State of Arizona Electric Vehicle Infrastructure Deployment Plan

September 1, 2022

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List of Acronyms

AAA	American Automobile Association
AADT	average annual daily traffic
ADA	Americans with Disabilities Act
ADOT	Arizona Department of Transportation
AFC	alternative fuel corridor
AFV	alternative fuel vehicle
APS	Arizona Public Service
BIL	Bipartisan Infrastructure Law
CCS	combined charging system
CE	categorical exclusion
CHAdeMO	CHArge de MOve
CNG	compressed natural gas
DAC	disadvantaged communities
DBE	disadvantaged business enterprise
DCFC	direct current fast charging
DER	distributed energy resources
EJ	environmental justice
EV	electric vehicle
EVITP	Electric Vehicle Infrastructure Training Program
EVSE	electric vehicle supply equipment
FFY	federal fiscal year
FHWA	Federal Highway Administration
GHG	greenhouse gas
GWh	gigawatt hours
ICE	internal combustion engine
JATC	Joint Apprenticeship and Training Program

kW	kilowatt
kWh	kilowatt hour
LEP	limited English proficiency
LMI	low- to moderate-income
MOU	memorandum of understanding
NEHC	National Electric Highway Coalition
NEPA	National Environmental Policy Act
NEVI	National Electric Vehicle Infrastructure
O&M	operation and maintenance
PEV	plug-in electric vehicles
Plan	Arizona's EV Infrastructure Deployment Plan
Q&A	questions and answers
SP	special publication
SR	state route
SRP	Salt River Project
SWEEP	Southwest Energy Efficiency Project
TEP	Tucson Electric Power
UNSE	UNS Electric Inc.
USDOT	U.S. Department of Transportation
VMT	vehicle miles traveled

Introduction

Overview

Adopting electric vehicles (EVs) increases the resilience of the transportation system, improves air quality, and contributes to meeting state and federal carbon-reduction goals. Because more Arizonans and visitors to the state are driving EVs, the State is working to take advantage of federal funding opportunities to develop the infrastructure needed to support EV drivers. The Arizona Department of Transportation (ADOT), as tasked by the Bipartisan Infrastructure Law (BIL) and the National Electric Vehicle Infrastructure (NEVI) Formula Program, has developed Arizona's EV Infrastructure Deployment Plan ("Plan"), which seeks to increase the long-range mobility of EV drivers by reducing gaps in electric vehicle supply equipment infrastructure (EVSE; i.e., an EV charging station) and contributing to an equitable, reliable, resilient, and accessible national EVSE network.

Funding to support this work was secured in March 2022 and the analysis and development of the Plan commenced in May 2022.

Development Process

The Plan was developed in response to the provision of funding for EV adoption that was included in the BIL, which was enacted as the Infrastructure Investment Jobs Act, Public Law 117-58 (November 15, 2021). The NEVI Formula Program is a $5 billion program established in the BIL to serve as a catalyst for the construction and implementation of a national network of 500,000 EVSE by 2030.

State departments of transportation can nominate corridors along the national highway system within their states to become Alternative Fuel Corridors (AFCs) and be eligible for funding for EVSE installations and upgrades under the BIL.

Study Area

Currently, Arizona's designated AFCs are all part of the Interstate Highway System. In 2020, the Arizona State Highway System had 9,440 total centerline miles, including 1,168 centerline miles of interstate highway. Arizona's entire roadway network (including local roads) had 66,968 centerline miles. While interstate highways make up less than two percent of the state's total roadway network, they account for 21.3% of the vehicle miles traveled (VMT) on Arizona roads.[1] **Table 1** lists the VMT along each of the major interstates that have been designated as AFCs.

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[1] ADOT. (n.d.) *Fast Facts from ADOT*. Retrieved from https://azdot.gov/fast-facts

Table 1: AFCs VMT Data

Corridors	VMT per Day (million miles)
I-8	1.9
I-10	19.4
I-15	0.6
I-17	7.5
I-19	1.8

Plan Development

The Plan was developed in accordance with federal law, NEVI Formula Program guidance, Arizona law and ADOT Policies. ADOT has hosted and will continue to host public engagement activities with community-based organizations, transportation stakeholders, federal, state, local and tribal representatives, as well as other impacted groups, in order to refine a Plan that is equitable and beneficial to the entire state.

The Plan was developed in cooperation with the Arizona Department of Environmental Quality, Arizona Department of Commerce, Arizona Corporation Commission, Arizona Department of Administration, and Arizona Residential Utility Consumer Office.

ADOT based the Plan on the NEVI Formula Program Notice of Proposed Rulemaking which is currently open for public comment. It is anticipated that the proposed rule will change based on comments submitted to the Federal Highway Administration (FHWA). ADOT intends to comply with the final regulation and will amend this Plan to reflect the final rule when issued.

Plan Vision and Goals

The vision of the Plan is to aid in the deployment of a national EVSE network and make EV driving accessible and reliable in the state of Arizona.

ADOT has set six goals for an interconnected EVSE network:

- Reduce range anxiety by closing gaps in the EVSE network along Arizona's AFCs
- Support the development of an EVSE network that is resilient, equitable, accessible, and reliable
- Engage stakeholders and the public in the planning, development, and installation of EVSE
- Identify potential new AFC locations during the outreach process
- Utilize efficient contracting and procurement mechanisms to: maximize the amount of infrastructure that can be built; consider future needs; and reduce current risk(s) to support the EVSE network's long-term viability
- Use data and performance metrics to evaluate charger installation and operations in order to inform the development of program improvements

Plan Milestones

Major milestones and anticipated dates of EVSE deployment include:

May 2022

- Began data collection and Plan research
- Began ongoing stakeholder outreach

June 2022

- Held State Agency coordination meeting
- Held online stakeholder workshop
- Conducted online stakeholder survey

July 2022

- Began ongoing public outreach
- Held online public meeting held
- Conducted online public survey

Federal Fiscal Year (FFY) 2022

- Complete and submit the final EV Infrastructure Deployment Plan

FFY 2023

- Continue public and stakeholder outreach.
- Solicit and award contracts to upgrade existing stations and begin upgrade installations
- Begin the solicitation process for new EVSE stations
- Nominate new AFCs through the federal process
- Update the EV Infrastructure Deployment Plan to include the new AFCs

FFY 2024

- Award contracts for new EVSE stations and begin installation
- Solicit and award installation and operation contracts for EVSE stations on new AFCs, up to the funding limit
- Update EV Infrastructure Deployment Plan, including stakeholder and public outreach

FFY 2025

- Solicit and award remaining funding for EVSE deployment
- Update EV Infrastructure Deployment Plan, including stakeholder and public outreach

FFY 2026

- Complete installation of remaining EVSE
- Evaluate the performance of NEVI Formula Program implementation

State Agency Coordination

Because the Plan has the potential to significantly impact all state residents, ADOT recognizes the importance of coordinating with other state agencies in developing and approving the Plan. Multiple state agencies were identified as key stakeholders, described in the *Public Engagement -Stakeholders Involved in Plan Development* section.

Coordination with these agencies was conducted throughout the Plan's development, including at a State Agency Partners Meeting held on June 16, 2022. The meeting's objective was to gather input to inform the development of the Plan. Participating agency partners were

- Arizona Department of Environmental Quality
- Arizona Department of Commerce
- Arizona Corporation Commission
- Arizona Department of Administration
- Arizona Residential Utility Consumer Office
- Arizona Governor's Office

Separate from this meeting, a stakeholder survey was circulated to these state agencies, and individual agencies were contacted as needed. They were also notified of public outreach activities, including virtual and in-person public meetings and public surveys. Ongoing meetings will continue to be held with state agencies as needed.

Plans to Utilize Domestic EVSE

ADOT will act in accordance with the final NEVI Formula Program rulemaking to maximize opportunities to utilize EVSE made in the United States. ADOT recognizes that the Buy America requirements of 23 U.S.C. 313 and the Build America, Buy America Act apply to the use of NEVI Formula Program funds, and that it is the intent of the FHWA to maximize, consistent with the law, the use of goods, products, and materials produced in the United States. ADOT will ensure that EVSE station owners comply with FHWA's final regulations. When appropriate, ADOT may seek waivers from these provisions as provided by law and Executive Order 14005 ("Ensuring the Future is Made in All of America by All of America's Workers"). ADOT will continue to monitor updated policy guidance and regulations and amend or supplement the Plan as needed.

Public Engagement

Stakeholder Engagement and Public Involvement Goals

A Public Involvement Plan was developed to identify public involvement goals, methods to inform and engage key stakeholders and the public in the Plan development and ensure equitable access for underserved and Disadvantaged Communities (DACs) in engagement activities. The Public Involvement Plan ensures equitable statewide reach and encourages participation through both virtual methods, as well as in-person methods at a local level. The Public Involvement Plan includes multiple methods for the general public and key stakeholders to learn about and provide input on the Plan before the initial August 2022 submission, and again before Plan implementation.

Modeled after the International Association for Public Participation's *Spectrum of Public Participation*[2] process, ADOT's overall public participation goal is to consult the general public and key stakeholders in the Plan's development.

Throughout public engagement, ADOT will:

- Keep the public and stakeholders informed.
- Obtain feedback on the Plan analysis, alternatives and/or decisions.
- Listen to and acknowledge concerns and aspirations from the public and key stakeholders.
- Provide feedback on how public and key stakeholder input influenced the Plan recommendations.

Specific sub-goals include:

- Provide information about and facilitate informed public and stakeholder input on: Plan objectives; EVSE types and their charging speeds; federal requirements; guidelines for implementing the EVSE network; and the timeline for Plan submission and implementation.
- Secure participation from a broad cross-section of the community, as well as key stakeholders with an interest in EVSE development, with an emphasis on reaching DACs as identified in the Justice40 mapping tool.
- Raise awareness of ADOT's efforts to secure federal funding to improve infrastructure and transportation resiliency.
- Gain insight to supplement the data available on existing and future conditions.
- Gain insight into Arizona residents' propensity for, and barriers to, use of EVs.
- Understand the public's desires and priorities related to siting EVSE and prioritizing EVSE corridors, particularly in relation to how equity is evaluated and integrated into the prioritization process.
- Determine the community's perceptions and concerns regarding the EVSE network and inform future outreach efforts.

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[2] IAP2 International Federation (2018). *IAP2 Spectrum of Public Participation.* Retrieved from
https://cdn.ymaws.com/www.iap2.org/resource/resmgr/pillars/Spectrum_8.5x11_Print.pdf

Stakeholder and Public Involvement Activities

Public involvement is critical in the Plan's development. ADOT has developed a multi-faceted strategy to engage the public and key stakeholders. **Table 2** provides a description and status of public involvement activities. Some of these engagements were held prior to the Plan's initial submission in August 2022, and the remaining events are scheduled to occur after submission to gather input in preparation for finalizing and implementing the 2022 Plan.

Table 2: Public Involvement Activities

Activity	Status
Identification and notification of key stakeholders about the Plan. One-on-one meetings with key stakeholders.	April 2022 through Plan finalization
Tribal consultation and outreach with the six Arizona tribes, communities, and Native Nations with lands along AFCs (Navajo Nation, Gila River Indian Community, Colorado River Indian Tribes, Tohono O'odham Nation, Yavapai Apache Nation, Hopi Tribe).	April 2022 through Plan finalization
Development of a project email account azevplan@azdot.gov to receive and respond to public inquiries about the Plan.	May 2022 and throughout Plan
English/Spanish survey to sign up for the EV mailing list and ask questions.	May 2022 and throughout Plan
Establish EV Plan website to provide information, and for the public to ask questions and receive input.	May 2022 and throughout Plan
News releases, GovDelivery alerts, and social media were used to promote the Plan, announce the Plan's commencement, virtual and in-person public meetings, public survey(s), and the completion and posting of the Plan. For future engagement activities, ADOT will also place ads in print publications	May 2022 throughout Plan finalization
Development of frequently asked questions (FAQ) along with key messages to be used when responding to inquiries from the public and the media and addressing questions and answers (Q&A) at public meetings and workshops.	May 2022 and throughout Plan finalization
Development of a public project fact sheet.	June 2022
Virtual stakeholder workshop held (212 participants), which included a formal presentation, interactive discussion using real-time polling, and written and verbal Q&A.	June 30, 2022
Online stakeholder survey conducted (157 responses)	June 23 through July 8, 2022

Activity	Status
Virtual online statewide public meeting (302 attendees). The virtual meeting included live interpretation in Spanish, formal presentation, written and verbal Q&A, and additional comment options including an online form, email, phone, and mail.	July 14, 2022
Online public survey in English and Spanish (917 responses)	July 1 – July 21
Establish an English/Spanish project hotline for public questions/comments questions/comments.	July 2022 throughout Plan finalization
In-person public meetings held throughout the state. The meetings will provide open-house style engagement at the beginning and end of the meeting timeframe with a formal presentation and Q&A in the middle. Additional comment options will be provided including phone, mail, or email.	Anticipated Late 2022
Second online public survey in English and Spanish to seek input on the Plan recommendations and implementation.	Anticipated Late 2022

Stakeholder Engagement Notifications

Notifications for stakeholder engagement activities are provided via e-mail and ADOT's communication channels to encourage participation. Future events are discussed during all live events in order to spread awareness and maintain continuity and transparency. Each notification includes a phone number and email address that stakeholders can use to follow up with ADOT with questions and/or comments about future engagement events or the Plan development.

Public Involvement Notifications

To ensure equitable access of notification, ADOT is utilizing several channels to notify the public of engagement activities.

Notification Channels:
- Distribution of information by key stakeholders via their communication channels
- Circulation of a memo to elected officials and ADOT department leads
- Distribution of information via ADOT social media platforms
- Distribution of information via ADOT's GovDelivery email list. The Plan list was developed through an online survey inviting the public to sign up, a pop-up window on the Plan website, and email information provided in the public survey. To date, the email list has approximately 2,000 subscribers.
- Publication of information on the ADOT website
- Distribution of a news release to ADOT's statewide media list (TV, radio, and print; includes Spanish media)

For future public involvement activities seeking the public's input on the Plan, ADOT will continue to publicize opportunities for input via GovDelivery, social media, and the ADOT website, and will also develop and place ads in the following print publications:

- Arizona Republic
- Arizona Daily Star (Tucson)
- Arizona Daily Sun (Flagstaff)
- Prensa Hispana (Statewide Spanish)
- Relevant tribal publications

As presented in **Table 2**, a second survey will seek input from the public and stakeholders on the Plan recommendations and implementation. This survey will be available in hard copy form at the public meeting, as well as electronically via a customized survey link. It will be posted on the website and emailed to those on the project mailing list. ADOT will also distribute a news release, a GovDelivery notification, and social media posts to promote the survey.

Stakeholders Involved in Plan Development

An extensive and diverse list of key stakeholders for the Plan was developed by ADOT. It includes:

- City and county staff in communities along the AFCs
- Representatives from every Metropolitan Planning Organization/Council of Governments in Arizona
- Governor's office
- Various state agencies
- The six tribal communities with land along the AFCs
- EV industry representatives (including EVSE operators, EV automobile manufacturers, other EV suppliers, and EV advocacy organizations)
- Utility companies
- Chambers of commerce
- Other business or commerce organizations
- Large employers
- Others with interests in the Plan's development

Roadway users, including current EV users, are also stakeholders in the Plan.

Table 3 lists the organizations that were invited to participate in the Plan's development. Stakeholder organizations that address the goals of the Justice40 Initiative, identified in Executive Order 14008, are shown in bold text.

Table 3: Stakeholders Involved in Plan Development

Organization Category	Organizations Targeted for Engagement
Transportation planning organizations	- Central Arizona Governments - Central Yavapai Metropolitan Planning Organization - Lake Havasu Metropolitan Planning Organization - Maricopa Association of Governments - MetroPlan Metropolitan Planning Organization for Greater Flagstaff - Northern Arizona Council of Governments

Organization Category	Organizations Targeted for Engagement
	● Pima Association of Governments ● Sierra Vista Metropolitan Planning Organization ● Southeastern Arizona Governments Organization ● Sun Corridor Metropolitan Planning Organization ● Western Arizona Council of Governments ● Yuma Metropolitan Planning Organization
Counties and cities	● Apache County ● Coconino County ● Gila County ● Graham County ● La Paz County ● Maricopa County ● Navajo County ● Pima County ● Pinal County ● Santa Cruz County ● Yavapai County ● Yuma County ● Arizona League of Cities and Towns ● Avondale ● Benson ● Black Canyon City ● Buckeye ● Bowie ● Camp Verde ● Casa Grande ● Chambers ● Chandler ● Cochise ● Coolidge ● Cordes Junction ● Eloy ● Flagstaff ● Gila Bend ● Holbrook ● Joseph City ● Kingman ● Marana ● Maricopa ● Nogales ● Phoenix ● Quartzsite

Organization Category	Organizations Targeted for Engagement
	- Sahuarita - San Luis - San Simon - Sanders - Seligman - Tempe - Tucson - Welton - Willcox - Williams - Winslow - Yuma
State Department of Energy (DOE)	Arizona Department of Administration
Environmental protection agencies	- Arizona Department of Environmental Quality - U.S. Environmental Protection Agency
State economic development agencies	- Arizona Commerce Authority - Economics Collaborative of Northern Arizona - Greater Phoenix Economic Council - Mohave County Economic Department - City of Sahuarita Economic Development Department
Public transportation agencies	- City of Phoenix Public Transit - Arizona Transportation Authority - METROPLAN
Tribal governments	**Ak-chin Indian Community** **Cocopah Indian Tribe** **Colorado River Indian Tribes** **Fort McDowell Yavapai Nation** **Fort Mojave Indian Tribe** **Fort Yuma Quechan Tribe** **Gila River Indian Community** **Havasupai Tribe** **Hopi Tribe** **Hualapai Tribe** **Kaibab Band of Paiute Indians** **Navajo Nation** **Pascua Yaqui Tribe** **Pueblo of Zuni** **Salt River Pima-Maricopa Indian Community** **San Carlos Apache Tribe**

Organization Category	Organizations Targeted for Engagement
	● **San Juan Southern Paiute Tribe** ● **Tohono O'odham Nation** ● **Tonto Apache Indian Tribe** ● **White Mountain Apache Tribe** ● **Yavapai Apache Nation** ● **Yavapai-Prescott Indian Tribe**
Electric utilities; transmission and distribution owners and regulators	● Aha Macav Power Service ● Anza Electric Coop ● Arizona Corporation Commission ● Arizona Electric Power Co-op ● Arizona G&T Cooperatives ● Arizona Public Service ● Arizona Residential Utility Consumer Office ● CLEAResult ● Duncan Valley Electric Cooperative ● Garkane Energy Cooperative ● Graham County Electric Cooperative ● Grand Canyon State Cooperatives ● Mohave Electric Cooperative ● Pinnacle West ● Salt River Project ● Sierra Southwest Cooperative ● Southwestern Power Group ● Sulphur Springs Valley Electric Cooperative ● Trico Electric Cooperative ● Tucson Electric Power (TEP) and UniSource Energy Services
Community-based organizations, small business associations, chambers of commerce, labor organizations, and private entities	● Arizona Chamber of Commerce ● **Arizona Hispanic Chamber of Commerce** ● Arizona Small Business Association ● **Asian Corporate and Entrepreneur Leaders** ● **Black Chamber Arizona** ● **Chinese Chamber of Arizona** ● Economics Collaborative of Northern Arizona ● Flagstaff Chamber of Commerce ● Fortis Networks ● Greater Flagstaff Chamber of Commerce/Northern Arizona Chamber Organization ● Greater Phoenix Chamber ● Kingman Chamber of Commerce ● Phoenix Chamber of Commerce ● Tucson Metro Chamber

Organization Category	Organizations Targeted for Engagement
	● Valley Partnership
Private-sector EVSE owners and network operators	● Blink Charging ● Charge Point ● Charge Zero ● Electrify America ● EVgo
Vehicle manufacturers	● Atlis Motor Vehicles ● Audi ● BMW ● Cruise ● DeMenna (representing Avis) ● FCA Group ● General Motors ● Goodyear ● Lucid Motors ● Nikola Motor / Nikola Defense ● Toyota ● Proterra ● Tesla ● Waymo
Minority- and women-based organizations	● **Arizona Minority Contractors Association** ● **Chicanos Por La Causa** ● **Greater Phoenix Urban League** ● **NAACP Maricopa County Branch**
Freight industry	● Arizona Trucking Association
Environmental and other community advocacy organizations with an interest in EVSE	● **Arizona Forward** ● **Ceres** ● Southwest Energy Efficiency Project (SWEEP) ● The Nature Conservancy ● Valley of the Sun Clean Cities ● Western Resource Advocates

Organization Category	Organizations Targeted for Engagement
EV industry organizations and EV advocacy groups	• Alliance for Automotive Innovation • Alliance for Transportation Electrification • Arizona Technology Council • EV Noire • EV Transportation Alliance • Fourth Mobility • Phoenix Electric Automotive Association • Plug In America • Tucson Electric Vehicle Association (TEVA) • Zero EV
Gas station owners and operators	• Love's • Shell Recharge Solutions
Ride-share drivers/taxi drivers	• Lyft • Uber
Emergency management and public safety agencies	• Arizona Governor's Office
Other parties	• Atlas Public Policy • Electric Power Research Institute • Triadvocates • Generation Seven Strategic Partners • Phoenix IDA • QCM Technologies • Verdek

Preliminary Summary of Stakeholder Engagement Results and Input Received

At the time of this submission, not all stakeholder engagement and outreach events have been completed. This Plan will be updated as needed as results and feedback are received. Initial results, based on activities conducted through July 2022, are listed below.

Key Stakeholder Workshop

The key stakeholder virtual workshop was held on June 30, 2022, from 1:30 p.m. to 3:30 p.m. A total of 212 key stakeholders participated. The Plan team posed the series of questions to attendees listed below. Key input is noted after each question.

● What are the most important Justice40-related benefits the Plan could provide?
   o The two benefits rated most highly by participants were improved access to clean transportation and reducing exposure to fossil fuel emissions.

- What other benefits to DACs not mentioned previously do you think ADOT should consider or measure?
  - Responses primarily focused on access, job creation, environmental health, mobility, and energy resiliency.
- Overall, what does successful planning look like in this project? What should we consider as we develop and implement the Plan?
  - Responses primarily focused on utility and outside jurisdiction coordination, supply chain management, community support, and stakeholder inclusion/involvement.
- Overall, what does a successful outcome look like in this project? How can we measure that success?
  - Responses primarily focused on EVSE and EV usage rates, environmental health data, greenhouse gas (GHG) emission data, and EV public education level.
- In your organization's experience with EVs, what are some challenges you have encountered that we should be prepared to address?
  - Responses primarily focused on universal equipment and utility access, vandalism, cost, maintenance, and public understanding.
- In your organization's public-facing EV-related work, what are some obstacles and misconceptions you often need to address?
  - Responses primarily focused on cost, vehicle range, resistance to change, lack of knowledge, vehicle maintenance, and utility management.
- In your organization's public-facing EV-related work, what are some ideas and talking points that seem to resonate the best with the public?
  - Responses primarily focused on environmental benefits, affordability, range capacity per charge, tourism, and sustainability.
- What else should we be aware of that we might not already know as we approach planning and implementation?
  - Responses primarily focused on public safety, utility/infrastructure management, supply chain issues, public-private partnerships, expansion planning, Americans with Disabilities Act (ADA) capabilities, and the current supply of technicians, installers, and support personnel.

Key Stakeholder Survey

A key stakeholder survey was conducted from June 23 to July 8, 2022, using an online survey platform. The survey's questions were designed to engage government and public agencies, EV industry professionals, advocacy groups, and other organizations involved in the promotion and establishment of an EV charging network in the state. This differs from the public survey, which, while having some questions in common, was designed to engage a general public audience that may use or consider using EVs for transportation. All stakeholders who had been identified by that time, as shown in **Table 3**, were invited via email to participate in the survey. A total of 157 surveys were completed. Key input received through the stakeholder survey included:

- Respondents were asked to identify what type of organization they represent. The most common responses were government and public agencies (34%), utility companies (11%), EV infrastructure (8%), EV advocates (7%), and EV manufacturers (6%).

- 45% of respondents currently host EV charging stations; 86% of hosts are looking to upgrade and expand.
- In rating (on a scale of 1 to 5) the most important goals of the Plan's vision, the most highly rated goals were achieving a resilient, equitable, accessible, reliable network (4.5) and addressing range anxiety (4.2).
- The equity and Justice40 consideration most cited as "most important for achieving equity" was network access in rural, tribal, and other disadvantaged areas (79% of respondents).
- The most cited concern for infrastructure development was the feasibility of installation in areas without adequate utility infrastructure (60% of respondents).
- The charging station features most commonly cited as "most important" were upgraded utilities (64% of respondents), shade structures (59%), and additional chargers beyond the minimum required (54%).
- When asked to balance prioritizing additional EVSE stations versus additional features at EVSE stations, about 70% favored more EVSE.
- The location types that were most cited as best for EVSE were gas stations and truck stops (72% of respondents), and retail shopping centers, movie theaters, and restaurants (66%).

Respondents were also asked to prioritize which of the eight eligible corridors being evaluated in Plan should be built out with EVSE first. The results are shown in **Figure 1**.

Figure 1: Stakeholders Rankings of AFCs for EVSE Implementation
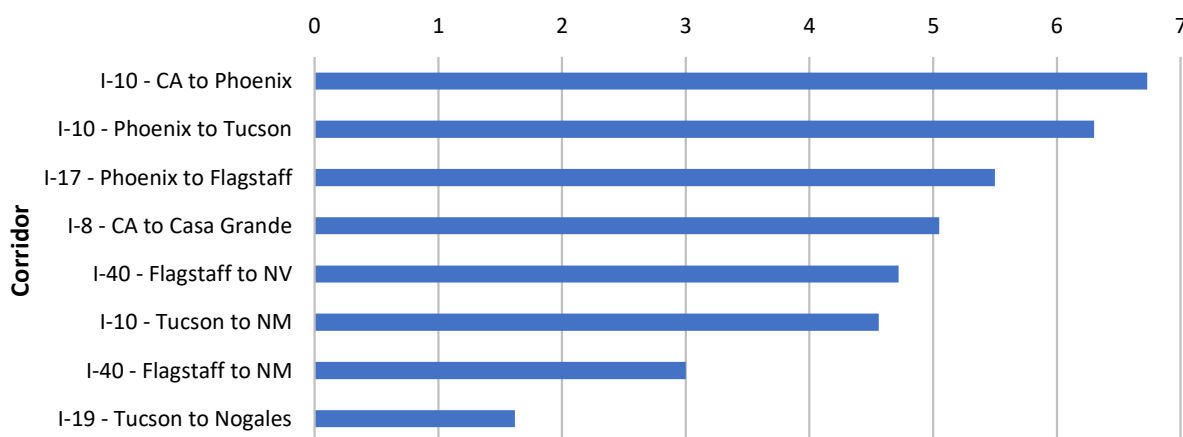
A total of 153 stakeholder survey respondents provided their organization's ZIP Code. **Figure 2** displays the locations of these ZIP Codes (over 70 different ZIP Codes in total). Responses that were invalid or not from within Arizona, 12.4%, are not included in **Figure 2**.

Figure 2: Stakeholder Survey Responses By ZIP Code

Responses from ZIP Code

1   5   10
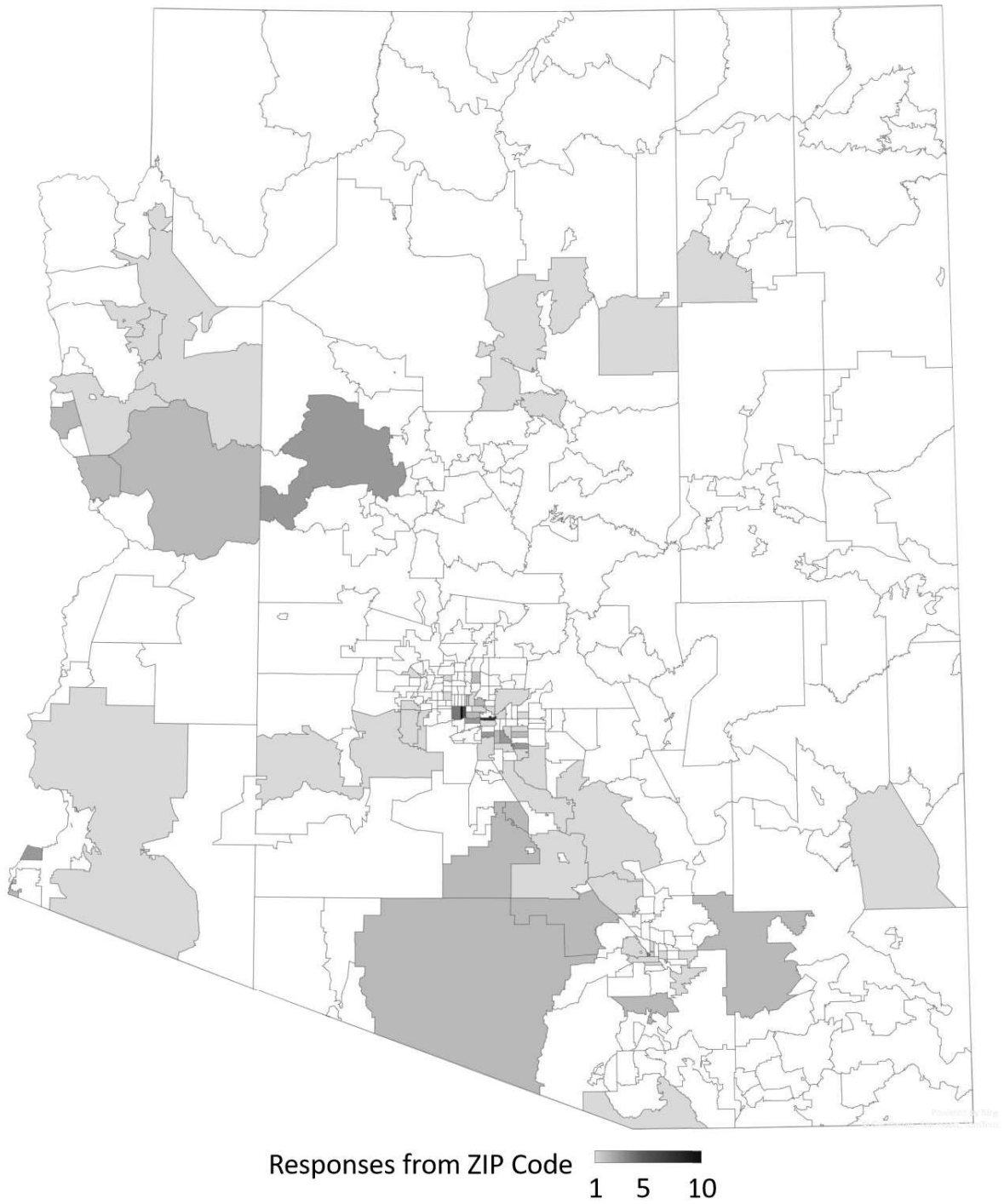
Key Stakeholder Questions and Comments

With both the stakeholder workshop and survey, participants and respondents were given the opportunity to provide questions and comments in an open format. The most commonly mentioned topics were:

- **Equity and Environmental Justice (EJ)**: Concern and encouragement to deploy as equitably as possible, particularly in reaching rural and tribal areas and other places that are likely to be overlooked by the private sector. Questions about the process for designating DACs, and how Justice40 benefits will be measured.
- **Corridors:** In addition to equity, support for reaching rural and tribal areas for completeness of network and access to parks. Desire for expanding beyond interstates to cover other state and federal roads.
- **Sites and Criteria:** Suggestions to prioritize existing fueling stations and rest areas. Concern that smaller businesses that can't support enough EVSE to meet requirements will be unable to participate. Mixed opinions about the one-mile requirement, finding the distance either too strict or too generous.
- **Fleets and Transit:** Support for designing the network to encourage the deployment of EV cargo, transit, and rideshare fleets.
- **Electrical Grid:** Concern for the impact of new stations on electrical demand, particularly in competing with air-conditioning systems during peak hours. Support for using solar energy and deploying on-site backups and storage.
- **Stations:** Concerns for security and maintenance at stations. Support for shade structures and other amenities. Support for installing higher-power stations now or planning for upgrades in the future.
- **Other Topics:** Concerns over the use of public funding for private investment. Support for a greater public role in the planning process. Questions about the role of local-level governments and agencies. Questions about the selection and procurement criteria and processes. Several organizations submitted reports and white papers covering EV-related topics.

Public Outreach Results

ADOT is committed to an inclusive public outreach process to achieve the goals of this Plan. **Table 2** details the process for obtaining public engagement.

Online Public Survey

An online public survey was conducted from July 1–21, 2022. This survey was designed to engage the general public in Arizona with questions related to everyday travel habits and the purchase, use, and charging of EVs that they may own or consider purchasing in the future. These questions differed from the key stakeholder survey, which focused on organizations with a role or direct interest in the development of an EV charging network in the state. This survey was promoted through several channels, including social media, email, and during the virtual public meeting. Separate surveys were conducted in English and Spanish. A total of 917 English surveys were completed; no Spanish survey responses were received. Key input received through the public survey included:

- 98.6% of respondents drive personal vehicles as one of their typical modes of transportation; only 2% of respondents ride buses, and 1% cited light rail as an unlisted response.

- In rating the importance (on a scale of 1 to 5) of different parameters in choosing how to 'get around on a daily basis,' the top two parameters were safety (4.2) and proximity to key services (4.1). The lowest-rated parameter was access to alternative modes of transportation, such as public transit and rideshare (2.4).
- 67% of respondents reported 'extensive knowledge' about EVs; only 1% have 'little to no knowledge.'
- 51% of respondents currently own an EV; 58% of those who do not own one say they are planning to buy one.
- The factors most commonly cited as 'holding [respondents] back from purchasing an EV' were the ability to travel long distances (74%), the purchase price (69%), and the time needed (64%) and convenience (59%) of charging an EV.

Table 4 compares where current EV owners typically charge their vehicles with where non-owners think they would likely charge an EV if they had one.

Table 4: EV Owners and Non-Owners Voted on Likely Charging Locations

Charge Location (selected responses)	Where Current EV Owners Typically Charge	Where Non-Owners Think They Would Typically Charge
At my house	94%	84%
At my apartment / condo	2%	3%
Nearest Direct Current Fast Charging (DCFC) charger	49%	38%
Where I work	18%	30%
Business / retail centers	17% / 18%	26% / 14%

Other information obtained included:
- When asked about how long they typically charge their vehicles at public EVSE, 50% of EV owners said 20–39 minutes. Twenty percent typically use public EVSE for less than 20 minutes, and 30% for 40 minutes or longer.
- Among EV owners who use public EVSE, 73% say that they most often use it for long-distance traveling needs.
- Gas stations and truck stops were most frequently cited as the 'best' locations for EVSE (70%) followed by retail shopping centers, movie theaters, and restaurants (69%).

Respondents were also asked to rank the importance of the eight highway corridors being evaluated in the Plan. **Figure 3** shows the implied importance of each corridor based on these rankings.

