes covered key topics that helped inform the plan including:

- + Focus initial efforts on deploying fast charging infrastructure first on Interstates, then Parkways, and then other priority corridors
- + Prioritize geographic coverage over site capacity
- + Pair charging with economic opportunity
- + Serve rural and disadvantaged communities

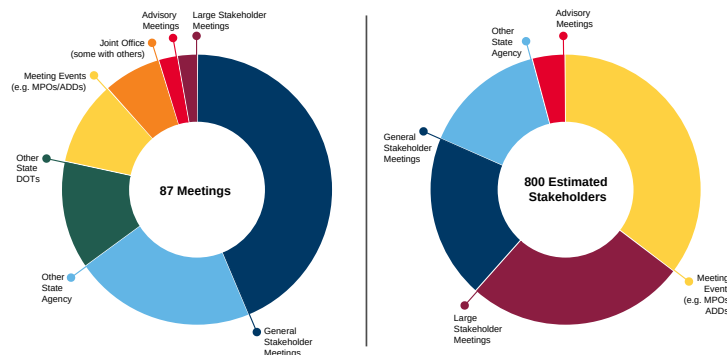


FIGURE ES.1 REPRESENTATIVE STAKEHOLDERS

Sidebar text in Executive Summary indicates how the EVIDP meets the NEVI guidance.

Introduction

- Plan development process
- Target dates
 - Completion July 2022
 - Approval by Sept. 2022
 - Implementation Oct. 2022
 - Deployment in 2023

State Agency Coordination

- Collaborative effort between KYTC and EEC
- Involved four other KY state agencies, FHWA, and other state DOTs
- Commitment to using U.S. made EV supply equipment

Public Engagement

- Stakeholder engagement included representatives from government agencies, municipalities, utilities, manufacturers, private firms, and non-profits
- Engagement included equity focused outreach that will continue as the plan evolves
- Stakeholder feedback supported the Joint Office goals including prioritizing Interstates and serving rural and disadvantaged communities

VISION AND GOALS

KYTC considered the NEVI Formula Program goals and guidance, in tandem with Kentucky's Long-Range Statewide Transportation Plan goals, to develop the EVIDP vision:

“A reliable, accessible, convenient, and affordable EV charging network that supports transportation choices, energy diversification, economic development, and environmental sustainability for all Kentuckians.”

As required by the **Chapter 4** guidance, KYTC evaluated the sources and uses of funding Kentucky will receive from the NEVI Formula Program. The total federal amount is approximately \$69.5 million over the 5-year program, with \$10.3M in Fiscal Year (FY) 2022. This will be matched by 20% (\$17.4M) in non-federal, likely private, funds for a total investment of at least \$86.9M. The expected amounts, uses, and timing are shown in **Figure ES.2** which is discussed further in EV charging infrastructure deployment below. To assess the state's progress on plan implementation, KYTC will update this EVIDP annually (or as required by the Joint Office) to reflect actual funding amounts and measure progress toward five goals:

1. A corridor-based EV charging system that supports interstate and regional travel
2. A local EV ecosystem that serves Kentucky's communities and travelers
3. A comprehensive system that supports transportation choices for all of Kentucky's residents
4. An interconnected, reliable, and resilient vehicle fueling system that can adapt to changes in market conditions and transportation technologies
5. A transportation system that reduces emissions and promotes clean air in Kentucky

Note: There will be quantifiable metrics for each goal.

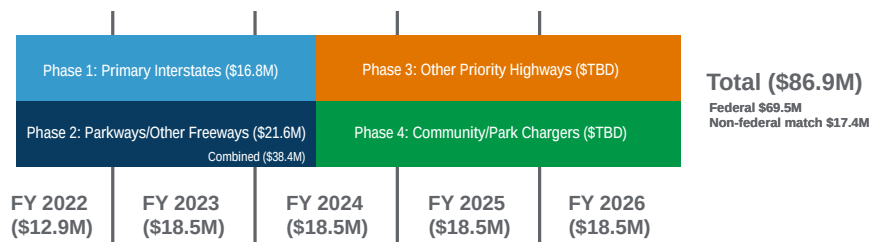


FIGURE ES.2 NEVI FORMULA FUNDING PROGRAM

CONTRACTING

KYTC and the Steering Committee identified priority outcomes for the contract method to implement the deployment of Direct Current Fast Charging (DCFC) stations. The contract method outcomes included maximize leverage of federal funds; attract multiple experienced proposers; arrange for contract partners to install, own, operate, and maintain the NEVI stations; engage with local, small, and disadvantaged businesses; and several others. KYTC has investigated a number of possible contract mechanisms, identifying the benefits and drawbacks of each.

With the plan complete, KYTC can now finalize the contracting approach. This includes completing a five-step process: 1) Finalize Concepts and Cost Estimates, 2) Talk to Industry, 3) Finalize the Contract Type, 4) Verify Legal Authority, and 5) Conduct Value-for-Money Analysis. Next, KYTC will advance to the procurement phase which includes developing procurement documents and evaluating proposals.

Plan Vision and Goals

- Aligns NEVI Formula Program goals with KY's LRSTP goals
- Identifies anticipated NEVI funding over the 5 year program
- Provides for annual updates
- Goals include quantitative targets including measuring system coverage and charging station reliability

Contracting

- Intend to contract with third-party entities for installation, operation, and maintenance of NEVI stations
- Establish a process to define the approach and requirements for third-party procurements
- Develop a strategy aimed at maximizing the use of federal funds
- Develop a strategy for how third-party entities will engage communities where EV charging infrastructure will be installed
- Develop a strategy for small business outreach related to implementing the EVIDP

Existing and Future Conditions Analysis

- Considered state specific geography, terrain, climate, market conditions, public transportation needs, and freight as it pertains to EV charger deployment
- Evaluated electric utilities that service the study area and grid capacity to support additional EV charging infrastructure
- Examined existing EV infrastructure and EV adoption and projected future adoption
- Identified risk and challenges to EV adoption and EV infrastructure deployment

EXISTING & FUTURE CONDITIONS ANALYSIS

In accordance with the NEVI Guidance, KYTC examined issues related to geography, terrain, and climate. These attributes are not expected to impact EV infrastructure planning in the state with a few possible exceptions. These exceptions include addressing snow removal, considering the mountainous highways in eastern Kentucky, and providing emergency charging equipment if power is lost during a storm event.

Kentucky is served by a network of Interstates and state parkways that provide for travel within, to, and through the state. I-65 and I-75, run north-south through the center of the state; I-24 runs through western Kentucky and I-64 runs east-west through the northern part of the state. The Parkway System covers other areas of the state, providing connectivity to rural areas. All of the Interstates and Parkways are designated as EV Alternative Fuel Corridors (AFCs) as shown on **Figure ES.3**. KYTC expects to use NEVI formula funds to deploy EV charging infrastructure on those AFCs. As described in the full report, additional priority corridors beyond the AFC network will be explored after the AFC network is approved by FHWA as built-out (**Figure ES.4**).

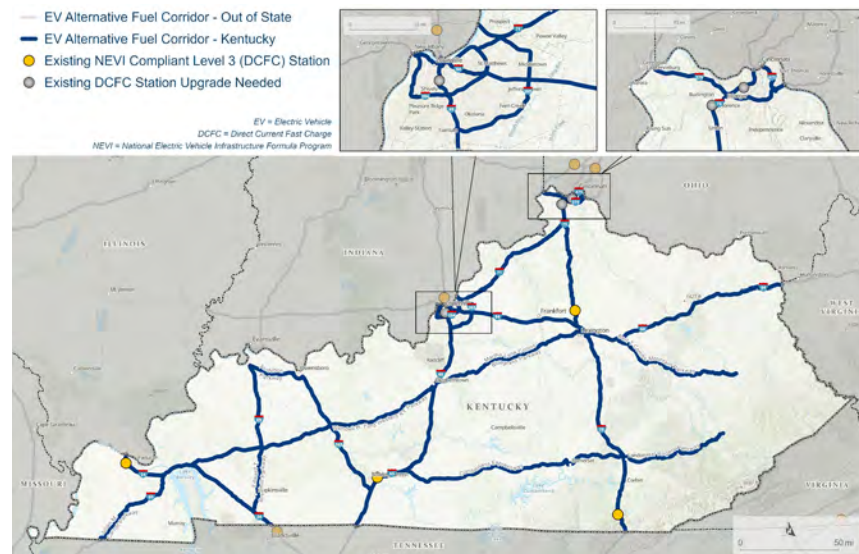


FIGURE ES.3 ALTERNATIVE FUEL CORRIDORS IN KENTUCKY

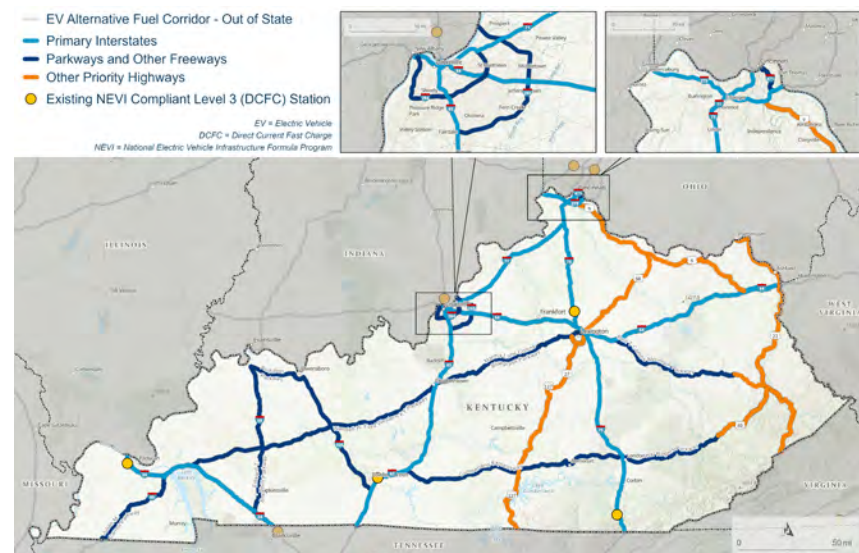


FIGURE ES.4 POTENTIAL OTHER PRIORITY CORRIDORS IN KENTUCKY



Electric power is distributed across Kentucky by 50 utilities, including investor-owned electric utilities, rural electric cooperatives, municipal electric systems, and Tennessee Valley Authority regulated utilities. The peak electrical power demand for DCFC stations was estimated along the AFC network based on projections for EV adoption and traffic growth. The results showed that the peak power demand through 2026 should not be difficult to meet with the existing electrical grid.

Kentucky currently has four publicly-accessible NEVI-compliant DCFC stations in the state with an additional four just beyond the state boundary. There are several publicly accessible non-NEVI compliant DCFC stations as well.

Currently, there are approximately 3,600 registered battery electric vehicles (BEVs) in Kentucky. This is 0.11% of the 3.3 million registered light-duty vehicles in the state, which is lower than the national average of 0.49% of registered vehicles. A forecast was developed that took into consideration twelve industry projections. It calls for BEV sales in Kentucky to reach a 30% market share in 2035, with 11.5% of all registered vehicles being a BEV by that time. Kentucky has lagged behind other areas of the country in EV adoption. However, with the growth of EV and battery manufacturing in the state and the substantial private, local, state, and federal investment in EVs and EV infrastructure, it is expected that adoption in Kentucky will increase and follow the national average in the future. This increase in adoption will go along with overcoming many of the identified barriers to EV adoption and EV infrastructure in Kentucky.

EV CHARGING INFRASTRUCTURE DEPLOYMENT

This section of the plan presents the proposed NEVI Program funded DCFC network, expected network demand, and how Kentucky is prioritizing locations on the network. It also covers other items required by the NEVI guidance.

KYTC prepared an analysis of the predicted demand for NEVI-compliant DCFC stations (NEVI stations) on the AFC network, along with assessments of power demand and station utilization. A NEVI station consists of a 4-port station with a minimum of 150kW of power per port (600kW total), and stations no more than 50 miles apart. The station demand is presented as a map of the required NEVI station density per 50 miles. **Figure ES.5** shows the predicted demand in 2030.

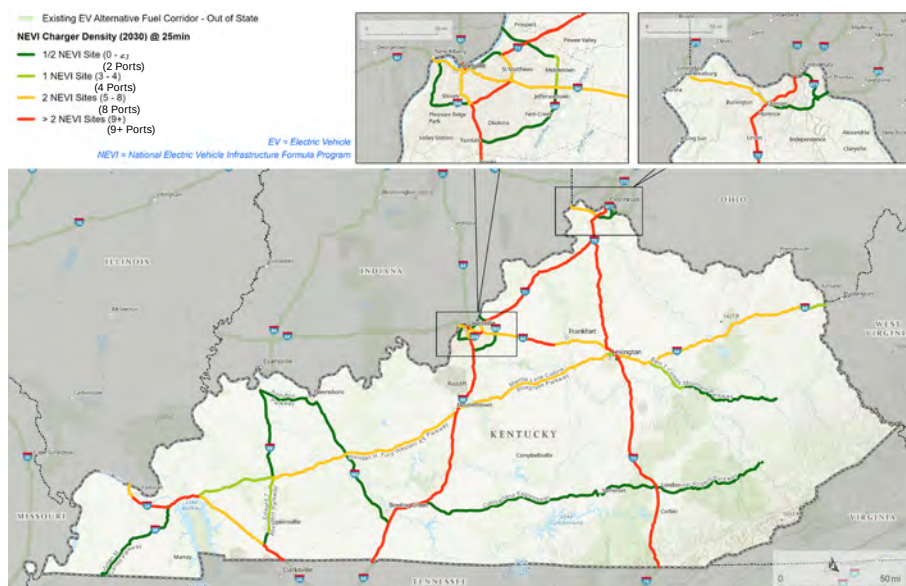


FIGURE ES.5 2030 NEVI CHARGER DENSITY

EV Charging Infrastructure Deployment

- Data-driven strategy for installations that prioritizes build-out along the Interstate Highway System
- Documented proposed DCFC network, NEVI station charger density, peak demand for NEVI stations, utilization rate for NEVI Stations, interchange suitability and prioritization
- Policy includes 4-tier plan to complete build-out starting with AFCs, then advancing to other corridors using a data-driven process to evaluate potential sites.

Kentucky's Electric Vehicle Infrastructure Deployment Plan

Implementation

- Approach to EV station operations and maintenance including data sharing is being planned to meet the 90-day and 180-day NEVI guidance and will be refined in partnership with FHWA and the Joint Office
- Outlines expected role of the private sector and how partners will be identified
- Addresses workforce and small business development opportunities
- Considers operations and maintenance, data sharing, emergency needs, and conceptual site layouts

The analysis does not recommend specific sites or interchanges but assigns planning level scores, which can be used to support future deployment activities. The approach is based on the view that there are multiple potentially good solutions to the challenge of sitting DCFC stations on the AFC network. Therefore, KYTC does not want to unnecessarily narrow the list. Instead, KYTC plans to involve the private sector in the implementation and contracting phases. **Figure ES.6** shows the interchange prioritization scores.

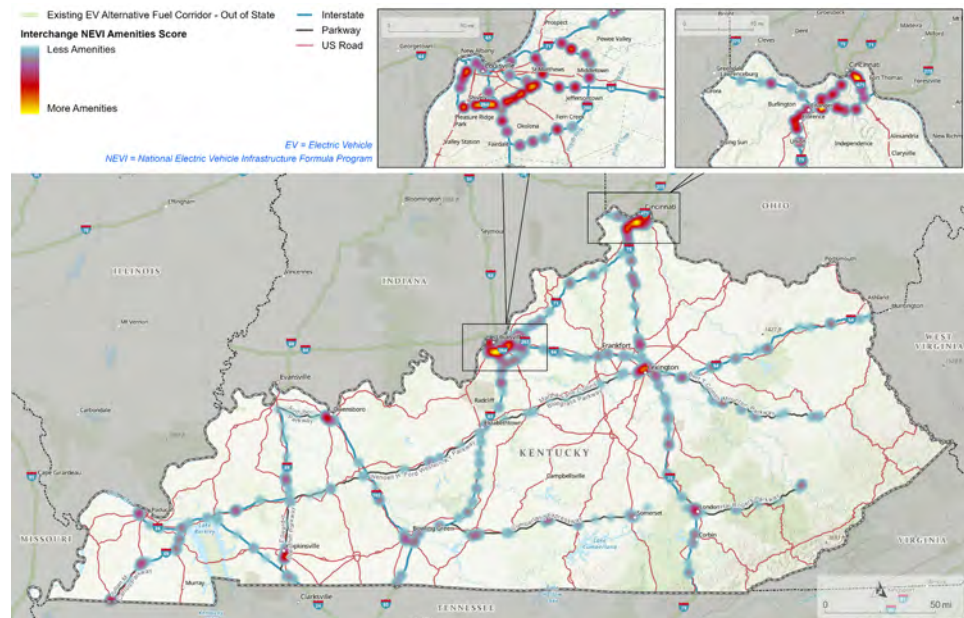


FIGURE ES.6 INTERCHANGE PRIORITIZATION SCORE

KYTC has a 4-tiered policy for the implementation of the NEVI Formula Program (See **Figure ES.2**). KYTC's policy is designed to provide capacity where needed and coverage to every corner of the state. Tier 1 would build out the Interstates, while Tier 2, which would run concurrently, would cover the Parkways. This would provide broad coverage along major highways including deployment in rural, mountainous, and disadvantaged communities. Tier 3 would address other priority corridors off the AFC network (see **Figure ES-4** for examples) and would run concurrently with Tier 4, which would include chargers in communities and at destinations. These tiers would further fill gaps and provide additional services in rural and disadvantaged communities.

IMPLEMENTATION

KYTC will involve the private sector in the implementation phase with the goal of maximizing the effectiveness of the federal investment. This will be done while adhering to the Joint Office requirements (90-day and 180-day guidance) and striving to meet KYTC's goals as outlined in this plan.

KYTC expects that operations and maintenance (O&M) for NEVI stations will be performed by private third-party providers, who will be required to meet specific contractual O&M standards. The contracting process will be used to identify station installers, service providers, and site hosts. The private operators will be responsible by contract to collect and share data and meet the other program requirements.

The EVIDP addresses the topic of labor, training, and installation standards. With regard to installation, preliminary charger types, standards, and possible layouts are presented. These will continue to be refined as the project advances.



CIVIL RIGHTS

KYTC routinely administers Federal-aid funds and is committed to compliance with State and Federal civil rights laws. The NEVI Formula Program will be implemented using the adopted practices related to Civil Rights compliance that have been successfully implemented in other federal funding programs for decades such as the Disadvantaged Business Enterprise (DBE) Program, Title VI of the Civil Rights Act, and Americans with Disabilities Act (ADA).

EQUITY

The Commonwealth supports equity considerations when planning investments in EV charging infrastructure. During the development of the EVIDP, KYTC used the EV Charging Justice40 Map tool to analyze the existing and future EV network for Kentucky and incorporated the location of these communities as a criterion for the selection of corridors and the priority scoring of interchanges. KYTC is working to develop approaches to encourage and monitor the participation of all citizens in the planning process and has taken specific steps to identify disadvantaged community members that should be included in the outreach and engagement program. Throughout the NEVI Formula Program, KYTC will engage these groups to understand the potential for workforce development, potential barriers to effective deployment and use of the infrastructure, and the potential to adjust the program to better suit the needs of every community member.

LABOR AND WORKFORCE

The NEVI Formula Program will generate substantial opportunities for equitable and accessible job creation in Kentucky's electrical and construction trades as a network of EV chargers is planned, designed, installed, and commissioned. Kentucky is prepared to meet this opportunity through its strong utility stakeholders and powerful workforce practices including leveraging statewide workforce initiatives, bolstering equity and accessibility to the workforce, educational collaboration, inclusive input and outreach, and leveraging the energy industry.

CYBERSECURITY

KYTC has identified a variety of best practices and strategies associated with maintaining the reliability and security of the state's EV charging network. As the plan advances further into implementation, KYTC will continue to coordinate with the Joint Office and other partners including Kentucky's Office of Technology to include the appropriate requirements and regulations to address cybersecurity.

PROGRAM EVALUATION

KYTC has developed a program evaluation plan that would provide the Joint Office with data documenting the impact of the federal dollars invested in EV charging infrastructure. It would also provide the Joint Office and KYTC with metrics regarding Kentucky's progress towards its goals and the performance of the charging network.

DISCRETIONARY EXCEPTIONS

Kentucky is not requesting any discretionary exceptions.

Civil Rights

- Addressed compliance with State and Federal civil rights laws.

Equity Considerations

- Considered equity throughout plan development

Labor and Workforce Considerations

- Explored potential training outreach opportunities - ongoing.

Cybersecurity

- Set framework in place to address cybersecurity; approach will be refined as plan evolves

Program Evaluation

- Proposed metrics for evaluating performance in achieving stated goals
- Proposed metrics that address the items in the NEVI guidance

Discretionary Exceptions

- None requested

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ACRONYMS

AFC	ALTERNATIVE FUEL CORRIDOR
AASHTO	AMERICAN ASSOCIATION OF STATE HIGHWAY AND TRANSPORTATION OFFICIALS
ADA	AMERICANS WITH DISABILITIES ACT
ADD	AREA DEVELOPMENT DISTRICT
ADT	AVERAGE DAILY TRAFFIC
BEV	BATTERY ELECTRIC VEHICLES
BIL	BIPARTISAN INFRASTRUCTURE LAW
BTS	BUILD-TO-SUIT
CED	CABINET FOR ECONOMIC DEVELOPMENT
CMAR	CONSTRUCTION MANAGEMENT AT RISK
DAC	DISADVANTAGED COMMUNITIES
DB	DESIGN-BID
DBB	DESIGN-BID-BUILD
DBE	DISADVANTAGED BUSINESS ENTERPRISE
DBF	DESIGN-BUILD-FINANCE
DBFO	DESIGN-BUILD-FINANCE-OPERATE
DBFOM	DESIGN-BUILD-FINANCE-OPERATE-MAINTAIN
DBOM	DESIGN-BUILD-OPERATE-MAINTAIN
DCFC	DIRECT CURRENT FAST CHARGER
DID	DEFENSE-IN-DEPTH
DOT	DEPARTMENT OF TRANSPORTATION
EV	ELECTRIC VEHICLE
EVSE	ELECTRIC VEHICLE SUPPLY EQUIPMENT
EVIDP	ELECTRIC VEHICLE INFRASTRUCTURE DEPLOYMENT PLAN
EEC	KENTUCKY ENERGY AND ENVIRONMENT CABINET
FHWA	FEDERAL HIGHWAY ADMINISTRATION
FY	FISCAL YEAR
ICE	INTERNAL COMBUSTION ENGINE
IIJA	INFRASTRUCTURE INVESTMENT AND JOBS ACT
KACO	KENTUCKY ASSOCIATION OF COUNTIES
KCFC	KENTUCKY CLEAN FUELS COALITION
KLC	KENTUCKY LEAGUE OF CITIES



KMUA	KENTUCKY MUNICIPAL UTILITY ASSOCIATION
KPMA	KENTUCKY PETROLEUM MARKETERS ASSOCIATION
KRWG	KENTUCKY RESILIENCY WORKING GROUP
KUTC	KENTUCKY UNEMPLOYMENT TAX CREDIT
KYTC	KENTUCKY TRANSPORTATION CABINET
KW	KILOWAT
LRSTP	LONG-RANGE STATE TRANSPORTATION PLAN
MPO	METROPOLITAN PLANNING ORGANIZATION
MW	MEGAWATT
NASEO	NATIONAL ASSOCIATION OF STATE ENERGY OFFICIALS
NEVI	NATIONAL ELECTRIC VEHICLE INFRASTRUCTURE
NPV	NET PRESENT VALUE
O&M	OPERATIONS AND MAINTENANCE
PSC	PUBLIC SERVICE COMMISSION
RFP	REQUEST FOR PROPOSAL
SBD	SECURITY BY DESIGN
SE REVI	SOUTHEAST REGIONAL ELECTRIC VEHICLE INFORMATION EXCHANGE
STP	STATE TRANSPORTATION PLANNING
STRIDE	SPOOFING, TAMPERING, REPUDIATION, INFORMATION DISCLOSURE, DENIAL OF SERVICE, ELEVATION OF PRIVILEGE
TAH	TOURISM ARTS AND HERITAGE CABINET
TETC	THE EASTERN TRANSPORTATION COALITION
U.S. DOE	UNITED STATES DEPARTMENT OF ENERGY
U.S. DOT	UNITED STATES DEPARTMENT OF TRANSPORTATION
VFM	VALUE-FOR-MONEY
VW	VOLKSWAGEN
WOTC	WORK OPPORTUNITY TAX CREDIT
ZEV	ZERO EMISSION VEHICLE



This symbol indicates guidance from The Joint Office
U.S. DOT and U.S. DOE



CHAPTER 1

INTRODUCTION

BACKGROUND

The nation's transportation system is beginning its most significant transformation since the Interstate System was established. The Federal Bipartisan Infrastructure Law (BIL), enacted as the Infrastructure Investment and Jobs Act (IIJA), passed in 2021 provides investments to help modernize infrastructure assets and support emerging technologies including electric vehicles (EVs). The resulting changes will provide long-lasting infrastructure and mobility improvements including supporting the adoption of electric vehicles by developing a national network of electric vehicle chargers.

In parallel with the federal initiatives, major automotive manufacturers have announced \$7.8 billion in investments in EV battery production in Kentucky. This includes \$5.8 billion and 5,000 new jobs to establish BlueOvalSK in Hardin County and \$2.0 billion and 2,000 new jobs at Envision AESC in Warren County. These projects will position Kentucky to be the EV battery production capital of the United States. They also position Kentucky's residents and businesses to be major beneficiaries of this industry transformation.

One of the new Federal policy and funding initiatives included in the IIJA was the creation of the National Electric Vehicle Infrastructure (NEVI) Formula Program which provides funding to states to deploy EV charging infrastructure to support this automotive industry and technology shift to EVs. The guidance issued for the NEVI Formula Program required that states develop an Infrastructure Deployment Plan outlining how they would utilize the formula funding. Kentucky has developed an EV Infrastructure Deployment Plan (EVIDP) that addresses the federal guidelines with partnerships across agencies and stakeholders.

PLAN DEVELOPMENT

Kentucky's EVIDP was prepared by the Kentucky Transportation Cabinet (KYTC) in close coordination with the Kentucky Energy and Environment Cabinet (EEC). The plan was developed in accordance with the 90-day NEVI Formula Program Guidance (NEVI Guidance) issued on February 10, 2022. KYTC is currently reviewing and will work to comply with the 180-day NEVI guidance issued on June 9, 2022. The plan will be flexible and will continue to evolve as new program rules and information becomes available over the five-year life of the NEVI Formula Program. This EVIDP documents the process that was used to develop the plan which included three key elements: Stakeholder Engagement, Technical Analysis, and Policy and Plan Development. A summary of the plan development process is provided in **Figure 1.1**.

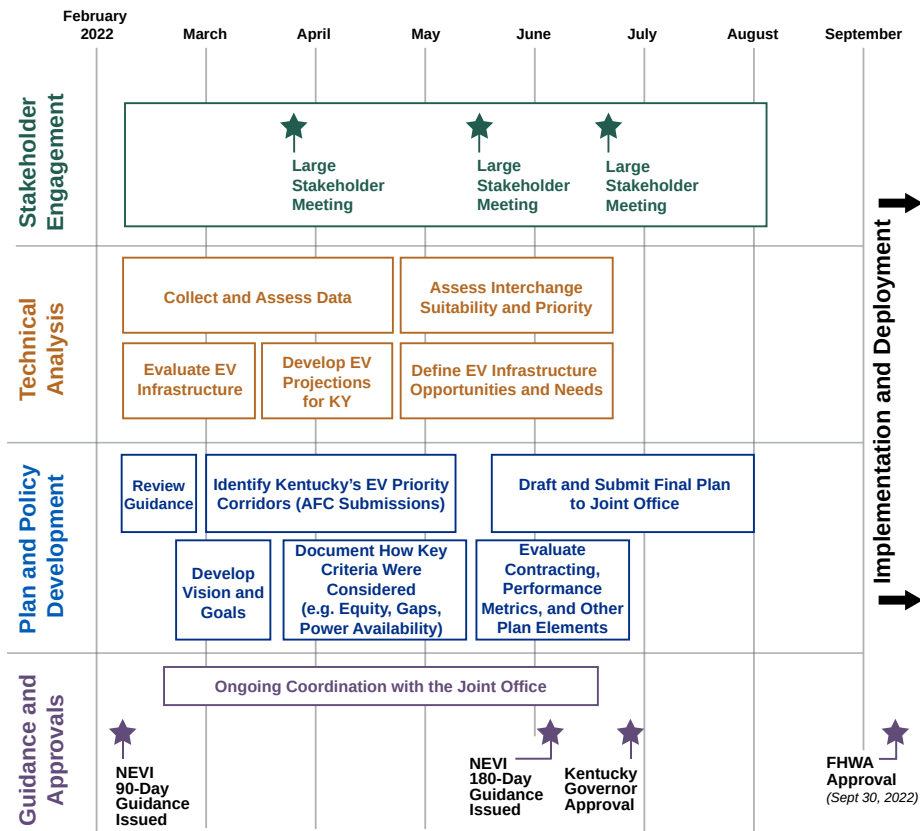


FIGURE 1.1 KENTUCKY EVIDP PROCESS

Stakeholder Engagement – KYTC reached out to over 100 different agencies, organizations, and stakeholder groups across the state. KYTC also set up a Steering Committee and two representative Advisory Committees. The input and feedback received from these stakeholders helped inform many aspects of the plan. Information gathered from these entities was essential to the technical and policy planning tasks.

Technical Analysis – The evaluation and assessment activities addressed the criteria outlined in the NEVI Guidance. This work provided a sound quantitative basis for decision making, including determining the suitability and prioritization of corridors and interchanges for Direct Current Fast Charger (DCFC) deployments.

Plan and Policy Development – The planning and policy work outlined the program vision and goals. It also addressed key topics such as funding, equity, contracting, and coordination with other states and their EV infrastructure programs. The final result is a focused, but flexible plan for Kentucky.

STUDY AREA

The study area is the State of Kentucky as illustrated in **Figure 1.2**. Kentucky is centrally located with numerous cross-state connections, including both north-south and east-west Interstates. The expansion of EV infrastructure in Kentucky will benefit the many drivers who travel within, to, and through Kentucky daily.



FIGURE 1.2 STUDY AREA

DEVELOPMENT, ADOPTION, AND IMPLEMENTATION

Kentucky initiated the plan development in January 2022 (See **Figure 1.3**). Work on the plan was substantially complete in June 2022 when the plan was approved by Kentucky's Governor Andy Beshear. The plan was then submitted to the Joint Office of the U.S. Department of Energy and the U.S. Department of Transportation (Joint Office) in July 2022. It is expected that the Federal Highway Administration (FHWA) will approve the plan by September 30, 2022. KYTC expects to begin implementation in October 2022. Deployment will occur in phases and is expected to begin in 2023 assuming FHWA approval of the plan by the end of September. This schedule will be dependent on the time required to complete the contracting process and start construction. It is anticipated that lead times for acquiring major infrastructure elements (e.g., charging equipment and transformers) could impact construction timelines, so it is not possible to provide a detailed deployment or construction schedule.

