



**FINAL** SEPTEMBER 2022

# IOWA'S ELECTRIC VEHICLE INFRASTRUCTURE DEPLOYMENT PLAN



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# INTRODUCTION

## Background

The nation's transportation system is beginning a very significant transformation. The 2021 Federal Bipartisan Infrastructure Law (BIL), enacted as the Infrastructure Investment and Jobs Act (IIJA), provides investments to help modernize infrastructure assets and support emerging technologies, including electric vehicles (EVs). This legislation will provide long-lasting infrastructure and mobility improvements by developing a national network of EV chargers.

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 the automotive industry and technology shift toward EVs. The guidance issued for the NEVI Formula Program required that states develop an Infrastructure Deployment Plan (IDP) outlining their planned utilization of the formula funding. Iowa has developed a plan that addresses the federal guidelines with partnerships across agencies and stakeholders.

## Plan Development

The Iowa Department of Transportation (DOT) led the effort to prepare the Iowa plan, with the assistance of the Iowa Economic Development Authority (IEDA), which houses the Iowa Energy Office (IEO). IEDA staff members have been engaged in EV planning efforts for several years, and their previous efforts laid the foundation for this plan. Continued collaboration between the two agencies has been crucial to this plan.

The plan was developed in accordance with the 90-day NEVI Formula Program Guidance issued on February 10, 2022. Iowa DOT is working to comply with the 180-day NEVI guidance issued on June 9, 2022. The plan is flexible and will continue to evolve as new program rules and information become available over the 5-year life of the NEVI Formula Program. Based on the NEVI guidance, this plan will be updated annually to incorporate changes occurring the previous year.



## Study Area

The study area is the state of Iowa, as illustrated in **Figure 1**. Iowa is centrally located, with numerous cross-state connections, including both north-south and east-west interstates. Drivers traveling within, to, and through Iowa will all benefit from the EV infrastructure expansion.

Figure 1: Study Area





# CHAPTER 1

## State Agency Coordination

The Iowa Department of Transportation (Iowa DOT) is the lead agency for developing the Iowa Electric Vehicle Infrastructure Deployment Plan (EVIPD). However, the Iowa Economic Development Authority (IEDA), which houses the Iowa Energy Office (IEO), has been very involved in the creation of the plan. IEDA staff members are engaged in electric vehicle (EV) planning efforts and projects within Iowa. In addition to creating many reports that serve as the foundation for this planning effort, IEDA staff provide in-depth knowledge and crucial insights on Iowa's existing EV ecosystem. The two agencies have previously worked together on energy initiatives within the state, such as the Volkswagen (VW) settlement funds that have been allocated for Iowa.

Beyond this high level of collaboration, Iowa DOT and IEDA collaborated with several other Iowa state agencies to provide information and receive input on the plan. This effort culminated in a virtual meeting held in June 2022. At this meeting, state agency representatives brought up concerns and/or applicable regulations that may affect the statewide administration of this plan. The robust conversation provided Iowa DOT and IEDA an opportunity to ask crucial questions and discuss how each agency can play a role in the build-out and administration of EV infrastructure.

Topics discussed at this meeting included new tax regulations that may affect EV charging purchases; electrical grid capacity analysis and utility coordination processes; the need for a strong cybersecurity plan to protect the network from malicious actors; how to best promote and market open charging spots to travelers; and how/if approaches will be taken to certify and measure electrical output from the chargers.

### PARTICIPATING STATE AGENCIES

- » Iowa DOT
- » IEDA
- » Iowa Utilities Board (IUB)
- » Iowa Office of the Chief Information Officer (OCIO)
- » Iowa Tourism Office
- » Iowa Department of Revenue (IDR)
- » Iowa Department of Public Safety (IDPS)
- » Iowa Department of Homeland Security and Emergency Management (HSEMD)

### ADDITIONAL STATE AGENCIES INVITED TO ATTEND

- » Iowa Department of Natural Resources (DNR)
- » Iowa Department of Agriculture
- » Iowa Office of the Consumer Advocate

### OTHER STATE AGENCIES, FEDERAL AGENCIES, AND ORGANIZATIONS

In addition, several other governmental and quasi-governmental agencies were involved as stakeholders in the development of the plan. These include:

- » Federal Highway Administration (FHWA) – Iowa Division Office
- » Visitors Bureaus
- » Public Transit Organizations
- » Cities
- » Metropolitan Planning Organizations (MPO), Planning Councils, Planning Commissions, Regional Transportation Authorities, Etc.



Iowa DOT and IEDA collaborated with several other Iowa state agencies to provide information and receive input on the plan. This effort culminated in a virtual meeting held in June 2022, when state agencies discussed how implementation of this plan relates to state-level rules and activities.

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# CHAPTER 2

## Public Engagement

The Iowa Department of Transportation (IDOT) and IEDA developed a robust stakeholder and public engagement process as a key part of creating the state's EV charging IDP. This began with building a thorough public engagement and communications plan to guide the involvement process, as well as the development of a stakeholder list. The list was designed to engage a wide swath of agencies, organizations, utilities, businesses, and others who are part of Iowa's EV ecosystem, as well as to take equity and environmental justice factors under consideration.



## 2.1 Outreach and Engagement Goals

Overall communication goals are to:

- Educate stakeholders and the public about the planning process, including key outcomes.
- Provide mechanisms for receiving input from stakeholders and the public .
- Engage stakeholders and the public to collect feedback that informs plan development.
- Transform complex technical data into clear, accessible communication materials that are compelling and inclusive.

## 2.2 Public Input

To best engage members of the public on Iowa's efforts to develop the NEVI plan, Iowa DOT and its partners created a website with public, easy-to-understand information about EVs and the NEVI program. Located on Iowa DOT's website, this accessible and up-to-date website also included a resources guide with links to other related and applicable EV planning documents. See the website at [www.iowadot.gov/IowaEVPlan](http://www.iowadot.gov/IowaEVPlan).

Also, a public, on-demand webinar was posted on the website to provide 24-hours-a-day/7-days-a-week access to information about Iowa's development of the plan.

As of mid-July 2022, nearly 15,000 individuals have visited the site, according to Iowa DOT's Web team.

## 2.3 Survey

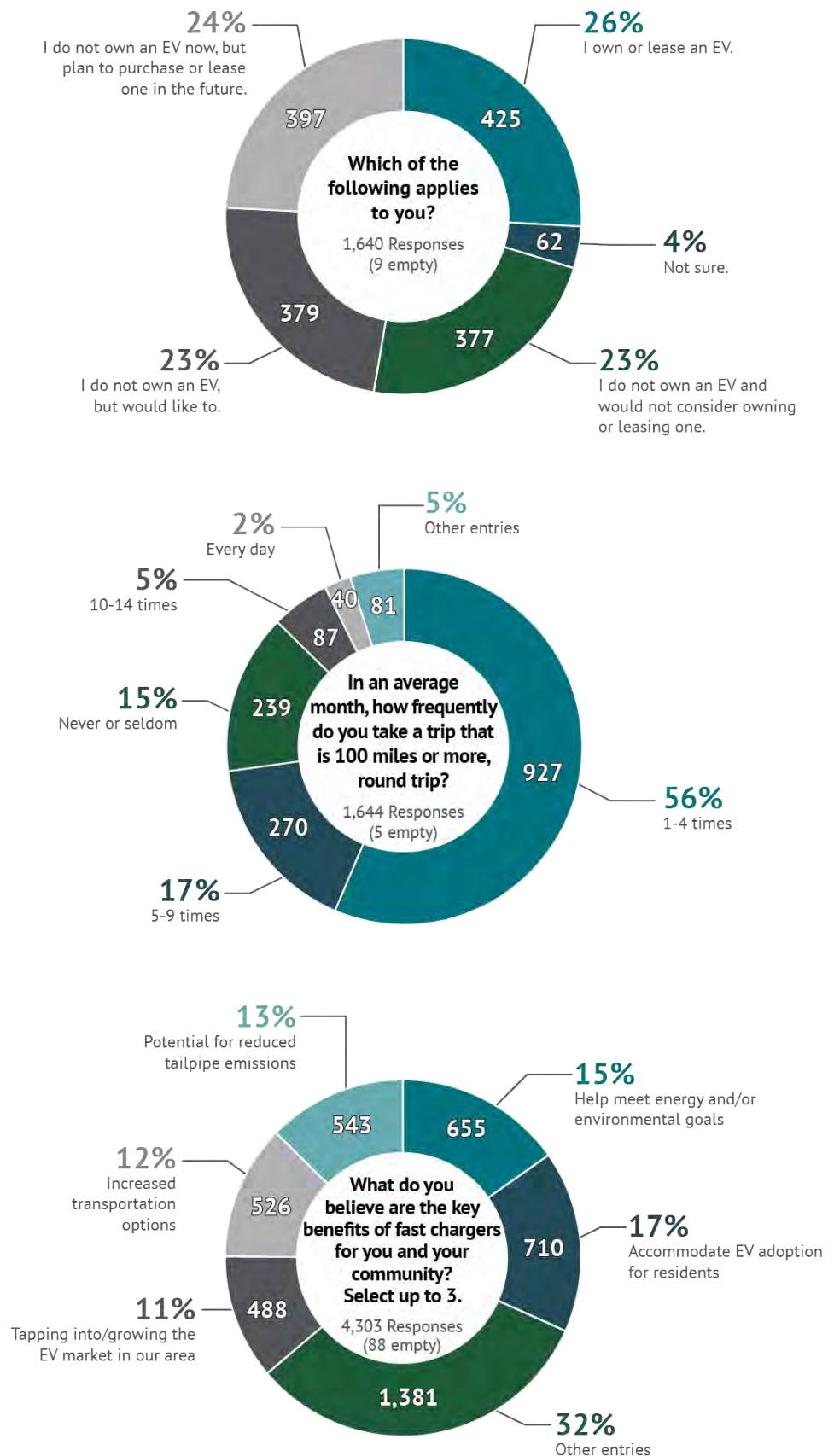
Additionally, an online survey was developed to receive feedback and input from both the general public and key stakeholders previously identified by Iowa DOT. The survey, which took less than 10 minutes to complete, included questions about experience with EVs, thoughts on the potential advantages and disadvantages of having EV charging infrastructure in their communities, opinions on key amenities and ranking criteria, and optional demographic information. Figure 2 depicts selected survey results.

The survey was publicized in several methods, including:

- » Via email to the stakeholder list.
- » In a news release distributed by Iowa DOT.
- » Links and graphics shared on Iowa DOT's Facebook and Twitter accounts.
- » On the Iowa EV plan website.

The survey received 1,649 submissions, providing a large set of data on respondent opinions regarding EV infrastructure. It also gathered information on self-reported driving and mobility habits. Additionally, the survey asked the open-ended question, "Is there anything else you would like to share with us regarding future considerations for fast-charging EV infrastructure?" More than 700 comment responses were received and analyzed for common themes and sentiment, with 30 percent having a positive sentiment, 45 percent having a neutral sentiment, and 25 percent having a negative sentiment.

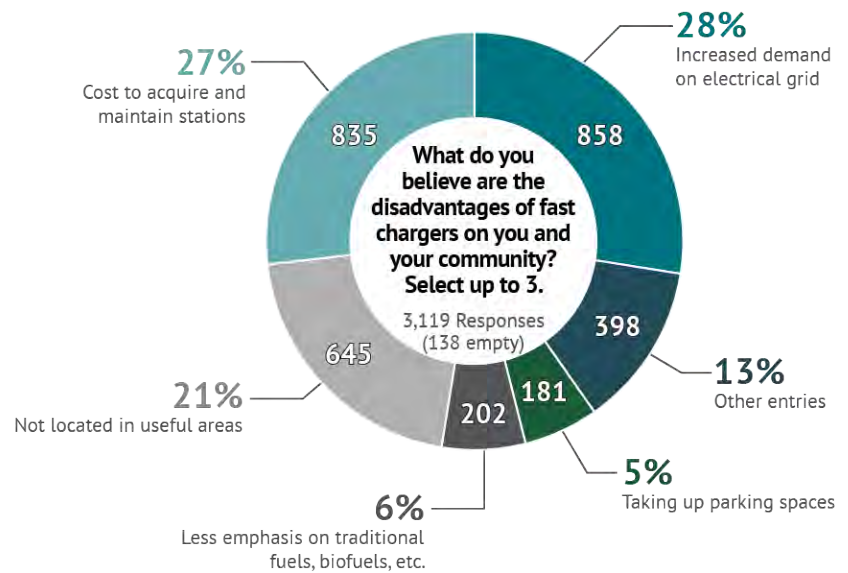
Figure 2: Selected Results from the Iowa EV Survey



### 2.3.1 Common Comment Themes, From Most to Least Frequent

- » Station Amenities and Location
- » General Support
- » Power Needs
- » General Opposition
- » Affordability
- » Cost/Funding of Infrastructure
- » Range Anxiety
- » Disadvantaged Communities

Figure 2: Selected Results from the Iowa EV Survey (Cont.)



## 2.4 Meetings

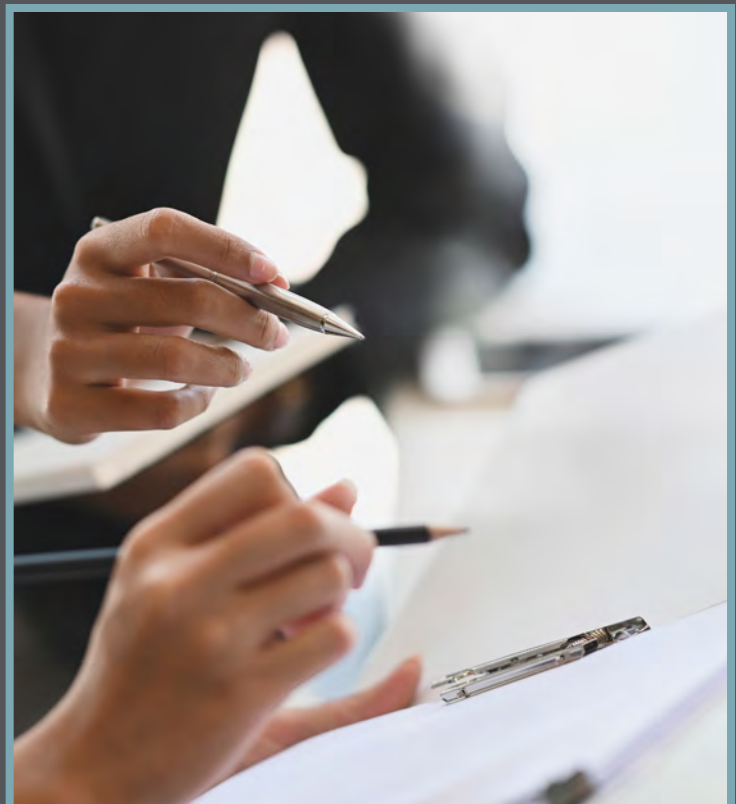
During the development of Iowa's Electric Vehicle Infrastructure Deployment Plan (EVIDP), Iowa DOT and its partners held seven meetings with more than 100 key stakeholders to provide background education and receive input. The meeting content was adapted to fit the background and interests of each group, from utility-specific audiences to coordination meetings with neighboring states.

More information about the meetings can be found below.

### 2.4.1 Small Group Stakeholder Meetings

Several small group stakeholder meetings were held during the plan development, with the aim of addressing specific topics or cultivating positive relationships with key stakeholders. These conversations allowed Iowa DOT staff to both answer and ask questions of specific groups, which informed plan development and feasibility. Examples of these meetings include:

- » Large Iowa electric utility providers, including Alliant Energy and MidAmerican Energy.
- » Municipal electrical utility providers and cooperatives represented by the Iowa Association of Electric Cooperatives (IAEC) and the Iowa Association of Municipal Utilities (IAMU).
- » Iowa's neighboring states, including South Dakota, Wisconsin, Minnesota, Illinois, Missouri, Nebraska, and Kansas.





Additionally, IEDA staff met with representatives from the Iowa Department of Education and International Brotherhood of Electrical Workers (IBEW) to discuss existing and potential future training efforts that produce certified Electric Vehicle Infrastructure Training Program (EVITP) electricians. In addition to brainstorming on strategies to keep growing this pool of skilled talent, such as financial investment from the EV industry and potential partnerships with statewide agencies, participants expressed the goal to keep this workforce local and expand programs through community colleges.

## 2.4.2 Large Group Stakeholder Workshop

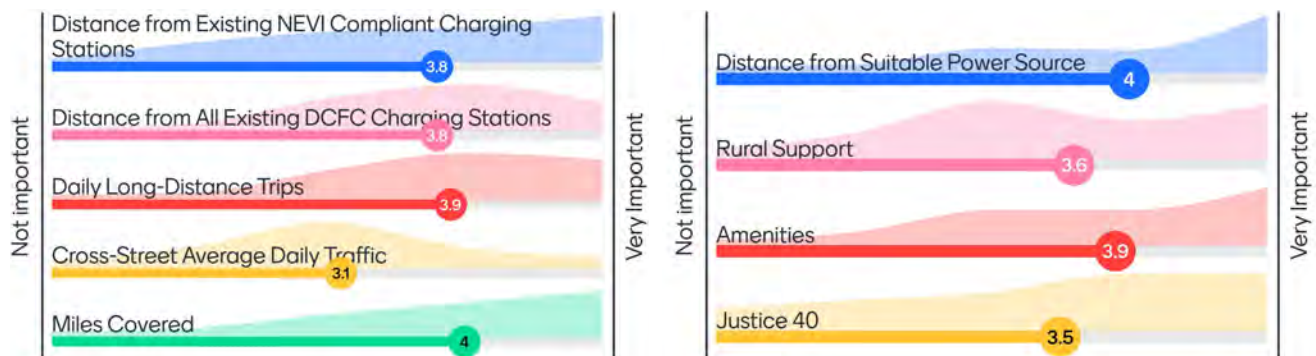
A virtual large group stakeholder workshop was held in June 2022. The purpose of this workshop was threefold: (1) To engage our stakeholders in the NEVI planning process; (2) Educate this group about Iowa's EV market advancements and conceptual NEVI deployment planning; and (3) Receive input to inform plan development. The meeting presentation was specifically designed to facilitate feedback via an online interactive polling program, which received real-time input that was displayed for all participants to see. Additionally, Iowa DOT and its partners answered questions from attendees. Many types of organizations attended the meeting, including:

- » Iowa Metropolitan Planning Organizations and Regional Planning Agencies
- » Convenience Stores and Other Private Businesses
- » Cities and Public Transit Authorities
- » Utilities and Utility Associations/Co-Ops
- » Tourism and Economic Development Professionals
- » State Agencies
- » Researchers and Environmental Professionals
- » Neighboring State DOTs
- » Unions and Workforce Development Professionals

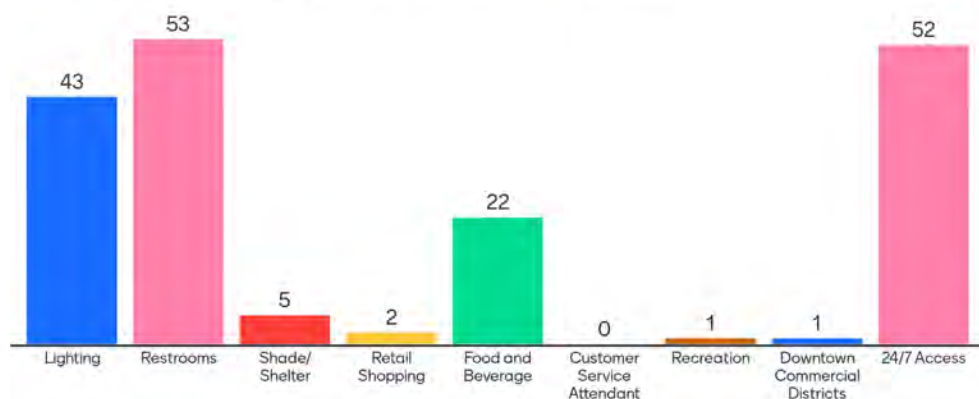
An example of the feedback received during this meeting can be seen in the tables and charts below.

**Figure 3: Workshop Feedback**

How important do you find each criterion when considering site selection?



What amenities do you think are the most important at potential EV charging sites? Choose three.

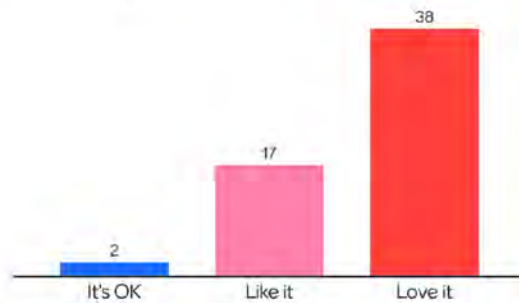




### Figure 3: Workshop Feedback (Continued)

Example of sentiment tracking on individual plan goals:

**A sustainable transportation and energy system that can adapt to economic, technological, and environmental changes while providing reliability**



## 2.5 Key Engagement Takeaways

Throughout the plan development process, Iowa DOT and its partners received feedback and input from both the public and key stakeholders. Participants in various engagement activities such as the survey and large-group workshops were asked their opinions on potential site amenities, feasibility, benefits and/or disadvantages, and site selection criteria. Additionally, this input informed the plan development team of opportunities for continuing education to ensure that all stakeholders understand the NEVI program. The feedback gathered from these efforts was used to inform specific plan elements and may also be considered as future related EV efforts are developed within the state. Upon analyzing all feedback, several key themes emerged within the data. While not comprehensive of all responses and comments, the below list summarizes several general thoughts that were mentioned multiple times during the planning process.

### 2.5.1 Key Themes

- » Certain amenities are highly desired at Direct Current Fast Charging (DCFC) charging locations. The amenities deemed most important include 24/7 access, restrooms, and lighting. The amenities deemed least important include retail shopping, customer service attendant, recreation, and proximity to downtown commercial districts.
- » DCFC fast sites should be prioritized in areas with high traffic volumes, along interstate highways, and in areas in which there are gaps in the existing charging network.
- » There is confusion and misinformation about the NEVI program requirements for chargers and charger locations, as well as about EVs in general. This highlights the importance and opportunity for continued educational campaigns as NEVI-compliant chargers are deployed within Iowa.
- » Stakeholders believe that when considering site selection for NEVI-compliant chargers, miles covered and distance from a suitable power source are the most important criteria.
- » Rural areas, as well as those off the designated Alternative Fuel Corridors (AFCs), want the opportunity to be included in EV infrastructure deployment.
- » Once installed, EV chargers should be adaptable for all types of vehicles, which may require some additional charging infrastructure.
- » Advertising and marketing will be needed to inform the public about charging locations and availability once they are installed and active.

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# CHAPTER 3

## Vision and Goals

### 3.1 Methodology

The Iowa EVIDP vision and goals were developed by first reviewing the Joint Office of Energy and Transportation's NEVI Formula Program objectives and criteria for funding to deploy a network of EV chargers nationwide. Second, the project team conducted a review of Iowa DOT's adopted 2022 State Transportation Plan, Iowa in Motion,<sup>1</sup> which delineates the state's transportation goals, system objectives, and guiding principles for the future.

The Iowa EVIDP goals are drawn from, and aligned with, the Iowa in Motion goals to work in tandem with the state's top priorities, while addressing the growing national demand for EV charging infrastructure and forthcoming federal support under the NEVI Formula Program and Discretionary Grant Program for Charging and Fueling Infrastructure. The state's approach toward adapting to this type of infrastructure demand was most recently addressed in a report completed in 2018 by the Iowa Economic Development Authority (IEDA), "Charging Forward: Iowa's Opportunities for Electric Vehicle Infrastructure Support."<sup>2</sup>

### 3.2 Vision

The project team wanted to ensure that the EVIDP vision was consistent with the vision developed for Iowa in Motion. That vision is for "a safe and efficient multimodal transportation system that enables the social and economic well-being of all Iowans, provides enhanced access and mobility for people and freight, and accommodates the unique needs of urban and rural areas in a sustainable manner."<sup>3</sup> Some of the key focal points of this vision were incorporated into the EVIDP vision, such as the social and economic well-being of Iowans, accessibility, sustainability, and mobility. For this plan, the additional key concept of reliability was added due to the need for reliable charging infrastructure. Together, these concepts envision an affordable, convenient, reliable, and equitable statewide network.



### 3.3 Goals

To fulfill the vision, the project team developed a series of plan goals for a 5-year time frame. These goals identify specific ways that the plan will address mobility, equity, human and environmental health, sustainability, and economic vitality through EV infrastructure.<sup>4</sup>



**The goals also align with the system objectives identified in Iowa in Motion, stated as:**

**Safety:** The transportation system is safe to use and minimizes incidents, crashes, injuries, and fatalities.



**Sustainability:** The transportation system is available and in good condition, meeting the needs of today and preparing for the future.



**Accessibility:** Users can readily access the transportation system and services without unnecessary barriers.



**Flow:** The transportation system reliably and efficiently moves people and goods, while minimizing user delays and costs.

**Table 1** presents the plan goals and alignment with the system objectives. Quantitative, outcome-based targets for the plan goals are presented in Chapter 12.

**Table 1: Iowa EVIDP Goals Aligned With System Objectives**

IOWA EVIDP GOALS	IOWA IN MOTION SYSTEM OBJECTIVES
<b>Goal 1:</b> An EV fast-charging system that supports regional and interstate travel.	Flow, Accessibility
<b>Goal 2:</b> A local EV system that promotes equitable access and mobility throughout Iowa's communities.	Accessibility
<b>Goal 3:</b> A charging network that helps provide the traveling public with a variety of transportation and energy options.	Flow, Accessibility
<b>Goal 4:</b> A transportation system that reduces energy life-cycle emissions to minimize impact on human and environmental health.	Sustainability
<b>Goal 5:</b> A sustainable transportation and energy system that can adapt to economic, technological, and environmental changes, while providing a high level of system reliability.	Sustainability, Flow
<b>Goal 6:</b> A charging network that supports long-term EV station success, which maximizes economic benefits for consumers.	Sustainability, Flow
<b>Goal 7:</b> A growing network of chargers that fosters innovation and collaboration to expand economic opportunities.	Sustainability

Along with these goals, Iowa DOT commits to ensuring that the EV supply equipment installed under this program is maintained in compliance with NEVI standards for at least 5 years from the date of installation.

## 3.4 Use of NEVI Funds

Iowa DOT will receive a total of \$51,374,369 in NEVI funds during the 5-year period from federal Fiscal Year (FY) 2022 to FY26. The FY22 amount of \$7,604,168 has been assigned and is shown in **Table 2**. The minimum 20-percent nonfederal match is also shown, which results in a total of \$9.5 million (M) for FY 2022. Estimates have been made for the remaining years to support planning and programming decisions. The total NEVI funding, plus the minimum 20-percent match, totals \$64.3M for the 5 years. If a larger nonfederal match can be secured, that amount could increase.

NEVI guidance requires states to build out their AFC corridors and have them certified by FHWA before they can use the NEVI formula funds “off corridor.” They also require that states prioritize interstates in the identification of AFCs and expenditure of NEVI formula funds. However, once NEVI criteria are met, states can deploy stations on other critical corridors and areas of the state.

Iowa DOT has evaluated long-distance travel patterns within the state. The analysis confirmed that Interstate (I)-80, I-35, I-29, and I-380 are all important corridors for long-distance trips in, and through, the state. The four interstates make up almost all Iowa’s EV AFC network, and the initial focus of the state’s NEVI charger build-out.

Based on this work, the first 2 years of funding are expected to be primarily dedicated to accomplishing the goal of installing DCFC infrastructure on the AFC corridors. However, starting in FY24, Iowa DOT expects to have fully built out the AFC system and to begin exploring to support EV travel in Iowa. Future plan updates will specify the locations and costs of EV charging infrastructure and other NEVI allowable expenditures in each fiscal year. The breakdown of funding availability, by year, is indicated in **Table 2**, and highlights the overall funding per year from federal and local sources.

**Table 2: NEVI Formula Funds and Matching Funds (in millions)**

FEDERAL FY	FORECASTED NEVI FUNDS (80%)	MINIMUM LOCAL MATCH FUNDS (MIN 20%)	TOTAL (100%)
2022	\$7.6	\$1.9	\$9.5
2023	\$10.95	\$2.75	\$13.7
2024	\$10.95	\$2.75	\$13.7
2025	\$10.95	\$2.75	\$13.7
2026	\$10.95	\$2.75	\$13.7
<b>TOTAL</b>	<b>\$51.4</b>	<b>\$12.9</b>	<b>\$64.3</b>

## 3.5 Plan Update Schedule

Iowa DOT anticipates an annual update to this plan to reflect any additional funding, costs, project progress, implementation changes, or areas that may need to be re-evaluated once construction of the charging network has begun. Iowa DOT views this plan as a “living document” that captures the best, and most relevant, information available at the time, but with a full understanding that this may change. It is the intent of the annual updates to demonstrate progress, highlight areas in which improvements could be made, and provide the United States (U.S) DOT, Joint Office of Energy and Transportation, and peer states with any information that may be helpful to share. In addition, it is an opportunity to update the plan with any additional lessons learned or guidance provided by other peer states and the Joint Office of Energy and Transportation.

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# CHAPTER 4

## Contracting Mechanisms

### 4.1 Delivery Outcomes and Objectives

Recognizing the complexities of constructing, owning, and operating EV charging stations, as well as having a desire to promote new innovations in EV charging station development, Iowa DOT has initially elected to only consider contracting and delivery models that do not include Iowa DOT as an owner of EV charging infrastructure. As such, Iowa DOT will seek to engage third-party entities to install, own, operate, and maintain the EV charging infrastructure on state AFCs. Iowa DOT will carefully select private or public providers who have the proper expertise and experience to effectively deploy this new, publicly available infrastructure in a manner that best leverages federal funding.

To balance opportunity and risks associated with the diverse components of Iowa's charging system, Iowa DOT will focus its approach on deploying and administering the state EV charging program around the following outcomes or objectives:

- » Maximize leverage of federal dollars, while following all federal requirements.
- » Select providers who understand and will fully commit to the State of Iowa goals.
- » Confirm the contracting and delivery method is permissible under Iowa law, and that requirements can be met.
- » Utilize a delivery method that is attractive to multiple proposers possessing proven knowledge and experience in the development and implementation of EV infrastructure.
- » Provide robust oversight for contract performance, while being efficient with Iowa DOT staff time during design, construction, and operation.
- » Require operations and maintenance (O&M) and charging/energy management services to be the responsibility of experienced contract partners, and not be the responsibility of Iowa DOT.
- » Require that site hosts, developers, and/or providers are the designated EV charging site owners. The State of Iowa will not be owners, in whole or part, of these EV charging sites.
- » Achieve delivery of the project based on requirements of NEVI guidance and the state of Iowa (further information in Chapter 7, Implementation).
- » Facilitate future technology upgrades (both hardware and software) to leverage the anticipated enhancements in charging speed and efficiency.
- » Engage local communities near potential charging infrastructure sites.
- » Engage small and disadvantaged businesses in the design, construction, operation, and maintenance of charging equipment and supportive infrastructure.

## 4.2 Program Delivery and Contracting

Delivery methods considered for EV charging infrastructure must account for the need for state oversight as a steward of federal funds, while also seeking private sector innovation and strong long-term relationships. In consideration of the above outcomes and objectives, the state of Iowa will seek to further investigate development of a grant-based program framework to administer NEVI funds in the deployment of Iowa's EV charging infrastructure.