Figure 3: Public Respondents' Ranking of AFCs for EVSE Implementation
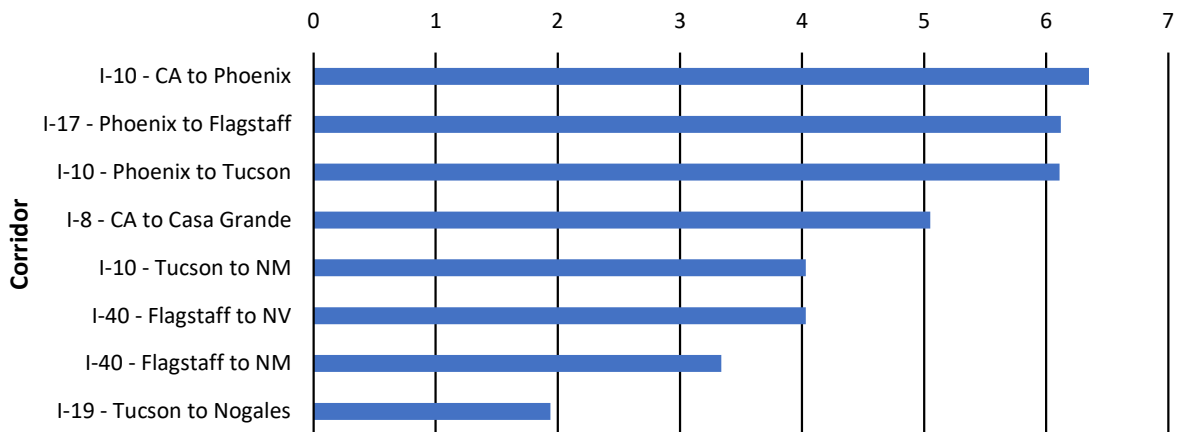
A total of 904 public survey respondents provided their home ZIP Code. **Figure 4** displays the locations of these ZIP Codes (over 200 unique ZIP Codes in total). Note that 2.2% of responses were either invalid or arrived from outside of Arizona, and therefore are not included in the map.

Figure 4: Public Survey Responses by ZIP Code

Responses from ZIP Code
1   7   17
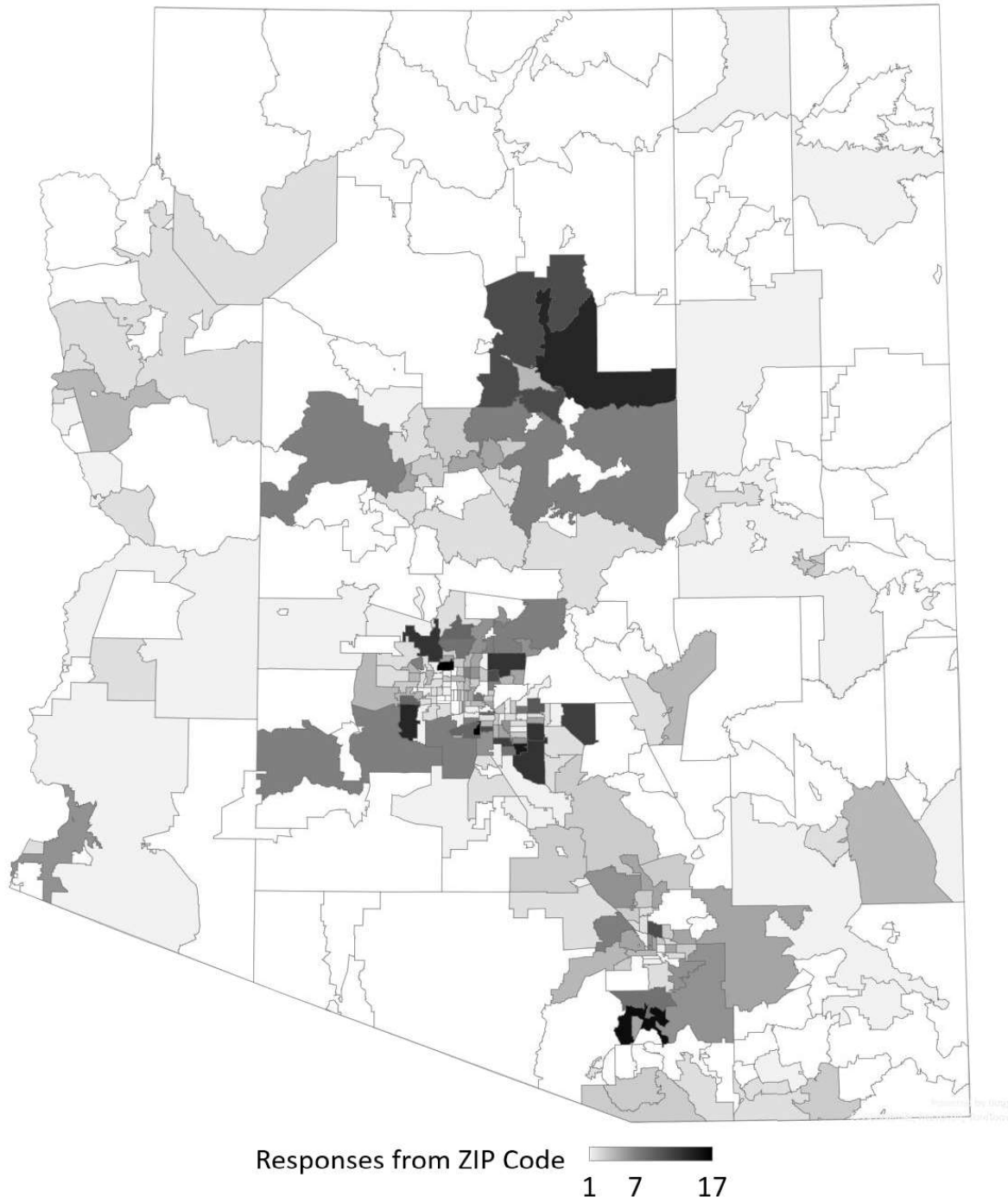
Public Questions and Comments

A virtual public meeting was held on July 14, 2022, from 6:00 p.m. to 7:30 p.m. A total of 302 individuals participated. With both this virtual public meeting and the public survey, participants and respondents were given the opportunity to provide questions and comments in an open format. The most commonly mentioned topics were:

- **Corridors:** In addition to equity concerns, support for reaching rural and tribal areas for completeness of network and access to parks and tourist destinations. Desire for expanding EVSE network beyond interstates to cover other state and federal roads.
- **Chargers and Technology:** Questions about the role of hydrogen fueling in current and future networks. Support for CHAdeMO- and Tesla-compatible facilities. Support for charging at wattages higher than 150 kilowatt (kW) or providing infrastructure for future upgrades. Mixed opinions for including Level 2 charging options at stations.
- **Implementation and Operations:** Questions about timelines and requirements for both contracting and purchasing. Strong support for ensuring station maintenance and reliability. Support for time-limiting station use and enforcing charger parking spaces as EV-only. Suggestions to consult or partner with major national charging service providers. Desire to use an app or website to list locations with real-time pricing and availability.
- **Siting and Criteria:** Support for tighter station placement in hilly areas due to reduced range. Support for placement at gas stations and truck stops, hotels, small towns (to bolster commerce), and in rest areas (with some suggestions to seek exemptions to allow this).
- **Amenities:** Frequent requests for various amenities, particularly shade structures, adequate lighting, security cameras, wi-fi internet access, and wider pull-through stations for vehicles pulling trailers. Support for placement near always-open businesses for food, restrooms, and security/assistance.
- **Electrical Grid:** Strong concern regarding whether the grid and electrical supply can support EV charging, particularly during summer peak demand, and if brownouts or rolling blackouts will impact service. Substantial support for committing to renewable energy for charging, including deployment of solar panels and battery backups at stations.
- **Equity and EJ:** Concerns for lack of direct benefits to rural areas, non-interstate cities, and those who cannot afford EVs, and how Justice40 benefits will be quantified. Concerns for more public funding benefitting EV owners, who are thought of as already receiving subsidies for their vehicles and who may avoid paying certain taxes. Concerns that northern and eastern parts of the state are left out of the Plan. Encouragement for partnering with tribal governments to improve access.
- **Costs and Payments:** Requests for a variety of payment methods, including credit/debit cards, app-based, car-based, etc., without the need for accounts or subscriptions. Questions about pricing for using chargers and if prices can be regulated or capped.
- **Opportunities:** Questions about how businesses, local governments, and charities can support the network. Ideas for EV-supportive services and businesses.
- **Other Opposition:** Concerns for publicly funding private businesses, worries that stations that require public funding to build will be at unprofitable locations and will close. Concerns over environmental harm involved with encouraging EV use, particularly battery creation and disposal and the use of fossil fuel-generated electricity. Doubts over personal and societal need for and benefits of EVs. Concerns that the Plan is premature, and that government should wait until EV technology has improved and the market has expanded.

- **Other Topics:** General support for the Plan and EV promotion. Opinions that an EVSE network is vital to maintaining Arizona's desirability and tourism appeal. Mixed opinions on government's role in advocating for universal charging standards. Support for continued public involvement through Plan finalization and implementation. Concerns for EV adoption's impact on funding roadways. Desire for supporting charger installation at apartments and condominiums.

Other Comments

Through July 2022, ADOT received an additional 128 questions and comments from the public via email and telephone. Frequent questions and comments included suggestions for station locations, businesses inquiring about hosting or building EVSE sites, and individuals voicing their concerns for the Plan, particularly related to public investment in private business and concerns with potential impacts to the electric grid.

Measuring the Effectiveness of the Public Involvement Activities

To measure the overall participation levels for the project, the engagement metrics have been listed below. During engagement efforts, demographic data will be collected from participants to measure their effectiveness in conducting equitable, accessible engagement.

Engagement Metrics:
- **Webpage visits:** Through July 2022, the Plan website had 5,238 total page views.
- **GovDelivery email metrics** (total emails sent, open rate)**:** Through July 2022, 5,037 emails were sent with 3,111 emails opened, a rate of 62%.
- **Social media engagement** (impressions and comments)**:** Through July 2022, social media posts had 410,265 impressions and over 1,200 comments.
- **Public meeting and workshop attendance:** 212 people attended the key stakeholder workshop and 302 people attended the virtual public meeting.
- **Public and stakeholder surveys returned:** 157 key stakeholder surveys were returned, and 917 public surveys were returned.
- **Requests for accommodations** (language, mobility, accessibility, etc.)**:** Through July 2022, one request for accommodation was received.
- **Comments and questions** (submitted by email, phone, and mail)**:** Through July 2022, 128 comments and questions were received by email and telephone. No comments or questions have been received by mail.

Demographic Data

ADOT will continue to gather demographic data in conjunction with specific outreach activities. ADOT will gather the following demographic data to demonstrate the reach of engagement efforts.
- ZIP Code (method: stakeholder and public surveys)
- Race/ethnicity (methods: self-ID survey at public meetings, public survey, and website)
- Vehicle availability/ownership (method: public survey)

Information on ZIP Code, vehicle availability, and vehicle ownership was described previously in the *Key Stakeholder Survey and Public Online Survey* subsections. **Table 5** displays the results of self-identification surveys that were associated with the virtual public meeting, the key stakeholder meeting, and the public online survey.

Table 5: Self-Identification Survey Results Across Activities

Race/Ethnicity	Stakeholder Meeting	Public Meeting	Public Survey	State Population[3]
White, Non-Hispanic/Latino	77.1%	75.0%	78.5%	53.2%
Hispanic/Latino	17.1%	10.0%	6.3%	32.3%
African American/Black	0.0%	3.8%	2.5%	5.4%
American Indian/Alaskan Native	2.9%	1.3%	1.7%	5.3%
Asian	2.9%	5.0%	3.9%	3.8%
Native Hawaiian/Other Pacific Islander	0.0%	1.3%	0.3%	0.3%
Two or More Races	0.0%	3.8%	6.8%	3.1%
Response Count	35	80	590	

Documentation

The final documentation of public involvement activities for the Plan will include compiling all materials related to public involvement activities, summarizing and analyzing comments, and describing how the comments are being addressed. The guidance provided in ADOT's *Public Involvement Plan[4]* regarding documentation and comment management will be followed.

Evaluation includes the analysis of attendance numbers and attendee demographics, along with other trackable metrics, at the conclusion of each outreach event to gauge outreach effectiveness. ADOT will consider additional outreach methods should the planned methods fail to meet desired outcomes for participation and diversity. A final public involvement report will be prepared for the Plan, which will capture all public outreach efforts and participation.

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[3] U.S. Census Bureau. *QuickFacts Arizona 2021.* Retrieved from https://www.census.gov/quickfacts/AZ.

[4] Arizona Department of Transportation, Communications Division (2017). *Public Involvement Plan.* Retrieved from https://azdot.gov/sites/default/files/2019/05/adot-public-involvement-plan.pdf

Public meeting summaries will be prepared and will document attendees, notification methods (including copies of email alerts, news releases, print ads, and social media posts), sign-in sheets, returned self-ID surveys, civil right materials provided, Plan materials (including presentation, exhibits, and handouts), comments received and the given responses, and any other pertinent information.

Survey reports will be prepared summarizing the number of participants, the demographic breakdown of participants, and the responses to each survey question with accompanying charts and graphics to illustrate data. Stakeholder and public outreach reports will include the cross-tabulation of data needed to identify preferences, concerns, or other issues or information for various stakeholder types, and other information that will help inform the technical analysis.

The report will also provide a table of comments and questions received through other methods (email, mail, phone, etc.) and the responses provided.

Plan Vision and Goals

To create a framework for the successful implementation of a statewide charging infrastructure network, ADOT has developed the following vision and goals for the Plan. These goals will provide a baseline for program evaluation that will monitor three key areas to determine success: data collection, equitable access, and network reliability.

Vision

The Plan seeks to increase long-range mobility for EV drivers by closing the current gaps in charging station infrastructure placement along Arizona's AFCs and supporting the development of an equitable national EVSE network.

Goals

ADOT has set six goals that an interconnected EVSE network must achieve to realize the agency's vision. ADOT's Plan and associated commitments will:

1. **Reduce range anxiety by closing gaps** in the EVSE network along Arizona's AFCs.
2. Support the development of an EVSE network that is **resilient, equitable, accessible, and reliable.**
3. **Engage stakeholders and the public** in the planning, development, and installation of EVSE.
4. Identify **potential new AFC locations** during the outreach process.
5. Utilize **efficient contracting and procurement mechanisms** to: maximize the amount of infrastructure that can be built, consider future needs, and reduce risk(s) in order to support the EVSE network's long-term viability.
6. **Use data and performance metrics** to evaluate EVSE installation and operations in order to inform the development of program improvements.

Annual Goals

The following five-year program identifies specific goals for each FFY through 2026:

FFY 2022

- Complete and submit the EV Infrastructure Deployment Plan
- Solicit public and stakeholder input on potential new AFCs to be considered for nomination

FFY 2023

- Solicit and award contracts to upgrade existing stations and begin upgrade installations
- Begin the solicitation process for new EVSE stations
- Nominate new AFCs through the federal process
- Update the EV Infrastructure Deployment Plan to include the new AFCs

FFY 2024

- Award contracts for new EVSE stations and begin installation
- Solicit and award installation and operation contracts for EVSE stations on new AFCs, up to the funding limit

FFY 2025

● Solicit and award remaining funding for EVSE deployment

FFY 2026

● Complete installation of remaining EVSE
● Evaluate the performance of NEVI Formula Program implementation

The Plan will be updated annually to reflect Arizona's funding plan for the upcoming fiscal year.

Five-Year Goal

The five-year program culminates in the following five-year goal:

● Utilize 100% of the NEVI funding on Arizona's AFCs by the end of FFY 2026.

Contracting

ADOT intends to issue competitive contracts to private entities to either upgrade existing stations or to acquire, install, operate, and maintain new stations identified in the Plan using NEVI Formula Program funds. If a charging station identified in the Plan is deployed on public land, such as a national park, funds may be awarded directly to public agencies to upgrade or install, own, operate and maintain new EV station locations. Awardees will provide the required non-federal matching funds. Notification of funding opportunities will be issued by ADOT. All awards will be reimbursement-based; no advances of funds will be provided.

ADOT is authorized to enter into agreements with public or private entities for the purposes of this program under Title 28, Chapter 2 of the Arizona Revised Statutes. All contracting and procurement activities will be subject to the applicable requirements of 2 CFR Section 200 et seq. and 2 CFR Section 1201 et seq. ADOT plans to upgrade eligible existing non-compliant DCFC stations first; then fill in remaining gaps with new stations.

Upgrade of Existing, Eligible, DCFC Stations

A solicitation will be issued seeking proposals to upgrade existing DCFC stations to NEVI standards. The solicitation will identify eligible locations, current owners, and the expected upgrade needs. At locations where two eligible DCFC stations are located at one interchange the applications will be competitively scored, and the best proposal selected.

Applications will be reviewed, and proposals selected, based upon a variety of factors. ADOT is considering factors including, among others, the applicant's:

- Eligibility
- Ability to further program goals
- Demonstrated record of providing reliable and safe EV charging services meeting industry standards
- Operations, security, emergency, and resilience plans
- Technical, managerial, and financial capacity
- Community engagement plan
- Budget/independent cost estimate

New EVSE Stations

After ADOT has identified locations where upgrades will occur, the agency will solicit for the installation of new EVSE stations to close gaps in the network.

The competitive solicitation may either:

- Solicit one entity to design, build, own, operate, and maintain all new EVSE stations statewide, or
- Be subdivided into regions or corridors of the state, and solicit one entity to build, operate, and maintain all stations in each, individual area.

Applications for new EVSE stations will be reviewed, and proposals selected based upon a variety of factors. ADOT is considering factors including, among others, the applicant's:

- Eligibility
- Ability to further program goals
- Experience and expertise in EVSE station installation, ownership, operation, and maintenance
- Demonstrated record of providing reliable and safe EV charging services meeting industry standards
- Security, cyber security, emergency, and resilience plans
- Operations and maintenance plans
- Technical, managerial, and financial capacity
- Community engagement plan
- Budget/independent cost estimate

Strategies Leading to Efficient and Effective Deployment Against Plan Goals

ADOT will consider using NEVI Formula Program funds for new EVSE station operations and maintenance costs during the first five-years of station operation, particularly in locations anticipated to have low utilization of EVSE. As a part of this process, ADOT will solicit private entities with experience, expertise, financial capacity, strong maintenance plans, and a demonstrated record of reliable operations to minimize the risk of stranded assets.

ADOT will require, via contract terms, that infrastructure be maintained and operated at the same location for a period of no less than five years from the installation date with the consideration of providing service beyond the use of NEVI Formula Program funds. Contract terms may require that awardees for new stations post a performance bond to guarantee that the EVSE remains operational for the five-year performance period.

Compliance with State and Federal Requirements

Solicitations will comply with all applicable Federal and State procurement requirements. They will be advertised and made available to potential awardees through outlets such as eCivis, eGrants, or other appropriate distribution channels. Notice of Funding Opportunities will be published as provided by federal or state regulations. ADOT will hold pre-proposal meetings or other meetings as appropriate with potential awardees to discuss program goals, requirements, considerations, and other topics.

Solicitation documents will provide detailed information on submittal requirements, eligibility, program goals, and standards for station upgrade, installation, operation, and maintenance, as applicable. Administrative and other applicable requirements including Federal cross-cutting requirements, NEVI Formula Program requirements, applicable State requirements, and applicant responsibilities relating thereto, and other relevant information will also be included.

ADOT will monitor the finalization of NEVI Formula Program rulemaking to ensure that its requirements are incorporated in the solicitation documents and in the contracts executed with all parties awarded NEVI Formula Program funding.

ADOT subject matter experts will evaluate agency precedents, best practices, and legal requirements to identify the best procurement and contracting solutions that will meet all applicable federal and state laws and NEVI program goals.

Contracts will contain provisions requiring that all applicable federal requirements are met by the awardee, and appropriate monitoring will be conducted to verify compliance.

Public Disclosure Requirements

ADOT intends to comply with FHWA final NEVI Formula Program rulemaking relating to contracting with private entities. The following strategies are based on proposed NEVI rules but may be amended to reflect the final rule when it is issued.

- ADOT will comply with the FHWA's public disclosure requirements, as published in the final NEVI Formula Program rulemaking, for the documents concerning the operations of EVSE including the procurement process used, price, the number of bids received, the identification of the awardee, the proposed contract with the awardee and, in accordance with State law, and the financial summary of contract payments. ADOT will ensure these items are made publicly available whether through an announcement, public comment period, or other means.
- Any agreements for the operation and maintenance (O&M) of an EV charging station will be subject to Arizona Revised Statutes (A.R.S) Title 41 (State Government), Chapter 24 (Solicitation and Awarding of Grants), 2 CFR 200 et seq. and 2 CFR 1200 et seq.

Additional Public Disclosure Considerations
- ADOT will encourage station owners to consider electricity rates in the surrounding community when setting a pricing structure to confirm users are being reasonably charged for use. The rate should offset the lifetime cost of the charging station, including:
  o Need to recover fixed operating costs
  o Need to recover usage-based or other variable operating costs
  o Management of vehicles left in EVSE parking spaces for extended periods or other misuse patterns
  o Incentivizing charging during lower-cost off-peak hours
  o Ability of targeted users to access or enable the EVSE
  o Ability of targeted users to pay for and afford charging rates
  o Need for networked versus non-network stations to apply charges and process payment
- Station owners will be encouraged to take advantage of offerings from local utilities to minimize upfront and operational costs. Additionally, electric utility providers may offer electricity rates that encourage the recharging of vehicles during off-peak, overnight times that may be much lower than on-peak, midday times.

Environmental Compliance

Projects that require federal approval and are funded by FHWA must meet the requirements of the National Environmental Policy Act (NEPA). Development of the statewide EV Plan qualifies as a Categorical Exclusion (CE) under 23 CFR 771.117(c)(1) because it is a planning activity that does not lead directly to construction. The installation of EV charging infrastructure is a separate activity that will require an additional environmental approval. The awardee for each site will be responsible for meeting

NEPA requirements and providing the appropriate documentation to ADOT for approval. ADOT can provide the vendor with a list of recommended environmental consultants with expertise in supporting the agency through the environmental review process, if needed.

A vast majority of federal-aid projects have no significant environmental impacts and can be determined to be a CE. It is anticipated that EV charging sites would meet the definition of a CE under 23 CFR 771.117(c)(21). Pursuant to 23 U.S.C. 326 the FHWA Arizona Division and ADOT have entered into a Memorandum of Understanding (MOU) for the State Assumption of Responsibility for CEs. The CE Assignment MOU (326 MOU) was signed by FHWA and ADOT on January 3, 2018. CEs listed under 23 CFR 771.117 paragraph (c) are approved by ADOT under the 326 MOU.

All CE determinations follow documentation requirements, proper CE determination under 23 CFR 771.117 (c) and (d), environmental analysis, re-evaluation under 23 CFR 771.129, evaluation of "unusual circumstances," inclusion of environmental commitments, and exercise of proper approval authority under the aforementioned 326 MOU. Utilizing an ADOT CE Checklist, supported by cultural, biology, hazardous materials, air quality, and noise, among other technical evaluation criteria, assesses project impacts. The environmental review and required documentation would be appropriate to the scope of each project and specific conditions at each site. Upgrade sites located at existing charging sites that require minimal or no ground disturbance may be covered by a CE type that reflects minimal cultural, biology, and hazardous materials investigations. Sites where new charging stations are installed may experience more ground disturbance and would require a higher level of environmental study and documentation. If project activities have the potential to impact cultural resources, these sites may require cultural resources investigations and consultation under Section 106 of the National Historic Preservation Act. Land ownership of the site will also be considered. Any sites on Tribal land may require additional approvals or outreach to the affected Native American Tribes.

The timeline for CE approval is dependent upon project-specific circumstances and approvals. CEs for upgrades to existing charging sites with minimal ground disturbance can be expected to take approximately three months to complete and obtain approval. CEs for new build sites with more ground-disturbing activities, or those requiring cultural resources survey and/or Section 106 consultation, may take up to six months to complete and obtain approval. In addition, certain technical studies such as hazardous materials or biological surveys may need to be updated if extensive time has transpired between conclusion of the environmental process and the start of construction. Any subsequent environmental field work is often completed prior to the start of construction and execution time should be considered in site location scheduling.

Participation of Small Businesses

ADOT will encourage the participation of small business enterprises and will also consider proximity of small businesses in the location of charging stations. ADOT has a disadvantaged business enterprise (DBE) program to ensure DBEs (which also must qualify as a small business) have an equal opportunity to receive and participate in USDOT (U.S. Department of Transportation)-assisted contracts. ADOT will require awardees to abide by these regulations when procuring contracts for installers and station hosts. See the *Implementation - Opportunities for the Participation of Small Businesses* section for more information on ADOT's efforts.

Community Engagement

It is important that third-party entities engage with the community where EVSE infrastructure will be installed to help ensure the locations are in line with the community's needs, barriers to implementation are identified upfront, and the station will ultimately be used by the community. ADOT will require that potential charging station owners describe their community engagement strategy as part of their application / proposal to ADOT, and the strength of their strategy will be considered during the selection process. Community engagement requirements shall comply with civil rights requirements, and the ADOT Public Involvement Plan. Community engagement requirements will be included in all contracts. Additionally, when required by law, public hearings will be held for projects prior to initiating the procurement process.

Existing and Future Conditions Analysis

This analysis summarizes the existing EV charger technologies, Arizona geography and travel patterns, existing and planned EVSE infrastructure in Arizona, a forecast of EV adoption, and a charging-demand analysis in Arizona through the year 2040.

Electric Vehicle Basics

EVs are powered by electric motors, while internal combustion engine (ICE) vehicles are powered by fossil fuels. Current specifications for a typical EV are shown in **Table 6**.

Table 6: Typical EV Technical Specifications

Specification	Description	Value
Vehicle Size	Types of EV available on the market.	Commonly sedans. Beginning to develop SUVs and trucks.
Range[5]	The distance that a battery in an EV vehicle can travel before needing to be recharged.	150-300 miles
Efficiency[6]	The mileage of an EV per unit capacity of the battery.	2.78 mi/kilowatt hour (kWh)
Battery Size[7]	The battery capacity of an EV.	54-108 kWh
Battery Pack Cost[8]	The cost of an EV battery per unit capacity.	$157/kWh

Charger Types

EV chargers are manufactured in a variety of connector types and power outputs. Charger power output is directly related to vehicle charging time; the higher the power, the shorter the time needed to charge the vehicle. There are three charger power level classifications.

Level 1 chargers use standard 20 ampere, 120-volt outlets, which are those typically found in a home. Charging speeds are slow at a rate of 2-5 miles of range per hour and therefore only suitable for home

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[5] U.S. Department of Energy. (n.d.) *Electric Vehicles*. Alternative Fuels Data Center. Retrieved from https://afdc.energy.gov/vehicles/electric.html.

[6] U.S. Department of Energy. (n.d.) *Vehicle Cost Calculator Assumptions and Methodology.* Alternative Fuels Data Center. Retrieved from https://afdc.energy.gov/calc/cost_calculator_methodology.html.

[7] Electric Vehicle Database. (n.d.) *Useable Battery Capacity of Full electric Vehicles.* Retrieved July 22, 2022, from https://ev-database.org/cheatsheet/useable-battery-capacity-electric-car.

[8] Office of Energy Efficiency and Renewable Energy. (n.d.) *FOTW #1206, Oct 4, 2021: DOE Estimates That Electric Vehicle Battery Pack Costs in 2021 Are 87% Lower than in 2008.* Retrieved from www.energy.gov/eere/vehicles/articles/fotw-1206-oct-4-2021-doe-estimates-electric-vehicle-battery-pack-costs-2021.
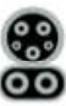
and overnight charging locations.[9] Level 1 charging is becoming less common as battery capacity continues to increase and Level 1 chargers are now generally used as emergency chargers.

Level 2 chargers use higher-voltage outlets: 220-volt, such as what is commonly used by clothes dryers. Higher voltage allows faster charging, at a rate of 10–20 miles of range per hour. This type of charger is typically found in EV charging stations at workplaces, curbside parking spots, hotels, parks, or other public destinations.

Level 3, or DCFC, allows for charging at higher speeds but requires commercial-grade power levels. Charging speed is at a rate of about 60–80 miles of range per hour, and power output levels vary between 50 kW and 350 kW. Close collaboration with the local electric utility is required when installing Level 3 chargers. The owner of a charging site must ensure that proper power capacity and quality are provided to the site, as DCFC chargers require higher power demand than Levels 1 or 2.

The NEVI Formula Program only funds the deployment of Level 3 DCFC chargers, and this Plan covers only the installation of such chargers. Each charger type requires a specific connector that transfers power to the vehicle from the grid. **Table 7** displays the four connector types used in the United States, where each connector type refers to the shape of the charging inlet on the vehicle, which must be compatible with the EV charging station's port. For DCFC, as required under NEVI, the J1772 Combined Charging System (CCS) and CHArge de MOve (CHAdeMO) types are the only cross-compatible connectors; Tesla Combo plugs are proprietary to Tesla EV owners, even if they can be found at non-Tesla Super Chargers. Since CHAdeMO is being phased out in favor of CCS, the NEVI formula program only requires the installation of CCS connectors.[10]

Table 7: Common EV Connector Types

EV Charger	Charge Description
J1772	The primary connector type used for Level 1 and Level 2 charging.
J1772	A CCS is a J1772 connector with additional ports to enable DCFC.
CHAdeMO	Used on some US cars for DCFC only. Vehicles with CHAdeMO will have a second inlet (usually J1772) for Level 1 or Level 2 charging.
Tesla Combo	Used only by Tesla (for Level 1, Level 2, and DCFC)

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[9] Smith, M. (2016, July). *Level 1 Electric Vehicle Charging Stations at the Workplace.* Retrieved January 31, 2022, from https://afdc.energy.gov/files/u/publication/WPCC_L1ChargingAtTheWorkplace_0716.pdf

[10] Electrify America (2021, May). *California ZEV Investment Plan: Cycle 3.* Retrieved July 22, 2022, from https://www.electrifyamerica.com/assets/pdf/cycle3_invesment_plan.2338a9b6.pdf

Public Charging Infrastructure

To support widespread EV adoption, a publicly available charging network is crucial because it will:

- Provide alternatives to at-home EVSE: Many people face challenges when installing EVSEs at their residence (e.g., the prohibitive cost of installing EVSE, the complexity of installing at rental units and multi-family dwellings). Having an extensive public EVSE network may enable people to purchase an EV even without access to an EVSE at home.
- Reduce driver range anxiety: A major reason that drivers do not purchase EVs is the fear of running out of battery charge before reaching one's destination or charging location, sometimes referred to as range anxiety. A robust network of public EVSE infrastructure may mitigate this apprehension.
- Enable inter- and intra-state travel: To enable long-distance EV travel across the United States, developing an EVSE network along main highway corridors is required. USDOT has worked with the states to develop the AFCs.[11] program that will build a national network of EV chargers, fully available to the public and at sufficient density to support long-distance travel within states and across the country.

Existing State Characteristics

State Geography, Terrain, Climate and Land Use Patterns

Geography and Terrain

Arizona is in the Southwestern portion of the United States and is bordered by the states of California, Nevada, Utah, Colorado, and New Mexico; to the south, it shares an international border with Mexico. The western Arizona border is formed by the Colorado River, which flows from the Grand Canyon to the north, through Lake Mead, along the communities of Bullhead City, Lake Havasu City, Parker, and Yuma in the southwestern corner.

Arizona has large areas of arid desert land primarily throughout the central, southern, and western portions of the state, including the Sonoran, Chihuahuan, and Mojave deserts. While Arizona has a great deal of low-lying desert landscapes, more than half of the state lies above an elevation of 4,000 feet above sea level. Elevation increases moving north and east to more mountainous regions, characterized by the Mogollon Rim which cuts diagonally across the state's, higher-elevation mountain region, and the Colorado Plateau, which is home to the Navajo and Hopi Tribal lands. Arizona has some of the world's most recognizable natural landforms, including the Grand Canyon, Painted Desert, Petrified Forest, Chiricahua National Monument, and Monument Valley.

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[11] U.S. Department of Transportation, Federal Highway Administration. (n.d.). *Alternative Fuel Corridors.* Retrieved from https://www.fhwa.dot.gov/environment/alternative_fuel_corridors/

The state's geographic divisions can be summarized into three spaces: the Colorado Plateau, the Basin and Range Province, and the Central Highlands. The northeastern portion of the state is known as the Colorado Plateau, which is also made up of parts of Utah, Colorado, and New Mexico. The portion lying within the Arizona border largely consists of tablelands that are intermittently interrupted by mesas and plateaus, such as those found in Monument Valley.

At the southern extent of the Colorado Plateau sit the highest peaks in the state: Humphrey's Peak (12,633 feet) in the San Francisco Mountains and Baldy Mountain (11,403 feet) in the White Mountains. This area then transitions into the Central Highlands, known for plateaus, rugged mountain peaks, and rolling hills. The Basin and Range Province comprises much of the Sonoran Desert, where vast, open valleys create a suitable environment for the broad urban growth of the state's largest cities within the Phoenix and Tucson metropolitan areas.

Arizona has truly rich and diverse natural and built landscapes, including the large urban metropolitan areas, the high elevation and snow-capped volcanic peaks of the San Francisco Mountains, the sprawling Sonoran Desert, large contiguous areas of tribal lands, and the lush Coconino National Forest. This range of landscapes provides opportunities for, yet also imparts limitations to, the efficient movement of goods and people.

Most of Arizona's built environments were developed after World War II, and they were shaped by the development of faster transportation options—namely, interstate highways. The Phoenix metropolitan area, the fifth largest in the nation, is the primary center of development and economic opportunity. Growth has been accelerated, in part, by the efficient vehicular transportation systems throughout the area, including interstate highways, a modern freeway system, and a robust urban arterial grid-based network.

Climate

Arizona experiences a wide range of weather patterns that vary depending on season and the region of the state. Arizona weather can be generalized into two climates: In the southern and western portion of the state, including Maricopa, Yuma, Pima, La Paz, Mohave, Santa Cruz, Pinal, Cochise, and Graham Counties, there are mostly arid lands. However, the northern and eastern Coconino, Yavapai, Gila, Greenlee, Navajo, and Apache Counties have a more alpine climate.

Temperatures in the state generally peak in summer, with daytime high temperatures regularly reaching between 90° F and 110° F. The hottest areas of the state are in the Sonoran Desert in the south, central, and southwest. Nighttime summer temperatures regularly drop to between 50° F and 90° F.[12] This fluctuation between high and low temperatures is accompanied by a high potential for dust storms, haboobs, and monsoon storms that, paired with dry terrain, can lead to flash-flooding events and unsafe travel conditions.