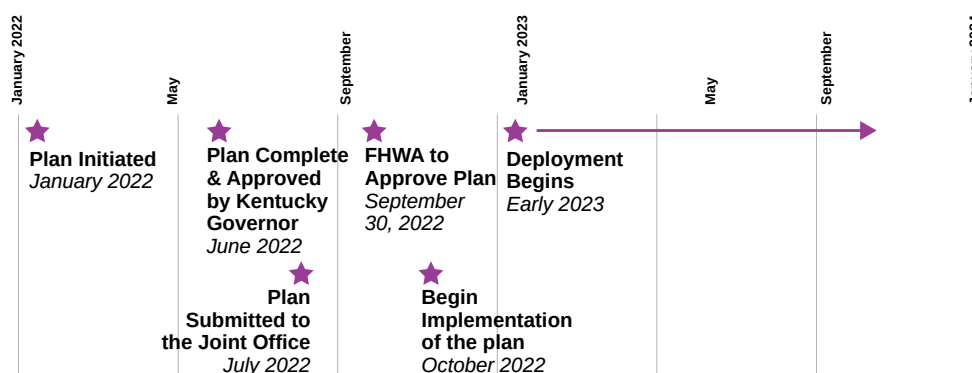


FIGURE 1.3 TIMELINE OF DEVELOPMENT, ADOPTION, AND IMPLEMENTATION

CHAPTER 2

STATE AGENCY
COORDINATION

KYTC is the lead agency for developing the EVIDP; however, the plan was developed in close coordination with EEC. Staff from the EEC have been involved in the EV planning conversation for many years. They provided knowledge and insight on key topics. The EEC is also the lead agency responsible for the distribution of the Volkswagen (VW) settlement funds that have been allocated to zero emission vehicle (ZEV) infrastructure. KYTC and EEC leadership reviewed the draft EVIDP before the document was submitted to the Governor for approval.

In addition to coordinating with EEC, KYTC created a Steering Committee that includes representatives from KYTC, EEC, the Public Service Commission (PSC), and the FHWA. This group has been meeting weekly since March of 2022 to discuss the plan development and related topics. KYTC has also reached out to other state agencies to coordinate on specific parts of the plan (**Figure 2.1**).



FIGURE 2.1 OTHER STATE AGENCIES INVOLVED IN EV INFRASTRUCTURE PLANNING



KYTC also coordinated with departments of transportation (DOTs) from adjoining states to coordinate on Alternative Fuel Corridors (AFCs), and to determine how they were implementing the NEVI Formula Program guidance. One-on-one meetings were held with Illinois DOT, Indiana DOT, Ohio DOT, Tennessee DOT, and West Virginia DOT. KYTC has not coordinated with Missouri DOT or Virginia DOT yet since there are no Interstate or Parkway/Freeway connections between those states and Kentucky. Collaboration with these states will take place later in the five-year NEVI program as the deployments shift to other priority routes.

In addition to the one-on-one discussions, KYTC has also been a part of several regional meetings where several adjoining states have been represented. These meetings have included sessions sponsored by the Joint Office as well as The Eastern Transportation Coalition (TETC), Southeast Regional Electric Vehicle Information Exchange (SE REVI), American Association of State Highway and Transportation Officials (AASHTO), National Association of State Energy Officials (NASEO), and affiliated groups. These sessions have provided a forum for discussing key topics related to AFCs and the NEVI Guidance.

In addition to the state agencies discussed here, many other local and regional agencies, as well as statewide organizations and advocacy groups were actively involved in the plan development. This included Metropolitan Planning Organizations (MPOs) and Area Development Districts (ADDs) from across the state. The many agencies and groups involved in the plan development are discussed further in **Chapter 3: Public Engagement.**

As outlined by the NEVI Guidance and requested for inclusion in this section of the plan, KYTC and EEC have been working to develop an approach that maximizes opportunities to use U.S.-made EV supply equipment (EVSE), in addition to U.S.-made materials and products for site development, electrical equipment, and construction materials. For example, KYTC is exploring opportunities to secure US-made equipment before NEVI funding availability, as it may be difficult to procure chargers once funding is available.

KYTC understands that the Buy America requirement is a key feature of this program intended to spur the growth of the EVSE charging industry in America. The implementation of the program will follow the requirements as outlined in the April 18, 2022, Presidential Memo M-22-11, and KYTC and EEC will continue to monitor guidance to ensure requirements are met. KYTC and EEC have already begun the process of identifying “Buy America” compliant charging infrastructure, and have come to understand that charging infrastructure providers are working to provide equipment that meets the requirements as well.

A potential challenge that KYTC foresees is the procurement of charging infrastructure that exceeds the program guidelines. For example, KYTC is exploring the benefits of stations that can deliver 175kW per port and 350kW with power-sharing when only one vehicle is present. These are new chargers with advanced technology, and it will be a challenge to obtain chargers that follow compliance. That said, KYTC understands that Buy America compliance will supersede the preference for infrastructure capability and will continue to identify opportunities to meet the requirements while obtaining infrastructure that is suitable for the program.

CHAPTER 3

PUBLIC ENGAGEMENT

KYTC and their partner state agencies implemented an extensive stakeholder engagement program as part of planning for the deployment of EV charging infrastructure across Kentucky. This began with a thoughtful communication and outreach program designed to reach the many agencies, organizations, companies, and other stakeholders in Kentucky's EV Ecosystem. **Figure 3.1** highlights many of the stakeholders that KYTC engaged with during the plan development, illustrating the effectiveness of the program.

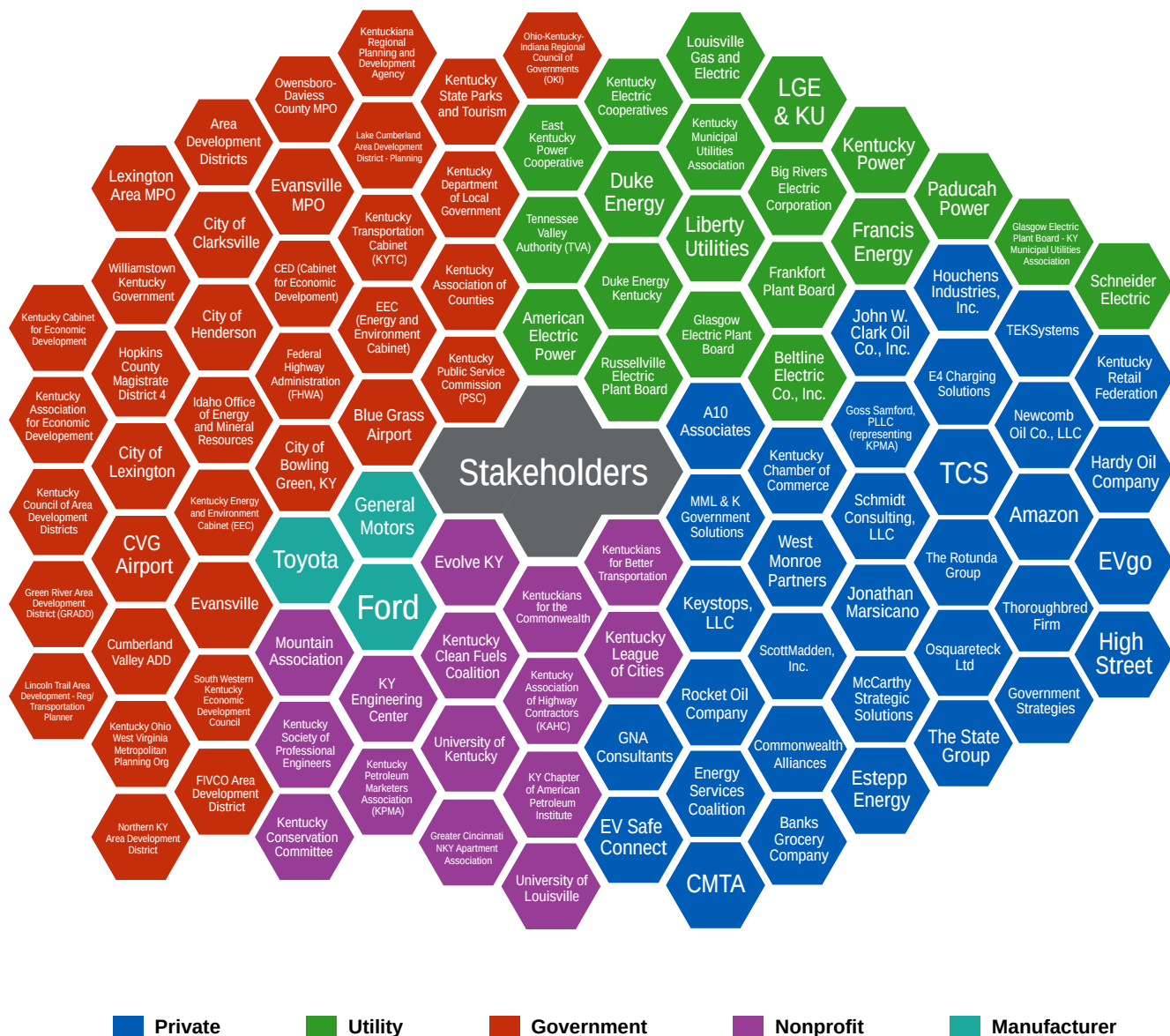


FIGURE 3.1 STAKEHOLDER ENGAGEMENT OF KENTUCKY'S EV ECOSYSTEM

COMMUNICATION PROGRAM GOALS

The communications plan and engagement process were developed and implemented with the primary goals of:

- + Engaging in discussions with stakeholders about planning for EVs and EV infrastructure, both along corridors but also in communities
- + Identifying key partners and gathering/sharing data
- + Informing stakeholders about the NEVI Formula Funding Program, and general information about EVs and EV infrastructure.
- + Obtaining feedback and answering questions related to the NEVI Program
- + Requesting feedback on plan-related topics such as the evaluation criteria

MEETINGS

Between February 2022 and July 2022, KYTC engaged in over 80 meetings and outreach efforts, reaching nearly 800 stakeholders. These engagement efforts included Large Stakeholder Meetings, Speaker Events; Advisory Committee Meetings; and Smaller Group Stakeholder Discussions (**Figure 3.2**). There were also numerous meetings with the Joint Office, other state DOTs, and other Kentucky state agencies over the six-month period. Examples and more details are provided later in this chapter.

STEERING COMMITTEE

A steering committee was formed to provide management, oversight, and execute decisions concerning the organization and direction of the deployment plan. Meetings for the steering committee were held virtually, once a week. The committee also worked with outreach coordinators to help identify stakeholders and partners.

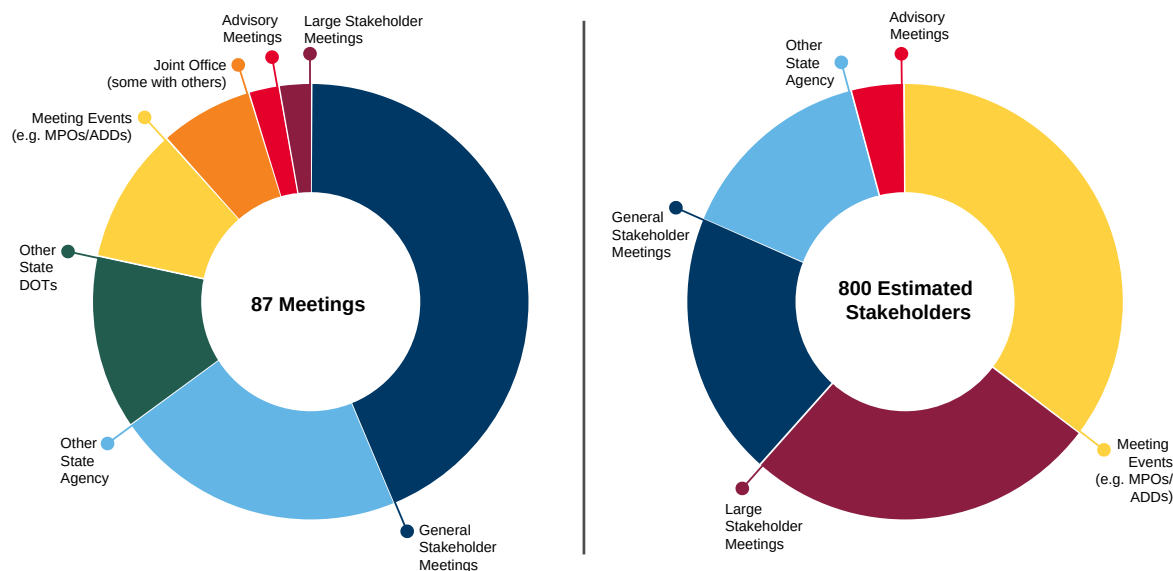


FIGURE 3.2 SUMMARY OF STAKEHOLDER MEETINGS



FIGURE 3.3 TECHNICAL ADVISORY COMMITTEE

REPRESENTATIVE TECHNICAL ADVISORY COMMITTEE

The Technical Advisory Committee (**Figure 3.3**) was set up to provide focused input during the development of the plan. This committee was composed of entities such as utility companies that could provide data about current infrastructure and provide guidance on what would be needed to build out the charger network. The group is expected to continue meeting in the future to facilitate the implementation and future updates of the EVIDP. In addition to the Steering Committee members, the following organizations were represented:

- + Kentucky Electric Cooperatives
- + Kentucky Municipal Utility Association (KMUA)
- + Investor-Owned Electric Utilities (IOUs)
- + Kentucky Clean Fuels Coalition (KCFC)
- + Kentucky Finance and Administration Cabinet
- + Kentucky Petroleum Marketers Association (KPMA)



FIGURE 3.4 GOVERNMENTAL ADVISORY COMMITTEE

REPRESENTATIVE GOVERNMENT/POLICY ADVISORY COMMITTEE

A Government/Policy Advisory Committee (**Figure 3.4**) was also set up to provide input on the plan, in addition to assisting with outreach to local jurisdictions to prepare them for implementation. The group is expected to continue meeting in the future, as needed, to facilitate the implementation and future updates of the EVIDP. In addition to the Steering Committee members, the following organizations were represented:

- + Cabinet for Economic Development (CED)
- + Kentucky Association of Counties (KACO)
- + Kentucky Council of Area Development Districts (ADDs)
- + Kentucky Finance and Administration Cabinet
- + Kentucky League of Cities (KLC)
- + Metropolitan Planning Organizations (MPOs)
- + Tourism Arts and Heritage (TAH) Cabinet

LARGE GROUP STAKEHOLDER MEETINGS

Three large virtual stakeholder meetings were conducted during the development of the plan. These meetings were designed to reach out to any interested stakeholders. Each meeting included informational and educational elements and were also designed to facilitate feedback. Attendees were involved through the chat function as well as through virtual meeting interactive polling. Breakout groups were also used during one of the meetings to provide people with the opportunity to talk in small group settings about any questions, concerns, or ideas. Many groups attended the meetings including but not limited to:

- + American Electric Power
- + Area Development Districts
- + Big Rivers Electric Corporation
- + Cabinet for Economic Development
- + Commonwealth Alliances
- + Duke Energy
- + East Kentucky Power Cooperative
- + Energy Services Coalition
- + Evolve KY
- + Federal Highway Administration (FHWA)
- + Ford
- + Frankfort Plant Board (FPB)
- + General Motors
- + Gladstein Neandross & Associates (GNA) Clean Transportation and Energy Consultants
- + Goss Samford, PLLC (representing KPMA)
- + Government Strategies
- + Hopkins County Magistrate District 4
- + Kentuckians for Better Transportation
- + Kentucky Association for Economic Development
- + Kentucky Association of Counties
- + Kentucky Cabinet for Economic Development
- + Kentucky Chamber of Commerce
- + Kentucky Chapter of American Petroleum Institute
- + Kentucky Clean Fuels Coalition
- + Kentucky Conservation Committee
- + Kentucky Department of Local Government
- + Kentucky Electric Cooperatives
- + Kentucky Energy and Environment Cabinet (EEC)
- + Kentucky League of Cities
- + Kentucky Municipal Utilities Association (KMUA)
- + Kentucky Petroleum Marketers Association (KPMA)
- + Kentucky Power

- + Kentucky Public Service Commission (PSC)
- + Kentucky Retail Federation
- + Kentucky Society of Professional Engineers
- + Kentucky State Parks and Tourism
- + Kentucky Transportation Cabinet (KYTC)
- + LG&E-KU
- + McCarthy Strategic Solutions
- + MML & K Government Solutions
- + Mountain Association
- + Schmidt Consulting, LLC
- + Schneider Electric
- + Tennessee Valley Authority (TVA)
- + The Rotunda Group
- + Thoroughbred Firm
- + Toyota Manufacturers of North America, Toyota Motor Manufacturer Kentucky (TMNA/TMMK)
- + University of Louisville
- + Williamstown Kentucky Government

SPEAKER EVENTS

As a means of sharing information, KYTC staff and other project team members spoke at over a dozen agency or group events during the plan development. This included meetings such as MPO, ADD, county association, and utility association meetings. KYTC also participated in Federal and state meetings. Examples include:

- + The Eastern Transportation Coalition (TETC) presentation on April 13, 2022
- + The KYTC sponsored State Transportation Planning (STP) meeting held in Frankfort, KY on April 20, 2022. This hybrid meeting was attended by over 100 transportation planners across the state. It provided an opportunity for many community and planning leaders across the state to learn about the plan, ask questions, and provide feedback.
- + The Quarterly Kentucky Municipal Utility Association meeting held in Leitchfield, KY on April 21, 2022. This meeting reached a very different group of stakeholders and provided an excellent opportunity for them to provide feedback and raise concerns about electric utility related issues.
- + AASHTO Planning Webinar Series, Part 2: EV Plan Development on May 9, 2022

Dozens of smaller group stakeholder discussions were also held throughout the plan development to discuss specific topics ranging from emerging technology to community charging to ongoing station deployments by other agencies. Five examples are:

- + Kentucky based vehicle manufacturer meeting to discuss topics such as power levels, site layouts, and vehicle charging speeds.
- + Kentucky Clean Fuels Coalition (KCFC) meeting to discuss the AFCs, plan development process, and the CFC's initiatives to install stations in Kentucky using U.S. DOE grant funding.
- + EvolveKY meeting to discuss their experiences installing hundreds of Level 2 charging ports around the state. EvolveKY is a non-profit EV advocacy group in Kentucky.
- + Petroleum Marketers Association meeting to discuss the NEVI funding and guidance. Also to hear the perspective of, and get feedback from, the association's members.
- + An equity focused meeting with the Kentucky Resiliency Working Group (KRWG) Equity Task Force and representatives from the ADDs and MPOs across the state to solicit input on the plan and plan deployment.

During the plan development, KYTC also met with university researchers, EVSE installers/operators, individual utilities, and many others. KYTC also met with parties interested in freight movement, including hydrogen fuel cell freight stakeholders such as Amazon and TMNA/TMMK.

FEEDBACK RECEIVED

Throughout the stakeholder engagement process, virtual meeting interactive polling tools, breakout groups, and digital messaging were utilized to listen to feedback regarding Kentucky's infrastructure deployment plan priorities, goals and other major topics important to the plan's development. This feedback and how it has been incorporated in the development of this plan is discussed below.

BARRIERS TO EV ADOPTION AND EV INFRASTRUCTURE DEPLOYMENT

Stakeholders listed cost, range limitations, and charging time as common barriers to EV adoption and EV infrastructure deployment (**Figure 3.5**). These topics are addressed further in **Chapter 6**.



FIGURE 3.5 COMMON BARRIERS TO EV ADOPTION AND DEPLOYMENT

CRITERIA FOR SELECTING OTHER PRIORITY EV CORRIDORS

During stakeholder engagement meetings, attendees were presented with information and weighed in on how future EV corridors should be prioritized. Key themes included:

- | | | |
|-------------------|-------------------|---------------------------|
| + Major Roads | + Residence Types | + Destinations |
| + Population | + Traffic | + Development Opportunity |
| + Private Sector | + Access | + Disadvantaged Areas |
| + Proximity | + Capacity | + Distance |
| + EV Registration | + Connectivity | + Gaps |

DEPLOYMENT CORRIDOR PRIORITIZATION

During the second stakeholder meeting, attendees weighed in on the plan's goals and the prioritization of deploying EV infrastructure on different types of corridors and areas. Based on the live polling responses, attendees rated the use of NEVI formula funds for deploying DCFC chargers on Interstates as the top priority which matches U.S. DOT's stated top priority for the program (**Figure 3.6**). The deployment of DCFC on Parkways was the second priority, closely followed by other state priority corridors. The deployment of Level 2 chargers in communities and at destinations was rated as the lowest priority for this program. Stakeholders mentioned an approach that would leave the Level 2 charging to be implemented at the local level (due to its lower cost and lower complexity) and leave DCFC charging infrastructure to KYTC (due to its higher cost and higher complexity).

Attendees scored the use of NEVI formula funds for deploying DCFC chargers on Interstates as the top priority, which matches U.S. DOT's top priority for the program.

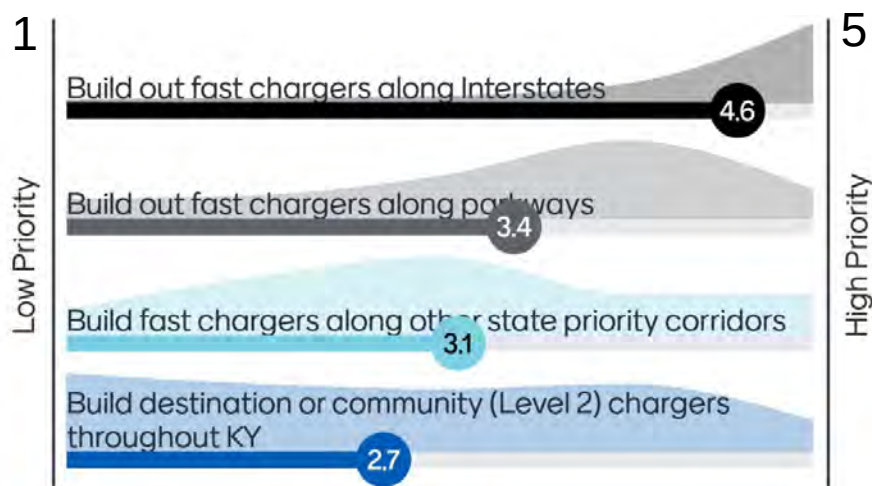


FIGURE 3.6 DEPLOYMENT PRIORITIZATION

MOST IMPORTANT CHARACTERISTICS FOR LOCATING DCFC STATIONS

During the first stakeholder meeting, stakeholders were asked to rate the importance of characteristics for locating DCFC stations from 1= least important, to 10= most important. Providing service to long-distance travelers was ranked as the most important characteristic for Level 3 Charging Sites (**Table 3.1**).

TABLE 3.1 IMPORTANT CHARACTERISTICS FOR LEVEL 3 (DCFC) CHARGING SITES

Characteristic	Weighted Average
Service to long-distance travelers	8.0
Plugging Gaps (smaller sites on more corridors)	6.7
Proximity to businesses and services	6.6
Near high-density population centers	6.2
Near tourist areas and attractions	5.9
Direct access for site ingress and egress	5.8
Service to rural or underserved areas	5.7
Building Capacity (bigger sites on fewer corridors)	3.9

CRITERIA FOR PRIORITIZING INTERCHANGES FOR FAST CHARGING STATIONS

During stakeholder meetings, attendees were asked to share how the state could prioritize interchanges for DCFC stations. The planning team developed draft criteria and considerations (listed below) that were used as discussion points with stakeholders. In general, stakeholders thought the criteria reflected the priorities that should be considered for either the selection of interchanges or the selection of candidate host sites for the infrastructure.

SUMMARY OF THEMES

- + Accessibility and ease of access to the charging station.
- + Traveler Amenities such as shops or restaurants that can serve travelers.
- + Capacity for the grid to accommodate NEVI-compliant DCFC chargers.
- + Community Assets such as parks, open space where people can spend time while a vehicle charges.
- + Destinations that draw locals and tourists to an area, especially those that draw long distance travelers.
- + Justice40 Communities that are located in both the urban and rural portions of Kentucky.
- + Economic Opportunity in places like redevelopment districts, or areas identified by government for focused investment.

KEY ENGAGEMENT TAKEAWAYS

Throughout the engagement process, feedback was collected from a wide variety of stakeholders and participants. Participants were asked to explore barriers to deployment, opportunities for successful implementation, and areas where additional coordination or efforts will need to be made. The feedback received from this effort was used to inform specific elements in the Plan but will also be used as a guide for future program implementation efforts and future EV-related efforts. While the key takeaways listed below do not capture every comment received, they do provide a summary of some of the areas that are critical to making this Plan and program a success in Kentucky. (The views listed below were mentioned by at least several individuals/stakeholders throughout the plan development process.)

- + Focus DCFC infrastructure first on Interstates, then Parkways, and then National Highway System (NHS) corridors that support long-distance travel.
- + Prioritize geographic charger coverage over site capacity. Fewer chargers in more places are better than more chargers in fewer places.
- + Traveler amenities are important. Chargers should be placed with consideration to nearby businesses, services, destinations, attractions, and other amenities that can be accessed when a vehicle is charging.
- + Pair charging with economic opportunity. There is a recognition that this infrastructure has the potential to be an economic catalyst that leverages new technology and next-generation transportation systems. Example: Location of chargers within redevelopment districts or co-located to serve the manufacturing facilities that are building the technology here in Kentucky. Batteries for the new Ford F-150 Lightning will be manufactured by people driving that vehicle to work, charging it on infrastructure developed as part of this program.
- + Serve rural and disadvantaged communities. This includes engagement, minimum infrastructure requirements, prioritization of infrastructure in these communities, and selection of corridors to serve these communities.
- + Education will be a continuous need. Electric mobility is still new to many people, and there will be a period of transition before it becomes well-known.
- + Partner whenever possible, from utilities, workforce development providers, and communities, to OEM's, EV groups, and local and regional governments.
- + Engage and support communities that will be home to DCFC infrastructure, and those who wish to start the planning and implementation of destination charging for their communities. This includes streamlined permitting, model code, general guidance, and community readiness planning.
- + Power availability was a key concern, especially in rural areas. The program should provide the ability to install less chargers (less load) in less-utilized areas. Coordination with utilities throughout the process will be key in identifying the ability to deliver the needed power to chargers.
- + There was recognition that new DCFC chargers do not need to be located near existing chargers (both DCFC and Level 2).

CHAPTER 4

PLAN VISION AND GOALS

KYTC 2022-2045 DRAFT LRSTP

KYTC's 2022-2045 Draft Long-Range State Transportation Plan (LRSTP) goals, objectives, and guiding principles were considered alongside the NEVI guidance to develop Kentucky's EVIDP vision and goals. The KYTC LRSTP goals, objectives, and guiding principles are summarized below. They correlate well with the NEVI guidance emphasizing topics such as seamless connectivity, reliability, and equity.



LRSTP GOALS & OBJECTIVES

Goal 1: Enhance safety

Goal 2: Deliver a high level of maintenance and resiliency

Goal 3: Ensure a reliable flow of people and freight

Goal 4: Provide local, regional, and global connectivity for communities

Goal 5: Deliver and operate a system that protects or enhances the natural and human environment



LRSTP GUIDING PRINCIPLES

Principle 1: Equity

Principle 2: Adaptability/Sustainability

Principle 3: Seamlessness

Principle 4: Quality of Life

Principle 5: Economic Vitality

NEVI GUIDANCE

OVERVIEW

The BIL makes the most transformative investment in EV charging in United States history. It puts the country on a path to a nationwide network of 500,000 EV chargers by 2030 to achieve a convenient, reliable, affordable, and equitable charging experience for all users. This national network will:

- + Accelerate equitable adoption of EVs, including for those who cannot reliably charge at home. (Equity)
- + Reduce transportation-related greenhouse gas emissions and help put the U.S. on a path to net-zero emissions by no later than 2050. (Environment)
- + Position U.S. industries to lead global transportation electrification efforts and help create family-sustaining union jobs that cannot be outsourced. (Economic Development)

Source: 90-Day NEVI Guidance

PURPOSE STATEMENT

The purpose of the NEVI Formula Program is to “provide funding to States to strategically deploy electric vehicle charging infrastructure and to establish an interconnected network to facilitate data collection, access, and reliability.” To be effective, the EV charging infrastructure deployed under this program must provide a seamless customer experience for all users through a convenient, reliable, affordable, and equitable national EV charging network.

Source: 90-Day NEVI Guidance

EVIDP VISION

Kentucky's EVIDP vision and goals are presented in **Table 4.1**. They align with the LRSTP goals to work in tandem with the state's top priorities to address the growing national demand for EV charging infrastructure. For each goal, a quantifiable performance metric is presented. The performance metrics are discussed further later in this chapter.

KENTUCKY'S EVIDP VISION

A reliable, accessible, convenient, and affordable EV charging network that supports transportation choices, energy diversification, economic development, and environmental sustainability for all Kentuckians.

TABLE 4.1 VISION AND GOALS

2022-2045 LRSTP			
Kentucky's EV Goals	Goals	Guiding Principles	How the Plan will Meet the Goals
GOAL 1 A corridor-based EV charging system that supports interstate and regional travel	G3, G4	P1, P3, P5	Kentucky has defined a system of Interstates and Parkways that serve long-distance travelers within and through the state. The system connects major urban and rural areas across the state. Most EV drivers will be able to access the system by driving 50 miles or less. (Metric: System miles covered by EV charging stations that meet the standards outlined in this plan.)
GOAL 2 A local EV ecosystem that serves Kentucky's communities and travelers	G3, G4	P1, P2, P3, P5	Although intended for long-distance travel, the fast-charge infrastructure can also serve as a vital part of the local EV ecosystem near these corridors. They can serve as a backup for local Level 2 charging or be used for emergency fast charging. (Metric: Number of residents and employees within 15 miles and 50 miles of EV charging stations installed using NEVI funds.)
GOAL 3 A comprehensive system that supports transportation choices for all of Kentucky's residents	G3, G4	P1, P3, P5	Justice40 and rural communities were a key consideration in the selection of corridors and prioritization of interchanges for future charging infrastructure. It is essential that Kentucky's EV infrastructure work for all of Kentucky's communities. (Metric: Number of rural and Justice40 residents within 15 miles and 50 miles of EV charging stations installed using NEVI funds.)
GOAL 4 An interconnected, reliable, and resilient vehicle fueling system that can adapt to changes in market conditions and transportation technologies	G2	P2, P3, P5	The switch to electrified mobility opens Kentucky's transportation sector to new energy sources, providing an opportunity for energy diversification and redundancy that is not possible with petroleum-burning internal combustion engines. Reliability will be critical to the success of the system. (Metric: Percent operational time for EV charging stations installed using NEVI funds.)
GOAL 5 A transportation system that reduces tailpipe emissions and promotes clean air in Kentucky	G3	P1, P2, P4	Increasing the number of zero emission vehicles on Kentucky's highways will reduce pollution. Reducing tailpipe emissions will also benefit communities adjacent to major corridors by decreasing pollution that may affect these areas. (Metric: Number of registered EVs in the state of Kentucky.)

NEVI FORMULA PROGRAM FUNDS - SOURCES

KYTC will receive approximately \$69.5 million in NEVI formula funds over the five-year period from Federal Fiscal Year (FY) 2022 to FY 2026 as indicated in **Table 4.2**. The minimum 20% non-federal match required to secure that funding is \$17.4 million, for a minimum total five-year program amount of \$86.9 million. If a larger non-federal match can be secured that amount could increase.

TABLE 4.2 NEVI FORMULA FUNDS AND MATCHING FUNDS (MILLIONS)

Federal Fiscal Year	Forecasted NEVI Funds	Match Funds	Total
2022	\$10.3	\$2.6	\$12.9
2023	\$14.8	\$3.7	\$18.5
2024	\$14.8	\$3.7	\$18.5
2025	\$14.8	\$3.7	\$18.5
2026	\$14.8	\$3.7	\$18.5
Total	\$69.5	\$17.4	\$86.9

The FY 2022 federal amount is approximately \$10.3 million. The minimum 20% non-federal match for FY 2022 is \$2.6 million, resulting in a total of \$12.9 million for the year. It is assumed that the remaining annual amounts will be divided evenly over the following four years. This results in approximately \$14.8 million in federal funds and \$3.7 million in matching funds or \$18.5 million in total for FY 2023 through FY 2026. This plan is expected to be updated on an annual basis (as needed) to reflect the state funding plans for each fiscal year.

NEVI FORMULA PROGRAM FUNDS - USES

It was estimated that up to 32 NEVI-compliant charging stations could be required to build out the AFC network in Kentucky. (The AFC network is discussed in detail in **Chapter 6**). This assumed a NEVI compliant 4-port charging system would be installed every 50 miles or less. For some corridors, the distance between chargers could be less than 30 miles due to the corridor length and/or interchange spacing. The estimate includes 14 stations on the major Interstates and 18 stations on the Parkways or other freeways.

The per unit cost estimate for the design and construction of each installation was conservatively estimated at \$1.2 million. The resulting cost for all AFCs is \$38.4 million: \$16.8 million for the Interstates and \$21.6 million for the Parkways and other freeways.