### 4.2.1 Grant Application Program

Many states, including Iowa, have used a grant application process to solicit and select EV charging sites and partners for the implementation, ownership, and operation of DCFC stations. The benefit to this approach is the opportunity for a variety of businesses to be involved in the competition for selection of projects. It also allows for selection of the best sites and partners out of a pool of them. For instance, a single contract-holder may place NEVI-compliant 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.

Given the potential scale of EV charging in Iowa, considerations for administrative costs, staffing, and technical expertise will be given in administering and managing a competitive grant program for EV charging infrastructure. Iowa DOT may decide to utilize professional service providers to assist with the responsibilities of the NEVI program implementation and oversight. Additionally, Iowa DOT will explore economies of scale to allow multisite installations to be more competitive in the grant program delivery mechanisms.

### 4.2.2 EV Charging Provider Considerations

Utilizing several criteria, the selected providers will be chosen based on a strong understanding of Iowa's priorities and standard of involvement in local communities. The providers will be held to commitments made within their response to equitably serve disadvantaged communities and rural areas, and to involve small and local businesses. The state of Iowa's approach will require qualified public and private parties to develop a realistic strategy that furthers the achievement of this plan's goals, and provides controls on the time frame of EV charging deployment.

Community engagement is important in the delivery of projects. Charging sites will be selected based on coordination with local businesses and utilities to determine easements and other terms of use. The site design process will also require coordination with local permitting and regulatory agencies to address planning and zoning requirements and local ordinances. Coordination would primarily be completed by the installation contractor and/or the charger supplier.

EV charging infrastructure projects involve advanced technology (hardware and software) and technology integration, as well as comprehensive service requirements to maintain EV charger availability, manage energy costs, automate charging and fare collection, etc. EV charging providers will be required to provide ongoing O&M services of the EV charging equipment, procure the software necessary to operate EV charging equipment and monitor system performance, and utilize charge management software to help manage charging costs and revenues. Agreements between an EV charging provider and Iowa DOT should include robust performance requirements that incentivize best practices to achieve long-term system reliability and performance.

While EV charging infrastructure deployment may be typically associated with the private or commercial industry, public entities could consider opportunities to own and/or deploy EV charging sites. Whether it is a private or public entity, EV charging infrastructure can be delivered using a variety of contracting methods. Many of the possible contracting methods would be operated under the Charging as a Service (CaaS) model. CaaS removes the ownership and maintenance burden from one entity, such as the site owner, and shifts it to a charging host. CaaS typically supplies the hardware, software, driver support, and maintenance to the site owner, with a flexible payment system. CaaS is becoming common with fleets, in which high charger installation costs and charging anxiety and risk are mitigated or reduced.

## 4.3 Process

Iowa DOT plans to engage in a careful process to finalize a delivery method and procure public and/or private partner(s). The anticipated implementation of the program (discussed in Chapter 7) will be informed by this process. In addition, many of the NEVI guidance requirements such as O&M, 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:** Iowa DOT will complete its analysis of the future EV infrastructure needs in Iowa 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.
2. **Talk to Industry:** It is common in major construction to engage potential bidders, equipment vendors, and operators for critical reviews before the procurement is underway. Iowa DOT will treat the NEVI deployment in the same structured manner to allow industry interest and insights in order to enhance Iowa DOT's plan for engaging with provider partners. Crucial stakeholders in this engagement will be the affected utilities to review the capacity to provide power in various locations. Additional stakeholders will include communities in which the potential charging stations may be located.
3. **Assess and Screen Contracting Options:** With state partners, Iowa DOT will work through a process of risk workshops, funding analysis, program/project scheduling, and refinement to advance a limited number of contracting options for final vetting.
4. **Verify Legal Authority:** Iowa DOT will verify legal authority and requirements associated with the varying ownership, development, and O&M scenarios within its contracting options.
5. **Elect a Contracting Option:** Iowa DOT will look to use a grant application program to administer the NEVI funds and development of EV charging stations. However, there are several nuances to a grant application procurement structure that Iowa DOT will explore to encourage a competitive bid environment, appropriately screen qualified applicants, create a manageable pool of EV charging providers, and achieve compliance with applicable federal and state rules and regulations.
6. **Develop Procurement Documents:** A potentially complex procurement will need to be carefully constructed for Iowa DOT to approve and move forward. Procurement documents for Requests for Proposal (RFPs) such as this can be lengthy and complex, and often seek specific requirements from proposers. In this instance, taking all steps necessary to ensure a pool of bidders with the appropriate level of qualifications and experience is critical. Documents should be developed so they do not exclude respondents, either implicitly or explicitly, due to the complexity of the procurement.
7. **Evaluate Procurement Responses:** Because of the funding requirements, procurement responses are likely to be long and technically complex. Specialists in various technical disciplines, finance, and funding may be required to provide input to the evaluation team.

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# CHAPTER 5

## Existing and Future Conditions

### 5.1 State Geography and Terrain

Iowa's geography consists of rolling hills and flat plains. The elevation varies between 1,677 feet (ft) above sea level at Hawkeye Point in northwestern Iowa to 480 ft above sea level in Keokuk in southeastern Iowa. The state is bounded by the Missouri River on the west and the Mississippi River on the east, with several rivers running through it (**Figure 4**). The most varied relief in the state is in the Driftless Area (where there was no glaciation) in the northeastern portion of the state, where the Mississippi River bluffs reach 300 to 400 feet above the valley.<sup>5</sup>

The minimal variation in elevation creates a suitable environment for long-distance travel. The flat and gently rolling terrain has allowed the interstates to be built relatively straight, which provides drivers with a long and wide line of sight and the ability to travel quickly. These conditions are suitable to EVs such that there is no additional strain on vehicle motors needing to power up and slow down through steep hills.

There are few localized exceptions to these conditions, such as in the Driftless Area or near the state's rivers. While terrain in these areas is varied, it is not anticipated that the charging station spacing will need to be reduced below the 50-mile (mi) NEVI requirements because the vehicle range will typically be around 300 mi, allowing ample other opportunities to charge.

Figure 4: Iowa's Geography and Terrain



## 5.2 Climate

Iowa's four seasons provide an average temperature range from about 14 degrees Fahrenheit (F) in the winter to the mid-80s F in the summer,<sup>6</sup> with occasional extreme temperatures of more than 100 F in the summer and minus 28 F in the winter.

Precipitation averages 26 to 38 inches (in) of rain from the northwest to the southeast from spring through fall. Iowa's average snowfall ranges from 18 to 42 in per year.<sup>7</sup> Rapid snowmelt and heavy summer rains have led to severe flooding in several places throughout the state.<sup>8</sup>

Iowa's hot and cold temperatures can impact the reliability of EVs such that they may lose range, and the batteries can wear out sooner. If drivers are using the vehicle's air conditioning or heating, that usage will pull from the battery and reduce the range of travel. Using the heat during a typical Iowa winter day of 20 F can reduce range by as much as 41 percent. On a summer day, an EV using air conditioning can lose about 17 percent of range. Future improvements in battery technology are expected to reduce sensitivity to the cold.<sup>9</sup> EVs are also typically heavier than gas-powered cars and have a lower center of gravity. These characteristics can help drivers retain control of the vehicles when driving on snow-covered roads.<sup>10</sup>

It is best to charge the EV's battery when it is already warmed up, either from parking in a garage or driving the vehicle.<sup>11</sup> The preference for a garage will impact the adoption of EVs in favor of those who can provide garage parking. The preference for warmth when charging also reduces flexibility when planning trips such that owners will want to warm up the vehicle before charging. Most DCFC stations are rated between minus 30°C to 50°C (minus 22°F to 122°F). While monthly average temperatures fall within the charger's operable temperature ranges, temperature extremes, particularly low temperatures, may impact charging for brief periods. While high temperatures can also affect charging and the battery, their effect is not as significant as colder temperatures.

Iowa's annual average wind speed across the state varies from about 4 meters per second (m/s) in the southeastern part of the state to about 7 m/s in the northwest.<sup>12</sup> The state has been able to benefit from wind in development of wind energy, but this wind also can impact travel when it creates headwinds that may shorten EVs' range.

## 5.3 Land Use Patterns

The state of Iowa is 55,857.1 square miles (sq mi) or 36,016,500 acres (ac). Of this acreage, only about 2 percent is urbanized, comprising nine metropolitan and 15 micropolitan areas. About 64 percent of the population lives in the urban areas,<sup>13</sup> establishing them as major nodes in the transportation system. The primary land uses in the state are cropland, pastureland, and small amounts of forestland. Refer to **Table 3** for a breakdown of the state's land uses, and **Figure 5** to review a map of the state's urban areas.

Iowa has 99 counties, generally with the county seat located near the center of each county. The small size of each county and the location of the county seat allowed residents near the edge of the county to travel to the county seat to conduct business, and then return home within a day of travel by horse.<sup>14</sup> As a result of land use planning, the state's highway grid allows the county seat to typically be accessed by both an east-west highway and a north-south highway.

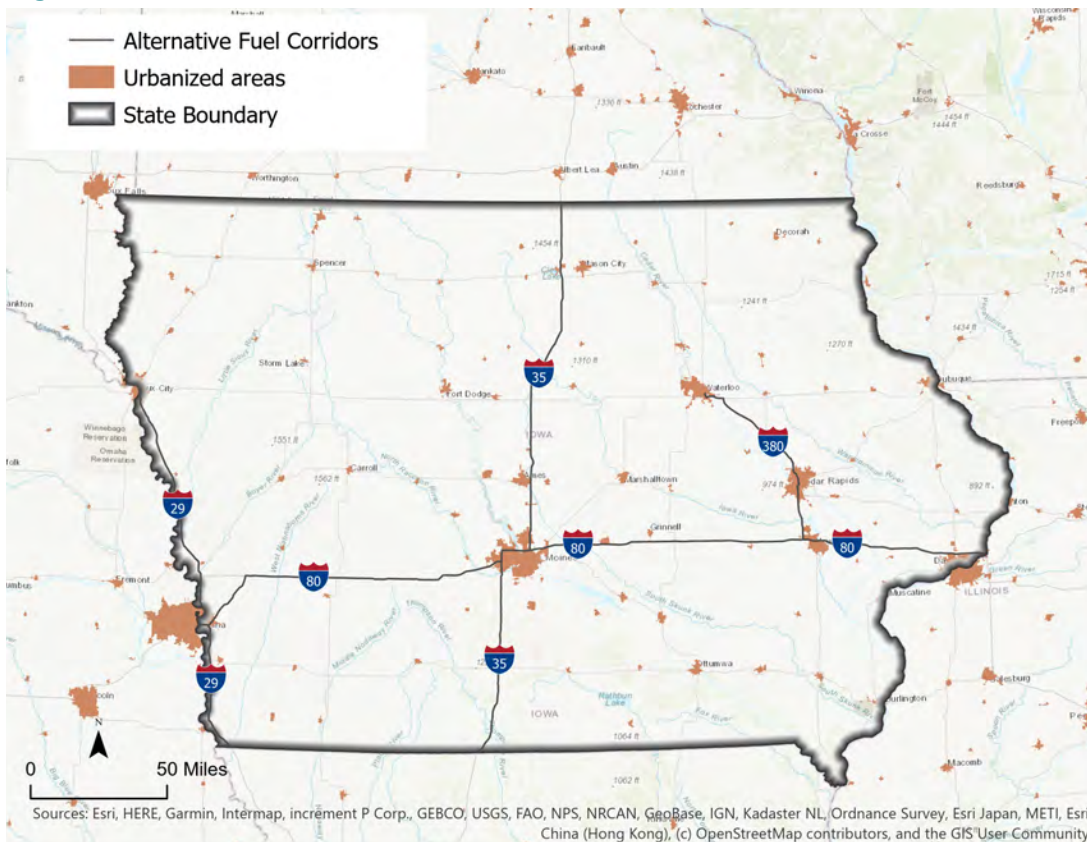
The rural character of the state creates long travel distances between urban areas, while the grid network creates frequent access to state or county highways. The numerous route options will need to be considered in planning for future EV charging stations.



Table 3: Iowa's Land Use<sup>15</sup>

LAND USE	DETAIL	ACRES (1,000)	PERCENT
Cropland	Idle	1,738	5%
	Pasture	225	1%
	Crops	24,750	69%
Grassland Pasture	Pasture and Range	2,879	8%
Forest	Grazed	878	2%
	Not Grazed	2,090	6%
Special Uses	Defense and Industrial	51	0%
	Farmstead	423	1%
	Parks and Wilderness	510	1%
	Rural Transportation	970	3%
Urban	Urban	628	2%
Miscellaneous	Wetlands, Unproductive Woodlands	606	2%

Figure 5: Iowa's Urban Areas<sup>16</sup>



## 5.4 Transportation Needs

### 5.4.1 Travel Patterns

Iowa In Motion 2050, the State Long-Range Transportation Plan (SLRTP), refers to the Iowa Code's definition for Iowa's primary transportation system as "those roads and streets both inside and outside the boundaries of municipalities which are under Iowa DOT jurisdiction." This 9,600-mi system is divided into five classifications:

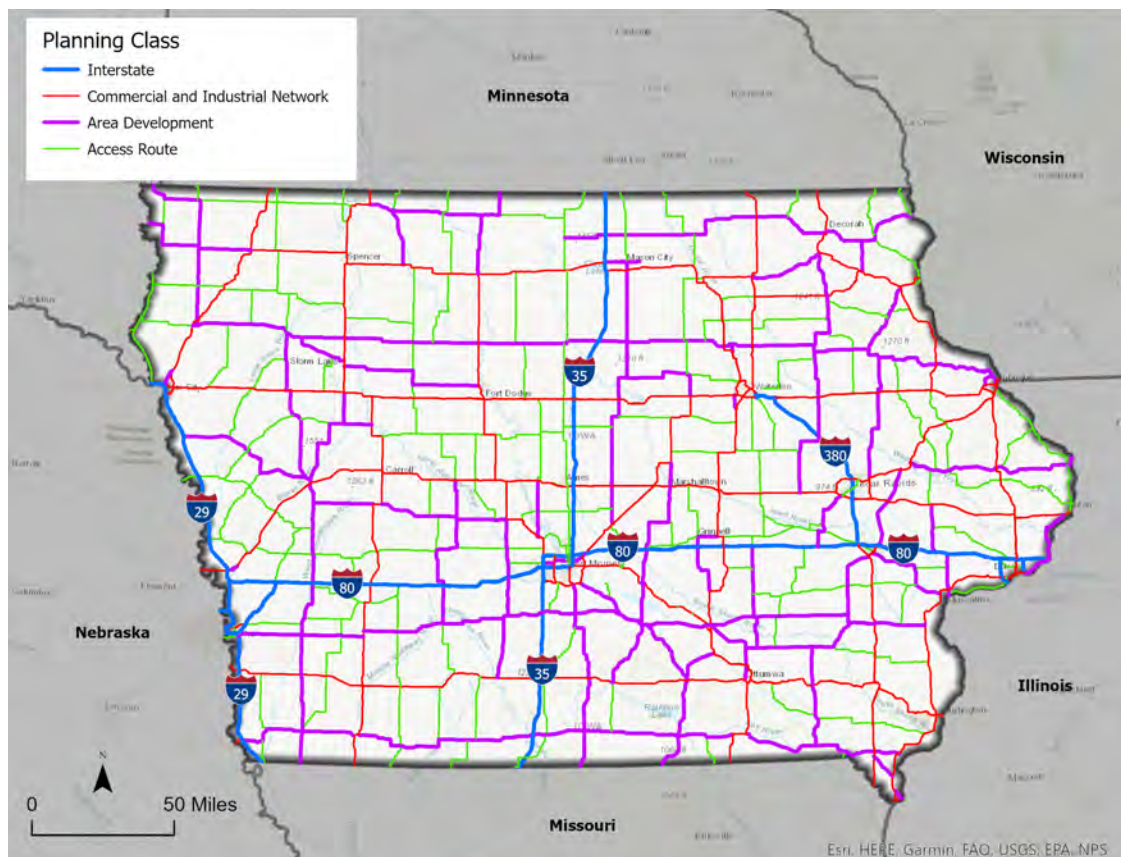
- » **Interstate:** Connects to the national transportation network and major metropolitan areas.
- » **Commercial and Industrial Network (CIN):** Connects cities with a population greater than 20,000 to major metropolitan areas and are identified by the state to enhance opportunities for the development and diversification of the state's economy.
- » **Area Development:** Connects cities with populations greater than 5,000 to the CIN and major commercial and industrial centers.
- » **Access Route:** Connects cities with populations greater than 1,000 to employment, shopping, health care, and education facilities.
- » **Local Service:** Connects cities with populations less than 1,000 to local commercial and public service.<sup>17</sup>

**Figure 6** depicts Iowa DOT planning classes for the primary highway system.

The interstate corridors, followed by the CIN and possibly Area Development, will eventually require additional charging infrastructure to support long-distance travel. Potential long-distance travel along the corridors is discussed in Chapter 6.

The development of a national EV infrastructure network will require incremental development of stations along high-use corridors such as the Iowa Interstate system to best provide access to chargers to the public at large. Over time, additional charging infrastructure may spread to lower tiers of the state's transportation system to provide charging opportunities for the state's travelers, both urban and rural.

**Figure 6: Iowa DOT Planning Classes for the Primary Highway System**



## 5.4.2 Public Transportation Needs

The Iowa Public Transit Long Range Plan includes a strategy to “decrease fuel costs for transit agencies by adopting electric, hybrid, or flex-fuel efficient vehicles.”<sup>18</sup> The plan does not address issues related to charging transit fleets, but for most local systems, charging would be completed while the fleets are in storage. The plan also notes that hybrid and electric buses have a different type of braking system that performs better as an autonomous vehicle (AV).<sup>19</sup> The recommended transition from gas- or diesel-powered transit vehicles to those powered by electricity may better position transit agencies to adopt AVs in the future, and better compete with new AV technologies that assist populations that do not drive.

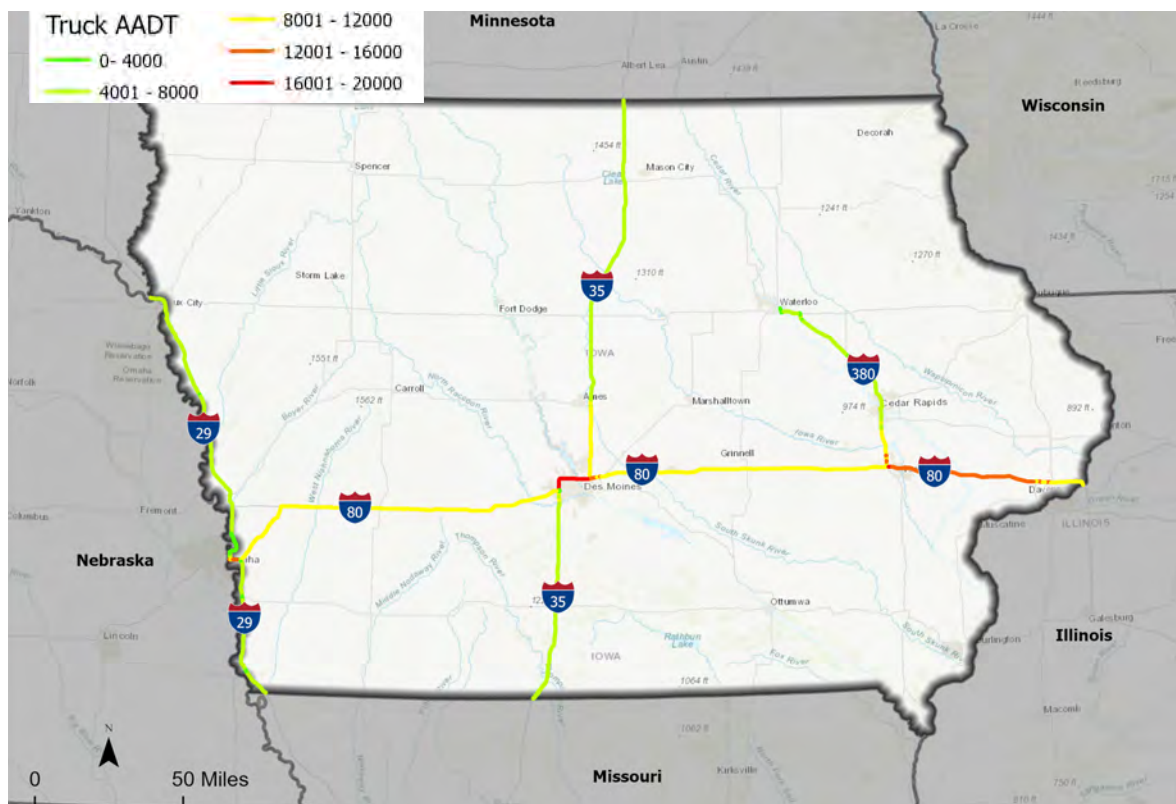
Iowa has 12 large urban transit authorities, seven small urban transit authorities, and 16 rural regional agencies.<sup>20</sup> The Des Moines Area Regional Transit Authority (DART) has already adopted seven all-electric buses into its fleet. DART charges the buses overnight. In addition to zero emissions, DART notes additional benefits such as reduced noise pollution and savings on O&M costs.<sup>21</sup> Iowa City Transit also incorporated four electric buses into their system in January 2022.<sup>22</sup> CyRide in Ames added two new electric buses to its fleet in 2022, and received a grant to add three more by 2023.<sup>23</sup>

The urban transit fleets are unlikely to use the charging infrastructure along the interstate system, but there may be opportunities for rural transit systems with smaller vehicles, depending on their routes, charging times, and site layout for the vehicle size. Fleets will generally charge at central locations, but may occasionally charge elsewhere. Additional design elements must be considered should medium- or heavy-duty vehicles charge at these locations.

## 5.4.3 Freight and Supply Chain Needs

Iowa freight traffic is expected to continue to increase through the SLRTP time frame of 2050. Truck freight is expected to grow from about 455M tons (TN) in 2017 to almost 692M TN in 2050. These trips are heavily concentrated on the interstate highway system and the CIN.<sup>24</sup> Existing average daily truck traffic along the AFCs is shown in **Figure 7**.

**Figure 7: Heavy- and Medium-Duty Truck Traffic on AFCs**





Since most freight travels farther than the distance provided by a single charge, electrical-powered freight trucks will be dependent upon reliable charging infrastructure. The charging stations should be accessible all hours and days to support the commodities markets. Since freight trucks often park overnight as they travel along the interstate system, coupling these parking areas with charging stations may provide infrastructure and time-related efficiencies.

Further, freight trucks will need to travel beyond the interstates, so charging networks will also need to expand across the state to support freight-hauling EVs. To remain efficient and competitive, freight haulers need to travel as directly as possible to their destinations. This may result in a demand for charging infrastructure along several additional routes, even if that results in charging stations close to one another, to avoid circuitous travel patterns.

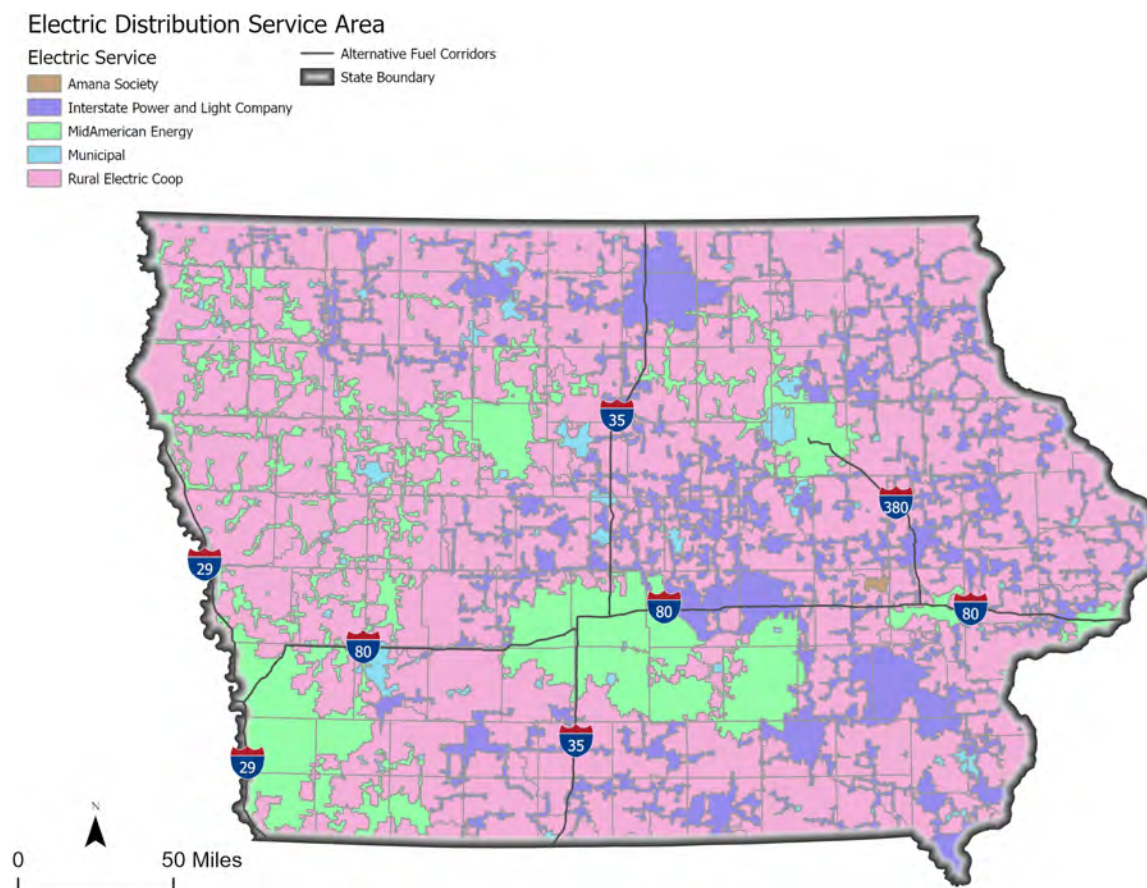
While EV charging stations can be utilized by light-, medium-, and heavy-duty vehicles, it is not always ideal or feasible to have each vehicle type charging at a single charging station. Similar to current internal combustion fueling islands available today, the vehicle sizes, parking needs, and safety precautions likely necessitate different charging requirements for EV classifications. Similarly, the battery size and required charging speed for these vehicles may also impact charging stations that are not intended for certain vehicle sizes.

## 5.5 Utility Considerations

### 5.5.1 Electrical Utilities

Creating an electrical utility network to support EV charging stations will require the cooperation and coordination of several utility providers. MidAmerican Energy services many of the urban areas in Iowa. Other service providers include Interstate Power and Light Company (doing business as Alliant Energy), rural electric cooperatives (RECs), and some municipal electric utilities. The Amana Society provides its own service.<sup>25</sup> Electrical service territory boundaries are depicted in **Figure 8**.

**Figure 8: Electrical Service Territory Boundaries**



## 5.5.2 Grid Capacity Needs

The utility grid connection is critical to the deployment of DCFCs across Iowa. The NEVI charging station requirements clearly outline the minimum need for four 150-kilowatt (kW) chargers, each capable of simultaneous operation for a minimum peak load of 600 kW. This requirement dictates the peak load necessary for the utility to support at each charging facility. It is understood that the initial overall utilization of each site could be much lower than the 600-kW peak. Lower utilization can cause financial challenges to installing large electrical service upgrades that may see minimal use until more EVs are available and present on the roadways.

Given the peak load requirements, most utilities will likely install a 750-kilovolt-ampere (kVA) distribution transformer to meet the requirements for a minimum NEVI station. Sites with higher utilization or those with plans for future improvements, such as 350-kW chargers, may require even larger service upgrades. The utility service will be determined by each individual utility and will be based on the final site design.

During this planning study process, the Iowa DOT team reached out to several Iowa utilities and utility organizations that may be affected by installing NEVI-compliant charging stations. On June 7, 2022, the planning team met with IAMU and IAEC. These two trade organizations represent the generally rural electrical utilities in the state. Municipal utilities often focus on rural towns and small cities, while the cooperatives typically serve rural customers, often with service territories across multiple counties.

On June 9, 2022, the planning team met with the two independently operated utilities (IOUs) in Iowa. These IOUs included both MidAmerican Energy and Interstate Power and Light Company (Alliant Energy). In addition, the Iowa Utility Association (IUA) and International Transmission Company (ITC) Midwest attended this meeting. IUA is a trade organization representing the state IOUs, and ITC Midwest provides high-voltage transmission service in Iowa.

In general, the separate utility discussions covered similar topics/issues, but also allowed for focused discussions regarding specific considerations for the differing utility sizes. The meeting agendas focused on the following items:

- » NEVI Charging Station Requirements
- » Iowa Roadway Corridors Currently Under Planning Consideration
- » Conceptual Station Siting Along Interstate Corridors
- » Electrical Loads/Requirements
- » Potential Phased Installations
- » New Service Requirements/Demarcation Point for Electrical Chargers
- » EV Charging Rates/Incentives
- » Existing EV Programs Available at the Utilities

Following the discussions, the utilities and present representation felt that most of the utilities could handle an additional 600-kW load at most interstate exits, provided three-phase power is already located nearby. The attendees stated that each site would be different and would require some additional analysis. Iowa DOT and Iowa Economic Development Authority (IEDA) plan to continue consultation with utilities to help evaluate potential barriers, the cost-effectiveness to serve various locations, and building out the infrastructure in a manner that maintains, or strengthens, resilience of the electrical grid.

## 5.6 Industry and Market Conditions

### 5.6.1 Alternative Fuel Corridors

The NEVI Formula Program funding must be prioritized for the interstate highway system and the designated AFCs in the state. AFCs are designated by the FHWA, as directed by the Fixing America's Surface Transportation (FAST) Act of 2015.

Iowa's designated AFCs are I-29, I-35, I-80, and I-380. These interstates were nominated by the state of Iowa through a partnership of Iowa DOT, IEDA, and the Iowa Clean Cities Coalition (ICCC).

The AFC program covers various fuel types, including electricity, compressed natural gas, liquefied natural gas (LNG), hydrogen, and propane. AFC Corridor Ready segments have enough charging stations in place for an EV to make a reliable trip, while Corridor Pending segments are targeted for additional stations.

The AFC program guidance and corridor application process predates the NEVI program. As such, some locations that are part of a Corridor Ready segment are not NEVI compliant and will require further development or upgrade of charging infrastructure.

According to the Joint Office of Energy and Transportation's Designated Charging Corridors,<sup>26</sup> the Corridor Ready segments are shown in **Table 4**, while the Corridor Pending segments are shown in **Table 5**. These corridors are also shown in **Figure 9**.