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[12] *Climate and monthly weather forecast Arizona, USA.* Weather U.S. (n.d.) Retrieved from https://www.weather-us.com/en/arizona-usa-climate#climate_text_1

Winters across the state are more temperate than the summers, with average highs of 70° F in lower-elevation locations, but nighttime temperatures regularly reach or drop below freezing. The most severe winter conditions are experienced in the northern highlands, which include the largest city in northern Arizona, Flagstaff, having a yearly average low temperature of 32° F.[13]

Overall, statewide rainfall averages 13 inches annually, with most of it falling during late summer and fall. Extreme rainfall can be found in the northern high elevations, and may reach 20 inches, while the southern desert regions get less-frequent rainfall but experience late summer monsoon seasons, which result in a large percent of the total yearly rainfall. The areas with the highest annual rainfall across the state include Payson (20 inches), Coronado National Monument (21 inches), Flagstaff (21 inches), and Williams (22 inches). The lowest annual rainfall is concentrated in Western Arizona, including Parker (4.6 inches), Lake Havasu City (4.2 inches), and Yuma (3.3 inches). [14]

Snowfall is more concentrated to the north and east portions of the state and generally falls between November and March.[15] Areas with the highest annual snowfall are Show Low (19 inches), Grand Canyon Village (43 inches), Williams (65 inches), and Flagstaff (90 inches).[16] While some of this snowfall is centralized in less populous areas, Arizona has many natural recreational areas that receive large amounts of traffic even in such adverse weather conditions.

Land Use

Land use and transportation are related to the development patterns found in Arizona. Early history of the state shows the initial development of towns around and near train stops. As time passed and technology advanced, land use continued to follow transportation trends, with Arizona's greatest period of growth concurring with the increased use of the automobile and, more importantly, the interstate highway system.

Arizona land use is divided between private, public, and state property. In Arizona, approximately 18% of land is privately held. By the numbers, Arizona has 42% (30.3 million of 72.9 million acres) owned by the federal government, split up mostly between the Forest Service, National Park Service, Fish and

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[13] *The 10 Coldest Cities in Arizona – Enjoy the Mildest Climates in Arizona.* Strategistico. (2022, April). Retrieved from https://www.strategistico.com/coldest-cities-in-arizona/.

[14] *Average Yearly Precipitation for Arizona.* Current Results. (n.d.) Retrieved from https://www.currentresults.com/Weather/Arizona/yearly-average-precipitation.php.

[15] *Climate and monthly weather forecast Arizona, USA.* Weather U.S. (n.d.) Retrieved from https://www.weather-us.com/en/arizona-usa-climate#climate_text_1.

[16] *Average Yearly Precipitation for Arizona.* Current Results. (n.d.) Retrieved from https://www.currentresults.com/Weather/Arizona/yearly-average-precipitation.php.

Wildlife Service, Bureau of Land Management, and the Department of Defense.[17] The State of Arizona then owns another 13% of land (9.6 million acres) in the state trust, making just over 51% of land in Arizona under government control.[18]

Arizona also has large tracts of tribal lands, with the largest being the Navajo Nation spanning 17.28-million acres across northeastern Arizona, Utah, and New Mexico. In total, 22 tribes reside on 27% of the land (or 20.1 million acres) in Arizona.[19]

State Travel Patterns, Public Transportation Needs, Freight and Other Supply Chain Needs

In 2020, the Arizona State Highway System had 9,440 total centerline miles, including 1,168 centerline miles of interstate highway. A schematic of the National Highway System in Arizona is shown in **Figure 5**. Arizona's entire roadway network (including local roads) had 66,968 centerline miles.

Figure 5: Arizona National Highway System

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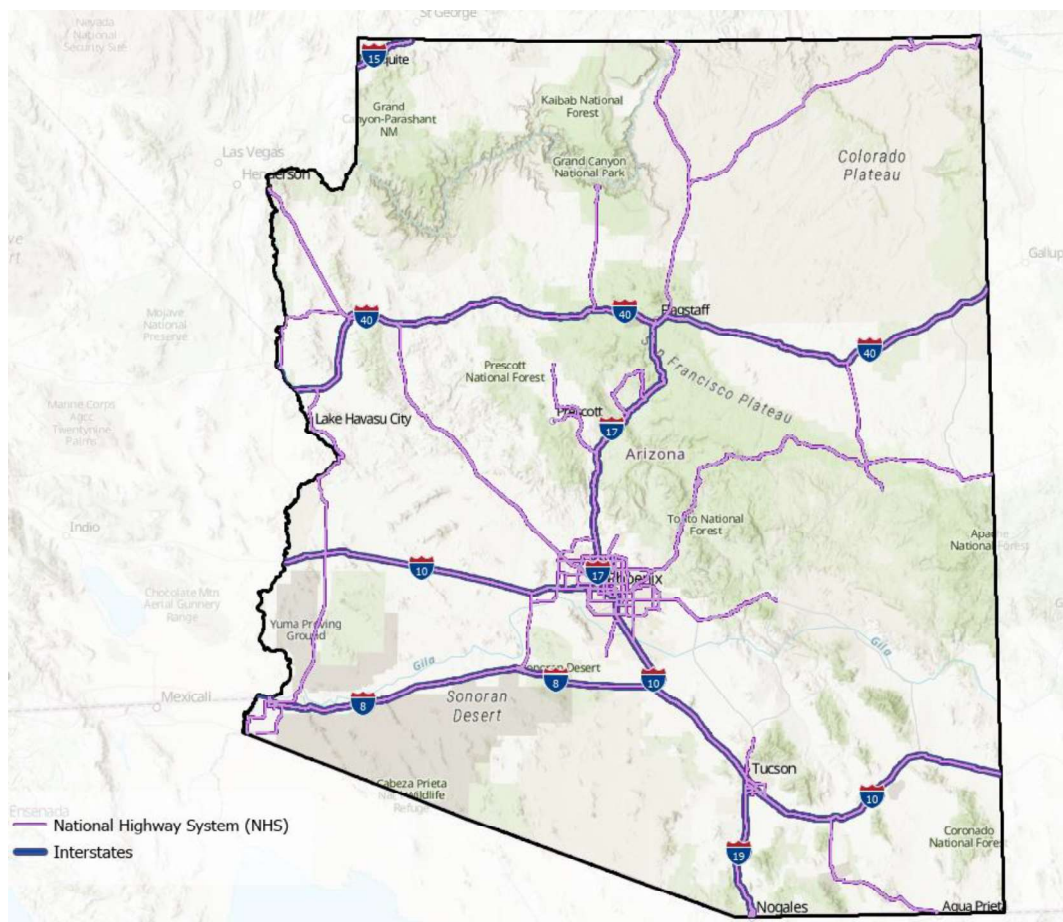
[17] *Arizona is the #8 state with the most land owned by the federal government*. Stacker (2022, May). Retrieved from https://stacker.com/arizona/arizona-8-state-most-land-owned-federal-government.

[18] U.S. Department of Agriculture. (n.d.). *Managing Semi-Arid Watersheds: Watershed Basics - Public Land Management and Land Ownership in Arizona*. Retrieved from https://www.fs.fed.us/rm/boise/AWAE/labs/awae_flagstaff/watersheds/basics/management.html.

[19] *Id*.

While interstate highways make up less than two percent of the state's total roadway network, it accounts for 21.3% of the VMT on Arizona roads.[20] **Table 8** shows the VMT along each of the major interstates that have been identified as AFCs.

Table 8: AFCs VMT Data

Corridors	VMT per Day (million miles)
I-8	1.9
I-10	19.4
I-15	0.6
I-17	7.5
I-19	1.8
I-40	6.5
Total	38.1

As EVs are being adopted for private use, they are also being adopted by public transit agencies. Many of the public transit agencies across the state have already begun to research the feasibility of adding EVs to their fleets-if they are not already actually incorporating them. The cities of Phoenix and Tempe are converting their bus fleets to low-emission and zero-emission fuel sources, and are testing electric buses on some of their routes.[21] Additionally, the Phoenix Union High School District began using electric buses in 2020 and are continuing efforts to fully transition the fleet to EVs.[22] Using funds from the Federal Transit Administration's Low-No Emission Grant Program, the Sun Tran bus system and the City of Tucson have been introducing electric buses to their already 100% clean fuel fleet.[23] Mountain Line, the transit agency in the Flagstaff area, has completed a Zero Emissions Bus Plan, and will transition their bus fleet by 2034.[24]

Truck traffic accounts for approximately 14% of VMT in Arizona along the designated AFCs,[25] with large ports in California contributing to cross country traffic along interstate highways. Freight movements into and throughout Arizona presents another consideration for how EV trucking will be handled across the state and at charging stations along the AFCs as these trucks will also need to charge as truck fleets become more electrified. Data from 2018 shows that there were 98-billion ton-miles (i.e., one ton of

[20] ADOT. (n.d.) *Fast Facts from ADOT*. Retrieved from https://azdot.gov/fast-facts

[21] Ryback, K. (2022, March 2). *As Cities Across Arizona Convert to Electric Buses, What's Stopping ASU?* The State Press. Retrieved from https://www.statepress.com/article/2022/03/why-are-asu-buses-still-diesel-powered#

[22] *The Future is Electric – Phoenix Celebrates First Electric School Bus.* LCV. (2020, January). Retrieved from https://www.lcv.org/article/future-electric-phoenix-celebrates-first-electric-school-bus/

[23] *Sun Tran rolls out GILLIG battery-electric bus.* AzTA. (n.d.) Retrieved from https://www.azta.org/news/sun-tran-starts-service-of-first-electric-bus

[24] *Mountain Line Zero-Emission Bus Implementation Plan*. (2020, December). Retrieved from: https://mountainline.az.gov/wp-content/uploads/2021/03/Phase-2-Implementation-FINAL.pdf

[25] ADOT. (n.d.) *Average Annual Daily Traffic Report 2021*. Retrieve from https://azdot.gov/sites/default/files/media/2022/07/2021-AADT-Interstate.pdf

freight shipped one mile) of freight flow in and out of the state.

Currently, the United States continues to experience the effects of supply chain shortages. These shortages have been caused by several factors, but one key factor has been the inability to move freight from major ports. In the long term, an increase in EV freight hauling may strengthen supply chains, as the dependency on moving fuel to ports and trucking centers would be reduced or eliminated.

Alternative Fuel Corridors

Since 2016, FHWA has accepted nominations from state departments of transportation, including ADOT, for AFCs. Those considered "corridor ready" contain enough fueling facilities to enable corridor travel with the designated alternative fuel; those considered "corridor pending" lack sufficient existing facilities to support alternative fuel vehicle (AFV) travel. **Table 9** lists Arizona's AFCs; they are depicted in map format in **Figure 6**.

Table 9: Arizona's EV AFCs

Status	Corridor Name	Location
EV Pending	I-19	Between the AZ/Mexico border and I-19/I-10 interchange in Tucson.
EV Ready	I-10	Between Buckeye and Benson
	I-17	Between West Anthem Way, Phoenix and Camelback Rd., Phoenix
	I-40	Between the I-40/I-17 interchange in Flagstaff and Winslow
EV Pending	I-8	Between the AZ/CA border and the I-8/1-10 interchange in Casa Grande
	I-10	Between the AZ/CA border and Buckeye; and between the AZ/NM border and Benson
	I-17	Between the I-17/I-10 interchange in Phoenix and Camelback Rd., Phoenix; and between Camelback Rd., Phoenix and the I-17/I-40 interchange in Flagstaff
	I-40	Between the AZ/CA border and I-40/I-17 interchange in Flagstaff; and between the AZ/NM border and Winslow
EV Ready	I-15	Between AZ/Nevada border and AZ/UT border
EV Ready	I-10	From Tucson, AZ to Phoenix, AZ
EV Pending	I-10	From the AZ/NM border to Tucson, AZ; and from the AZ/CA border to Phoenix, AZ
	I-17	From Phoenix, AZ to Flagstaff, AZ

Source: https://www.fhwa.dot.gov/environment/alternative_fuel_corridors/

Figure 6: Arizona's EV AFCs
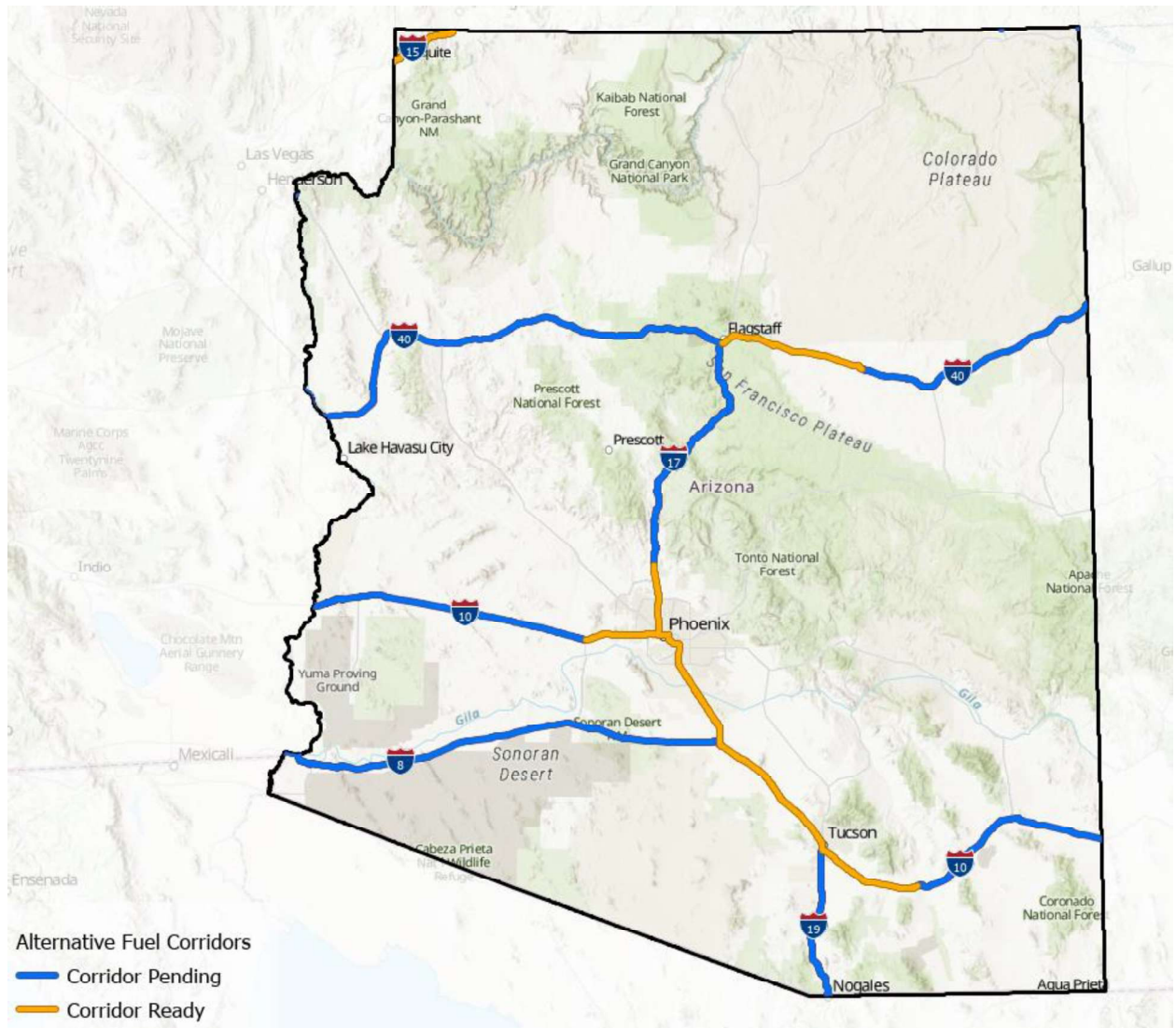
Existing Locations of Charging Infrastructure Along AFCs

Table 10 presents the existing locations of Level 2 and DCFC charging infrastructure along the AFCs, as of June 22, 2022. **Figure 7** displays interstate charging locations on a map of Arizona. Although the Plan is focused on the deployment of DCFC, Level 2 chargers are also listed in **Table 10** since they support the EV charging network.

Table 10: Existing Locations of Charging Infrastructure Along AFCs (as of 6/22/2022)

State EV Charging Location Unique ID	Charger Level (DCFC, L2)	Route	Location	Number of EV Connectors	EV Network
39853	Level 2	I-10	Avondale	1	Non-Networked
39861	Both	I-10/I-17	Phoenix	2 each (4 total)	Non-Networked
39863	Both	I-10	Tempe	1 each (2 total)	Non-Networked
61294	Level 2	I-10	Chandler	2	ChargePoint Network
61295	Level 2	I-10	Chandler	2	ChargePoint Network
66290	Level 2	I-10/I-17	Phoenix	2	ChargePoint Network
66794	Level 2	I-10/I-17	Phoenix	2	ChargePoint Network
76160	Level 2	I-10/I-17	Phoenix	2	ChargePoint Network
76161	Level 2	I-10/I-17	Phoenix	2	ChargePoint Network
76907	Level 2	I-10/I-40	Flagstaff	2	AmpUp
79956	Level 2	I-10/I-17	Phoenix	2	ChargePoint Network
80014	Level 2	I-10/I-17	Phoenix	2	ChargePoint Network
85633	Level 2	I-10/I-17	Phoenix	2	ChargePoint Network
95292	Level 2	I-10/I-17	Phoenix	4	Blink Network
95412	Level 2	I-10/I-17	Phoenix	1	Blink Network
95568	Level 2	I-10/I-17	Phoenix	2	Blink Network
95706	Level 2	I-10/I-17	Phoenix	7	Blink Network
95707	Level 2	I-10/I-17	Phoenix	2	Blink Network
95738	Level 2	I-10/I-17	Phoenix	1	Blink Network
95880	Level 2	I-10/I-19	Tucson	1	Blink Network
95964	Level 2	I-10/I-17	Phoenix	2	Blink Network
96019	Level 2	I-10/I-17	Phoenix	4	Blink Network
96059	Level 2	I-10/I-17	Phoenix	2	Blink Network
96060	Level 2	I-10/I-17	Phoenix	1	Blink Network
96100	Level 2	I-10/I-17	Phoenix	2	Blink Network
96383	Level 2	I-10	Tempe	1	Blink Network
101980	DCFC	I-10	Buckeye	8	Tesla

State EV Charging Location Unique ID	Charger Level (DCFC, L2)	Route	Location	Number of EV Connectors	EV Network
101981	DCFC	I-10/I-8	Casa Grande	6	Tesla
101982	DCFC	I-10/I-40	Flagstaff	12	Tesla
101984	DCFC	I-40	Holbrook	12	Tesla
101985	DCFC	I-40	Kingman	10	Tesla
101986	DCFC	I-17	Mayer	8	Tesla
101989	DCFC	I-10/I-17	Phoenix	16	Tesla
101990	DCFC	I-10	Quartzsite	36	Tesla
101994	DCFC	I-10/I-19	Tucson	10	Tesla
101996	DCFC	I-10	Willcox	8	Tesla
101997	DCFC	I-8	Yuma	8	Tesla
104200	Level 2	I-10/I-17	Phoenix	1	ChargePoint Network
112761	Level 2	I-10/I-40	Flagstaff	3	Tesla Destination
112762	Level 2	I-10/I-40	Flagstaff	1	Tesla Destination
112763	Level 2	I-10/I-40	Flagstaff	1	Tesla Destination
112764	Level 2	I-10/I-40	Flagstaff	3	Tesla Destination
112765	Level 2	I-10/I-40	Flagstaff	2	Tesla Destination
112770	Level 2	I-40	Kingman	2	Tesla Destination
112783	Level 2	I-10/I-17	Phoenix	2	Tesla Destination
112831	Level 2	I-10/I-19	Tucson	3	Tesla Destination
112832	Level 2	I-40	Winslow	1	Tesla Destination
114851	Level 2	I-15	Mesquite	3	Tesla Destination
118886	DCFC	I-10/I-40	Flagstaff	1	ChargePoint Network
121828	DCFC	I-10	Buckeye	4	Electrify America
121833	DCFC	I-8	Yuma	4	Electrify America
122218	Level 2	I-40	Petrified Forest	2	ChargePoint Network
122249	DCFC	I-8	Gila Bend	8	Tesla
122359	Level 2	I-10/I-17	Phoenix	6	Tesla Destination
123009	DCFC	I-40	Williams	1	Non-Networked
123483	DCFC	I-10	Benson	4	Electrify America
124348	DCFC	I-17	ANTHEM	4	Electrify America
127934	DCFC	I-10/I-40	Flagstaff	4	Electrify America
135874	DCFC	I-40	Winslow	4	Electrify America
145281	Level 2	I-10/I-17	Phoenix	2	Volta
145653	Level 2	I-10/I-17	Phoenix	2	ChargePoint Network
145749	DCFC	I-10/I-19	Tucson	10	Electrify America
146891	Level 2	I-10/I-17	Phoenix	2	ChargePoint Network
146892	Level 2	I-10/I-17	Phoenix	2	ChargePoint Network

State EV Charging Location Unique ID	Charger Level (DCFC, L2)	Route	Location	Number of EV Connectors	EV Network
147040	Level 2	I-10/I-17	Phoenix	2	ChargePoint Network
147041	Level 2	I-10/I-17	Phoenix	2	ChargePoint Network
147083	Level 2	I-10/I-17	Phoenix	2	ChargePoint Network
147118	Level 2	I-10/I-17	Phoenix	2	ChargePoint Network
147121	Level 2	I-10/I-17	Phoenix	2	ChargePoint Network
147458	Level 2	I-10/I-17	Phoenix	2	ChargePoint Network
149194	DCFC	I-10	Tempe	8	Electrify America
150334	Both	I-10/I-17	Phoenix	2 each (4 total)	Blink Network
151953	DCFC	I-17	New River	10	Tesla
153411	DCFC	I-10	Ehrenberg	8	Tesla
154797	DCFC	I-8	Tacna	8	Tesla
156367	Level 2	I-10	Goodyear	2	ChargePoint Network
164142	Level 2	I-10	Chandler	2	SemaConnect Network
164254	Level 2	I-10/I-17	Phoenix	3	Blink Network
164351	Level 2	I-40	Williams	2	SemaConnect Network
164414	Level 2	I-10/I-19	Tucson	4	SemaConnect Network
164787	Level 2	I-10/I-17	Phoenix	2	ChargePoint Network
165214	Level 2	I-10	Buckeye	2	ChargePoint Network
166787	Level 2	I-10	Goodyear	2	ChargePoint Network
167342	Level 2	I-10/I-40	Flagstaff	2	ChargePoint Network
167343	Level 2	I-10/I-40	Flagstaff	2	ChargePoint Network
168622	Level 2	I-40	Kingman	2	Tesla Destination
168689	Level 2	I-10/I-17	Phoenix	4	Tesla Destination
168691	Level 2	I-10/I-40	Flagstaff	2	Tesla Destination
168702	Level 2	I-10	Chandler	2	Tesla Destination
168741	Level 2	I-8	Gila Bend	4	Tesla Destination
168852	Level 2	I-40	Williams	5	Tesla Destination
169028	Level 2	I-10/I-17	Phoenix	1	Tesla Destination
169228	Level 2	I-10/I-17	Phoenix	4	Tesla Destination
169240	Level 2	I-10/I-17	Phoenix	3	Tesla Destination
169411	DCFC	I-8	Dateland	4	Electrify America
170168	Level 2	I-10/I-17	Phoenix	3	Blink Network
171760	Level 2	I-10/I-17	Phoenix	2	ChargePoint Network
171771	Level 2	I-10/I-17	Phoenix	2	ChargePoint Network
171772	Level 2	I-10/I-17	Phoenix	2	ChargePoint Network
171839	Level 2	I-10/I-17	Phoenix	2	ChargePoint Network
171845	Level 2	I-10/I-17	Phoenix	2	ChargePoint Network

State EV Charging Location Unique ID	Charger Level (DCFC, L2)	Route	Location	Number of EV Connectors	EV Network
171846	Level 2	I-10/I-17	Phoenix	2	ChargePoint Network
171928	Level 2	I-10/I-17	Phoenix	1	ChargePoint Network
173956	DCFC	I-10	Chandler	1	ChargePoint Network
174635	Level 2	I-10/I-17	Phoenix	2	ChargePoint Network
175685	Level 2	I-10	Goodyear	2	ChargePoint Network
182918	Level 2	I-10/I-19	Tucson	1	ChargePoint Network
182919	Level 2	I-10/I-19	Tucson	1	ChargePoint Network
182920	Level 2	I-10/I-19	Tucson	1	ChargePoint Network
182921	Level 2	I-10/I-19	Tucson	1	ChargePoint Network
184916	DCFC	I-40	Williams	4	Electrify America
185095	Level 2	I-10/I-40	Flagstaff	2	Non-Networked
185098	DCFC	I-10/I-17	Phoenix	1	Non-Networked
186033	Level 2	I-10/I-17	Phoenix	2	ChargePoint Network
186034	Level 2	I-10/I-17	Phoenix	2	ChargePoint Network
186193	Level 2	I-10	Goodyear	1	Non-Networked
186198	Level 2	I-10/I-17	Phoenix	2	Non-Networked
186348	Level 2	I-10/I-17	Phoenix	3	Non-Networked
186349	Level 2	I-10	Tempe	1	Non-Networked
186350	Level 2	I-10	Chandler	2	Non-Networked
186351	Level 2	I-10	Chandler	1	Non-Networked
187569	Level 2	I-10/I-17	Phoenix	2	ChargePoint Network
187879	DCFC	I-40	Kingman	4	Electrify America
187884	Level 2	I-10/I-17	Phoenix	4	Blink Network
187948	DCFC	I-10	Quartzsite	4	Electrify America
189037	Level 2	I-10/I-19	Tucson	2	Blink Network
189311	Level 2	I-8	Yuma	2	Blink Network
189658	Both	I-10/I-17	Phoenix	1 each (2 total)	Blink Network
189685	DCFC	I-10/I-19	Tucson	4	Non-Networked
190647	Level 2	I-10/I-17	Phoenix	2	ChargePoint Network
191561	DCFC	I-10	Chandler	4	Electrify America
193276	Level 2	I-10/I-17	Phoenix	2	ChargePoint Network
193277	Level 2	I-10/I-17	Phoenix	2	ChargePoint Network
193278	Level 2	I-10/I-17	Phoenix	2	ChargePoint Network
193279	Level 2	I-10/I-17	Phoenix	2	ChargePoint Network
195717	Level 2	I-10/I-17	Phoenix	2	Blink Network
195718	Level 2	I-10/I-17	Phoenix	4	Blink Network
195719	Level 2	I-10/I-17	Phoenix	2	Blink Network

State EV Charging Location Unique ID	Charger Level (DCFC, L2)	Route	Location	Number of EV Connectors	EV Network
195724	Level 2	I-10/I-17	Phoenix	2	Blink Network
195733	Level 2	I-10/I-19	Tucson	2	ChargePoint Network
195734	Level 2	I-10/I-19	Tucson	2	ChargePoint Network
196011	Level 2	I-10/I-40	Flagstaff	2	ChargePoint Network
196012	Level 2	I-10/I-40	Flagstaff	2	ChargePoint Network
198039	Level 2	I-10/I-19	Tucson	2	SemaConnect Network
198261	DCFC	I-10	Tempe	1	EVgo Network
198884	DCFC	I-10/I-8	Casa Grande	1	EVgo Network
201449	Level 2	I-10/I-40	Flagstaff	2	ChargePoint Network
201450	Level 2	I-10/I-40	Flagstaff	2	ChargePoint Network
201865	Level 2	I-40	Holbrook	2	Blink Network
202355	Level 2	I-8	Yuma	4	Non-Networked
202359	Level 2	I-10/I-17	Phoenix	4	Non-Networked
202365	Level 2	I-10/I-40	Flagstaff	4	Non-Networked
202369	Level 2	I-40	Holbrook	4	Non-Networked
202371	Level 2	I-10	Goodyear	4	Non-Networked
202372	Level 2	I-10/I-17	Phoenix	4	Non-Networked
202374	Level 2	I-10/I-17	Phoenix	4	Non-Networked
202383	Level 2	I-10/I-17	Phoenix	4	Non-Networked
202395	Level 2	I-10/I-8	Casa Grande	2	Volta
205051	Level 2	I-10	Avondale	2	ChargePoint Network
205372	DCFC	I-19	Green Valley	1	ChargePoint Network
205566	DCFC	I-40	Kingman	14	Tesla
205762	Level 2	I-10	Avondale	2	ChargePoint Network
206318	Level 2	I-8	Yuma	2	ChargePoint Network
206319	Level 2	I-8	Yuma	2	ChargePoint Network
206479	Level 2	I-10/I-19	Tucson	2	ChargePoint Network
206610	DCFC	I-10/I-19	Tucson	16	Tesla
207198	DCFC	I-10	Avondale	1	ChargePoint Network
207199	DCFC	I-10	Avondale	1	ChargePoint Network
207804	Level 2	I-10	Tempe	1	ChargePoint Network
207805	Level 2	I-10	Tempe	1	ChargePoint Network
207806	Level 2	I-10	Tempe	1	ChargePoint Network
207807	Level 2	I-10	Tempe	1	ChargePoint Network
211831	Level 2	I-19	Green Valley	1	ChargePoint Network
211832	DCFC	I-19	Green Valley	1	ChargePoint Network
212779	Level 2	I-40	Winslow	4	Non-Networked
212782	Level 2	I-10	Goodyear	4	Non-Networked

State EV Charging Location Unique ID	Charger Level (DCFC, L2)	Route	Location	Number of EV Connectors	EV Network
213154	Level 2	I-10/I-17	Phoenix	8	Non-Networked
217183	Level 2	I-10/I-40	Flagstaff	2	ChargePoint Network
217184	Level 2	I-10/I-40	Flagstaff	2	ChargePoint Network

Figure 7: Map of Existing Interstate Charging Stations in Arizona
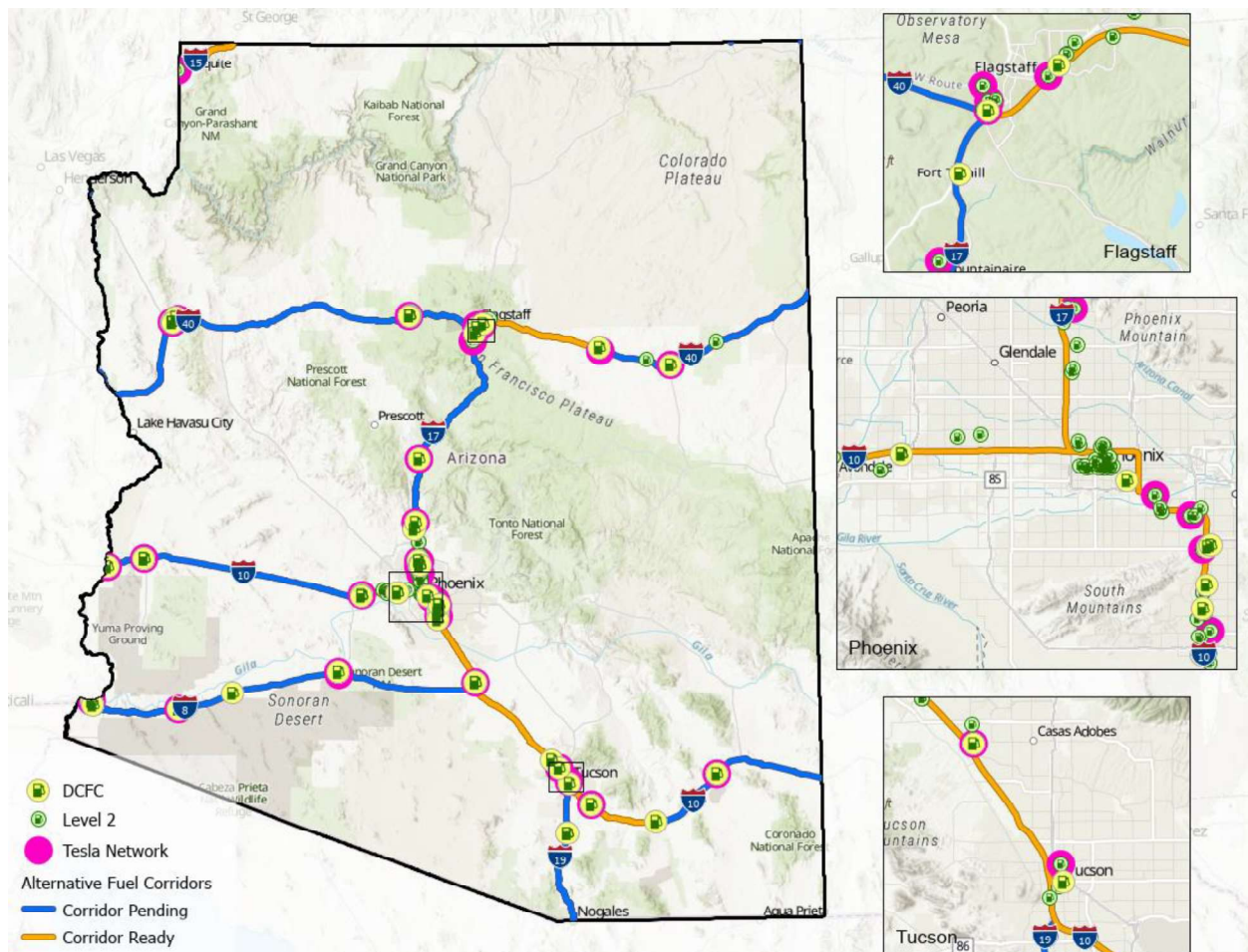
Current Grid Capacity

The high-power output of DCFC requires adequate capacity on the electrical grid and specific electrical service conditions such as three-phase power. An understanding of where three-phase service and adequate electrical capacity exists will play a critical role in identifying sites for proposed charging stations. Sites that do not have adequate electrical conditions will need to be upgraded, adding to the cost and timeline of deployment. ADOT currently lacks data on available grid capacity but plans to collaborate with electric utilities (e.g., APS, TEP, Salt River Project, Navopache Electric Co-op, Mohave Electric Cooperative, UNS Electric, Sulphur Springs Valley Electric Co-op) to understand grid conditions at the proposed sites. Following engagement, ADOT may revise the proposed sites if constraints are identified.

Known Risks and Challenges

Table 11 lists the risks and challenges identified in Arizona regarding the deployment of EV charging infrastructure.

Table 11: Known Risks and Challenges

Risk/Challenge	Description	Mitigation
Staffing	The Plan implementation will require a significant number of ADOT staff, including environmental, cybersecurity, contracts, legal, and project management, as well as staff to monitor, collect data, and prepare federal reports. NEVI funds cannot be used to hire new staff positions and ADOT is unlikely to have the resources to create new positions specifically for this program.	Select a contracting mechanism that enables effective implementation of the Plan with existing staff.
Stranded Assets	To close gaps and help to meet needs of underserved communities, some stations will be placed in rural, tribal, and low-income communities; these areas might initially have low station utilization and may be unprofitable for some time, but their installation is required for sufficient infrastructure coverage. Private businesses may build and operate a station if a grant pays for the first five years of operations and maintenance, but the private business could find it unprofitable to continue operation after the grant funds are exhausted and, as a result, abandon the station.	Develop contracting mechanisms that encourage well-established EV firms to own the stations and that offer an incentive to keep them running long-term.