Based on these estimates, Kentucky should be able to deploy the needed chargers on the Interstates and Parkways (all AFCs) part way through FY 2024. (See **Figure 4.1**). Kentucky would then in FY 2024 request to have the AFC system certified as

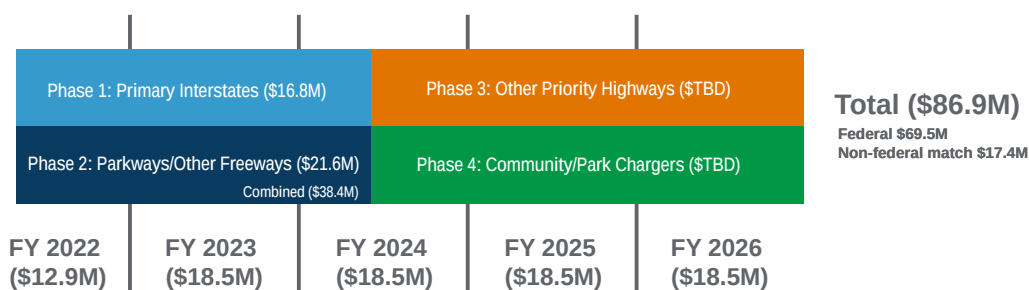


FIGURE 4.1 NEVI FORMULA FUNDS USES BY YEAR

built-out by the Secretary of the U.S. DOT. This would require that U.S. DOT certify that the AFCs (with priority given to the Interstates) are NEVI compliant, except where any specific documented exceptions have been granted.

If Kentucky is certified as built-out in FY 2024, the remaining funds from FY 2024 through FY 2026 could be used with more flexibility. For example, they could be used to install DCFC stations on other priority corridors around the state (see **Chapter 6**). Investment in these corridors could expand the EV charging network into areas that do not have direct access to an Interstate or Parkway. After build-out, funds could also be used to install Level 2 chargers in communities or at parks and other destinations. This could extend the EV charging network even further and support economic development initiatives across the Commonwealth.

FIVE-YEAR TARGETS

In accordance with the NEVI Guidance, KYTC is identifying outcome-based aspirational targets for the next five years (**Table 4.3**). Currently, two of them have preliminary quantifiable targets. The targets are expanded upon in **Chapter 13: Program Evaluation**. They are also subject to change based on the Notice of Proposed Rule Making that was issued on June 9, 2022. They may also be modified during the program implementation process as new information becomes available.

TABLE 4.3 FIVE-YEAR TARGETS

No.	Goal	Performance Metric	Five-Year Target
1	A corridor-based EV charging system that supports interstate and regional travel	System miles covered by EV charging stations that meet the standards outlined in this plan.	>800 miles
2	A local EV ecosystem that serves Kentucky's communities and travelers	Number of residents and employees within 15 and 50 miles of EV charging stations installed using NEVI funds.	TBD as Part of Implementation Process
3	A comprehensive system that supports transportation choices for all of Kentucky's residents	Number of rural and Justice40 residents within 15 and 50 miles of EV charging stations installed using NEVI funds.	TBD as Part of Implementation Process
4	An interconnected, reliable, and resilient vehicle fueling system that can adapt to changes in market conditions and transportation technologies	Percent operational time for EV charging stations installed using NEVI funds.	>97% Uptime
5	A transportation system that reduces tailpipe emissions and promotes clean air in Kentucky	Number of registered BEVs in the state of Kentucky.	TBD as Part of Implementation Process

ANNUAL PLAN UPDATES

In accordance with the guidance, this plan is expected to be updated annually (as needed) to reflect future year funding allocations, new guidance, and progress in implementing the plan. The annual updates would provide an opportunity to adjust the plan, including the goals and targets, based on new information, ongoing stakeholder and public input, and lessons learned. These annual updates would also provide a scheduled opportunity for information sharing with other states and the Joint Office.



Each state should provide 5-year goals for the duration of the program



Plans should be updated on an annual basis to reflect the state funding plans for that fiscal year.

CHAPTER 5

CONTRACTING



FHWA anticipates that in most instances States will contract with private entities for the installation, operation, and/or maintenance of EV charging infrastructure funded in whole or in part through the NEVI Formula Program.

KYTC intends to contract with outside third-party entities to install, own, operate, and maintain the EV infrastructure for the Commonwealth. KYTC will carefully select private partners that have the proper expertise and experience, can effectively deploy the public sector resources in a manner that maximizes and leverages the federal funding, and who understand Kentucky's priorities regarding the involvement of local communities in rural areas and the need to involve small and local businesses. In addition, the contracting mechanism will facilitate the selection of contractor(s) who have a realistic plan to deploy the charging infrastructure in a manner that will enable KYTC to meet the goals and time frame put forth in this plan.

CONTRACTING AND DELIVERY METHODS

Like most types of infrastructure, EV charging infrastructure can be delivered using a variety of contracting methods. In fact, it is possible that different portions of the program could be built using different contracting structures, depending on the risks and opportunities associated with a given segment. The public owner and private partner share the risk and control to varying degrees depending on the contracting methodology. All contracting methods have pros and cons, and all present some challenges to the public owner.

KYTC narrowed down the contracting approaches by first considering their priority outcomes for this effort:

- + Maximize leverage of federal dollars while following all federal requirements
- + Select a contracting partner who understands and is fully committed to KYTC's stakeholder outreach, community interaction, equity commitments, and small business development goals
- + Make sure the contracting method is permissible under Kentucky law and that any requirements can be met
- + Select a contracting method that would attract multiple proposers with proven knowledge and experience in the development and implementation of EVSE and supporting infrastructure
- + Minimize KYTC staff time during design and construction while still having robust oversight to guarantee performance
- + Arrange for operations and maintenance (O&M) and charge/energy management services to be handled by experienced contract partners and not be the responsibility of KYTC
- + Arrange for contract partners to own the EVSE, supporting infrastructure, station sites, and site improvements.
- + Deliver the project per the requirements of the NEVI guidance and the State of Kentucky (further information in **Chapter 9: Implementation**)
- + Facilitate the continual upgrade of technology (both hardware and software) to leverage the latest technologies and improvements in charging speed and efficiency

- + Provide for a smooth ownership transition at the appropriate time to a private owner and operator
- + Engage with local communities where charging infrastructure will be built
- + Engage with small businesses and disadvantaged businesses to build out the infrastructure

Delivery methods that shift control from the owner toward the private partner may place limits on the owner's control - but also provide opportunities for more innovative approaches and long-term, comprehensive relationships. Given the unique nature of the EV infrastructure project, KYTC has determined that more traditional methods like Design-Bid-Build (DBB) and Design-Build (DB) are less appropriate for this effort and less likely to meet the Commonwealth's priorities.

EV infrastructure projects involve advanced technology (hardware and software) and technology integration, as well as comprehensive service requirements to maintain EVSE availability, manage energy costs, and automate charging and fare collection, etc. Therefore, while different methods for design, construction, EVSE procurement and installation may be considered, KYTC is currently planning to rely on a qualified third-party vendor to provide ongoing O&M services of the EVSE, procure the software necessary to operate EVSE, and monitor system performance, and utilize charge management software to help manage charging costs and revenues. Contract(s) for these services should include robust performance requirements that incentivize best practices to ensure long-term system reliability and performance. KYTC may ask this vendor to provide training to KYTC staff in these service areas so that KYTC can rely less on third-party vendors over time if desired.

The delivery methods that are recommended for further consideration are listed below (note that this list is not exhaustive as other options not listed, or variations of those listed may also be considered):

DESIGN-BUILD-OPERATE-MAINTAIN (DBOM)

With this method, the owner, KYTC, would contract with a single provider to fully design and construct the project. The provider would then assume operations and maintenance of the system after commissioning for a contracted term. The single provider can steer design and construction in a way that maximizes the efficiency of the project lifecycle, but KYTC would have limited input into the design process. The medium-term operations and maintenance would be built into the contract, which would relieve that burden from KYTC. However, KYTC would need to continue to manage the contract with the provider (although many owners hire an owner's rep or GEC (General Engineering Consultant) to manage the contract). Ultimate ownership would transfer under the terms of the contract.

KYTC may want to consider the separation of DB and O&M/charge management contracts. Separate contracts may be required to attract the highest quality bidders for each discipline if enough contractors/consortiums are not deemed to be available in the market that are both willing to provide these combined services and/or able to demonstrate a successful record of accomplishment providing these combined services.

TRADITIONAL DESIGN-BUILD-FINANCE-OPERATE-MAINTAIN (DBFOM)

KYTC, the owner, would award a single contract with a provider that would complete the full range of design-build services, as well as O&M and charge management, for a defined period. In addition, in this method the provider is also responsible for identifying and, at least in part, providing the private capital or finance to design and construct the project. One of the challenges of this method is that contract negotiations can be complex and KYTC would need to manage this complicated, multi-faceted contract throughout the life of the project (although many owners hire an owner's rep or GEC to manage the contract). In the conclusion, ownership would transfer under the terms of the contract.

EV DBFOM (DEVELOPED FOR THIS PROJECT)

The unique aspects of EV charging also provide the opportunity for an alternative delivery model tailored more specifically to the reality of establishing an EV system. There are at least two potential ways to approach this effort.

- + **a. "Master Developer"** Under a DBFOM umbrella, it would be possible for the DBFOM developer to segment the project by a corridor or geographic area and serve as a "master developer," managing multiple smaller design-build projects. Each small contractor could be responsible for operations and maintenance, or O&M could revert to the master developer. The DBFOM developer would retain responsibility for the overall financial approach. KYTC would contract with the developer, and the developer would own the system at the conclusion of the contract. Issues such as long-term management would rest with the master developer, who could decide to manage, lease, or sell various segments of the overall project at their discretion. KYTC could set certain requirements as part of the ownership transfer that the developer would need to pass along to the smaller owners.
- + **b. "Franchise Operator"** This approach would result in the developer serving as more of a franchise operator, securing final plans and bids from contractors to design, install, operate, maintain, and own stations within corridors or geographic areas. Because the contractors would be managing smaller areas, they could focus on the cost and revenue options as they differed in various locations and would bid accordingly. Rural charging corridors, for example, might need to provide subsidies, while urban charging corridors or locations in truck stops might generate revenues. Priority and more generous terms could be given to those who bid on rural franchises, or franchises in underserved communities. The system could be similar to how McDonald's or other large franchises work, with a manager that controls the agreement and sets certain standards for operations, but where the individual franchise owners can operate their franchise and earn and keep the revenue if they meet the conditions of their franchise agreement. The DBFOM developer, serving as the franchise operator, would be responsible for managing the overall system and developing the agreements, including financial agreements, with the smaller franchisees. Once the franchise operator took on the ownership of the larger franchise, KYTC would no longer have responsibility for the charging system and would have no relationship with the franchisees.



KYTC will explore multiple DBFOM contracting sub-options that offer different approaches to revenue distribution and market risk allocation. One option is for KYTC to share revenues, and the corresponding market risks, with a developer. Under the second sub-option, KYTC would not take on any market risk and, therefore, forego revenue sharing. Under both approaches, KYTC would have an ongoing project oversight role, ensuring that the project is compliant with the NEVI guidance and the requirements established by the Commonwealth of Kentucky.

PROGRESSIVE CONTRACTING APPROACHES

KYTC will explore with the market the potential for methods to accelerate project delivery and mitigate key risks. Such methods include the use of a pre-development agreement (PDA) between KYTC and a developer/contractor to address key project risks (e.g., supply chain issues and land acquisition) and contracting issues (e.g., performance metrics and key performance indicators suitable to meet NEVI requirements).

GRANT APPLICATIONS

Many states have used a grant application process to solicit and select EVSE sites and partners for the implementation, ownership, and operation of DCFC stations. One benefit to this approach is the opportunity for smaller partners to be involved in the competition and selection of projects. It also allows for the selection of the best sites and partners out of a pool of sites and partners. For instance, a single contract holder may place NEVI stations at one type of site host, while a grant process could open site hosting opportunities to a broader cross-section of businesses or destinations. However, this approach can require extensive staff time and expertise to manage the contracts and with a larger number of proposals comes the challenge of evaluating proposals in a fair and deliberate manner. Departments of Transportation staff from states with prior experience in EVSE grants have indicated that significant staff time may be required to administer the grants and manage contracts, which would be compounded by the requirements for Federal data sharing and reporting required by 2 CFR Part 200 and the NEVI requirements. Time would also be needed to confirm compliance with all contract terms, where enforcement and resolution could become an issue.

GRANT APPLICATIONS - BUNDLED LOCATIONS

One approach that KYTC will explore further is the concept of bundling locations as part of a grant application process. Respondents would submit proposals for building NEVI stations for a set or corridors or in an area of the state. This would limit the number of agreements that KYTC must ultimately manage. It would also reduce the effort required to evaluate the proposals. The bundles could be developed to include some high-demand corridors and some low-demand corridors to yield a balance with respect to revenue generation. The details of this approach would need to be worked out, but this could provide a method that achieves key project goals and requirements, provides flexibility, could be implemented quickly, and limits the administrative burden on KYTC staff.

PROCESS

Building an EV charging network in the Commonwealth will be a challenging undertaking. To minimize the risk and maximize the value of lessons learned from around the country, the Commonwealth plans to engage in a careful process to finalize a delivery method and procure the right private partner(s). The anticipated implementation of the program (discussed in **Chapter 8**) will be informed by this process. In addition, many of the NEVI guidance requirements such as operations, maintenance, data sharing, and reporting will be incorporated into the requirements of the contracting mechanism identified in this process.

1. Finalize the project concept design and cost estimates: KYTC will complete its analysis of the potential future EV infrastructure needs in Kentucky to identify the DCFC station characteristics (desired capacity, efficiency, speeds, etc.), general locations, costs (capital and operating) and phasing before conducting a detailed delivery option/contracting analysis. Once a plan is in place to develop the EV infrastructure over time, the exercises listed below to determine the appropriate delivery method(s) can commence.

2. Talk to industry: It is common in Alternative Delivery and with public-private partnerships (P3) to engage potential bidders in a structured manner before procurement is underway, exploring industry interest and gaining insight into what might work (or not work) for potential private partners. Public agencies need to understand what their industry partners are interested in, and why. They also need to understand what partners may be reluctant to agree to. The Commonwealth's procurement rules will be strictly adhered to.

It is anticipated that KYTC could host a round-robin workshop with interested providers in August of 2022. During the workshop, KYTC would describe the project and receive feedback on the level of interest and potential roadblocks. This process would inform the development of an RFP (Request for Proposal) to maximize the potential that KYTC would receive enough competitive responses from qualified teams to meet the goals of the project and the contract mechanism.

3. Finalize the right contracting option

- + **Risk workshops.** Through one or more structured workshops, KYTC would refine their key priorities, identify potential risks, and walk through how effectively the selected method(s) could help meet their goals while minimizing risk. These workshops could help the agency understand how to modify the development and procurement approach if needed.
- + **Funding/financing analysis.** An analysis is required to determine the funding available for the project (including grant funding) and the potential need for financing. This assessment would determine the extent to which the delivery options should include a financing component.
- + **Look at other projects.** Alternative Delivery options such as DBOM and P3 now have a robust history in North America. Looking at what has, and has not, worked elsewhere will help KYTC make the best decision.
- + **Develop a schedule.** This process should include the development of a working schedule for the assessment and finalization of the contracting approach, development of the procurement documents, award, and negotiations.
- + **Identify up to three preferred contracting options for further analysis.** Based on the tasks listed above, narrow down the viable contracting options (three maximum) to be subjected to further, more detailed analysis.



4. Verify Legal Authority: KYTC can engage in P3s, but there are some limitations in terms of contract size and legislative oversight, as well as interagency cooperation with the Finance & Administration Cabinet. The agency will make sure that these limitations are well understood before making a final decision on the contracting method. In the case that a P3 option is selected, the Finance & Administration Cabinet has a transportation focused P3 process that was recently adopted but has never been used. The process requires a fully developed P3 proposal that must be reviewed and approved by the Kentucky legislature. As this project continues to develop, KYTC will build the legislative package needed to submit to the legislature. KYTC anticipates coordination with the agency's legislative affairs team to answer questions from the legislative body as they arise, and will work expeditiously to gain approval.

5. Conduct Value-for-Money (VFM) Analysis: After the previous steps have been completed, it is recommended that KYTC perform a final analysis that evaluates, on a qualitative and quantitative basis, the options considered in step #2 listed above. This report will justify the preferred option based on the ability of the delivery option to meet KYTC project delivery objectives, the alignment of the option's risk allocation with KYTC's risk profile and the net present value (NPV) of the option versus other alternatives.

6. Develop procurement documents: A complex procurement, especially if it contemplates a hand off to another owner at the end of a term, will need to be carefully constructed for KYTC to approve and move forward. Procurement documents for RFPs such as this are lengthy and complex, and often seek specific requirements from proposers. In this instance, taking the necessary steps to obtain a pool of bidders with the appropriate level of qualifications and experience is critical. Professional advisors, potentially including outside legal, technical, and financial advisors, will be utilized to guide KYTC through the process.

7. Evaluate proposals: Proposals are likely to be long and technically complex. The agency will need support to establish procedures to impartially evaluate multiple proposals. The integrity of the process needs to be a priority. Specialists in various technical disciplines, and in finance and funding, may be needed to provide input to the evaluation team. Final negotiations may need to be part of the process of finalizing a selection.

8. Use professional advisors: Few public agencies have all the resources necessary for large and complex procurements, which will be particularly true in this case – a type of project that KYTC has not done before. KYTC anticipates technical, legal, and financial assistance will be needed throughout the process.

CHAPTER 6

EXISTING AND FUTURE CONDITIONS ANALYSIS

This section identifies the existing conditions in Kentucky at the time of the Plan creation. As required by the NEVI guidance it addresses geography, terrain, temperature, precipitation, EV ownership projections, and transportation patterns. It also addresses electric utilities, grid capacity, existing EV infrastructure, Alternative Fuel Corridors, and known risks and challenges for EV deployment.



“...information regarding the State’s geography and terrain as it pertains to its EV charger deployments”



“...current and future temperature and precipitation patterns”

GEOGRAPHY, TERRAIN, AND LAND USE

Kentucky has a diverse geography that extends from the Cumberland Mountains to the Mississippi River (**Figure 6.1**). Some of the major features to consider when planning for EV infrastructure deployment include:

- 1. Mountainous Regions** – The Cumberland/Appalachian mountains occupy the eastern third of Kentucky, which includes steep and winding roads that will reduce the range of an EV. Highways in this region are often indirect due to natural barriers, which can lead to longer driving distances.
- 2. Lakes and Rivers** – Kentucky has several major rivers and large lakes including the Ohio River and the Cumberland River, and Lake Cumberland. These water bodies often have few bridge crossings, which can lead to long driving distances.
- 3. Large Forest and Natural Areas** – There are several large forested areas such as the Daniel Boone National Forest, which have few highways and long stretches of undeveloped areas that are less suitable for charging infrastructure.
- 4. Land Use / Rural Areas** – Kentucky is a mixture of urban centers, small towns, and large rural areas with little development. Charging infrastructure will need to support travel throughout the rural areas of Kentucky, making EVs an option for residents in all areas of the state. Similarly, there will be EV infrastructure issues in the urban areas, though they may be more related to the need for Level 2 charging for high-density residential areas.

CLIMATE AND PRECIPITATION

Kentucky’s climate is moderate with cold winters, mild spring/fall, and warm summers. Temperatures are generally cooler in the mountains in the east and warmer in the west. The state has an average annual high of 87°F in summer and an average low of 23°F in winter. During winter, there are numerous days, especially in the eastern portion of the state, where temperatures drop well below freezing.



FIGURE 6.1 KENTUCKY'S TOPOGRAPHY

Similarly, there are numerous days with temperatures that exceed 95°F. Kentucky receives about 48 inches of rain on average per year and approximately 11 inches of snow. Kentucky also has had several major ice storm events.

Extreme temperatures can affect EV battery life through the need to cool or warm the vehicle as well as due to the impact on batteries and charging. However, Kentucky's temperature and precipitation conditions are not expected to have a significant impact on EV infrastructure planning in the state with a few exceptions. First, they reinforce the need for amenities and services at or near DCFC stations. Second, there will be a need to provide snow removal and possibly de-icing during winter storm events. Third, there may be locations where a covered charging station may be beneficial to protect drivers from the sun and weather. Finally, it may be necessary to provide emergency charging equipment if power is lost during a storm event. This is discussed further later in the plan.

ROADWAY NETWORK / TRAVEL PATTERNS

Kentucky has 10 Interstate highways and 10 state Parkways/Expressways intended for inter-state and regional travel, and a network of National Highway System roadways to provide connectivity throughout Kentucky's 120 counties. The major Interstates include I-65 and I-75 which run north-south through the center of the state and carry high traffic volumes; I-24 runs through western Kentucky and I-64 runs east-west through the northern part of the state. The Parkway System is vital to Kentucky because it connects most of the remainder of the state. Long-distance travel in and through the state is examined in more detail in **Chapter 7**. All of the Interstates and Parkways are part of the EV Alternative Fuel Corridor network discussed later in this Chapter.

KYTC's Long-Range Statewide Transportation Plan identifies the need to maintain the state's critical transportation infrastructure and identifies funding and strategies to meet this need. KYTC is committed to maintaining and improving the state's existing infrastructure as it provides charging infrastructure to support travel on these roadways.



**"...travel
patterns"**

PUBLIC TRANSPORTATION

Kentucky has 25 rural public transportation services and nine urban city bus transit services. Annually, they provide over 31 million trips and serve approximately three million elderly and disabled passengers. The rural services are typically on-demand and the urban services mostly operate a fixed route service. Many rural operators also provide intercity services as well as connect with the larger urban systems and commercial bus networks.

KYTC anticipates that fixed route charging will be addressed through other plans and programs oriented to address fixed route transit. For rural operators, there may be a future need for light-duty DCFC charging once handicapped accessible vehicles are produced, and this need should be accounted for during the station siting process. While Kentucky has few park-and-ride options at present, charging for these users should be addressed using Level 2 charging stations.



FREIGHT AND SUPPLY CHAIN NEEDS

Kentucky is a major junction for the nation's freight movement as it is centrally located in the country and able to move trucks effectively and efficiently. It is home to four automobile assembly plants and over 450 parts suppliers. Kentucky is the third largest auto producer in the country accounting for 11.2 percent of total U.S. auto production.

Over 803.3 million tons of freight move through Kentucky, with approximately 78% of this transported via trucks. **Figure 6.2** shows the breakdown of freight movement by different modes of transport. The public DCFC infrastructure planned is not intended for freight, as local freight companies will likely have dedicated charging infrastructure at depots, and long-distance freight will require substantially more power than what is needed at a NEVI-compliant station. However, KYTC will incorporate potential guidance related to freight into future plan updates. Kentucky is also exploring the potential for hydrogen truck refueling stations in the state along the Hydrogen Alternative Fuel Corridors.

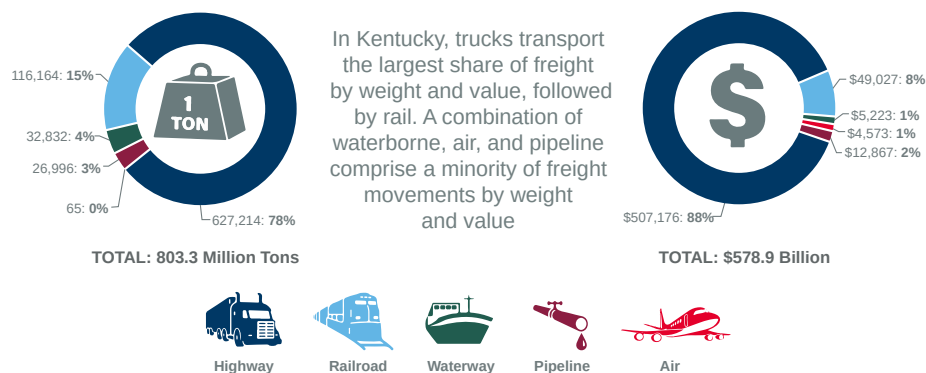


FIGURE 6.2 FREIGHT MOVEMENT IN KENTUCKY

DCFC CHARGING NETWORK

ALTERNATIVE FUEL CORRIDORS

In accordance with the guidance, KYTC will use the initial NEVI Formula Program Funds to deploy EV charging infrastructure on the Alternative Fuel Corridors (AFCs). As shown in **Figure 6.3**, all of the Interstates and Parkways across the state are part of the AFC network. The Interstates and Parkways were designated as AFCs to be in alignment with Kentucky's needs related to long-distance travel and statewide network connectivity. The long-distance travel estimates are discussed more later in this plan. Based on the AFC designations, the entire Interstate and Parkway system is eligible for this initial NEVI-funded EV infrastructure deployment.

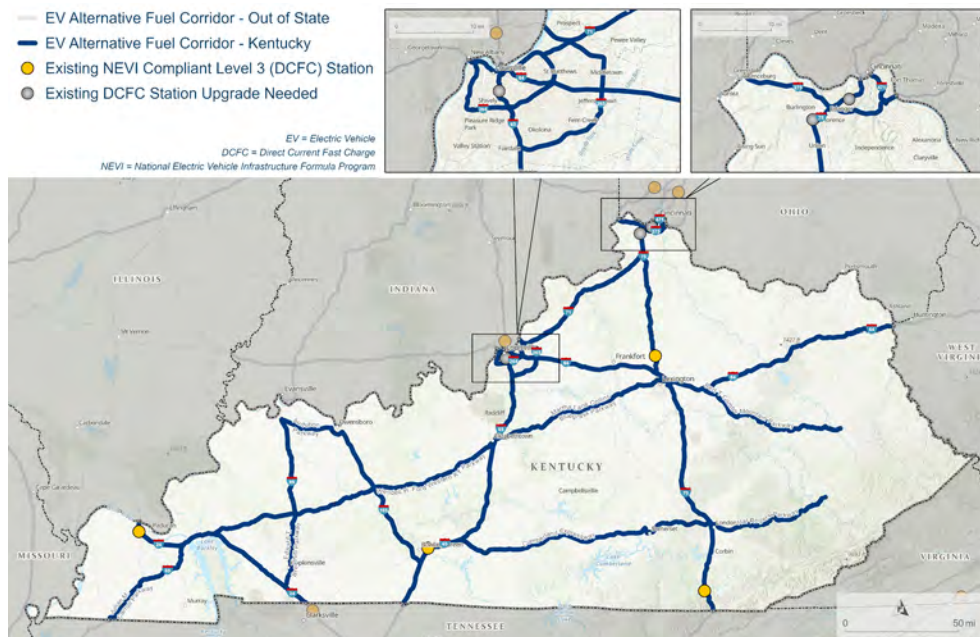


FIGURE 6.3 ALTERNATIVE FUEL CORRIDORS IN KENTUCKY

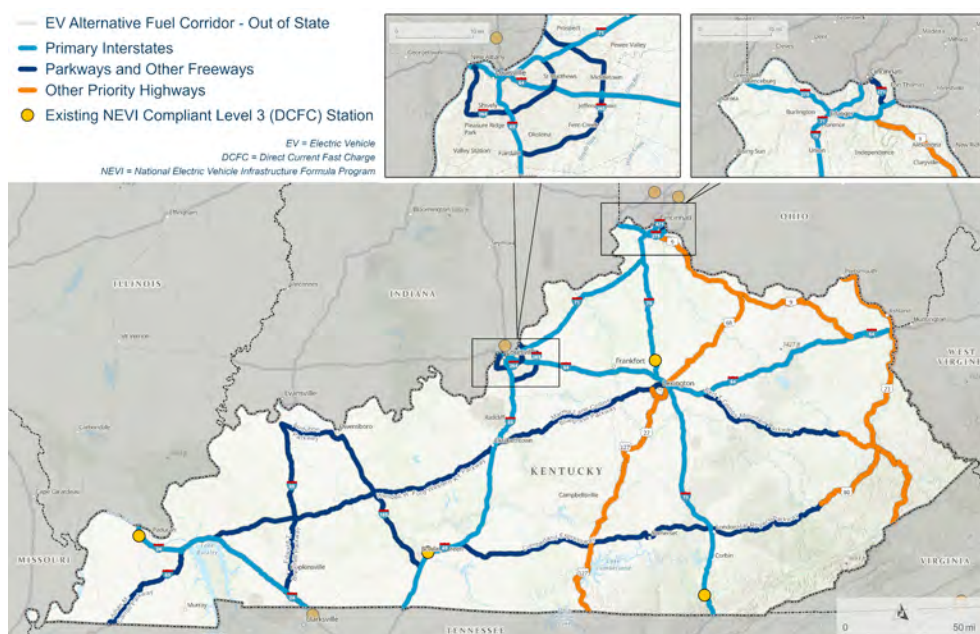


FIGURE 6.4 POTENTIAL OTHER PRIORITY CORRIDORS IN KENTUCKY



**States should
prioritize the
Interstate
Highway System.**



**“... provide EV
users with the
confidence that
they can travel
long distances and
expect reliable
access to EV
charging stations”**



**“..fill gaps
to provide a
convenient,
reliable,
affordable, and
equitable national
EV charging
network”**



There are 4 NEVI compliant DCFC stations in Kentucky and another 4 just beyond the state border.

KYTC is anticipating that the three-digit Interstates in Louisville and Northern Kentucky (I-264, I-265, I-275, and I-471) are already NEVI compliant based on the proximity of NEVI compliant chargers. However, KYTC will review this assumption pending further guidance from the Joint Office.

ADDITIONAL CORRIDORS

Additional corridors will be needed to better connect the rural areas of the state, especially those located far from an Interstate or Parkway. **Figure 6.4** shows several potential Other Priority Corridors (orange) that have been proposed to provide this additional coverage. These non-AFC corridors could be added to and/or modified as the plan is updated in the future, but they provide one scenario for further extending the EV infrastructure coverage past the Interstates and Parkways.

CHARGING INFRASTRUCTURE ON AFCs

There are currently 13 DCFC stations in Kentucky, although only seven of these were publicly accessible 24-hour DCFC stations within one mile of an Interstate. Four of these publicly accessible stations are NEVI compliant. The seven DCFC stations are shown in **Figure 6.3** and they are listed in **Table 6.1**. The four public NEVI-compliant stations are owned and operated by Electrify America.

There are additional NEVI-compliant DCFC stations just beyond the state border on I-65 in Indiana, on I-71 and I-275 in Ohio, and on I-24 in Tennessee. These stations provide some AFC network coverage in Kentucky.

Information about these stations is publicly available on various websites and apps. This information dissemination will continue to be important and is discussed further in other chapters of this report.