**Table 4: Iowa's Corridor Ready Routes**

ROUTE	SEGMENT	MILEAGE
I-80	De Soto to Davenport*	195.0
I-80	Avoca to Omaha, NE	40.4

*\*NEVI-compliant stations on this corridor are more than 50 mi apart. Therefore, this corridor is not fully NEVI compliant.*

**Table 5: Iowa's Corridor Pending Routes**

ROUTE	SEGMENT	MILEAGE
I-80	Avoca to De Soto	69.3
I-35	Northern State Border to Des Moines	132.3
I-35	Southern State Border to Des Moines	72.5
I-380	Waterloo to Interstate 80	73.1
I-29	Sioux City to Southern State Border	150.9
I-480/ Old US 6	In Council Bluffs from Nebraska to I-80	8.0

In the development of compliant corridors to be certified by FHWA under NEVI, EV corridors that are fully built out will provide a maximum distance between stations of 50 mi, with stations located one mi or less from the corridor. In limited circumstances, a discretionary exception to those location requirements can be requested by the state DOT and approved by the Joint Office of Energy and Transportation. The stations must be DCFC and include at least four charging ports with Combined Charging System (CCS) connectors, each supporting a power output of at least 150 kW.



Figure 9: Iowa's AFCs



## 5.6.2 Existing EV Charging Stations

### CHARGER TYPES

There are three levels of chargers. Level 1 is the slowest, followed by Level 2, and then DCFC, which is the fastest charger. DCFC chargers are required to be used for new NEVI-compliant EV charging sites.

#### LEVEL 1 CHARGING STATIONS

Level 1 chargers, also known as trickle chargers, run off a standard residential 120-volt (V), 20-ampere (A) circuit and supply between 3 to 7 mi of range per hour of charging. They are the healthiest option for the battery and will extend the life of the EV, but they are impractical for anything besides residential charging due to their long charge times. Level 1 chargers are also the cheapest option, because they typically do not require additional infrastructure.

#### LEVEL 2 CHARGING STATIONS

Level 2 chargers provide between 10 to 60 mi of range per hour of charging. This figure is subject to fluctuation due to charger manufacturer and the vehicle. Level 2 chargers use 240V or 208V outlets and are still healthy for the battery. The power output of a Level 2 charger ranges from 3.3 kW to 19.2 kW. The typical Level 2 charger runs off a 40A circuit breaker which can safely supply 32A, supplying 7.7 kW at 240V. Level 2 chargers are the preferred daily method of charging, but are still impractical for charging during long trips.

Level 2 chargers are the most abundant chargers. The most concentrated charger location is Des Moines. The rest of the chargers are split among other smaller cities and along state highways.

#### DCFC STATIONS

DCFCs, also known as Level 3 chargers, are optimal for long road trips. DCFCs are found at public EV charging stations and provide about 200 mi of range per 30 minutes of charge operating at 400V alternating current (AC) to around 800V AC. DCFCs can have a power supply from 50 kW to 350 kW. Over time, continued use will decrease the battery life more significantly than Level 1 or Level 2 chargers. However, on-board vehicle charge controllers work to mitigate these losses via current limiting control. DCFCs are the most expensive due to the equipment cost and the required additional infrastructure. At a minimum, NEVI-compliant chargers must be capable of dispensing 150 kW to each vehicle connected for charging.

DCFC distribution follows the same pattern as the Level 2 chargers. There is a large concentration in Des Moines, with lesser concentrations in surrounding cities.

Thirty-seven existing charging sites representing 65 ports are within the required NEVI distances from a designated AFC. Most of these sites have too few chargers, and some of the sites do not reach the minimum 150-kW power requirement. The NEVI program will aim to upgrade these sites to reach NEVI compliance, when possible.

## PUBLIC CHARGING

Most public EV charging stations are concentrated in the state's urban areas, as shown in **Figure 10**. In addition to these charging stations, there are additional stations that support the state's EV infrastructure network, but do not meet NEVI minimum standards. The total of public and private charging outlets in the state is 646.<sup>27</sup>

Level 2 chargers are slower than DCFCs and are less useful for charging along the highway corridor. However, Level 2 chargers are useful once arriving at a destination (e.g., work, home, shopping, etc.).

DCFCs are significantly more important than Level 2 chargers to long-distance travel. There are numerous DCFCs within Iowa. These DCFC station locations, as well as the number and size of chargers, are shown in **Table 6**. There are three existing NEVI-compliant DCFC stations within Iowa. The charging station locations are depicted in **Figure 10**. In addition to the currently installed stations, those station locations planned for deployment along alternative fuel corridors in 2022 are also shown in **Figure 10**.

**Figure 10: Iowa's Public DCFC Charging Stations**



**Table 6: Iowa's DCFC Locations as of May 25, 2022**

ID	STATION NAME	LOCATION	ROUTE (NOTE AFC)	EV DCFC COUNT	EV NETWORK
69844	Kwik Trip #280	Davenport	U.S. 6/ Business U.S. 61	4	GRN
99792	Catfish Bend Casino	Burlington	U.S. 61	1	GRN
143245	Big Barn HD DCFC HOG	Des Moines	I-80/I-35	1	CPN
152297	Fort Dodge	Fort Dodge	U.S. 169	2	GRN
152298	Emmetsburg	Emmetsburg	U.S. 18	2	GRN

Table 6: Iowa's DCFC Locations as of May 25, 2022 (Continued)

ID	STATION NAME	LOCATION	ROUTE (NOTE AFC)	EV DCFC COUNT	EV NETWORK
152299	Sheldon	Sheldon	U.S. 18	2	GRN
152509	Waterloo Center for the Arts	Waterloo	U.S. 63/U.S. 218	2	GRN
152510	Clarinda	Clarinda	U.S. 34	2	GRN
163622	Waterloo Hy-Vee	Waterloo	I-380	2	GRN
163833	Avoca Casey's	Avoca	I-80	2	GRN
163864	McGrath Chevrolet of Dubuque	Dubuque	U.S. 20	1	NON
164247	De Soto Kum & Go	De Soto	I-80	1	GRN
164616	Davenport	Davenport	I-74	2	GRN
164828	Altoona Fast and Fresh	Altoona	I-80	2	GRN
165565	Fort Dodge Kwik Star	Fort Dodge	U.S. 169	2	GRN
165566	Early Casey's	Early	U.S. 20	2	GRN
167380	Altoona Casey's	Altoona	I-80	2	GRN
167599	Oskaloosa	Oskaloosa	IA 92	2	GRN
168150	Sioux City Kum & Go	Sioux City	I-29	2	GRN
169874	Kum & Go Northwood DCFC 2	Northwood	I-35	1	CPN
170114	Kum & Go Coralville DCFC 2	Coralville	I-80	1	CPN
170333	Casey's Williamsburg #2	Williamsburg	I-80	4	EA
170881	Carroll	Carroll	U.S. 30	2	GRN
170904	Iowa City Kum & Go	Iowa City	IA 1/U.S. 6	2	GRN
170906	Ankeny	Ankeny	I-35	2	GRN
181823	Kum & Go Northwood DCFC 1	Northwood	I-35	1	CPN
181929	Kum & Go Coralville DCFC 1	Coralville	I-80	1	CPN
183101	Route 65 Harley DCFC HOG	Indianola	U.S. 65	1	CPN
187862	Iowa 80 Truckstop DCFC 1	Walcott	I-80	1	CPN
187871	Iowa 80 Truckstop DCFC 2	Walcott	I-80	1	CPN
189949	Phillips 66 Station 1	Iowa City	I-80	1	CPN
189950	Phillips 66 Station 2	Iowa City	I-80	1	CPN
190421	Waukee Kum & Go 540	Waukee	I-80	4	EA

Table 6: Iowa's DCFC Locations as of May 25, 2022 (Cont.)

ID	STATION NAME	LOCATION	ROUTE (NOTE AFC)	EV DCFC COUNT	EV NETWORK
190434	Walmart 1965 Council Bluffs	Council Bluffs	I-80/I-29	4	EA
192697	LeMars Kwik Star	LeMars	U.S. 1	2	GRN
192879	Ames EV DCFC 1	Ames	I-35	1	CPN
192880	Ames Ev DCFC 2	Ames	I-35	1	CPN
192916	Davenport Kwik Star	Davenport	U.S. 6/U.S. 61	2	GRN
202969	Polk City Kum & Go	Polk City	I-35	2	GRN
203300	Adel Fareway	Adel	U.S. 169	2	GRN
203354	Colfax Kum & Go	Colfax	I-80	2	GRN
204261	Charles City Kwik Star	Charles City	U.S. 218	2	GRN
204315	Des Moines Fleur Hy-Vee	Des Moines	I-235	2	GRN
204316	300 MLK	Des Moines	I-235	2	GRN
204685	Council Bluffs Hy-Vee	Council Bluffs	I-29	2	GRN
204686	Johnston Hy-Vee	Johnston	I-80/I-35	2	GRN
205882	Bevington Kum & Go	Bevington	I-35	2	GRN
206041	Norwalk Fareway	Norwalk	U.S. 5	2	GRN
206157	Sckia Sckia 1 Abb	Sioux City	I-29	1	CPN
206713	West Des Moines Hy-Vee	West Des Moines	I-35	2	GRN
206752	Bettendorf Twin Span	Bettendorf	I-80	2	GRN
207188	Iowa River Landing	Coralville	I-80	2	GRN
207958	Grimes Hy-Vee	Grimes	I-35	2	GRN
213908	Urbandale Kum & Go	Urbandale	I-35	2	GRN

## 5.6.3 Role of DCFC Stations

DCFC stations are important to the AFC because they provide the fastest charging option of about 15 to 45 minutes, which is substantially faster than the Level 2 charging time of 4 to 10 hours. Fast-charging is necessary for people to use EVs on long-distance trips when they want to continue traveling to their destination as soon as possible. Slower charging stations are acceptable in locations in which people are expected to spend more time, such as home, school, and work.

## 5.6.4 Information Dissemination about EV Charging Stations

For EV usage to be widely adopted, EV charging stations need to be predictable and reliable. Until they are as ubiquitous and predictable as gas stations, EV charging station locations and status should be maintained on websites and user mobile applications. A national site would be most useful since it would facilitate planning for interstate travel, such as [www.DriveElectric.gov](http://www.DriveElectric.gov) and the Alternative Fuels Data Center (AFDC). Numerous charging network apps are also available.



Various partners within the state of Iowa will continue their education efforts on EV stations. These include utilities, regional MPOs, cities, and state agencies with a role in assisting or overseeing EV charging stations.

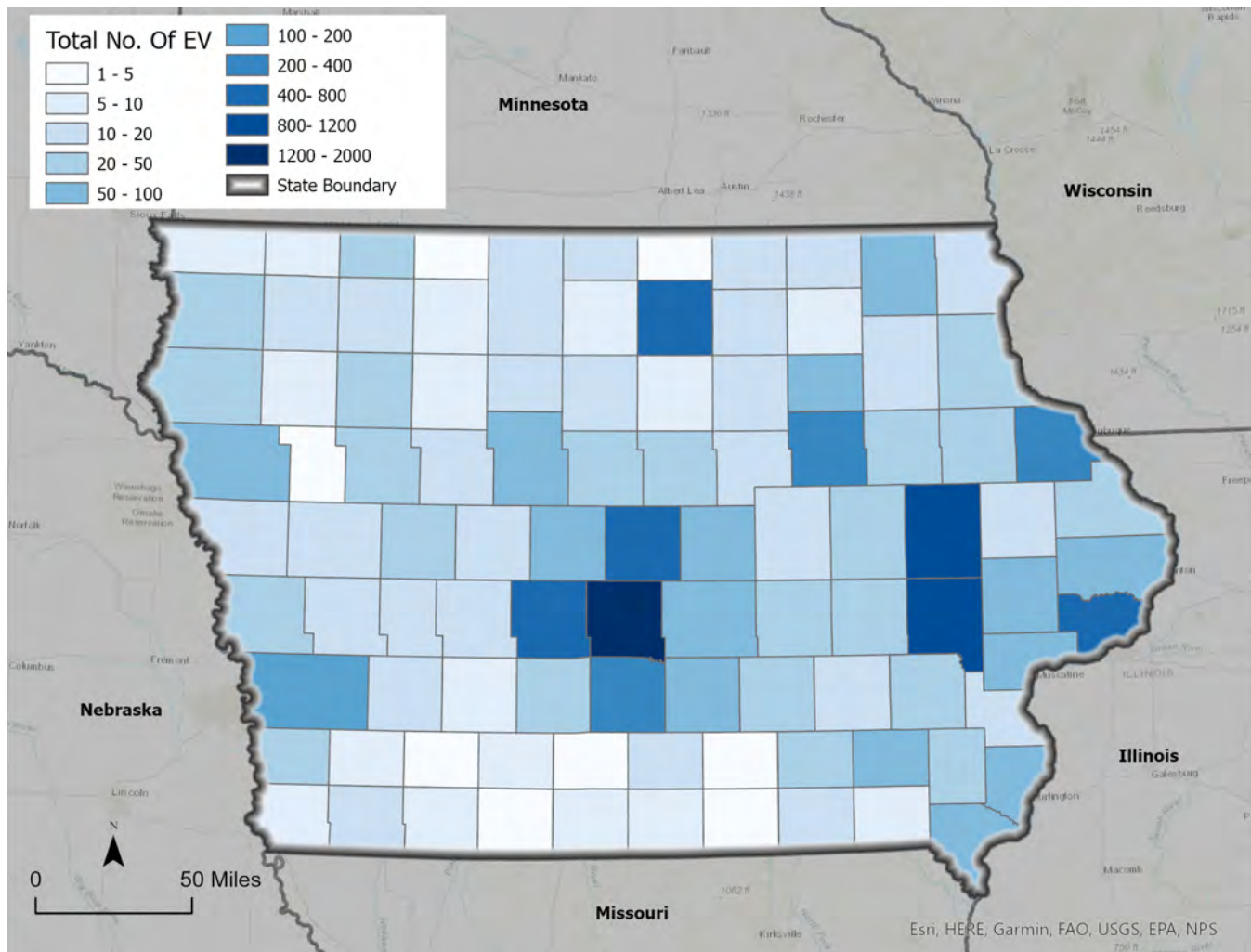
## 5.6.5 Iowa EV Ownership

In Iowa, the ownership of EVs is still emerging due to the recent growth in availability of EV models. As of March 2022, there were 9,402 renewals or first-time registrations of EVs or plug-in hybrid electric vehicles (PHEVs) in Iowa.

**Figure 11** shows the number of EVs registered in each county, indicating clusters in more populated urban areas. Iowa DOT is also investigating the rates of EV sales to understand how EV sales in Iowa compare to EV sales in other domestic markets. In 2019, there were 502 sales of battery EVs, which is 0.45 percent of the auto sales market for the state. There were 251 sales of PHEVs, representing 0.23 percent of the market. Together, that is a total of 753 sales, or 0.68 percent of that year's auto sales market in Iowa.

For the United State overall, the share of EV sales was 2.1 percent of the auto market (1.54 percent for battery EVs [BEVs] and 0.57 percent for PHEVs)<sup>28</sup>. From this information, Iowa DOT must plan for early NEVI deployments that provide primary charging benefits to travelers visiting or passing through. Iowa DOT is also monitoring this trend to identify both patterns in Iowa EV adoption and U.S. EV adoption in the initial 5-year NEVI funding cycle.

**Figure 11: Number of EVs by County as of March 2022<sup>29</sup>**



### 5.6.6 Projected EV Ownership

The EV ownership in Iowa is relatively small, but it has grown at a significant pace of between 30- and 40-percent compound annual growth from 2018 to 2022. Iowa DOT has reviewed a cross-section of national annual EV sales forecasts from both the U.S. government<sup>30</sup> and the private sector<sup>31, 32, 33</sup> between 2018 and 2030. The growth in EV sales in these forecasts grows from a few hundred thousand EVs to as high as 3.5M to 6M EVs sold each year. Iowa DOT further investigated annual growth rate trends on a per-year basis to examine potential EV ownership in the state during the planning horizon. Iowa DOT established an upper and lower bound projection for EVs as a percentage of the statewide vehicle fleet, as shown in **Figure 12**. Then, based on the projected number of vehicles statewide, an upper- and lower-bound projection was developed for the number of EVs (BEVs and PHEVs) requiring charging infrastructure, as shown in **Figure 13**. The Iowa projections anticipate between 6.9- and 13.7-percent EV fleet adoption by 2040, resulting in a range of 225,000 to 450,000 EVs owned by Iowans that would benefit from NEVI investment.

It should be noted that even though both BEV and PHEV registrations are factored into overall EV growth factors, the PHEVs are not expected to charge at DCFCs due to their small battery range and commuting use.

Figure 12: EV Ownership Percentage Forecast

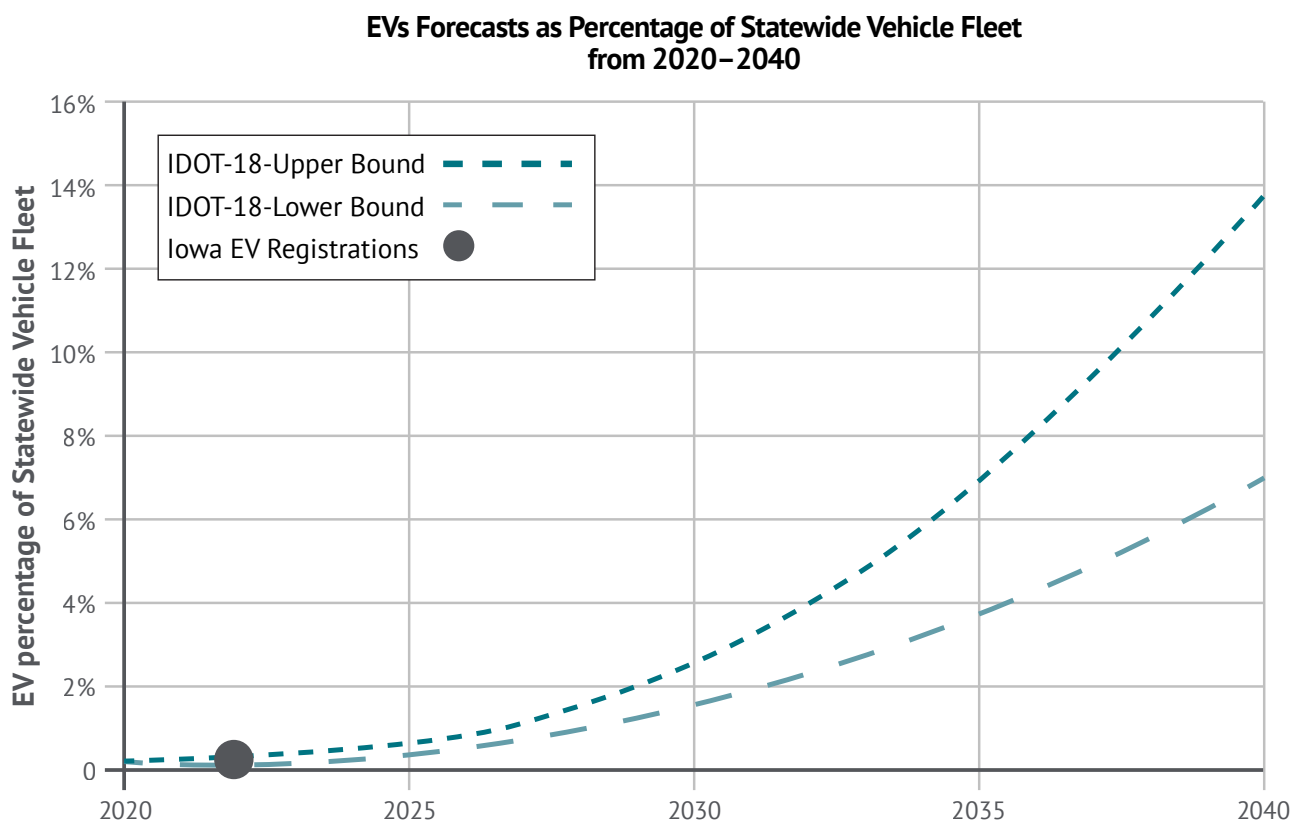
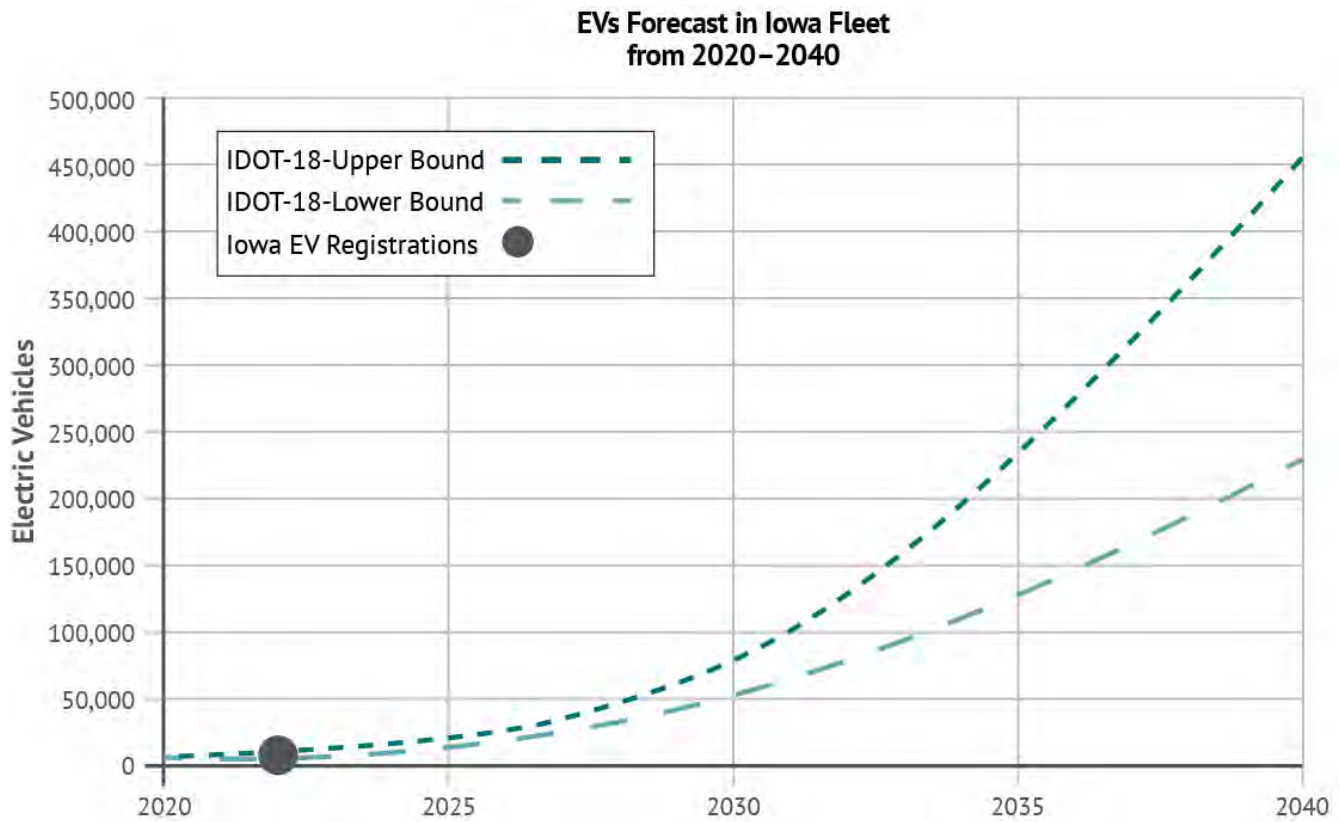




Figure 13: EV Ownership Forecast



**Table 7** was developed to numerically depict the data presented in **Figure 12** and **Figure 13** for existing and projected EVs between 2020 and 2040.

Table 7: Projected EVs on the Road in Iowa

GROWTH SCENARIO		2020	2025	2030	2035	2040
Lower	Percent of EVs	0.1	0.5	1.5	3.9	6.9
	Number of EVs	4,488	15,242	50,572	127,824	229,271
Upper	Percent of EVs	0.1	0.6	2.4	6.9	13.7
	Number of EVs	4,781	19,594	78,197	228,947	452,143

## 5.6.7 Electric Vehicle Laws and Regulations in Iowa<sup>34</sup>

### ELECTRICITY FUEL TAX

Electricity is subject to the excise tax of \$0.026 per kilowatt-hour (kWh) of fuel delivered or placed into a battery or other energy storage device of an EV at any location in Iowa other than a residence.

(Reference Iowa Code 452A.2, 452A.3, and 452A.86.)

**EV Fee** – EV owners must pay an annual fee in addition to standard registration fees. Since January 1, 2022, all-electric EV owners must pay an annual fee of \$130, and PHEV owners must pay an annual fee of \$65. (Reference Iowa Code 321.116.)

**Electricity Dealer License** – Beginning on July 1, 2023, a person may not sell or dispense electricity as a vehicle fuel at a location other than a residence or otherwise act as a licensed electricity fuel dealer or user unless the person holds a valid license issued by the IDR. To obtain a license, a person must file an application with the IDR. (Reference House File 767, 2019, and Iowa Code 452A.42.)

**Public Utility Definition** – An entity providing electricity for the purpose of EV charging is not considered to be a public utility. Regulated public utilities cannot prohibit or restrict the sale of electricity at an EV charging station. (Reference 199 Iowa Administrative Code Rule 20.20.)

**Alternative Fuel Vehicle (AFV) Conversion Registration** – When a motor vehicle is modified to use a different fuel type or more than one type of fuel, the vehicle's registered owner must notify the county treasurer of the new fuel type or alternative fuel types within 30 days. If the vehicle is able to use a special fuel, the county treasurer will issue a special fuel identification sticker. (Reference Iowa Code 321.41.)

## 5.6.8 Utility Incentives in Iowa<sup>35</sup>

**EV Infrastructure Support** – Iowa utilities joined the National Electric Highway Coalition (NEHC), committing to create a network of DCFC stations connecting major highway systems from the Atlantic Coast to the Pacific Coast of the United States. NEHC utility members agree to ensure efficient and effective fast-charging deployment plans that enable long-distance EV travel, avoiding duplication among coalition utilities, and complement existing corridor DCFC sites. For more information, see the NEHC website.

**MidAmerican Customer EV Charging Station Rebate** – MidAmerican Energy ([www.midamericanenergy.com/electric-vehicles-rebates](http://www.midamericanenergy.com/electric-vehicles-rebates)) offers commercial customers a rebate of \$1,500 for the purchase of Level 2 EV charging stations for workplace charging. For more information, see the MidAmerican Energy Electric Vehicle Rebates website.

**MidAmerican Customer EV Rebate** – MidAmerican Energy offers residential customers a rebate of \$500 for the purchase or lease of a new EV. For more information, see the MidAmerican Energy Electric Vehicle Rebates website.

**Alliant Energy Customer EV Charging Station Rebate** – Alliant Energy offers residential customers a rebate of up to \$750 for a Level 2 EV charging station. For more information, see the Alliant Energy website ([www.alliantenergy.com/cleanenergy/whatyoucando/electricvehicles/evhomechargersandrebates](http://www.alliantenergy.com/cleanenergy/whatyoucando/electricvehicles/evhomechargersandrebates)).

**Alliant Energy Commercial EV Rebate** – Alliant Energy offers commercial customers a rebate of up to \$1,500 for a Level 2 EV charging station at community, business, or multifamily housing locations. For more information, see the Alliant Energy website [Alliant Energy - Community, Business, and Multifamily EV Charging Stations](http://www.alliantenergy.com/cleanenergy/whatyoucando/electricvehicles/evhomechargersandrebates)

Electrical customers of municipal electrical utilities and RECs may qualify for an incentive from their utility and should contact them to inquire.

## 5.7 Known Risks and Challenges to EV Deployment

### 5.7.1 Barriers to EV Infrastructure Deployment

#### » Limited Utility Infrastructure

- This is a concern for supplying the day-to-day charging needs of EVs.
- These areas may not have easy access to the three-phase power required by DCFC.

#### » Utility Demand Charges

- Some rate structures are not friendly for high-power, low-utilization loads like a DCFC station. A high demand spread over multiple charging sessions decreases the peak demand charge among all users
- While EV adoption is low, utilization will also be low, and costs to provide the required power levels for charging sessions 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

- These areas may have a small number of EVs, but higher volumes of pass-through EV traffic.

#### » Costs – DCFC stations are more expensive than other charging stations.

#### » Regulatory

- Local zoning codes and permitting may not address, or easily accommodate, the stations.
- Easements will be needed for extension of utilities and siting of the charging stations. There may be negotiations among the property owners and station operators about rights and responsibilities related to the station.

#### » Locating

- Charging stations may need to be covered to protect users from weather elements, adding cost.
- When locating in existing parking lots, property and business owners may be resistant to dedicating parking to only EVs rather than keeping spots open for any type of vehicle.

#### » Maintenance

- Snowfall will require hand shoveling around the charging stations, which is staff intensive and may not be prioritized over other shoveling needs.
- Stations may be hit and damaged by snowplows.
- Stations may be vandalized and require increased security.

#### » Workforce

- Availability of skilled EV and charger maintenance personnel.

### 5.7.2 Barriers to EV Adoption

» **Lack of Charging Infrastructure** – There is a concern of getting stranded due to lack of infrastructure or faulty infrastructure. As new NEVI charging stations are installed, this barrier will be alleviated for long-range travel. However, some smaller towns will still lack local charging infrastructure.

» **Range Anxiety** – People are concerned that EVs cannot travel very far and will need to stop frequently for recharging, which will negatively impact their travel plans.

» **Long Recharge Times** – People are hesitant to purchase EVs due to the time needed to recharge the battery. NEVI-complaint infrastructure will include DCFC stations, with 150-kW minimum power to alleviate this concern, but the recharge time for an EV will still be three to four times as long as what it takes to refill a vehicle with gasoline.

» **EV Purchase Cost** – The cost of EVs and limited availability on the used car market may be a barrier to many households. Further, the high cost to enter the market may also deter those who feel it is affordable since it may be difficult to recoup their losses if they decide that they do not like the vehicle and want to return to gas-powered transportation.

» **At-Home Charging** – The need for at-home charging is a barrier for those living in multifamily housing that does not offer charging infrastructure.

» **Maintenance Resources** – The issue of maintenance as a barrier is twofold: 1) The availability of nearby, reliable automobile shops with expertise in EVs may be limited in rural areas. 2) Many drivers maintain their own vehicles and will be hesitant to maintain a new type of propulsion system.

- » **Weather Concerns** – There is a significant negative impact on the battery in cold temperatures, which reduces the travel range. This is also a disadvantage to people who do not have access to a garage for winter parking and charging.
- » **Power Outages** – There may be a concern of widespread and/or long-lasting power outages that ultimately strand EV owners due to the inability to charge their vehicles. Additionally, concerns are repeatedly raised about whether the electrical grid can handle the increased load of widespread EV adoption, and how that could impact power availability in their communities.
- » **Battery Concerns** – Some consumers are concerned about the production and disposal of an EV battery. This may include concerns that the original manufacture of the battery is not sustainable and causes environmental harm, or that extraction of minerals negatively impacts community health or violates human rights. Further, there may be concern about disposal of the battery at the end of its useful life, such that disposal harms the environment.<sup>36</sup>
- » **Additional Trip Planning** – Many consumers will not want to make the additional effort to plan their routes and stops for long-distance travel.
- » **Too Quiet** – EVs are perceived as being very quiet while in operation due to the lack of a combustion engine. While this may be a perk to many users, it may also be a concern to others. Other roadway users may not hear the EV approaching, and therefore may be more likely to be caught in the EV's path of travel. The National Highway Traffic Safety Administration (NHTSA) requires that EVs manufactured after September 2020 make warning sounds when traveling up to 30 kilometers per hour (kph) (18.6 miles per hour [mph]), and when going in reverse.<sup>37</sup>

# CHAPTER 6

## EV Charging Infrastructure Deployment

### 6.1 Introduction

The foundation for charging station infrastructure within Iowa has been laid by private industry installing charging stations across the state. However, much of this infrastructure is not near Iowa's interstate system, and many of the stations that exist today are not compliant with NEVI guidelines.