Risk/Challenge	Description	Mitigation
Equity	The most profitable and easiest to develop EV charging station locations have already been built. Proposed EV station locations are in rural, tribal, and underserved areas that may not attract developers.	Bundle several stations, entire corridors, and/or geographic areas into a single contract to make development more attractive.
Cybersecurity	Cyber-attacks are a risk to customers' financial transaction data, personal data, and vehicle-connected devices. Any identified EVSE vulnerabilities can introduce the potential of malware installation and propagation to vehicles, charging infrastructure and other connected technologies. Exposing equipment to breaches in cybersecurity can put payment data and personal information of the customer at risk, and also present risks to the charging network and electrical grid.	Develop and maintain a robust cybersecurity plan throughout the lifetime of the infrastructure. Include requirements from this Plan in all applicable contracts.
Location Viability and Permitting	Some proposed infrastructure locations might be space-constrained and/or on private/leased property.	Permits and agreements should be plainly written and permitting processes streamlined. Space constraints should be considered in the selection of potential EV station sites. As charging infrastructure could recharge RVs or over the road trucks pulling trailers, there should be sufficient space for large vehicles where they could be expected
Charger Types	Multiple connector types exist for DCFC charging. Inclusion of only one type might exclude certain vehicles from being able to utilize the charging infrastructure.	Consider connectors and/or adapters that can be used by different vehicles.
Communication Reliability	All chargers will be networked, and any loss of connection would result in the charger(s) going out of service.	Operating contracts of charging infrastructure should include up-time performance metrics to maintain a very high level of reliability, which could include redundancies of

Risk/Challenge	Description	Mitigation
		different networks if the primary network goes down.
Unbanked Population	Not everyone has access to a credit/debit card as some of the population remains unbanked.	Consider the feasibility and utility of alternative payment methods, such as prepaid debit cards.
Demand Charges	During peak period usage, it is more costly to provide electricity. Utility providers may add additional demand charges on top of standard electricity prices to compensate for the increased delivery costs.	Consider software at charging stations to allow for variable pricing. This would help to manage peak demand and minimize operating costs while still providing adequate levels of charging. ADOT can assist EVSE operators in coordinating with utility providers to understand and anticipate expected demand charges.
Vandalism and Damage	Charging stations could be vandalized if not properly secured or damaged from improper use (e.g., vehicle crash, driving over charging cords)	Implement security features such as protective bollards, retractable cords, vandal-proof chargers, closed circuit television.
Supply Chain Shortages	Due to the COVID-19 pandemic, supply chain shortages exist across all industries, including items needed for EV infrastructure deployment (i.e., raw materials, microchips, equipment, and labor). As all 50 states are simultaneously procuring and deploying NEVI-compliant infrastructure, this impact could worsen.	Actively plan for and incorporate longer-than-expected lead times for the procurement of materials when developing schedules.
Extreme Weather and Battery Fires	During the extreme heat of the summer months, EVs are more susceptible to lithium-ion battery fires. These fires are difficult to extinguish.	Mitigation strategies would include adequate fire suppression facilities at key locations.

Risk/Challenge	Description	Mitigation
Changing Technology	EV technology is rapidly evolving and could quickly outpace currently available EV infrastructure.	Futureproof new station locations by adding larger conduits and other cost-effective improvements to enable future upgrades. Consider requiring chargers that operate at 400 and 800 volts.

State, Regional, and Local Policy

Table 12 summarizes the relevant Arizona policies and plans at various levels of government.

Table 12: Arizona EV Policies and Plans

EV Policy Breakdown		
Policy	**Agency**	**Description**
State		
Arizona Statewide Transportation Electrification Plan: Phase II	APS and TEP	In 2021, APS and TEP released the Arizona Statewide Transportation Electrification Plan: Phase II as a follow-up to the Phase I plan released in 2019. It put forth a comprehensive and actionable roadmap for transportation electrification in Arizona, including an analysis of promising EV opportunities and significant engagement with the state's TE stakeholder community. Updates are anticipated every three years. The plan process focused on a cost/benefit analysis of electrification opportunities and stakeholder engagement. The cost/benefit analysis found that transportation electrification could generate net benefits of $28 billion for Arizona, $9 billion for drivers or fleet owners, and $12 billion for utility ratepayers, in present value. Within this Phase II plan, APS and TEP propose statewide EV goals by vehicle segment and utility, with a proposed goal for electric light duty vehicles at 450,000, 95,000, and 1,076,000 vehicles for APS, TEP, and State service areas, respectively. These goals are intended to be met by the year 2030

EV Policy Breakdown		
Policy	Agency	Description
EV Cost-Benefit Analysis	SWEEP	SWEEP released an EV Cost-Benefit Analysis for Arizona in December 2018 with a focus on passenger vehicles in two scenarios (moderate and high adoption rates). The moderate scenario estimated that a cumulative net benefit from plug-in EV use in Arizona will exceed $3.7 billion state-wide by 2050, but this number could increase to exceed $31 billion under the high adoption scenario. These savings would be derived from electric utility customers in the form of reduced electric bills, from drivers in the form of reduced annual vehicle operating costs, from owners of public charging infrastructure, from residents due to reduced costs of complying with future carbon reduction regulations, and from society at large based on the value of reduced nitrogen oxides emissions.
Regional		
Transportation Electrification Implementation Plan	TEP and UNS Electric Inc. (UNSE)	TEP and UNSE intend for the implementation plan to build off the Statewide Transportation Electrification Plan, to focus on the barriers best addressed by the electric utility. This includes public lack of awareness, insufficient charging infrastructure and network, costs of EV charging and grid impacts, and access for underserved and low- to-moderate income (LMI) customers.

EV Policy Breakdown		
Policy	Agency	Description
Local		
Draft Transportation Electrification Plan	City of Phoenix	In June 2022, the City of Phoenix approved the Draft Transportation Electrification Action Plan, which summarizes the current state of the city's EV adoption and infrastructure, their target goals for the year 2030, and a list of goals with provided action items to achieve their target number of 280,000 EVs by the year 2030. The plan follows 'Roadmap 2030,' which includes five steps to prepare for the increased adoption. The plan makes note of issues related to charging infrastructure shortages, actual versus perceived cost, limited model availability, range-anxiety, lack of EV-ready building codes, and public knowledge and experience with EVs as a few of the factors still standing in the way of greater adoption rates. To overcome these issues, the plan sets three distinct strategies: Prioritize Equity, Accelerate Public Adoption of EVs, and Lead by Example. Currently, Phoenix has adoption goals in line with the federal government's 2030 nationwide EV adoption, but they still lack the infrastructure needed for charging the proposed number of EVs by 2030.

Laws and Regulations

Within Arizona, any state agency or political subdivision that operates an alternative fueling station is required to allow vehicles, other state agencies, or political subdivisions to utilize the station to the extent practical.[26] Any state agency, board, or commission must purchase hybrid EVs, AFVs, or another vehicle that meets GHG emission standards.[27] In large counties (defined by having over 1.2 million people), at least 75% of the total municipal fleet must operate on alternative fuels.[28] Any federal fleets based in Arizona that operate primarily in large counties must have at least 90% of the fleet operating on alternative fuel.[29]

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[26] State of Arizona (2014). Arizona Revised Statutes 49-572.

[27] State of Arizona (2011). Arizona Revised Statutes 41-803.

[28] State of Arizona (2013, 2015, 2018, 2011). Arizona Revised Statutes 9-500.04, 49-474.01, 49-541, and 49-571.

[29] State of Arizona (2018). Arizona Revised Statutes 49-573

Coalitions/MOUs

Arizona joined Colorado, Idaho, Montana, Nevada, New Mexico, Utah, and Wyoming in signing the Regional Electric Vehicle West MOU to create an Intermountain West EV Corridor. This corridor will enable an EV to drive seamlessly across the states that signed the MOU using the major transportation corridors. In 2019, a revised West MOU was signed to update the corridor goals to include educating consumers and fleet owners, coordinating EV charging stations to achieve a consistent user experience, producing minimum standards for EV charging stations, collaborating on funding opportunities, and supporting the build out of DCFCs along EV corridors.[30]

Arizona utilities (UniSource, APS, and TEP)[31] joined the National Electric Highway Coalition (NEHC) that aims to create a DCFC network that connects major highways systems across the country. To enable long distance EV travel, NEHC members agree to ensure efficient and effective DCFC deployment plans through avoiding duplication and complementing DCFC sites.

Incentives

Arizona offers a variety of incentives (both monetary and policy oriented) to encourage low and zero-emission vehicle adoption. They are typically stated in relation to AFVs to be more encompassing than just EVs, but in some cases include hybrid vehicles.

State

ADOT issues special license plates dedicated to AFVs that are powered by propane, compressed natural gas (CNG), electricity, or hydrogen. The plates provide applicable drivers with incentives for driving AFVs, including the ability to park without penalty in parking areas designated for carpool operators and in spaces designed for EV charging.[32] [33] Similarly, Arizona Revised Statute 28-2416 allows qualified AFVs to use high-occupancy vehicle lanes, regardless of the number of occupants, although this exemption will expire in September 2025.[34] Owners of qualified AFVs that are registered in Arizona for the first time are not required to complete emissions testing in their first year only, unless they are used for commuting into Phoenix or Tucson.[35]

A financial incentive is also currently provided. AFVs purchased in 2022 or earlier have a reduced annual vehicle license tax assessment based on a percent of the suggested retail price.[36]

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[30] U.S. Department of Energy. (n.d.). *Regional Electric Vehicle (REV) West Plan*. Alternative Fuels Data Center. Retrieved from https://afdc.energy.gov/laws/11875.

[31] Edison Electric Institute (2022, June). *EEI U.S. Member Company Service Territories.* Retrieved from https://www.eei.org/-/media/Project/EEI/Documents/About/EEI-Member-Map.pdf

[32] State of Arizona (2014, 2015). *AZ Statutes 1-215 and 28-877*

[33] State of Arizona (2005). Arizona Revised Statutes 28-876

[34] State of Arizona (2014, 2015). *AZ Statutes 1-215 and 28-2416*

[35] State of Arizona (2018, 2005). *AZ Statutes 49-542 and 49-542.05*

[36] State of Arizona (2014, 2015, 2015). *AZ Statutes 1-215, 28-5805, and 28-5801*

Utility and Private Incentives

Utility providers within Arizona offer various incentives and rebates to help encourage building out the charging infrastructure network. APS operates the Take Charge AZ pilot program which offers free EV charger installation, maintenance, and educational services to its workplace, fleet, and multi-unit dwelling customers.[37] They do not pay for the energy used, but do help businesses, fleets, and multi-family complexes establish EV accessibility by installing charging stations, and cables, establishing service, educating staff, and conducting check-ups on equipment.

The Salt River Project (SRP) offers residential customers who operate an EV or plug-in hybrid vehicle the opportunity to use time-of-use electricity rates for at-home charging during super off-peak hours (11pm to 5am, year-round) and additional off-peak hours (non-peak hours that vary by season) on weekends, holidays, and some weekday hours. A separate smart submeter is required for EV charger usage and is provided by SRP.[38] SRP also has rebates for commercial users and offers funding to trained vendors who study electrification opportunities. These opportunities can be for commercial non-road equipment through the Electric Qualified Service Provider Assessment Program and on-road electrification opportunities for fleets under the Fleet Advisory Services Program.[39]

On the infrastructure side, SRP provides rebates for installing charging infrastructure. SRP has a marketplace for individuals to purchase Level 2 chargers with instant rebates applied at the time of purchase. Businesses can receive $1,500 per networked Level 2 charging station port, and government, non-profit and school customers can receive $4,000 per Level 2 port. The amount increases to $15,000 per DCFC port for businesses and $20,000 per DCFC port for government, non-profits, and school customers. Rebates are limited to three DCFC ports per customer per program year.

TEP also offers various rebates and incentives. At the residential level, rebates of up to $500 are provided for installing chargers; time-of-use rates are required.[40] TEP has a program similar to SRP's that offers a rebate of $4,500 per port for Level 2 workplace charging, $6,000 per port at multi-family dwellings, and $24,000 per port for DCFC chargers at any land use. These rebates increase to $6,000, $9,000, and $40,000 if the deployment is in a low-income area.[41]

Arizona Electric Vehicle Market Analysis

The global EV market has grown over the past decade thanks to increased availability, improved vehicle range, cost competitiveness with ICEs due to maturing battery technology, and the wide availability of tax rebates and other incentives. Emission reduction targets set by government agencies have also led to an increased focus on expanding EV usage.

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[37] *Take Charge AZ.* APS. (n.d.) Retrieved from https://www.aps.com/en/About/Sustainability-and-Innovation/Technology-and-Innovation/Electric-vehicles/Take-Charge-AZ.

[38] *Electric Vehicle (EV) Price Plan.* SRP. (n.d.) Retrieved from https://www.srpnet.com/prices/home/electricvehicle.aspx.

[39] *Electrification rebates.* SRP (n.d.). Retrieved from https://www.srpnet.com/energy-savings-rebates/business/rebates/electrification.

[40] *EV Rebates.* TEP. (n.d.) Retrieved from https://www.tep.com/ev-rebates/.

[41] *Smart EV Charging Program.* TEP. (n.d.) Retrieved from https://www.tep.com/smart-ev-charging-program/.

Overview and Purpose

To support Arizona's EV market analysis, an assessment of the existing number of registered light-duty EVs in Arizona was conducted based on current vehicle registration numbers, existing market information, and EV adoption projections. EV adoption projections were performed for low-, medium-, and high-growth scenarios through the year 2040. Projection results are provided to inform recommendations on charging infrastructure and create the most effective and efficient solutions for EV adoption within Arizona.

Current EV Ownership in Arizona

ADOT reports the number of vehicles registered within Arizona, as shown in **Table 13**, for the previous three fiscal years. There were 40,964 EVs registered in Arizona at the end of FY21, which accounts for 0.55% of all registered vehicles and 64.9% of the 63,147 registered AFVs.

Arizona Revised Statute §1-215.4 defines an alternative fuel as one of the following:

- Electric
- Natural gas/CNG or liquified petroleum gas
- Hydrogen
- Blend of 70% alternative fuels with 30% gasoline (unavailable in Arizona)
- Solar.[42]

Vehicle sales and historical EV adoption data provide insight into future EV adoption at the localized level.

Table 13: Arizona Vehicle Registrations

	FY19	FY20	FY21
Vehicles Registered	7,863,112	7,828,255	7,444,032
AFVs Registered	33,299	37,477	63,147
EVs Registered	28,770	34,898	40,964

Source: https://azdot.gov/fast-facts

The number of registered EVs increased by 21% between FY19 an FY20 and by 17% between FY20 and FY21. Vehicle registrations in FY19 and FY20 included an "unassigned category" for law enforcement's use and also included disability placards. FY21 excluded these counts, but continued to include trailers, off-road vehicles, and commercial fleets. In FY21, only 4.8 million vehicles are standard, class I passenger vehicles.

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[42] *Arizona Revised Statute §1-215.4*. Retrieved from https://www.azleg.gov/ars/1/00215.htm

To date, EVs do not represent a significant market share in Arizona, although Arizona's share of nationwide EV sales is greater than the national average.[43] Barriers to the aggressive adoption of EVs are likely attributed to:

- Initial capital costs: While studies show that operations and maintenance costs throughout the lifecycle of an EV are significantly lower than those of traditional ICE vehicles, EVs have a higher purchase cost which can be a barrier for some, particularly low-income drivers.
- Weather concerns: Higher temperatures significantly reduce EV range—the electricity needed for heating and cooling systems is diverted away from the drivetrain and thus reduces the amount of onboard energy. Given that Arizona experiences extremely hot temperatures throughout the summer, it is easy to expect drivers to worry about range limitations. Most of Arizona's population lives in areas that typically experience mild winters, however, there are a few mountainous areas that experience cold weather which also reduces EV range.
- Range anxiety: Many drivers are reluctant to purchase EVs as their primary vehicle due to concerns that their vehicle will not have sufficient battery capacity and/or that they will not be able to easily access an EV charger in order to cover their desired driving distance or reach their intended destination.

These barriers may eventually be lowered by incentives to make initial purchases of EVs more affordable, improvements to battery capacity and vehicle range, and the expansion of the DCFC network.

EV Adoption Forecast

Methodology

Industry trends, localized EV adoption factors, and historical vehicle trends in Arizona were used to build the EV adoption forecast to estimate the anticipated rate of EV adoption and the percent of Arizona's anticipated passenger EV market over the next 20 years as shown in **Figure 8**. For each future year modeled, the adoption forecast is recalculated based on projected changes in the EV market of preceding years.

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[43] *EV Market Share by State*. Evadoption. (n.d.) Retrieved from https://evadoption.com/ev-market-share/ev-market-share-state/

Figure 8: EV Adoption Forecast Methodology Flow Diagram
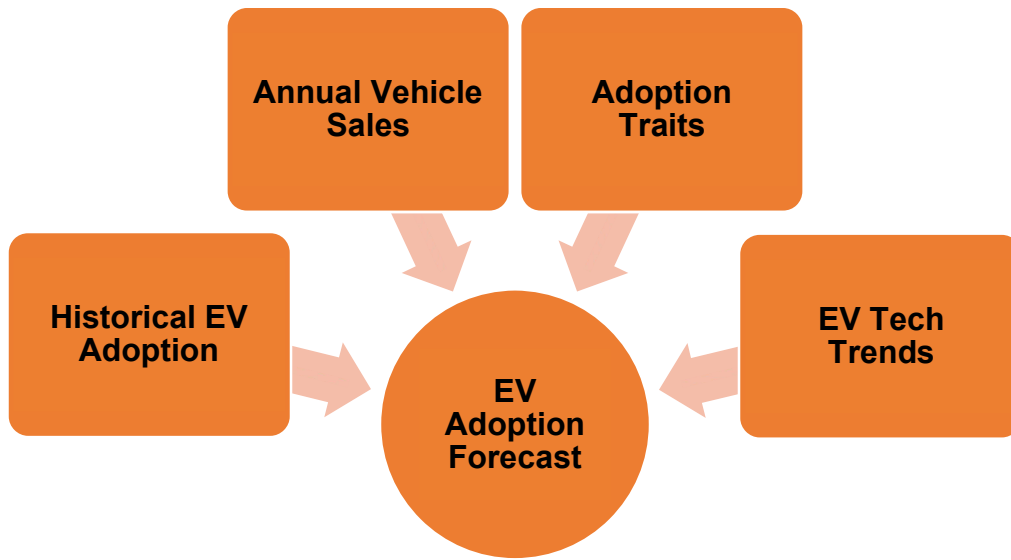

EV Adoption Forecast Factors

For each year modeled, an EV adoption factor was calculated representing the percentage of annual total vehicle sales that is anticipated to be EVs. The calculation itself was developed based on two input categories correlated to EV adoption: industry trends and state characteristics. The calculation was also tested and refined to verify that the forecasted results aligned with both historical data and other industry projections.

EV Tech Trends – Industry Trends

Battery technology improvements, reduced upfront vehicle costs, and the development of a public charging network are all changing the EV industry by lowering barriers to entry and further encouraging current and future EV purchases. These trends are prerequisite to providing potential vehicle buyers with the evidence needed in order to be confident that EVs are becoming as capable, affordable, and accessible as ICEs. The projection model uses industry trends as input factors for EV adoption, by examining model availability and initial EV capital cost when compared to an ICE vehicle. The density of the public charging network is also utilized in the model.

EV Tech Trends - Model Availability

The expanded availability of EV options on the market gives drivers enough flexibility to select EVs that fit within their preferences, budget, lifestyles, and preferred manufacturer. Model availability was estimated using the number of currently available EV models on the market; projections through 2040 for model availability are based on announcements and electrification commitments from major vehicle manufacturers. Both industry trends, due to public preference as well as federal targets and commitments to reduce emissions, suggest that manufacturers will continue progressing toward fully electrified fleets by 2040. **Figure 9** displays the model availability projections for some of the major vehicle manufacturers.

Figure 9: EV Model Availability Forecast

Legend: BMW, Ford, GM, Honda, Hyundai, Kia, Mazda, Mercedes, Nissan, Subaru, Tesla, Toyota, Volkswagen, Other
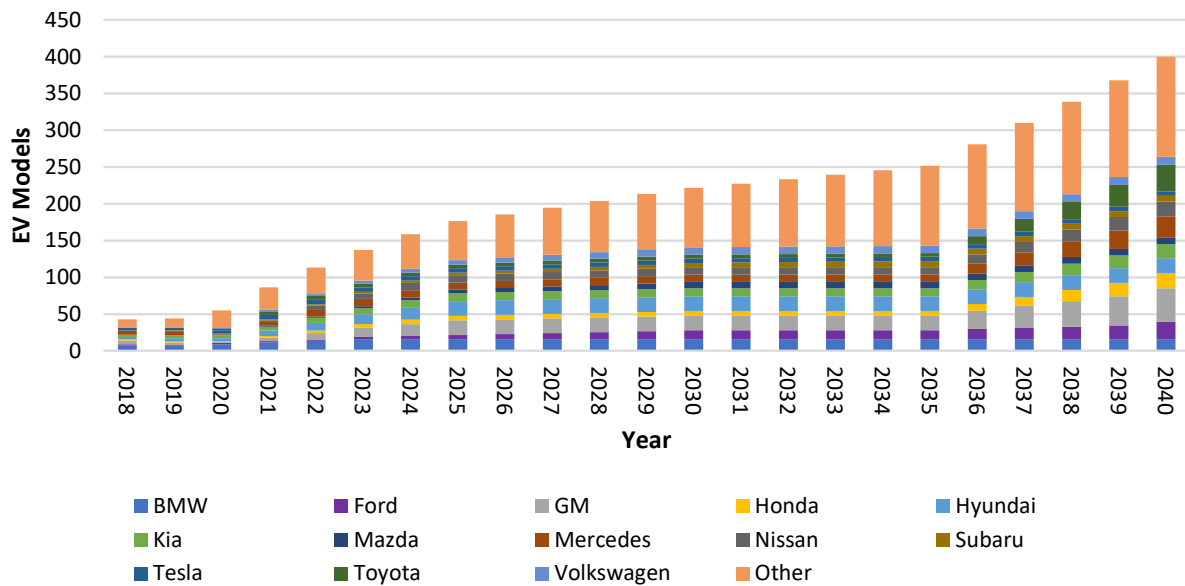
EV Tech Trends – Costs

One of the primary barriers to EV adoption is the higher upfront cost of an EV when compared to an ICE vehicle. According to Kelly Blue Book, in May 2022 the average price to purchase an EV was $64,338, compared to an ICE vehicle at an average of $47,148.[44] Despite the higher purchase price, the current disparity between ICEs and EVs is expected to decrease and lead to increased EV adoption. The adoption model utilizes a projected cost reduction of EVs through 2040, due to declining battery prices, as an input. Anticipated cost competitiveness between EVs and ICEs is expected to occur in 2025 based on the projection.

Adoption Traits – Arizona Characteristics

EV adoption varies significantly depending on numerous indicators, such as the potential purchaser's income, educational attainment, environmental concern, home ownership, and the number of vehicles already owned. For example, drivers with higher levels of household income or higher concern for the environment are more likely to purchase an EV than those with lower income or less concern for the environment.[45] These factors can vary geographically, thus they were assessed on a localized level to yield the EV adoption outputs for Arizona.

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[44] *New-Vehicle Prices Flirt with Record High in May, According to Kelley Blue Book, as Luxury Share Remains Strong.* Kelley Blue Book. (2022, June 9). Retrieved from https://b2b.kbb.com/news/view/new-vehicle-prices-may-2022-luxury-share-remains-strong/.

[45] Stockkamp, C.; Schäfer, J.; Millemann, J.A.; Heidenreich, S. (2021, October 2). *Identifying Factors Associated with Consumers' Adoption of e-Mobility—A Systematic Literature Review.* Sustainability 2021, 13, 10975. Retrieved from https://doi.org/10.3390/su131910975.

In Arizona, the average gallon of gasoline costs $4.73 as of July 22, 2022 (higher than the national average of $4.41).[46] Due to global and national macroeconomic factors, gas prices are expected to continue to increase or to stay elevated for the near future, which could make purchasing an EV more attractive to consumers as the difference in operating costs between EVs and ICE vehicles continues to grow.

For EV adoption in Arizona, state level data for residents were assembled from publicly available sources. Each factor is presented in **Table 14** along with the applicable data source.

Table 14: Arizona State Characteristics that Influence EV Adoption

State Characteristic	Factor Measurement	Arizona Value	Source
Median Household Income	Household income	$61,5299	2020 US Census
Environmental Concern	Local election results	49% voted for a platform that supported environmental policies, including EV infrastructure development	2020 Federal Election Results
3+ Car Households	Number of households with three or more cars	590,173	2020 ACS 5-Year Estimates
Total Households	Households	2,643,430	2020 ACS 5-Year Estimates
College Education Attained	Percentage of residents with a bachelor's degree or higher	30.3%	2020 US Census
Homeowner Percentage	Percentage of single unit detached households in Arizona	65.3%	2020 US Census
Vehicle Count	Number of registered passenger vehicles	4,818,711	ADOT
Existing Level 2 Ports	Number of Level 2 charging ports installed	1810	Alternative Fuels Data Center
Existing DCFC Ports	Number of DCFC charging ports installed	459	Alternative Fuels Data Center

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[46] *Gas Prices.* AAA. (n.d.) Retrieved from https://gasprices.aaa.com/.

State Characteristic	Factor Measurement	Arizona Value	Source
EV Policies	Policies that drive EV adoption including charging infrastructure plans, emission/adoption goals, building codes, and incentives	19%	American Council for an Energy-Efficient Economy
Annual Vehicle Sales	Share of new vehicle registrations in the United States	2.19%	National Automobile Dealers Association
Historical EV Adoption	Number of registered EVs in Arizona	2019: 28,770 2020: 34,898 2021: 40,964	ADOT

EV Adoption Forecast Assumptions

The following key assumptions were made to forecast EV adoption through the year 2040:

- Between 2035 and 2040, car manufacturers will exceed current EV commitments by electrifying their full fleet, including all sedans, SUVs, and trucks.
- Operational and maintenance costs are not included as consumers are typically more concerned with the initial price (rather than full life-cycle costs) when determining which vehicle type to purchase, although it should be noted that the recent significant surge in gas prices has begun to shift this consumer mindset.
- Battery technology will mature by 2030, leading to upfront cost declines of EVs. Beyond 2030, costs are assumed to be constant.

An optimal amount of charging infrastructure is developed to meet the estimated increase in adoption using 4 DCFCs per 1,000 EVs, 60 public Level 2 chargers per 1,000 EVs, and at-home charging is available for homeowners.[47] Each year, the expanded charging network infrastructure is used as the input factor for adoption for the subsequent year being modeled as an iterative process.

- Vehicle sales are constant throughout 2040 as total new vehicles sales have remained generally constant in the United States between 2015-2019; however, impacts from COVID-19 and policy pressure to further encourage EV adoption may impact this assumption in the future.[48]

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[47] *Federal EV policy*. Union of Concerned Scientists. (n.d.). Retrieved January 31, 2022, from https://www.ucsusa.org/resources/federal-ev-policy.

[48] *New and used passenger car and light truck sales and leases*. New and Used Passenger Car and Light Truck Sales and Leases | Bureau of Transportation Statistics. (n.d.). Retrieved January 31, 2022, from https://www.bts.gov/content/new-and-used-passenger-car-sales-and-leases-thousands-vehicles.

Three scenarios were analyzed to identify the potential magnitude of growth in EV adoption due to economic and policy trends. The scenarios are defined in **Table 15**. These scenarios were applied to the EV adoption forecasts to quantify the range of potential EV adoption in Arizona. Due to the current economic factors and supply chain shortages, the low-growth scenario describes current circumstances; however, recent EV policy direction and the long-term outlook for widespread EV adoption required the analysis of medium- and high-growth scenarios as well.

Table 15: EV Market Model Growth Scenarios

Growth Scenario	Description
Low	Reduce model availability by 25% compared to the medium projection. This scenario accounts for supply shortages of EV components.
Medium	Scale high-growth scenario to better align with historical EV adoption trends. This scenario accounts for the unique EV adoption factors in Arizona and projections of the EV market into the future.
High	Increase in the cost parity of an EV compared to an ICE vehicle by 25% compared to the medium projection to reflect rising gas prices. This scenario reflects other policies and infrastructure deployment to meet Arizona's 1.5 million EVs on the road in 2038.

Findings

The model generated estimates for Arizona's EV adoption based on the three growth scenarios (as shown in **Figure 10**, **Figure 11**, and **Table 16**). EV adoption estimates for 2030 range between 6%–14% of the total Arizona passenger vehicle market being electric, with 11%–25% of new sales being EVs. For comparison, forecasts predict 9% of the country's fleet will be electric in the same time period, with 36% of new sales being EVs; this is driven by recent federal government targets of 50% of all vehicle sales to be EVs by 2030.[49] [50]

Figure 10: Expected EV Adoption in Arizona 2020-2040 Total Registrations

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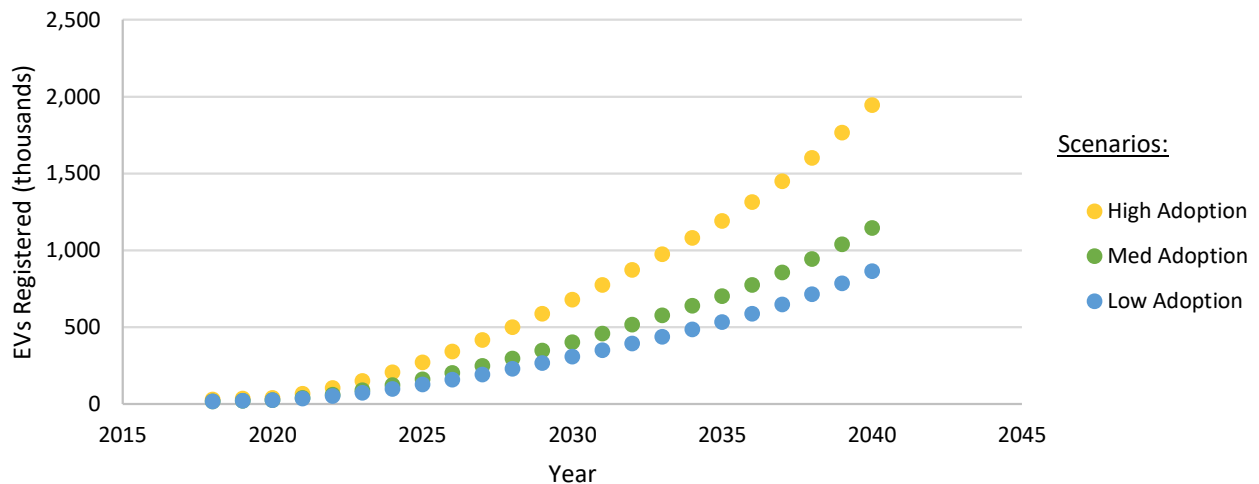
[49] Bauer, G.; Hsu, C.; Nicholas, M.; Lutsey, N. (2021, July). *Charging up America: Assessing the growing need for U.S. Charging Infrastructure through 20230*. Retrieved January 31, 2022, from https://theicct.org/sites/default/files/publications/charging-up-america-jul2021.pdf

[50] The United States Government. (2021, August 5). *Fact sheet: President Biden announces steps to drive American leadership forward on clean cars and trucks*. The White House. Retrieved January 31, 2022, from https://www.whitehouse.gov/briefing-room/statements-releases/2021/08/05/fact-sheet-president-biden-announces-steps-to-drive-american-leadership-forward-on-clean-cars-and-trucks/

Figure 11: Expected EV Adoption in Arizona 2020-2040 by New Sales
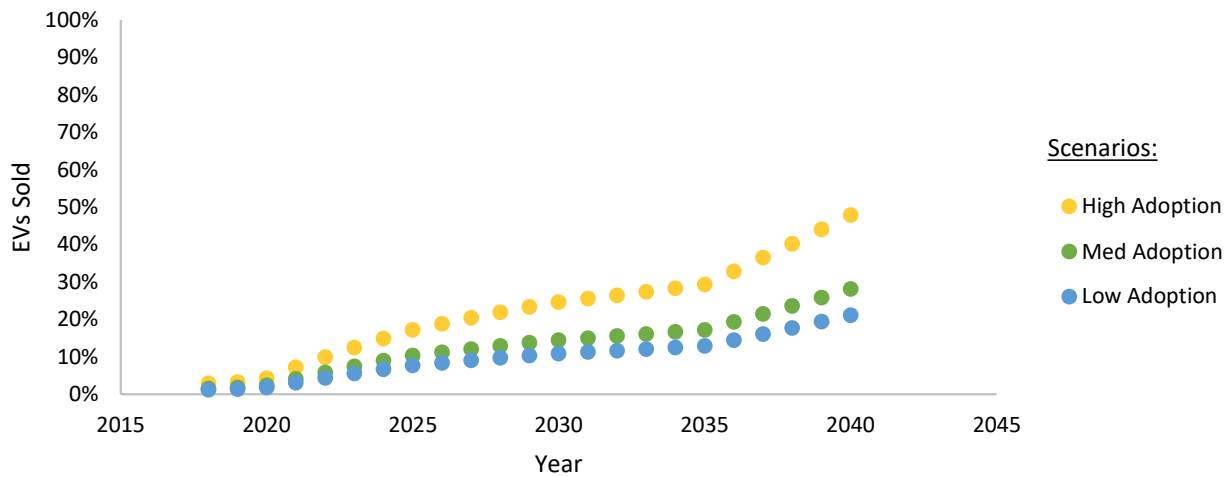
Table 16: Expected In-State EV Adoption

Growth Scenario	EV Estimate 2030		EV Estimate 2040	
	EVs Registered	In-state EV Market %	EVs Registered	In-state EV Market %
Low	307,897	6.4%	864,991	18.0%
Medium	402,293	8.3%	1,145,084	23.8%
High	678,920	14.1%	1,944,045	40.3%

The factors driving EV adoption are key when comparing the different growth scenarios.

- EV models are directly correlated with the number of EVs registered. The low-growth scenario assumes a 25% reduction in EV models available compared to the medium-growth scenario, resulting in only three-quarters as many EVs on the road. EV model availability is a primary factor in any adoption increases, as ICE models are expected to become rare as manufacturers begin to offer only EVs.
- As the initial price of EVs continues to reach parity with ICE vehicles, new EV sales continue to rise in the near-term. The rate of growth of EV sales will begin to slow though still continue to increase as EVs become the more economical option; modeling indicates that this period of slower growth is mostly due to an anticipated lack of new EV models being introduced between 2026 and 2035, and the modeling assumption that rapid EV model development does not begin until 2035.
- While new EV sales are expected to continue to rise annually, growth will be tempered since vehicle fleet stock takes a significant amount of time to turn over (even in the most aggressive scenario). For example, ICEs have an average vehicle life of approximately ten years.

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The most likely growth scenario for Arizona over the analysis period is the medium forecast. Continued deployment of EV charging infrastructure, education on the benefits of EVs, federal and local government policy support, and financial assistance will support the forecasted adoption rate.