TABLE 6.1 EXISTING LOCATION OF DCFC CHARGERS

State EV Charging Location ID	Charger Level (DCFC)	Route	Location	Number of EV Connectors (Ports)	EV Network
121785	DCFC	I-75	112 Osborne Way, Georgetown	4	Electrify America
121794	DCFC	I-24	5130 Hinkleville Rd, Paducah	4	Electrify America
121795	DCFC	I-65	350 Corvette Dr., Bowling Green	4	Electrify America
121797	DCFC	I-75	589 KY-92, Williamsburg	4	Electrify America
143276	DCFC	I-65	1700 Arthur St, Louisville	1	ChargePoint Network
194188	DCFC	I-75	2100 Dixie Hwy, Fort Mitchell	1	ChargePoint Network
198896	DCFC	I-75	7625 Doering Dr., Florence	1	EVgo Network

This table is current as of Feb 2, 2022

ELECTRIC UTILITIES

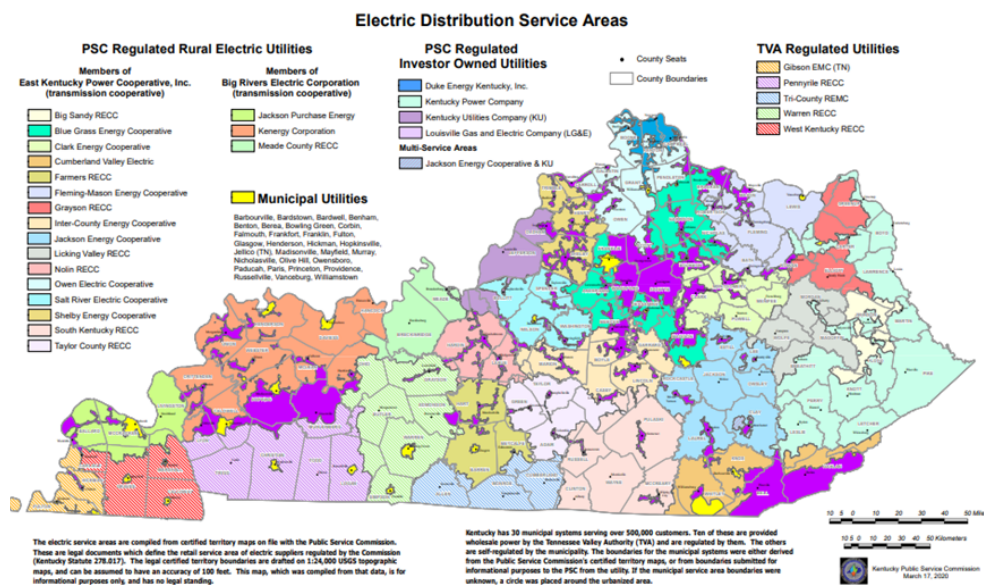
Electric power in Kentucky is distributed by investor-owned electric utilities, municipal electric systems, Tennessee Valley Authority (TVA) regulated utilities, and rural electric cooperatives (**Figure 6.5**). The investor-owned utilities and the rural electric cooperatives are regulated by the Public Service Commission (PSC). The investor-owned utilities serve the more densely populated areas of the state, including Louisville, Lexington, and Northern Kentucky. Many small and mid-sized cities have their own municipal electric utilities, and the more rural areas are served by rural electric cooperatives (including the TVA-regulated cooperatives).

Due to a variety of factors including large coal reserves, natural gas pipelines, and an abundant water supply, Kentucky enjoys some of the lowest utility costs in the country. Extensive coordination was conducted with representatives from the various electric utilities as a way to understand where adequate power supply was available and to understand their plans for EV infrastructure.

The peak electrical power demand for DCFC stations along the AFC network in Kentucky was estimated based on projections for EV adoption and traffic growth. This analysis is discussed in detail in **Chapter 7**. The estimates showed that within the NEVI period (through 2026) the peak power demand on all AFC corridors is below 1 MW for all potential charging sites outside of three small high-volume areas near cities. The peak demand for about half of the AFC network is below 300 kW. This level of demand is not expected to be difficult to meet with the existing electrical grid.



**“Electric utilities
and grid capacity”**



**Kentucky has over 50
electric utilities.**

FIGURE 6.5 ELECTRIC DISTRIBUTION SERVICE AREAS IN KENTUCKY

ELECTRIC VEHICLES IN KENTUCKY

REGISTERED BATTERY ELECTRIC VEHICLES

Currently there are approximately 3,600 registered battery electric vehicles (BEVs) in Kentucky. This is 0.11% of the 3.3 million registered light-duty vehicles in the state, which is lower than the national average of 0.49% of registered vehicles. The majority of the BEVs registered in Kentucky today are located in the major urban areas or nearby counties, with few vehicles present in the more rural areas. **Figure 6.6** shows the current number of registered BEVs by county and **Figure 6.7** shows the current adoption percentage of BEVs by county.

BATTERY ELECTRIC VEHICLE SALES

In 2021, approximately 1% of all light-duty vehicle sales in Kentucky were BEVs. This compares to approximately 3% nationally. However, as shown in **Figure 6.8**, both the state and national trends have been increasing over the last several years. This may be further compounded in Kentucky, where new EV-related economic opportunities (such as Ford's new battery plant) raise the awareness of the technology, and position EVs as a "Made in Kentucky" technology.

EV SALES AND REGISTRATION PROJECTIONS

An EV adoption forecast for light-duty BEVs in the state of Kentucky was developed based on EV adoption forecasts from various sources including university research, national laboratories, and private forecasting models. **Figure 6.9** shows 12 forecasts for EV market sales between now and 2045. These industry sales projections range from a low of 28% to a high of 82% in 2045. The models make different assumptions about battery costs, technological advancements, government incentives, and other factors. Some of the conservative models were developed before manufacturers made major EV announcements and before the IIJA was approved. Some of the more aggressive models have historically over-predicted adoption rates.

The figure also shows the industry average which was used for planning EV adoption in Kentucky. The predicted trend for Kentucky is balanced, falling near the middle of the pack of industry projections. While Kentucky has lagged other areas of the country in EV adoption, with the growth of EV and battery manufacturing in the state and the substantial private, local, state, and federal investment in EVs and EV infrastructure it is expected that adoption in Kentucky will increase and generally follow the national average in the future.

As indicated, the projection shows BEV market sales in Kentucky reaching 18% in 2030. By this time BEVs are expected to have reached price parity with internal combustion engine (ICEs) vehicles. BEV sales are expected to reach 30% in 2035 and just under 60% in 2045.

Over time, BEV sales will begin to transform the registered light-duty vehicle fleet in Kentucky. However, given that vehicles typically stay in use for 15 to 20 or more years it will take a considerable time for the percentage of registered BEVs to reach high levels. **Figure 6.10** shows the predicted BEV share of registered light-duty vehicles in Kentucky over time. In 2025, BEVs are forecasted to reach 1.2% of all registered vehicles. That will increase to 4.5% in 2030, 11.5% in 2035, 21.9% in 2040, and 33.8% in 2045. (These projections may be revisited during the annual plan update process.)

The Kentucky BEV projections were used to predict NEVI station infrastructure needs on the AFCs over time. However, these needs were not tied on where the EVs would be registered, but rather they were tied to the estimated percentage of long-distance travelers that were predicted to be BEVs.

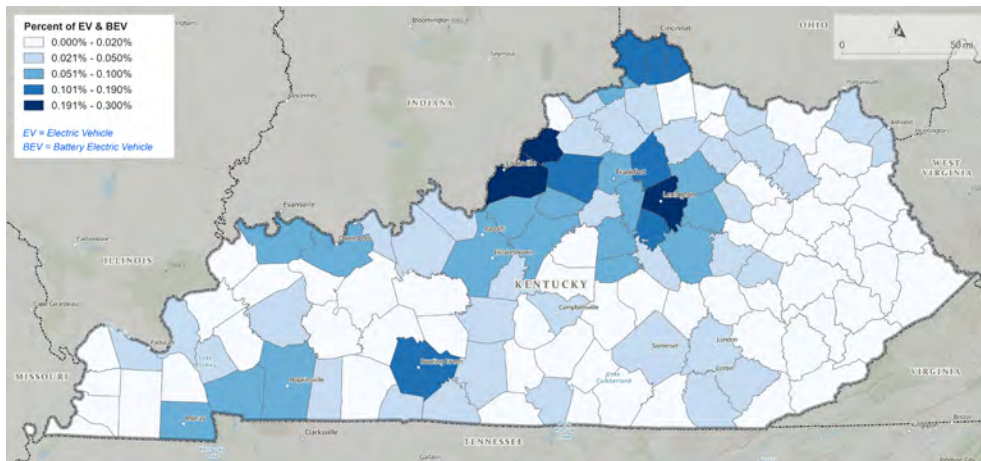


FIGURE 6.6 BEV ADOPTION PERCENTAGE BY COUNTY (2022)

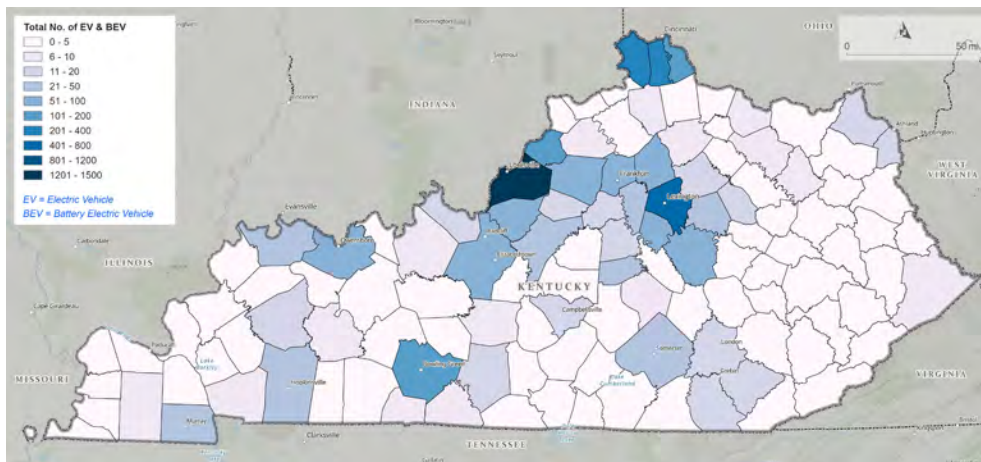


FIGURE 6.7 NUMBER OF BEVS BY COUNTY (2022)

Battery Electric Vehicle (BEV) Sales in the US and Kentucky

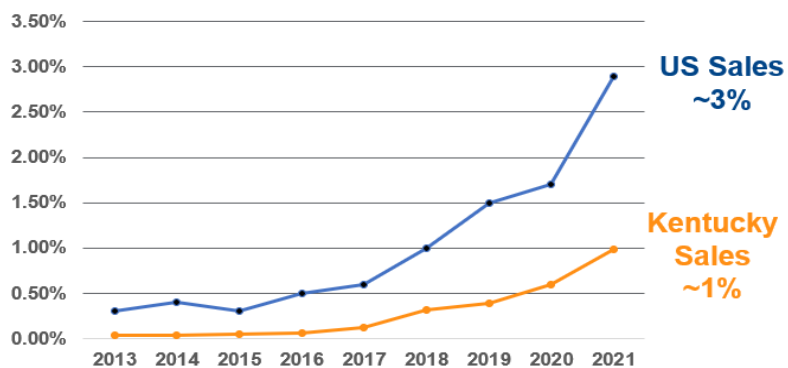


FIGURE 6.8 BEV SALES IN THE US AND KENTUCKY

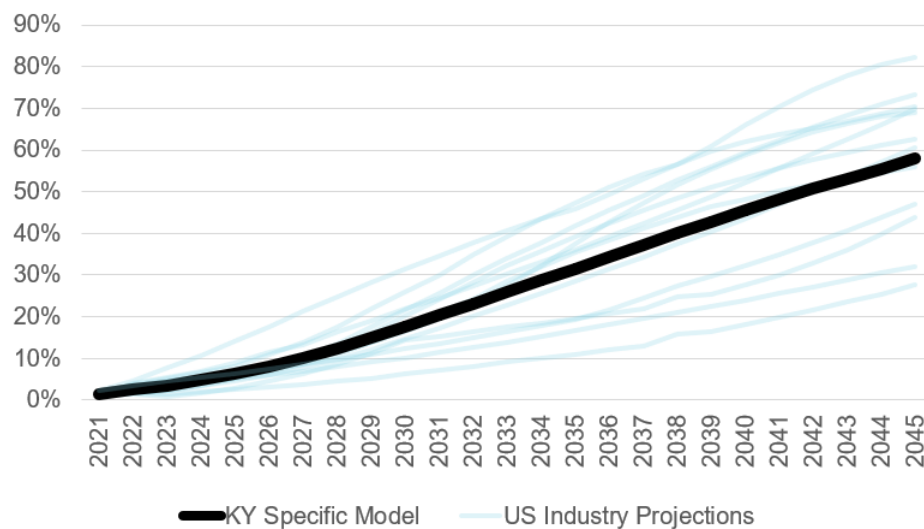


FIGURE 6.9 BEV MARKET SALES FORECAST

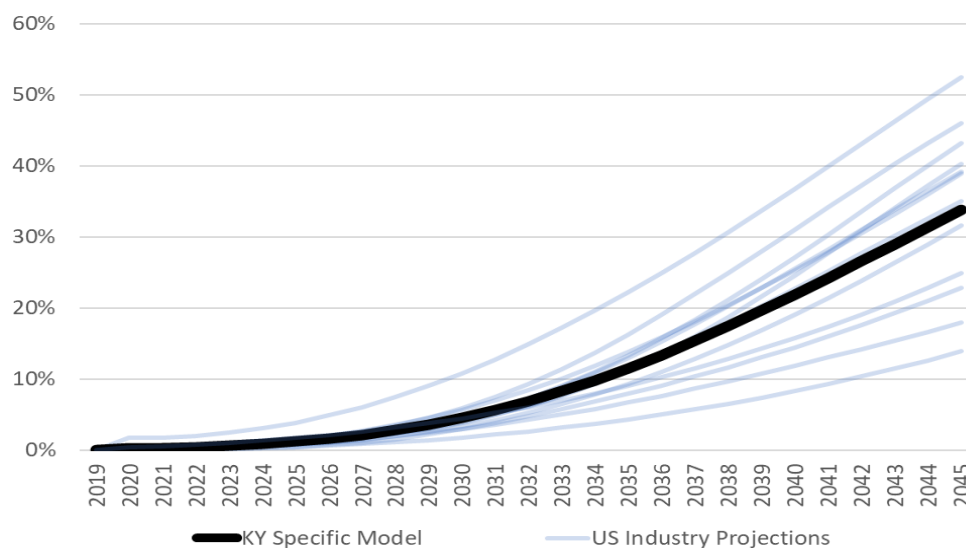


FIGURE 6.10 OVERALL BEV ADOPTION RATE FORECASTS



“This section should also include a discussion on known risks and challenges for EV deployment.”

RISKS, CHALLENGES, AND BARRIERS

There are several barriers to EV adoption and EV infrastructure deployment in Kentucky. Many of these surfaced and were discussed during the stakeholder engagement process. A summary of these barriers is provided below. KYTC is aware of these barriers and is actively working to partner with FHWA and the Joint Office to overcome them. The effective implementation of the NEVI program will help overcome several of the barriers to EV adoption in the state. The contracting approach and ongoing discussions with utilities, local communities, businesses and industry, rural and disadvantaged communities, and other stakeholders will help overcome the key barriers to EV infrastructure deployment.

BARRIERS TO EV ADOPTION



Lack of Charging Infrastructure

NEVI will address this for long-range travel but not for community charging needs



Range Anxiety for Long Trips

NEVI is seeking to address this directly



Long Recharge Times

150 kW minimum power dictated by NEVI will alleviate this some, but the recharge time for an EV will still be 3-4 times as long as what it takes to refill a vehicle with gasoline

BARRIERS TO EV INFRASTRUCTURE DEPLOYMENT



Limited Utility Infrastructure

Grid capacity must be able to support chargers

- + This is a bigger concern for supplying the day-to-day charging needs of EVs
- + The load from a DCFC network along the highway will not be significant or a challenge for the utilities
- + The locations of some DCFC may be difficult (see Rural/Underserved Infrastructure Gaps)



Utility Demand Charges

Rate structures are not friendly for high power low utilization loads like a DCFC

- + While EV adoption is low, utilization will also be low, and costs for electricity will be high
- + Increased utilization alleviates demand charge impacts, but it is difficult to get to high utilization if costs are high



Rural/Underserved Infrastructure Gaps

Supporting long distance travel means supporting travel through rural areas

- + These areas may have a small number of EVs but higher volumes of pass-through EV traffic
- + These areas may not have easy access to the 3-phase power required by DCFC



Regulatory Framework

Planning, zoning, building codes, and other regulations

- + Local regulatory agencies do not have experience with EVSE, and that can complicate the procedure for getting a project permitted
- + Different localities may have different regulations and processes

RISKS AND CHALLENGES OF LOW AND HIGH DEMAND AFCs

A risk that became apparent during the plan development was the low and high charging demand projections on some of the state's AFCs. The projections are discussed in detail in **Chapter 7**, but the risks and challenges of that finding are discussed here.

As part of the plan development process, a data-driven NEVI station demand analysis was prepared. This analysis forecasted demand for NEVI compliant (4-port) charging stations over time on Kentucky's AFCs. **Figure 6.11** shows the results of that analysis for 2026 (near the end of the NEVI Formula Program) and **Figure 6.12** shows the results for 2030 (four years after the end of the program).

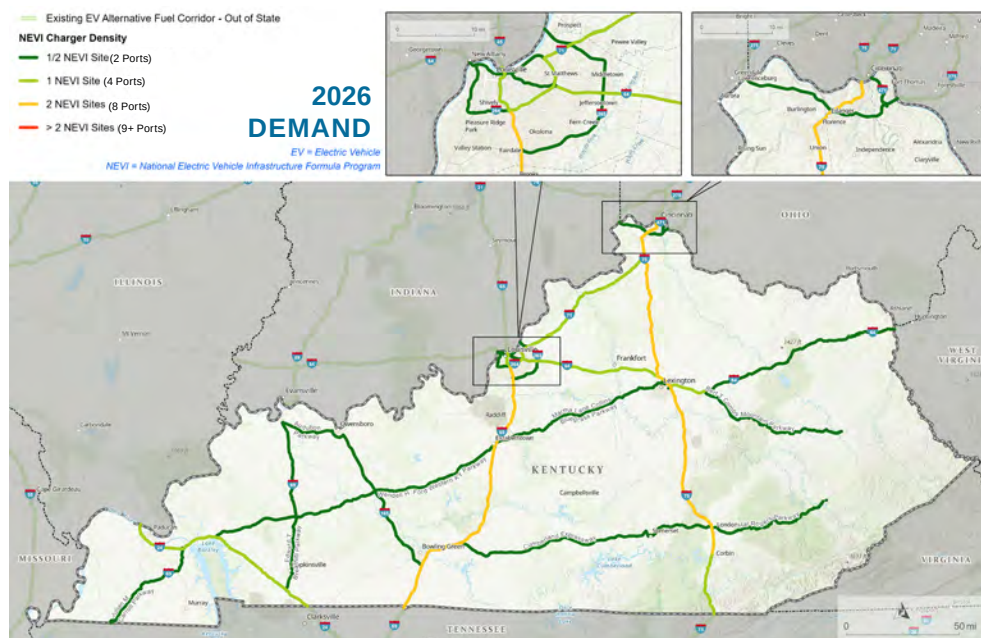


FIGURE 6.11 2026 DEMAND - NEVI CHARGER DENSITY MAP

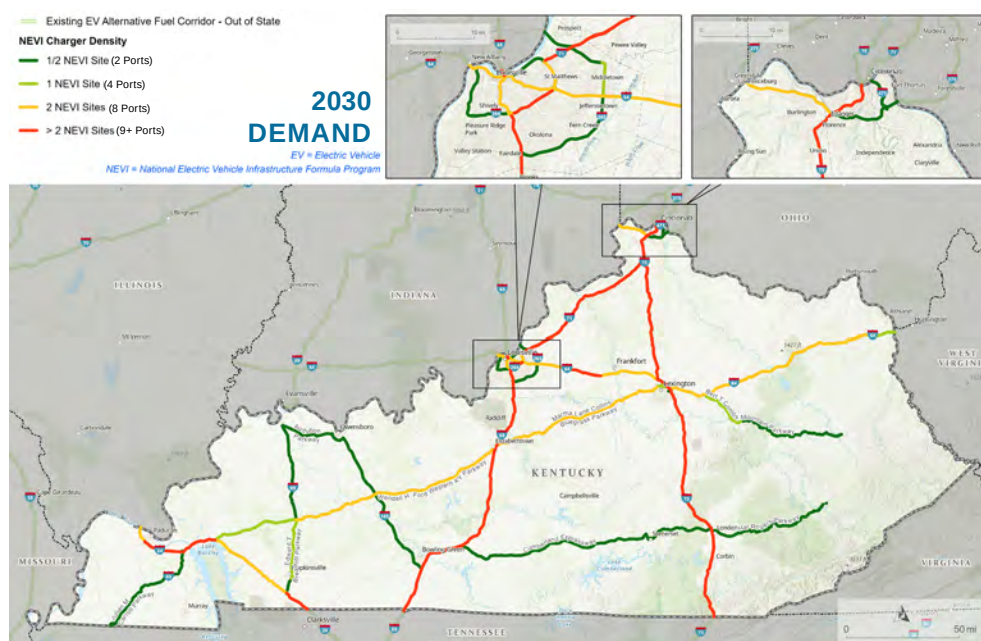


FIGURE 6.12 2030 DEMAND - NEVI CHARGER DENSITY MAP

A risk that became apparent during the plan development was the low and high charging demand projections on some of the states AFCs.



As shown, some of Kentucky's Parkway AFCs are projected to have demand levels that may not support NEVI compliant 4-port installations every 50 miles until after 2026 and several may not support them even in 2030. In contrast, some of the major Interstate AFCs are projected to need more charging capacity than would be provided by one NEVI-compliant 4-port installation every 50 miles. These are preliminary planning results, but they highlight the potential risks and challenges related to the market demand for charging.

A risk in the low-demand corridors is that there may not be sufficient revenue to fund the station operations and maintenance. The low demand also raises questions about the long-term financial feasibility and sustainability of the stations on those corridors. KYTC will work to overcome the challenges related to low demand by considering contracting options that bundle some of the higher and lower demand locations together. KYTC could also consider using additional state funding to support low-demand stations if necessary. Overcoming this issue is critical to avoiding stranded assets and preventing the installation of EVSE that will be outdated before it is needed.

A related consideration is that the low-demand corridors will also be less attractive to private sector investment outside the NEVI program. This means the NEVI stations on those corridors are likely to have less competition than the NEVI stations in the high-demand corridors. This may lead to higher than expected usage over time due to there being few if any charging alternatives in some areas.

A risk on the high demand corridors (e.g., I-65 and I-75) is that one 4-port NEVI station would not be sufficient, resulting in long wait times and low customer satisfaction. To overcome this challenge, KYTC could consider incentivizing private firms to install additional ports or to select and prepare sites for future growth. This could include installing below-ground power and utility infrastructure that would support future station expansions.

In summary, KYTC is planning to build all AFCs in accordance with the NEVI guidance, but risks and challenges will need to be overcome related to high and low charging demand on different corridors.

CHAPTER 7

EV CHARGING INFRASTRUCTURE DEPLOYMENT

This chapter presents the proposed NEVI Program funded DCFC network, expected network demand, and how Kentucky is prioritizing locations on the network. It also covers other items assigned to this chapter in the NEVI Guidance.

- + Proposed DCFC Network
- + Funding Sources
- + Demand for DCFC Stations
- + Interchange Suitability and Prioritization
- + Interchange Scoring Criteria
- + Infrastructure Deployments/Upgrades
- + State, Regional, and Local Policy

PROPOSED DCFC NETWORK

Kentucky's proposed NEVI Program funded DCFC network covers all the Interstates and Parkways in the Commonwealth (see **Figure 7.1**). The network will allow Kentucky residents and through travelers to reach anywhere in the state in an electric vehicle. The network includes EV AFCs and provides important connections to surrounding states. The network was developed considering factors such as daily traffic, long-distance trips, connectivity, and service to rural and underserved areas.

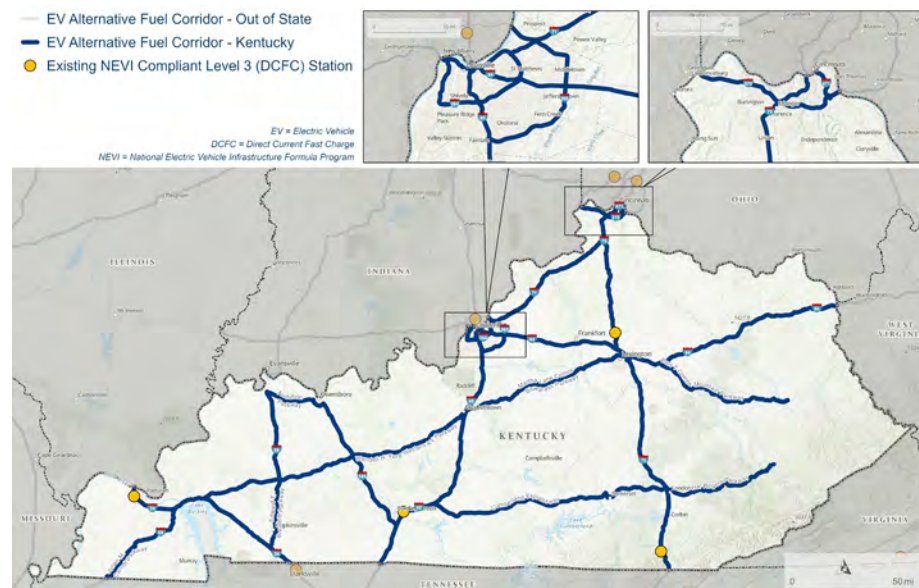


FIGURE 7.1 PROPOSED FAST CHARGING NETWORK (EV AFC NETWORK)

FUNDING SOURCES

This topic was discussed in **Chapter 4: Plan Vision and Goals**, which outlined the expected sources and uses of funds. Kentucky expects private companies will be the primary source for the matching funds for this program, though public sources could be used as well. The details of the project funding will be determined during project implementation. Further discussion on these items can be found in **Chapter 5: Contracting** and **Chapter 8: Implementation**.

DEMAND FOR DCFC STATIONS

The demand for NEVI-compliant DCFC stations (NEVI stations) on the EV AFC network was estimated using forecasted daily long-distance traffic volumes, EV adoption projections (**Chapter 6**), and assumptions about station utilization and dwell time. This information was used to estimate:

- + Number of NEVI stations per 50 miles needed to meet expected demand (Density)
- + Peak power demand per NEVI station (Power Demand)
- + NEVI station utilization percentages (Utilization)

A NEVI station consists of a 4-port station with a minimum of 150kW of power per port (at least 600kW total). The maximum spacing between NEVI stations is 50 miles.

DCFC STATION DENSITY

Figure 7.2 to Figure 7.7 illustrate the estimated minimum number of NEVI stations (and ports) needed every 50 miles to meet the demand for fast charging along each corridor for 2025, 2030, 2035, 2040, and 2045. These estimates are based on long-distance trip forecasts for each future time period (considering travel in 50-mile increments up to 250+ miles). The estimates use the statewide EV adoption projections (**Chapter 6**). They also assume that the maximum daily station utilization rate is 40% and the average vehicle dwell time to charge is 25 minutes.

Based on the current travel patterns and EV market adoption, the NEVI station density needed to meet the demand in 2022 is $\frac{1}{2}$ of a NEVI station (2 ports) per 50 miles throughout the system. By 2025, the major Interstates (I-65, I-75, I-64, and I-24) require at least one NEVI station per 50 miles to meet the demand. In and near the major urban areas some highways reach two NEVI stations (8 ports) per 50 miles. However, most of Kentucky's AFC network still needs only $\frac{1}{2}$ of a NEVI station (2 ports) per 50 miles in 2025.

In 2030, the demand increases to greater than two NEVI stations (9+ ports) per 50 miles on large portions of the major Interstates. Other Interstates and Parkways reach one to two NEVI stations per 50 miles, while some of the Parkways with lower volumes of long-distance trips remain at $\frac{1}{2}$ of a NEVI station per 50 miles (or only 2 ports per 50 miles). The demand continues to increase through 2045, with most of system requiring more than two NEVI stations per 50 miles in the long term.



“This section should also identify the source of non-federal funding for EV charging infrastructure deployments.”

With this five-year NEVI program, KYTC is working to assist FHWA in trying to overcome some of the main EV ownership and EV infrastructure barriers to lay the groundwork for the eventual private growth of the market to meet the demand demonstrated by these figures.

