



Joint Office of
**Energy and
Transportation**

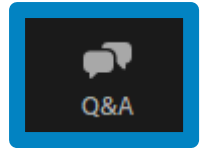
J3400 State of the Market

December 17, 2024

driveelectric.gov

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- Submit questions using the “Q&A” window
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- If you speak during the webinar or use video, you are presumed to consent to recording and use of your voice or image.



Agenda

Introduction

Polling

Welcome Remarks from Gabe Klein

Federal Highway Administration updates

Presentations

- Sarah Hipel, Joint Office of Energy and Transportation
- Frank Menchaca, SAE International
- Sam Abuelsamid, Guidehouse Insights
- Joann Zhou, Argonne National Laboratory
- Abby Brown, National Renewable Energy Laboratory

Panel Discussion and Audience Q&A





Polling Questions



Welcome from the Executive Director



JOINT OFFICE OF
**Energy and
Transportation**



Mission

To accelerate an electrified transportation system that is affordable, convenient, reliable, and safe.

Vision

A future where everyone can choose to ride and drive electric.

Background on Joint Office of Energy and Transportation

Created by Congress in the **Infrastructure Investment and Jobs Act (IIJA)**, to address the unique problems presented by the evolving EV-charging landscape.

The statute identifies

9

major areas of emphasis

Areas of emphasis (summarized)

- 1) technical assistance for vehicle charging
- 2) data sharing
- 3) performance of a national and regionalized study of vehicle charging
- 4) training and certification programs
- 5) a program to promote renewable energy generation, storage, and grid integration
- 6) transmission pilots in the rights-of-way
- 7) research, strategies, and actions to mitigate the effects of climate change
- 8) development of a streamlined utility accommodations policy for transmission in the transportation right-of-way
- 9) any other issues that the Secretary of Transportation and the Secretary of Energy identify as issues of joint interest

Joint Office is supporting over \$19 billion in IIJA funding for clean transportation



National Electric Vehicle Infrastructure (NEVI) Formula Program (U.S. DOT)

\$5 billion for states to build a national EV charging network along corridors, including **\$148 million** awarded to repair and replace non-operational chargers.



Charging & Fueling Infrastructure Discretionary Grant Program (U.S. DOT)

\$2.5 billion for communities to build EV charging, as well as hydrogen, natural gas, and propane fueling infrastructure



Low-No Emissions Grants Program for Transit (U.S. DOT)

\$5.6 billion for transit agencies to deploy low- and no-emission transit buses



Clean School Bus Program (U.S. EPA)

\$5 billion in support of electric school bus deployments



Clean Heavy Duty Vehicles Program (U.S. EPA)

\$1 billion to replace existing Class 6 and Class 7 non-zero-emission heavy-duty vehicles



Ride & Drive Funding Opportunity (Joint Office)

\$46.5 million to enhance charging resiliency and performance and enhance workforce development



Communities Taking Charge Funding Opportunity (Joint Office)

\$54 million to expand community e-mobility access

Joint Office is also supporting billions in private funding for clean transportation



Transformational Stakeholder Engagement: Leveraged industry relationships to inform IIJA and IRA program design, effectively implement EV-ChART, and develop best practices for API data sharing requirements.



Navigating EVSE Market Volatility: Led the governmentwide response to the unexpected dissolution / sale of EnelX (2nd largest EVSE in North America) and minimized the impact to consumers and federal grantees.



Developing Reliability Solutions with Industry: Engaged industry to complete a reliability-focused initiative, improving adapter safety standards and creating a strong foundation for continued EV infrastructure resilience.



Establishing Industry Standards and Protocols: Partnered with SAE and private sector to standardize key protocols, including the SAE J3400 connector standard, which set a common framework for Level 2 charging.



Guiding Open-Source EVSE Development: Partnered with industry to support development of open-source EVSE solutions, including enhanced charging and interoperability and fostering innovation within the charging network.



Enhancing Interoperability: Collaborated with industry players in the ChargeX consortium to conduct testing events, identifying and mitigating engineering issues, while benchmarking supplier performance in real time.



Setting the Stage for a National Seamless Charging Network: Coordinated with the industry to launch national Plug-and-Charge technology, simplifying secure access for users across networks while ensuring security and scalability.