This chapter describes the state of Iowa's approach to deploying NEVI-compliant charging infrastructure. This discussion focuses on existing infrastructure, and where corridor gaps remain. While there are a few locations that may already be NEVI compliant, many sites may either need to be upgraded or have new sites established to build out NEVI-compliant corridors. This chapter also details the methodology used by Iowa DOT to identify potentially suitable charging areas along the state's interstate system, and the approach used to prioritize a build-out of charging infrastructure along the corridors. The chapter also provides a longer-term forecast of peak energy grid and charging site utilization that will help guide further investment of available NEVI funds that are 3 or more years from the time of this analysis.



To meet the vision and goals of this plan, an overarching strategy for installing EV charging infrastructure along Iowa's AFCs is needed. The strategy approach adopted by Iowa DOT to meet this plan's vision and goals prioritizes a build-out of NEVI-compliant infrastructure along the interstate highway system.

### 6.2 Iowa EV Charging Infrastructure Policy

In accordance with NEVI guidance, Iowa DOT will utilize processes to confirm that projects using NEVI funds meet the eligibility requirements identified in FHWA guidance and the BIL. Iowa DOT will craft an approach to individual project and program oversight that confirms EV charging infrastructure deployments are consistent with federal guidance. The minimum standards and requirements for NEVI projects include the following:

- » Projects will adhere to Chapter 1 of Title 23, United States Code (U.S.C. 2 Code of Federal Regulations [CFR] Part 200, 23 U.S.C. 109[s][2]), which cover federal-aid highway requirements; Americans with Disabilities Act (ADA), Title VI of the Civil Rights Act and Title VIII of the Civil Rights Act; Uniform Relocation Act Assistance and Real Property Acquisition Act (URA); and the National Environmental Policy Act (NEPA). Details of the Iowa DOT approach to civil rights and equity are further described in Chapters 8 and 9.
- » EV site charging projects will be included in the relevant Statewide Transportation Improvement Program (STIP)/Transportation Improvement Program (TIP) and long-range plans.
- » EV site charging projects will meet state and federal environmental requirements, such as compliance with NEPA.
- » EV charging equipment, network, interoperability, traffic-control devices, charging network connectivity, and other standards will meet the applicable minimum standards described in the Proposed Rule 87 Federal Register (FR) 37262 on the NEVI program.

## 6.3 Iowa EV Charging Infrastructure Strategy

The approach for deploying EV charging infrastructure within Iowa is grounded in the network that exists today. Use of existing NEVI-compliant charging sites will maximize past investments, thereby allowing greater levels of investment in sites positioned for upgrading to be NEVI-compliant and sites at which no charging infrastructure exists today. The plan emphasizes allocation of NEVI funding to locations that will not be a natural draw for private investment, specifically sites that limit range anxiety associated with long-distance travel and provide coverage in Iowa's rural areas.

This section discusses the location of Iowa's existing charging sites, calling out those sites currently in compliance with NEVI guidelines, as well as noncompliant sites that could be targeted for investment. Corridor gap areas in which little or no charging-related infrastructure is found are also discussed.

### 6.3.1 Existing NEVI-Compliant Charging Sites

There are currently three existing charging sites that are NEVI compliant, with a minimum of four 150-kW charging stations located within 1 mi of the AFC. All three of these sites are located along I-80, and all three sites are currently operated by Electrify America. In addition, the site located in Council Bluffs is also within 1 mi of I-29. The three NEVI-compliant stations are shown in **Table 8**, and are also represented by the yellow star locations shown in **Figure 14**.

**Table 8: NEVI-Compliant Charging Stations**

ID	STATION NAME	LOCATION	ROUTE (NOTE AFC)	EV DCFC COUNT	EV NETWORK
170333	Casey's Williamsburg #2	Williamsburg	I-80	4	EA
190421	Waukee Kum & Go 540	Waukee	I-80	4	EA
190434	Walmart 1965 Council Bluffs	Council Bluffs	I-80/I-29	4	EA

### 6.3.2 Existing Upgradable Charging Sites

In addition to the NEVI-compliant sites, there are also 100 DCFCs installed at 54 sites throughout Iowa. Of these 54 locations, 29 sites (57 chargers) are located along existing AFCs. Each of the non-NEVI-compliant sites contains one to two DCFCs, and the charger size may not meet the minimum 150-kW charger size requirement. These 29 locations, summarized in **Table 9**, would need some upgrades if they were to meet NEVI requirements. Iowa DOT is not requiring or advocating that these stations be upgraded, but it may be more economical to upgrade some sites due to the existing infrastructure already in place. The non-NEVI-compliant sites are operated either by Greenlots or ChargePoint.

After the completion of this annual plan, Iowa DOT will further develop a strategy for upgradable sites to qualify for NEVI funds through methods described in Chapter 4, Contracting.

The non-NEVI-compliant sites are shown as red squares in **Figure 14**. Because of the proximity of some sites to nearby sites and the overall map scale, some charging sites may not be distinctly represented.



Table 9: Non-NEVI-Compliant Charging Stations Along AFCs

ID	STATION NAME	LOCATION	ROUTE (NOTE AFC)	EV DCFC COUNT	EV NETWORK
143245	Big Barn HD DCFC HOG	Des Moines	I-80/I-35	1	CPN
163622	Waterloo Hy-Vee	Waterloo	I-380	2	GRN
163833	Avoca Casey's	Avoca	I-80	2	GRN
164247	De Soto Kum & Go	De Soto	I-80	1	GRN
164828	Altoona Fast and Fresh	Altoona	I-80	2	GRN
167380	Altoona Casey's	Altoona	I-80	2	GRN
168150	Sioux City Kum & Go	Sioux City	I-29	2	GRN
169874	Kum & Go Northwood DCFC 2	Northwood	I-35	1	CPN
170114	Kum & Go Coralville DCFC 2	Coralville	I-80	1	CPN
170906	Ankeny	Ankeny	I-35	2	GRN
181823	Kum & Go Northwood DCFC1	Northwood	I-35	1	CPN
181929	Kum & Go Coralville DCFC 1	Coralville	I-80	1	CPN
187862	Iowa 80 Truckstop DCFC 1	Walcott	I-80	1	CPN
187871	Iowa 80 Truckstop DCFC 2	Walcott	I-80	1	CPN
189949	Phillips 66 Station 1	Iowa City	I-80	1	CPN
189950	Phillips 66 Station 2	Iowa City	I-80	1	CPN
192879	Ames EV DCFC 1	Ames	I-35	1	CPN
192880	Ames Ev DCFC 2	Ames	I-35	1	CPN
202969	Polk City Kum & Go	Polk City	I-35	2	GRN
203354	Colfax Kum & Go	Colfax	I-80	2	GRN
204685	Council Bluffs Hy-Vee	Council Bluffs	I-29	2	GRN
204686	Johnston Hy-Vee	Johnston	I-80/I-35	2	GRN
205882	Bevington Kum & Go	Bevington	I-35	2	GRN
206157	Sckia Sckia 1 Abb	Sioux City	I-29	1	CPN
206713	West Des Moines Hy-Vee	West Des Moines	I-35	2	GRN
206752	Bettendorf Twin Span	Bettendorf	I-80	2	GRN
207188	Iowa River Landing	Coralville	I-80	2	GRN
207958	Grimes Hy-Vee	Grimes	I-35	2	GRN
213908	Urbandale Kum & Go	Urbandale	I-35	2	GRN

# IOWA'S EVIDP

Iowa also has 12 DCFC sites in development with committed funding. Out of that group of programmed sites, six of the DCFC sites were approved for VW settlement funding on June 24, 2022, and are currently entering implementation with scheduled startup by December 2023. Of these 12 DCFC locations, six stations are located along existing AFCs, and are therefore included as part of the analysis of AFCs for EV infrastructure deployment. These charging locations are shown in **Table 10**.

The sites currently approved for construction are shown as orange circles in **Figure 14**. Because of the proximity of some sites to nearby sites and the overall map scale, some charging sites may not be distinctly represented.

**Table 10: Planned DCFC Sites Along AFCs**

STATION NAME	LOCATION	ROUTE (NOTE AFC)	EV DC FAST COUNT
Kum & Go Clear Lake	Clear Lake	I-35	2
Kum & Go Ellsworth	Ellsworth	I-35	2
Kum & Go New Virginia	New Virginia	I-35	2
Kum & Go Stuart	Stuart	I-80	2
Equilon Enterprises (Shell)	Missouri Valley	I-29	4
Equilon Enterprises (Shell)	Council Bluffs	I-29	4

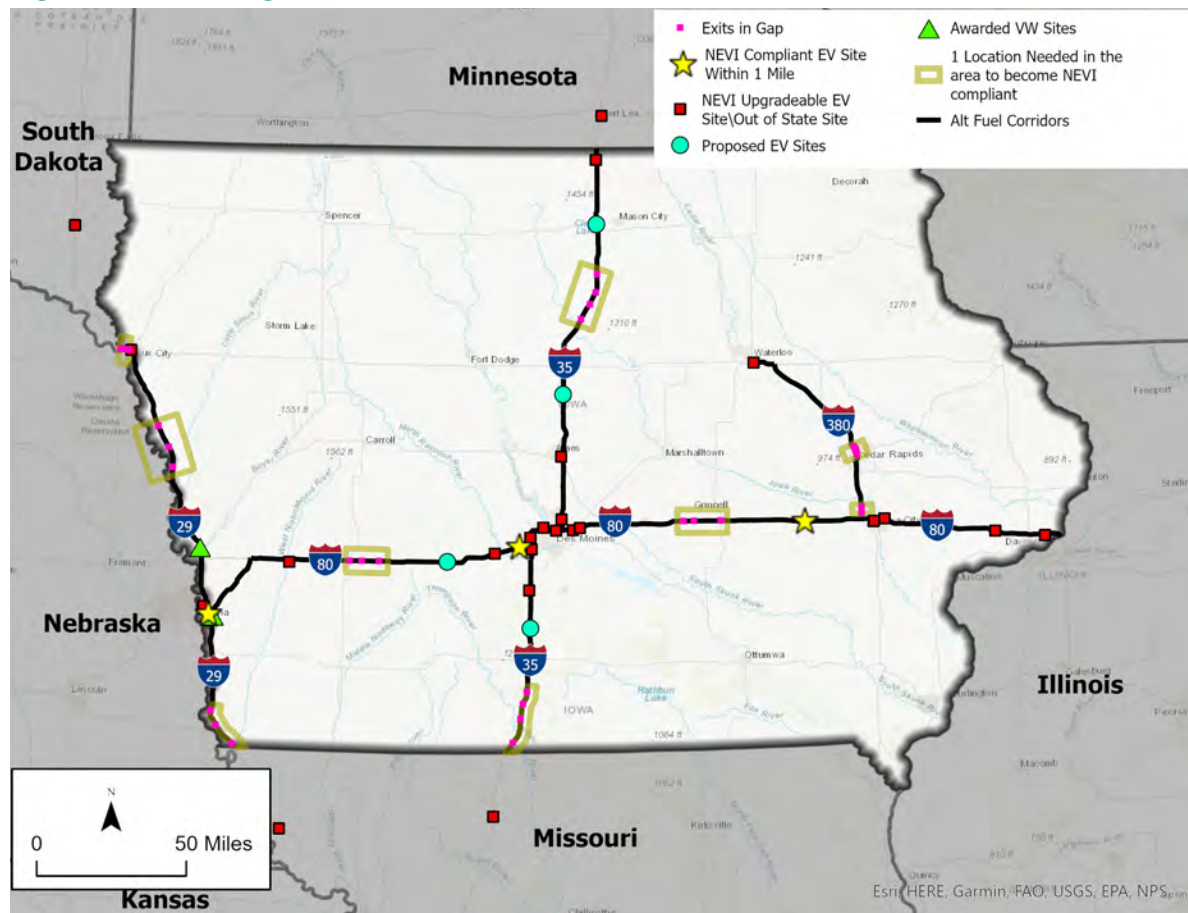
**Figure 14: Iowa's Existing DC Fast-Charging Sites Along AFCs**



### 6.3.3 Corridor Gap Areas

Addressing corridor gap areas is a focus for Iowa DOT in building out the statewide charging network. The identification of sites in these gap areas builds off the existing charging site analysis, identifying interstate exits beyond 50 mi from existing sites that could be targeted for the installation of NEVI-compliant charging infrastructure. These gap areas are shown in **Figure 15**. It is noted that specific exits are not called out in these gap areas, but rather a collection of exits for each gap area is identified. The purpose of identifying several exits within a gap area allows for further review of each individual exit's suitability and priority for investment in charging infrastructure.

Figure 15: Existing Gap Sites



#### I-80 GAP AREAS

Gap areas were identified along the I-80 corridor, both east and west of I-35. The eastern gap area spans three interstate exits in Jasper and Poweshiek counties between the cities of Newton and Grinnell. These are eastbound/westbound at Exits 179, 182, and 191.

The western I-80 gap area also spans three interstate exits located in Cass County. These are eastbound/westbound at Exits 60, 64, and 70.

#### I-35 GAP AREAS

Gap areas along I-35 were identified along the corridor both north and south of I-80. The gap area located on the northern portion of I-35 highlights four interstate exits located in Franklin County. These are northbound/southbound at Exits 159, 165, 170, and 176.

The southern I-35 gap area begins at Iowa's border with Missouri and applies only to the northbound direction of travel. Northbound travelers within this gap area would be more than 50 miles from the nearest proposed NEVI-compliant station on I-35 in Missouri. In addition to filling a northbound direction gap, a new station in this area benefits southbound travelers as well. The four exits associated with this gap area are in Decatur County, and include Exits 4, 12, 18, and 22.

## I-29 GAP AREAS

Three gap areas were identified along I-29. The southern I-29 gap area begins at Iowa's border with Missouri and applies only to the northbound direction of travel. Northbound travelers within this gap area would be more than 50 miles from the nearest proposed NEVI-compliant station on I-29 in Missouri. In addition to filling a northbound direction gap, a new station in this area benefits southbound travelers as well. The three exits associated with this gap area are in Fremont County and include Exits 1, 10, and 15.

A second gap area for both northbound and southbound travelers was identified along I-29 in Monona County that spans three exits. These include Exits 105, 112, and 120.

The third gap area along I-29 is in Sioux City, near Iowa's border with South Dakota. Like the gap sites located near Iowa's border with Missouri, there is a lack of NEVI-compliant charging infrastructure in South Dakota that is within 50 mi of these exits. The three exits identified within this gap site are Exits 147, 149, and 152. This gap site includes both directions of travel.

## I-380 GAP AREAS

I-380 had two gap areas identified. The first is located at the southern terminus of this corridor in Johnston County. Constructing a station at the corridor's southern limit provides up to 50 miles of NEVI-compliant coverage for the northbound direction of travel and benefits southbound travelers. The exits associated with the I-380 gap area are Exits 2 and 4.

## 6.4 Funding Sources

Iowa DOT will receive a total of \$51,374,369 in NEVI funds during the 5-year period from federal FY22 to FY26. The FY22 amount of \$7,604,168 has been appropriated and is shown in **Table 11**. The minimum 20-percent nonfederal match is also shown, which results in a total of \$9.5M for federal FY22. Estimates have been made for the remaining years to support planning and programming decisions. The total NEVI funding plus the minimum 20-percent match totals \$64.3M for the 5 years. If a larger nonfederal match can be secured, that amount could increase.

NEVI guidance requires states to build out AFCs and have them certified before they can use the NEVI formula funds "off corridor." They also require that states prioritize interstates in the identification of AFCs and expenditure of NEVI formula funds. However, once NEVI criteria are met, states can deploy stations on other critical corridors.

Iowa DOT has evaluated long-distance travel patterns within the state. The analysis confirmed that I-80, I-35, I-29, and I-380 are all important corridors for long-distance trips in, and through, the state. The four interstates make up almost all of Iowa's EV AFC network and the initial focus of the state's NEVI charger build-out.

**Table 11: NEVI Formula Funds and Matching Funds (Millions)**

FEDERAL FISCAL YEAR	FORECASTED NEVI FUNDS (80%)	MINIMUM NON-FEDERAL MATCH FUNDS (MIN 20%)	TOTAL (100%)
2022	\$7.6	\$1.9	\$9.5
2023	\$10.95	\$2.75	\$13.7
2024	\$10.95	\$2.75	\$13.7
2025	\$10.95	\$2.75	\$13.7
2026	\$10.95	\$2.75	\$13.7
<b>Total (5 Year)</b>	<b>\$51.4</b>	<b>\$12.9</b>	<b>\$64.3</b>

Based on this work in EV charging infrastructure strategy, the first 2 to 3 years of funding are expected to be primarily dedicated to installing DCFC infrastructure on the AFC corridors. However, starting in FY24, Iowa DOT expects to have fully built out the AFC system and will explore investments in other areas and corridors to support EV travel in Iowa. Future plan updates will specify the locations and costs of EV charging infrastructure and other NEVI allowable expenditures in each fiscal year. The breakdown of funding availability by year is indicated in **Table 12**, highlighting the overall funding per year from federal and local sources.

Iowa DOT has a general strategy for maximizing federal NEVI program dollars over 5 years with the minimum nonfederal match. As described in Chapter 4, Contracting Mechanisms, Iowa DOT's principles for the use of NEVI funds will use private funds, to the extent practical, and will arrange for contract partners to own, operate, and maintain charger, supporting infrastructure, station sites, and site improvements.

## 6.5 Infrastructure Deployments/Upgrades (2022-26)

Iowa DOT will continue to detail its plans for NEVI infrastructure projects beyond the current NEVI planning cycle. The approach to maximize the NEVI fund value will include factors enumerated in an anticipated future competitive solicitation, but they will, at a minimum, consider two elements – the suitability of a site and the priority of a site for targeting investment.

### 6.5.1 Suitability and Prioritization Approach

Iowa DOT developed a series of criteria for assessing the suitability and priority of interchange locations along Iowa's interstate system to guide investment proposals to best achieve Iowa's priorities. The criteria selected for this process are weighted in terms of location suitability and priority, so that composite suitability/priority scoring can be developed for evaluating each site.

### 6.5.2 Site Suitability

Consideration of a site's suitability looks at the location's quality in meeting the needs of EV users, while positively contributing to sustainable site ownership and power delivery functions. In essence, the suitability of a site is dependent on that location's ability to connect to the existing power grid, while attracting traffic levels that provide economic sustainability.

An example of an existing suitable site is Exit 118 along I-80 within the city of Waukee. The suitability of this site is evident, as NEVI-compliant charging infrastructure has already been installed, which highlights that the site can receive the proper level of power required of NEVI-compliant charging infrastructure. Supplementing the site's power capacity is the high number of long-distance trips that occur along I-80 at this location, and the high cross-street average daily traffic volumes at this exit. The ability of this site to satisfy these criteria, along with the fact that a NEVI-compliant site has been built here through private investment, demonstrates its high suitability.

### 6.5.3 Site Priority

Consideration of a site's priority looks at the location's importance in delivering an equitable provision, construction, and ownership of charging service, while providing EV users with predictable opportunities for charging their vehicles. A major element of site priority is the emphasis to fund construction of NEVI-compliant sites that limit range anxiety for long-distance and rural travel.

The priority criteria are important for identifying potential sites in rural areas that fill gaps in the existing DCFC network. Providing accessible charging infrastructure to underserved areas throughout Iowa is another aim of the site priority criteria.

It is noted that the suitability and priority analysis applies only to upgradable sites or new charger sites installed to fill a gap. The composite suitability and composite priority are reported for each exit statewide, though future competitive solicitations anticipate limiting the scope of exits eligible for NEVI funding. The suitability and priority criteria rankings are shown in **Table 12**. Descriptions of these criteria are discussed in the following.



Table 12: Suitability and Priority Criteria

CRITERIA	SUITABILITY WEIGHT	PRIORITY WEIGHT
Distance From Existing NEVI-Compliant Charging Stations	10	0
Distance From All Existing DCFC Charging Stations	0	10
Daily Long-Distance Trips	10	10
Cross-Street Average Daily Traffic	3	7
Miles Covered – Two- and Three-Digit Interstates	7	10
Distance from Three-Phase Power Source	3	0
Maximum Voltage of Nearest Power Source	3	0
Number of Substations Within 2 Mi	3	0
Amenities	5	3
Urban vs. Rural	0	10
Disadvantaged Communities/Justice40	0	10
<b>Total</b>	<b>44</b>	<b>60</b>

## 6.5.4 Criteria Descriptions and Weighting

### DISTANCE FROM EXISTING NEVI-COMPLIANT CHARGING STATIONS

NEVI-compliant stations are charging locations with at least four ports capable of each supplying 150 kW at the same time. These locations must be located within 1 mi of the corridor. The NEVI requirements are for stations to all be located within 50 mi of one another along charging corridors. Since the charging network will only be considered fully built out based on NEVI-compliant stations, these are the only stations that have an impact on whether a site is suitable or not. The presence of a noncompliant charging site does not make a location less suitable based on NEVI requirements.

#### SCORING

To fill the charging gaps and introduce new NEVI-compliant stations to areas that do not currently have any, scoring for this criterion is more dependent on the distance from the existing NEVI-compliant stations. Those locations that are farther from an existing NEVI-compliant site will score higher than those that are located nearer to a site. The scoring is shown in **Table 13**.

Table 13: Scoring Criterion for Existing NEVI-Compliant Station Proximity

SCORE <i>raw</i>	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
100.4 – 150.5	0.9
150.5+	1.0

#### WEIGHTING

As shown in **Table 12**, this criterion is only applicable to the Suitability weighting and is not applicable to the Priority weighting. The Suitability weighting for this criterion rates high, with a total weight of 10 out of 44.



## DISTANCE FROM ALL EXISTING DCFC CHARGING STATIONS

The location of any publicly accessible DCFC stations, regardless of charger quantity or size, affects which locations should have the highest priority for installing new chargers. Even though these stations may not meet NEVI compliance, they are still usable chargers that provide some level of support for long-distance travel on the highway system. Locations that are far away from any other chargers should be given a higher priority, so that the network is more usable even before full NEVI compliance is reached. For consideration for this criterion, chargers must be publicly accessible, use standard protocols, and be a minimum of 50 kW.

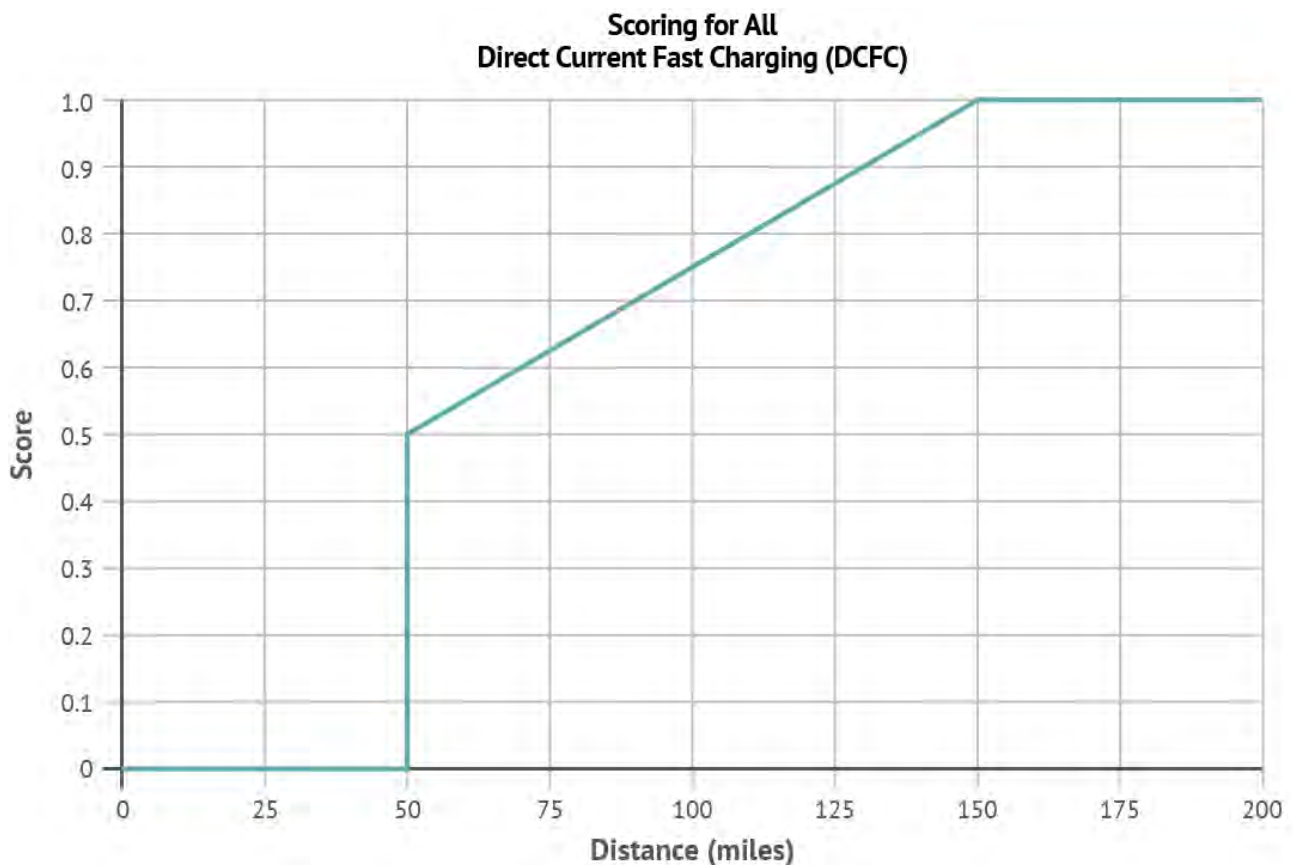
### SCORING

Sites must be at least 50 mi away from the nearest charger before they get a score for this metric. There is a discontinuity at this point where the score jumps. The score then increases linearly up to the maximum value of 1 at 150 mi, and then is capped. A graph of the score, and the formula for determining the score, is shown in **Figure 16**.

### WEIGHTING

This criterion is only applicable to the Priority weighting and is not applicable to the Suitability weighting. The Priority weighting for this criterion rates high, with a total weight of 10 out of 60.

**Figure 16: All Existing DCFC Charging Station Scoring**



$$score = MAX \left( 0, MIN \left( 1, \frac{distance - 50}{200} \right) \right) + \begin{cases} 0, & distance < 50 \\ 0.5, & distance \geq 50 \end{cases}$$

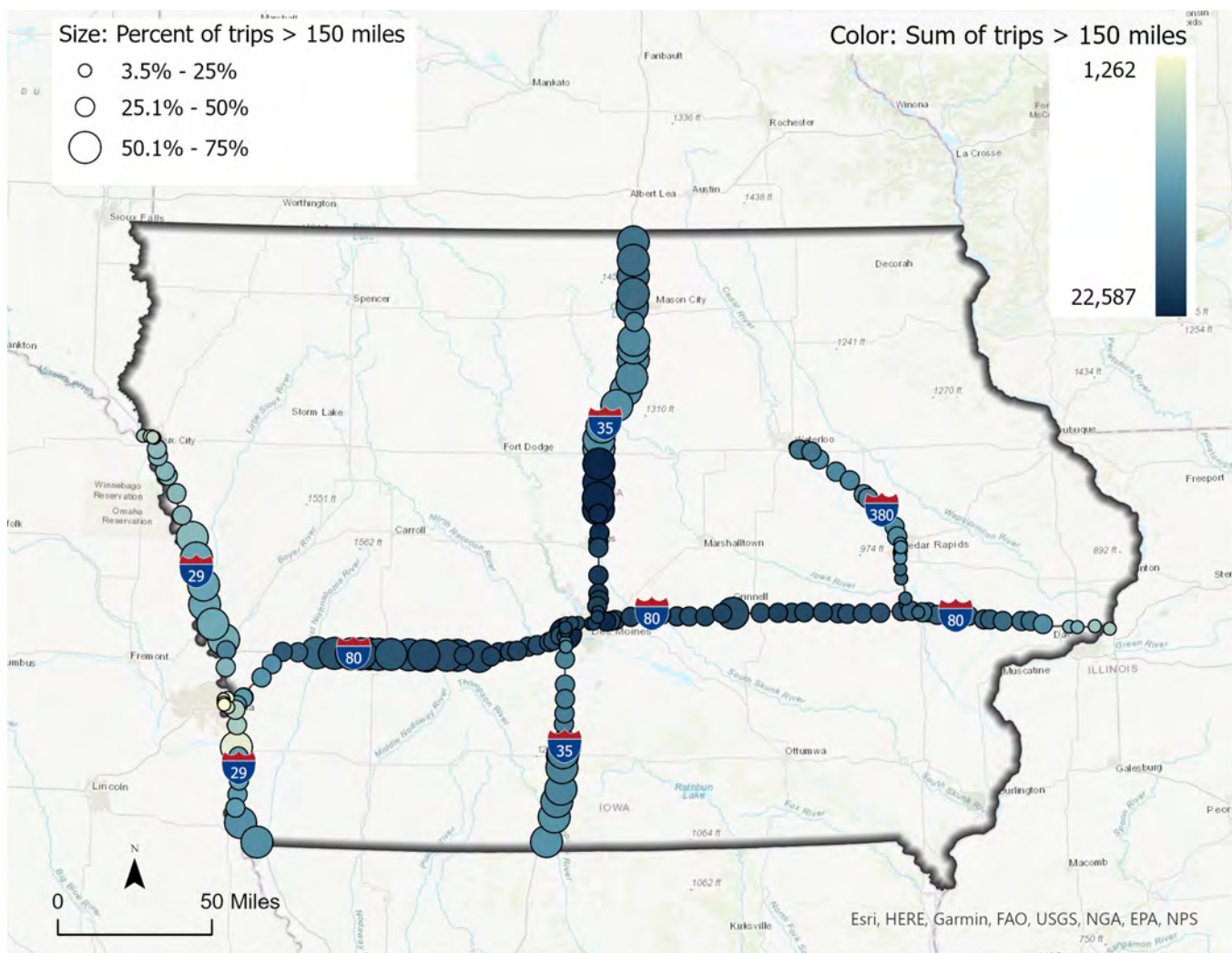
## DAILY LONG-DISTANCE TRIPS

The majority of EV charging takes place at home, where lower electricity costs make it more economical to recharge a battery than at a DCFC station. DCFC stations along the highway should be expected to be used primarily by travelers when other charging methods are not an option and speed is of the essence.

The probability that an EV will need to stop and use a charging station is dependent on several factors. One of these factors is the range that the EV is capable of traveling. An EV with a 150-mi range is more likely to stop and charge than an EV with a 300-mi range. Another factor that will influence whether an EV will stop to charge is how far they have traveled. Even a long-range EV will be required to stop if the length of the trip goes beyond the range of the vehicle.