Kentucky's Electric Vehicle Infrastructure Deployment Plan

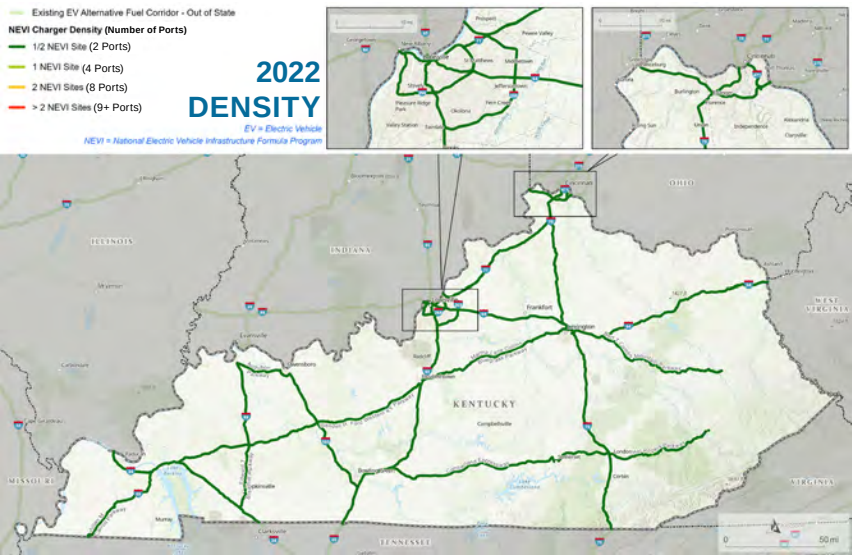


FIGURE 7.2 2022 NEVI CHARGER DENSITY

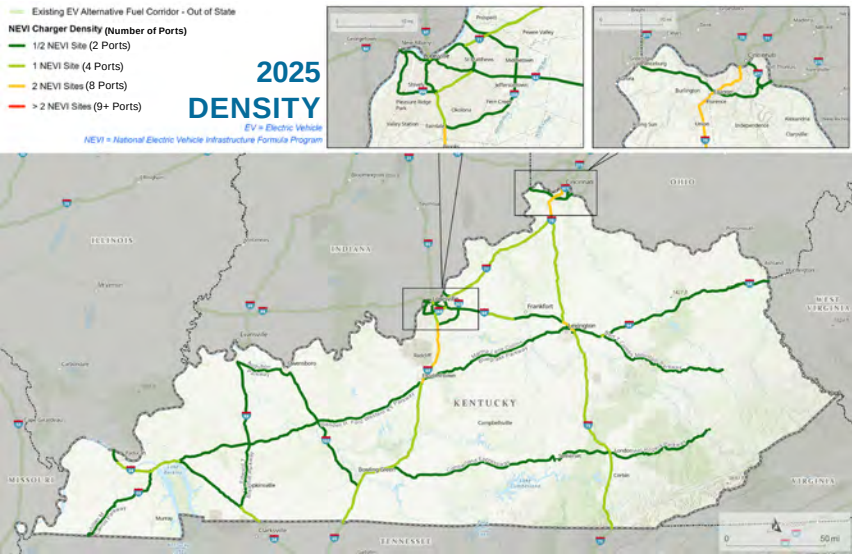


FIGURE 7.3 2025 NEVI CHARGER DENSITY

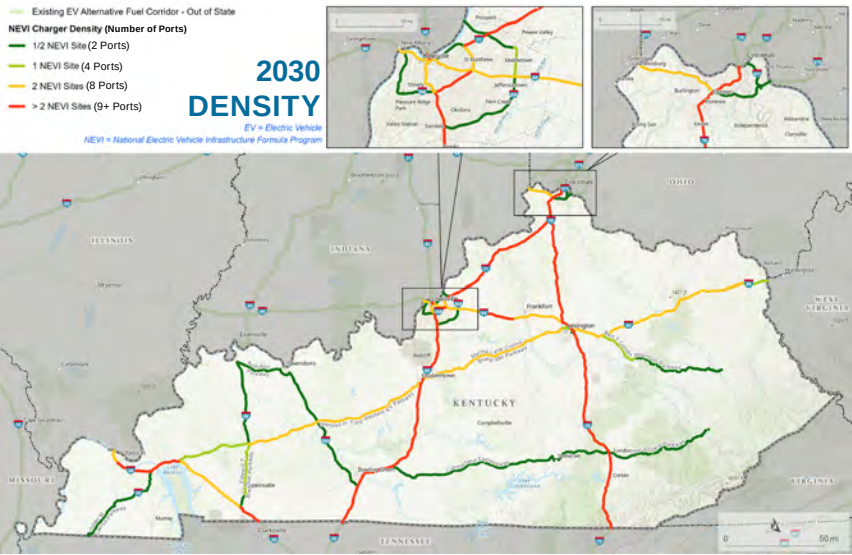


FIGURE 7.4 2030 NEVI CHARGER DENSITY

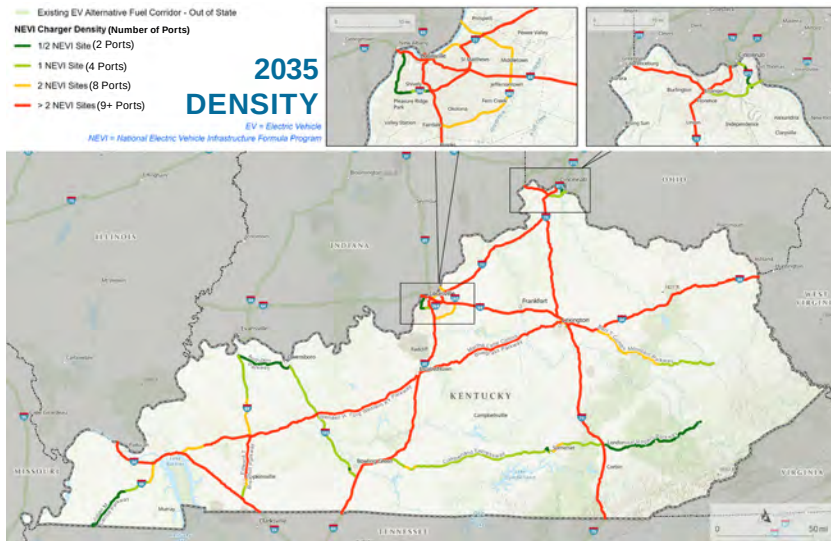


FIGURE 7.5 2035 NEVI CHARGER DENSITY

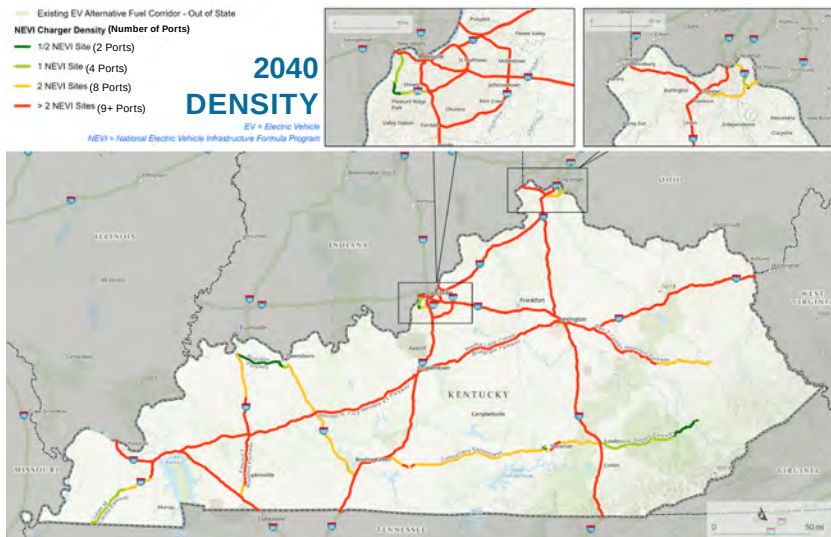


FIGURE 7.6 2040 NEVI CHARGER DENSITY

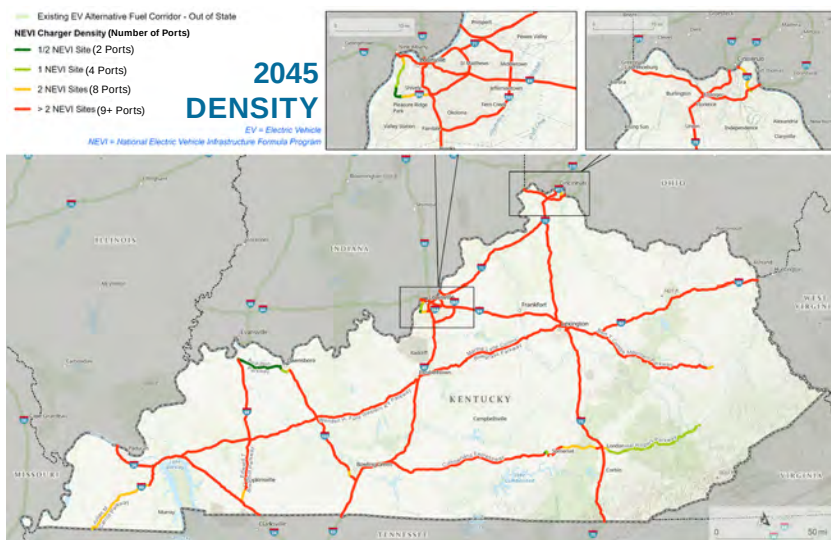


FIGURE 7.7 2045 NEVI CHARGER DENSITY

Kentucky's Electric Vehicle Infrastructure Deployment Plan

PEAK POWER

The information used to estimate the demand for NEVI stations was also used to calculate the peak power demand along each corridor for 2022, 2025, 2030, 2035, 2040, and 2045. **Figure 7.8 to Figure 7.13** illustrate the peak power demand per 50 miles. The maps show how the electrical grid will be impacted by the DCFC load over time.

The highest peak load in 2045 is 20 MW for a 50-mile stretch of road and based on the traffic projections and EV adoption rates, some of the more remote areas of the state will not experience any significant load increases over the entire forecasted period.

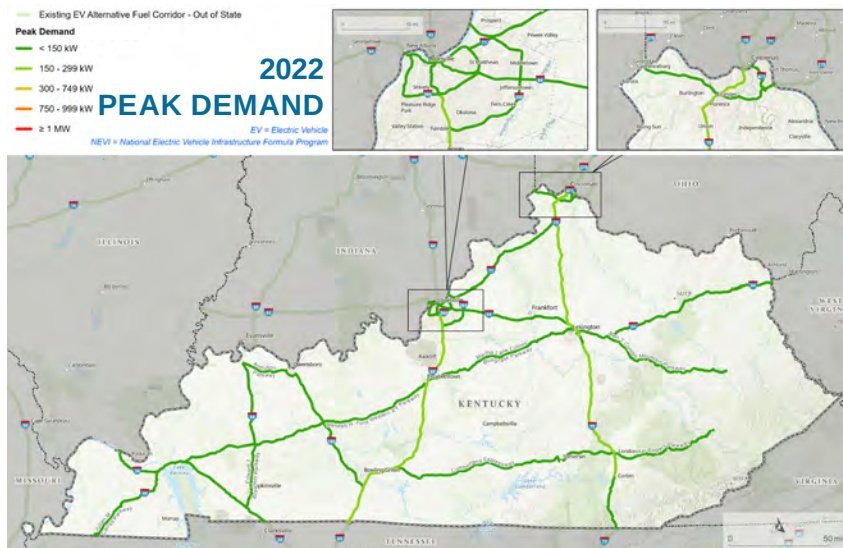


FIGURE 7.8 2022 PEAK DEMAND

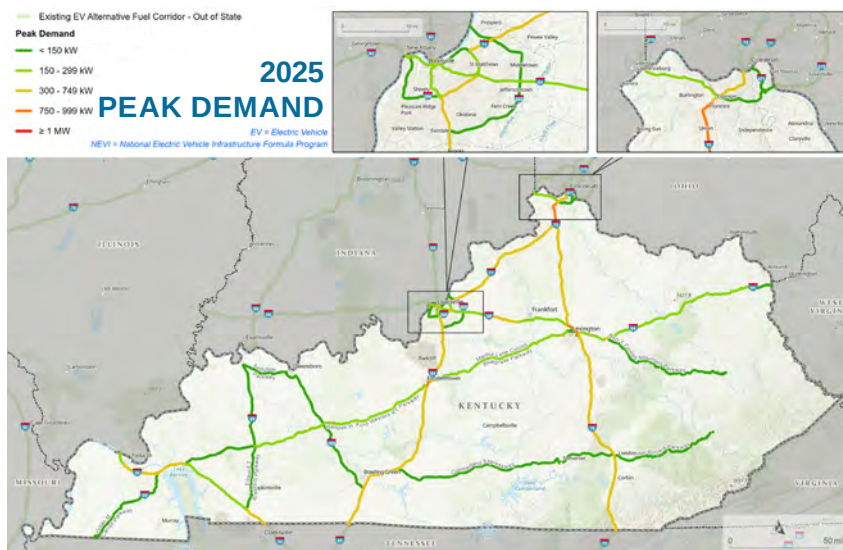


FIGURE 7.9 2025 PEAK DEMAND

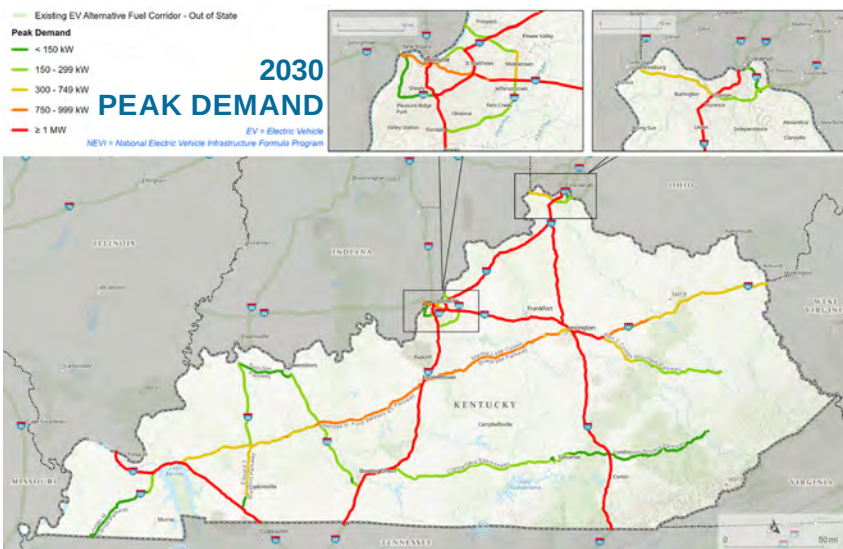


FIGURE 7.10 2030 PEAK DEMAND

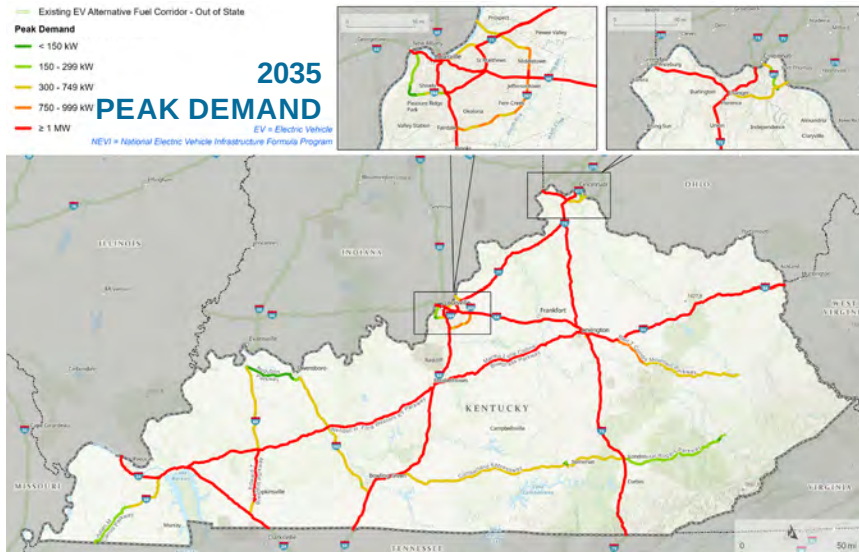


FIGURE 7.11 2035 PEAK DEMAND

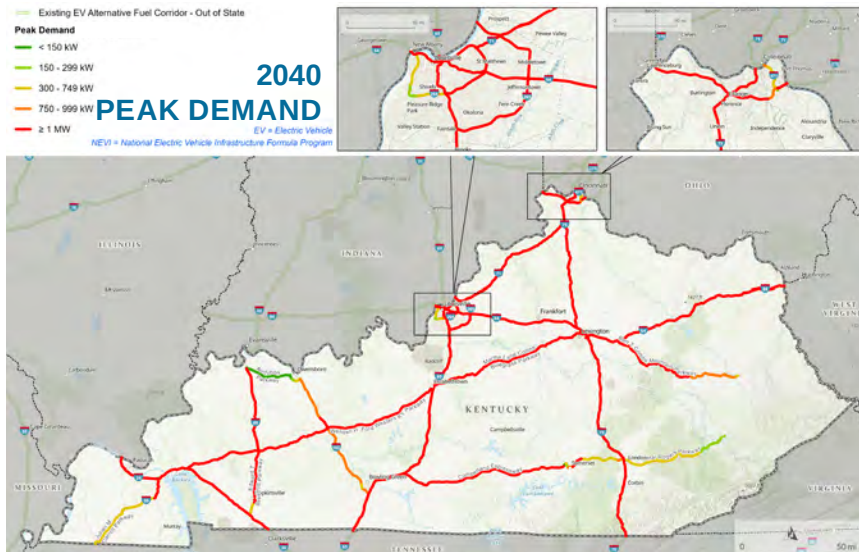


FIGURE 7.12 2040 PEAK DEMAND

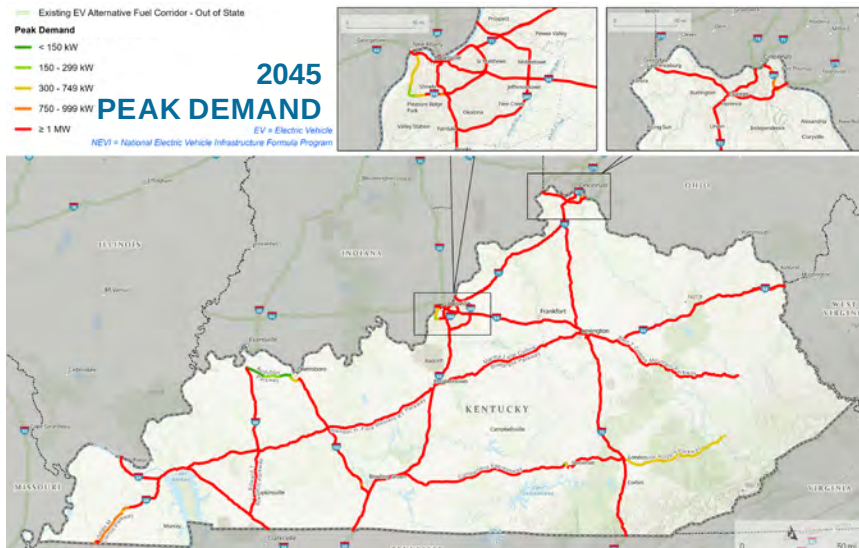


FIGURE 7.13 2045 PEAK DEMAND

Kentucky's Electric Vehicle Infrastructure Deployment Plan

UTILIZATION

Using the information from the prior analyses, the estimated utilization rate for a single NEVI-compliant 4-port DCFC station every 50 miles was calculated for each analysis year (Figure 7.14 to Figure 7.19). The utilization rates in 2022 are below 25% but they are expected to increase to 25% to 50% on the major Interstates by 2025. A reasonable maximum utilization is expected to be in the 40% to 50% range. Above this level wait times would be very long and additional NEVI stations or ports would be warranted.

By 2030, rates would increase to over 100% on the major Interstates if only one NEVI compliant DCFC was present per 50 miles, indicating that this level of infrastructure would be unable to support the charging needs of EVs traveling on these corridors. Other portions of the system vary from <25% up to 100%. These maps can also be used to estimate the commercial viability of the corridors over time.

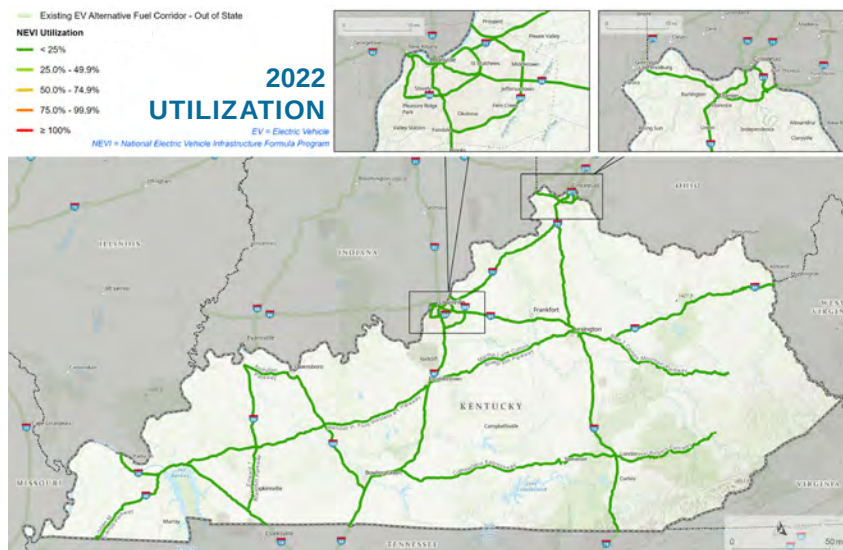


FIGURE 7.14 2022 NEVI UTILIZATION

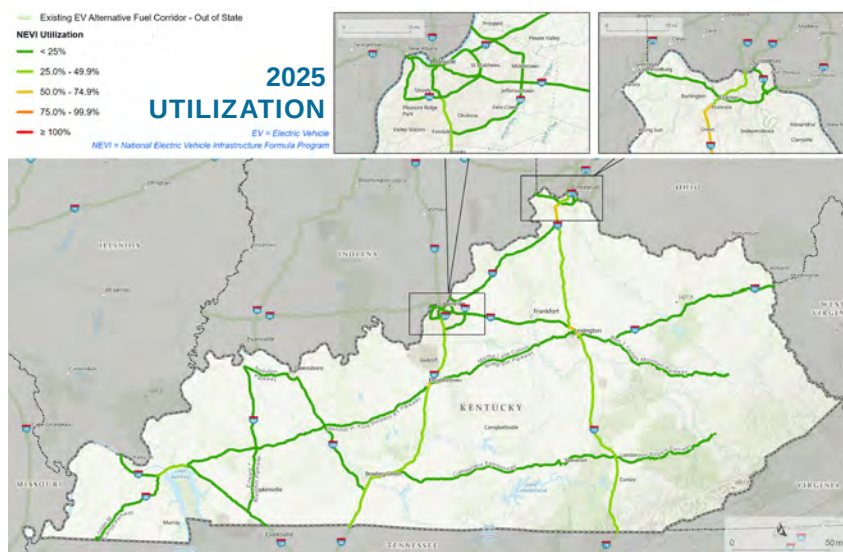


FIGURE 7.15 2025 NEVI UTILIZATION

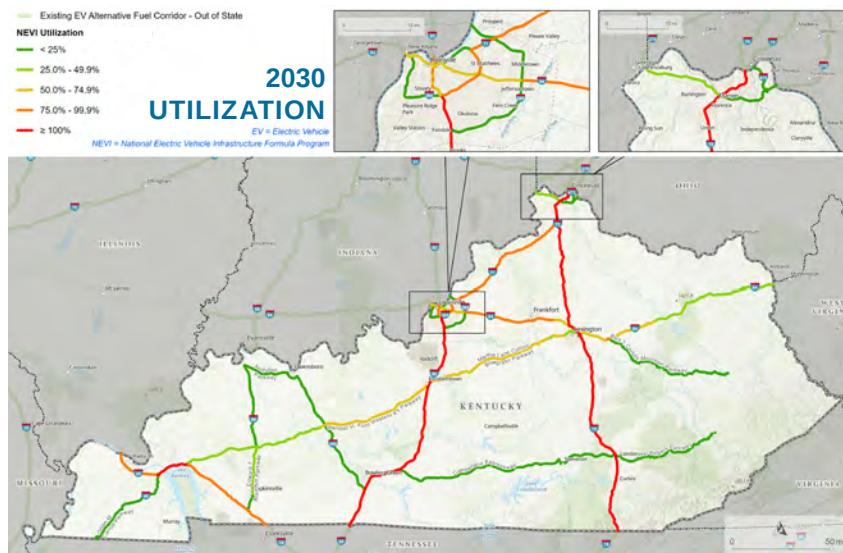


FIGURE 7.16 2030 NEVI UTILIZATION

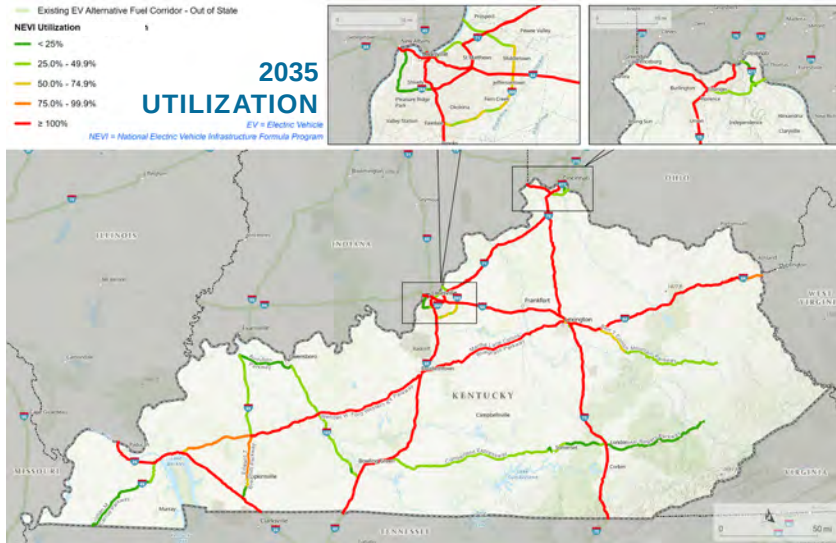


FIGURE 7.17 2035 NEVI UTILIZATION

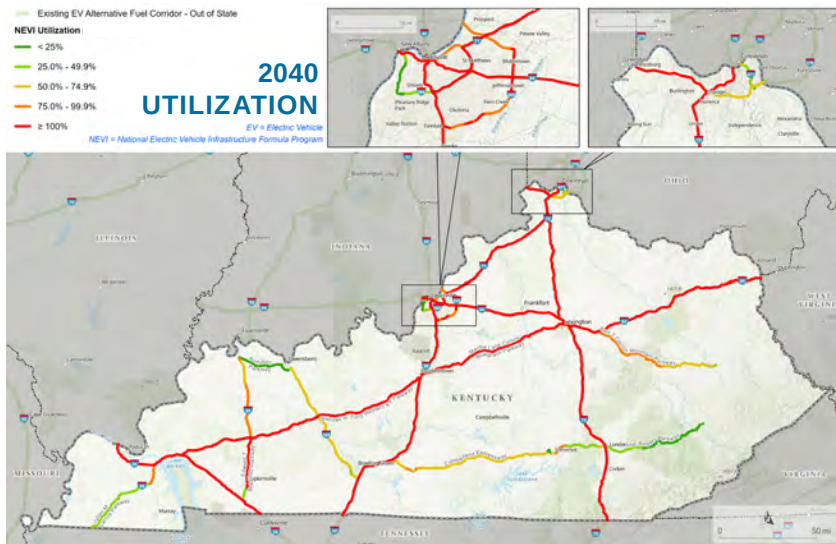


FIGURE 7.18 2040 NEVI UTILIZATION

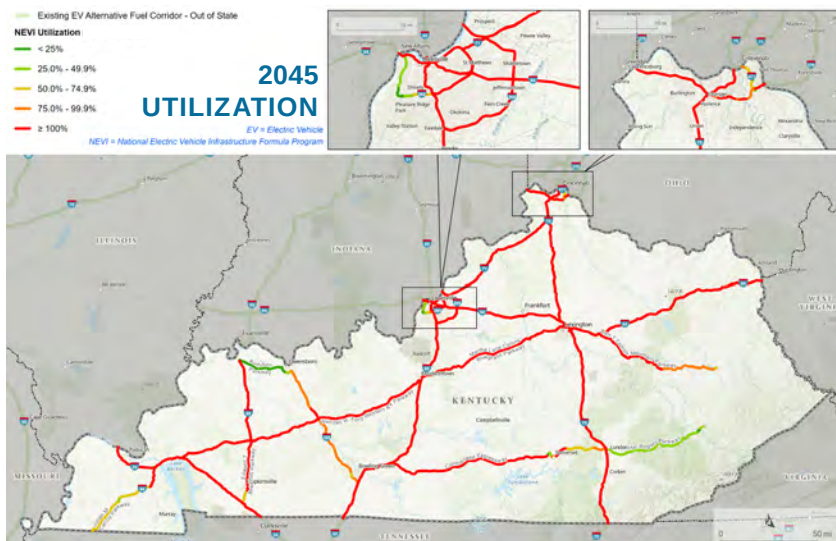


FIGURE 7.19 2045 NEVI UTILIZATION

INTERCHANGE SUITABILITY AND PRIORITIZATION

This plan assesses the AFC network at the interchange level with the goal of determining the relative suitability and prioritization of each interchange for the installation of NEVI compliant DCFC stations. The analysis does not recommend specific sites or interchanges, but rather assigns planning level scores to each, which can be used to support future deployment activities.

This approach is based on the view that there are multiple potentially good solutions to the challenge of siting NEVI stations every 50 miles across the AFC network in Kentucky. Therefore, KYTC does not want to unnecessarily narrow the list of potential interchanges (and therefore sites). Instead, KYTC plans to involve the private sector in the implementation and contracting phase. This would include private sector proposals for how to best solve what is essentially an indeterminate network optimization problem.

METHODOLOGY

The objective, data-driven methodology, was developed for determining the suitability and prioritization of interchanges for locating NEVI-compliant DCFC stations. The criteria used for this analysis were directly linked to factors highlighted in the NEVI guidance.

Interchange suitability was based on several factors including how a station at that interchange would help build out the required network per NEVI requirements, serve as many users as possible, and require the least amount of infrastructure investment. Highly suitable interchanges typically would have readily available power infrastructure, existing amenities, and high anticipated site utilization.

Interchange prioritization was focused on determining where public funds should be invested to fill EV infrastructure gaps and build out the system per NEVI guidelines. Prioritization considered many of the same factors as suitability; however, it also included factors such as service to rural and disadvantaged communities. Understanding and balancing an interchange's suitability and prioritization is important. Interchanges that are extremely suitable are also locations where private firms are likely to invest their own funds. In fact, private firms may be willing to invest more than the minimum 20% match to construct, own, and operate some highly suitable locations. The prioritization of public funds takes into account suitability factors as well as equity factors to identify locations where public investment is needed to build the network equitably. **Table 7.1** shows the criteria used to determine the suitability and prioritization of each interchange. Scores of 0 to 1 were assigned for each criterion based on the specific interchange characteristics. Weighted scores were developed using the weighting factors shown in the table. (The final scores were normalized based on the maximum values to yield a score of 0 to 1 for each interchange for both suitability and prioritization.)

The criteria weights for calculating the suitability and prioritization scores differ as shown. For example, Long-Distance Trips have a weight of 10 for suitability and a weight of 7 for prioritization. Another example is that a rural designation score has 0 weight for suitability, but it has a 10 weight for prioritization.

All of the suitability and prioritization criteria are discussed in detail later in this Chapter.

TABLE 7.1 INTERCHANGE SUITABILITY AND PRIORITIZATION CRITERIA

SUITABILITY				PRIORITIZATION				Legend
Rank	No.	Criteria	Weight	Rank	No.	Criteria	Weight	
	1A	Dist. to Existing NEVI Compliant DCFC Stations	10		1B	Distance to Existing DCFC Stations	10	 High Rank
	2	Predicted Long-Distance Trips in 2026	10		7	Justice40 Designation	10	 Medium Rank
	3	Power Availability and Reliability	10		8	Rural Designation	10	 Low Rank
-	3A	3-Phase Power Avail.	5		2	Predicted Long-Distance Trips in 2026	7	
	3B	Maximum Voltage	2					
	3C	No. of Substations	3					
	4	Miles of Corridor Coverage	7		4	Miles of Corridor Coverage	7	
	5	Presence of Amenities	7		3	Power Availability and Reliability	4	
	6	Intersecting Road Traffic	3	-	3A	3-Phase Power Avail.	2	
					3B	Maximum Voltage	1	
					3C	No. of Substations	1	
N/A	7	Justice40 Designation	-		5	Presence of Amenities	3	
N/A	8	Rural Designation	-		6	Intersecting Road Traffic	3	
Total			47	Total			54	

A final critical step of the analysis process was the application of an exclusion zone for both the suitability and prioritization evaluations. Interchanges were excluded from the suitability rankings if they were located within 20 driving miles of an existing NEVI-compliant DCFC charging location along the same corridor (e.g., along I-75 or I-24). This reflects the NEVI guidance that requires 50-mile maximum spacing. There is little benefit to investing public funds at an interchange that is too near an existing NEVI-compliant DCFC station along the same corridor, as this would not help reach the required coverage. Interchanges were excluded from the prioritization rankings if they were located within 20 miles (straight line measurement) of any existing DCFC station. This reflects the understanding that interchanges should not be prioritized if they are located too close to an existing DCFC station, which prioritizes filling in the gaps.

INTERCHANGE SUITABILITY MAP

All interchanges on the AFC network were scored for suitability using the criteria listed in **Table 7.1** and discussed in detail later in this Chapter. **Figure 7.20** presents the heat map showing the interchanges that are most suitable for deploying NEVI stations. There are acceptable locations on all corridors, indicating that there are likely several options for deploying NEVI stations and meeting the NEVI criteria on the AFC network.

The most suitable interchanges are found closer to the urban areas, which is to be expected, as they have the highest traffic, readily available power, and existing amenities. The areas along the Parkways have fewer suitable locations and may not be as financially feasible in the near term. However, there are suitable locations spread across the state, indicating that it will be possible to effectively deploy NEVI stations on all corridors.

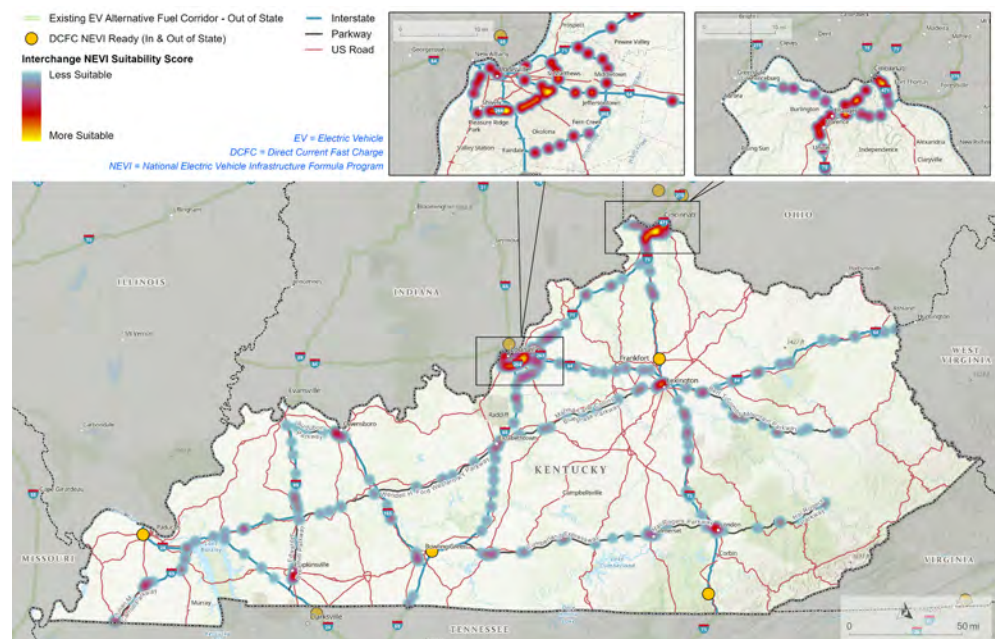


FIGURE 7.20 INTERCHANGE SUITABILITY SCORES

Note: Major intersections were scored on the Hal Rogers Parkway where it is not grade separated.

INTERCHANGE PRIORITIZATION MAP

Similarly, the criteria were used to score interchanges on the AFC network with regard to the priority for deploying NEVI stations (**Figure 7.21**). The resulting heat map highlights the interchanges that are the highest priority for public investment in deploying NEVI stations. Due to the exclusion areas and the change in criteria weighting, this map highlights different areas compared to the suitability map. For example, several locations on I-64 and the Mountain Parkway in eastern Kentucky rank very high as do several locations on I-69, the Western Kentucky Parkway, and the Cumberland Expressway. These higher priority locations identify places where focused efforts would be appropriate to promote NEVI station deployments.