Creating Framework for National Vision of Zero-Emission Freight: With industry, NGOs, as well as state and local support, developed a framework that was embraced by stakeholders and used to prioritize billions in federal grant awards.

Supporting multimodal electrification: Through the two JO funding opportunities, private companies can be directly funded, and multimodal and ultra light vehicle charging solutions were prioritized.

We are also tackling the challenges to building a reliable, convenient national charging network including institutional lack of experience.

Reliability

Cybersecurity

Interoperability

**Data Sharing
and
Transparency**

**Access and
Accessibility**

**Electric Grid
Integration +
Permitting**

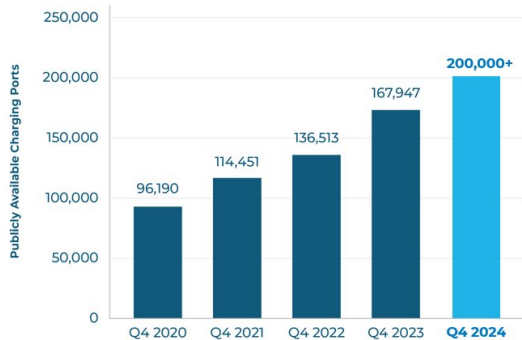
**Institutional
Capacity +
Workforce**

**Unified
Comms**

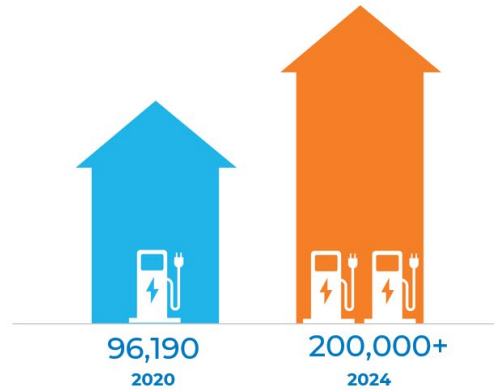
**Partnerships
and Policy**

Our national public charging network has doubled since 2020

Public National Charging Network



We've doubled.
It's kind of a big deal.