A model of vehicle traffic, including trip origin and destination details, was used to count the number of trips passing each roadway segment each day, and put them into buckets based on the overall trip length. The buckets are zero to 50 mi, 50 to 100 mi, 100 to 150 mi, 150 to 200 mi, 200 to 250 mi, and more than 250 mi. These data are used to provide information on how many long-distance trips there are at a given location (**Figure 17**).

**Figure 17: Daily Long-Distance Trips**



## SCORING

Because different models of EVs have different ranges of travel, it is not possible to use a single number for the cutoff of a long-distance trip in which a vehicle will need to stop and charge. Instead, the probability of needing to stop was applied for each range bucket. The probability for each bucket at any given location was then summed to determine the overall raw score to get an aggregate count of the total number of vehicles expected to charge passing by that location. The probabilities are presented in **Table 14**.

**Table 14: Long-Distance Travel Charge Probability**

BUCKET	CHARGE PROBABILITY
0 – 50.4 mi	0%
50.5 – 100.4 mi	10%
100.5 – 150.4 mi	50%
150.5 – 200.4 mi	85%
200.5 – 250.4 mi	95%
250.5 + mi	100%

$score_{raw} = \#_{50-100} 10\% + \#_{100-150} 50\% + \#_{150-200} 85\% + \#_{200-250} 95\% + \#_{250+}$

It should not be assumed that every one of these vehicles will stop and use the charger. Since NEVI requirements place a charger every 50 mi, and vehicles have ranges that are much longer than 50 mi, even vehicles that need to use a charger will not stop at every charger they pass. The raw score is normalized to the range of zero to 1, according to **Table 15**.

**Table 15: Scoring Criterion for Daily Long-Distance Trips**

SCORE <sub>raw</sub>	SCORE
0 – 4,999 stops	0
5,000 – 9,999 stops	0.3
10,000 – 15,999 stops	0.75
16,000 – 20,999 stops	0.9
21,000+ stops	1

**Note:** A typical EV in the future is expected to have a range of around 300 mi. There is, however, an upper and lower limit to how much of the battery capacity a driver will utilize. Because of range anxiety, drivers are expected to stop at somewhere around 20 to 30 percent of battery capacity. Because of the limitation on charging speed, drivers are likely to stop charging and resume their trip when they reach about 80 percent of battery capacity. This means that about half the total range is available for use during long-distance travel. An average range of 300 mi means that EVs will need to stop to charge about once every 150 mi. With stations spaced at 50-mi intervals, it should be expected that only about one out of three vehicles that need roadside charging will stop at any given location.

## WEIGHTING

This criterion is applicable to both the Suitability and Priority weighting. The Suitability weighting for this criterion rates high, with a total weight of 10 out of 44. The Priority weighting for this criterion rates high with a total weight of 10 out of 60.

## CROSS-STREET AVERAGE DAILY TRAFFIC

Highway travelers are not the only vehicles that may utilize DCFC infrastructure. While it is much less likely for off-highway traffic to require access to a charger, it is advantageous to have chargers available where there is the highest amount of overall traffic present. This metric considers the AADT volumes of the roads that are accessible from the exit at which the charging station is located. **Figure 18** depicts the intersecting AADT volumes for Iowa's interstate exits.

**Figure 18: Cross-Street Average Daily Traffic**



### SCORING

Cross-street roadways with higher AADT score higher than those with lower AADT. The scoring for each AADT is shown in **Table 16**.

### WEIGHTING

Under this analysis, the cross-street average daily traffic is given a lower weight than long-distance trips. This criterion is applicable to both the Suitability and Priority weighting. The Suitability weighting for this criterion rates low with a total weight of 3 out of 44. The Priority weighting for this criterion rates medium with a total weight of 7 out of 60.

**Table 16: Cross-Street Average Daily Traffic Scoring**

CROSS STREET ADT	SCORE
0 – 3,520	0.2
3,521 – 10,500	0.5
10,501 – 22,790	0.7
22,791 – 42,600	0.9
42,601+	1

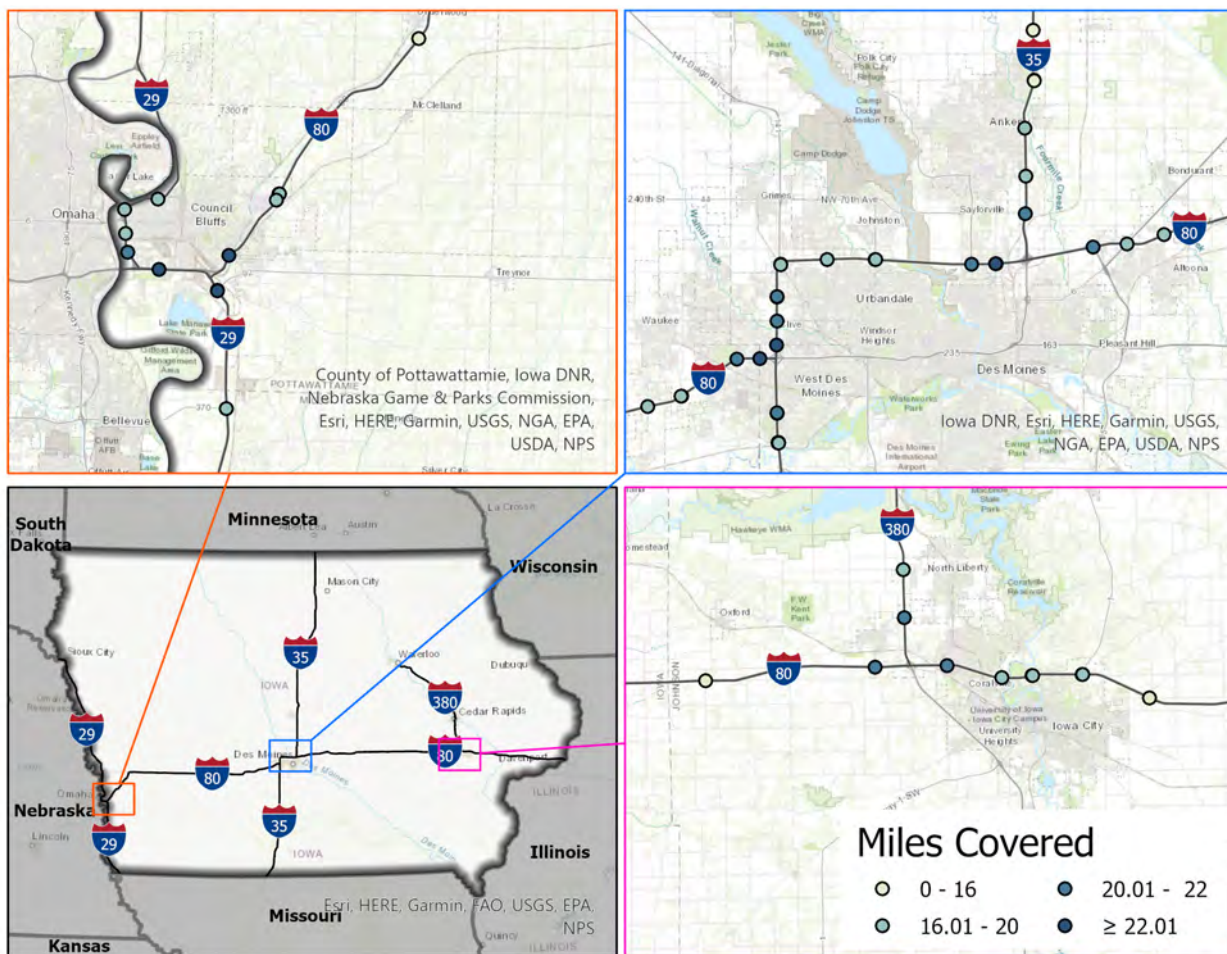


## MILES COVERED – TWO- AND THREE-DIGIT INTERSTATES

Even when a site is too far from a corridor to count as a covered site under the NEVI requirements, it is still beneficial to have a charging station closer to as many miles of roadway as possible instead of far away. This is captured by measuring the total number of miles covered on two-digit and three-digit interstates that are within 8 mi of the site. Eight mi is approximately a 15-minute detour off the interstate, and would still be considered reasonable for most drivers.

A site that is near the intersection of roads of this type will cover more total miles and is more likely to cover multiple corridors with a single charging site. **Figure 19** depicts the miles covered for the existing applicable interstate exits.

**Figure 19: Miles Covered**



### SCORING

Those exits that have higher distance for multiple roadway miles covered score higher than those with lower miles covered. The scoring for miles covered is shown in **Table 17**.

### WEIGHTING

This criterion is applicable to both the Suitability and Priority weighting. The Suitability weighting for this criterion rates medium with a total weight of 7 out of 44. The Priority weighting for this criterion rates high with a total weight of 10 out of 60.

**Table 17: Miles Covered Scoring**

DISTANCE	SCORE
0 – 16.00 mi	0
16.01 – 20.00 mi	0.6
20.01 – 22.00 mi	0.9
≥ 22.01 mi	1



## AVAILABILITY OF THREE-PHASE POWER SOURCE

Three-phase power is required for a DCFC site. At the power level required to feed four NEVI-compliant chargers, power would need supplied from a nearby distribution line. This has a significant impact on site suitability due to the high costs to bring power a long distance to a new site. A desktop review of available three-phase power was completed via Google Earth, including Street View, for this study to assess if viable power is likely to be available near interstate exits. The presence and capacity of power must be confirmed by the local utility prior to site selection. In many cases, multiple power providers may be located within one mi of the exit. The results of the desktop review are shown in **Figure 20**.

**Figure 20: Three-Phase Power Availability**



## SCORING

The availability of three-phase power was assessed by the proximity of power to an area. This analysis did not include the utility's ability to serve the projected load at this stage, so this needs further review prior to selecting and developing a charging site. A site was determined to have three-phase power available if it had visible overhead (OH) three-phase power or multiple businesses within one mi of the interstate exit. Sites with three-phase power available just outside one mi were deemed to have power nearby, and exits that had no visible power or businesses were scored the lowest. Three-phase power availability scoring is shown in **Table 18**.

**Table 18: Three-Phase Power Availability Scoring**

THREE-PHASE POWER	SCORE
Yes	1
Close	0.7
No	0

As an example, a site with no three-phase utility power coverage includes a rural interstate exit with minimal or no existing services or businesses. These locations may include a rural farm, residence, or business that has only single-phase power. However, single-phase power is not adequate to serve these locations. An example of an exit with no available three-phase power is shown in **Figure 21**.

**Figure 21: Example Exit - No Three-Phase Power**



An example of a site with some three-phase power includes rural areas that have three-phase power available, but due to the distance from a potential substation or the minimal number of businesses served, it may be cost-prohibitive to serve the charging load. An example of an exit with three-phase power close by is shown in **Figure 22**.

**Figure 22: Example Exit - Three-Phase Power Close By**

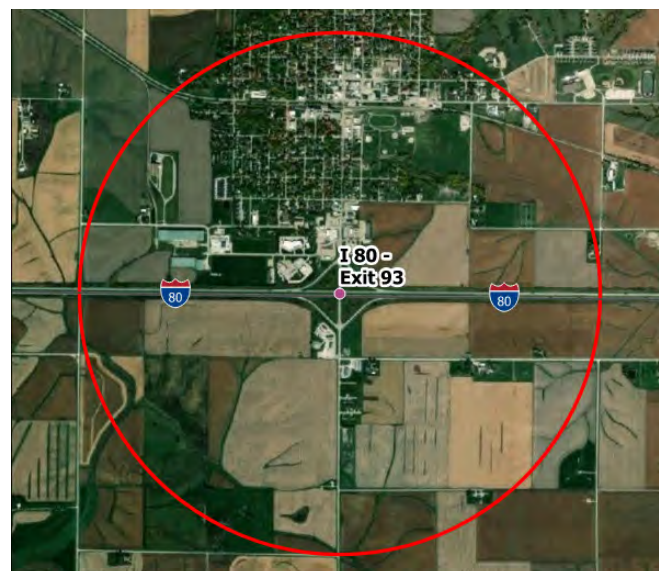


A site with full coverage of three-phase power includes multiple existing businesses near the interstate exit. There is typically at least one strong three-phase power source visible nearby, though the capacity of the source must be verified by the utility. An example of an exit with available three-phase power is shown in **Figure 23**.

## WEIGHTING

This criterion is only applicable to the Suitability weighting and is not applicable to the Priority weighting. The Suitability weighting for this criterion rates a total weight of 3 out of 44. However, it has a more substantial influence on overall suitability when aggregated with the other power criteria.

**Figure 23: Example Exit - Three-Phase Power Available**





## MAXIMUM VOLTAGE OF NEAREST POWER SOURCE

This criterion is the voltage rating of the nearest power source. For a substation, this is the highest incoming voltage present from the utility's transmission system. Distribution line voltages are not regularly reported by the serving utility, so only the incoming substation transmission voltage was utilized for this analysis. The maximum voltage was a metric utilized for this analysis, but the voltage and the ability to serve the load must still be confirmed by the local utility prior to installing chargers at a site.

Higher voltages can supply larger loads and are better suited for providing the power level needed for chargers.

**Figure 24** depicts the maximum voltages reported at substations nearest to each interstate exit.

**Figure 24: Maximum Voltage of Nearest Power Source**



### SCORING

The maximum voltage scores are shown in **Table 19**.

**Table 19: Maximum Voltage Scoring**

VOLTAGE	SCORE
< 69 kV	0
69 – 114 kV	0.7
115 kV+	1

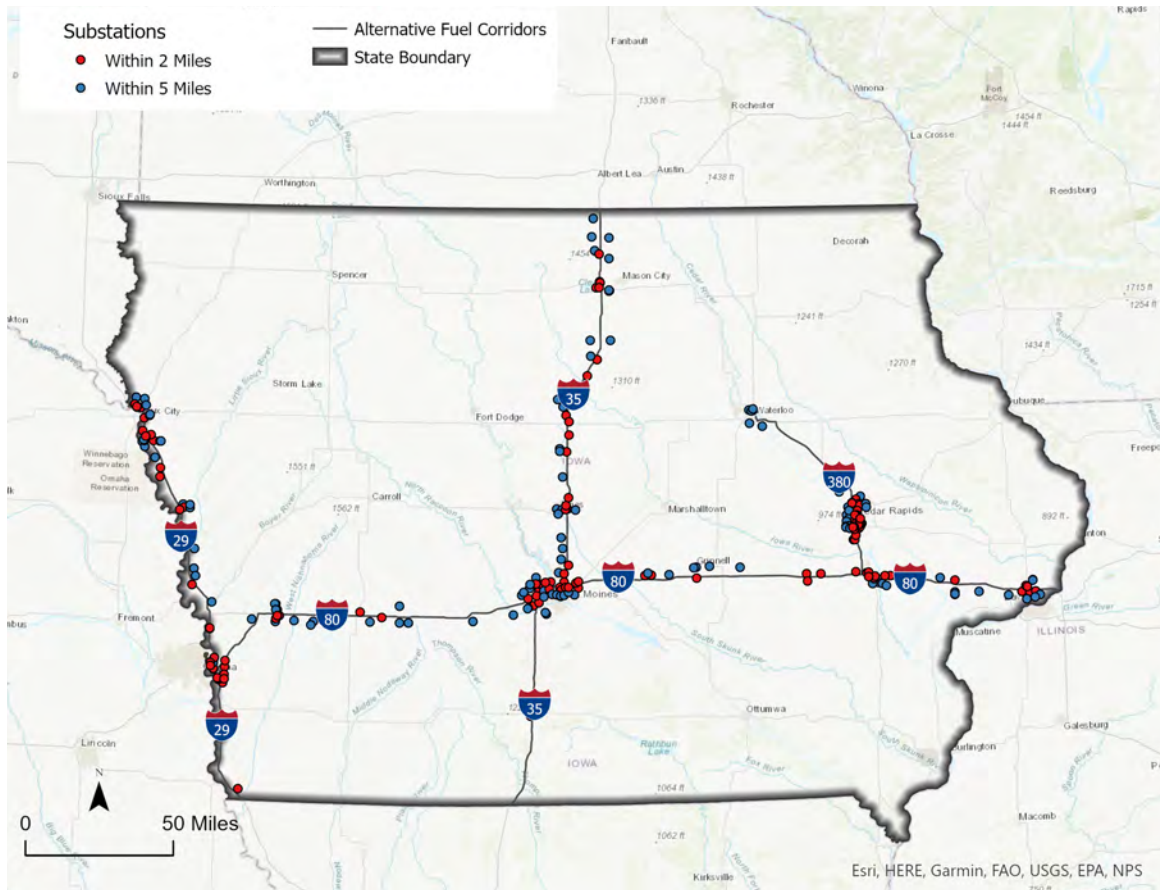
### WEIGHTING

Similar to other power source metrics, this criterion is only applicable to the Suitability weighting and is not applicable to the Priority weighting. The Suitability weighting for this criterion rates a total weight of 3 out of 44. However, it has a substantial influence on overall suitability when aggregated with the other power criteria.

## NUMBER OF SUBSTATIONS WITHIN TWO 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 when multiple substations are nearby. This metric is used to identify sites that will have more reliable power. Substation locations are shown in **Figure 25**.

**Figure 25: Substations Within Two Miles**



### SCORING

Three levels of scoring are included for this criterion. Those locations with only a single nearby substation are scored lower, while those locations with three or more substations are rated the highest. The scoring breakdown is shown in **Table 20**.

### WEIGHTING

This criterion is only applicable to the Suitability weighting and is not applicable to the Priority weighting. The Suitability weighting for this criterion rates low, with a total weight of 3 out of 44. However, it has a substantial influence on overall suitability when aggregated with the other power criteria.

It is noted that the Suitability weight for each individual power-related criteria may not be relatively high, but when summed together account for more than 25 percent of the possible suitability score a site can earn. Thus, the importance of power delivery is paramount when identifying suitable sites for targeting public investment in NEVI-compliant charging infrastructure.

**Table 20: Substations Within Two-Mile Scoring**

NUMBER OF SUBSTATIONS	SCORE
0	0
1	0.5
2	0.95
3+	1

## AMENITIES

Even with improvements in charging technology, the amount of time that will be required for EVs that stop at DCFC sites along the highway will be significant – typically around 30 minutes. It is ideal to have charging sites at which there are some amenities that drivers can make use of while waiting for their vehicle to charge. These amenities include things such as convenience stores, restaurants, and parks. A desktop review of available amenities was completed via Google Earth, including Street View, for this study to assess if amenities are available near interstate exits. The score for this metric is based on an aggregation of information about the area within one mi of the interchange at which a charging site could be located. **Figure 26** depicts the amenity density within one mi of Interstate exits.

**Figure 26: Amenity Density**



## SCORING

Several amenity types were developed for this criterion, including convenience stores, lodging, parks, restaurants, and shops. Scores were assigned to each interstate exit based on the presence of one or more of these amenities within one mi of the exit. Higher scores were assigned to exits that had multiple amenities within the one-mi threshold. The scoring breakdown is depicted in **Table 21**.

## WEIGHTING

Sites that have more amenities nearby will be more attractive to drivers when they look for a place to charge, which makes this an important characteristic for site suitability. Sites that do not have amenities may need to have additional facilities built at the charging site, such as restrooms, which would increase the cost and complexity of building out the charging network. For this reason, the presence of existing amenities is also important when identifying sites.

The Suitability weighting for this criterion rates medium, with a total weight of 5 out of 44. The Priority weighting for this criterion rates low, with a total weight of 3 out of 60.

**Table 21: Amenity Scoring**

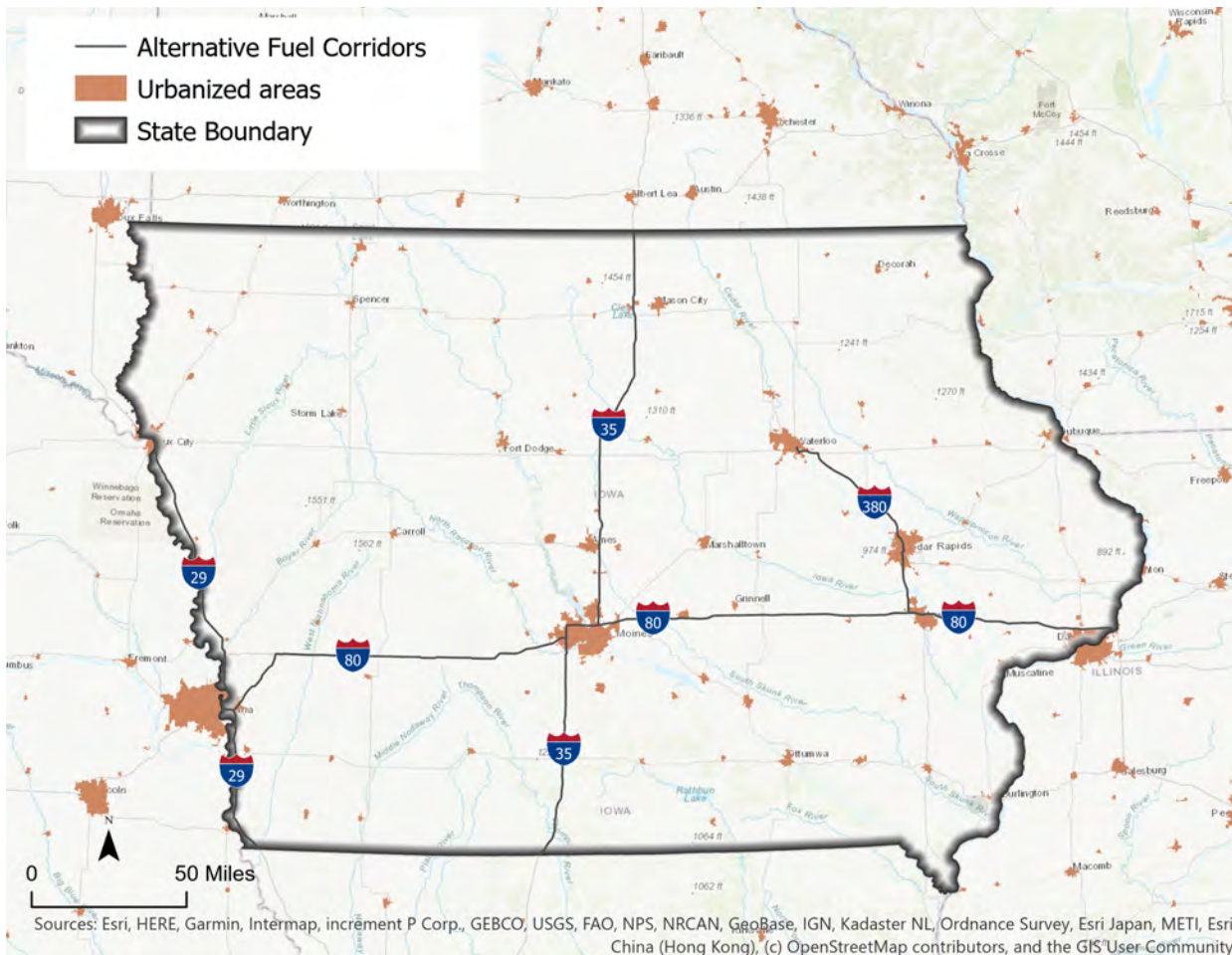
AMENITY COUNT	SCORE
0	0
0.5	0.1
1.5	0.95
2	0.95
3+	1



## URBAN AND RURAL AREAS

NEVI guidance points out the need for publicly available EV charging infrastructure in rural areas. The U.S. Census Bureau's 2020 urbanized area classification data were used to identify which areas were urban, with all other areas considered to be rural. The urban areas are shown in **Figure 27**.

**Figure 27: Urban Areas**



### SCORING

The scoring for this criterion followed a simple binary approach in which a site would score if it was located within a rural area, as demonstrated in **Table 22**.

### WEIGHTING

Consistent with the guidance, rural areas were scored higher for the prioritization of deploying charging stations. This criterion is only applicable to the Priority weighting and is not applicable to the Suitability weighting. The Priority weighting for this criterion rates high, with a total weight of 10 out of 60.

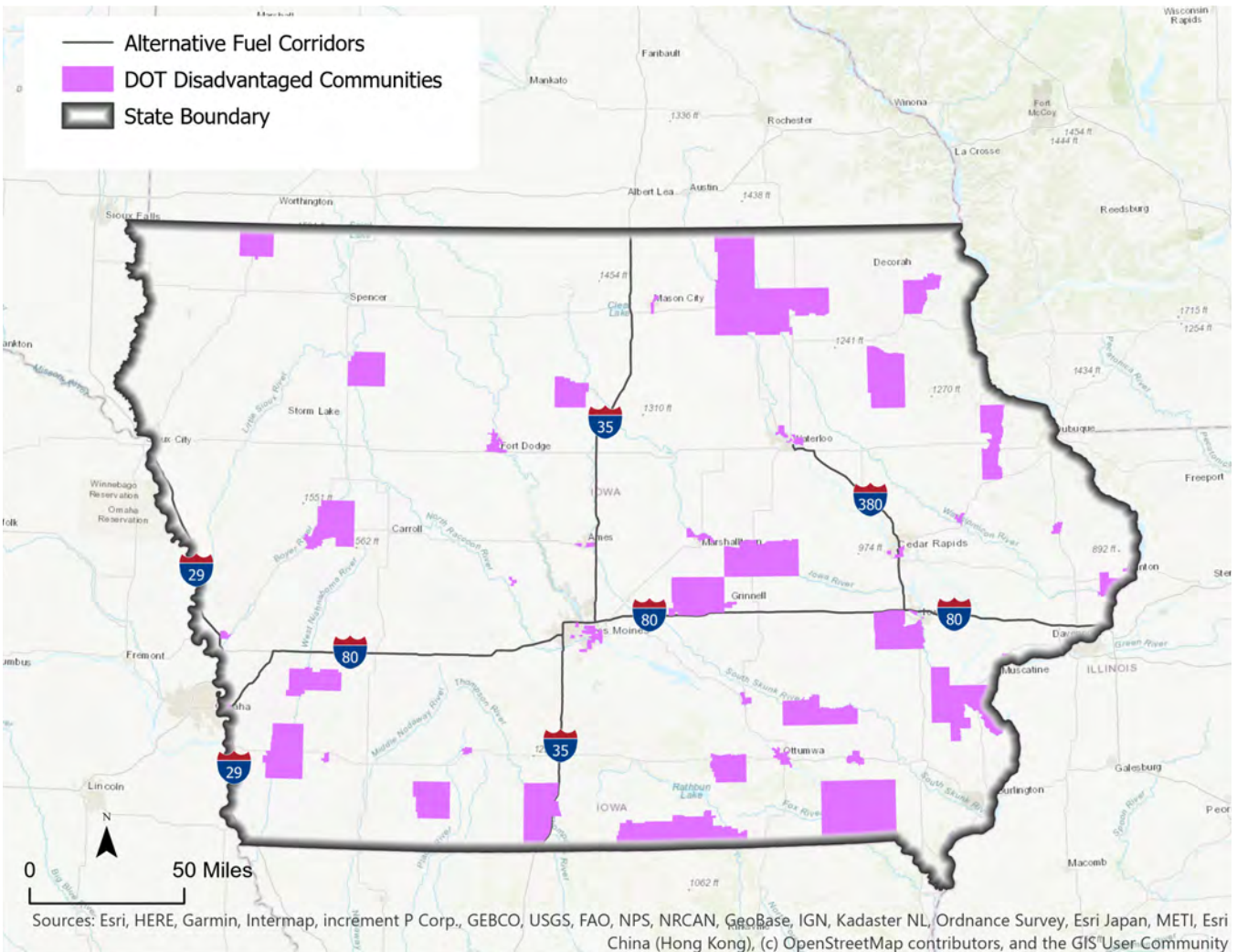
**Table 22: Urban and Rural Areas Scoring**

RURAL AREA	SCORE
Yes	1
No	0

## DISADVANTAGED COMMUNITIES

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. The NEVI guidance encourages states to use the EV charging Justice40 Initiative Mapping Tool to facilitate this portion of the analysis. The Justice40 map is shown for reference in **Figure 28**.

### Figure 28: Disadvantaged Communities



## SCORING

The scoring for this criterion followed a similar approach used for the urban and rural area criterion, in which sites located in areas identified as containing disadvantaged communities receive a score of one. This scoring approach is summarized in **Table 23**.

## WEIGHTING

This criterion is only applicable to the Priority weighting and is not applicable to the Suitability weighting. The Priority weighting for this criterion rates high, with a total weight of 10 out of 60.

### Table 23: Disadvantaged Communities Scoring

DISADVANTAGED COMMUNITY	SCORE
Yes	1
No	0

## 6.5.5 Other Criteria Considerations

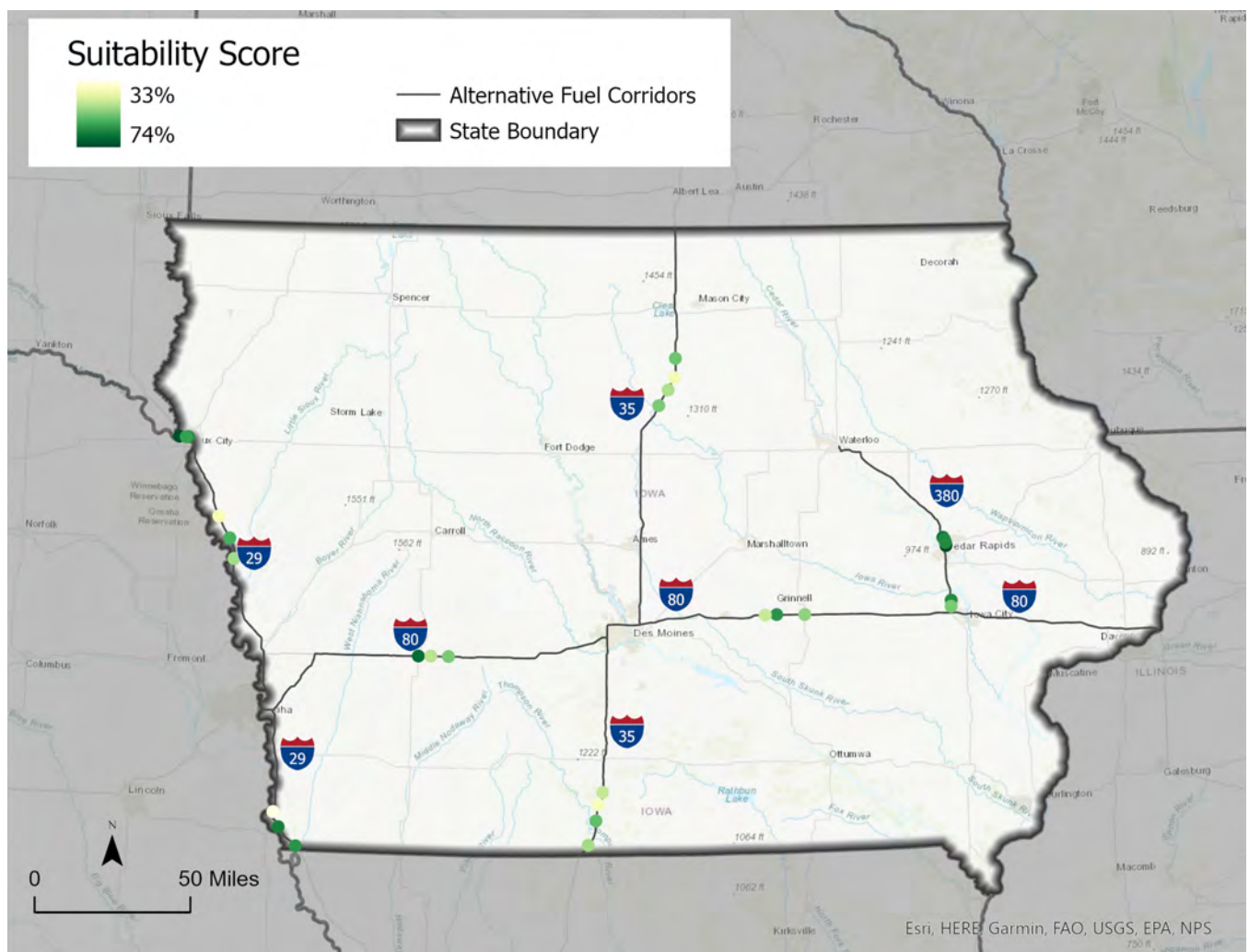
Additional criteria were considered for site suitability and prioritization analysis, but were not included as they are more applicable to Level 2 community chargers than they are to DCFC stations. These criteria include socioeconomic factors such as population and employment density, as well as current EV ownership rates, local attractions, and tourist destinations.