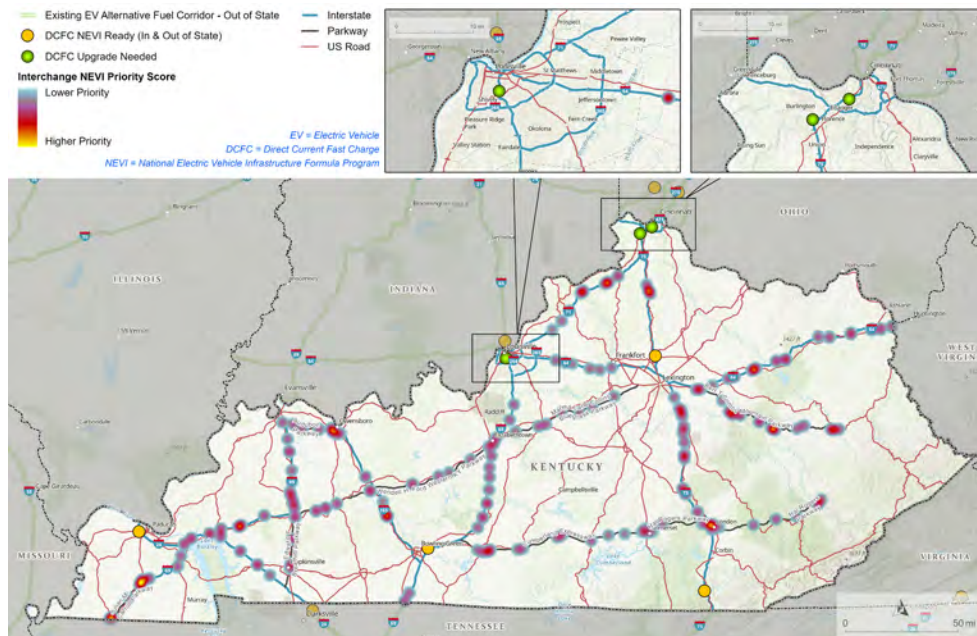


FIGURE 7.21 INTERCHANGE PRIORITIZATION SCORES

INTERCHANGE SCORING CRITERIA

The following sections summarize the approach used to calculate the suitability and prioritization criteria scores. The numbering matches the numbering in **Table 7.1**. The criteria are directly related to the NEVI guidance. For example, power availability and reliability was a top factor for interchange suitability and service to rural and/or Justice40 communities were top ranked factors for interchange prioritization. The criteria scores were also developed to be quantifiable and repeatable to the maximum extent possible.

The work was completed in coordination with the utility companies and took stakeholder input into account. For example, during numerous stakeholder discussions, the importance of amenities was emphasized. This feedback influenced the scoring approach used for that factor.

The EV infrastructure market is evolving rapidly. Some of these scores are based on inputs such as the proximity of a NEVI station. As new stations come online, these criteria and scores would be affected. This should be taken into account as the plan moves forward into deployment.

- ⚡ **Criteria 1A** - Distance to Existing NEVI Compliant DCFC Stations
- ⚡ **Criteria 1B** - Distance to All Existing DCFC Stations
- ⚡ **Criteria 2** - Predicted Long-Distance EV Trips in 2026
- ⚡ **Criteria 3** - Power Availability and Reliability
- ⚡ **Criteria 3A** - 3-Phase Power Availability
- ⚡ **Criteria 3B** - Maximum Voltage
- ⚡ **Criteria 3C** - Substations within 2 Miles
- ⚡ **Criteria 4** - AFC Network Miles Covered
- ⚡ **Criteria 5** - Presence of Amenities/Services
- ⚡ **Criteria 6** - Intersecting Road Traffic
- ⚡ **Criteria 7** - Rural Area Designation
- ⚡ **Criteria 8** - Justice40 Designation

CRITERIA 1A - DISTANCE TO EXISTING NEVI COMPLIANT DCFC STATIONS

The NEVI guidance states that to achieve build-out on the AFCs, NEVI-compliant DCFC stations must be located within 50 miles of each other along the AFCs. This 50-mile distance applies across state lines, so NEVI stations in Kentucky can cover AFCs in surrounding states and vice versa. It also excludes proprietary DCFC stations (e.g., Tesla stations) as they are not NEVI compliant.

Interchanges were scored for suitability based on how far away they are from a NEVI compliant DCFC station that is located on the same corridor. If they were very close, then it would not be suitable to install another NEVI station and the interchange received a score of 0. But as the distance increased, the scores increased to a high of 1.0. The locations of non-NEVI compliant DCFC stations were not used for this criterion (but they are for criterion 1B). Future guidance from the Joint Office may influence this scoring approach as clarification is provided on what constitutes a “corridor” and whether or not a NEVI-compliant DCFC station on one AFC can serve part of another nearby AFC. The distance to the nearest NEVI compliant DCFC station was also used to implement the prioritization exclusion zone at the end of the analysis as discussed previously.

The locations of the NEVI stations in and around Kentucky are shown in **Figure 7.22**. The score assigned to each distance range is provided in **Table 7.2**.

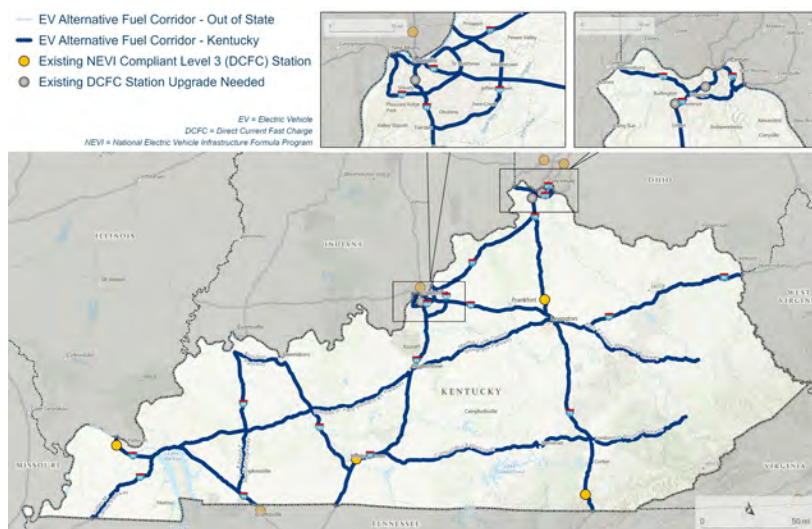


FIGURE 7.22 EXISTING CHARGING STATIONS (NEVI COMPLIANT AND UPGRADES NEEDED)

TABLE 7.2 DISTANCE TO EXISTING NEVI COMPLIANT DCFC STATIONS SCORING

Distance (miles)	Score
0-20.4	0.0
20.5-25.4	0.2
25.5-35.4	0.5
35.5-50.4	0.7
50.5-100.4	0.8
100.5-150.4	0.9
150.5+	1.0

CRITERIA 1B - DISTANCE TO ALL EXISTING DCFC STATIONS

To identify the highest priority interchanges for deploying publicly supported DCFC stations, the distance to any publicly accessible DCFC station becomes important. All things being equal, installing a new DCFC station near an existing station, even if it is not NEVI compliant, would be a lower priority than installing one in an area with no nearby service. To be counted, existing DCFC stations must be publicly accessible, use standard protocols, and offer a minimum of 50 kW. Even if a station does not support NEVI build-out, it is still a usable charger providing some level of support for long-distance travel. It may also be a candidate for an upgrade. Therefore, interchanges far from any DCFC stations were given a higher priority, so that the network would be more usable even before NEVI build-out is reached.

The locations of existing publicly accessible DCFC stations (NEVI compliant and non-NEVI compliant) are shown in **Figure 7.22**. The distance to the nearest DCFC station was also used to implement the suitability exclusion zone at the end of the analysis as discussed previously.

Interchanges must be at least 20 miles away from the nearest publicly accessible DCFC station to receive a score for this criterion. The score increases linearly to a maximum of 1.0 at 100 miles or more. The scoring is illustrated in **Figure 7.23**.

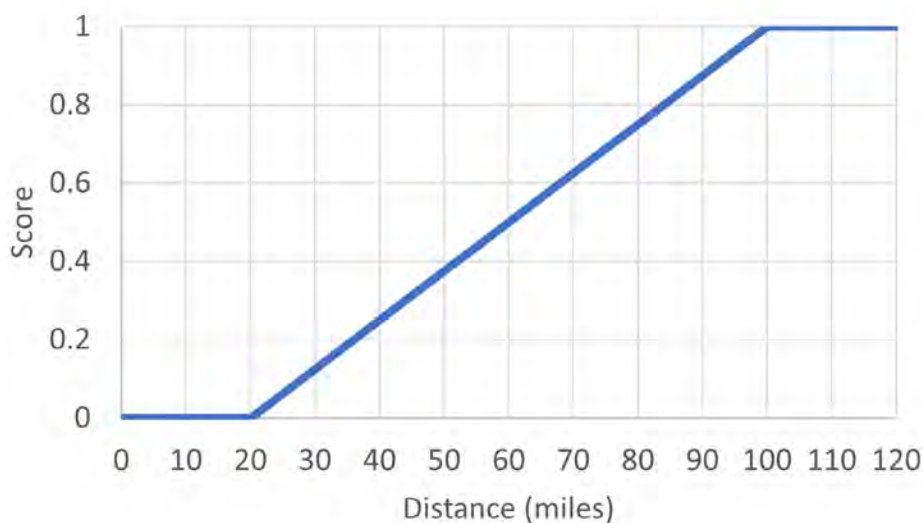


FIGURE 7.23 DISTANCE TO ALL EXISTING DCFC STATIONS SCORING

CRITERIA 2 - PREDICTED LONG-DISTANCE EV TRIPS IN 2026

As much as 80% of EV charging is expected to take place at home using Level 1 and 2 chargers, where the low electricity costs make it economical to recharge a battery and where the speed of charging is not as important.¹ Workplace and public Level 2 chargers are also expected to serve as important recharging locations. DCFC stations along the AFCs would mainly be used by drivers who do not have other charging options that meet their needs. For example, they may be traveling a long distance, or they may need to recharge quickly.

The probability that an EV will stop and use a DCFC station is dependent on several factors. One of these is the EV range. For example, an EV with a 150-mile range is more likely to stop and charge than an EV with a 300-mile range. Another factor that influences whether an EV will stop to charge is how far they have already traveled. Even a long-range EV will stop if the length of the trip goes beyond the range of the vehicle.

To score each interchange, Kentucky's Statewide Traffic Demand Model, which includes 48 US states, was used to predict the number of trips per day of various lengths on each AFC segment for the year 2026. The forecasted trips were placed into six distance ranges: 0-50 miles, 50-100 miles, 100-150 miles, 150-200 miles, 200-250 miles, and 250+ miles. The data was used to estimate the number of trips in the six distance ranges that pass each AFC interchange. For reference, **Figure 7.24** shows the estimated number of trips longer than 150 miles in the year 2026.

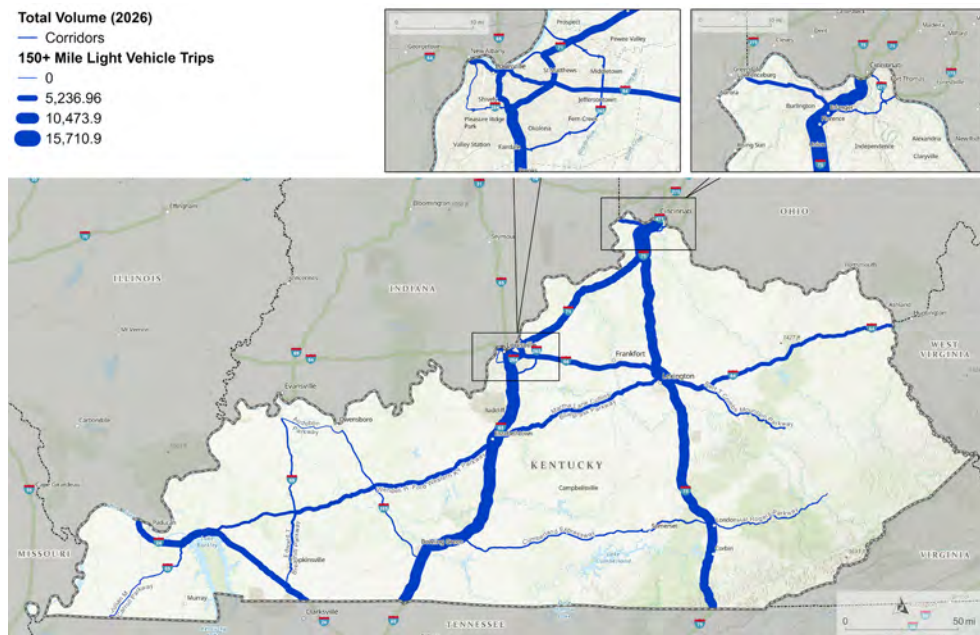


FIGURE 7.24 LONG DISTANCE TRIPS

¹ *Incorporating Residential Smart Electric Vehicle Charging in Home Energy Management Systems* National Renewable Energy Laboratory. 2021. <https://www.nrel.gov/docs/fy21os-ti/78540.pdf>

EV models have very different travel ranges; therefore, it was not possible to use a single distance cutoff for when a vehicle would need to stop and charge. Instead, a probability of needing to stop and charge was assigned to each distance range (**Table 7.3**). These probabilities were used to estimate the total number of vehicles that may need to stop and charge somewhere along their trip.

TABLE 7.3 PROBABILITY OF LONG DISTANCE TRIPS STOPPING TO CHARGE

Distance Range	Probability of Needing to Stop and Charge
0 - 50.4 miles	0%
50.0 - 100.4 miles	10%
100.5 - 150.4 miles	25%
150.5 - 200.4 miles	75%
200.5 - 250.4 miles	95%
250.5 + miles	100%

This criteria score was based on the estimated total number of daily vehicles passing an interchange that would need to stop and charge somewhere along their trip. The volumes were grouped into ranges with scores assigned as shown in **Table 7.4**. Given the range of EVs and other DCFC station charging options, not every one of these vehicles would stop and charge at the interchange being evaluated (see note below for details). However, the magnitude of this number gives a good indication of the overall demand for charging in that area.

TABLE 7.4 PREDICTED LONG-DISTANCE EV TRIPS IN 2026 SCORING

Daily Vehicles Passing Interchange Needing to Stop Along Their Trip	Score
0-2,349	0.0
2,350-5,100	0.2
5,101-9,800	0.4
9,801-16,500	0.6
16,501-24,600	0.8
24,601+	1.0

Note: A typical EV in the future is expected to have a range of around 300 miles. There is, however, an upper and lower limit to how much of the battery capacity a driver will utilize. Due to range anxiety, drivers are expected to stop at somewhere around 20-30% battery capacity. Due to limitations on charging speed, drivers are likely to stop charging and resume their trip when they reach about 80% battery capacity. This means that about half of the total range is expected to be used during long-distance travel. An average range of 300 miles means that EVs would need to stop to charge about once every 150 miles.



CRITERIA 3 - POWER AVAILABILITY AND RELIABILITY

A readily available and reliable electrical service is essential to the deployment of NEVI-compliant DCFC stations. Three sub-criteria were selected for this criterion to adequately address the range of needs: 3A - 3-Phase Power Availability, 3B - Maximum Voltage, and 3C – Number of Substations. Together, these topics cover the proximity of the required 3-phase power lines, the amount of power available, and the reliability of that power. Interchanges that score well on these three sub-criteria are likely to have a lower deployment cost and be more effective in meeting the NEVI performance requirements.

With regard to scoring, power has a significant impact on interchange suitability, since it could be very expensive to bring power to a new site. Interchanges without sufficient power would be deemed not suitable for a DCFC charging station. Power is also important for interchange prioritization, but it is less important because there may be a location where a NEVI compliant DCFC station is needed, but power is not immediately available or there are fewer nearby substations. For example, to serve a rural area and meet NEVI spacing requirements, it may be necessary to run a 3-phase power line a short distance to a new site (such as further down a crossroad).

CRITERIA 3A - 3-PHASE POWER AVAILABILITY

Three-phase power is required to serve a DCFC site. Power can come from a substation, or it may be tapped from a distribution line. For each interchange, the availability of 3-phase power was assessed in both directions for 1 mile. A score of 1.0 was assigned if there was nearly complete coverage of the roadway by 3-phase power. A score of 0 was assigned if there was no coverage. **Figure 7.25** shows hypothetical examples of how interchanges were scored and **Table 7.5** shows the scoring rubric.

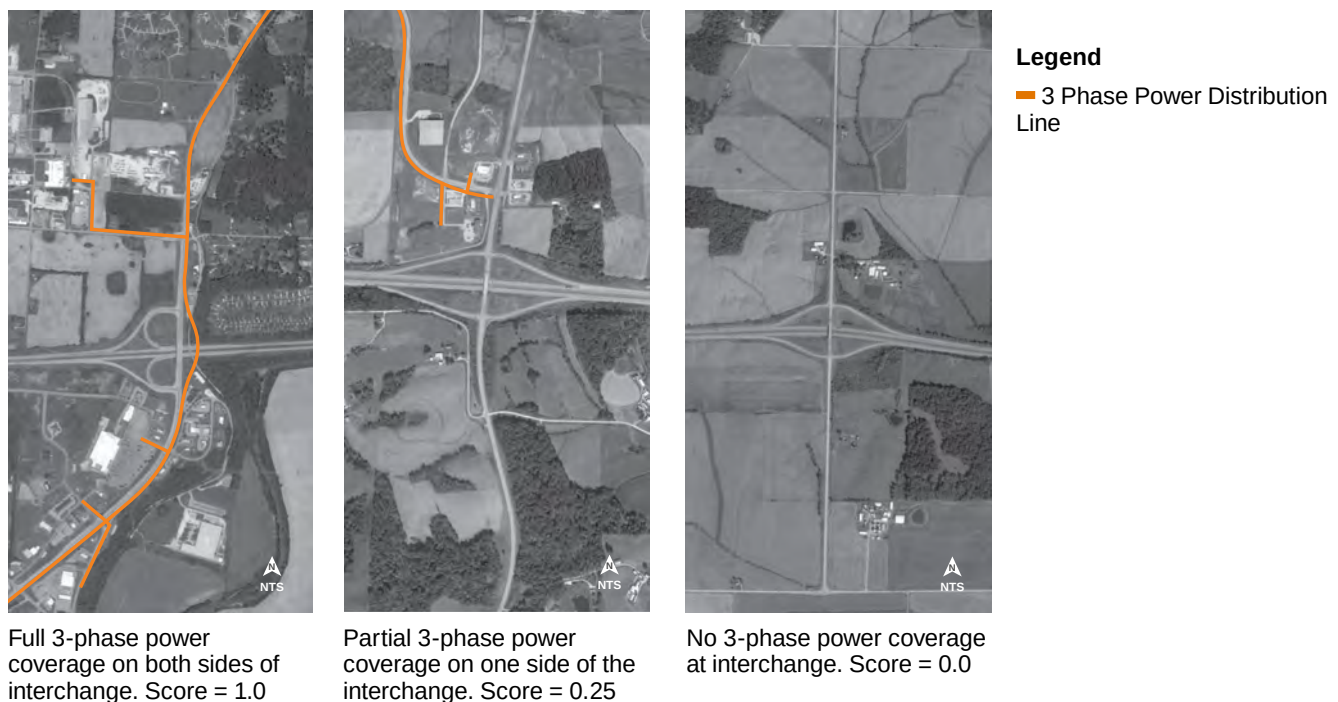


FIGURE 7.25 HYPOTHETICAL 3-PHASE POWER AVAILABILITY MAPS AND SCORING

TABLE 7.5 3-PHASE POWER AVAILABILITY SCORING

3-Phase Power Coverage Scoring	Score
No Coverage	0.0
Partial Coverage on One Side	0.25
Partial Coverage on Both Sides or Complete Coverage on One Side	0.5
Complete Coverage on One Side and Partial Coverage on the Other Side	0.75
Complete Coverage on Both Sides	1.0

CRITERIA 3B - MAXIMUM VOLTAGE

This is the voltage rating of the nearest power source. For a substation, this is the highest incoming voltage present. For a distribution line, this is the line voltage. Higher voltages can supply larger loads and are better suited for providing the power level needed for DCFC stations. Interchanges with high voltages are also better able to meet the NEVI guidance that promotes future station flexibility and expandability.

The analysis for this criterion is illustrated in **Figure 7.26** with the scoring provided in **Table 7.6**.

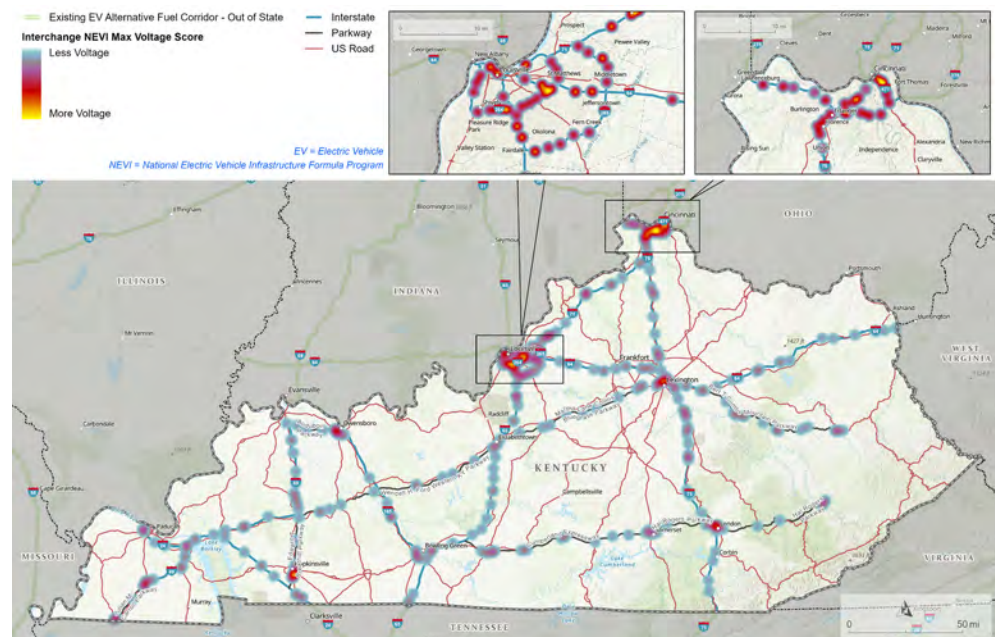


FIGURE 7.26 MAXIMUM VOLTAGE NEAR POWER SOURCE

TABLE 7.6 MAXIMUM VOLTAGE SCORING

Voltage	Score
115kV+	1.0
69-114kV	0.7
<69kV	0.0

CRITERIA 3C – SUBSTATIONS WITHIN 2 MILES

Sites that are within close range of multiple substations are more likely to have reliable power than sites that are near a single substation. It is also possible to provide redundant power feeds to improve reliability further when multiple substations are nearby. This criterion is used to identify sites that will have more reliable power. **Figure 7.27** shows substation locations relative to the AFC network. The scoring for this criteria is shown in **Table 7.7**.

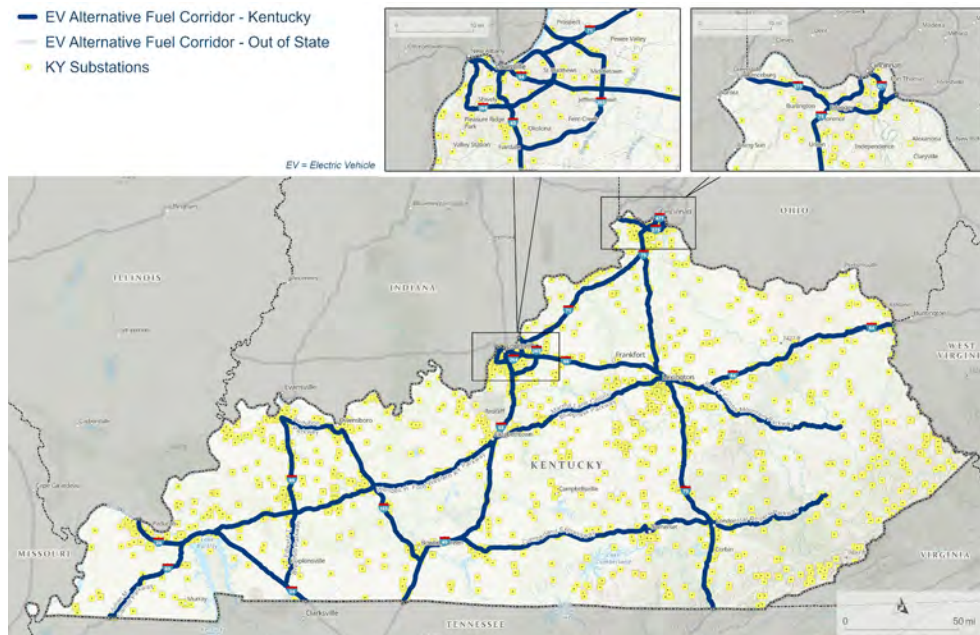


FIGURE 7.27 SUBSTATION MAP

TABLE 7.7 SUBSTATIONS WITHIN 2 MILES SCORING

Number of Substations	Score
1	0.3
2	0.7
3+	1.0

CRITERIA 4 - AFC NETWORK MILES COVERED

With Kentucky's network of AFCs, there are numerous intersecting AFCs. One of the factors that was determined to be beneficial was the ability for one DCFC station to provide some level of coverage for multiple AFCs. While the coverage of an intersecting corridor may not count toward NEVI build-out (final guidance on this is pending), it could still provide additional convenient charging opportunities for drivers. To quantify this criterion, the number of miles of AFC network within eight miles (driving distance) was calculated for each interchange.

Eight miles (one-way) was chosen since this represents a maximum 15-minute round-trip detour to reach an interchange from a nearby corridor. An interchange that is not near any intersecting AFCs will typically cover 16 miles. However, an interchange that is near the intersection of two or more AFCs would cover more total AFC miles and likely serve more users (see **Figure 7.28**). The scoring rubric for this criterion is provided in **Table 7.8**.

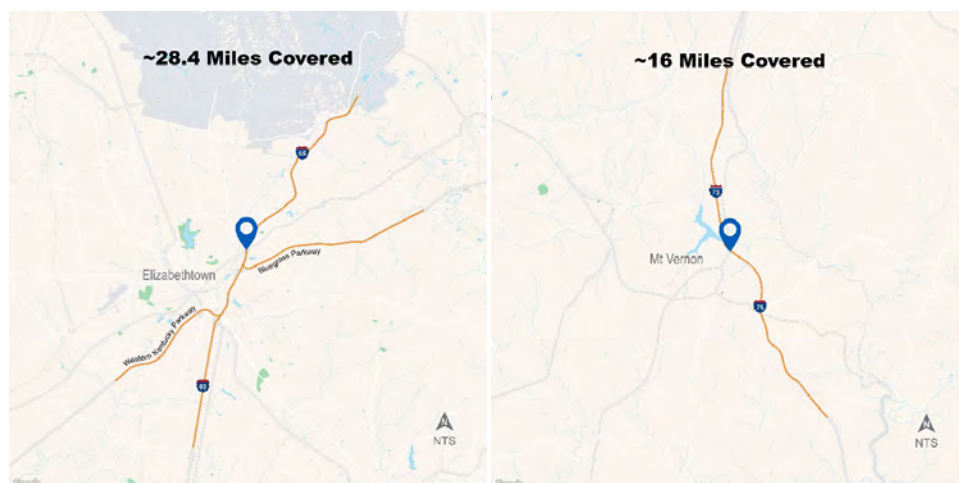


FIGURE 7.28 8-MILE AFC COVERAGE IN ALL DIRECTIONS

TABLE 7.8 AFC NETWORK MILES COVERED SCORING

Distance	Score
0-16 miles	0.0
16.01-28.00 miles	0.3
28.01-40.00 miles	0.7
≥ 40.01 miles	1.0

CRITERIA 5 – PRESENCE OF AMENITIES/SERVICES

Even with improvements in charging technology, the amount of time that will be required for EVs that stop at DCFC charging sites along the highway will be significant, likely around 25 minutes. It is ideal to have charging sites where there are amenities and services that drivers can take advantage of while waiting for their vehicle to charge. These include convenience stores, restaurants, and parks.

Interchanges that have more amenities and services will be attractive to drivers when they look for a place to charge, which makes this an important characteristic for site suitability. Locations without amenities may need to have facilities constructed (e.g., restrooms and vending machines). This would increase the cost and complexity of building in that location.



Another factor captured by this criterion is driver habits and expectations. This was brought up by stakeholders. The interchanges where drivers stop today to access amenities and services are potentially good locations for EV charging stations. They already have the benefit of driver awareness and familiarity. **Figure 7.29** highlights the amenity/service score density on the AFC network. The score for this criterion is based on information collected for the one-mile area surrounding each interchange as well as the ease of using the interchange as presented in **Table 7.9**. The final score for each location was normalized to yield a 0 to 1.0 score for each interchange.

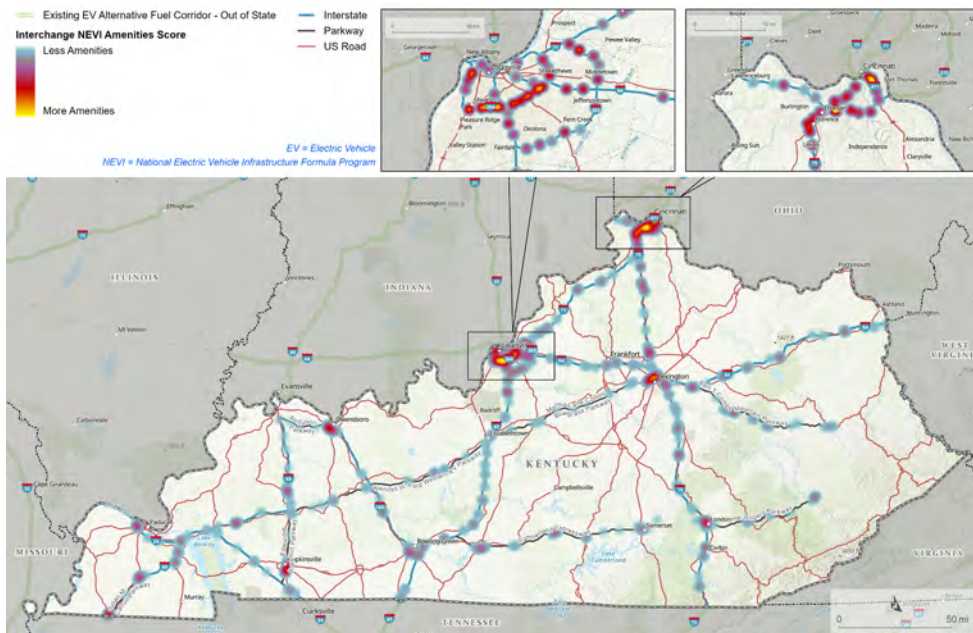


FIGURE 7.29 PRESENCE OF AMENITIES/SERVICES DENSITY MAP

TABLE 7.9 PRESENCE OF AMENITIES/SERVICES SCORING

Amenity	Description	Scoring	Score Range
Convenience Stores	Number of convenience stores within 1 mile	25 points for each up to 125 max.	0-125
Fast Food Restaurants	Number of fast-food restaurants within 1 mile	25 points for each up to 125 max.	0-125
Sit Down Restaurants	Number of sit-down restaurants within 1 mile	25 points for each up to 125 max.	0-125
Parks	Presence or absence of a park within 1 mile	0 points: No park 100 points: Park	0,100
Easy on/off	A qualitative score of how easily a driver can get off and back on the Interstate, considering these factors: • Simplicity of design • Presence of signals • Presence of medians	50 points: Hard 100 points: Medium 150 points: Easy	50 – 150
Total			50-625

CRITERIA 6 - INTERSECTING ROAD TRAFFIC

Long-distance travelers on the AFC network are not the only drivers that would make use of DCFC infrastructure. Local drivers on the intersecting roadways at an interchange are also potential users as are other drivers in the area. As discussed previously, 80% or more of charging will occur at Level 1 and Level 2 chargers at home or work due to cost and other factors. However, there will be times when drivers need to use a DCFC station to recharge quickly or because they do not have other options available. Therefore, it is advantageous to have DCFC stations at interchanges with high daily traffic volumes.