Recommendations and Considerations

Based on the existing and future conditions assessment, recommendations and considerations are as follows:

- By the year 2030, the medium-growth scenario predicts 402,293 vehicles (8.3%) on Arizona roadways to be EVs. This is expected to be the most likely forecast scenario, as it aligns with historical adoption data and is reflective of federal policies' and local governments' trends to encourage EV adoption. However, due to lingering COVID-19 impacts and current supply chain storages, this trend may start as a low-growth scenario in the near-term, then develop into the medium-growth scenario. In order to achieve the high-growth scenario, aggressive state and federal policies would need to be enacted to further encourage EV adoption.
- Despite Arizona currently having a small number of EVs on the road, all growth scenarios predict that the number of EVs will at least double between 2021 and 2023. The active participation of the Arizona state government, including its coordination with local jurisdictions and electric utilities, is critical to supporting this transition by following best practices to plan for and accelerate EV adoption. Potential initiatives include developing EV readiness plans, providing educational materials, hosting workshops to facilitate cross-stakeholder collaboration (to share best practices and help streamline efforts across the state), or adopting state EV-adoption targets.
- Policy levers may be utilized to accelerate adoption rates and turn over existing vehicle stock more quickly, and they could include early vehicle retirement programs or incentives on new vehicle purchases.
- The long-term COVID-19 pandemic impacts may hinder EV adoption due to economic constraints on individual households and the global automobile market. These impacts should be considered along with any additional EV adoption barriers that may be faced, particularly by disadvantaged or vulnerable populations. Comprehensive electrification considerations—such as incentives for the purchase of EVs, expanded funding sources, partnerships, and streamlined permitting processes— can all support reducing barriers to electrification. The overall EV adoption trends are expected to remain fairly consistent based on current projections, and the trends point toward an increasingly aggressive nationwide electrification trajectory to reduce emissions and promote public health.

Arizona Charging Demand Analysis

To properly plan for future EV needs, it is important to understand and forecast anticipated charging infrastructure demands.

Widespread EV adoption can bring benefits to both individuals and the environment, but there is also a significant challenge in ensuring an adequate network of public charging infrastructure to meet the growing charging demand. Meeting this demand also poses the issue of ensuring local electric utilities can continue to provide reliable service even with the added load of transportation electrification. If not properly planned for, the impacts resulting from increased electrification on the charging network and impacts to electricity demand can lead to rising electricity prices, grid constraints, and blackouts.

Charging Demand Methodology

The charging demand analysis was conducted using traffic data along the AFCs, taking into account the results from the EV market analysis. The analysis calculated the expected annual electricity consumption of EVs along the AFCs through the year 2040 and accounted for traffic pattern changes, anticipated improvements to battery economy, and the impacts of Arizona weather conditions on EV performance. The calculation steps were:

- Utilize the EV adoption forecast to estimate statewide EV traffic using existing average annual daily traffic (AADT) numbers and applying an annual average growth rate.
- Calculate the AADT of EVs along each individual AFC to understand charging demand needs.
- Calculate the yearly energy consumption factor by multiplying the mileage by the estimated fuel efficiency (in kWh/mile).

EV Traffic and Mileage

ADOT records daily passenger vehicular traffic and mileage data for each corridor, as shown in **Table 17**. Daily VMT were calculated by multiplying the corridor segments' length (in miles) by the AADT. To account for increases in traffic resulting from population and economic growth, a 2.1% average annual growth rate was assigned to both the AADT and VMT.[51]

Table 17: AADT of EVs in Arizona, 2021

Corridor	Length of Corridor (miles)	2021 AADT (miles)	Forecast 2040 AADT (miles)
I-8	178.3	11,130	16,950
I-10	391.2	49,730	75,740
I-15	29.4	23,270	35,450
I-17	146.5	51,710	78,760
I-19	63.1	29,020	44,210
I-40	359.6	18,190	27,700

Determining the future EV AADT required the use of the forecasted totals of passenger EVs traveling in Arizona by the year 2040. The values are anticipated to change annually due to changes in EV adoption. For this analysis, it was assumed that the percentage of EVs in Arizona's vehicle fleet is equal to EV AADT as a percentage of statewide AADT.

Annual EV energy consumption was calculated by applying an average battery capacity (in kWh/Mile) for passenger EV vehicles to the known AADT on the routes.[52] The resulting value represents the amount of electricity an EV is estimated to consume on each designated travel corridor; additional mileage is accumulated traveling to and from the corridor.

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[51] The 2.1% growth rate is based on historical VMT trends and will fluctuate slightly from year to year.

[52] Battery energy consumption refers to the energy consumption rate of the EV and accounts for propulsion, cabin climate control, and other subsystems. It does not include losses during charging.

Figure 12 displays the expected average battery energy consumption of light-duty passenger vehicles (e.g., sedans, SUVs, and trucks) and are based on current EV specifications and forecasted future improvements. Battery fuel economy is assumed constant after 2030 due to limitations on our knowledge of standards and technology improvements past that point.

Figure 12: EV Battery Energy Consumption Projections
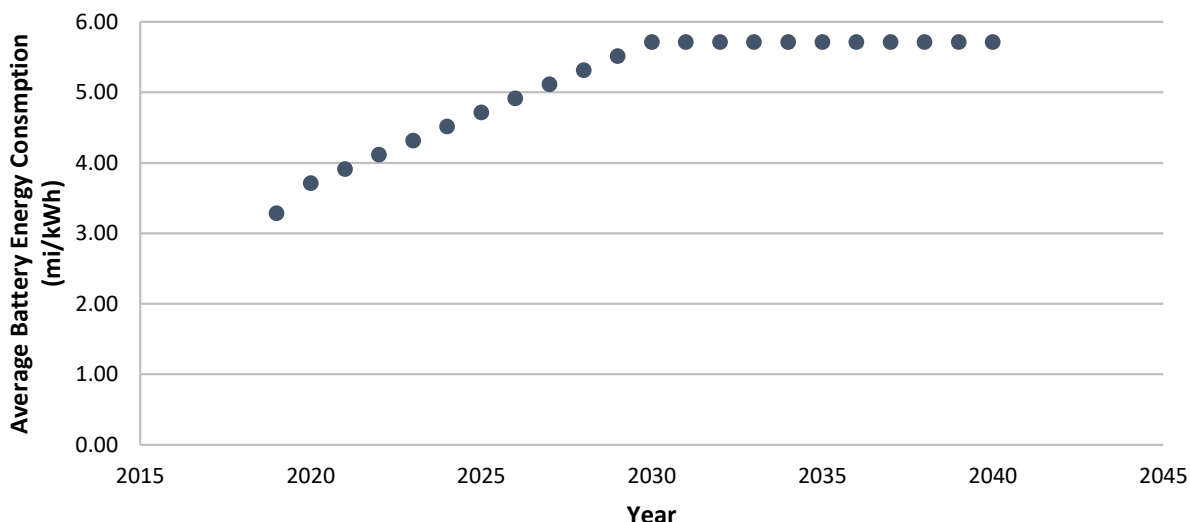
Localized Weather Impacts

As weather impacts can affect battery range, it is important to account for localized weather patterns. Arizona experiences a broad range of temperatures throughout the state, throughout the year, and between day and night. EV performance can be affected by weather due to energy from the vehicle's battery being used to support cooling and heating systems (to condition both the vehicle cabin and to maintain battery temperature) in addition to standard propulsion, which leads to decreased travel range. Studies show that an ambient temperature of 20° F results in a 41% reduction in driving range, while a temperature of 95° F results in a 17% reduction (both results compared to testing at 75° F).[53] Other factors, such as elevation, wind, and precipitation affect vehicle range; however, these other factors are taken into consideration in the annual fuel efficiency metric.

Charging Demand Results

The charging demand analysis estimates that EVs will account for between 3.0 million and 6.6 million miles of interstate travel daily in Arizona by the year 2030. A significant amount of electricity would be required to recharge the vehicles (estimated to be between 684 gigawatt hours (GWh) and 1,509 GWh as seen in **Figure 13**) under assumed vehicle efficiencies. Much of this electricity will be consumed through home or workplace charging; however, this underlies the importance of deploying a public DCFC network capable of supporting EV growth.

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[53] *AAA Electric Vehicle Range Testing*. AAA. (2019, February). Retrieved January 31, 2022, from
https://www.aaa.com/AAA/common/AAR/files/AAA-Electric-Vehicle-Range-Testing-Report.pdf

Figure 13: Forecasted EV Energy Consumption
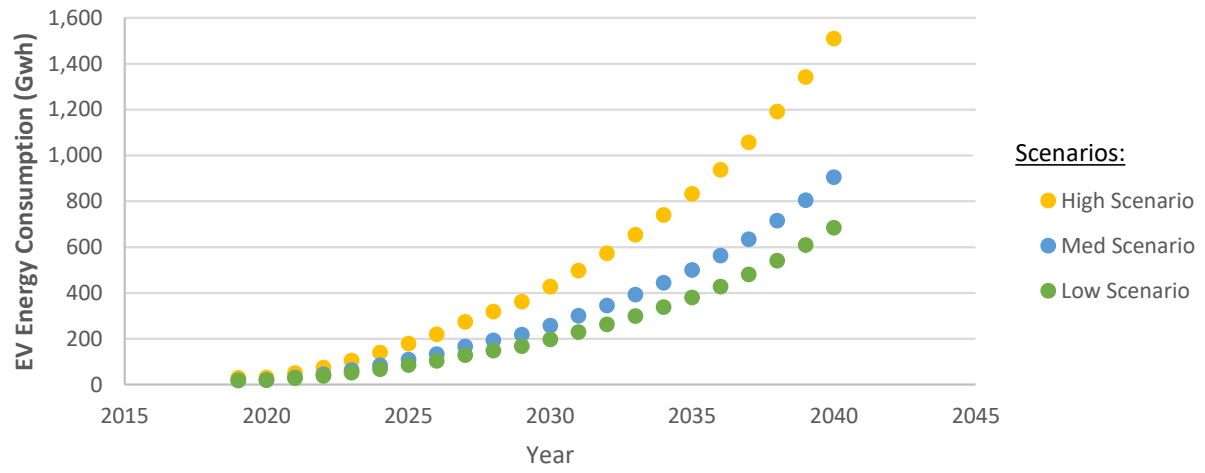
EV Charging Infrastructure Deployment

Developing a nationwide public EVSE network is key to encouraging and supporting EV adoption. To achieve this goal, the NEVI Formula Program designates that a state may receive funding to deploy EVSE along its AFCs if it meets the NEVI requirements including the following:

- Publicly accessible DCFCs must be within 50 miles of each other. Discretionary exceptions may be granted.
- EVSE must be less than one mile away from a highway intersection or interstate exit.
- Site power capability must be at least 600 kW, to support at least 150kW per port simultaneously across four ports.
- Each DCFC station must be equipped with a CCS connector.

Arizona's NEVI-compliant EV Charging Infrastructure Deployment Plan will comply with the aforementioned requirements.

All of Arizona's Interstates (I-8, I-10, I-15, I-17, I-19, and I-40) have received AFC designation by the US DOT. The Plan proposes EVSE in strategic locations to complete the network along the Interstates according to the NEVI requirements.

Funding Sources

The deployment of ADOT's EV infrastructure will involve partnerships with third-party private entities that have the interest, expertise, and resources to meet federal funding match requirements. These partners will upgrade existing or design, build, own, maintain, and operate new EVSE locations, as well as meet the required non-federal share to match the NEVI Formula Program.

Funding sources for EVSE stations in Arizona are displayed in **Table 18**. These sources include utility incentives, for which EVSE station owners may be eligible, federal NEVI Formula Program Funds, and the required non-federal match. Additional programs, such as time of use programs offered by local utilities, are also available to reduce the cost of EV ownership but are excluded from this list as they do not directly reduce upfront EVSE costs.

Table 18: Available Funding Sources

Name	Program Description	Type of Funding	Administering Organization(s)	Amount
Electric Vehicle Charging Station Rebate	Rebate for installing networked Level 2 chargers at commercial, workplace, or multi-family sites.	Rebate	SRP	$1,500 per port
Electric Vehicle Charging Station Rebate	Rebate to cover installation of Level 2 charger at residential sites.	Rebate	TEP	$500 for two-way charger, $250 for one-way
Commercial Electric Vehicle Charging Station Rebate	Rebate for technical assistance and installation of Level 2 or DCFC stations. Higher rebates are available for low-income residents.	Rebate	TEP	Between $4,500 and $40,000, depending on charger type and income level
Commercial Electrification Rebates	Rebate to install, among other technologies, Level 2 charging stations at commercial sites.	Rebate	SRP	$1,500 per port
Arizona's NEVI Planning	Funding to strategically site EVSE along AFCs every 50 miles within 1-mile of AFCs to establish an interconnected network.	Grant	FHWA (NEVI Formula Program)	$76,483,976
Non-Federal Share (Match)	Private entity investment in EVSE and EVSE operations along AFC every 50 miles within one mile of AFCs.	Private investment	EVSE Station Owners	$19,120,994

ADOT anticipates allocating federal NEVI Formula Program funds across program years as follows:

- FFY 2022-FFY 2023: 27,600,000
  - FFY 2022: $11,300,000 (rolled over to FFY 2023)
  - FFY 2023: $16,300,000
- FFY 2024: $16,300,000
- FFY 2025: $16,300,000
- FFY 2026: $16,283,976

The deployment strategy for FFY 2022 and FFY 2023 is described below. Each subsequent year, the Plan will be amended to include a deployment plan and funding allocation amounts for the upcoming FFY.

FFY 2022 - FFY 2023 EVSE Deployment Strategy

ADOT proposes a four-fold EVSE deployment strategy for FFY 2022 and FFY 2023. This strategy is designed to meet the objectives set forth in the *Vision and Goals* section of this Plan. It is also intended to increase the long-range mobility for EV drivers and support the development of an equitable national charging network by closing gaps in charging infrastructure along the State's. The four facets of this strategy include:

- Utilizing existing NEVI-compliant stations
- Upgrading existing DCFC stations within one mile of AFCs
- Closing remaining gaps with new stations
- Using discretionary exemptions as appropriate

NEVI-Compliant EVSE Stations

The first EVSE deployment strategy is to utilize existing NEVI-compliant stations within one mile of AFCs. ADOT has identified 13 existing NEVI-compliant stations along AFCs in the State. These stations are listed in **Table 19** and shown in **Figure 14**. The map also shows the closest DCFC charging stations in neighboring states; these chargers may need to be upgraded to develop a cohesive interstate network.

Table 19: NEVI-Compliant EVSE Stations

State EVSE Location Unique ID	Route	Locations	Address	Exit Number	Anticipated EVSE Network	Utility Territories	Station Ownership
187879	I-40	Kingman	3490 Stockton Hill Rd Kingman, AZ 86409	51	TBD	TBD	Electrify America
184916	I-40	Williams	1100 W Cataract Lake Rd Williams, AZ 86046	163	TBD	TBD	Electrify America
127934	I-10/I-40	Flagstaff	2601 E. Huntington. Rd. Flagstaff, AZ 86004	198	TBD	TBD	Electrify America
135874	I-40	Winslow	700 Mikes Pike St. Winslow, AZ 86047	253	TBD	TBD	Electrify America
187948	I-10	Quartzsite	760 S Quartzsite Blvd Quartzsite, AZ 85346	17	TBD	TBD	Electrify America
121828	I-10	Buckeye	1060 S. S. Watson Buckeye, AZ 85326	117	TBD	TBD	Electrify America
149194	I-10	Tempe	5000 S. Arizona Mills Circle Tempe, AZ 85282	155	TBD	TBD	Electrify America
191561	I-10	Chandler	4976 Premium Outlets Way Chandler, AZ 85226	162	TBD	TBD	Electrify America
198884	I-8	Yuma	1450 S. Yuma Palms Parkway Yuma, AZ 85365	2	TBD	TBD	EVgo Network
169411	I-8	Dateland	1734 Ave 64 E Dateland, AZ 85333	67	TBD	TBD	Electrify America
145749	I-10/I-19	Tucson	6401 W. Marana Center Blvd Tucson, AZ 85742	244	TBD	TBD	Electrify America
123483	I-10	Benson	201 S Prickly Pear Ave Benson, AZ 85602	303	TBD	TBD	Electrify America
124348	I-17	Anthem	4435 W. Anthem Way Anthem, AZ 85086	229	TBD	TBD	Electrify America

Figure 14: NEVI-Compliant EVSE Stations, Arizona, 2022
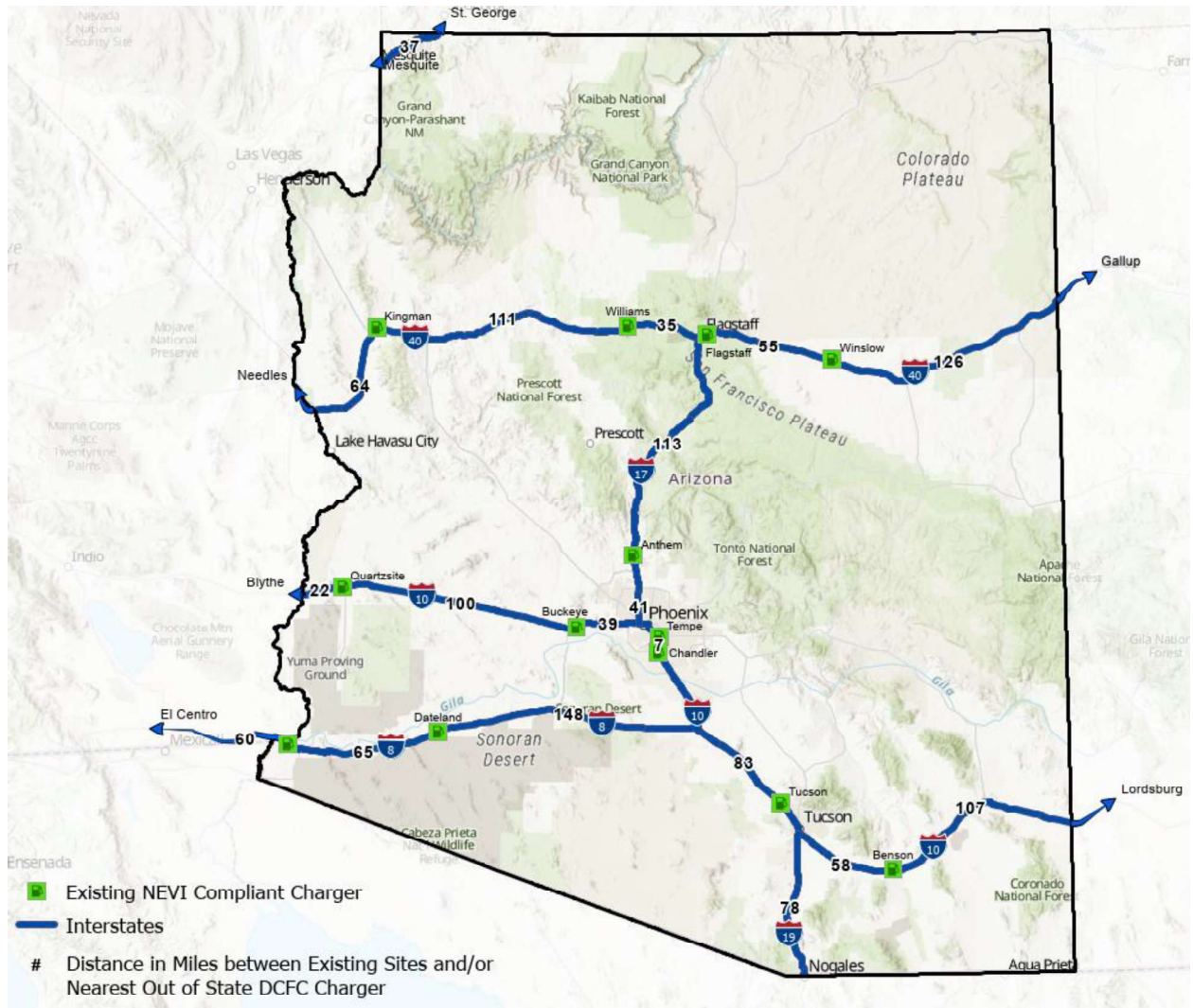
Upgrading Existing DCFC Stations

The second deployment strategy is to upgrade existing DCFC stations along AFCs to make them NEVI-compliant. ADOT plans to release a solicitation during the first half of FFY 2023 directed at owners of existing DCFC stations that are within one mile of AFCs, but not NEVI-compliant. Eight eligible locations that have DCFC stations have been identified for potential upgrade using NEVI Formula Program funds. These stations are listed in **Table 20** and shown in **Figure 15**.

Table 20: Potential Station Upgrades

State EVSE Location Unique ID	Route	Locations	Address	Exit Number	Anticipated EVSE Network	Utility Territories	Anticipated Station Ownership	FY22 Funding Amount
101984	I-40	Holbrook	2096 Navajo Blvd Holbrook, AZ 86025	286	Tesla	APS	Existing	TBD
101986	I-17	Cordes Lakes / Cordes Junction	14925 Cordes Lakes Rd Mayer, AZ 86333	262	Tesla	Liberty Utilities	Existing	TBD
101981 or 198884	I-10	Casa Grande	2453 E. Florence Blvd Casa Grande, AZ 85194 Or 1005 N Promenade Pkwy Casa Grande, AZ 85194	194	Tesla or EVgo	Electrical District 2	Existing	TBD
101994	I-10	Tucson	9255 S Rita Rd Tucson, AZ 85747	273	Tesla	TEP	Existing	TBD
154797	I-8	Tacna	9250 South Avenue 40E Tacna, AZ 95352	42	Tesla	Wellton-Mohawk Irrigation District	Existing	TBD
122249	I-8	Gila Bend	826 826 W Pima St. Gila Bend, AZ 85337	115	Tesla	SRP	Existing	TBD
101996	I-10	Willcox	1251 Virginia Avenue Willcox, AZ 85643	340	Tesla	Sulphur Springs Valley Electric Coop	Existing	TBD

State EVSE Location Unique ID	Route	Locations	Address	Exit Number	Anticipated EVSE Network	Utility Territories	Anticipated Station Ownership	FY22 Funding Amount
205372, 211832	I-19	Green Valley	1030 W Duval Rd Green Valley, AZ 85614	69	ChargePoint	TBD	Existing	TBD

Figure 15: Potential Station Upgrades

New Stations

Remaining gaps in the network will be addressed by adding new NEVI-compliant stations. During the second half of FFY 2023, ADOT plans to release a second solicitation to seek applicants to build, own, operate, and maintain new EVSE infrastructure where needed. These areas will be identified by taking

into consideration existing NEVI-compliant stations and those selected for upgrade. ADOT proposes that NEVI Formula Program funds be utilized to install, operate, and maintain new EVSE stations during the program period. Depending upon the number of stations chosen for upgrade, ADOT estimates that 11 to 19 new stations will be needed. Proposed charging station locations were identified by first investigating 50-mile gaps within the existing NEVI-compliant and potential upgraded charging sites. A list of proposed locations was identified using on-site specific criteria that would make an EVSE installation impactful. Additional criteria may be added based on public and stakeholder input. The criteria utilized included:

- Traffic volume
- Amenity count
- Justice40 designations
- Connection to other major routes
- Connectivity to neighboring states
- Utility capacity
- Stakeholder feedback

Table 21 and **Figure 16** depict EVSE station locations, including potential upgrades, that could address gaps in the network, although further stakeholder engagement is needed to identify specific sites within the proposed locations. If an appropriate site for EVSE infrastructure can't be identified or acquired at the location, other locations will be considered.

Table 21: EVSE Station Locations* Addressing Network Gaps

State EVSE Location Unique ID	Route	Location	Exit Number	Anticipated EVSE Network	Utility Territories	Anticipated Station Ownership	FY22 Funding Amount
TBD	I-40	Lake Havasu City	9	Unknown at time of Plan submittal	UNS Electric	Unknown at time of Plan submittal	TBD
TBD	I-40	Seligman	123	Unknown at time of Plan submittal	Mohave Electric Cooperative	Unknown at time of Plan submittal	TBD
TBD	I-40	Kingman	66	Unknown at time of Plan submittal	Mohave Electric Cooperative	Unknown at time of Plan submittal	TBD
TBD	I-40	Twin Arrows Casino	219	Unknown at time of Plan submittal	APS	Unknown at time of Plan submittal	TBD

State EVSE Location Unique ID	Route	Location	Exit Number	Anticipated EVSE Network	Utility Territories	Anticipated Station Ownership	FY22 Funding Amount
TBD	I-40	Petrified Forest	311	Unknown at time of Plan submittal	APS	Unknown at time of Plan submittal	TBD
TBD	I-40	Sanders	339	Unknown at time of Plan submittal	Navopache Electric Cooperative	Unknown at time of Plan submittal	TBD
TBD	I-17	Munds Park	322	Unknown at time of Plan submittal	APS	Unknown at time of Plan submittal	TBD
TBD	I-17	Camp Verde	287	Unknown at time of Plan submittal	APS	Unknown at time of Plan submittal	TBD
TBD	I-10	Salome	45	Unknown at time of Plan submittal	APS	Unknown at time of Plan submittal	TBD
TBD	I-10	Tonopah	94	Unknown at time of Plan submittal	APS	Unknown at time of Plan submittal	TBD
TBD	I-10	San Simon	378	Unknown at time of Plan submittal	Sulphur Springs Valley Electric Cooperative	Unknown at time of Plan submittal	TBD
TBD	I-19	Nogales	4	Unknown at time of Plan submittal	UNS Electric	Unknown at time of Plan submittal	TBD
TBD	I-10	Eloy	200	Unknown at time of Plan submittal	TBD	Unknown at time of Plan submittal	TBD
101984	**I-40**	**Holbrook**	286	**Tesla**	**APS**	**Existing**	**TBD**

State EVSE Location Unique ID	Route	Location	Exit Number	Anticipated EVSE Network	Utility Territories	Anticipated Station Ownership	FY22 Funding Amount
101986	**I-17**	**Cordes Lakes / Cordes Junction**	262	**Tesla**	**Liberty Utilities**	**Existing**	**TBD**
101981 or 198884	**I-17**	**Casa Grande**	194	**Tesla or EVgo**	**Electrical District 2**	**Existing**	**TBD**
101994	**I-10**	**Tucson**	273	**Tesla**	**TEP**	**Existing**	**TBD**
154797	**I-8**	**Tacna**	42	**Tesla**	**Wellton-Mohawk Irrigation District**	**Existing**	**TBD**
122249	**I-8**	**Gila Bend**	115	**Tesla**	**SRP**	**Existing**	**TBD**
101996	**I-10**	**Willcox**	340	**Tesla**	**Sulphur Springs Valley Electric Cooperative**	**Existing**	**TBD**
205372, 211832	**I-19**	**Green Valley**	69	**ChargePoint**	**TBD**	**Existing**	**TBD**

Potential DCFC station upgrades are shown in bold.

Figure 16: EVSE Station Locations Addressing Network Gaps

Discretionary Exemptions

ADOT is requesting two discretionary exemptions from the requirement that charging infrastructure be installed every 50 miles along the State's AFCs. The proposed discretionary exemptions are described below and illustrated in **Figure 17**. Additional information regarding the discretionary exemptions may be found in Appendix A.

Kingman to Seligman

The 57-mile segment of I-40 between Kingman and Seligman is in a rural area with no existing amenities within one mile of the corridor. ADOT limited the distance of this gap as much as possible by proposing a new charging station just east of Kingman. The proposed exemption is for a 7-mile gap, as NEVI-compliant chargers will be sited 57 miles apart from each other.

Gila Bend to Casa Grande/Eloy

East of Gila Bend, I-8 is a rural area with no existing amenities within one mile of the corridor until reaching the interchange with I-10. ADOT proposed upgrading the existing stations in Casa Grande and installing a new site in Eloy to ensure convenient charging options for both westbound and eastbound I-10. The proposed exemption is for a 17-mile gap, as NEVI-compliant chargers will be sited 67 miles apart from each other.

Figure 17: Discretionary Exemption Requests

FFY 2022 - FFY 2023 EVSE Deployment Strategy Summary

As described previously, ADOT's FFY 2022 – FFY 2023 EVSE deployment strategy contains four facets to increase the long-range mobility for EV drivers by closing gaps in charging infrastructure along the State's AFCs and supporting the development of an equitable national charging network. The deployment strategy identifies NEVI-compliant EVSE stations and non-compliant DCFC stations for potential upgrades, then fills in gaps by providing funding for the installation, operation, and

maintenance of new stations in locations addressing those gaps. Exemptions are being requested only as necessary and will not jeopardize a convenient, affordable, reliable, and equitable national EV charging network. **Figure 18** shows the State of Arizona's proposed EVSE network locations.

Figure 18: Proposed Charging Network

Following the deployment of proposed charging locations and approval of exemptions, ADOT plans to apply to FHWA to upgrade the status of I-8, I-10, I-15, I-17, I-19, and I-40 to the corridor-ready designation, meaning there is sufficient access to refueling along those interstate highways.

FFY 2024 – FFY 2026 Deployment Strategy

ADOT is currently soliciting information from stakeholders and the public about what additional routes should be considered for AFC nomination. Only routes on the National Highway System (NHS) are eligible for nomination as AFCs. The preliminary list of potential AFC candidates may be found in **Table 22**.

Table 22: Preliminary List of Potential New AFC Candidates

Corridor Name	Location
US 60	Phoenix to Wickenburg; Phoenix to Globe; Show Low to New Mexico border
US 93	Wickenburg to I-40; Kingman to Hoover Dam
US 95/State Route (SR) 95	San Luis to Bullhead City
SR 64	I-40 to Grand Canyon National Park
SR 68	US 93 to Bullhead City
SR 69	I-17 to Prescott
SR 77	SR 260 to I-40
SR 85	I-8 to I-10
SR 87	Phoenix to Payson
US 89	Flagstaff to Utah border
SR 90	I-10 to Bisbee
US 160	US 89 to Four Corners
SR 260	Payson to Show Low; Camp Verde to Sedona
SR 80	Bisbee to Douglas
SR 77	Tucson to north limit of NHS route (Pima/Pinal County border)
SR 179	I-17 to Sedona
SR 347	Maricopa to I-10
SR 287	Casa Grande to I-10
SR 89/89A	SR 69/SR 169 to north end of NHS route

ADOT will continue to perform outreach to identify potential candidates, and tentatively plans to identify all new AFC candidates for nomination by the end of FFY 2022. The evaluation of candidates for AFC nomination will be based upon the improvement to State and national EV connectivity they provide and the remaining balance of NEVI Formula Program funding. Nominations, along with their corresponding EVSE infrastructure deployment plans, will be included in future Plan updates.

During FFY 2024 through FFY 2026, and following the status upgrade of I-8, I-10, I-15, I-17, I-19, and I-40 to the corridor-ready designation, ADOT plans to utilize NEVI Formula Program funding to deploy EVSE infrastructure along newly designated AFCs.

Deployment Criteria for FFY 2024 – FFY 2026

To prioritize and support an equitable, efficient, and utilized charging network, ADOT will assess proposed locations based on the following selected criteria. Additional criteria may be added based on public and stakeholder input. The criteria include:

- Traffic Volume
- Amenity count
- Justice40 designations
- Connection to other major routes
- Connectivity to neighboring states
- Cost
- Proximity to other EVSE stations
- Utility capacity
- Public and stakeholder feedback

Other Considerations

Public transportation is a key consideration when addressing the mobility needs of DACs. The proposed charging sites will be accessible to electric rideshare vehicles and transit vans along the corridors.

ADOT plans to focus on increasing the number of EVSE stations to support EV access to state and national highway networks before seeking additional redundancy. ADOT may, based on additional stakeholder and public input or other factors, address redundancy in future Plan updates.

FHWA has designated four Arizona highways (I-10, I-17, I-19, and I-40) as Primary Highway Freight System routes that are critical to the movement of freight. ADOT will consider encouraging EVSE station design to accommodate both passenger vehicles and larger commercial vehicles.

State, Regional, and Local Policy

ADOT has identified plans, policies, and studies relating to transportation electrification. This Plan can help advance the goals of those plans and policies. EVSE locations may utilize utility or other incentives contemplated by these plans and policies for the installation of EVSE infrastructure. ADOT plans to continue coordination and engagement with state, regional, and local policy related stakeholders. **Table 23** summarizes the relevant Arizona policies and plans at these three levels.

Table 23: Arizona EV Policies and Plans

EV Policy Breakdown		
Policy	Entity	Description
State		
Arizona Statewide Transportation Electrification Plan: Phase II	APS and TEP	In 2021, APS and TEP released the Arizona Statewide Transportation Electrification Plan: Phase II as a follow-up to the Phase I plan released in 2019. It put forth a comprehensive and actionable roadmap for transportation electrification in Arizona, including an analysis of promising EV opportunities and significant engagement with the state's TEP stakeholder community. Updates are anticipated every three years. A cost/benefit analysis of electrification opportunities and stakeholder engagement found that transportation electrification could generate net benefits of $28 billion for Arizona, $9 billion for drivers or fleet owners, and $12 billion for utility ratepayers, in present value. Within this Phase II plan, APS and TEP propose statewide 2030 EV goals by vehicle segment and utility, with a proposed goal for electric light-duty vehicles at 450,000, 95,000, and 1,076,000 vehicles for APS, TEP, and State service areas, respectively.
EV Cost-Benefit Analysis	SWEEP	SWEEP released an EV Cost-Benefit Analysis for Arizona in December 2018 with a focus on passenger vehicles in two scenarios (moderate and high adoption rates). For the moderate scenario, it was estimated that a cumulative net benefit from plug-in electric vehicles (PEV) use in Arizona will exceed $3.7 billion state-wide by 2050, but this number could increase to exceed $31 billion under the high scenario. These savings would be derived from electric utility customers in the form of reduced electric bills, from drivers in the form of reduced annual vehicle operating costs, from owners of public charging infrastructure, from residents due to reduced costs of complying with future carbon reduction regulations, and from society at large based on the value of reduced nitrogen oxides emissions.

EV Policy Breakdown		
Policy	Entity	Description
Regional		
Transportation Electrification Implementation Plan	TEP and UNSE	TEP and UNSE intend for the implementation plan to build off the Statewide Transportation Electrification Plan, to focus on the barriers best addressed by the electric utility. This includes public lack of awareness, insufficient charging infrastructure and network, costs of EV charging and grid impacts, and access for underserved and LMI customers.
Local		
Draft Transportation Electrification Plan	City of Phoenix	In June 2022, the City of Phoenix approved the Draft Transportation Electrification Action Plan, which summarizes the current state of the city's EV adoption and infrastructure, their target goals for the year 2030, and a list of goals with provided action items to achieve their target number of 280,000 EVs. The plan follows a 'Roadmap 2030', which includes five steps to prepare for the increased adoption. The plan notes issues related to charging infrastructure shortages, actual/ perceived cost, limited model availability, range-anxiety, lack of EV-ready building codes, and public knowledge and experience with EVs as a few of the factors still standing in the way of greater adoption rates. To overcome these issues, the plan sets three distinct goals/strategies: Prioritizing Equity, Accelerate Public Adoption of EVs, and Lead by Example. Currently, Phoenix has set adoption goals in line with the federal government's 2030 nationwide EV adoption.