Site characteristics, including security, shelter, and lighting are also considered to be important factors when assessing site suitability. However, these characteristics are related to site design rather than the process of identifying potential interchanges amenable to the installation of DCFC sites. Further consideration of these factors is recommended at the deployment phase of the project.

## 6.5.6 Interchange Suitability and Priority Scores

Based on the criteria outlined above, all interchanges on the AFCs across the state were scored. The resulting heat map highlights the interchanges within the charging gaps that are most suitable for deploying DCFC stations (**Figure 29**). As shown, there are acceptable locations on all interstate corridors, indicating that there are likely several options for deploying DCFC stations and meeting the NEVI criteria on AFCs.

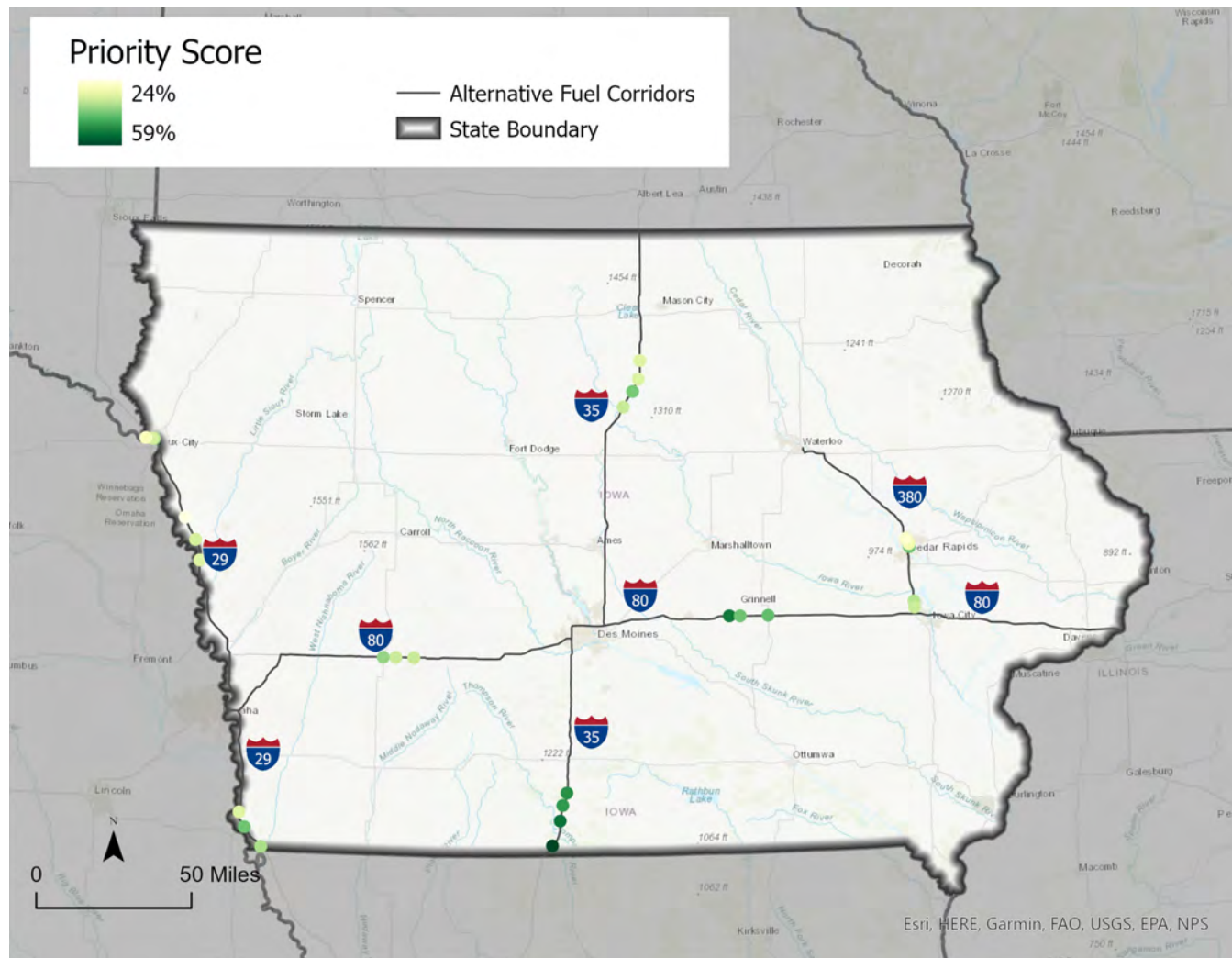
**Figure 29: Suitability Heat Map**





Similarly, the criteria were used to score the interchanges on the AFCs regarding the priority for deploying DCFC stations (**Figure 30**). The resulting heat map highlights the interchanges that are most important for deploying DCFC charging stations.

**Figure 30: Priority Heat Map**



The overall Suitability and Priority scores for the gap areas shown in **Figure 29** and **Figure 30** are shown in **Table 24 through Table 27** by interstate corridor for each exit in Iowa. The nearest utility to each exit is also included in each table. Interchanges on I-29 are shown in **Table 24**. Interchanges on I-35 are shown in **Table 25**, and interchanges on I-80 are shown in **Table 26**. Finally, interchanges on I-380 are shown in **Table 27**.

Percent Suitability and percent Priority scores shown in **Table 24 through Table 27** catalog the resulting scores for each exit included in a targeted gap area. The thresholds used for the Suitability and Priority scores are in **Table 24**.

It is noted that certain exit numbers shown in the following tables do not appear sequential due to I-80 and I-35 being co-signed throughout the Des Moines metropolitan area.

Table 24: Suitability and Priority Scores – I-29

EXIT NUMBER	EXIT LOCATION	PERCENTAGE SUITABILITY	PERCENTAGE PRIORITY	UTILITY SERVICE TERRITORY
1	Hamburg	62%	37%	MidAmerican Energy/Atchison-Holt Electric Cooperative
10	Sidney	65%	42%	MidAmerican Energy/Atchison-Holt Electric Cooperative
15	Percival	33%	32%	MidAmerican Energy
105	Blencoe	49%	32%	Western Iowa Power Cooperative/MidAmerican Energy
112	Onawa	58%	33%	Western Iowa Power Cooperative/Onawa Municipal
120	Whiting Exit	38%	24%	Western Iowa Power Cooperative
148	South Sioux City	63%	37%	MidAmerican Energy
149	South Sioux City	60%	33%	MidAmerican Energy
151	Riverside Boulevard	73%	28%	MidAmerican Energy

Table 25: Suitability and Priority Scores – I-35

EXIT NUMBER	EXIT LOCATION	PERCENTAGE SUITABILITY	PERCENTAGE PRIORITY	UTILITY SERVICE TERRITORY
4	Lamoni	49%	59%	Lamoni Municipal/Southwest Iowa Rural Electric Cooperative
12	Decatur City	55%	53%	Interstate Power and Light Company/Clarke Electric Cooperative
18	County Road J20	37%	48%	Interstate Power and Light Company
22	Van Wert	45%	49%	Interstate Power and Light Company/Clarke Electric Cooperative
159	Dows	53%	34%	Franklin Rural Electric Cooperative/Interstate Power and Light Company
165	Hampton; Clarion	48%	41%	Interstate Power and Light Company/Franklin Rural Electric Cooperative
170	Alexander	39%	32%	Franklin Rural Electric Cooperative/MidAmerican Energy
176	Sheffield	54%	32%	Franklin Rural Electric Cooperative



Table 26: Suitability and Priority Scores – I-80

EXIT NUMBER	EXIT LOCATION	PERCENTAGE SUITABILITY	PERCENTAGE PRIORITY	UTILITY SERVICE TERRITORY
60	Atlantic; Audubon	68%	39%	Atlantic Municipal/MidAmerican Energy
64	Wiota	47%	34%	Atlantic Municipal
70	Anita	53%	34%	Guthrie County REC
179	Oakland Acres	45%	52%	Pella Cooperative Electric Association/Interstate Power and Light Company
182	Grinnell	62%	42%	Interstate Power and Light Company
191	Malcom	51%	43%	Interstate Power and Light Company

Table 27: Suitability and Priority Scores – I-380

EXIT NUMBER	EXIT LOCATION	PERCENTAGE SUITABILITY	PERCENTAGE PRIORITY	UTILITY SERVICE TERRITORY
2	North Liberty	53%	34%	Linn County REC
4	North Liberty	63%	36%	Interstate Power and Light Company/Linn County REC
22	Coldstream – 29th Street Glass Road – 32nd Street	74%	42%	Interstate Power and Light Company
23	42nd Street	63%	29%	Interstate Power and Light Company
24A	Iowa 100 (Collins Road)	63%	29%	Interstate Power and Light Company
24B	Blairs Ferry Road	63%	29%	Interstate Power and Light Company
25	Boyson Road	67%	26%	Interstate Power and Light Company/ Linn County REC

## 6.5.7 Demand for DCFC Charging Stations

Demand for DCFC charging stations is a critical factor guiding Iowa DOT's investment in the statewide charging network. Several factors were used to estimate demand for DCFC charging stations, including forecasted daily long-distance trips, EV adoption projections, and station user potential. Two forecast years were used for demand analysis – an interim year, 2026, which represents the final year of NEVI programming, and a horizon year, 2040, to capture long-range conditions.

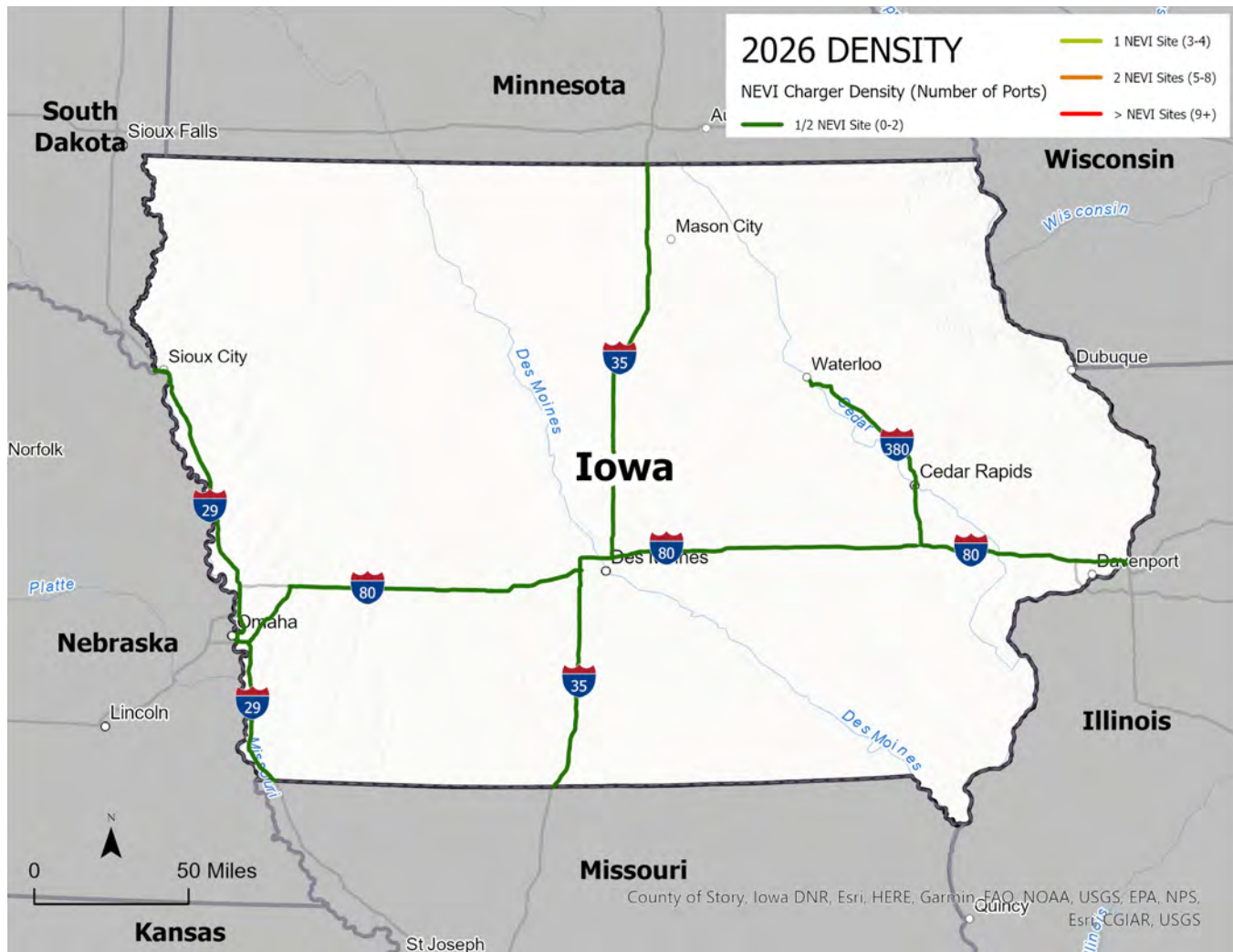
Iowa DOT has found that current EV adoption rates within the state are relatively low, so the current focus is to build out a statewide charging network that is able to anticipate an increased adoption rate through 2040. This build-out is intended to keep pace with the increased number of EVs on the road. As such, a demand analysis was conducted to inform a plan for infrastructure development that meets the needs of Iowa's EV users in the year 2040.

## 6.5.8 DCFC Station Density

DCFC station density estimated the minimum number of NEVI-compliant charging stations needed every 50 mi to meet estimated demand along Iowa's AFC corridors. Density was estimated for the years 2026 and 2040 and used outputs from Iowa DOT's statewide Travel Demand Model (TDM). The TDM was used to forecast long-distance trip levels, defined as trips of 150 mil or more, for 2026 and 2040. Also incorporated into the station density analysis were the statewide EV adoption projections discussed in Chapter 5. Assumptions made for this analysis were a 40-percent station utilization rate and an average vehicle dwell time to charge of 25 minutes.

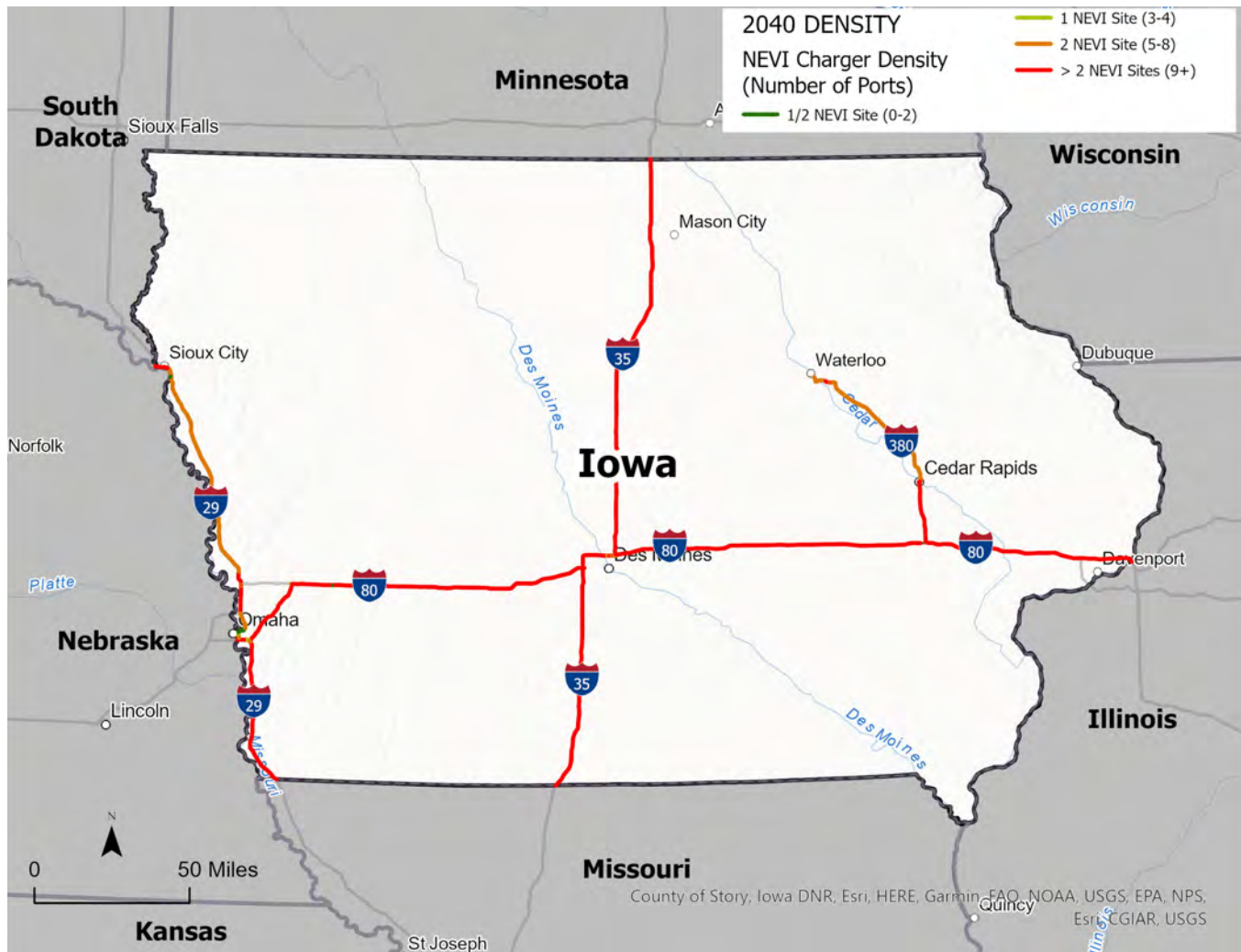
Based on the current travel patterns and EV market adoption, the NEVI station density needed to meet anticipated demand in 2026 is less than one NEVI station (four ports) every 50 mi along Iowa's AFC. **Figure 31** shows estimated DCFC charger density requirements for Iowa's interstate corridors for the year 2026.

Figure 31: DCFC Charger Density, 2026



Looking out to the horizon year, 2040, it is estimated that increased station density will be required due to an acceleration of EV adoption rates, an increase in the amount of long-distance travel occurring along Iowa's interstate system, and an increased proportion of long-distance EV travel. The resulting density is expected to exceed the 2026 level of one NEVI station (four ports) every 50 mi, requiring a build-out of the charging network beyond the 2026 level. The consideration of this anticipated demand is an important consideration for Iowa DOT in planning future investment in the network. **Figure 32** shows estimated DCFC charger density requirements for Iowa's interstate corridors for the year 2040.

**Figure 32: DCFC Charger Density, 2040**



## 6.5.9 Peak Power

Inputs used in the DCFC station demand analysis were carried over to determine peak power demand along Iowa's AFCs for the years 2026 and 2040. **Figure 33** and **Figure 34** show peak power demand and how the state's electrical grid is likely to be impacted by the DCFC load in the future. Peak demands for most of Iowa's interstate corridors are expected to exceed 1 megawatt (MW) by 2040.

Figure 33: Peak Demand, 2026

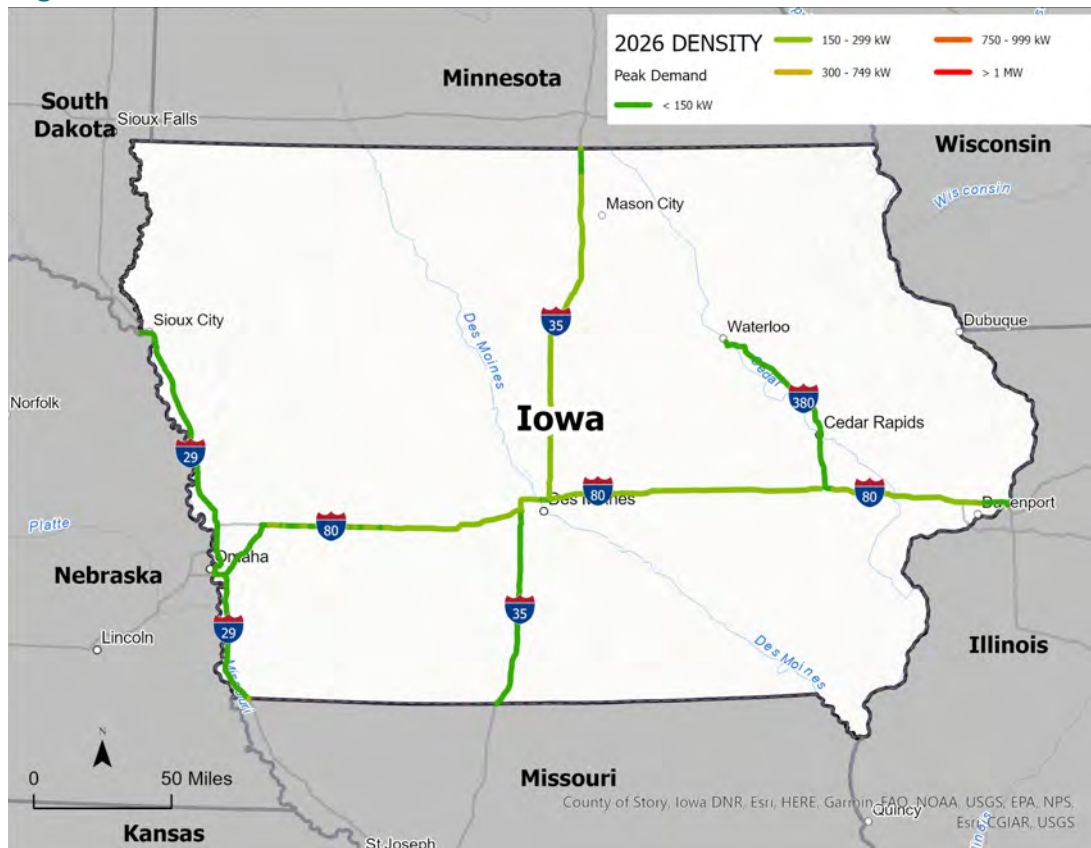
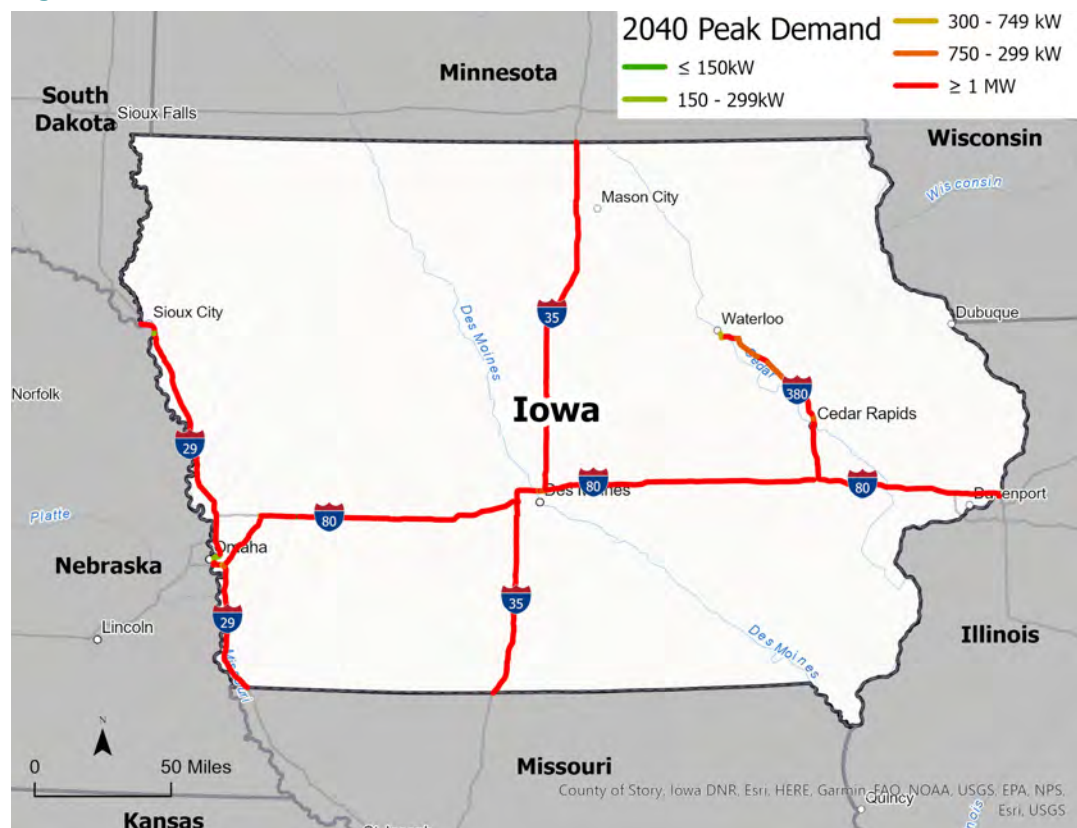


Figure 34: Peak Demand, 2040





### 6.5.10 Utilization

Utilization rates for four-port DCFC stations sited every 50 mi along Iowa's interstate corridors were calculated for the years 2026 and 2040. Utilization rates for 2026 are expected to reach less than 25 percent, compared with an anticipated maximum possible utilization rate of 40 percent. A utilization rate above 40 percent would result in lengthy wait times, in turn triggering the need for more investment to build additional charging infrastructure. **Figure 35** and **Figure 36** illustrate estimated utilization for 2026 and 2040.

Based on Iowa DOT's initial build-out of NEVI-compliant charging infrastructure, it is anticipated that utilization rates will remain below the 40-percent threshold in the short and mid-term. Beyond this time frame, EV adoption rates and the number of EVs making long-distance trips are expected to raise utilization rates above the 40-percent threshold. This rise in utilization rates will then spur the need for investment in expanding the statewide charging network.

### Figure 35: NEVI Utilization, 2026

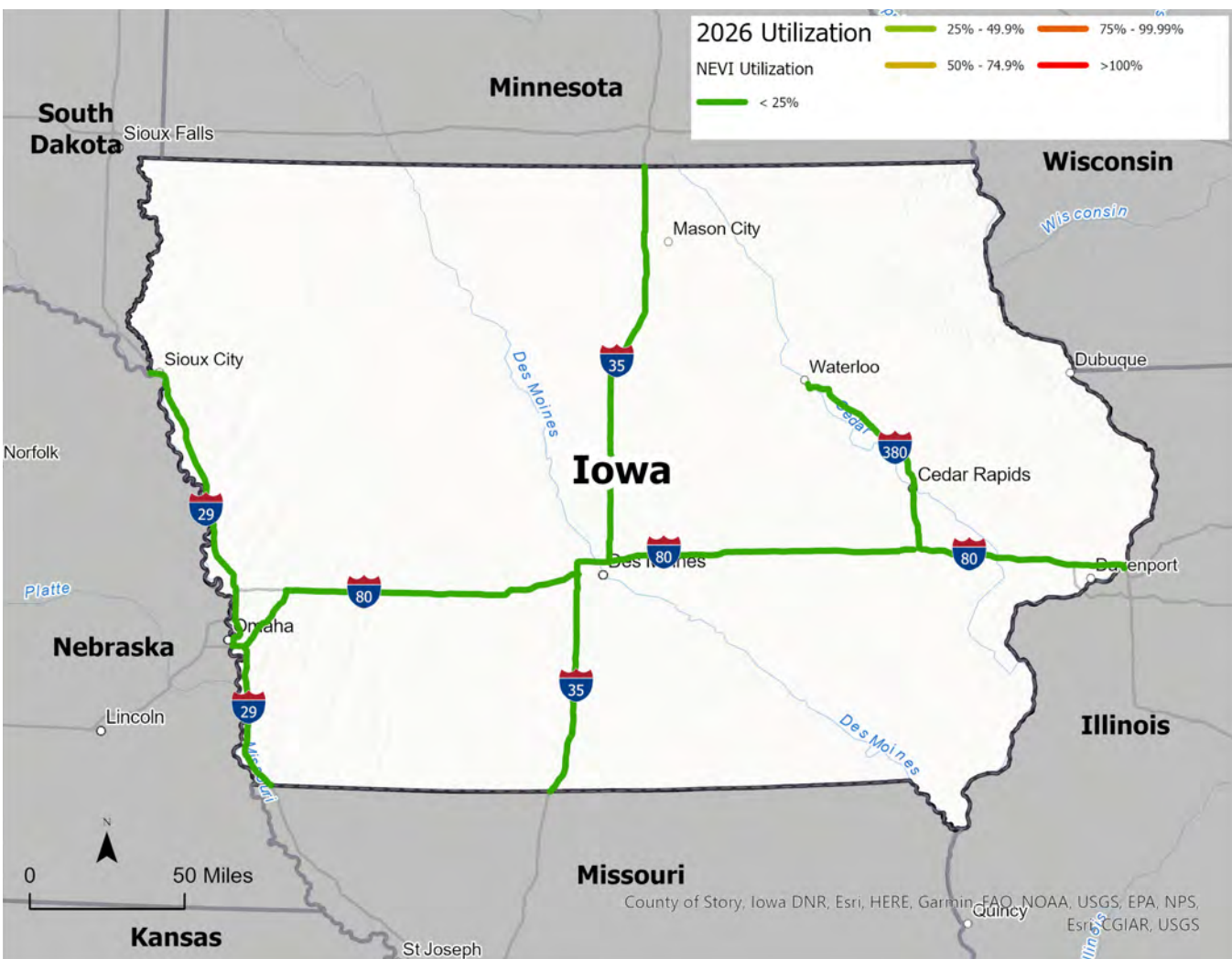
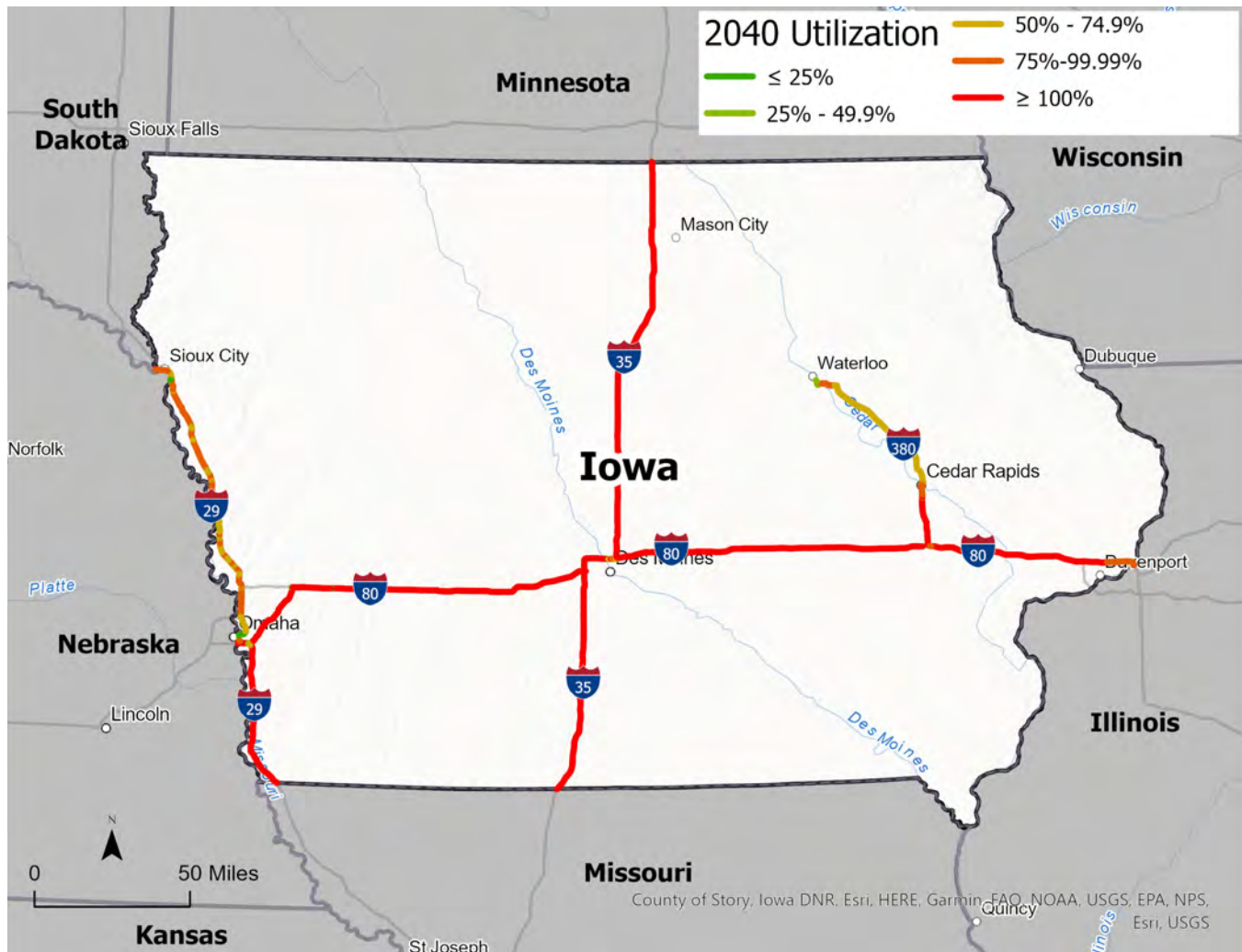




Figure 36: NEVI Utilization, 2040



### 6.5.11 Upgrades of Corridor Pending Designations to Corridor Ready Designations

The Iowa portion of the EV AFC is described in further detail in Chapter 5, Existing and Future Conditions. Iowa DOT will program and implement yet-to-be-determined EV charging upgrades and deployments in partnership with the private sector. The state's AFC build-out strategy will likely increase the proportions of corridor mileage of I-29, I-35, I-80, and I-380 that meet the criteria for a Corridor Ready designation.