This criterion considers the average daily traffic volumes (ADT) of the roadway intersecting the AFC network at the interchange being evaluated. For this criterion, the intersecting road ADT on both sides of the interchange was summed to indicate total traffic activity at the interchange. (One-sided interchanges only had one value.) The resulting scores for this criterion are illustrated in **Figure 7.30** and the scoring rubric is provided in **Table 7.10**.

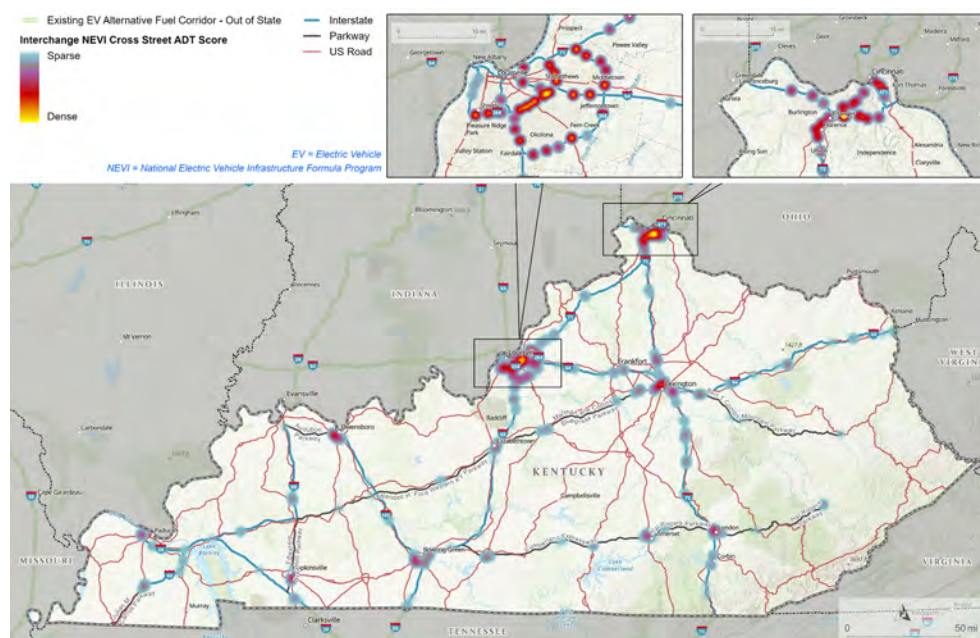


FIGURE 7.30 INTERSECTING ROAD TRAFFIC SCORES

TABLE 7.10 INTERSECTING ROAD TRAFFIC SCORING

Cross Street ADT (Sum of Both Sides of Interchange)	Score
0-10,000	0.0
10,001-24,000	0.2
24,001-38,000	0.5
38,001-58,000	0.7
58,001-92,000	0.9
92,001+	1.0

CRITERIA 7 - RURAL AREA DESIGNATION

The NEVI guidance emphasizes the need for EV charging infrastructure in rural areas. Each interchange area received a score from 0 to 1.0 based on the percentage of the interchange area that was classified as rural. For example, an interchange located entirely in a rural area received a 1.0 for this criterion, while an interchange located in an entirely urban area received a 0. The scores for partly rural interchanges were tied directly to the percent of the area determined to be rural. These scores were not used to calculate interchange suitability, but consistent with the NEVI guidance they were used to calculate interchange prioritization (see **Table 7.1**). The Census Bureau's 2020 urbanized area classification data was used to define the rural areas across the state as illustrated in **Figure 7.31**.

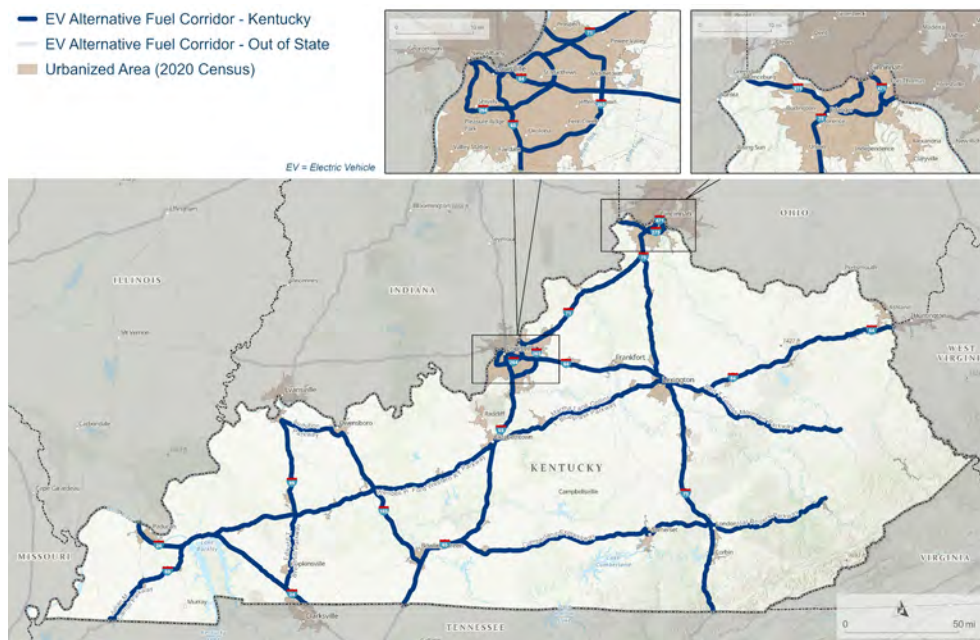


FIGURE 7.31 URBAN AND RURAL AREAS IN KENTUCKY

Scoring: There is no scoring table included for the rural designation because the score is the fractional value of the area around the interchange that is designated as rural.

CRITERIA 8 - JUSTICE40 DESIGNATION

A key factor for the prioritization of vehicle charging locations is equity and the beneficial impact of the EV infrastructure investment on underserved or disadvantaged communities. This is especially important in Kentucky where many areas are underserved. The NEVI guidance encourages states to use the EV Charging Justice40 map (**Figure 7.32**) to facilitate this portion of the analysis. This map is intended to help states achieve the Justice40 goal of 40% of the benefits of Federal investments in clean transportation going to disadvantaged communities (DACs). The investments do not have to be in those communities, but the benefits should accrue to those communities. The Justice40 map is consistent with the Justice40 Interim Guidance and is based on U.S. DOT's interim definition for DACs.

Each interchange was scored from 0 to 1.0, based on the percentage of the interchange area that was classified as a DAC. Similar to the rural category, Justice40 was not used to score the suitability for each interchange. However, consistent with the NEVI guidance, interchanges with high Justice40 values were scored higher for the prioritization of deploying charging stations (see **Table 7.1**).

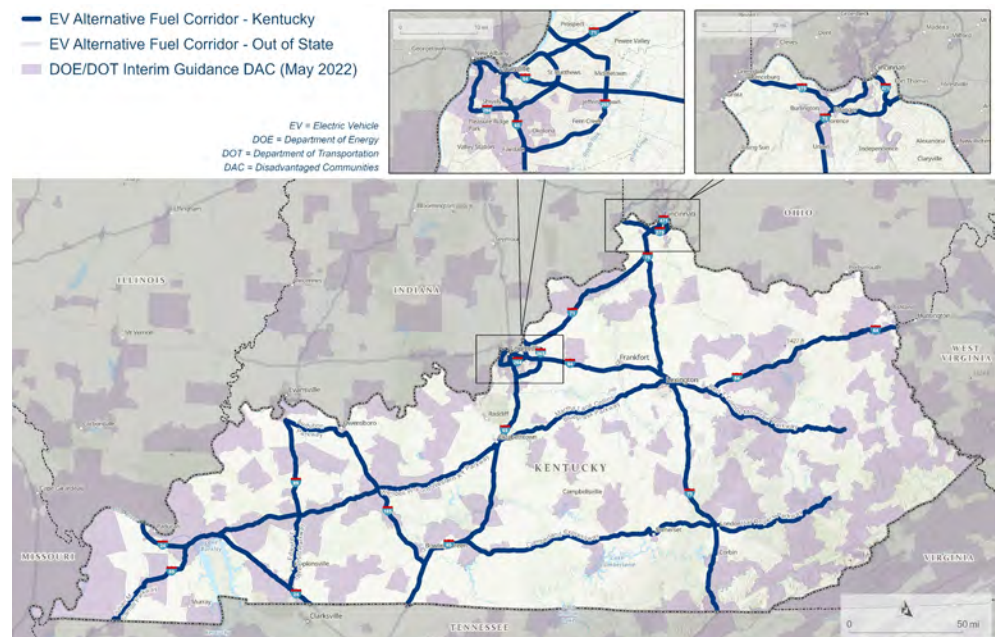


FIGURE 7.32 EV JUSTICE40 MAP

Scoring: No table is provided for this criterion because the score is the fractional value of the area around the interchange that is designated as a Justice40 area.

OTHER CRITERIA CONSIDERED

Several other criteria were considered but not included for suitability or prioritization scoring such as population and employment density, EV ownership percentages, local attractions, and tourist destinations. These are important considerations, but they are more applicable to planning for Level 2 community chargers rather than NEVI-compliant DCFC stations.

Several other criteria such as security, shelter, lighting, and potential site hosts are also important, but they are relevant for choosing specific sites rather than identifying potential interchange areas. These types of factors will need to be considered as the project moves from planning to deployment.



INFRASTRUCTURE DEPLOYMENTS/UPGRADES

Kentucky has four existing NEVI-compliant stations (as shown previously in this chapter) and three DCFC stations that would require upgrades to reach full NEVI compliance.

To meet the needs of Kentucky's traveling public, KYTC has developed a list of preliminary station considerations, along with initial conceptual parking and charging site layouts, both of which are presented in **Chapter 8: Implementation**. The station considerations are consistent with the NEVI guidance and stakeholder input. The site layouts are intended to show ways to provide flexibility. For example, sites will likely need to accommodate vehicles with trailers and facilitate snow removal so that it does not impact charger access. The ability to upgrade sites will also be a consideration during deployment, especially in corridors where the demand is expected to grow and exceed the capacity of a 4-port station.

KYTC's approach to site prioritization recognizes the need for power delivery at the site and has identified which sites are proximate to power substations (as shown previously in this chapter). Including this as a criterion is intended to minimize the construction cost of power infrastructure needed to serve the site. It is anticipated that transformers may be required to serve each charging site, but the extension of power to the site should be minimized. This will be left to the private sector to optimize and choose specific site locations and site hosts that have ready accessibility to available power and available capacity, thus minimizing the infrastructure improvements needed and the cost of the NEVI station.

STATE, REGIONAL, AND LOCAL POLICY

KYTC has a four-tiered policy for implementation of the NEVI Formula Funding Program which matches the expected uses of the formula funds (**Chapter 4**). The first tier includes all of the primary Interstates, prioritizing them for build-out to handle capacity. The second tier runs concurrent with the first, and includes all of the Parkways and other Interstates, using a data-driven approach to deploy stations across the entire state. This second tier prioritizes geographic coverage, especially in rural, mountainous, and disadvantaged communities. In accordance with the NEVI guidance, these first two initiatives will take priority for the first years of the program.

Once the AFC network is built-out, the third tier of the program would begin, which is to provide DCFC stations on other priority corridors and highways, especially those without nearby access to an Interstate or Parkway. Concurrent with this initiative is the fourth tier which includes providing funding for community and destination charging throughout the Commonwealth. This could be for DCFC stations or Level 2 stations. Tiers 3 and 4 will also seek to fill gaps and provide services in rural and disadvantaged communities. While EV adoption is typically lower in these areas (see **Chapter 6**), providing charging infrastructure will be key to promoting travel to these areas and opening the possibility of electric vehicle adoption for community members.

KYTC developed this policy with a simple principle at its heart – cover the state and leave nobody out. The program has been designed to provide both capacity where needed and coverage to every corner of the state, and KYTC anticipates that the ongoing engagement will provide an opportunity to better understand how the program can meet this intent. Throughout the process, KYTC is intending to work with communities to offer guidance on needed policy or code changes to help make the implementation process easier both for this program and for future EV infrastructure programs they may pursue.

CHAPTER 8

IMPLEMENTATION

Strategies for guiding the implementation of the program will rely heavily upon the contracting process as described in **Chapter 5: Contracting**. KYTC has structured the program to allow EVSE program managers the ability to optimize the network and the service offerings according to the requirements to be developed in the contracting process and aligned with the suitability and prioritization analysis described in **Chapter 7: EV Charging Infrastructure Deployment**. This process is intended to give each respondent an opportunity to enhance the effectiveness of every federal dollar spent to develop the network while meeting minimum federal and state requirements. KYTC will define the desired outcomes as part of the contracting process and score the respondents on their abilities to meet those requirements. In essence, the specific strategies will be developed by the private respondents, which correspond to the desired outcomes that KYTC will define.

KYTC will incorporate guidance and requirements from the Joint Office into components of the contracting requirements. Proposed rules outlined in the FHWA/ DOT 180-day NEVI Program guidance will be included in the implementation and contracting requirements for infrastructure providers. The six categories covered in the 180-day guidance are numbered below:

1. Installation, operation, and maintenance by qualified technicians of EV infrastructure.
2. Interoperability of EV charging infrastructure.
3. Traffic control devices and on-premise signs acquired, installed, or operated.
4. Data requested related to a project funded under the NEVI Formula Program, including the format and schedule for the submission of such data
5. Network connectivity of EV charging infrastructure.
6. Information on publicly available EV charging infrastructure locations, pricing, real-time availability, and accessibility through mapping applications.

STRATEGIES FOR EVSE OPERATIONS & MAINTENANCE

KYTC anticipates that the operations and maintenance of all EVSE will be performed by the station's private third-party provider. As part of the contracting process, minimum requirements will be defined for charger uptime (97% as defined by the NEVI Program requirements), repair lead time, repair responsiveness, failure/fault reporting, regular maintenance, cleaning, and station upkeep. The requirements will also meet the 180-day NEVI Formula Program guidance issued on June 9, 2022. It is anticipated that different responders would have different business models, but each would need to demonstrate that the site host is engaged to monitor, routinely inspect, and perform basic site cleaning functions.

KYTC's approach to EVSE operations and maintenance will be planned to meet both the 90-day and 180-day NEVI Formula Program Guidance.



STRATEGIES FOR IDENTIFYING ELECTRIC VEHICLE CHARGER SERVICE PROVIDERS AND STATION OWNERS

The process identified in **Chapter 5: Contracting** will be used to identify both charger service providers and station owners (site hosts). It is anticipated that the selection of appropriate site hosts would be a requirement of the contract and that one of the first steps in developing the proposal would be to highlight preliminary partnerships, interchange selections, and potential engagement with small businesses and site hosts to partner for infrastructure build-out.

KYTC is in the process of determining the best approach for guiding infrastructure deployment in a manner that aligns with the interchange suitability and prioritization analysis in **Chapter 7: EV Charging Infrastructure Deployment**. This could include a sliding scale of funding availability based on the suitability and prioritization scores. It could also include viewing a project more favorably if it is located near, or includes build-out of, desirable amenities or if it exceeds the NEVI guidance minimums in ways that benefit the traveling public.

KYTC is also looking at ways to cost-effectively build out the system while setting up the network of DCFC stations and private contractors for long-term success. One possible approach would be to develop contracts that bundle higher and lower-utilization corridors. Grouping higher-performing sites with lower-performing sites would allow private respondents to develop a workable long-term financial and operations and maintenance plan for all of the sites in the bundle, and not just the charging locations that would experience the most use.

At this stage, KYTC is exploring the potential for different contracting models and those models may change throughout the project. For example, one or a small number of contracts may be preferable in the initial stages of the program and on key Interstates to promote consistency and lower program risk. But as the program matures, there may be benefits to expanding the contracting types and/or number of respondents later in the program for the build-out of state highways and Parkways. KYTC may also explore a regional approach that allows respondents to draw from regional workforce and expertise, focusing their portion of the program not necessarily on specific corridors, but on corridors within a specific region.

STRATEGIES FOR EVSE DATA COLLECTION & SHARING

KYTC expects that EVSE data collection and sharing would be the primary responsibility of the third-party contractor and would be outlined as a requirement in the contract. During the selection process, each respondent is anticipated to provide their approach to data collection and sharing, which could include the level of detail they are willing to provide, their approach to assembling and anonymizing data, their data handling, usage, and security practices, and their approach to leveraging data to inform program decisions such as future charger build-out or monitoring of charger health.

KYTC's approach to data collection and sharing will include working closely with private project partners to address FHWA's required annual, quarterly, and real-time reporting.

As outlined in the 90-day guidance, KYTC will consider requiring data describing charging usage, cost, and reliability that can be shared with the Joint Office to support program evaluation and improvement efforts. As outlined in the 180-day proposed rules, KYTC will utilize the template provided to submit data to the Joint Office. KYTC will consider requiring data describing charging station location, type of equipment available, price, and status that can be shared via an Application Programming Interface (API) with public-facing directories, including the Alternative Fuel Data Center's Station Locator. Data sharing will also conform to the requirements now being developed by the Joint Office.

STRATEGIES TO ADDRESS RESILIENCE, EMERGENCY EVACUATION, SNOW REMOVAL/ SEASONAL NEEDS

KYTC has identified several types of resilience that the charging network would need to address. While these are likely not the only areas related to resilience, they represent the areas that are commonly identified as points of failure.

- + **Technology resilience** - Charging and battery technology is constantly evolving, and the charging provider should have the ability to upgrade chargers to meet new standards and evolving battery technology. Delivering suitable power to the site is a key focus of this effort, along with modular infrastructure that can be easily upgraded.
- + **Energy/grid resilience** - KYTC will continually explore options for energy resilience along with utility partners and charging providers. One challenge to implementing the charging system is the numerous utility providers located along the corridor network, which is also an opportunity to create energy resilience for the charging network.
- + **Natural disaster resilience** - Snow, flooding, tornadoes, and temperature extremes are the natural disasters that may be experienced in Kentucky. These present major challenges for EV infrastructure resilience. Because KYTC has no prior experience with EV infrastructure, it is expected that resilience in these areas would be addressed primarily by the private charging provider, with requirements to address resiliency possibly included as a component of the contracting process.

A mobile generator that can be used to charge vehicles in case of emergency or grid resiliency issues is an option KYTC may explore in the future. KYTC may consult with the Kentucky PSC and other stakeholders to determine if the generation of power is allowable under Kentucky's current utility regulation. The need for a backup power connection within each charging site may also be explored, along with considerations for where a generator could be parked.

Kentucky has no defined statewide evacuation routes. The Kentucky Emergency Management Agency has divided the state into ten areas, each of which may have a localized evacuation network defined to move people outside of localized emergency response areas. Because these areas are regional in nature and KYTC's corridor network extends into all ten areas, it is not anticipated that additional DC fast chargers would play a role in localized emergency evacuations.

It is anticipated that seasonal needs and snow removal will be a requirement of the contracting process, and the specific responsibilities of these services will be determined between the site host and the charging network provider. KYTC will explore minimum standards related to snow removal, including best practices to ensure snow removal does not block access to charging infrastructure.

STRATEGIES TO PROMOTE STRONG LABOR, SAFETY, TRAINING, AND INSTALLATION STANDARDS

KYTC will continue to promote the use of small businesses in the construction and maintenance of Kentucky's transportation infrastructure. For this program, KYTC and its partners may be able to identify workforce training opportunities. For example, the equipment could be made available for training purposes. The purchase of a charger can be a substantial investment for a vocational school, but there may be opportunities to use chargers and equipment for educational purposes prior to (or during) equipment installation. This could apply to the actual installation process of the equipment, where the contractor may be asked to provide educational assistance to further develop a skilled Kentucky workforce related to charging infrastructure. This is also an opportunity to engage with the Justice40 communities to develop workforce training opportunities related to infrastructure installation, operation, and maintenance. Contractors should also recognize that the ongoing operations and maintenance of the infrastructure and the sites should be an opportunity to develop regional skills and workforce opportunities, and that the training of this workforce should be a key component of the program.

Regarding safety, training should be made available to first responders and site hosts that provide guidance and safety procedures to manage infrastructure in the case of a malfunction, equipment destruction, or an emergency event.

This plan includes some initial draft standards related to charging sites, chargers, and desired amenities. However, KYTC will look to the first contractor to develop a set of installation and design standards for the program and apply those as the basis for standards to the rest of the program. It is anticipated that these standards should allow flexibility for different technologies and chargers to be deployed at a future date. For future contracts that may be utilized for regional projects, contractors may develop modified standards that respond to regional characteristics or site-specific requirements.

POTENTIAL SITE AND LAYOUT CONSIDERATIONS

KYTC has identified considerations that will be taken into account in preparing guidelines for deploying NEVI stations in Kentucky. The considerations are presented in **Table 8.1**. As noted, the topics apply to all AFCs and any guidelines will be compliant with NEVI guidance.

With regard to power levels, the minimum is 150kW per port, with higher levels being desirable. 175kW per port with power sharing (Option A), would allow for 350kW when only one of the two ports is in use. The siting interval and distance from the AFC will meet NEVI requirements. All stations will meet ADA accessibility standards.

The stations will be planned and designed to serve long-distance travelers during a 10-30 minute wait while their vehicle charges. This means that there is a minimum level of amenities and services that will be needed; however, higher levels of amenities and services are very desirable. KYTC has identified a preliminary list of amenities that could be part of the considerations for site suitability. Amenities could be located off-site, but close enough to walk, such as a charging site adjacent to a restaurant or coffee shop. Amenities are categorized into tiers, each corresponding to the level of preference or need.



180-Day NEVI Program Rules outline potential certification requirements for EVSE installers:

(i) Certification from the Electric Vehicle Infrastructure Training Program (EVITP).

(ii) Graduation from a Registered Apprenticeship Program for electricians that includes EVSE-specific training and is developed as a part of a national guideline standard approved by the Department of Labor in consultation with the Department of Transportation.

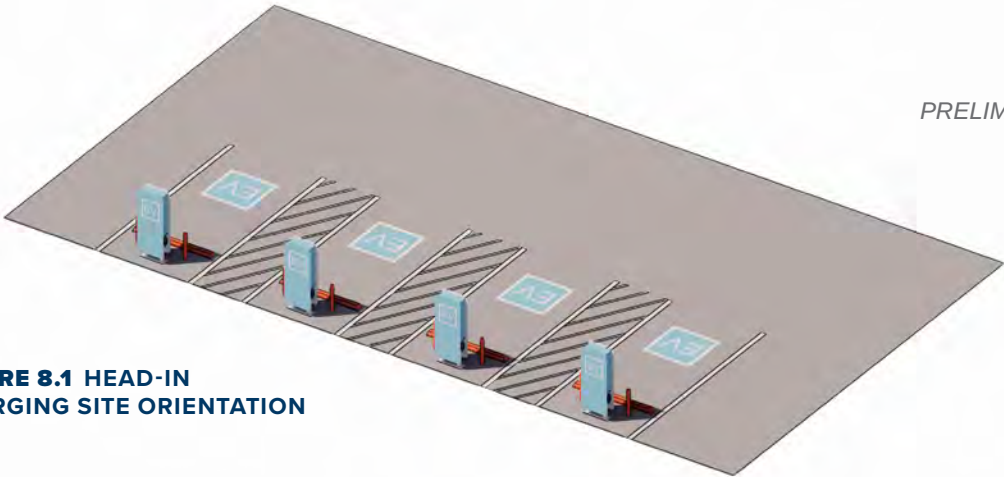
Kentucky's Electric Vehicle Infrastructure Deployment Plan

- + **Minimum Amenities and Features:** Bathroom, vending machine, benches, trash can, security camera, lighting
- + **Preferred Amenities and Features:** Restaurant, convenience store, shelter/canopy
- + **Ideal Amenities and Features:** Outdoor space/park/playground, pet relief area, multiple restaurants, back-up power connection

The initial conceptual layouts shown in **Figure 8.1** to **Figure 8.3** illustrate possible options for NEVI compliant stations. The design of these layout is ongoing, but some of the key considerations include the need to consider 1) site size and orientation, 2) site ownership and development costs, 3) offering at least one pull through stall for large vehicles or vehicles with trailers, 4) effective snow removal, 5) how to meet all ADA requirements, 6) providing space for electrical equipment, and 7) making access to the ports simple and intuitive. It is expected that these conceptual layouts will change as Kentucky further develops its approach to deployment. Site layouts must also be very flexible as each site will have its own unique opportunities and constraints.

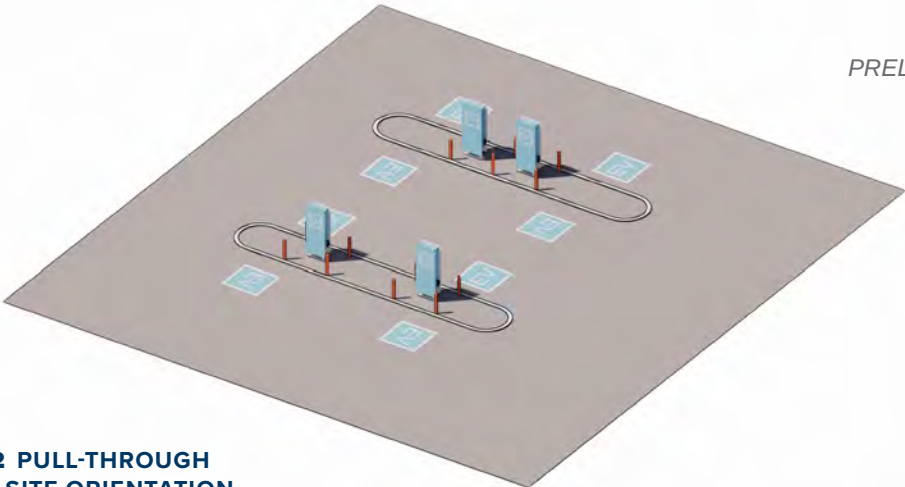
TABLE 8.1 POTENTIAL SITE AND LAYOUT CONSIDERATIONS

NEVI Station Considerations	
Applicability	+ Applies to all AFCs + Conforms with NEVI standards required to be certified fully built-out
Charger Types / Power Levels	+ Minimum 150 kW x (4) (600 kW total) + Option A 175 kW x (4) (700 kW total) with power sharing (350 kW per port) + Option B 350 kW x (2) and 150 kW x (2) (1 MW)
Siting Interval	+ Located a maximum of 50 miles from another NEVI-compliant charging station + Located no more than one mile from the corridor
Accessibility	+ Compliant with all applicable ADA standards
Minimum Amenities and Services	+ Bathroom, vending machine, benches, trash can, lighting, security camera
Preferred Amenities and Services	+ Restaurant, convenience store, shelter/canopy
Ideal Amenities and Services	+ Outdoor space/park/playground, pet relief area, multiple restaurants, back-up power connection
Conceptual Site Orientations (Development Ongoing)	+ Minimum Head-in charging site orientation (see Figure 8.1 and Figure 8.2) + Preferred Pull-through charging site orientation (see Figure 8.3)



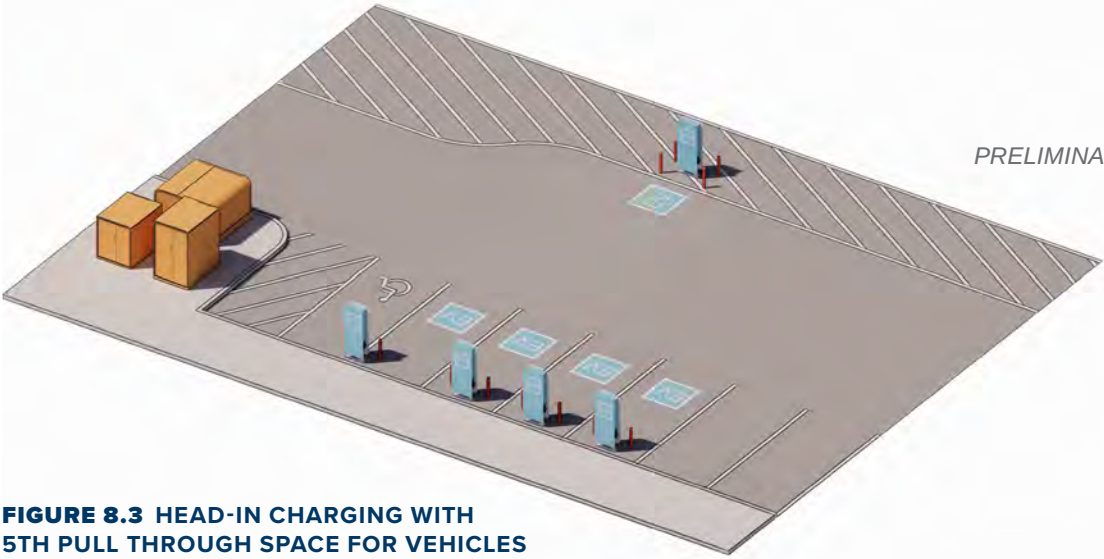
PRELIMINARY DRAFT

FIGURE 8.1 HEAD-IN CHARGING SITE ORIENTATION



PRELIMINARY DRAFT

FIGURE 8.2 PULL-THROUGH CHARGING SITE ORIENTATION



PRELIMINARY DRAFT

FIGURE 8.3 HEAD-IN CHARGING WITH 5TH PULL THROUGH SPACE FOR VEHICLES WITH TRAILERS

CHAPTER 9

CIVIL RIGHTS



“This section of the Plan should discuss how the State planning and implementation will ensure compliance with State and Federal civil rights laws ...”

KYTC routinely administers Federal-aid funds and is committed to compliance with State and Federal civil rights laws. The NEVI Formula Funding Program will be implemented using the adopted practices related to Civil Rights compliance that have been successfully implemented on other federal funding programs for decades. The Disadvantaged Business Enterprise (DBE) Program, Title VI of the Civil Rights Act, Americans with Disabilities Act (ADA), Section 504 of the Rehabilitation Act, and all accompanying U.S. DOT regulations and ancillary programs will be an automatic part of the NEVI Formula Program from the onset.

THE KYTC CIVIL RIGHTS PROGRAM

- + Prohibits entities from denying an individual any service, financial aid, or other benefit because of race, color, national origin, or disability.
- + Prohibits entities from providing a different service or benefit or providing these in a different manner from those provided to others under the program.
- + Prohibits segregation or separate treatment in any manner related to receiving program services or benefits.
- + Prohibits entities from requiring different standards or conditions as prerequisites for serving individuals.
- + Prohibits discriminatory activity in a facility built in whole or part with Federal funds.
- + Prohibits locating facilities in any way that would limit or impede access to a Federally funded service or benefit.
- + Encourages the participation of minorities as members of planning or advisory bodies for programs receiving Federal funds.
- + Requires information and services to be provided in languages other than English when significant numbers of beneficiaries are of limited English-speaking ability.
- + Requires entities to notify the respective population about applicable programs.
- + Requires assurance of nondiscrimination in purchasing of services and hiring practices.



The Kentucky Transportation Cabinet has established that no person shall be excluded from participation in, or be denied the benefits of, or be subjected to discrimination under any program or activity receiving Federal financial assistance from KYTC on the grounds of race, color, age, sex, disability, or national origin. The U.S. DOT Equity Action Plan, which complements the administration's Justice40 and Executive Order 13985, speaks directly to assuring that with innovative fields like electric vehicles; underserved communities and businesses have fair access and benefit from these initiatives. Additionally, KYTC recognizes that U.S. DOT has emphasized the need for the enforcement of the federal civil rights programs related to the NEVI Formula Program, which offers guidance related to equitable access to opportunities associated with the program.