Implementation

Implementation requirements and considerations are crucial to ensuring the feasibility of the Plan's recommendations, as well as the long-term sustainability and resiliency of charging stations. These considerations are expected to promote the efficient use of funds and support effective EVSE infrastructure deployment at an efficient cost. They are also intended to meet broader equity goals (including Justice40), by supporting labor, safety, training, and installation standards, and by providing opportunities for small businesses.

ADOT will incorporate the relevant requirements and monitoring provisions into the contracts to be established with EVSE owners. Compliance will be monitored, as appropriate, through reported data and periodic onsite inspection of charging locations, EVSE, and records.

The following implementation requirements and considerations align with the proposed NEVI rule requirements to develop a set of expectations related to operations and maintenance, data collection and sharing, resilience, and labor training for ADOT's site owners' using NEVI Formula Program funding. ADOT may amend the Plan to reflect the final rule when it is issued.

Strategies for EVSE Operations and Maintenance

EVSE are only an asset to EV owners if they remain in working order. The investment of public funds should be protected by ensuring that operations and maintenance best practices are implemented by ADOT's site owners. ADOT intends to comply with FHWA's regulations relating to EVSE operations and maintenance. As regulations and guidance are updated and finalized, ADOT will amend the relevant strategies. The following strategies are based on proposed NEVI rules, but the Plan may be amended to reflect the final rule when it is issued.

Requirements

ADOT will ensure that EVSE station owners are maintaining EVSE infrastructure in good working order by using qualified technicians in compliance with all EVSE infrastructure manufacturer requirements and with all requirements issued by FHWA. Technician qualifications are more fully described in the *Labor, Safety, and Training* section. Requirements and monitoring provisions will be set forth in the contract between ADOT and the station owner. ADOT will monitor compliance through reported data and periodic onsite inspection of charging infrastructure and records.

ADOT will require that owners of EVSE infrastructure funded by the NEVI Formula Program provide reasonable plans and guarantees for maintaining the EVSE, related equipment, and overall EVSE locations are in good working order. Those reliability standards are more fully described in the *Program Evaluation - Metrics* section. Maintenance plans, guarantee requirements, and monitoring provisions will be set forth in the contract. ADOT will review plans and guarantees for sufficiency prior to acceptance. ADOT will monitor compliance with maintenance plans and guarantees through reported data and periodic onsite inspection of charging locations, EVSE, and records.

ADOT will require that infrastructure be maintained at the same location for a period of no less than five years from the installation date with the consideration of service beyond the NEVI Formula Program

funds. After the five-year required maintenance period, ADOT's station owners may retire the infrastructure that has reached the end of its useful life and consider upgrading or replacing the EVSE. However, if the EVSE is still functioning to meet its intended purpose after five years, ADOT will require that its station owners consider maintaining, or supporting the maintenance of, the EVSE to make use of federal resources most efficiently.

Annually, identifying information about organizations operating, maintaining, or installing EVSE will be submitted. A use, reliability, and maintenance data submittal will occur quarterly. One of the primary categories of data collection will be maintenance and reliability data. Further details about this data submittal are described in the *Program Evaluation - Reporting* section. The final list of required data in the quarterly submission will be based on the final NEVI rules and the Plan may be amended to reflect the final rule when it is issued.

ADOT will require that EVSE owners provide mechanisms for customers to report outages, malfunctions, and other issues with charging infrastructure. ADOT will require that site owners make these reporting mechanisms accessible and equitable by complying with the American Disabilities Act of 1990 requirements and multilingual access as required by law or applicable guidance.

ADOT will require station owners to consider purchasing EVSE with a parts-and-labor warranty if appropriate and cost effective.

To minimize downtime by ensuring repairs are completed in a timely manner for EVSE at higher risk for high maintenance costs, ADOT will require that owners consider purchasing a continued maintenance plan from the charging infrastructure installer or manufacturer.

ADOT will require station owners to consider the effects of the charger choice on O&M costs early during the design phase. When a charger is part of a network, the network provider may cover payment and maintenance costs. If selecting a networked charger for purchase, ADOT will encourage site owners to first consider the necessity of adequate cell service at the proposed site to ensure the station can communicate with its network and users can access applications for payment.

Additional Strategy

ADOT will encourage owners to consider appropriate funding levels for each station for any costs that extend beyond the initial installation costs (e.g., transaction costs for processing debit or credit card payments, networking fees to connect the unit to cellular or Wi-Fi communications networks, station management activities, rent or lease payments for parking spots, repair of damaged units, and replacement of malfunctioning parts). Consideration of each location's effect on its O&M costs will be valuable. For example, urban areas with higher traffic may require more frequent maintenance due to vehicle damage, overuse, or vandalism; as such, ADOT will recommend that potential owners evaluate each potential site based on location, charger type, level of use, network capabilities, and warranties so that the annual funding reserve fund for its lifetime maintenance costs can be appropriately determined. The following recommendation will be provided to site owners as a suggested O&M best practice to help them meet program requirements. This recommendation will be provided to potential owners along with other solicitation documents during the charging station owner selection process and discussed during pre-bid or similar meetings and in communications with selected owners.

Strategies for EVSE Data Collection and Sharing

ADOT recognizes that data collection and sharing can be used to update and improve the program over time, as well as provide users with the information needed to use the network. ADOT intends to comply with the final NEVI rules and guidance relating to EVSE data collection and sharing. Any cyber security recommendations or requirements related to data sharing or network connectivity are addressed in the *Cybersecurity* section. The following strategies are based on proposed NEVI rules, but the Plan may be amended to reflect the final rule when it is issued.

Requirements:

- ADOT will require that its station owners maintain the cost of charging at a price that is reasonable (for example, comparable to competitive market) and minimize demand charges or other fixed utility fees. ADOT will monitor compliance through required data submittals.
- To increase awareness of charging infrastructure and improve customer and station host satisfaction, ADOT will require its EVSE owners to share data describing EVSE location, type of equipment available, price, status, and other information—free of charge—via an application programming interface with public-facing directories, including the Alternative Fuel Data Center's Station Locator.
- Station owners will comply with the proposed interoperability requirements for charger-to-EV communication to ensure that chargers are capable of the communication necessary to perform smart charge management and Plug and Charge.
- To allow for secure remote monitoring, diagnostics, control, and updates, station owners will comply with FHWA's proposed network connectivity requirements for charger-to-charger network communication, charging network–to–charging network communication, and charging network–to–grid communication.
- Station owners will comply with the proposed network connectivity requirements to require chargers to be capable of smart charge management and Plug and Charge capabilities by requiring the ability to communicate through Open Charge Point Protocol in tandem with ISO 15118.
- Station owners will comply with the proposed requirement that payment options include contactless payment methods, that contactless payment be accepted from all major debit and credit cards, and that access and service are not restricted by membership or payment method type. ADOT will require that multilingual access and access for people with disabilities be provided when creating payment instructions. Provisions for payment options will be set forth in the contract. ADOT will monitor compliance through periodic onsite inspection of charging stations.

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

The following strategies are based on proposed NEVI rules, but the Plan may be amended to reflect the final rule when it is issued.

Emergency Evacuation, Snow Removal, and Seasonal Needs

EVSE infrastructure should be conveniently and safely located. If the EVSE cannot be safely accessed during snow events or emergency situations, they are not as strong an asset to the AFC. EVSE stations should provide convenient charging to allow vehicles to evacuate an area safely and quickly in an emergency or evacuation scenario.

Strategies:

- ADOT will consider emergency and evacuation needs, including how they will support overall emergency evacuation plans along roadways in the selection of EVSE locations. This will include accounting for the growing number of EVs using designated evacuation routes.
- ADOT will consider the potential impacts of extreme weather events, including the use of currently available USDOT tools and resources to assess the vulnerability and risk of planned and existing EVSE stations and the development, deployment, and monitoring of resilience solutions.
- ADOT will consider the location of existing and proposed EVSE infrastructure with respect to the Federal Flood Risk Management Standard, as well as how climate may affect the floodplain. ADOT will require construction of EVSE infrastructure consistent with the Federal Flood Risk Management Standard. To the extent consistent with the law ADOT will consider users' need to access EVSE during times of emergency such as evacuation from natural disasters, and the risk associated with locating EVSE in base-floodplains in the location of EVSE and in the facility's design. If an existing station that is proposed for an upgrade is identified to be in a floodplain, there must be proposed mitigation strategies if continuing with the selected station. For new station location selection, the owner would identify the station location but be responsible for environmental and floodplain considerations.
- ADOT will comply with future FHWA guidance on addressing traffic incident management, crashes, and emergency situations. Emergency response information will be provided on-site at EVSE. ADOT will ensure compliance with any other required customer service strategies to connect charging stations to or provide access for traffic incident management solutions such as the provision of an emergency call box. Required provisions for traffic incident management and emergency call boxes will be included in the contract and monitored with periodic onsite inspection of charging locations.
- In areas that experience annual snowfall, such as central and northern Arizona, ADOT will ensure its stations owners take preventative actions such as salting, and reactive actions such as snow plowing, to address snow buildup that could block access to the EVSE infrastructure. This could include a barrier or overhang to protect equipment from snow drifts in the design as required.
- In areas that experience intense sun and heat, such as Southern and Western Arizona, ADOT will recommend that station owners consider ways to protect EVSE, such as shade structures.
- The American Automobile Association (AAA) has attempted a pilot program for mobile EVSE in some states. Through the program, trucks with Level 2 and 3 charging on board could be dispatched to EVs that lost charge. This program and its five vehicles have since been retired due to low use. However, AAA is re-evaluating its options and, in the meantime, would provide such vehicles with a tow. ADOT will continue to monitor the availability of similar programs to address these types of incidents.

Resilience Considerations

The AFCs are only an asset if EVSE are functional when needed most—during emergencies, outages, and evacuations. This requires consideration of resilience strategies such as the installation of battery storage and renewable energy sources in order to create a microgrid for EVSE to operate independently off the grid. The following strategies are based on proposed NEVI rules, but the Plan may be amended to reflect the final rule when it is issued.

Requirements and Strategies:
- ADOT will require all station owners to consider the inclusion of distributed energy resources (DER) (e.g., solar arrays, energy storage) and electrical distribution and switching equipment where practicable and necessary.
- ADOT will require that EV stations located in floodplains be upgraded to mitigate the impacts of flooding. Resilience data will be submitted quarterly (amending as guidance is finalized). For details, refer to the *Program Evaluation – Reporting* section.
- ADOT will consider requiring backup generation and energy storage at charging station locations with significant resilience needs. This may include installing onsite energy generation such as solar where most appropriate. If renewable options are not practical, other types of back-up generation may be considered, such as diesel or natural gas generators.

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

Developing an EVSE network provides opportunities to create well-paying jobs to build a modern sustainable infrastructure. Minimum skill, training, and certification standards for technicians ensure that the deployment of EVSE infrastructure will support stable career-track employment for workers, creating more openings for workers to pursue training in the electrical trades—critical occupations for the clean energy transition. By requiring installation, maintenance, and operations to be performed by a well-qualified, highly skilled, certified, licensed, and trained workforce, the EVSE network's safety and reliability will be increased. The following strategies are based on proposed NEVI rules, but the Plan may be amended to reflect the final rule when it is issued.

Requirements:
- ADOT will require that designs meet all applicable fire protection and prevention standards and traffic safety requirements. ADOT will monitor compliance through periodic review of station records.
- ADOT will ensure emergency management and public safety agencies will be consulted as appropriate.
- ADOT will ensure that station owners are operating and maintaining EV charging infrastructure with a focus on public road safety. This includes the provision of adequate lighting, fire protection, and other traffic safety features. ADOT will monitor compliance through periodic onsite inspection of charging locations and records.
- As discussed in the *Labor and Workforce - Training Strategies* section, training and hiring standards will be upheld in EVSE contracts and ADOT will monitor compliance through a periodic review of station records.
- ADOT will encourage station owners to ensure that there are trained staff on call in emergency situations.

Additional Strategies

The following recommendations will be provided to site owners as suggested best practices to help them enhance labor and workforce considerations at EVSE stations and the overall network. These

recommendations will be provided to potential owners along with other solicitation documents provided during the EVSE station owner selection process and discussed during pre-bid or similar meetings and in communications with selected owners.

- ADOT will make its site owners aware that several additional DOT funding and finance programs are also available to support workforce training for innovative technologies.
- ADOT will consider the development of workforce training programs to meet future demand of PEV charging infrastructure and drive economic development in DACs.

Opportunities for the Participation of Small Businesses

As EVSE infrastructure can be a draw towards locations that drivers may not have initially gone to without the infrastructure, consideration should be given to those businesses that are being supported by the chosen locations. The following strategies are based on proposed NEVI rules, but the Plan may be amended to reflect the final rule when it is issued.

Requirements
- When selecting charging station locations, ADOT will consider locations at or immediately adjacent to land uses with food retailers, convenience stores, and small businesses with an ADA accessible pathway between the EVSE infrastructure and the identified establishment's front door, and other comparable facilities.
- ADOT will continue to engage the public and stakeholders that represent or provide services to small businesses including the Arizona Small Business Association, the state and local chambers of commerce, and other chambers of commerce such as the Hispanic Chamber of Commerce, the Black Chamber of Commerce, and the Chinese Chamber of Commerce.
- ADOT has established a DBE program in accordance with USDOT regulations to ensure DBEs have an equal opportunity to receive and participate in USDOT-assisted contracts. One of the requirements to qualify as a DBE is that the company must not exceed the Small Business Administration size standards in 13 CFR part 121 for the type of work it performs. It is ADOT's policy to:
  - Ensure nondiscrimination in the award and administration of USDOT-assisted contracts.
  - Create a level playing field on which DBEs can compete fairly for USDOT-assisted contracts.
  - Ensure that the DBE program is narrowly tailored in accordance with relevant law.
  - Ensure that only firms that meet 49 CFR Part 26 eligibility standards are counted as DBEs.
  - Help remove barriers to the participation of DBEs in USDOT-assisted contracts.
  - Assist in the development of firms that can compete successfully in the marketplace outside the DBE program.
  - ADOT will use these same policies to ensure DBEs are given equal opportunity in any NEVI Formula Program funded awards.

Installation Standards

Meeting current and anticipated market demands for EVSE infrastructure—including expected power levels and charging speed—and minimizing the time needed to charge vehicles is crucial for a successful EVSE network. Designing and managing facilities properly before installation can reduce upfront costs and later the operational costs associated with charging stations. The following strategies are based on proposed NEVI rules, but the Plan may be amended to reflect the final rule when it is issued.

Requirements

The following installation standards will be required:

- ADOT will only consider DCFC for NEVI Formula Program funding.
- Station owners must consider future-proofing EVSE to accommodate expansions needed to support growing demand and the electrification and charging demands of medium- and heavy-duty trucks. Such expansions may address station size, power levels, and conduit size.
- ADOT will submit quarterly data as required by FHWA, such as the submission of detailed EVSE acquisition and installation costs and grid connection and upgrade costs paid by the charging station operator. Refer to the *Program Evaluation – Reporting* section for more detail.
- Station owners must consider pre-wiring new buildings for future EVSE stations to minimize installation costs down the line. Station owners will also be encouraged to consider installing oversized electric conduits to prevent additional costs of trenching and asphalt repairs in the future when additional EVSE are needed.
- Station owners must consider the need for funding to support basic infrastructure needs and upgrades, particularly in rural communities, where roads may not have existing curb and gutters to support a curbside PEV charger installation. Limited existing infrastructure places such communities even further behind in terms of access to technology and/or mobility. Owners must also account for the cost of equipment and infrastructure needed to protect EVSE, such as bollards, which can protect the investment from vehicle damage.
- Station owners must consider installation of signage and pavement markings to designate EVSE locations, prevent non-EVs from parking, and directing EV drivers to less visible station locations. This includes complying with existing requirements in the Manual on Uniform Traffic Control Devices for Streets and Highways found at 23 CFR part 655 and the Highway Beautification regulation at 23 CFR part 750 and any processing updates to those requirements.

Civil Rights

To ensure all EVSE customers and participants are provided with equitable opportunities to engage in EVSE offerings, the Plan complies with State and Federal civil rights laws and regulations, including Title VI of the Civil Rights Act of 1964 (Title VI), the ADA of 1990, Section 504 of the Rehabilitation Act of 1973, Executive Order 12898 on Environmental Justice, and Executive Order 13166 on Limited English Proficient (LEP) Persons.

Title VI prohibits discrimination on the basis of race, color, or national origin, either directly or indirectly in the types, quantity, quality, or timeliness of program services, aids, or benefits that they provide or in the manner in which they provide them, in any program that receives Federal funds or other Federal financial assistance. Executive Order 13166 for Limited English Proficiency is a requirement of recipients of Federal financial assistance to take reasonable steps to provide Limited English Proficient individuals with language services (oral or written) to ensure meaningful access to the agency's programs, activities, and services. Identification of LEP persons is required for the purpose of ensuring access to language services pursuant to this Executive Order. To ensure nondiscriminatory practices based on Title VI, ADOT will:

- Ensure public outreach materials, including handouts, posters, and other communications, are accessible to all persons in alternative language formats and provide vital documents in English and Spanish.
- Ensure EVSE stations provide information, instructions, and other communications in English and Spanish by including these requirements in future contracting and procurement mechanisms.

ADA prohibits discrimination and guarantees that people with disabilities have the same opportunities as everyone else to participate in the mainstream of American life, including employment opportunities, purchasing goods and services, and participating in state and local government services. The following efforts will be instituted to comply with the statutory requirements of the ADA:

- Ensure EVSE stations, including accessible parking spaces, are developed in accordance with ADA and Architectural Barriers Act Disability Guidelines for transportation facilities, including but not limited to the Public Right-of-Way Accessibility Guide.
- Follow procedures outlined in ADOT's Transition Plan for Public Rights-of-Way, including Title II: Public Services and Transportation.
- Maintain EVSE station signage that clearly designates all available facilities and accessible entrances and exits from those facilities.
- Ensure that access for people with disabilities be provided in the creation of payment instructions.
- Ensure that public meetings and outreach efforts are ADA-compliant. This includes, among other efforts, ensuring that public meetings are accessible to everyone, including those with disabilities, that venues are accessible by ADA-compliant transportation options, and information provided is in accessible formats for persons with vision or hearing disabilities.

Section 504 of the Rehabilitation Act protects qualified individuals from discrimination based on their disability by forbidding organizations and employers from excluding or denying individuals with disabilities an equal opportunity to receive program benefits and services. To ensure nondiscriminatory practices based on Section 504, ADOT will:

- Provide Notice of Reasonable Accommodations language at EV charging stations in English and Spanish.

Executive Order 12898 on EJ requires "the fair treatment and meaningful involvement of all people, particularly minority and low-income populations, in the environmental decision-making process." The United States Department of Transportation (USDOT) Order 5610.2(a) and FHWA Order 6640.23A require compliance with Executive Order 12898. This includes the "full and fair participation by all potentially affected communities in the transportation decision-making process."

Executive Order 14008 on Tackling the Climate Crisis (Justice40) states that "40 percent of the overall benefits" of Federal investments from covered programs should flow to DACs. To respond to that directive, ADOT has established a methodology for calculating the benefits that a) flow from the EV Infrastructure Deployment Plan and b) accrue in DACs.

To ensure nondiscriminatory practices based on EJ, ADOT will:

- Identify and engage low-income and minority populations in the Plan development.
- Identify and consider low-income and minority populations in siting EVSE stations.
- Follow the plan outlined in the *Equity* section of this Plan.
- Follow the other mandates of Justice40 as they evolve.

Cybersecurity

Owners of EVSE stations will be responsible for meeting the cybersecurity requirements defined within this section of the Plan, the cybersecurity specification attached as Appendix C, and other applicable State and Federal regulations. The specification in Appendix C is subject to further public comment and review and may require updates in future publications. The cybersecurity requirements posed here will ultimately work to ensure the safety and security of planned EVSE infrastructure. Requirements will include considerations for secure system updates, event logging and intrusion detection, secure operation of EVSE during communication outages, ensuring appropriate encryption systems are in use, and identity and access management processes. The following are based on proposed NEVI rules, but the Plan may be amended to reflect the final rule when it is issued.

Requirements
- Provide feasible plans and agreements to address how service will persist in the event of a communications outage. Required output from owners must properly define the minimum amount of information necessary to continue providing service to customers, how that information will be securely stored on the EVSE and illustrate ways that the physical connection to the vehicle will be secured while operating in this mode.
- Enact appropriate physical security measures. These practices must include procedures pertaining to physical access allowed to EVSE by customers and service technicians in order to prevent physical tampering of equipment.
- Adhere to strict identity and access management procedures based on industry best practices to prevent administrative or technological access to equipment by unauthorized personnel.
- Adopt the most current and stable encryption mechanisms to secure any data stored and communicated as which is relevant for service provision to customers.
- Adhere to update and patch management procedures adherent to industry standards and best practices. This works to mitigate the possibility of malware installation and propagation throughout the EVSE network and its vehicular connections.
- Employ mechanisms to detect malware and intrusion attempts into the system. Documented proof is required to ensure the functional capabilities of these mechanisms, which ensure the ability to detect and respond to cybersecurity exposures and potential breaches and additionally to reduce the risk of malware installation and propagation throughout the charging network and vehicular connections.
- Employ event logging and reporting of auditable events, such as logins, failed logins, high-value transactions, warnings and error messages, input validation errors, etc. Documented proof is required to ensure accountability, visibility, incident alerting, and forensics.
- Demonstrate that appropriate cybersecurity assessments are conducted at least annually on deployments and equipment in accordance with the National Institute of Standards and Technology Special Publication (SP) 800-115.
- Ensure the protection of collected, stored, and communicated customer payment information. Ensure that only the minimum required customer payment information is collected, stored, and communicated with appropriate payment services and administration centers as applicable.

- Provide feasible plans for how they will address future cybersecurity considerations as they pertain to the equipment and charging network. As new cybersecurity incidents occur and exposures are discovered, the cybersecurity posture of EVSE deployed must scale and adapt to meet the further growing security requirements and best practices.
- Cybersecurity requirements and guidance provided by the latest revisions of applicable standards and regulations shall be adhered to. These include, but are not limited to:
  - NEVI Notice of Proposed Rulemaking 23 CFR Part 680
  - Architecture Reference for Cooperative and Intelligent Transportation (ARC-IT)
  - National Institute of Standards and Technology (NIST)
    - SP 800-53
    - SP 800-115
  - Arizona Statewide Policy (8130) System Security Acquisition and Development
  - Payment Card Industry Data Security Standard (PCI DSS)
  - Health Insurance Portability and Accountability Act (HIPAA)
  - North American Electric Reliability Corporation Critical Infrastructure Protection (NERC CIP)

Labor and Workforce Considerations

ADOT has developed labor and workforce strategies to support and expand existing EVSE programs to build an equitable, diverse, and local EVSE workforce.

ADOT will require a standardized specification (e.g., Electric Vehicle Infrastructure Training Program (EVITP) or other qualifying program) that documents requirements for a minimum level of skill and training through certification. This ensures that the workforce installing and maintaining EVSE has appropriate level of training, licenses, and certifications to ensure that the installation and maintenance of EVSE is performed safely by a qualified and increasingly diverse workforce.

In addition, ADOT will encourage EVSE owners to hire from existing certification, licensing, and apprenticeship programs to build a cohesive EVSE workforce pipeline that provides careers to personnel qualified to perform EVSE installation, maintenance, and operations.

ADOT will consider establishing partnerships and requirements to support training pathways inclusive of DACs, women, minorities, and other underrepresented groups to ensure the EVSE careers are accessible to all Arizonans. As described more fully in the *Implementation* section of this Plan, ADOT has established a DBE program in accordance with USDOT regulations to ensure DBEs have an equal opportunity to receive and participate in USDOT-assisted contracts.

Workforce and Training Strategies

The following strategies are based on proposed NEVI rules, but the Plan may be amended to reflect the final rule when it is issued.

ADOT will require the following certification/training standards. These standards will be set forth in the contracts between ADOT and ESVE owners, and ADOT will monitor compliance through periodic review of station records.

Requirements:
- ADOT will require that, apart from apprentices, all electricians installing and maintaining EVSE must be certified through EVITP or be a graduate of a Registered Electrical Apprenticeship Program that includes EVSE-specific training and is developed as part of a national guideline standard approved by the Department of Labor in consultation with the Department of Transportation.
- For projects requiring more than one electrician, at least one electrician must meet the requirements above, and at least one electrician must be enrolled in an electrical registered apprenticeship program.
- Other onsite, non-electrical workers involved in the installation, operation, and maintenance of EVSE must have graduated from a registered apprenticeship program or have the appropriate licenses, certifications, and training as required by the State.

ADOT will consider additional strategies for recommendation to EVSE owners to help them enhance labor and workforce considerations at charging stations and the overall network.

Recommendations:

- ADOT will consider pathways to fund individual EVITP certifications as a low-cost method to support a large group of electricians to become certified quickly.
- ADOT will inform site owners that several additional USDOT funding and finance programs are also available to support workforce training for innovative technologies.
- ADOT will also consider partnering with other potential government agencies who develop programs that increase women and minority participation, address workforce gaps, build skills supporting emerging transportation technologies, and attract new sources of job-creating investment.
- ADOT will encourage EVSE owner participation with training providers, including existing pre-apprenticeship and apprenticeship programs, workforce boards, labor unions, community-based organizations, and nonprofits to support a diverse, local workforce for the EVSE network. To build a diverse, local EVSE workforce, ADOT will encourage EVSE owners to coordinate with and hire from the below list of existing electrician licensing, certification, and apprenticeship programs. ADOT will reevaluate opportunities at these and other programs annually.
- Existing electrician licensing and certification programs
  - AZ Department of Economic Security Apprenticeship Office: Arizona's Apprenticeship Program.[54]
  - Pima Community program (certification and associate degrees)
  - Gateway Community College (certification and associate degrees)
  - Chandler-Gilbert Community College (certification)
- Existing electrician apprenticeship programs
  - ABA-AGC Education Fund
  - Independent Electrical Contractors of Southern Arizona
  - Independent Electrical Contractors Association
  - Tucson Electrical Joint Apprenticeship and Training Program (JATC)
  - National Electrical Contractors Association Apprenticeship Program
  - Western Electrical Contractors Association
  - Globe-Miami Electrical Jt. Apprenticeship and Training program
  - Phoenix Electrical JATC

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[54] Arizona Department of Economic Security. (n.d.) Arizona's Apprenticeship Program. Retrieved from https://des.az.gov/services/employment/apprenticeship

Equity Considerations

ADOT is committed to complying with the Justice40 Initiative—a part of Executive Order 14008—when using the NEVI Formula Program. This section outlines how the Plan identified and engaged with DACs throughout the Plan's development, as well as the actions taken to ensure that benefits to DACs are captured throughout this work.

Identification and Outreach to Disadvantaged Communities in the State

As part of the public involvement planning process, a review of statewide census data was conducted to identify the State's demographics. Data points reviewed include race/ethnicity, age, income level, and disability. Separately, vehicle accessibility/ownership was reviewed to assess the current status of EV market penetration and the equitable distribution of EV accessibility and ownership. As part of planning for in-district meetings, additional reviews were conducted to identify specific areas within districts for targeted outreach and notification of public meetings.

Tools to Engage Disadvantaged Communities

Tools utilized to ensure opportunity for meaningful participation by disadvantaged and traditionally underserved individuals and communities are listed below. These tools will continue to be utilized as outreach is conducted for further refinement of the Plan:

- Translation of public involvement materials, including notices and the project fact sheet, into Spanish and other languages, as identified through the LEP Four-Factor Analysis or by request.
- Spanish oral interpretation at all public meetings and Spanish translation of graphics on the project webpage. Additional language services available by advance request.
- Use of Google Translate on the ADOT project webpage, allowing the translation of information into approximately 100 languages.
- Outreach and engagement of local government partners and special interest groups to participate and share information with their constituents and members.
- Promotion of public meetings and other outreach efforts by posting fliers in English and Spanish at community gathering places.
- Utilization of community contacts, mailing lists and other means to initiate and continue communication.
- Targeted public outreach to the identified low-income and minority communities within the project area via stakeholder partner channels.
- Display of Notice of Availability of Reasonable Accommodations on all project public-facing materials.
- Selection of meeting venues accessible by public transit.

Actions to Ensure Nondiscriminatory Practices

To ensure nondiscriminatory practices based on Title VI, ADOT has adhered to the following applicable actions and will continue to do so during outreach throughout Plan refinement.

- Provide ADOT Nondiscrimination brochures in both English and Spanish to public meeting attendees.
- Display the ADOT Nondiscrimination Notice to the Public poster in English and Spanish at public meetings and encourage meeting participants to read the information.
- Include ADOT's Nondiscrimination Notice to the Public slide in English and Spanish in the meeting presentations and read the accompanying script.
- Provide the opportunity for in-person and virtual meeting attendees to complete the voluntary Title VI Self Identification cards. Virtual meetings provide the Self-ID Survey through a slide with a link and the link posted in the chat for attendee convenience. Hard-copy cards are provided to attendees at in-person meetings upon check in.

Actions to Ensure Accessibility

The following strategies have been utilized when appropriate for the outreach activity and will continue to be utilized throughout Plan development to comply with the ADA's statutory requirements.

- Ensured public meeting venues are ADA-compliant and accessible by ADA-compliant transportation options, and that information provided is accessible for persons with vision or hearing disabilities.
- Ensured that virtual public meetings and stakeholder workshops are ADA accessible, which included instructing users how to turn on closed captioning services, having speakers turn on their cameras, providing minimum font sizes in presentations, and including a required Auxiliary Aids and Services slide regarding how to request ADA accommodations.
- Ensured that materials posted to the website are accessible PDFs that are compatible with readers.
- If online resources are used to provide project information, guidance is provided on how to use online resources and resources will be ADA accessible, including assistance for those with visual impairment and information about alternative methods for participation.
- Provided the Notice of Availability of Reasonable Accommodations on all public-facing materials for the study. Reasonable accommodations are provided upon request (e.g., sign language interpreter, copies of materials in accessible formats, etc.).

DAC Outreach Results

As part of the survey collection, optional questions about demographics were included for those who wished to provide such information. Demographic data received from the survey was not included with any other information collection but was used to determine the representative cross-section of survey reach within the State.

At the time of submission of this report, final public outreach results have not been collected since additional public outreach activities are planned. However, engagements are scheduled to be completed by November 2022 and the Plan will subsequently be updated in accordance with the feedback received throughout the outreach.

Process to Identify, Quantify, and Measure Benefits to DACs

Executive Order 14008 states that "40 percent of the overall benefits" of Federal investments from covered programs should flow to DACs. To respond to that directive, ADOT has established a methodology for calculating the benefits that flow from the EV Infrastructure Deployment Plan and accrue in DACs.

ADOT's EV Infrastructure Deployment Plan intends to meet the Justice40 program requirements by monitoring program success in identifying, quantifying, and measuring benefits to DACs. ADOT intends to monitor and report progress as required by FHWA and will amend this Plan as needed as guidance and regulations are finalized. ADOT is soliciting feedback regarding DAC benefits and metrics through stakeholder and public engagement. ADOT will amend the Plan to reflect input from stakeholders and the public through the Public Outreach and Involvement activities.

The USDOT methodology for defining DACs includes data for 22 indicators collected at the census tract level and grouped in to six categories of transportation disadvantages:

1. **Transportation access disadvantage** identifies communities and places that spend more, and take longer, to get where they need to go.
2. **Health disadvantage** identifies communities based on variables associated with adverse health outcomes, disability, as well as environmental exposures.
3. **Environmental disadvantage** identifies communities with disproportionately high levels of certain air pollutants and high potential presence of lead-based paint in housing units.
4. **Economic disadvantage** identifies areas and populations with high poverty, low wealth, lack of local jobs, low homeownership, low educational attainment, and high inequality.
5. **Resilience disadvantage** identifies communities vulnerable to hazards caused by climate change
6. **Social disadvantage** identifies communities with a shared history of discrimination, racism, or other forms of disadvantage that warrant consideration along with each/any of the above measures.

Benefits to DACs through this Plan

ADOT developed a methodology to measure benefits to DACs associated with implementing the Plan by assessing impacts aligned with the USDOT categories and the interim Justice40 guidance. These benefits and associated metrics reflect the positive impacts of expanding EVSE access to DACs and tribal communities, as defined by Justice40, through transportation planning that emphasizes equitable investments. These equitable investments will be important as Arizona's population continues to grow and impact the distribution of EV and EVSE access in DACs.

For example, in 2020, Arizona recorded the second fastest growing population in the nation, and approximately 45% of Arizonans identify as minorities.[55] Arizona is also home to one of the largest Native American populations in the nation, and approximately 27% of the State's land is owned by

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[55] Arizona Commerce Authority. (n.d.). *Demographics (Census Bureau Data).* Retrieved from
https://www.azcommerce.com/oeo/population/demographics-census-data/

Native American Tribes.[56] Measuring benefits to DACs in a rapidly changing and growing environment will better inform decision-making around EVSE access throughout the duration of this program.

Benefits to DACs will be reassessed and amended to meet the final Justice40 and NEVI rulemaking requirements and feedback from the public and stakeholders.

Metrics to Measure Impacts and Benefit to DACs

- Benefit to DAC: Improvement in EV transportation and accessibility, reliability, and options (USDOT Categories: 1, 5, 6)
  - o Metric: Number of new EVSE installed in DAC-defined census tracts and tribal lands
    - Frequency of Measurement: Annually
    - Data Source: ADOT charging station location identifier for potential new AFCs
- Benefit to DAC: Increased access to charging system for disadvantaged populations by having alternative payment options (USDOT Categories: 1, 4, 6)
  - o Metric: Percentage of chargers in the network with alternative payment options and the percentage of chargers within the system with alternative payment options in DACs
    - Frequency of Measurement: Annually
    - Data Source: ADOT charging station locations
- Benefit to DAC: Reduction of exposure to harmful transportation-related emissions (including diesel particulate matter, other PM 2.5, and air toxics), (USDOT Categories: 2, 3)
  - o Metric: Concentration of pollutants, PM, and other air toxins found in DAC defined census tracts and tribal lands with newly installed EV charging locations
    - Frequency of Measurement: Annually
    - Data Source: Air quality monitoring results for ozone, diesel particulate matter, or other emissions in DACs obtained from the Arizona Department of Environmental Quality
- Benefit to DAC: Increased EV transportation accessibility, reliability, and options (USDOT Categories: 1, 4, 6)
  - o Metric: Number of new EVSE installed in close proximity to public and affordable housing properties and multifamily dwellings
    - Frequency of Measurement: Annually
    - Data Source: ADOT charging station locations
- Benefit to DAC: Reduce negative impacts on DACs due to installation of EV charging stations (USDOT Categories: 2, 3, 4, 5, 6)
  - o Metric: Measure negative impacts such as increased right-of-way acquisition, negative impact to overall aesthetics including decreasing greenspace, and increases in safety concerns in DACs
    - Frequency of Measurement: Annually
    - Data Source: ADOT traffic data, ADOT crash/safety data, ADOT right-of-way plans and records

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[56] U.S. Department of Agriculture. (n.d.). *Managing Semi-Arid Watersheds: Watershed Basics - Public Land Management and Land Ownership in Arizona*. Retrieved from https://www.fs.fed.us/rm/boise/AWAE/labs/awae_flagstaff/watersheds/basics/management.html

- Benefit to DAC: Increased access to clean, high-frequency transportation options (USDOT Categories: 1, 2, 3, 5)
  o Metric: Number of new EVSE installed in DAC-defined census tracts and tribal lands
    ▪ Frequency of Measurement: Annually
    ▪ Data Source: Locations of chargers and transit/rideshare locations

- Benefit to DAC: Improved Job Access Score (USDOT Categories: 4, 6)
  o Metric: Number of EVSE installation, operations and maintenance, network connectivity, and other support jobs created for residents in DAC-defined census tracts and tribal lands
    ▪ Frequency of Measurement: Annually
    ▪ Data Source: Electric Vehicle Charging Justice40 Map tool, Arizona Commerce Authority's Occupation Employment and Wages, Employment Projections, and In-Demand Jobs reports

Program Evaluation

ADOT's data-driven program evaluation plan will ensure accountability, evaluate performance toward meeting the State's vision and goals for the EV Infrastructure Deployment Plan, and meet NEVI Formula Program requirements by monitoring three key areas of success: data collection, equitable access, and network reliability. ADOT intends to monitor and report progress as required by FHWA and may amend the Plan as needed to reflect the final rule when issued. This plan will be revisited and updated annually to address opportunities for improvement.