### 6.5.12 Public Transportation and EV Freight Considerations

Iowa's infrastructure deployments and upgrades will focus on light-duty vehicle charging in the first few years to achieve NEVI build-out. The power consumption needs of electric freight vehicles will likely require separate, but parallel, planning to account for large power loads and the different charging activity patterns of business users compared with personal vehicle users. The state's public transportation systems will continue to explore EVs, but the initial EV charging infrastructure deployments will focus on personal vehicles, as most public transportation agencies with EVs rely on charging at their facilities for several reasons. Additional details on Iowa's freight patterns and public transportation systems are included in Chapter 5.

## 6.5.13 Increases of Capacity/Redundancy Along Existing AFC

Looking forward, Iowa DOT will need to develop a long-term approach to EV charging infrastructure capacity and redundancy along AFCs. The initial focus of EV charging infrastructure deployment will be to either add new charging sites to exits on AFCs with more than 50 mi of spacing to adjacent EV charging stations, or to upgrade EV sites that score as a high priority based on Iowa's established priority scoring. In future annual plan updates, Iowa DOT will consider increases in charging infrastructure capacity and redundancy.

## 6.5.14 Utility Planning

As part of a robust public and stakeholder engagement process, Iowa DOT has begun meeting with relevant electrical utility associations and utility regulators in coordination with the IEDA. Information from the IUB has helped clarify cost structure options and the regulatory processes in the state. Ongoing engagement with electrical utilities (which are outlined earlier in this plan by their service areas) will be a key step in confirming site viability and understanding the impact of power delivery to the timeliness of deployments.

The NEVI program will aim for cost-effective investment in utility build-outs to support new and enhanced EV charging stations, while maintaining grid reliability and resiliency.

## 6.5.15 Information Dissemination about EV Charging Station Availability

Iowa DOT will focus the state's EV charging infrastructure deployment strategy on meeting NEVI minimum standards and guidance for EV charging station availability shared in a transparent manner. Iowa DOT will require that stations installed under the NEVI program meet all NEVI reporting requirements, including those presented in the June 22, 2022, Notice of Proposed Rulemaking (NPRM) once the final ruling is adopted. The NPRM includes provisions for basic charging station information, real-time status, and real-time charging price. The FHWA indicates that this information would be available free of charge to third-party software developers through Application Programming Interface (API). Additionally, Iowa DOT will require NEVI-funded stations to confirm that a minimum station uptime is met, per NEVI guidance. The Joint Office of Energy and Transportation and FHWA will post further guidance, and Iowa DOT will incorporate that guidance of minimum requirements to any requests for private industry applications for NEVI funding.

## 6.6 State, Regional, and Local Policy

Iowa has engaged in statewide and collaborative planning that has produced state-level strategies to adapt to the growing EV market.

The following state policy recommendations were provided to the Iowa Legislature in 2019:

- » Allow the Resale of Electricity for Vehicle Charging
- » Enable Regulatory Oversight of Charging Stations
- » Address EV-Related Shortfalls to the Road Use Tax Fund

Specifics of these policy recommendations can be found in *Charging Forward: Iowa's Opportunities for Electric Vehicle Infrastructure Report*.<sup>38</sup> All three policy recommendations have progressed toward implementation to a certain extent. Specifically, the following policies have been implemented at the state level during the past several years:

- » Amendment to Chapter 20, "Service Supplied by Electric Utilities," Iowa Administrative Code and adopted Rule 199-20.20(476).<sup>39</sup> This rule addresses EV charging services, the source of electrical power, method of sale of EV charging at commercial or public charging stations, and other clarification. This rule addressed the recommendation on the resale of electricity for vehicle charging.
- » As discussed in Chapter 5 of this plan, Iowa has implemented new fees for plug-in EVs and will be implementing an \$0.026 excise tax on a per-kWh basis for EV charging in nonresidential locations in July 2023. These policies were put into effect in 2019 by Senate File (SF) 473<sup>40</sup>, which became law. The excise tax will be collected by the IDR, and this new revenue addresses the recommendation on shortfalls to the Road Use Tax Fund.

As an increasing number of EV drivers are charging their vehicles, the key elements for regulatory oversight of charging stations may become more evident based on station operation and usage experiences. Various regulatory topics are addressed in a handbook adopted by the Iowa Department of Agriculture and Land Stewardship's DALSS's) Weights and Measures Bureau, which oversees the dispensing of other motor fuels in Iowa. National Institute for Standards and Technology (NIST) Handbook 130, Uniform Laws and Regulations in the Areas of Legal Metrology and Fuel Quality, addresses retail sales of electricity as a vehicle fuel. This handbook and associated regulatory oversight may address accuracy of kWh delivered to a vehicle, information provided to consumers, and related topics. Additional topics and roles/responsibilities for state agencies regarding oversight of charging stations could be explored in the future as well.

Iowa regions and localities will also have policies that have implications for NEVI charging station development. In this first year of the state's NEVI build-out, the precise site locations are still under development, so the policies of specific regions and localities are not included in this plan. Iowa DOT will, in future plan updates, consider programmed EV charging infrastructure deployment locations to determine if relevant regional and local policies should be captured in the state's EV plan. Policies included in future plan iterations will consider noting potential issues with zoning and permitting of EV charging infrastructure.

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# CHAPTER 7

## Implementation

Strategies for guiding the implementation of the program will rely heavily on the contracting and delivery process, as described in Chapter 4, Contracting Mechanisms. Currently, the grant application process appears to be the only viable contracting mechanism for Iowa DOT. The grant requirements will be developed to select sites that coincide with analysis described in Chapter 6, EV Charging Infrastructure Deployment. Iowa DOT and its partners have developed this approach to best put federal dollars to work within the state economy, guided by the state's objectives and policies.

Iowa DOT will stipulate adherence to guidance and requirements of the NEVI program and the Joint Office of Energy and Transportation to NEVI fund awardees. Proposed rules outlined in the FHWA/U.S. Department of Transportation (USDOT) 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-premises signs acquired, installed, or operated.
4. Data requested related to a project funded under the NEVI Formula Program, including the format and schedule of 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.

Implementation will also follow the principles established in Iowa's SLRTP:

- » **Continue advancing sustainable planning at Iowa DOT.**<sup>41</sup> – EVs are intended to be more sustainable than internal combustion engine vehicles and reduce greenhouse gas (GHG) emissions.
- » **Seek policies and investments that are dual benefit, supporting today's users with tomorrow's technology needs.**<sup>42</sup> – This recommends considering future changes in technology when implementing new infrastructure. In the near term, this may mean developing a backbone EV charging network with partnerships that require minimums focused on today's EV users, but rewarding innovation for the system to adapt to an evolving technology and user base.
- » **Continue to work with local governments, state agencies, utilities, and other stakeholders** to advance energy-related planning efforts and alternative-fuel infrastructure improvements in Iowa.<sup>43</sup>

## 7.1 Strategies for Operations and Maintenance

Iowa DOT anticipates that the operations and maintenance will be performed by the station's public or private third-party provider. Minimum requirements will be defined for charger port uptime (97 percent, 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 will have different business models, but each will need a process to ensure that the site host is engaged to monitor, routinely inspect, and perform basic site-cleaning functions.



## 7.2 Strategies for Identifying EV Charger Service Providers and Station Owners

The process identified in Chapter 4, Contracting Mechanisms, will be used to identify both charger service providers and station owners (site hosts). It is anticipated that selection of appropriate site hosts would be a requirement, 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.

Iowa DOT is in the process of determining the best approach for guiding infrastructure deployment in a manner that aligns with interchange suitability and priority detailed in Chapter 6, EV Charging Infrastructure Deployment. This could include a sliding scale of funding availability based on the Suitability and Priority scores documented. It could include evaluating a project more favorably if it exceeds the NEVI guidance minimums in ways that benefit travelers.

Iowa DOT is also considering ways to cost-effectively build out the system, while setting up the network of DCFC stations and third-party grantees for long-term success.

The Iowa DOT recognizes that it may be too early at this stage to identify all delivery models that might be used over the life of the NEVI program. In early deployment, one, or a small number of agreements, may be preferable to focus on a limited number of key interstate corridors with a high potential for consistency and fewer program risk factors. As the program matures, there may be benefits to expanding the delivery types and/or number of respondents to cover DCFC station construction and enhancements across the state after the AFC system is recognized as fully built-out.

## 7.3 Strategies for Data Collection and Sharing

Iowa DOT expects that data collection and sharing would be the primary responsibility of the third-party provider and would be outlined as a requirement in the agreement. 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.

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

## 7.4 Strategies to Address Resilience, Emergency Evacuation, Snow Removal/Seasonal Needs

Iowa DOT 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** – One challenge to implementing the charging system is the numerous utility providers located along the corridor network, which is also an opportunity to ensure energy resilience for the charging network.

» **Natural Disaster Resilience** – Snow, flooding, tornadoes, and temperature extremes are the natural disasters that are often experienced in Iowa. These represent major challenges for EV infrastructure resilience. It is expected that resilience in these areas would be addressed primarily by the private charging provider, with requirements to address resilience possibly included as a component of the contracting process.

There are a variety of emerging energy storage technologies that are being pursued and explored in Iowa by private businesses and utilities. One of the planned fast charging stations will be designed to pilot a battery-powered station that the local utility will monitor over time. Batteries could be deployed at charging stations and expanded, if needed, to ensure that adequate electricity is available from the grid for charging vehicles in the event of power outages. Iowa

DOT will balance concerns such as cost, environmental impact, material availability, ownership, maintenance, and risk when evaluating the need for energy storage or backup power generation. Any redundant power supply deployed to serve chargers must be installed within all legal requirements, including who can supply the primary or backup power. In most cases, the utility grid is extremely reliable, with most outages repaired within an hour or less. Extreme outages are often the result of severe weather conditions, when travel is also limited.

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

## 7.5 Strategies to Promote Strong Labor, Safety, Training, and Installation Standards

Iowa will continue to promote the use of small businesses in the construction and maintenance of EV charging infrastructure. Iowa DOT has engaged with labor unions through this study to identify workforce training opportunities, and will continue to look for other opportunities throughout the NEVI deployment process. For example, equipment could possibly 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, in which the third-party provider may be asked to provide educational assistance to further

develop a skilled workforce. This is also an opportunity to engage with the Justice40 communities to develop workforce training opportunities related to infrastructure installation, operation, and maintenance. Third-party providers should also recognize that ongoing O&M 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 provides guidance and safety procedures to manage infrastructure in the case of a malfunction, equipment destruction, or an emergency event.

## 7.6 Potential Site Standards and Layouts

Charging station layout may vary by site, depending on the needs. Many sites across the United States currently utilize head-in or back-in parking. This parking is adequate in most circumstances, but it may be difficult for snow removal, or when trying to charge a vehicle that is pulling a trailer and would be better suited for pulling through the charge area. In those cases, a configuration similar to existing gas fueling islands may be better. Each site may vary and should be designed to fit the site and customer needs. One potential layout is shown in **Figure 37** for head-in or back-in parking, while **Figure 38** depicts potential pull-through parking.

Figure 37: Example Charger Parking

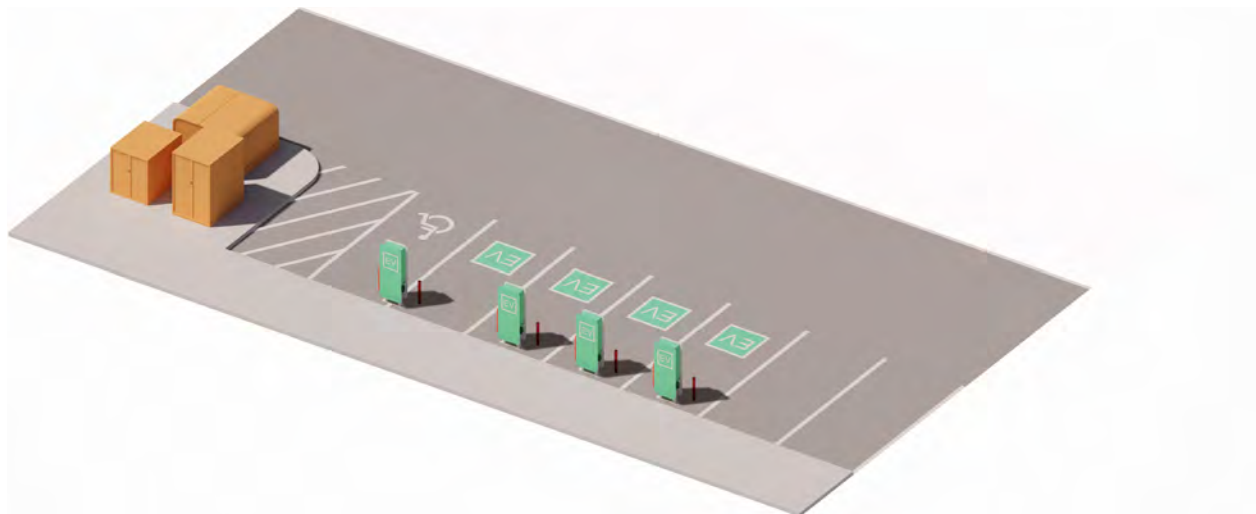
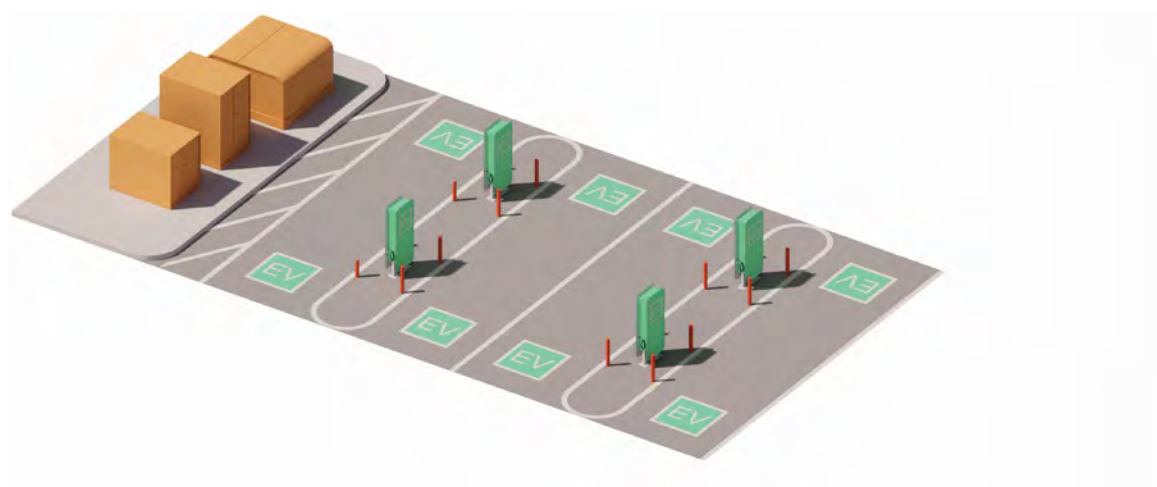


Figure 38: Example Pull-Through Charging



In the example pull-through parking area, the charging stations have four charging stalls in addition to one additional stall. This parking combination meets both ADA and NEVI requirements. There are still only four dispensers, one of which will have two cords. One dispenser will be split with a handicap-accessible space.

Future charger parking stall additions may be necessary and would come with time, as the site demand increases. Available amenities must also be considered when installing charging stations. Since the average charging time will be about 30 minutes, it is important to have nearby amenities such as convenience stores, parks, restaurants, etc. Charging stations will require adequate lighting and 24-hour access to bathrooms, at a minimum. Public input received during the engagement process identified other desired amenities such as squeegees for window washing or trash receptacles next to the charging stations, similar to what drivers are used to having conveniently available while getting liquid fuels.

The estimated charging station site cost is approximately \$1M, depending on amenities and provisions for future expansion. Some sites may cost less due to the site design or the presence of existing infrastructure. This cost estimate does not include additional options such as extra park benches, canopies, layover parking, larger 350-kW chargers, or other features.

# CHAPTER 8

## Civil Rights

Iowa DOT assures that no person shall, on the grounds of race, color, national origin, sex, age, or disability, be excluded from participation in, be denied the benefits of, or be otherwise subjected to discrimination under any Iowa DOT service, program, or activity, regardless of whether those programs and activities are federally funded or not. Iowa DOT also assures that every effort will be made to prevent discrimination through the impacts of its programs, policies, and activities on minority and low-income populations, and it will take reasonable steps to provide meaningful access to services for persons with Limited English Proficiency (LEP). This means the NEVI program will be developed and delivered under the Iowa DOT civil-rights program umbrella from the onset.

Iowa DOT is a seasoned recipient of federal financial assistance, including, but not limited to, NEVI. Therefore, it is the policy of Iowa DOT to comply with numerous nondiscrimination laws and regulations, including:

- » Title VI of the Civil Rights Act of 1964 (prohibits discrimination on the basis of race, color, or national origin).
- » Title VII of the Civil Rights Act of 1964 (prohibits employment discrimination on the basis of race, color, national origin, sex, or religion).
- » URA of 1970 (prohibits unfair treatment of persons displaced, or whose property has been acquired because of federal or federal-aid programs and projects).
- » 1973 Federal-Aid Highway Act (prohibits discrimination on the basis of sex).
- » Title IX of the Education Act (prohibits discrimination because of sex in education programs or activities).
- » Section 504 of the Rehabilitation Act of 1973 (prohibits employment discrimination based on disability for any program or project which receives federal financial assistance).
- » Civil Rights Restoration Act of 1987 (broadened applicability of Title VI of the Civil Rights Act of 1964, The Age Discrimination Act of 1975, and Section 504 of the Rehabilitation Act of 1973 by expanding the definition of the terms “programs or activities” to include all the programs or activities of the federal-aid recipients, subrecipients, and contractors, regardless of if the project or program is federally funded).
- » Executive Order (EO) 12898 (addresses environmental justice considerations to ensure burdens are not disproportionately high and adverse for minority and low-income populations)
- » Executive Order 13166, Improving Access to Services for Persons with LEP (by taking steps to provide materials, programs, and services in alternate languages).
- » ADA of 1990 (improves accessibility for disabled individuals through design considerations of infrastructure and facilities).

## 8.1 Title VI and ADA

Iowa DOT is committed to ensuring that projects, programs, and services are performed without discrimination, under Title VI and ADA. Iowa DOT expects every manager, supervisor, employee, and subrecipient of federal-aid funds administered by Iowa DOT to be aware of, and apply, the intent of nondiscrimination laws and regulations in performing their assigned duties. To accomplish this, Iowa DOT develops, adopts, and implements nondiscrimination requirements through the Civil Rights Bureau. The FHWA requires Iowa DOT to develop a plan that clarifies roles, responsibilities, and procedures for Title VI, ADA, and applicable ancillary programs. Each organizational Iowa DOT bureau is committed to specific actions to implement these nondiscrimination requirements into appropriate business practices, projects, manuals, directives, and regulations.

## 8.2 Small/Disadvantaged Business Utilization

The NEVI program will be a vehicle to enhance USDOT's initiative for wealth creation for small, disadvantaged businesses, and expanding access to increase in social and economic opportunity for disadvantaged and underserved communities. This is accomplished by exploring opportunities to:

- » Establish participation goals and determine the opportunities for the participation and utilization of Disadvantaged Business Enterprise (DBE) firms on contracts associated with the NEVI program.
- » Develop proactive programs to support an increase of small DBE firms in the innovative scopes associated with EV infrastructure construction and maintenance in the NEVI program
- » Work to maximize opportunities for DBEs within Iowa DOT's existing DBE program through targeted outreach to DBEs on EV infrastructure-oriented workforce development.



# CHAPTER 9

## Equity Considerations

Iowa considers equity when planning investments in EV charging infrastructure. Iowa DOT recognizes that while the use of EVs is gradually increasing in the state, EV ownership is not currently an option for all Iowans due to availability and affordability issues, and it may not be the right fit for some of the wide-ranging mobility needs in the state. As the demand and the charging network grow over time, it is expected that passenger vehicle model options will increase, and prices for EVs will decrease. Transit services in metropolitan and on-demand rural service are also expected to transition to cleaner options, in part, because they, too, are federally funded and can take advantage of recent funding increases for EV technologies. Proactive planning of these investments in infrastructure would benefit populations across Iowa.

The Justice40 Initiative, established in January 2021 by EO 14008, Tackling the Climate Crisis at Home and Abroad, states 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 National Electric Vehicle Infrastructure Formula Program guidance (released in February 2022) identify clean transportation, to include the NEVI program, as Justice40-covered programs.

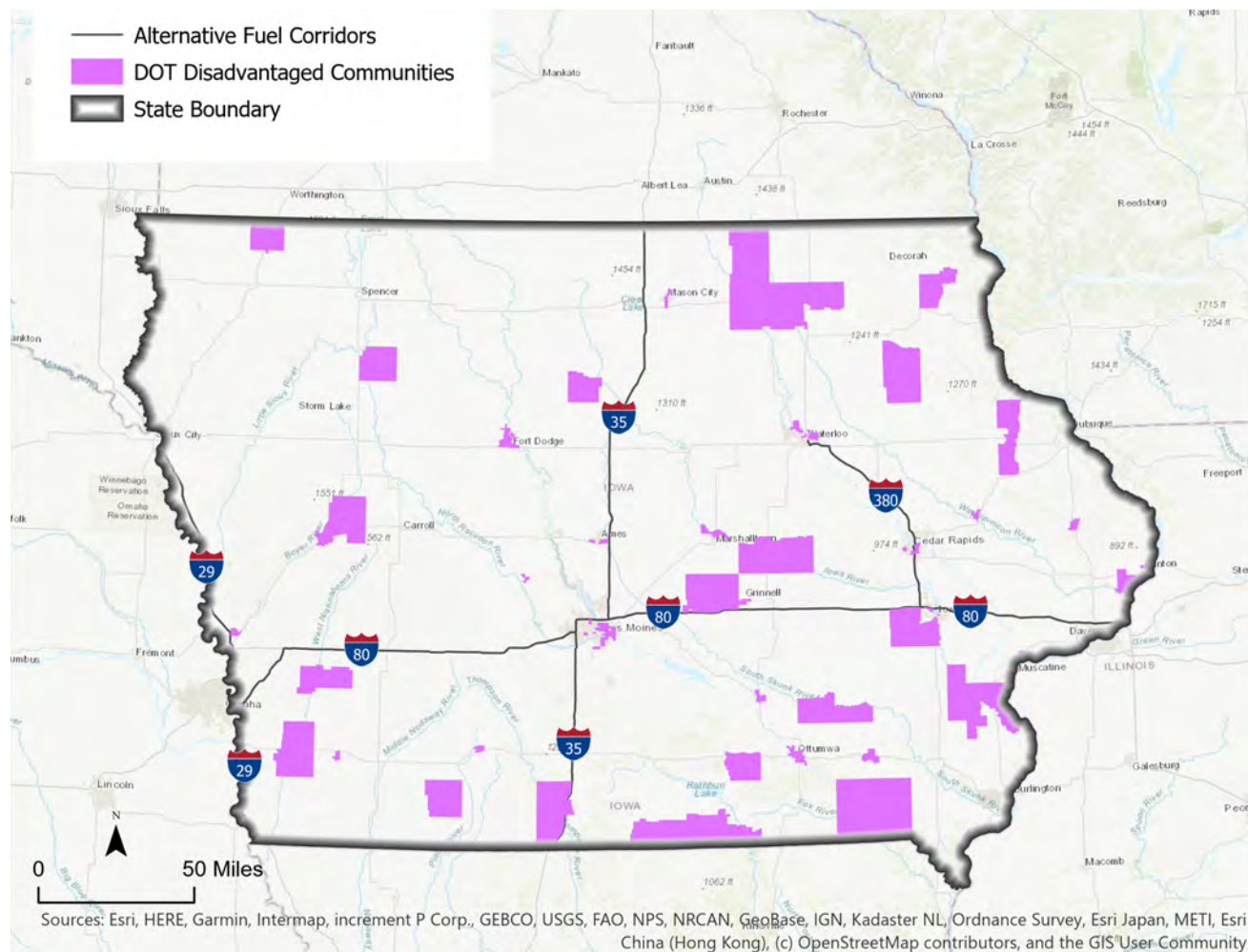
### 9.1 Identification and Outreach to DACs in the State

As part of USDOT and the U.S. Department of Energy (DOE) partnership in implementing Justice40, an interim definition for DACs was developed to assist states to identify them. “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.

Iowa DOT has utilized the EV Charging Justice40 Map Tool to analyze the existing and future EV network for Iowa, and incorporate the location of these communities as a criteria for the priority scoring of interchanges when identifying potential future infrastructure sites. Iowa DOT recognizes that a site being located within, or near, a DAC provides benefits to that community. For the purpose of this analysis, and being able to measure these locations, the term “near” was defined as being within a one-mi radius of the defined DAC geography from the Justice40 Map Tool. This geography defining these DACs for Iowa, along with locations that meet this one-mi radius parameter, are shown in **Figure 39**. Total sites within a mile of AFCs and Justice40 areas:

- » Existing NEVI Compliant: 1
- » Proposed Sites: 2
- » NEVI Upgradable Sites: 10

Figure 39: Justice40 Map



Iowa DOT develops and maintains procedures to encourage and monitor inclusive participation of all citizens in the planning process. This public participation process was developed to offer Iowans the opportunity to help identify transportation issues, needs, and priorities; plan how to meet those needs and priorities; and select transportation projects that turn the plans into reality. This means:

- » Information and opportunities for public involvement are provided continuously throughout the planning and programming process.
- » Information about plans, programs, and projects are widely distributed.
- » Comments are sought and encouraged from the public, including transportation DACs, individuals, and groups.
- » Public comments, suggestions, and concerns are listened to, and considered, when decisions are made.

Engagement was actively sought and considered in the development of the Iowa NEVI Plan from a number of stakeholders, including those that represent rural, underserved, and DACs. An engagement strategy was crafted and carried out by Iowa DOT utilizing a variety of proven outreach methods to enable inclusive, meaningful, and transparent input. Outreach was conducted through email invitations to complete an online survey, invitations to view a public on-demand webinar, stakeholder meetings, and links to the informational website and online comment and update request form. Input was collected through website and social media, survey responses, public meetings, and voting and polling methods.

Content shared with stakeholders included educational materials developed to provide foundational information about EVs and the NEVI program. These materials were designed to provide all stakeholders, including those from disadvantaged communities, a level of knowledge appropriate to fully understand the process and provide feedback that could be used to guide decisions. The survey requested optional demographic data about the respondent. While this wasn't consistently provided, the answers that were received allowed Iowa DOT personnel to better understand who responded to the survey.

While this initial outreach effort was considered a success, Iowa DOT recognizes that engagement is ongoing and will continue to seek input from stakeholders.

For additional information on public engagement for the NEVI Plan see Chapter 2.

## 9.2 Process to Identify, Quantify, and Measure Benefits to DACs

Iowa DOT recognizes the emerging nature of the NEVI program and looks forward to working with USDOT to measure the benefits of this program as it evolves. Currently, benefits beyond geographic location can only be discussed qualitatively, as tools do not yet exist to measure other expected benefits. It is Iowa DOT's expectation that federal guidance and best practices on metrics to quantify benefits to DACs will continue to evolve. In the meantime, Iowa DOT is evaluating existing programs and data tools to internally enhance, target, and measure the benefits of the NEVI program to DACs. Initially, the location EV chargers and the percentage of those located in, or near, USDOT-designated DACs will be tracked using the EV Charging Justice40 Map Tool. Iowa DOT will also explore opportunities to enhance and measure DBE utilization on NEVI projects. This is discussed in additional depth within the workforce and labor element of this plan. Existing partnerships with MPOs and local governments will also be explored to continue to fine tune potential measurements and improvements for gauging air quality improvements and DACs.