TITLE VI AND ADA

KYTC is committed to ensuring that projects, programs, and services are performed without discrimination, under Title VI and ADA. To accomplish this, KYTC is responsible for ensuring the implementation and enforcement of the Civil Rights program within their activities and programs and any representatives or contractors associated with the NEVI Formula Program. This is accomplished by:

- + Incorporating Title VI and ADA nondiscrimination requirements into appropriate manuals, directives, and regulations.
- + Incorporating Title VI and ADA nondiscrimination requirements into the designing and planning phases of project development.
- + Developing procedures to advise beneficiaries of all nondiscrimination laws.
- + Maintaining documentation of beneficiary nondiscrimination activities.
- + Ensuring that workforce and budget appropriations are adequate to accomplish nondiscrimination commitments.
- + Ensuring that federally funded contracts with consulting firms contain Title VI/ Nondiscrimination assurances and that consultants comply.
- + Notifying the public of compliance with Title VI and ADA.
- + Providing a complaint process that allows for investigations of alleged violations and provides clear and effective access to efficient resolutions
- + Creating a uniform data collection standard for evaluation of, and outreach to Environmental Justice (EJ) communities in alignment with the Justice40 Initiative.

SMALL AND DISADVANTAGED BUSINESS UTILIZATION

The NEVI Formula Program will be a vehicle to enhance U.S. DOT's initiative for wealth creation for small and disadvantaged businesses and for expanding access to social and economic opportunities for disadvantaged and underserved communities. This can be accomplished by:

- + Establishing participation goals and determining opportunities for the participation and utilization of DBE firms on contracts associated with the NEVI Formula Program.
- + Developing proactive Capacity Building programs to support an increase of small DBE firms in the innovative scopes associated with electric vehicles and other contract opportunities in the NEVI Formula Program
- + Working to maximize opportunities for DBE within KYTC's existing program.
- + Focused outreach to support the current and potential DBE firms, including specific identification of African American, Latino, Asian American Pacific, Indigenous, and other underrepresented groups.

CHAPTER 10

EQUITY

KYTC supports equity considerations when planning investments in electric vehicle charging infrastructure. While the use of EV's is increasing in the state, KYTC recognizes that EV ownership is currently not an option for all of the Commonwealth's residents due to availability and affordability issues. In fact, it may not yet be an appropriate option for some of the wide-ranging mobility needs in the state. As the demand for electric vehicles and the charging network grow over time, it is expected that passenger vehicle model options will increase, and vehicle prices will decrease. Thinking ahead to ensure these infrastructure investments benefit populations across Kentucky equitably is a priority.

The Justice40 Initiative, established in January 2021 by Presidential Executive Order 14008 on Tackling the Climate Crisis at Home and Abroad, provides a goal that at least 40 percent of the overall benefits of certain Federal investments flow to disadvantaged communities (DACs). The Interim Implementation Guidance for the Justice40 Initiative (released July 2021) and the NEVI Guidance (released in February 2022 and June 2022) identifies clean transportation as a Justice40 covered program.

IDENTIFICATION AND OUTREACH TO DISADVANTAGED COMMUNITIES (DACs) IN THE STATE

As part of U.S. DOT and U.S. DOE partnership in implementing the Justice40 Initiative, an interim definition for DACs was developed to assist states in identifying those communities. "Communities" are defined as a group of individuals living in close geographic proximity to one another. "Disadvantaged" is defined through data investigation of these communities by a combination of variables including – low-income (and/or high persistent poverty), racial minority composition, linguistic isolation, high transportation cost burden, high energy cost burden, and disproportionate environmental stressors.

KYTC has started taking specific steps to identify and engage with DAC community members. This includes working with the Metropolitan Planning Organizations and Area Development Districts as well as the Equity Task Force (part of Kentucky's Resiliency Working Group) to develop a list of DAC organizations and individuals across the state to be contacted and invited to participate. These individuals and groups can then help reach other individuals, organizations, and companies. This approach is already beginning to show promise with new DAC community stakeholders and organizations in key areas being contacted and included in the process. More remains to be done, but the initiative has been started. Additional outreach and effective follow-up is necessary. Further engagement is anticipated to include meaningful participation in projects and programs by low-income and minority individuals, those with limited English proficiency, and other underserved groups.



The Plan should be developed through engagement with rural, underserved, and disadvantaged communities and stakeholders

This approach is already beginning to show promise with new DAC community stakeholders and organizations in key areas being contacted and included in the process.

PROCESS TO IDENTIFY, QUANTIFY, AND MEASURE BENEFITS TO DACS

Before deciding on specific DAC benefits to track, KYTC will to engage further with groups and individuals from DACs to discuss their thoughts on how the benefits should be identified and measured.

KYTC is considering the potential benefits suggested by the Joint Office for measuring benefits to DACs (see list below). However, before deciding on specific DAC benefits to track, KYTC will to engage further with groups and individuals from DACs to discuss their thoughts on how the benefits should be identified and measured. This engagement will be valuable for setting the approach for tracking DAC benefits and ultimately evaluating whether 40% of the program benefits are directly or indirectly accruing to DACs. This engagement will also be important for understanding the potential for workforce development, the potential barriers for effective deployment and use of the infrastructure, and the potential to adjust the program to better suit the needs of every community member.

KYTC sees value in performance-based planning and is experienced in measuring performance and reporting in accordance with U.S. DOT requirements. KYTC recognizes the emerging nature of the NEVI Formula Program and looks forward to working with DAC stakeholders and U.S. DOT to identify and measure the benefits of this program. If the program evolves to have a national standard for benefit metrics and measurement then KYTC would consider that standard. However, until then KYTC will consider the Justice40 benefits proposed in the Joint Office's Frequently Asked Questions. This could include benefits such as (but not limited to):

- + Improved access to clean transportation;
- + Decreased transportation energy cost;
- + Reduced exposure to transportation emissions;
- + Increased job opportunities, job training, and enterprise creation;
- + Increased energy resilience; and
- + Provision of charging infrastructure for on-demand transit services;

KYTC will also identify the location of NEVI funded DCFC stations and quantify the number of DAC residents in the areas surrounding the stations using the EV Charging Justice40 Map tool. This assessment is discussed further in **Chapter 13**.

KYTC also used the EV Charging Justice40 Map tool to analyze the existing and future EV network for Kentucky and incorporated the location of DACs as a primary criteria for the selection of corridors and the priority scoring of interchanges along these corridors.

KYTC will also explore opportunities to enhance and measure DBE utilization on NEVI projects (including Kentucky based DBE firms in the EV space). This is discussed in additional depth within the workforce and labor element of this plan. Existing partnerships with MPOs/ADDs and local agencies could also be explored to identify potential options for gauging statewide air quality improvements within DACs.

BENEFITS TO DACS THROUGH THIS PLAN

KYTC anticipates challenges in identifying the full direct, indirect, and cumulative benefits of this plan to DACs. While it is possible to account for charging infrastructure location in relationship to DACs, KYTC expects the benefits of this investment will go beyond the geographic location of the DCFC stations. EV infrastructure built within DACs when the area has low EV ownership provides modest benefits beyond enhancing business economy in these areas while EV owners are charging, until EV ownership increases. However, benefits to DACs can be expected if the program implementation and ongoing operations and maintenance employ residents of DAC communities, or if they include training and



education as part of the program. Additionally, as registered vehicles in Kentucky transition to alternative fuels, emissions are expected to decrease, yielding positive impacts for the communities located near transportation corridors.

Other potential DAC benefits related to cost burden, transit charging, and energy resilience, were listed previously and still others could relate to grid access, increased access to low cost capital, and increased parity in clean energy adoption. Some of these benefits are qualitative expectations and it may be difficult to quantify them reliably. However, new methods are likely to be developed as the NEVI funding program moves forward and KYTC will consider them as they become available.

With the implementation of EO 14008 for the elimination of Fossil Fuel subsidies, the EV plan should also address equity and equitable access to EV infrastructure, services and vehicles.

KYTC will therefore consider the following:

- + Need for the diversity of EVs inclusive of electric public transportation/transit and shared-ride vehicles especially for those disadvantaged communities that are transit dependent and not economically able to purchase EVs.
- + Strategies for engagement efforts related to rural, underserved, and disadvantaged communities and stakeholders to ensure that diverse views are heard and considered throughout the planning process.
- + Strategies for engagement efforts related to rural, underserved, and disadvantaged communities and stakeholders to ensure that the deployment, installation, operation, and use of EV charging infrastructure achieves equitable and fair distribution of benefits and services.
- + Approaches that would minimize gentrification-induced displacements resulting from new EV charging infrastructure.
- + Needs related to financial and physical/access constraints as well as potential strategies for overcoming those challenges.
- + Use of the EV Charging Justice40 Mapping Tool for:
 - Identifying disadvantaged communities and to measure whether 40% of the benefits are going to disadvantaged communities in accordance with the Interim Justice40 Guidance,
 - Prioritizing access of EV charging infrastructure to serve rural, underserved, and disadvantaged communities; and
 - Identify gaps in existing service and charging station availability to rural, underserved, and disadvantaged communities in the State.
 - Reviewing equitable access and regional EV adoption rates (counties and/or major cities – vehicle registrations) considering the following:
 1. State share of chargers in rural communities
 2. State share of chargers in underserved, and disadvantaged communities (could use the U.S. DOT Climate and Economic Justice Screening Tool)
 3. Comparative rate of EV adoption in underserved and disadvantaged communities relative to those outside of them (could use the U.S. DOT Climate and Economic Justice Screening Tool)
 4. Comparative rate of EV adoption in rural communities

CHAPTER 11

LABOR AND WORKFORCE



***This section
of the Plan
should consider
the training,
experience level,
and diversity of
the workforce
that is installing
and maintaining
EV charging
infrastructure.***

The NEVI Formula Program will generate substantial opportunities for equitable and accessible job creation in Kentucky's electrical and construction trades as a network of electric vehicle chargers is planned, designed, installed, and commissioned. The NEVI Formula Program will also increase opportunities for power generation and power distribution utilities to strengthen their workforce to provide electric vehicle transportation that is convenient, reliable, affordable, and equitable. Project planning, stakeholder engagement, construction, support services, and long-term maintenance will all provide robust opportunities. Kentucky is prepared to meet this opportunity through its strong utility stakeholders and powerful workforce practices.

The Commonwealth of Kentucky had a construction workforce of over 78,100 in May 2022, approximately 4.1% of the state's non-farm labor force. The latest Bureau of Labor and Statistics research on the construction workforce notes an average annual wage of \$48,000. Within the construction industry, the development of the NEVI network will rely on labor throughout the state and will need to leverage specialty contractor services, particularly electricians.

CONSTRUCTION BY AREA

One primary finding is the heavy concentration of construction jobs in three major metropolitan areas of the state: Louisville, Lexington, and Northern Kentucky. The state's dispersed footprint of small and medium-size urbanized areas and expansive rural areas will generate some construction activity distant from the primary centers of construction workers. Justice40 mapping highlights that proactive encouragement of local construction laborers will be needed across the state, especially in the eastern and western areas.

ELECTRICAL TRADE

The use of well-trained electrical staff will be critical to building out the NEVI network in Kentucky. Of the full construction workforce, 9,260 are electricians. The state is also well prepared with 22 Kentucky-based electrical contractors that have become certified in the Electric Vehicle Infrastructure Training Program.

LABOR AND WORKFORCE STRATEGIES

The Commonwealth of Kentucky has strong existing strategies that will enable NEVI investment to create jobs and benefits that are inclusive, local, and create a diverse and sustainable electric vehicle workforce. Workforce strategies will be coordinated with the Education and Labor Cabinets with the goal of expanding the sources of training, experience level, and diversity of the workforce installing and maintaining EV charging infrastructure. Stakeholder input is also being solicited from major stakeholders such as the state's utilities.

In deploying NEVI, Kentucky will be able to leverage the following strengths in developing the electric vehicle workforce. These include:

- + **Leverage Statewide Workforce Initiatives:** Kentucky can leverage statewide workforce initiatives already in place to accelerate the workforce focused on the EV network. The Kentucky Cabinet for Economic Development (Team Kentucky) has several successful programs. The Work Ready Skills initiative has invested over \$200M in training facilities statewide, supports over 250 apprentice programs in multiple trades, and incentivizes students to enter one of the 60 high-demand occupations across the state's top 5 work sectors. The Bluegrass State Skills Corporation (BSSC) stimulates economic development through customized industry-specific skills/occupational upgrade training. Through Team Kentucky, the BSSC approves incentives for qualified companies through a Grant-in-Aid program and a Skills Training Investment Credit.
- + **Bolster Equity and Accessibility to the Workforce:** Team Kentucky's Career Center rewards employers for hiring individuals who have had difficulty finding work. They include the Federal Work Opportunity Tax Credit (WOTC), a state-administered federal program awarded to companies that hire people facing significant barriers to employment. Additionally, the Kentucky Unemployment Tax Credit (KUTC) program provides employers a credit of \$100 per eligible hire against Kentucky income taxes owed when they hire residents who have been unemployed for at least 60 days and remain employed full time for 180 consecutive calendar days in the tax year in which the credit is claimed. Construction jobs can be even more accessible when utilizing the KY Fair Chance Bond, part of the national Federal Bonding initiative. Recruitment assistance is provided across a network of Kentucky Career Centers and partners that serve various talent pools such as veterans, individuals with disabilities, youth, and justice involved individuals.

KYTC's approach on labor and workforce will follow the requirements of the original 90-day NEVI guidance as well as the new 180-day NEVI guidance. This will include any adjustments based on changes to FHWA's Notice of Proposed Rulemaking.



- + **Educational Collaboration:** KYTC will work with agency partners to confirm the availability of technical training and higher education in sufficient quantity and diversity to support the NEVI impact on the local workforce. The NEVI program will incorporate outreach strategies with local schools, colleges, and vocational programs to develop a pipeline of employees with skill sets needed for the deployment of the NEVI program.
- + **Inclusive Input and Outreach:** The development workforce training and outreach plans will include input from diverse communities, advocacy groups, and industry organizations as well as diverse/DBE firms. KYTC will apply their tested practices to establish appropriate trainee / apprentice goals for NEVI projects. Educational collaboration as mentioned earlier will include outreach and recruitment at Historically Black Colleges and Universities (HBCUs) and Hispanic Serving Institute (HSIs) as well as diverse minority and women students to foster a broad diverse pool to address the need for a diverse local workforce.
- + **Leveraging the Energy Industry:** In October of 2021, Governor Andy Beshear, in collaboration with the EEC, announced Kentucky's energy strategy for a transitioning energy landscape, KYE3: Designs for a Resilient Economy. KYE3 is an energy strategy wrapped in economic development and focused on resilience. The acronym KYE3 stands for energy, environment, and economic development, three issues that are inextricably linked. The strategy is built on the state's 42,797 energy related jobs, large in-state automotive employers committed to electrified transportation, and nationally recognized natural resources and destinations. The plan's initial focus is on community engagement. Communities will have the chance to:
 - Choose the goals and objectives that resonate and make sense to them,
 - Pick a partner to work with, and start working on projects, ideas, and innovations that impact your community and the Commonwealth.

The NEVI program will become a pillar of this initiative, and KYTC and EEC will leverage their combined resources to create a robust workforce to support NEVI development in partnership with communities across the Commonwealth.

CHAPTER 12

CYBERSECURITY

The State of Kentucky and KYTC are committed to public service, including cybersecurity, cyber resiliency, and privacy protections for all services and systems KYTC operates in the communities they serve.

As the IJJA has allocated funds for deployment of EVSE, and as the Department intends to deploy these systems to support the goal of advancing widespread EV adoption, this cybersecurity chapter provides guidelines and best practices for the Department and EVSE deployers and fulfills the intent of Presidential Memo M2209. This chapter may be updated when the guidance on cybersecurity is finalized by the Joint Office.

The potential sources and types of cybersecurity threats for EVSEs are evolving and regularly scheduled risk assessments are prudent and necessary to provide Defense-in-Depth (DiD) protection. Successful exploitation of even a single DCFC can cause relay chatter, other various power quality issues and phase instability, that can have cascading effects upstream.

PRIMARY GOALS OF THE EVSE CYBERSECURITY GUIDANCE

- + Deploy secure EVSE Infrastructure within Kentucky's Transportation system. Secure is defined as:
 - Protected against physical or electronic intrusion by unauthorized persons or entities.
 - Hardened against damage or loss of service due to weather, environment, transient surge voltages, traffic incidents, etc.
 - Protected against insider threats whether malicious or inadvertent.
 - Segmented (separated) to protect against unintended damage, unauthorized access, loss of data, service availability, privacy breach etc. from unprotected connections among stakeholder partner and user systems.
- + Utilize revenue and financial systems that are compliant with the Payment Card Industry (PCI) requirements.
- + Utilize security operations that are compliant with and maintain certifications for Security Operations Center – Level 2 (SOC2) audit requirements.
- + Include requirements that a fully functional EV charging system be able to State fleet operations and service to the private motorist, while assuring maintenance of the above secure environment.
 - Include physical and electronic resiliency
 - Require that Security by Design be implemented in each project



This section of the Plan should discuss how the State will address cybersecurity.

KYTC's approach to cybersecurity will follow the requirements of the original 90-day NEVI guidance as well as the new 180-day NEVI guidance. This will include any adjustments based on changes to FHWA's Notice of Proposed Rulemaking.

CURRENT CYBERSECURITY STATE OF THE INDUSTRY

- + According to a September 2021 joint report by Sandia National Labs and the U.S. Department of Energy by Johnson and Slezak (2021) “.... there is no comprehensive EVSE cybersecurity approach and limited best practices have been adopted by the EV/EVSE industry.”
- + The report (IBID) went on to state “There is an incomplete industry understanding of the attack surface, interconnected assets, and unsecured interfaces.”

NEED TO CONDUCT PROJECT SPECIFIC RISK ASSESSMENTS

- + Since the industry does not yet have a clear picture of the attack surfaces, each project (or group of related projects) would require a full scope risk assessment to identify the comprehensive threat surface presented by and against the elements of all stakeholder partners/users (grid operators, vehicles, OEM vendors, charging network operators, etc.).
- + Sandia National Labs’ Suggested Process Flow, which is a recommended approach, is shown in **Figure 12.1**. Sandia National Labs followed the process/task flows in conducting their research on potential risk models for EVSE.
- + The STRIDE Model for capturing threat surfaces (see **Figure 12.2**) was created by Microsoft and is a good tool for documenting threat surfaces based on analysis of the: Processes, Data Flows, Endpoints, Trust Boundaries, and Electrical Equipment. These key elements for analysis are identified from the architecture and assessed for risk against the threats represented by STRIDE.

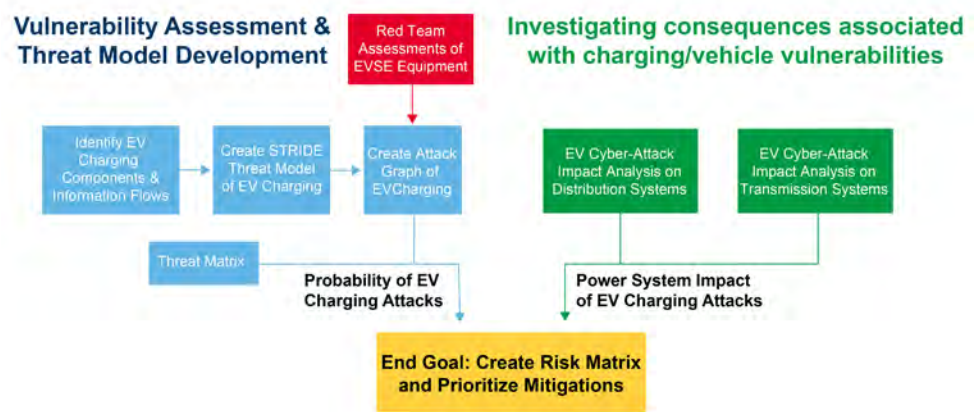


FIGURE 12.1 RISK/CONSEQUENCE PROCESS FLOWS

Source: Sandia National Labs



Threat Model includes: + Process (P) + Data Flows (DFs) + Endpoint (EE) + Trust Boundaries (dashed) + Electrical Equipment (green)	Threat	Desired Property
	Spoofing	Authenticity
	Tampering	Integrity
	Repudiation	Non-repudiability
	Information Disclosure	Confidentiality
	Denial of Service	Availability
	Elevation of Privilege	Authorization

FIGURE 12.2 STRIDE MODEL ELEMENTS
Source: Sandia National Labs

BEST PRACTICES
MINIMUM GUIDELINES

A critical element to establishing, and achieving the expectations outlined in this EVSE Plan is following a set of best practices. The EVSE implementer will follow best practices for ensuring cybersecurity of the EV infrastructure as well as requirements laid out by FHWA Joint Office guidance.

BEST PRACTICES
FOUNDATIONAL PRINCIPLES

Achieving the best feasible protective posture is facilitated by employing two foundational principles: Security by Design (SbD) and Defense-in-Depth (DiD).

- + Security by Design is the controlled use of established processes to build security functions, safeguards and procedures into software and systems design from project initiation, ensuring security is considered and tested throughout the entire design/engineering phase.
- + Defense in Depth is the practice of constructing cybersecurity defense via layers of protection that overlap and enhance adjacent layers. Where one layer is defeated, another is automatically implemented to step into the gap and continue defensive efforts.

BEST PRACTICES

FOLLOW EXISTING STANDARDS

KYTC requires compliance with all applicable national, State of Kentucky and Industry standards.

GENERAL BEST PRACTICES

A common set of recommended best practices are summarized below for the EV deployers. Details of these are available from: <https://doi.org/10.2172/1706221>

RISK MANAGEMENT

- + Establish full lifecycle risk reviews and prioritize improvements based on risk to EVSE operations.
- + Maintain updated architecture diagrams to identify critical assets, internet connections, open ports, and supported protocols.
- + Establish a process for active security patch management.

CONFIGURATION AND CHANGE MANAGEMENT

- + Create a formal process for uploading code.
- + Properly secure keys, credentials, and other secret items.

IDENTITY AND ACCESS MANAGEMENT

- + Require individual credentials for system login and don't reuse credentials.
- + Limit the use of system/maintenance accounts.

THREAT AND VULNERABILITY MANAGEMENT

- + Use a Common Vulnerability Scoring System (CVSS) to evaluate potential vulnerabilities and prioritize response.
- + Establish and regularly update a comprehensive threat profile.

COMMUNICATIONS

- + Encrypt all information internal and external to the EVSE.
- + Apply network segmentation and security systems including Intrusion Detection System (IDS), Intrusion Prevention System (IPS) and firewalls.

EVENT AND INCIDENT RESPONSE, CONTINUITY OF OPERATIONS

- + Implement Information Security Continuous Monitoring (ISCM) per National Institute of Standards and Technology Special Publication (NIST SP) 800-137.
- + Establish protocols and procedures for immediate response to logs or alerts from ISCM, Security Information and Event Management (SIEM) and IDS/IPS systems.
- + Create a Security Operations Center (SOC) and maintain SOC2 certification.
- + Establish business continuity, incident response and disaster recovery plans. Conduct regularly scheduled table-top exercises, drills, and reviews to test procedures, train staff and update per technology changes.

SUPPLY CHAIN MANAGEMENT

- + Use secure shipping channels that include verification of the state of EVSE when it departs facility.
- + Specify tamper resistant seals, alarms, and other protective measures to prevent and report attempts of unauthorized access to equipment or enclosures.

WORKFORCE MANAGEMENT

- + Incorporate redundancy and cross function capabilities for critical roles.
- + Evaluate competence of staff with periodic social engineering (phishing), audits, etc.

CYBERSECURITY PROGRAM MANAGEMENT

- + Mature a cybersecurity program strategy with clear priorities and governance model.
- + Include a “safe” environment for anonymous or protected means to report violations or vulnerability concerns.

CYBERSECURITY REFERENCES

The list of references below is limited to those from quotes, summarizations and infographics that were drawn in creating this chapter. Several other documents, articles, and subject matter expert (SME) resources were also consulted in forming the consensus of this chapter.

Harnett, K, Watson, G, and Brown, G, November 2019. Government Fleet and Public Sector Electric Vehicle Supply Equipment (EVSE) Cybersecurity Best Practices and Procurement Language Report, DOT-VNTSC-NAVY-20-01, Prepared by United States Department of Transportation Volpe Center and Prepared for: Department of Navy, Naval Facilities Engineering Command (NAVFAC), Public Works Business Line, Transportation Product Line. Available From: https://ntlrepositary.blob.core.windows.net/lib/68000/68700/68702/Navy_Public_Version_EVSE_Cybersecurity_FINAL_November_21_DOT_Library_VersionV4.pdf

Johnson, J and Slezak, L in a report for U.S. Department of Energy, Securing Vehicle Charging Infrastructure, SAND2020-11971R, September 30th, 2021. Available from: <https://doi.org/10.2172/1706221>

Anderson, B January 2020, SAND2020-0818C Securing Vehicle Charging Infrastructure Against Cybersecurity Threats, Presented at Hybrid and Electric Vehicle Technologies Symposium, January 28-30, Pasadena, CA. Available from: https://www.researchgate.net/publication/339053631_Securing_Vehicle_Charging_Infrastructure_Against_Cybersecurity_Threat

CHAPTER 13

PROGRAM EVALUATION



This section of the Plan should describe the State's schedule and plan for evaluating performance in achieving its 5-year goals and vision.

KYTC has developed a program evaluation plan that would provide the Joint Office with data documenting the impact of the federal dollars invested in EV charging infrastructure. It would also provide the Joint Office and KYTC with metrics regarding Kentucky's progress towards its goals and the performance of the EV charging network. Working in conjunction with various public and private partners, KYTC plans to collect data and publicly report progress on its EV goals at the frequency required by the Joint Office. The frequency of data collection and sharing could be modified if required by the Joint Office. KYTC would use the information to inform network development and the installation of additional chargers based on the use and performance of chargers in the network.

A summary of KYTC's proposed preliminary approach to program evaluation is shown in **Table 13.1**. Each goal is tied to one or more performance indicators supported by metrics that measure progress towards each goal. During the program implementation process, KYTC would set baseline values and 5-year aspirational targets for each metric. Through regular evaluations of Kentucky's charging network, KYTC could determine the most effective ways to strengthen and/or redirect its investment and overall program approach. This approach including the metrics and how the metrics are captured or measured may change as the EV infrastructure planning and deployment process evolves and as future guidance comes out.

TABLE 13.1 PROGRAM EVALUATION

Indicator	Metric	Source	5-Year Target
Goal 1: A corridor-based EV charging system that supports interstate and regional travel			
Network Coverage (includes minimum viable network completion)	System miles covered by EV charging stations that meet the standards outlined in this plan (miles and % of total system)	KYTC	>800 miles
	EV charging infrastructure, meeting NEVI minimum standards and requirements, is installed every 50 miles along the State's portion of the Interstate Highway System, where no exceptions have been granted (yes/no)	KYTC	
	Total chargers per federal NEVI dollar invested (rate per million USD for Level 2 and Level 3 chargers)	KYTC	
	Charging stations meeting NEVI guidance minimum standards (number)	KYTC	
	Charging stations meeting KY minimum standards (number)	KYTC	
Goal 2: A local EV ecosystem that serves Kentucky's communities and travelers			
Network Access	Residents within 15 miles of EV charging stations installed using NEVI funds (count and % of state total)	KYTC	
	Residents within 50 miles of EV charging stations installed using NEVI funds (count and % of state total)	KYTC	
	Average waiting time for an available charger <i>*if data is available (minutes)</i>	Owner operator	
Job Creation and Workforce	KYTC will work with CED to define a relevant metric for future measurement	CED	
Customer Satisfaction	Percent of EV owners willing to recommend EV to others	KY Non-Profit	
Goal 3: A comprehensive system that supports transportation choices for all of Kentucky's residents			
Equity	Rural and Justice40 residents within 15 miles of EV charging stations installed using NEVI funds (count and % of state total)	KYTC	
	Rural and Justice40 residents within 50 miles of EV charging stations installed using NEVI funds (count and % of state total)	KYTC	
	Justice40 benefits <i>*Will be determined during program development. Will be informed by community outreach to disadvantaged communities (DACs). Could include items listed in the recent Joint Office Frequently Asked Questions publication.</i>	KYTC	

 Priority Evaluation Metric

Kentucky's Electric Vehicle Infrastructure Deployment Plan

Indicator	Metric	Source	5-Year Target
Goal 4: A resilient vehicle fueling system that can adapt to changes in market conditions and transportation technologies			
Reliability	Percent time in service (percent time available) for EV charging stations installed using NEVI funds (percent)	Owner operator	97% uptime
	Stations achieving high reliability (97%) as defined by NEVI program (number of stations by owner operator)	Owner operator	
	Number of complaints per location (count per charging station)	Owner operator	
Utilization	Number of charging events (sum total by day, week, month, and year)	Owner operator	
	Charging energy consumed (sum DC MWh by day, week, month, and year)	Owner operator	
	Unique users per charging station (number by month and year)	Owner operator	
	Time with a vehicle connected, by location, land use and time of day (percent vehicle connection time per charger by month and year)	Owner operator	
Payments	State tax and fee revenue collected (sum by month and year)	KYTC, Owner operator	
	Average charging cost per kWh (dollar value)	Owner operator	
	Payments (number by subscription, app, and/or debit/credit card)	Owner operator	
Goal 5: A transportation system that reduces tailpipe emissions and promotes clean air in Kentucky			
EV Adoption	Registered Light Duty BEVs in the state of Kentucky (count and share of registered fleet)	Kentucky Motor Vehicle Licensing System	
	Consumers who are considering or plan to purchase an EV in the next 5 years (percent)	KY Non-Profit	
	Consumers who identify a lack of charging stations as a barrier to EV purchase (percent)	KY Non-Profit	
Air Quality	Fuel Consumption (gallons of gasoline and diesel consumed per registered vehicle)	KYTC	

 Priority Evaluation Metric

CHAPTER 14

DISCRETIONARY EXCEPTIONS

KYTC is not requesting discretionary exceptions with this plan submission. KYTC will begin building out the AFCs in accordance with the NEVI guidance upon the approval of this plan by FHWA.

CHAPTER 15

CONCLUSION

KYTC recognizes the potential for the NEVI Formula Program to catalyze the move to electrified transportation, a once in a generation opportunity to rethink transportation and its relationship to energy. The potential for this program and the economic development it could encourage is a key opportunity to train Kentucky's workforce to build, maintain, and operate the technology of tomorrow, and to use this as a chance to extend both the job and infrastructure benefits to Kentucky's underserved communities. The significant investment in electric vehicle manufacturing taking place in the state will likely spur an increased interest in the technology, the products of which will be supported by the network of DCFC infrastructure that this program is building. New vehicles and vehicle types are coming to market, expanding the appeal of EVs and further increasing the potential EV adoption in Kentucky.

The technology, the program, and the agency role is new to KYTC. The agency has worked to meet the intent and requirements of the NEVI guidance, with significant engagement and assistance from the Joint Office and FHWA. The approach is intended to balance the experience and strengths of the agency while tapping the experience and strengths of the private sector.

This Plan represents KYTC's approach with the information and experience available at this time, and the agency anticipates annual updates that reflect what has been learned in Kentucky and across the country, while reflecting any change in guidance offered by the Joint Office. This would include any changes related to the current Notice of Proposed Rule Making that was published for comment on June 9, 2022. The outreach and engagement process with stakeholders and the public will also be an ongoing process and continue to expand. Feedback received through engagement will inform the annual updates of the plan and ensure the program reflects any feedback that could improve the implementation.

In accordance with the NEVI guidance, the plan focuses on deploying DCFC stations on the identified AFCs (Interstates and Parkways) across the state, with the goal of serving all Kentucky residents as they make long-distance trips. The plan also sets the stage for future planning and funding that would expand the network beyond the AFCs to other priority corridors. This is an important next step once the initial AFC network is designated as built-out.

This plan does not identify specific locations for chargers along Kentucky's AFCs. KYTC has developed preliminary criteria that could be refined and adjusted to support the implementation and site selection process. Any future deployment criteria would need to meet the requirements of the NEVI Formula Program and KYTC's requirements, while still providing flexibility for private partners to build and operate infrastructure efficiently. The site selection and contracting process will be the next step in implementing the plan, and KYTC anticipates additional clarity at the end of the process.

Guidance and feedback on the approach outlined in this Plan is welcome. KYTC has engaged with the Joint Office several times through the development of this Plan, and is hopeful to continue the constructive engagement that has been valuable to this effort.