Metrics

ADOT will monitor and evaluate the program using the following metrics. A summary can be found in **Appendix B**.

- Performance Goal: Develop a convenient public EVSE network along Arizona's AFCs (Plan Goals 1, 2, 4, 6)
    - o Metric: Number of new AFC locations identified and developed
        - Frequency of measurement: Quarterly
        - Data source: ADOT charging station location identifier for potential new AFCs
    - o Metric: Number of EVSE locations for transit and shared ride vehicles
        - Frequency of measurement: Quarterly
        - Data source: Locations of EVSE and transit/rideshare locations
- Performance Goal: Provide access to program benefits (Plan Goals 1, 2, 3, 4, 5, 6)
    - o Metric: EV adoption rates
        - Frequency of measurement: Annually
        - Data source: ADOT, Motor Vehicle Division, vehicle registration records
    - o Metric: Estimated number of EV charger installation, operations and maintenance, network connectivity, and other support jobs created
        - Frequency of measurement: Annually
        - Data source: Arizona Commerce Authority, Occupation Employment and Wages, Employment Projections, and In-Demand Jobs reports
    - o Metric: Number of minority, Veteran, woman, and/or businesses owned by economically disadvantaged individuals that operate, maintain, and install the EVSE
        - Frequency of measurement: Annually
        - Data source: Local or state certification records from programs for minority-owned businesses, veteran-owned businesses, woman-owned businesses, and/or businesses owned by economically disadvantaged individuals

- Performance Goal: Achieve a resilient, equitable, accessible, and reliable EV charging network (Plan Goals 2, 5, 6)
    - Metric: Number of charging stations that meet the EV charging uptime (functioning) goal of 97% (calculated as required by program guidance) at the individual port level
        - Frequency of measurement: Quarterly
        - Data source: Total hours of outage and total hours of outage for reasons outside the charging station operator's control
    - Metric: EV charging station utilization rates
        - Frequency of measurement: Quarterly
        - Data source: EV charging stations utilization metrics including the number of charging sessions, energy (kWh) dispensed per session and successful session completion
    - Metric: Installation costs per EV charging station
        - Frequency of measurement: Quarterly
        - Data Source: Charging station real property acquisition cost, charging connection, and upgrade cost on the utility side of the electric meter, equipment acquisition and installation cost, DER acquisition and installation cost, and grid connection and upgrade costs paid by the charging station operator
    - Metric: Operating costs per EV charging station
        - Frequency of measurement: Quarterly
        - Data source: Total cost of electricity that the charging station operator must pay to operate on a charging station and maintenance and repair costs per charging station
    - Metric: Number of EV charging stations with DERs
        - Frequency of measurement: Quarterly
        - Data source: DER installed capacity, in kW or kWh as appropriate, of asset by type (e.g., stationary battery, solar, etc.) per charging station
- Performance Goal: Maintain high stakeholder engagement in the development of the EV charging network (Plan Goals 2, 3, 4, 6)
    - Metric: Number of engagement activities held
        - Frequency of measurement: Annually
        - Data source: ADOT stakeholder engagement records
    - Metric: Number of engagement activities held among DACs and tribal communities
        - Frequency of measurement: Annually
        - Data source: ADOT stakeholder engagement records
    - Metric: Number of participants in engagement activities
        - Frequency of measurement: Annually
        - Data source: ADOT stakeholder engagement records

- Performance Goal: Efficient use of Federal funding measured by amount of charging leveraged per Federal Dollar (Plan Goals, 2, 4, 5, 6)
  - o Metric: Quantity of funds distributed
    - Frequency of measurement: Quarterly
    - Data source: ADOT FFY funding records
  - o Metric: Number of funding recipients
    - Frequency of measurement: Annually
    - Data source: ADOT FFY funding records
  - o Metric: Charging station utilization rate per Federal Dollar
    - Frequency of measurement: Quarterly
    - Data source: ADOT FFY funding records, number of successful EV charging visits per month

Annual Plan Update

Before each FFY, ADOT will review and assess program performance using the metrics in the Program Evaluation Plan and other relevant data. Performance metrics will be made available to the public on at least an annual basis. Opportunities for improvement will be identified and addressed as necessary through the Plan's annual update.

Reporting

Reporting will occur on a quarterly and annual basis. The method and format of reporting will be in accordance with that required by the Joint Office.

Quarterly Reporting

Data will be submitted quarterly on charging station use, reliability and maintenance, and installation costs. Quarterly submittals shall include:

- Charging station location identifier
- Charging session start time, end time, and successful session completion (yes/no) by port
- Energy (kWh) dispensed to EVs per session by port
- Peak session power (kW) by port
- Charging station uptime calculated in accordance with the equation in § 680.116(b) for each of the previous 3 months
- Cost of electricity to operate per charging station in each of the previous 3 months
- Maintenance and repair cost per charging station for each of the previous 3 months
- Charging station real property acquisition cost, charging equipment acquisition and installation cost, DER acquisition and installation cost, and grid connection and upgrade cost on the utility side of the electric meter
- DER installed capacity, in kW or kWh as appropriate, of asset by type (e.g., stationary battery, solar, etc.) per charging station

Annual Reporting

- Information relating to the operation, installation, or maintenance of EVSE. These reports will contain:
  - The name, address and type of private entity involved in the operation, maintenance, and installation of EVSE
  - For private entities, identification of and participation in any state or local business opportunity certification programs including but not limited to minority-owned businesses, veteran-owned businesses, woman-owned businesses, and businesses owned by economically disadvantaged individuals

- Community Engagement Outcomes Report. This report will address community engagement activities conducted in accordance with the approved State EV Infrastructure Deployment Plan, including:
  - Community engagement type
  - Dates of community engagement activities
  - Numbers of attendees
  - Communities represented by attendees
  - How community engagement is included and reflected in the Plan

Appendix A: Arizona EV Deployment Plan Exception Request

ADOT is requesting two discretionary exemptions from the requirement that charging infrastructure be installed every 50 miles along the State's AFCs. The proposed discretionary exemptions are described in **Table 24** and shown in **Figure 18**. Stakeholder engagement activities should confirm if a charging installation would be feasible at any of the segments applied for discretionary exemptions.

Table 24: Discretionary Exemption Requests

Exception Number	Type	Distance of Deviation	Included in Round 6 AFC Nomination	Reason for Exception Request
1 – Kingman to Seligman (I-40)	☒ 50 miles apart ☐ 1 mile from exit	7 miles __ miles	☐ Yes ☒ No	☒ Grid Capacity ☒ Geography ☐ Equity ☐ Extraordinary Cost
2 – Gila Bend to Casa Grande/Eloy (I-8)	☒ 50 miles apart ☐ 1 mile from exit	17 miles __ miles	☐ Yes ☒ No	☒ Grid Capacity ☒ Geography ☐ Equity ☐ Extraordinary Cost

Figure 19: Map of Discretionary Exemption Requests
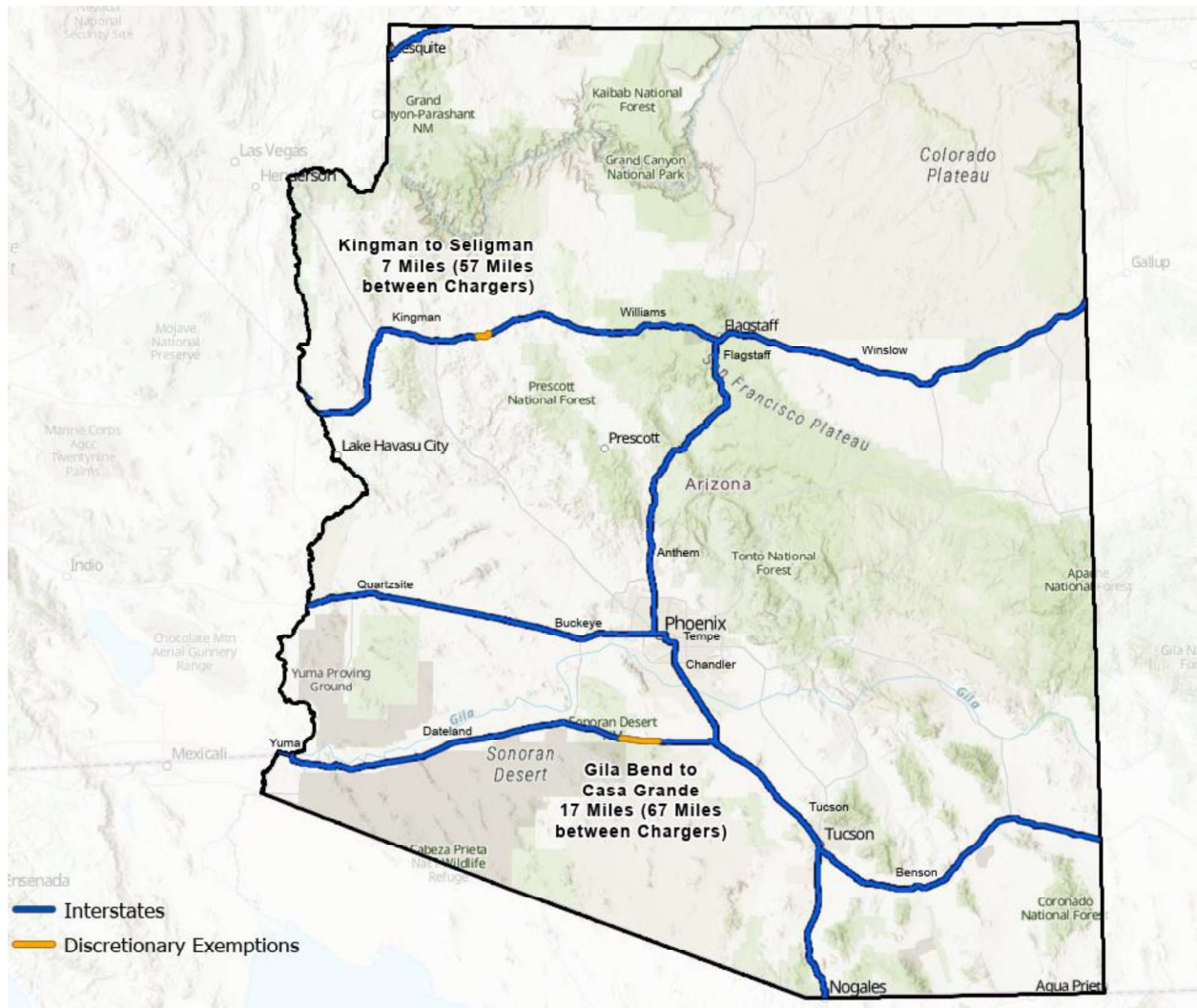
Justification for Exceptions

Kingman to Seligman

The 57-mile segment between Kingman and Seligman on I-40 is a rural area with no existing amenities within one mile of the corridor. ADOT limited the distance of this gap as much as possible in the new station proposal just east of Kingman. The proposed exemption is for a 7-mile gap as NEVI-compliant chargers will be sited 57-miles apart from each other.

Gila Bend to Casa Grande/Eloy

East of Gila Bend on I-8 is a rural area with no existing amenities within one mile of the corridor until reaching the interchange with I-10. ADOT proposed upgrading the Casa Grande existing stations and a new site in Eloy to ensure convenient charging options for both westbound and eastbound routes on I-10. The proposed exemption is for a 17-mile gap as NEVI-compliant chargers will be sited 67 miles apart from each other.

Appendix B: Performance Evaluation Metrics Summary Table

Table 25: Performance Evaluation Metrics Summary Table

Performance Goal	Metric	Frequency of Measurement	Data Source
Develop a convenient public charging network along Arizona's AFCs	Number of new AFC locations identified and developed	Quarterly, Annually	ADOT charging station location identifier for potential new AFCs
	Number of charging infrastructure locations for transit and shared ride vehicles	Quarterly	Locations of chargers and transit/rideshare locations
Provide access to program benefits	EV adoption rates	Annually	ADOT Motor Vehicle Division, vehicle registration records
	Number of EV charger installation, operations and maintenance, network connectivity, and other support jobs created	Annually	Arizona Commerce Authority, Occupation Employment and Wages, Employment Projections, and In-Demand Jobs reports
	Number of minority, veteran, woman, and/or businesses owned by economically disadvantaged individuals that operate, maintain, and install the EVSE	Annually	Local or state certification records from programs for minority-owned businesses, Veteran-owned businesses, woman-owned businesses, and/or businesses owned by economically disadvantaged individuals.
Achieve a resilient, equitable, accessible, and reliable EV charging network	Number of charging stations that meet the EV charging uptime (functioning) goal of 97% (calculated as required by program guidance) at the individual port level	Quarterly	Total hours of outage and total hours of outage for reasons outside the charging station operator's control
	EV charging station utilization rates	Quarterly	EV charging stations utilization metrics including the number of charging sessions, energy (kWh) dispensed per session and successful session completion

Performance Goal	Metric	Frequency of Measurement	Data Source
	Installation costs per EV charging station	Quarterly	Charging station real property acquisition cost, charging connection and upgrade cost on the utility side of the electric meter, equipment acquisition and installation cost, DER acquisition and installation cost, and grid connection and upgrade costs paid by the charging station operator
	Operating costs per EV charging station	Quarterly	Total cost of electricity that the charging station operator must pay to operate on a charging station and maintenance and repair costs per charging station
	Number of EV charging stations with DERs	Quarterly	DER installed capacity, in kW or kWh as appropriate, of asset by type (e.g., stationary battery, solar, etc.) per charging station
Maintain high stakeholder engagement in the development of the EV charging network	Number of engagement activities held	Annually	ADOT stakeholder engagement records
	Number of engagement activities held among DACs and tribal communities	Annually	ADOT stakeholder engagement records
	Number of participants in engagement activities	Annually	ADOT stakeholder engagement records
Efficient use of Federal funding measured by amount of charging leveraged per Federal Dollar	Quantity of funds distributed	Quarterly	ADOT FFY funding records
	Number of funding recipients	Annually	ADOT FFY funding records
	Charging station utilization rate per Federal Dollar	Quarterly	ADOT FFY funding records, number of successful EV charging visits per month

ADOT EV Charging Infrastructure Cybersecurity Specification

CHAPTER 1. TERMINOLOGY AND ABBREVIATIONS

ACRONYMS

Abbreviation	Meaning
ADOT	Arizona Department of Transportation
ARC-IT	Architecture Reference for Cooperative and Intelligent Transportation
CISA	Cybersecurity and Infrastructure Security Agency
CSO	Charging Station Operator
CSMS	Charging Station Management System
CVE	Common Vulnerabilities and Exposures
EV	Electric Vehicle
EVSE	Electric Vehicle Supply Equipment
ICS-CERT	Industrial Control Systems Cyber Emergency Response Team
ITS	Intelligent Transportation Systems
IVI	In-Vehicle Infotainment Center
NEVI	National Electric Vehicle Infrastructure
NERC-CIP	North American Electric Reliability Corporation Critical Infrastructure Protection
NIST	National Institute of Standards and Technology
OBE	On-Board Equipment
OCPP	Open Charge Point Protocol
PCI DSS	Payment Card Industry Data Security Standard

TERMS

Term	Definition
Charging Station	The physical system where Electric Vehicles can be charged.
Charging Station Operator	The mobility partner who operates the charging station infrastructure. For purposes of this specification this term will simultaneously refer to the Charging Station Vendor since the vendor is fulfilling this same role.
Connector/Plug	An independently operated and managed electrical outlet on a charging station which corresponds to a single physical connector.
Electric Vehicle Supply Equipment	An independently operated and managed part of the charging station that can deliver energy to one EV at a time.

REQUIREMENTS TERMINOLOGY

The key words "MUST", "MUST NOT", "REQUIRED", "SHALL", "SHALL NOT", "SHOULD", SHOULD NOT", "RECOMMENDED", "MAY", and "OPTIONAL" in this document are to be interpreted as described in the Internet Engineering Task Force Requests for Comment 2110[i] and 2119,[ii] which are defined in the below table.

Key Word	Definition
MUST	This word, or the terms "REQUIRED" or "SHALL", mean that the definition is an absolute requirement of the specification.
MUST NOT	This phrase, or the phrase "SHALL NOT", mean that the definition is an absolute prohibition of the specification.
SHOULD	This word, or the adjective "RECOMMENDED", mean that there may exist valid reasons in particular circumstances to ignore a particular item, but the full implications must be understood and carefully weighed before choosing a different course.
SHOULD NOT	This phrase, or the phrase "NOT RECOMMENDED" mean that there may exist valid reasons in particular circumstances when the particular behavior is acceptable or even useful, but when the full implications should be understood, and the case carefully weighed before implementing any behavior described in this label.
MAY	This word, or the adjective "OPTIONAL", mean that an item is truly optional. One vendor may choose to include the item because a particular marketplace requires it or because the vendor feels that it enhances the product while another vendor may omit the same item. An implementation which does not include a particular option MUST be prepared to interoperate with another implementation which does include the option, though perhaps with reduced functionality. In the same vein an implementation which does not include a particular option MUST be prepared to interoperate with another implementation which does not include the option (except, of course, for the feature the option provides.)

CHAPTER 2. INTRODUCTION

PURPOSE

The purpose of this specification is to establish a statewide cybersecurity standard for the deployment of Electric Vehicle (EV) charging infrastructure along the state's NEVI Formula Program funded EV charging installations by illustrating cybersecurity provisions derived from federal laws and regulations, and industry best standards to create cybersecurity requirements which the Charging Station Operator (CSO) MUST strictly and completely fulfill regarding the deploying and maintaining of EV charging infrastructure throughout the state of Arizona's EV charging installations.

Through strict adherence to the requirements in this document, the CSO can assure ADOT that the EV charging infrastructure met a baseline of substantial cybersecurity controls throughout ADOT's EV Infrastructure Deployment Plan.

SCOPE

- Requirements in this specification apply strictly to and are the responsibility of the CSO.
- Requirement items in this specification MUST be strictly and completely fulfilled by the CSO and submitted to ADOT for assessment.

CHAPTER 3. CYBERSECURITY RATIONALE

To establish the foundation of cybersecurity for the state of Arizona's EV charging installations, ADOT has constructed a set of requirements which correspond with both federal laws & regulations and industry best practice cybersecurity controls. These requirements are based primarily on cybersecurity provisions from the *National Electric Vehicle Infrastructure (NEVI) Formula Program Notice of Proposed Rulemaking (NPRM) (Title 23 CFR Part 680)[iii]* and the *National ITS Architecture and Standards (ARC-IT)* conformity requirements from the *Intelligent Transportation System Architecture and Standards (Title 23 CFR Part 940).[iv]* The narrative for requirement creation and steps are described herein.

CONTROL MAPPING

A crosswalk mapping all relevant cybersecurity provisions present in the various requirement sources and NIST SP 800-53[v] was created. Primary and secondary requirement sources utilized in this mapping are described below.

PRIMARY

NEVI

In order to address the cybersecurity provisions in *Title 23 CFR Part 680*, each provision was mapped to applicable cybersecurity controls defined in NIST SP 800-53r5 *Security and Privacy Controls for Information Systems and Organizations*.[vi]

ARC-IT

Next, the cybersecurity requirements defined in ARC-IT's *Device Class 5 Areas[vii]* (the security class applicable to ARC-IT's "Electric Charging Station" physical object) were mapped to applicable NIST SP 800-53 controls in much the same manner.

SECONDARY

Statewide Policy (8130): System Security Acquisition and Development

ADOT relied on its own *System Security Acquisition and Development Statewide Policy (P8130)*,[viii] which contains relevant third-party information system acquisition and deployment controls for the Payment Card Industry Data Security Standard[ix] (PCI DSS) and the Health Insurance Portability Act[x] in order to meet the customer and payment info cybersecurity considerations defined in *Title 23 CFR Part 680*. The PCI DSS and HIPAA controls[xi] contained within this statewide policy document were mapped to the applicable NIST SP 800-53 controls.

North American Electric Reliability Corporation Critical Infrastructure Protection (NERC CIP)

To address the cybersecurity consideration contained within *Title 23 CFR Part 680* defining the security of *Charging-Network-to-Grid Communication*, NERC CIP standards were utilized (*NERC CIP-011-2* "Information Protection" Requirements 1.1 & 1.2)[xii] and mapped to NIST SP 800-53.

CONTROL BASELINE

An initial cybersecurity baseline was constructed in accordance with NIST SP 800-53Br5 *Control Baselines for Information Systems and Organizations[xiii]* tuned to the *Security Control Baseline* of "High*"*, which was further modified with supplemental controls which were a product of the mapping crosswalk.

CREATION OF REQUIREMENTS

Submission of NIST SP 800-53A Assessment

Title 23 CFR Part 940 pertains to additions of modifications to ITS systems which are funded partly or in whole by the Highway Trust Fund.[xiv] This requirement was created to fulfill the conformity provisions present in *Title 23 CFR Part 940* as it pertains to ITS conformity requirements with *The National ITS Architecture and Standards* (ARC-IT), of which therein defines "Securing ITS" as a core architectural directive. Fulfillment of the current cybersecurity baseline (Appendix A) covers the physical components with the security class of ARC-*IT's Device Class 5 Areas*.[xv]

Fulfillment of Cybersecurity Compliance Controls Table

This requirement was created to meet cybersecurity provisions defined in *Title 23 CFR Part 680* by taking each particular cybersecurity provision and citing the cybersecurity baseline and component each provision should apply to. From there, the CSO MUST submit their plan to meet each requirement in the table.

Security Testing and Assessment - NIST SP 800-115

This section elaborates on the expectations with respect to security testing and assessment, guided by *NIST SP 800-115 Technical Guide to Information Security Testing and Assessment*.[xvi] The goal of this guidance is to ensure that vendors and owners regularly conduct security testing and assessments to demonstrate the effectiveness of security controls established in equipment, software, and networks utilized by EV charging infrastructure components. The CSO shall ensure that the activities outlined in NIST SP 800-115 are conducted on a regular interval, which includes policy reviews, vulnerability assessments, penetration testing, and others, as well as creating and maintaining a plan which shall define the logistical and technical details required to execute these activities.

CHAPTER 4. EV CHARGING INFRASTRUCTURE COMPONENTS

This section illustrates the multiple components which comprise electric vehicle charging infrastructure as defined in ARC-IT and OCPP diagrams and documentation. For the purpose of this specification, the CSO MUST address requirements for each relevant component listed when filling out requirements (see Chapter 5. Cybersecurity requirements for further details).

COMPONENT LIST

Below is a list of components owned by the CSO which facilitate the charging station's functionality.

Component	Description
Electric Vehicle Charging Station	Provides access to electric vehicle supply equipment that is used to charge hybrid and all-electric vehicles. For the purpose of this specification, this component will include the EVSE and connector(s). This component is provided, owned, and managed by the CSO.
CSMS	The system utilized by the CSO to manage charging stations. A majority of the CSMS core functions, including collection and management, overlap with that of the *Traffic Information Center* defined in ARC-IT. This system is owned and managed by the CSO.
PCI DSS Compliant Vehicle Payment Service	Supports vehicle payments for charging of EVs. Charging stations may utilize various methods of payment, to include an interface on the charging station itself which accepts debit/credit payment, or contactless methods in which the operator engages with the charging station remotely via either a mobile phone application or other OBE methods such as in-vehicle applications via the EV's IVI. Payment service mechanisms are provided, owned, and managed by the CSO.
PCI DSS Compliant Payment Administration Center	Provides general payment administration capabilities and supports the electronic transfer of funds from the customer to the CSO for charging services rendered. This system may be owned and managed by the CSO.

COMPONENT DIAGRAMS

Below are physical and interface diagrams of EV charging stations from ARC-IT and OCPP documentation. These are included as a resource for the CSO and others to describe the various components of EV charging infrastructure. [Note: "Electric Charging Station" as labeled by these ARC-IT diagrams is synonymous with "EV Charging Station" as utilized in this document.]

ARC-IT

ST05: Electric Charging Stations Management[xvii] – Physical Diagram
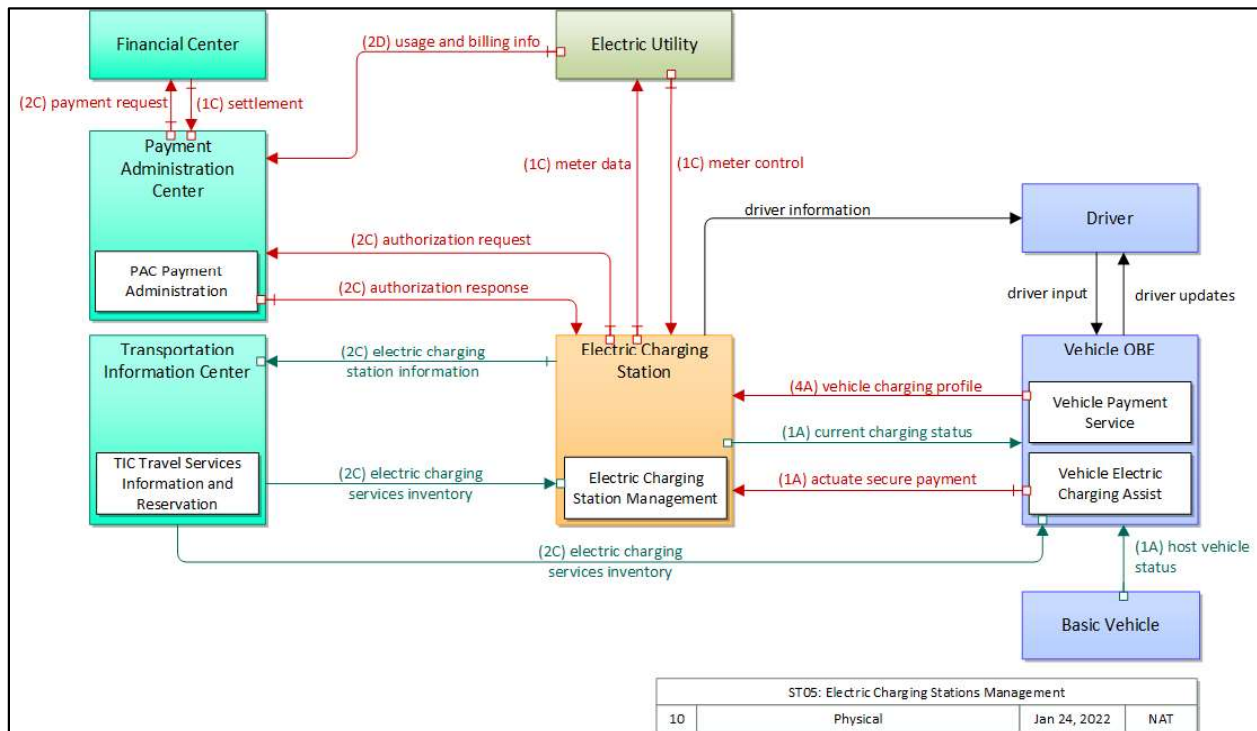
Figure 4-1. ARC-IT Physical Diagram - ST05: Electric Charging Stations Management

Electric Charging Station – Interfaces Diagram
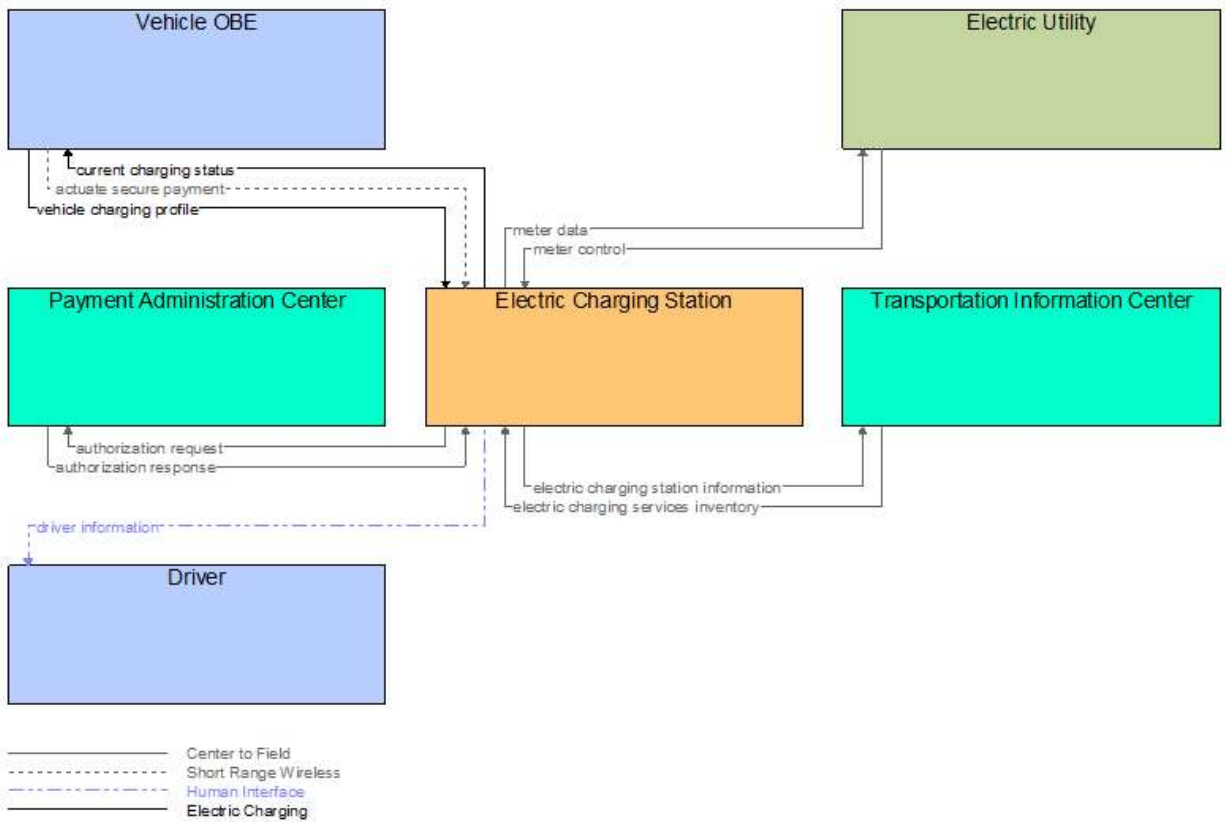
Figure 4-2. ARC-IT Interfaces Diagram – Electric Charging Station

Open Charge Point Protocol
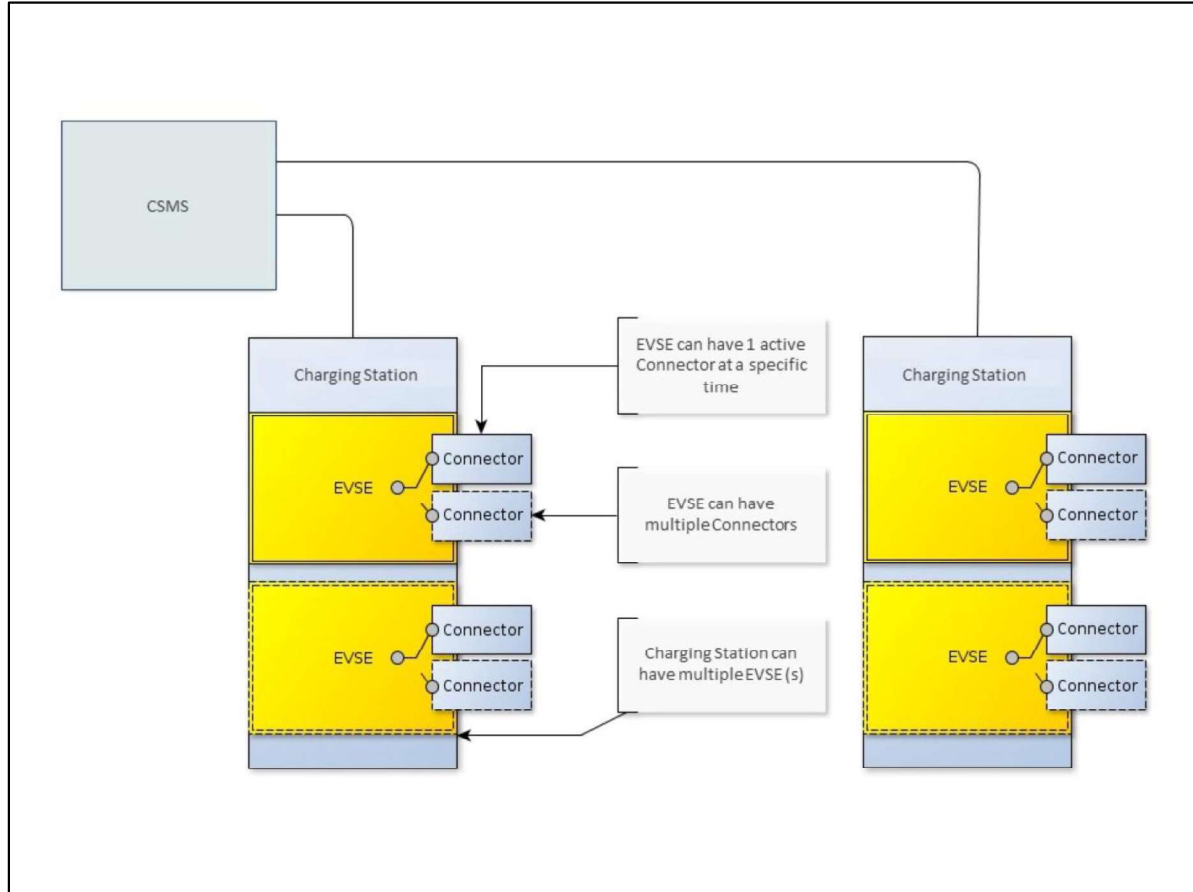
Figure 4-3. 3-tier model as used in OCPP

CHAPTER 5. CYBERSECURITY REQUIREMENTS

This section contains mandatory cybersecurity requirements the CSO must fulfill. These requirements exist to fulfill the following cybersecurity provisions:

- Cybersecurity considerations present in the *NEVI Formula Program* and requirements defined the *Notice of Proposed Rulemaking (NPRM)* of *Title 23 CFR Part 680*.[xviii] View *Appendix B* for exact definitions.
- Device Class 5 Areas[xix] (security Controls) defined in the *National ITS Architecture Reference/Architecture Reference for Cooperative and Intelligent Transportation* (ARC-IT) for *Electric Charging Station*[xx] and *Vehicle Payment Service*.[xxi] View *Appendix B* for exact definitions.