## 9.3 Benefits to DACs Through This Plan

Iowa DOT anticipates challenges in identifying the totality of direct, indirect, and cumulative benefits of this plan to DACs. While it is possible to account for charging infrastructure location in relationship to DACs, the benefits of this investment are expected to go beyond geographic location of the chargers. EV charger presence in DACs when the community has low, or no, EV ownership provides little benefit beyond enhancing business economy in these areas. However, Iowa DOT will engage rural transit providers who have adopted electric transit vehicles to identify whether NEVI-supported charging stations could be utilized for their needs. Through existing programs and outreach, job creation for EVs can be enhanced through the use and training of DBEs. Additionally, as the fleet transitions to alternative fuels, emission reduction is expected to provide cleaner air. These are currently qualitative expectations, as tools to reliably measure these benefits do not currently exist.

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# CHAPTER 10

## Labor and Workforce Considerations

The NEVI program will generate substantial opportunities for equitable and accessible job creation in the electrical and construction trades in Iowa, as a network of EV chargers is planned, designed, installed, and commissioned. Project planning, stakeholder engagement, construction and its support services, and long-term maintenance will all provide robust opportunities.

### 10.1 Construction and Electrical Trade in Iowa

The Construction sector is nationally defined by the U.S. Bureau of Labor Statistics (BLS) as being comprised of establishments primarily engaged in the construction of buildings and engineering projects (e.g., highways and utility systems), or in the construction trades. According to Iowa Workforce Development Quarterly Census of Employment and Wages, Iowa had a construction workforce of more than 79,600 in 2021, approximately 5.3 percent of the state's workforce.<sup>44</sup> The latest Iowa

Construction Industry Profile notes an average annual wage of \$58,789. Men continue to make up the majority of this industry in Iowa, holding 87.2 percent of the jobs in 2019.<sup>45</sup> Iowa statewide projections for 2020 to 2030 show anticipated growth in both the "heavy and civil-engineering construction" and "specialty trade contractors" fields of 17 and 22 percent, respectively, as shown in **Table 28**.<sup>46</sup>

**Table 28: Iowa Construction Industry Projections 2020-30**

INDUSTRY DESCRIPTION	NAICS CODE	TOTAL GROWTH	PERCENT CHANGE
Heavy and Civil Engineering Construction	237	2,185	17.9%
Specialty Trade Contractors	238	10,880	22.0%

*Source: Labor Market and Economic Research Bureau, Iowa Workforce Development*

The use of well-trained electrical tradespersons will be critical to the success of building out the NEVI network in Iowa. Of the full construction workforce, 6,106 are electricians. The state is also seeing growth in the skill set needed for NEVI implementation, with 19 Iowa-based electricians who have become certified in the EVITP. One primary finding is that, of the certified EVITP

electricians in Iowa, all are located in metropolitan areas, primarily in Des Moines. While Des Moines is centrally located, the state's dispersed footprint of small- and medium-size urbanized areas and expansive rural areas will likely generate some construction activity distant from the primary location of this workforce.

### 10.2 Educational Program and Partnerships

Proactive encouragement of local construction laborers will be needed across the state to appropriately engage benefits to DACs through job creation. A primary driver of this is through educational opportunities for the construction and electrical trades. The electricity workforce field is evolving and so is the talent. Currently, certificate programs such as EVITP exist to curate a skill set to an already licensed electrician. Apprenticeship programs run by the IBEW in Iowa include EVITP training in an effort to prepare for NEVI implementation.

In Iowa, electrician trade programs are currently offered through both registered apprenticeships and community college programs, or a hybrid of both. Iowa Code 103 states that “an applicant for a Class A Journeyman electrician license shall have successfully completed an apprenticeship training program registered by the Bureau of Apprenticeship and Training of the United States Department of Labor.” A comprehensive list of approved program, licenses, and certifications are maintained by the Iowa State Fire Marshal Division, Electrical Bureau.

Similar to electrical trades, construction trades are also available through registered apprenticeship and community college programs. Additionally, several Iowa high schools also offer quality pre-apprenticeship programs to prepare high school students to meet the basic qualifications for entry into a Registered Apprentice Program (RAP) upon graduation.

## 10.3 Labor and Workforce Strategies

Iowa will position its best assets, Iowans, to fill this job through leveraging existing partnerships with Iowa Department of Education, Iowa Workforce Development (IWD), IEDA, community colleges, high schools, and trade organizations to develop labor and workforce strategies, programs, and opportunities. Iowa has strong existing programs that will enable NEVI investment to create jobs and benefits that are inclusive, local, and create a diverse and sustainable EV workforce.

The development of the NEVI network will rely on labor throughout the state, and will need to leverage specialty contractor services, particularly electricians. This presents a unique opportunity for Iowa to target workforce development activities toward existing programs such as DBEs (women and minority-owned small business) to grow this industry, with goals to expand the sources of training, experience level, and diversity of the workforce that is installing and maintaining EV charging infrastructure.

In deploying NEVI, Iowa DOT will proactively partner with the Iowa Department of Education, IWD, IEDA, educational institutions, labor, and industry stakeholders to develop and refine an EV workforce strategy that combines the flexibilities of existing resources and programs. Iowa will be able to leverage the following strengths in developing the EV workforce during the horizon of this plan and beyond:

- » **Statewide Workforce Initiatives:** Iowa has the ability to leverage statewide workforce initiatives already in place to accelerate workforce focused on the EV network. One example is the Future Ready Iowa program, an initiative to build Iowa’s talent pipeline with the goal to have 70 percent of Iowa’s workforce possess education or training beyond high school by 2025. This program has established \$16M to scholarship and grant programs to help more Iowans achieve their educational goals.

- » **Programs Bolstering Workforce Equity and Accessibility:** The IEDA and Iowa DOT have programs targeted at women, minorities, individuals with disabilities, and service-disabled veterans (Iowa DOT – Disadvantaged Business Enterprise Program; IEDA– Targeted Small Business Program). IWD rewards employers for hiring individuals who have had difficulty finding work through the federal Work Opportunity Tax Credit (WOTC), a state-administered federal program awarded to companies that hire people facing significant barriers to employment.
- » **Educational Collaboration:** Iowa DOT 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. This collaboration will build on the Opportunities in Energy: Iowa Career Pathways,<sup>47</sup> completed by the Iowa Department of Education and various statewide partners, including utilities.
- » **Inclusive Input and Outreach:** Workforce training and outreach plans will be explored, and could include input from diverse communities, advocacy groups, and industry organizations, as well as diverse/DBE firms. Educational collaboration as mentioned earlier could include program and certificate development, outreach, and recruitment with established educational intuitions. Strategies for recruitment of minority and women students will be developed to foster a diverse local workforce.

# CHAPTER 11

## EV Supply Equipment Cybersecurity

The state of Iowa and Iowa DOT are committed to public service, including cybersecurity, cyber resiliency, and privacy protections for all services and systems in the communities in which they serve. Iowa DOT will provide NEVI funding for early implementation of EV charging equipment, but will not own or operate equipment. EV charging vendors and operators will be responsible for the networked services, electricity, Internet or cellular service, and reporting. Iowa DOT will actively partner with Iowa OCIO to sustain Iowa's strong cybersecurity posture. As technology emerges, the standard of due care is expected to mature and be maintained in correlation to the updated federal standards and guidelines. Iowa OCIO has developed a Cybersecurity Strategic Plan,<sup>48</sup> which will encompass the NEVI program as it is implemented in Iowa. Iowa DOT and Iowa OCIO will work together to appropriately identify resources to mitigate exposure and risk to EV charging site users.

As the U.S. Infrastructure Investment and Jobs Act has allocated funds for deployment of EV charging stations along designated AFCs, and as Iowa DOT intends to deploy these systems to support the goal of advancing widespread EV adoption, this cybersecurity policy document provides guidelines and best practices for Iowa DOT and EV charger deployers.

The potential sources and types of cybersecurity threats are evolving, and regularly scheduled risk assessments are prudent and necessary to provide Defense in Depth (DiD) protection. Successful exploitation of even a single DCF can have cascading effects upstream, and should be anticipated and mitigated through the established framework provided by the Iowa OCIO Strategic Plan. Planning for the protection of cybersecurity of this joint transportation and energy project will be a collective effort between Iowa DOT, Iowa OCIO, and stakeholders.

Primary goals of the EV charging cybersecurity guidance are:

- » Ensure that all EV charging infrastructure deployed with NEVI funds is secure. 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 and service availability, privacy breach, etc. from unprotected connections among stakeholder partner and user systems.
- » Ensure that all revenue and financial systems are compliant with the Payment Card Industry (PCI) requirements.
- » Ensure that all security operations are compliant with, and certification maintained for, Security Operations Center (SOC), Level 2 (SOC2), audit requirements.
- » Ensure that functionality required for a fully functional EV charging system is available to support commercial vehicle operations, government fleet operations, and service to private motorists, while assuring maintenance of the above secure environment.
- » Ensure that physical and electronic resiliency is built in.
- » Ensure that Security by Design (SbD) is implemented for each project.

## 11.1 Current Cybersecurity State of the Industry

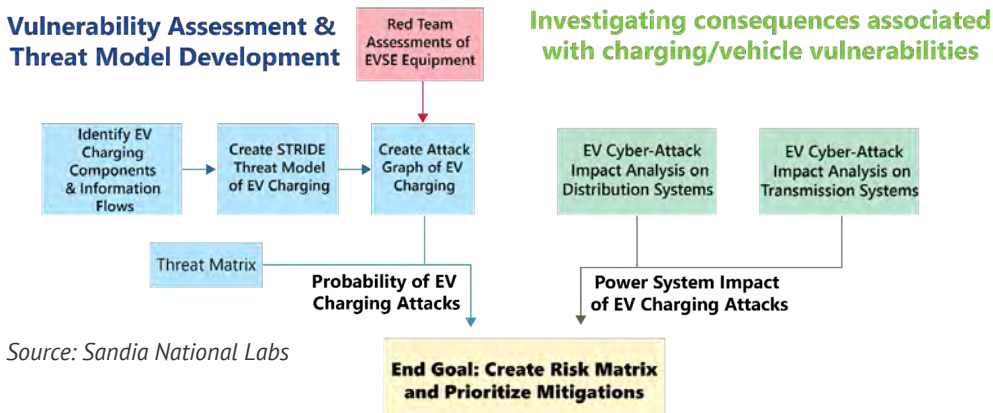
### 11.1.1 Industry Studies/Reports

- » Industry studies indicate threat surfaces will continue to evolve for some time. Regular review periods should be set for ongoing risk assessments and updated protective measures.
- » While Iowa DOT will not own or maintain these facilities, there is an ongoing public interest in requiring vendor/operators of NEVI-funded facilities to conduct periodic updates to vulnerability scanning and protective measures implemented.

### 11.1.2 Need to Conduct Project Specific Risk Assessments

- » As cybersecurity risks evolve over short time periods, each NEVI-funded project (or group of related projects) will 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, Original Equipment Manufacturer [OEM] vendors, charging network operators, etc.). The project risk assessment will be led and conducted by the vendor/contractor awardee of funds, in partnership with Iowa DOT and Iowa OCIO, at no additional cost to Iowa DOT or NEVI funds. A final assessment report will include identified risk, mitigating controls proposed, and a recurring schedule for reassessment and an updated response plan throughout the life of the project.
- » Sandia National Laboratories (SNL) followed the following process/task flows in conducting its research on potential risk models.<sup>49</sup> This is a recommended approach for NEVI-funded risk assessments.
- » The Spoofing, Tampering, Repudiation, Information Disclosure, Denial of Service, and Elevation of Privilege (STRIDE) model for capturing threat surfaces 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.<sup>50</sup> These key elements for analysis are identified from the architecture and assessed for risk against the threats represented by STRIDE.

Figure 40: Risk/Consequence Process Flows



Source: Sandia National Labs

Figure 41: STRIDE Model Elements

Threat	Desired property
Spoofing	Authenticity
Tampering	Integrity
Repudiation	Non-repudiability
Information disclosure	Confidentiality
Denial of Service	Availability
Elevation of Privilege	Authorization

Source: Sandia National Labs

## 11.2 Best Practices – Minimum Guidelines

A critical element to establishing, and achieving, the expectations outlined in this EV infrastructure deployment plan is following a set of best practices. The EV charging implementer will follow best practices for ensuring cybersecurity of the EV infrastructure.

### 11.2.1 Best Practices - Foundational Principles

Achieving the best feasible protective posture is facilitated by employing two foundational principles: SbD and DiD.

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

### 11.2.2 Best Practices – Follow Existing Standards

Iowa DOT requires compliance with all applicable national, state of Iowa, and industry standards.

### 11.2.3 General Best Practices

A common set of recommended best practices are summarized below for the EV charging equipment deployers. Details of these are available at [doi.org/10.2172/1706221](https://doi.org/10.2172/1706221).

- » Risk Management
  - Establish full life-cycle risk reviews, and prioritize improvements based on risk to EV charging 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 log-in, and do not 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 EV charging equipment.
  - Apply network segmentation and security systems, including Intrusion Detection System (IDS), Intrusion Prevention System (IPS), and firewalls.
  - Event and incident response, Continuity of Operations (COOP).
  - Implement Information Security Continuous Monitoring (ISCM), per NIST Special Publication (SP) 800-137, ISCM for Federal Information Systems and Organizations.
  - Establish protocols and procedures for immediate response to logs or alerts from ISCM, Security Information and Event Management (SIEM) and IDS/IPS systems.
  - Create an SOC, and maintain SOC2 certification
  - Establish business continuity, incident response, and disaster recovery plans. Conduct regularly scheduled tabletop 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 EV charging equipment when it departs the facility.
  - Specify tamper-resistant seals, alarms, and other protective measures to prevent and report attempts of unauthorized access to equipment or enclosures.
- » Workforce Management
  - Ensure critical roles have redundancy in personnel and cross-function capabilities.
  - Evaluate competence of staff with periodic social engineering (phishing), audits, etc.
- » Cybersecurity Program Management
  - Mature a cybersecurity program strategy with clear priorities and a governance model.
  - Include a safe environment for anonymous or protected means to report violations or vulnerability concerns.

## 11.2.4 Foundational Documents

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

Harnett, K., Watson, G., and Brown, G., November 2019. Government Fleet and Public Sector EVSE Cybersecurity Best Practices and Procurement Language Report, DOT-VNTSC-NAVY-20-01, prepared by USDOT Volpe Center, and prepared for the Department of Navy (DoN), Naval Facilities Engineering Systems Command (NAVFAC), Public Works Business Line, Transportation Product Line. Available from [ntlrepositary.blob.core.windows.net/lib/68000/68700/68702/Navy\\_Public\\_Version\\_EVSE\\_Cybersecurity\\_FINAL\\_November\\_21\\_DOT\\_Library\\_VersionV4.pdf](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 the DOE, Securing Vehicle Charging Infrastructure, SAND2020-11971R, September 30, 2021. Available from: [doi.org/10.2172/1706221](https://doi.org/10.2172/1706221).

# CHAPTER 12

## Program Evaluation

### 12.1 Evaluation Basics

To evaluate the success of this plan, Iowa DOT has identified performance metrics associated with each plan goal. Each year, Iowa DOT will evaluate and report on the progress toward each 5-year goal. The annual assessment will allow Iowa DOT to identify opportunities to adjust implementation efforts and better meet the goals.

The metrics were developed based on their ability to:

1. Accurately and Meaningfully Reflect the Goal
2. Provide a Unique Value (not like another metric)
3. Be Easily Acquired
4. Be Accurately Measured

During implementation and evaluation of this plan, new procedures or technology may provide an opportunity to adjust metrics or methodology. Evaluation procedures may be revised, provided that they still fulfill these four criteria.

### 12.2 Evaluation Metrics

The following tables identify indicators and metrics for each of the seven plan goals. The baseline and target values have been identified, to the extent possible. Baseline data is from 2022, unless otherwise stated. The remaining values (indicated with to be determined [TBD]) will be developed through the implementation phase of this plan.

#### GOAL 1: AN EV FAST-CHARGING SYSTEM THAT SUPPORTS REGIONAL AND INTERSTATE TRAVEL

Table 29: Goal 1 Performance Metrics

METRIC	DATA SOURCE	BASELINE VALUE	5-YEAR TARGET
<b>Percent of NEVI-compliant AFC Built Out</b> (directional miles compliant/ total miles)	Iowa DOT	27.0% (405/1,500)	100%
<b>Percent of NEVI-Compliant Stations Built Out</b> (number of stations compliant /19 to 24 stations needed for full compliance on AFCs)	Iowa DOT	17 to 21% (4/19 to 4/24)	100%

Directional miles of NEVI-compliant AFCs are calculated based on the nominal exit mile marker for 50 mi in both the increasing and decreasing mile-marker direction. For example, a station at Mile Marker 50 would cover to Mile Marker 0 in the decreasing mile-marker direction, and to Mile Marker 100 in the increasing mile-marker direction of travel. The total directional miles of AFCs planned for the state is 1,500 directional miles.<sup>51</sup>

Currently, there is a NEVI-compliant station in Council Bluffs off the South Expressway exit. It is three mi from the Iowa/Nebraska border along I-80. The mileage of

compliance along I-80 is three mi westbound, plus 50 mi eastbound, for a total of 53 directional miles. This station is located along a section of I-80 that is also a section of I-29 for 3 mi. The mileage of compliance along I-29 would be 50 mi southbound and 26 mi northbound, for a total of 76 directional miles. The northbound mileage is fewer than 50 mi, as a second, soon to be constructed, NEVI-compliant station will be located at the Missouri Valley exit. The mileage of coverage from that site is 26 mi in the southbound direction and 50 mi in the northbound direction, for a total mileage of 76 directional miles.

The third NEVI-compliant station is in Waukee off the Grand Prairie Parkway exit. The fourth NEVI-compliant station is in Williamsburg off the P Avenue/North Highland Street exit. The mileage of compliance associated with these stations along I-80 is 100 directional miles from each station, for a total contribution of 200 directional miles. When including all corridors, the baseline mileage covered is 405 directional miles.

For the second metric, the total number of stations needed for full compliance is a range of 19 to 24 stations, depending upon whether existing stations are upgraded for compliance or new stations are constructed.<sup>52</sup> For the baseline, we have reported a range of percentage build-out. As the deployment proceeds, the number of stations needed for full compliance will be adjusted accordingly.

## GOAL 2: A LOCAL EV SYSTEM THAT PROMOTES EQUITABLE ACCESS AND MOBILITY THROUGHOUT IOWA'S COMMUNITIES

**Table 30: Goal 2 Performance Metrics**

METRIC	DATA SOURCE	BASELINE VALUE	FIVE-YEAR TARGET
<b>Number of NEVI-Compliant Stations Serving Disadvantaged Areas</b>	Iowa DOT	1 station	TBD
<b>Number of NEVI-Compliant Stations Built in Rural Areas (under 50,000 population)</b>	Iowa DOT	2 stations	TBD

The two proposed metrics under Goal 2 focus on the number of stations within specific community types. The measurement of these metrics will conform to NEVI guidance that stations need to be located within one-mi driving distance of the AFC, so only exits located in disadvantaged areas or in rural areas will count toward these metrics.

Disadvantaged areas will be defined as Justice40 communities, per NEVI program guidance. Justice40 areas coincide with census tracts, which may use roads as boundary lines, such that a Justice40 community may be bounded by the AFC. In this case, a station on the opposite side of the AFC from the Justice40 community would still serve the disadvantaged areas, but would not be located within the disadvantaged area. To account for this, stations located within one mi of Justice40 communities will be included in this metric.

There are 73.4 mi of AFCs that are within, or bounded by, Justice40 communities, representing 9.8 percent of the planned build-out. While the goal of Justice40 is to provide 40 percent of the benefits of the program to disadvantaged areas, that goal cannot be applied directly to the number of stations or length of AFCs because Justice40 communities make up less than 40 percent of the AFCs.

The U.S. Census designation for urbanized areas is those with a population of 50,000 or more.<sup>53</sup> The remaining areas are considered rural for the purposes of this metric. There are two stations located in rural areas: the Missouri Valley (soon to be constructed) and Williamsburg (existing) exits.

## GOAL 3: A CHARGING NETWORK THAT HELPS PROVIDE THE TRAVELING PUBLIC WITH CONVENIENT ACCESS TO A VARIETY OF TRANSPORTATION AND ENERGY OPTIONS

Table 31: Goal 3 Performance Metrics

METRIC	DATA SOURCE	BASELINE VALUE	FIVE-YEAR TARGET
<b>Percent of NEVI-Compliant AFC Built Out</b> (directional miles compliant/1,500 total directional miles)	Iowa DOT	27.0% (405/1,500)	100%

The percent of NEVI-compliant AFC mileage metric used for Goal 1 is also appropriate for Goal 3 because the build-out of the network will provide convenient access to EV travel.

Another metric to be used for monitoring purposes only is the amount of time in which all ports are simultaneously in use. While high usage would be desired as a sign that the EV charging stations are beneficial to the public, if all ports are simultaneously in use, that could indicate that users need to wait to charge or continue to another station with an open port. This information can be used to inform the need for additional stations or ports in an area.

Finally, the Iowa DOT Motor Vehicle Division can provide data on the total number of EVs and PHEVs registered in the state. This metric is related to the usage and demand for charging infrastructure, and will be monitored during the course of the program. Currently, there are 9,402 EVs and PHEVs registered in the state out of 3.M total motor vehicle registrations.<sup>54</sup>

## GOAL 4: A TRANSPORTATION SYSTEM THAT REDUCES ENERGY LIFE-CYCLE EMISSIONS TO MINIMIZE IMPACT ON HUMAN AND ENVIRONMENTAL HEALTH

Table 32: Goal 4 Performance Metrics

METRIC	DATA SOURCE	BASELINE VALUE	FIVE-YEAR TARGET
<b>Amount of Charging Energy Consumed</b> (Energy usage of all stations in KWh)	Station Managers	No Baseline Value	TBD

The amount of energy consumed indicates a shift from traditional fuels to electric. The target will be developed through the deployment phase.

The ICCC, designated and supported by the U.S. DOE and housed at the IEDA, works to increase the adoption of alternative fuels, including use of EVs, among other initiatives. The Clean Cities Annual Report includes metrics regarding annual energy impact by alternative fuels, including EVs. The program also tracks GHG emission reductions by fuel type.<sup>55</sup>

## GOAL 5: A SUSTAINABLE TRANSPORTATION AND ENERGY SYSTEM THAT CAN ADAPT TO ECONOMIC, TECHNOLOGICAL, AND ENVIRONMENTAL CHANGES WHILE PROVIDING A HIGH LEVEL OF SYSTEM RELIABILITY

Table 33: Goal 5 Performance Metrics

METRIC	DATA SOURCE	BASELINE VALUE	FIVE-YEAR TARGET
<b>Uptime Rate</b> (amount of time that ports are in service/total time that stations are intended to be open)	Station Managers	N/A	97% (minimum)
<b>Charging Speed</b> (number of chargers with power level above 150 kW)	Station Managers	3	TBD

The uptime rate is defined in the NEVI Formula Program guidance. The FHWA proposes an uptime requirement of at least 97 percent to provide a reliable national network for EV charging.<sup>56</sup>

Uptime is calculated for the time when a charger's hardware and software are both online and available for use, or in use, and the charging port successfully dispenses electricity, as expected. For the purposes of the required minimum uptime calculation, FHWA proposes that charging port uptime must be calculated on a quarterly basis for the previous 12 months. Charging port uptime percentage would be calculated using the equation:

$$\mu = ([8760 - [T_{\text{outage}} - T_{\text{excluded}}]]) / 8,760 \times 100$$

in which  $\mu$  = port uptime percentage, and  $T_{\text{outage}}$  is the total hours of outage in the previous year.

$T_{\text{excluded}}$  is the total hours of outage in the previous year for reasons outside the charging station operator's control, such as electrical utility service interruptions, Internet or cellular service provider interruptions, and outages caused by the vehicles, provided that the charging station operator can demonstrate that the charging port would otherwise be operational.

A metric that indicates the ability for stations to adapt to technological changes is the electrical charge speed. The power level for stations is anticipated to be above 150 kW over time. Certain stakeholders in Iowa are already aiming to implement 180 kW or 200 kW in the near future. Chargers at three of the existing NEVI-compliant stations are already 350 kW.



## GOAL 6: A CHARGING NETWORK THAT SUPPORTS LONG-TERM EV STATION SUCCESS, WHICH MAXIMIZES ECONOMIC BENEFITS FOR CONSUMERS

Table 34: Goal 6 Performance Metrics

METRIC	DATA SOURCE	BASELINE VALUE	FIVE-YEAR TARGET
<b>Average Consumer Charging Cost Per kWh</b> (total consumer cost/total charging time)	Station Managers	N/A	TBD
<b>Efficiency of Federal Dollars</b> (total number of NEVI-compliant ports/total NEVI dollars used)	Iowa DOT	N/A	TBD
<b>Average or Median Number of Charging Sessions Per Port</b> (total number of sessions each year/total number of ports or median)	Station Managers	N/A	TBD

The average consumer charging costs must be reported as part of the NEVI Formula Program guidance. This metric indicates the economic benefit to the consumer.

The efficiency of federal dollars is a recommended metric from the NEVI Formula Program guidance.

The average or mean number of charging sessions indicates the success of the charging stations. The decision to use the average or median will be made after evaluating the data and determining if there are high or low outliers.

The baseline conditions and 5-year targets of these metrics cannot yet be determined, and will be developed through the deployment phase. The data are anticipated to be collected through the software utilized by the charging stations, which is already a common practice in the industry.

The qualitative feedback provided by station managers and consumers will be monitored to identify additional measures to be taken to ensure optimal outcomes for Iowans.

## GOAL 7: A GROWING NETWORK OF CHARGERS THAT FOSTERS INNOVATION AND COLLABORATION TO EXPAND ECONOMIC OPPORTUNITIES

Table 35: Goal 7 Performance Metrics

METRIC	DATA SOURCE	BASELINE VALUE	FIVE-YEAR TARGET
<b>Number of Electrical Contractors Certified through EVITP</b>	<a href="#">Home   EVITP</a>	19 Contractors; Target TBD	TBD

The number of electrical contractors certified through EVITP is an easily acquired metric that indicates growth in the EV business sector related to installation and maintenance of the charging stations. The target will be developed through the deployment phase, in addition to considering the other types of workforce development growth achieved through the NEVI program. For example, growing the workforce to maintain stations or receiving EV-related curriculum through existing training programs are both likely areas of growth and opportunity.

The state of Iowa intends to partner with private businesses to host and operate EV charging stations, which helps to fulfill this goal, but has not been identified as a reportable metric. As part of that effort, the state will ensure opportunities for DBEs.

In future years, other metrics may be considered such as the number of partnering businesses due to hosting or operating a station, number of utilities, or types of utilities. Additional businesses may develop to offer amenities or services to station patrons without any formal partnership with the state. Overall, the state desires to identify the total number of Iowans employed in an EV-related industry.

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# CHAPTER 13

## Exception Requests

The Iowa DOT has no exceptions to the NEVI requirements at this time.

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# CONCLUSION

The NEVI Formula Program, and the economic development it will bring, is a great opportunity to expand Iowa's workforce for the technology of tomorrow. Iowa DOT also recognizes the job and infrastructure benefits to Iowa's underserved communities. The significant investment in EV infrastructure will likely increase interest and adoption of EVs.

The technology and the program are continuing to be understood by Iowa DOT, drivers, facility operators, and many others. The agency has worked to meet the intent and requirements of the NEVI guidance, with engagement and assistance from the Joint Office of Energy and Transportation and FHWA. The approach is intended to balance the experience and strengths of Iowa DOT, while also utilizing the experience and strengths of the private sector.

This plan represents Iowa DOT's approach with the information and experience currently available. The agency anticipates annual updates that reflect lessons learned in Iowa and across the country, while reflecting updated guidance offered by the Joint Office of Energy and Transportation. This would include any changes related to the current NPRM 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. Feedback from stakeholders and public engagement will inform these annual updates, with the desire to improve future implementation.

In accordance with NEVI guidance, the plan focuses on deploying DCFC stations on the identified AFCs across the state, with the goal of serving all Iowans, and those visiting and passing through 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 potential priority corridors. This is an important step once the initial AFC network is designated as built-out.

This plan does not identify specific locations for chargers along Iowa's AFCs. Iowa DOT 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 Iowa DOT's requirements, while still providing flexibility for private partners to efficiently build and operate the system. The site selection and contracting process will be the next step in implementing the plan. Iowa DOT's next step, during Joint Office of Energy and Transportation review of this plan, is to clarify and finalize the contracting process so that the implementation process can begin as soon as efficiently possible.

Iowa DOT is looking forward to additional guidance and feedback toward the approach outlined in this plan.



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# ENDNOTES

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<sup>2</sup>IEDA. "Charging Forward: Iowa's Opportunities for Electric Vehicle Infrastructure Support." Provided to Iowa Legislature in February 2019.

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<sup>5</sup>Salisbury, Neil E. "Iowa." Britannica. April 14, 2022. Iowa | Flag, Facts, Maps, & Cities | Britannica (Accessed May 19, 2022)

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<sup>10</sup>EV Connect. "What to Expect from your Electric Car and Charging Station Performance in Cold Weather." January 20. Electric Cars in Cold Weather | EV Connect — EV Connect (Accessed May 20, 2022)

<sup>11</sup>EV Connect.

<sup>12</sup>National Renewable Energy Laboratory, U.S Department of Energy. "Iowa 30-Meter Residential-Scale Wind Resource Map," WINDEXchange: Iowa 30-Meter Residential-Scale Wind Resource Map ([energy.gov](http://energy.gov)) (Accessed May 20, 2022)

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<sup>15</sup>Economic Research Service. "Land Use Acreage Iowa." 2012. Last Updated August 20, 2019. US Department of Agriculture. USDA ERS - Maps and State Rankings of Major Land Uses (Accessed May 20, 2022)

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<sup>17</sup>Iowa DOT. "Iowa in Motion 2050 State Transportation Plan." Adopted by the Iowa Transportation Commission on May 10, 2022. Page 44. Iowa in Motion - Iowa Department of Transportation ([iowadot.gov](http://iowadot.gov)) (Accessed May 20, 2022)

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<sup>19</sup>Iowa DOT. "Iowa Public Transit 2050 Long Range Plan." July 14, 2020. Page 49. Iowa-Public-Transit-Plan-WEB.pdf ([iowadot.gov](http://iowadot.gov)) (Accessed June 6, 2022)

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<sup>51</sup>Mileage is calculated as: I-80 = 306 \* 2; I-29 = 152 \* 2; I-35 = 219 \* 2; I-380 = 73 \* 2.

<sup>52</sup>This is calculated as: 10 sites (I-80) + 6 sites (I-35) + 5 sites (I-29) + 3 sites (I-380) = 24 sites.

<sup>53</sup>U.S. Census Bureau. "The Urban and Rural Classifications." Page 12-1. Ch12GARM.pdf ([census.gov](http://census.gov)) (Accessed July 7, 2022).

<sup>54</sup>Iowa DOT. "Calendar Year 2021 Vehicle Registrations Summary." [regis2021.pdf\(iowadot.gov](http://regis2021.pdf(iowadot.gov)) (Accessed July 8, 2022). Count includes automobiles as well as bus, moped, motor homes, motorcycles, multi-purpose, all sizes of trucks and truck tractors.

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