The mandatory cybersecurity requirements are detailed in section *REQUIREMENT SUBMISSION GUIDELINES* below, and steps include:

1. Submission of NIST SP 800-53A Assessment[xxii]
2. Fulfillment of Cybersecurity Compliance Controls Table
3. Security Testing and Assessment – NISP SP 800-115[xxiii]

Though these requirements may be addressed in any order, it is RECOMMENDED that the CSO address each requirement in numerical order. By completing step 1 *Submission of NIST SP 800-53A Assessment* first, this significantly expedites step 2 *Fulfillment of Cybersecurity Compliance Controls Table*.

REQUIREMENT SUBMISSION GUIDELINES

Submission of NIST SP 800-53A Assessment

The CSO is required to submit the attached *NIST SP 800-53A* assessment spreadsheet, fulfilling each control listed in **Table 6A-1. Cybersecurity Control Baseline** in Appendix A. Fulfillment of each control must be met for each component as applicable. If a control is deemed as non-applicable for one or more components, then CSO must provide further detail in *Column I – "EXPLANATION & COMMENTS"* of the assessment document. For certain requirements with no present control, the CSO must provide a detailed explanation as to how exactly they are meeting the requirement for each component. While this baseline has been designed to incorporate PCI-DSS required controls outlined in ADOT P8130, the CSO shall be responsible for putting further controls in place as required by the latest version of the PCI DSS for payment systems.

While assessing each control, the CSO MUST annotate in *Column I – "EXPLANATION & COMMENTS"* how each control is applying to each component.

Cybersecurity Compliance Controls Table

Each requirement listed in the Cybersecurity Compliance Controls Table must be addressed and filled out in full by the CSO.

Column/Field Descriptions & Requirements

Cybersecurity Compliance Controls Table Columns	
Column	Description
#	Numeric identifier of each requirement.
Requirement	The stated cybersecurity requirement which must be met by the CSO.
Baseline Controls	The controls which fulfill the stated requirement.
Comp. Code	Component code for each component a requirement applies to. The codes are as follows: - *CS*: EV Charging Station - *MS*: CSMS - *PS*: Vehicle Payment Service - *PA*: Payment Administration Center If one of more of the components listed above are deemed as non-applicable to the charging station deployment by the CSO, then the CSO must provide in detail which components meet non-applicable status and a detailed explanation as to why it's non-applicable. This explanation must be provided in the column titled "**Compliance Description**" on how they are to meet said requirement. The CSO may also add listed component codes to this cell which weren't previously listed by default and must provide a detailed explanation on that component's inclusion into the requirement. Requirements will apply to all newly added component(s).
Compliance Status	CSO must denote compliance status by inputting a bold and capitalized **X** in the sub-column: - **Yes** if the requirement is fully and strictly met for all listed component codes for the relevant requirement. - **No** if requirements are not fully and strictly met for 1 or more of the listed component codes for the relevant requirement.
Compliance Description	This is where the CSO must describe: - Compliance status. - Plan to address compliance for the relevant requirement item. - Any components which are deemed as *non-applicable* for the charging infrastructure deployment and a detailed explanation as to why. - Any added components outside of the default listed components which are deemed as applicable to the charging infrastructure deployment, and a detailed explanation as to why. Each cell contains default pre-filled text which may contain additional information or description needs which the CSO must address in their entry.

Cybersecurity Compliance Controls Table

#	Requirement	Initial Control Baseline	Comp. Code	Compliance Status		Compliance Description
				Yes	No	
1	Ensure contactless remote payment methods are secure.	NIST SP 800-53 Control Numbers: AC-4;AC-10;AC-25;CA-2;CA-7;CA-8;PE-3;PL-8;PM-4;RA-3;RA-5;SA-3;SA-4SA-5;SA-8;SA-10;SA-11;SA-15;SA-17;SC-7;SI-2;SI-3:SI-4;SI-5;SI-12; SI-13; SI-14; SI-16; SI-17;SR-2;SR-3;SR-4;SR-5:SR-6;SR-7;SR-8;SR-9;SR-10	CS; MS; PS; PA			A detailed plan shall be provided that addresses how contactless payment methods will be secured on the charging station. Include payment methods applicable to the charging station in explanation (i.e., mobile app, terminal payment, etc). This plan shall additionally incorporate and maintain compliance with all elements of the latest versions of PCI DSS and PCI SCC.
2	Physical security strategies to address EV charging station tampering and unauthorized access.	NIST SP 800-53 Control Numbers: PE-1;PE-2;PE-3;PE-4;PE-5;PE-6;PE-8;PE-9;PE-10;PE-11;PE-12;PE-13;PE-14;PE-15;PE-16;PE-17;PE-18	CS			A detailed plan shall be provided that addresses physical security strategies of the charging station.
3	Cybersecurity strategies to address user identity and access management, selection of appropriate encryption systems, intrusion and malware detection, event logging and reporting,	NIST SP 800-53 Control Numbers: AC-1;AC-2;AC-3;AC-5;AC-6;AC-7;AC-8;AC-10;AC-11;AC-12;AC-	CS; MS; PS			A detailed plan shall be provided that addresses user identity and access management, selected encryption systems, intrusion and malware detection, event logging and reporting,

	management of software updates, and secure operation during communication outages.	14;AC-17;AC-18;AC-19;AC-20;AC-21;AC-22;AU-1;AU-2;AU-3;AU-4;AU-5;AU-6;AU-7;AU-8;AU-9;AU-10;AU-11;AU-12;IA-1;IA-2;IA-3;IA-4;IA-5;IA-6;IA-7;IA-8;IA-11;IA-12;MA-1;MA-2;MA-3;MA-4;MA-5;MA-6; SI-1;SI-2;SI-3;SI-4;SI-5;SI-6;SI-7;SI-8;SI-10;SI-11;SI-12;SI-16;SI-18				management of software updates, and secure operation during communication outages. To address "…secure operation during communication outages" describe the plan in detail on how you will persist service under this circumstance.
4	Ensure secure collection, processing, and retention of only the personal information strictly necessary to provide charging service to the customer, to include information required to complete the charging transaction.	NIST SP 800-53 Control Numbers: AC-1;AC-2;AC-3;AC-5;AC-6;AC-7;AC-8;AC-10;AC-11;AC-12;AC-14;AC-17;AC-18;AC-19;AC-20;AC-21;AC-22;AT-1;AT-2;AT-3;AT-4;AU-1;AU-2;AU-3;AU-4;AU-5;AU-6;AU-7;AU-8;AU-9;AU-10;AU-11;AU-12;CA-1;CA-2;CA-3;CA-5;CA-6;CA-7;CA-8;CA-9;IR-1;IR-2;IR-3;IR-4;IR-5;IR-6;IR-7;IR-8;MP-1;MP-	CS; MS; PS; PA			A detailed plan shall be provided that addresses how the charging station will account for and enact secure collection, processing, and retention of personal information strictly necessary to provide charging service.

		2;MP-3;MP-4;MP-5;MP-6;MP-7;PL-1;PL-2;PL-4;PL-8;PL-10;PL-11;PM-3;PM-5;PM-18;PM-19;PM-20;PM-21;PM-22;PM-24;PM-25;PM-26;PM-27;PT-2;PT-3;PT-4;PT-5;PT-6;SA-1;SA-2;SA-3;SA-4;SA-5;SA-8;SA-9;SA-10;SA-11;SA-15;SA-16;SA-17;SA-21;SA-22;SI-1;SI-2;SI-3;SI-4;SI-5;SI-6;SI-7;SI-8;SI-10;SI-11;SI-12;SI-16;SI-18				
5	Enact *Charger-to-Charger-Network* communications using a secure communication method.	NIST SP 800-53 Control Numbers: SC-1;SC-2;SC-3;SC-4;SC-5;SC-7;SC-8;SC-10;SC-12;SC-13;SC-15;SC-17;SC-18;SC-20;SC-21;SC-22;SC-23;SC-24;SC-28;SC-39	CS; MS			A detailed plan shall be provided that addresses how the charging station will secure communications to its charging network.
6	Ensure charging stations have the ability to receive and implement secure remote software updates, conduct real-time protocol translations, encryption and decryption, authentication, and	NIST SP 800-53 Control Numbers: AC-1;AC-2;AC-3;AC-5;AC-6;AC-7;AC-8;AC-10;AC-11;AC-12;AC-14;AC-17;AC-	CS; MS			A detailed plan shall be provided that addresses how the charging station will secure remote software update receipt and implementation, conducts real-time protocol translations, handles encryption and

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	authorization in their communications with charging networks.	18;AC-19;AC-20;AC-21;AC-22;AU-1;AU-2;AU-3;AU-4;AU-5;AU-6;AU-7;AU-8;AU-9;AU-10;AU-11;AU-12;IA-2;IA-3;IA-4;IA-5;IA-6;IA-7;IA-8;IA-11;IA-12;MA-1;MA-2;MA-3;MA-4;MA-5;MA-6;SC-1;SC-2;SC-3;SC-4;SC-5;SC-7;SC-8;SC-10;SC-12;SC-13;SC-15;SC-17;SC-18;SC-20;SC-21;SC-22;SC-23;SC-24;SC-28;SC-39;SI-1;SI-2;SI-3;SI-4;SI-5;SI-6;SI-7;SI-8;SI-10;SI-11;SI-12;SI-16;SI-18				decryption, enacts authentication and authorization in communications within their charging networks.
7	Ensure charging stations and charging networks securely measure, communicate, store, and report energy and power dispensed, real-time charging-port status, real-time price to the customer, and historical charging-port uptime.	NIST SP 800-53 Control Numbers: AC-1;AC-2;AC-3;AC-5;AC-6;AC-7;AC-8;AC-10;AC-11;AC-12;AC-14;AC-17;AC-18;AC-19;AC-20;AC-21;AC-22;SC-1;SC-2;SC-3;SC-4;SC-5;SC-7;SC-8;SC-10;SC-12;SC-13;SC-15;SC-17;SC-18;SC-	CS; MS			A detailed plan shall be provided that addresses how the charging station securely measures, stores, communicates, and reports required information within their charging networks.

		20;SC-21;SC-22;SC-23;SC-24;SC-28;SC-39				
8	Ensure charging stations utilize appropriate cybersecurity use cases and requirements in their communications with any charging network provider.	OCPP v2.0.1 Part 2 – Section A2 *"Use cases & Requirements"*	CS			List and provide detail here regarding which applicable use cases and requirements are fulfilled and how. Additionally, list and provide detail regarding which use cases and requirements are deemed non-applicable to your charging station system.
9	Ensure charging stations are designed to securely switch charging network providers without any changes to hardware.	N/A	CS; MS			A detailed plan shall be provided that addresses the design strategy for securely switching charging network providers without any changes to hardware.
10	Ensure the charging network must be capable of communicating with other charging networks to enable an EV operator to utilize a single credential to charge at charging stations that are a part of multiple charging networks.	N/A	CS; MS; PS			A detailed plan shall be provided that addresses how the charging network will enable utilization of a single credential for EV operators to charge at charging stations that are a member of multiple charging networks.
11	Ensure charging networks are capable of secure communication with electric utilities, other energy providers, or local energy management systems.	NIST SP 800-53 Control Numbers: SI-1; SI-2;SI-3;SI-4;SI-5;SI-6;SI-7;SI-8;SI-10;SI-11;SI-12;SI-16;SI-18;SR-1;SR-2;SR-3;SR-5;SR-6;SR-8;SR-9;SR-10;SR-11;SR-12	CS; MS			A detailed plan shall be provided that addresses how the charging network will secure it's communication with electric utilities, energy providers, and local energy management systems.

Security Testing and Assessment - NIST SP 800-115

Active assessment and testing of security controls and policies from both procedural and technical standpoints are critical to verify proper security control implementation and procedure compliance, as well as to demonstrate their practical effectiveness against modern cyber-attack methodologies. NIST SP 800-115 shall be utilized by system integrators, vendors and owners (CSO) of EV charging infrastructure as the guiding standard for security testing and assessment of their equipment and networks. For vendors, efforts shall include code reviews, periodic vulnerability analysis and security testing (white box and black box) of their equipment. For the CSO and system integrators, similar assessment efforts shall be conducted at the system level, with a primary focus on the network, interfaces, and site-specific configuration. Vulnerability scanning and penetration testing shall be conducted at both the equipment level (by the vendor) and at the system/network level (internal and external) by a professionally certified tester (e.g., OSCP, PNPT, eCPPT, or similarly qualified with demonstrated hands-on experience) using modern techniques, frameworks, and tools.

The CSO shall both develop cybersecurity assessment plans in accordance with section 6 of NIST SP 800-115. Assessment planning shall adhere to the following steps, which are quoted from section 6.7 of this standard:

- **Developing a security assessment policy.** Organizations should develop an information security assessment policy to provide direction and guidance for their security assessments. This policy should identify security assessment requirements and hold accountable those individuals responsible for ensuring that assessments comply with the requirements. The approved policy should be disseminated to the appropriate staff, as well as third parties who are to conduct assessments for the organization. The policy should be reviewed at least annually and whenever there are new assessment-related requirements.
- **Prioritizing and scheduling assessments.** Organizations should decide which systems should undergo assessments and how often these assessments should be done. This prioritization is based on system categorization, expected benefits, scheduling requirements, applicable regulations where assessment is a requirement, and resource availability. Technical considerations can also help determine assessment frequency, such as waiting until known weaknesses are corrected or a planned upgrade to the system is performed before conducting testing.
- **Selecting and customizing technical testing and examination techniques.** There are many factors for organizations to consider when determining which techniques should be used for a particular assessment. Factors include the assessment objectives, the classes of techniques that can obtain information to support those objectives, and the appropriate techniques within each class. Some techniques also require the organization to determine the assessors' viewpoint (e.g., internal versus external) so that corresponding techniques can be selected. -

- **Determining the logistics of the assessment.** This includes identifying all required resources, including the assessment team; selecting environments and locations from which to perform the assessment; and acquiring and configuring all necessary technical tools. - Developing the assessment plan. The assessment plan documents the activities planned for an assessment and other related information. A plan should be developed for every assessment to provide the rules and boundaries to which assessors must adhere. The plan should identify the systems and networks to be assessed, the type and level of testing permitted, logistical details of the assessment, data handling requirements, and guidance for incident handling. -
- **Addressing any legal considerations.** Organizations should evaluate potential legal concerns before commencing an assessment, particularly if the assessment involves intrusive tests (e.g., penetration testing) or if the assessment is to be performed by an external entity. Legal departments may review the assessment plan, address privacy concerns, and perform other functions in support of assessment planning.

The CSO SHALL, in concert with the requirement defined in section 3544 of the *Federal Information Security Modernization Act of 2014*,[xxiv] conduct "periodic testing and evaluation of the effectiveness of information security policies, procedures, and practices, to be performed with a frequency depending on risk, but no less than annually." This is echoed in the recommendation provided by NIST SP 800-115, which also recommends conducting such reviews "whenever there are new assessment-related requirements." NIST SP 800-53 provides further recommendations regarding the frequency of conducting security assessments. Vulnerability scanning and penetration testing shall be part of the activities conducted at least annually.

Assessments for payment systems must additionally comply with all PCI-DSS requirements. A PCI Security Standards Council (SCC) certified Quality Security Assessor (QSA) shall be utilized to determine the appropriate assessment frequency of EV charging payment systems, to verify that the latest PCI DSS requirements are being properly met, and to review/recommend changes to plans and controls as required for the payment system to maintain PCI DSS compliance. Payment software must additionally comply with PCI SSC Software Standards.

CSO SHALL also actively monitor and react to threat intelligence (including new CVEs and ICS-CERT advisories related to elements of their systems) which may necessitate re-assessment of their equipment and/or networks and may require patching or re-configuration to mitigate risk from emerging threats. Vendors shall immediately inform owners of any such information that may adversely impact their systems and provide guidance for temporary and long-term mitigation of associated risks.

CHAPTER 6. APPENDICES

APPENDIX A – CYBERSECURITY BASELINE

Table 6A-1 contains a listing of identifiers for cybersecurity control families and their enhancements for environments with a *High* security control baseline in accordance with NIST SP 800-53B r5, which has been further modified to include additional controls to meet requirements of *Title 23 CFR Part 680*, *Title 23 CFR Part 940*, and the *Statewide Policy (8130): System Security Acquisition and Development.*

Table 6A-1. Cybersecurity Control Baseline

CYBERSECURITY CONTROL BASELINE		
Control Number	Control Name	Initial Control Baselines
Access Control		
AC-1	Policy and Procedures	AC-1
AC-2	Account Management	AC-2 (1) (2) (3) (4) (5) (11) (12) (13)
AC-3	Access Enforcement	AC-3
AC-4	Information Flow Enforcement	AC-4 (4)
AC-5	Separation of Duties	AC-5
AC-6	Least Privilege	AC-6 (1) (2) (3) (5) (7) (9) (10)
AC-7	Unsuccessful Logon Attempts	AC-7
AC-8	System Use Notification	AC-8
AC-10	Concurrent Session Control	AC-10
AC-11	Device Lock	AC-11 (1)
AC-12	Session Termination	AC-12
AC-14	Permitted Actions Without Identification or Authentication	AC-14
AC-17	Remote Access	AC-17 (1) (2) (3) (4)
AC-18	Wireless Access	AC-18 (1) (3) (4) (5)
AC-19	Access Control for Mobile Devices	AC-19 (5)
AC-20	Use of External Systems	AC-20 (1) (2)
AC-21	Information Sharing	AC-21
AC-22	Publicly Accessible Content	AC-22
Awareness and Training		
AT-1	Policy and Procedures	AT-1
AT-2	Literacy Training and Awareness	AT-2 (2) (3)
AT-3	Role-based Training	AT-3
AT-4	Training Records	AT-4
Audit and Accountability		
AU-1	Policy and Procedures	AU-1
AU-2	Event Logging	AU-2
AU-3	Content of Audit Records	AU-3 (1)

CHAPTER 6. APPENDICES

APPENDIX A – CYBERSECURITY BASELINE

Table 6A-1 contains a listing of identifiers for cybersecurity control families and their enhancements for environments with a *High* security control baseline in accordance with NIST SP 800-53B r5, which has been further modified to include additional controls to meet requirements of *Title 23 CFR Part 680*, *Title 23 CFR Part 940*, and the *Statewide Policy (8130): System Security Acquisition and Development.*

Table 6A-1. Cybersecurity Control Baseline

Control Number	Control Name	Initial Control Baselines
CYBERSECURITY CONTROL BASELINE		
Access Control		
AC-1	Policy and Procedures	AC-1
AC-2	Account Management	AC-2 (1) (2) (3) (4) (5) (11) (12) (13)
AC-3	Access Enforcement	AC-3
AC-4	Information Flow Enforcement	AC-4 (4)
AC-5	Separation of Duties	AC-5
AC-6	Least Privilege	AC-6 (1) (2) (3) (5) (7) (9) (10)
AC-7	Unsuccessful Logon Attempts	AC-7
AC-8	System Use Notification	AC-8
AC-10	Concurrent Session Control	AC-10
AC-11	Device Lock	AC-11 (1)
AC-12	Session Termination	AC-12
AC-14	Permitted Actions Without Identification or Authentication	AC-14
AC-17	Remote Access	AC-17 (1) (2) (3) (4)
AC-18	Wireless Access	AC-18 (1) (3) (4) (5)
AC-19	Access Control for Mobile Devices	AC-19 (5)
AC-20	Use of External Systems	AC-20 (1) (2)
AC-21	Information Sharing	AC-21
AC-22	Publicly Accessible Content	AC-22
Awareness and Training		
AT-1	Policy and Procedures	AT-1
AT-2	Literacy Training and Awareness	AT-2 (2) (3)
AT-3	Role-based Training	AT-3
AT-4	Training Records	AT-4
Audit and Accountability		
AU-1	Policy and Procedures	AU-1
AU-2	Event Logging	AU-2
AU-3	Content of Audit Records	AU-3 (1)

AU-4	Audit Log Storage Capacity	AU-4
AU-5	Response to Audit Logging Process Failures	AU-5 (1) (2)
AU-6	Audit Record Review, Analysis, and Reporting	AU-6 (1) (3) (5) (6)
AU-7	Audit Record Reduction and Report Generation	AU-7 (1)
AU-8	Time Stamps	AU-8
AU-9	Protection of Audit Information	AU-9 (2) (3) (4)
AU-10	Non-repudiation	AU-10
AU-11	Audit Record Retention	AU-11
AU-12	Audit Record Generation	AU-12 (1) (3)
Assessment, Authorization, and Monitoring		
CA-1	Policy and Procedures	CA-1
CA-2	Control Assessments	CA-2
CA-3	Information Exchange	CA-3 (6)
CA-5	Plan of Action and Milestones	CA-5
CA-6	Authorization	CA-6
CA-7	Continuous Monitoring	CA-7 (1) (4)
CA-8	Penetration Testing	CA-8 (1)
CA-9	Internal System Connections	CA-9
Configuration Management		
CM-1	Policy and Procedures	CM-1
CM-2	Baseline Configuration	CM-2 (2) (3) (7)
CM-3	Configuration Change Control	CM-3 (1) (2) (4) (6)
CM-4	Impact Analyses	CM-4 (1) (2)
CM-5	Access Restrictions for Change	CM-5 (1)
CM-6	Configuration Settings	CM-6 (1) (2)
CM-7	Least Functionality	CM-7 (1) (2) (5)
CM-8	System Component Inventory	CM-8 (1) (2) (3) (4)
CM-9	Configuration Management Plan	CM-9
CM-10	Software Usage Restrictions	CM-10
CM-11	User-installed Software	CM-11
CM-12	Information Location	CM-12 (1)
Contingency Planning		
CP-1	Policy and Procedures	CP-1
CP-2	Contingency Plan	CP-2 (1) (2) (3) (5) (8)
CP-3	Contingency Training	CP-3 (1)
CP-4	Contingency Plan Testing	CP-4 (1) (2)
CP-6	Alternate Storage Site	CP-6 (1) (2) (3)
CP-7	Alternate Processing Site	CP-7 (1) (2) (3) (4)
CP-8	Telecommunications Services	CP-8 (1) (2) (3) (4)
CP-9	System Backup	CP-9 (1) (2) (3) (5) (8)
CP-10	System Recovery and Reconstitution	CP-10 (2) (4)
Identification and Authentication		
IA-1	Policy and Procedures	IA-1

IA-2	Identification and Authentication (organizational Users)	IA-2 (1) (2) (5) (8) (12)
IA-3	Device Identification and Authentication	IA-3
IA-4	Identifier Management	IA-4 (4)
IA-5	Authenticator Management	IA-5 (1) (2) (6)
IA-6	Authentication Feedback	IA-6
IA-7	Cryptographic Module Authentication	IA-7
IA-8	Identification and Authentication (non-organizational Users)	IA-8 (1) (2) (4)
IA-11	Re-authentication	IA-11
IA-12	Identity Proofing	IA-12 (3) (4) (5)
Incident Response		
IR-1	Policy and Procedures	IR-1
IR-2	Incident Response Training	IR-2 (1) (2)
IR-3	Incident Response Testing	IR-3 (2)
IR-4	Incident Handling	IR-4 (1) (4) (11)
IR-5	Incident Monitoring	IR-5 (1)
IR-6	Incident Reporting	IR-6 (1) (3)
IR-7	Incident Response Assistance	IR-7 (1)
IR-8	Incident Response Plan	IR-8
Maintenance		
MA-1	Policy and Procedures	MA-1
MA-2	Controlled Maintenance	MA-2 (2)
MA-3	Maintenance Tools	MA-3 (1) (2) (3)
MA-4	Nonlocal Maintenance	MA-4 (3)
MA-5	Maintenance Personnel	MA-5 (1)
MA-6	Timely Maintenance	MA-6
Media Protection		
MP-1	Policy and Procedures	MP-1
MP-2	Media Access	MP-2
MP-3	Media Marking	MP-3
MP-4	Media Storage	MP-4
MP-5	Media Transport	MP-5
MP-6	Media Sanitization	MP-6 (1) (2) (3) (7) (8)
MP-7	Media Use	MP-7
Physical and Environmental Protection		
PE-1	Policy and Procedures	PE-1
PE-2	Physical Access Authorizations	PE-2
PE-3	Physical Access Control	PE-3 (1)
PE-4	Access Control for Transmission	PE-4
PE-5	Access Control for Output Devices	PE-5
PE-6	Monitoring Physical Access	PE-6 (1) (4)
PE-8	Visitor Access Records	PE-8 (1)
PE-9	Power Equipment and Cabling	PE-9
PE-10	Emergency Shutoff	PE-10
PE-11	Emergency Power	PE-11 (1)

PE-12	Emergency Lighting	PE-12
PE-13	Fire Protection	PE-13 (1) (2)
PE-14	Environmental Controls	PE-14
PE-15	Water Damage Protection	PE-15 (1)
PE-16	Delivery and Removal	PE-16
PE-17	Alternate Work Site	PE-17
PE-18	Location of System Components	PE-18
Planning		
PL-1	Policy and Procedures	PL-1
PL-2	System Security and Privacy Plans	PL-2
PL-4	Rules of Behavior	PL-4
PL-8	Security and Privacy Architectures	PL-8
PL-10	Baseline Selection	PL-10
PL-11	Baseline Tailoring	PL-11
Program Management		
PM-3	Information Security and Privacy Resources	PM-3
PM-5	System Inventory	PM-5 (1)
PM-18	Privacy Program Plan	PM-18
PM-19	Privacy Program Leadership Role	PM-19
PM-20	Dissemination of Privacy Program Information	PM-20
PM-21	Accounting of Disclosures	PM-21
PM-22	Personally Identifiable Information Quality Management	PM-22
PM-24	Data Integrity Board	PM-24
PM-25	Minimization of Personally Identifiable Information Used in Testing, Training, and Research	PM-25
PM-26	Complaint Management	PM-26
PM-27	Privacy Reporting	PM-27
Personnel Security		
PS-1	Policy and Procedures	PS-1
PS-2	Position Risk Designation	PS-2
PS-3	Personnel Screening	PS-3
PS-4	Personnel Termination	PS-4 (2)
PS-5	Personnel Transfer	PS-5
PS-6	Access Agreements	PS-6
PS-7	External Personnel Security	PS-7
PS-8	Personnel Sanctions	PS-8
PS-9	Position Descriptions	PS-9
PII Processing and Transparency		
PT-2	Authority to Process Personally Identifiable Information	PT-2
PT-3	Personally Identifiable Information Processing Purposes	PT-3

PT-4	Consent	PT-4
PT-5	Privacy Notice	PT-5 (1) (2)
PT-6	System of Records Notice	PT-6
Risk Assessment		
RA-1	Policy and Procedures	RA-1
RA-2	Security Categorization	RA-2
RA-3	Risk Assessment	RA-3
RA-5	Vulnerability Monitoring and Scanning	RA-5 (2) (4) (5) (11)
RA-7	Risk Response	RA-7
RA-8	Privacy Impact Assessments	RA-8
RA-9	Criticality Analysis	RA-9
System and Services Acquisition		
SA-1	Policy and Procedures	SA-1
SA-2	Allocation of Resources	SA-2
SA-3	System Development Life Cycle	SA-3
SA-4	Acquisition Process	SA-4
SA-5	System Documentation	SA-5
SA-8	Security and Privacy Engineering Principles	SA-8
SA-9	External System Services	SA-9
SA-10	Developer Configuration Management	SA-10
SA-11	Developer Testing and Evaluation	SA-11
SA-15	Development Process, Standards, and Tools	SA-15 (3)
SA-16	Developer-provided Training	SA-16
SA-17	Developer Security and Privacy Architecture and Design	SA-17
SA-21	Developer Screening	SA-21
SA-22	Unsupported System Components	SA-22
System and Communications Protection		
SC-1	Policy and Procedures	SC-1
SC-2	Separation of System and User Functionality	SC-2
SC-3	Security Function Isolation	SC-3
SC-4	Information in Shared System Resources	SC-4
SC-5	Denial-of-service Protection	SC-5
SC-7	Boundary Protection	SC-7 (3) (4) (5) (7) (18) (21)
SC-8	Transmission Confidentiality and Integrity	SC-8 (1)
SC-10	Network Disconnect	SC-10
SC-12	Cryptographic Key Establishment and Management	SC-12 (1)
SC-13	Cryptographic Protection	SC-13
SC-15	Collaborative Computing Devices and Applications	SC-15
SC-17	Public Key Infrastructure Certificates	SC-17

SC-18	Mobile Code	SC-18
SC-20	Secure Name/address Resolution Service (authoritative Source)	SC-20
SC-21	Secure Name/address Resolution Service (recursive or Caching Resolver)	SC-21
SC-22	Architecture and Provisioning for Name/address Resolution Service	SC-22
SC-23	Session Authenticity	SC-23
SC-24	Fail in Known State	SC-24
SC-28	Protection of Information at Rest	SC-28 (1)
SC-39	Process Isolation	SC-39
System and Information Integrity		
SI-1	Policy and Procedures	SI-1
SI-2	Flaw Remediation	SI-2 (2)
SI-3	Malicious Code Protection	SI-3
SI-4	System Monitoring	SI-4 (2) (4) (5) (10) (12) (14) (20) (22)
SI-5	Security Alerts, Advisories, and Directives	SI-5 (1)
SI-6	Security and Privacy Function Verification	SI-6
SI-7	Software, Firmware, and Information Integrity	SI-7 (1) (2) (5) (7) (15)
SI-8	Spam Protection	SI-8 (2)
SI-10	Information Input Validation	SI-10
SI-11	Error Handling	SI-11
SI-12	Information Management and Retention	SI-12
SI-16	Memory Protection	SI-16
SI-18	Personally Identifiable Information Quality Operations	SI-18
Supply Chain Risk Management		
SR-1	Policy and Procedures	SR-1
SR-2	Supply Chain Risk Management Plan	SR-2 (1)
SR-3	Supply Chain Controls and Processes	SR-3
SR-5	Acquisition Strategies, Tools, and Methods	SR-5
SR-6	Supplier Assessments and Reviews	SR-6
SR-8	Notification Agreements	SR-8
SR-9	Tamper Resistance and Detection	SR-9 (1)
SR-10	Inspection of Systems or Components	SR-10
SR-11	Component Authenticity	SR-11 (1) (2)
SR-12	Component Disposal	SR-12

APPENDIX B. DEFINITIVE TEXT

The excerpts below are extracted from normative references in this document, and MUST NOT be accepted by the CSO as applicable cybersecurity requirements for the CSO, but instead the text is meant specifically as a reference.

The National Electric Vehicle Infrastructure (NEVI) Formula Program Guidance

Section III. STATE EV INFRASTRUCTURE DEPLOYMENT PLAN – B. Plan Format – Cybersecurity

This section of the Plan should discuss how the State will address cybersecurity. The Plan should identify considerations when software updates are made to ensure the station or vehicle is not compromised by malicious code, or that a vehicle infects other stations during future charges.

National Electric Vehicle Infrastructure (NEVI) Formula Program – Notice of Proposed Rulemaking (NPRM) - 23 C.F.R. § 680

§ 680.106 - Installation, operation, and maintenance by qualified technicians of electric vehicle charging infrastructure.

(f) Payment methods.

> *(1) Charging stations must provide for secure payment methods, accessible to persons with disabilities, which at a minimum shall include a contactless payment method that accepts major debit and credit cards, and Plug and Charge payment capabilities using the ISO 15118 standard (incorporated by reference, see § 680.120);*

(h) Security. States must implement physical and cybersecurity strategies consistent with their respective State EV Infrastructure Deployment Plans to mitigate charging infrastructure, grid, and consumer vulnerability associated with the operation of charging stations.

> *(1) Physical security strategies may address lighting, siting, driver and vehicle safety, fire prevention, tampering, charger locks, and illegal surveillance of payment devices.*

> *(2) Cybersecurity strategies may address user identity and access management, selection of appropriate encryption systems, intrusion and malware detection, event logging and reporting, management of software updates, and secure operation during communication outages.*

(k) Customer service. States must ensure that EV charging customers have mechanisms to report outages, malfunctions, and other issues with charging infrastructure. States must comply with the American with Disabilities Act of 1990 requirements and multilingual access when creating reporting mechanisms.

> *(l) Customer data privacy. Charging Station Operators must collect, process, and retain only that personal information strictly necessary to provide the charging service to a consumer, including information to complete the charging transaction and to provide*

the location of charging stations to the consumer. Charging Stations Operators must also take reasonable measures to safeguard consumer data.

§ 680.114 - Charging network connectivity of electric vehicle charging infrastructure.

(a) Charger-to-Charger-Network communication.

(1) Chargers must communicate with a charging network via a secure communication method.

(2) Chargers must have the ability to receive and implement secure, remote software updates and conduct real-time protocol translation, encryption and decryption, authentication, and authorization in their communication with charging networks.

(4) Chargers and charging networks must securely measure, communicate, store, and report energy and power dispensed, real-time charging-port status, real-time price to the customer, and historical charging-port uptime.

(5) Chargers must be capable of using Open Charge Point Protocol (OCPP) (incorporated by reference, see § 680.120) to communicate with any Charging Network Provider.

(6) Chargers must be designed to securely switch Charging Network Providers without any changes to hardware.

(b) Charging-Network-to-Charging-Network communication. A Charging Network must be capable of communicating with other Charging Networks to enable an EV driver to use a single credential to charge at Charging Stations that are a part of multiple Charging Networks.

(c) Charging-Network-to-grid communication. Charging Networks must be capable of secure communication with electric utilities, other energy providers, or local energy management systems.

Architecture Reference for Cooperative and Intelligent Transportation (ARC-IT)

Device Class 5 Areas

Device Class 5:

- Confidentiality: HIGH

- Integrity: HIGH

- Availability: HIGH

Devices of this class must meet controls from NIST 800-53 and ISO/IEC 15408 in the following areas:

- *Access Control*

- *Audit and Accountability*

- *Configuration Management*

- *Contingency Planning*

- *Identification and Authentication*

- *Incident Response*

- *Media Protection*

- *Personal Privacy*

- *Risk Assessment*

- *System and Services Acquisition*

- *System and Communications Protection*

- *System and Information Integrity*

In addition, organizations that develop, operate or maintain devices of this class must meet controls from NIST 800-53 and ISO/IEC 15408 the areas above and the following additional areas:

- *Awareness and Training*

- *[Security] Assessment and Authorization*

- *Maintenance*

- *Physical and Environmental Protection*

- *Planning*

- *Personnel Security*

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