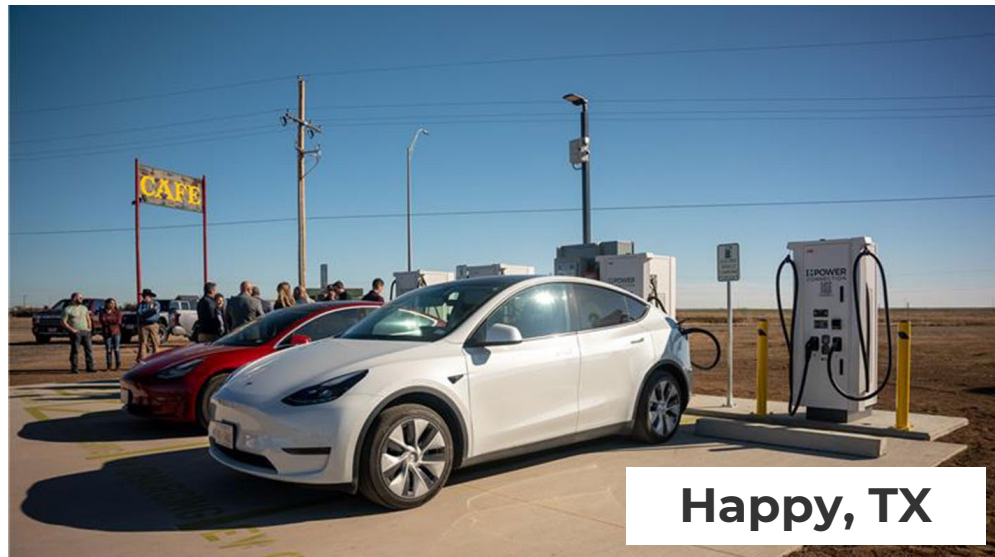


205K total publicly available charging ports

24.8K federally-funded publicly available charging ports underway

259 federally-funded publicly available ports operational in **15** states

NEVI Stations Are Opening with J3400 and CCS Connectors



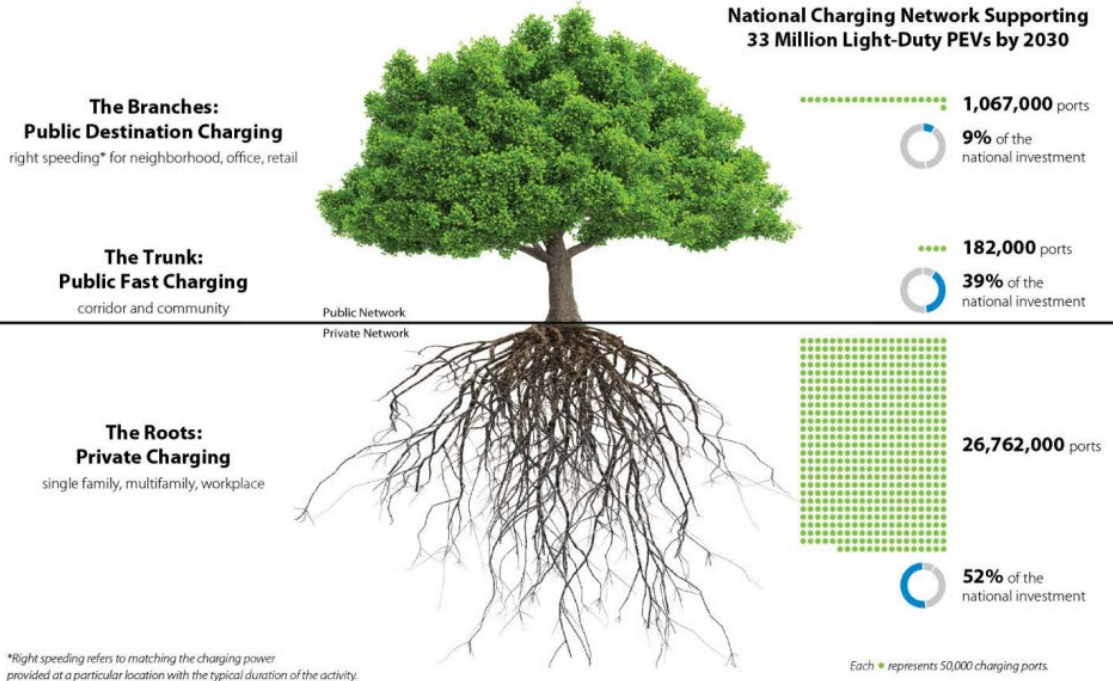
Happy, TX



Rockland, ME

Photos from Plugshare and
TXDot

In 2030, there will be a need for **1.2 million public charging ports**, and **85% of ports** will provide **Level 2 charging**





Federal Highway Administration NEVI Program FAQ Updates

NEVI Program Updates

U.S. Department of Transportation
Federal Highway Administration

About Programs Resources Briefing Room Contact Search FHWA

Office of Planning, Environment, & Realty (HEP)

Planning Environment Real Estate

National Electric Vehicle Infrastructure (NEVI) Program

FHWA → Environment → NEVI → Resources

National Electric Vehicle Infrastructure (NEVI) Formula Program Q&A

NEVI Formula Program Questions and Answers

Except for the statutes and regulations cited, the contents of this page do not have the force and effect of law and are not meant to bind the States in any way. This page is intended only to provide information regarding existing requirements under the law or agency policies.

Connectors

1.1 Question: Can North American Charging Standard (NACS) connectors be installed using NEVI Formula Program or Title 23 U.S.C. funds?

Answer:
Yes. NACS connectors can be installed on existing or new Direct Current Fast Chargers (DCFCs) using NEVI Formula Program or other eligible title 23 U.S.C. funds. The National Electric Vehicle Infrastructure Standards and Requirements (see 23 CFR 680.106(c)) allow for permanently attached non-proprietary connectors (such as NACS) to be provided on each charging port so long as the requirements of 23 CFR 680 are met, including that each DCFC charging port has at least one permanently attached Combined Charging System (CCS) Type 1 connector and is capable of charging a CCS-compliant vehicle.

1.2 Question: Can NEVI Formula Program funds be used to purchase adaptors? **Updated: 12/11/2024**

Answer:
Yes, provided that the adaptor is 1) directly or indirectly compatible with and ancillary to a permanently attached Combined Charging System (CCS) connector for DCFC ports, or to a permanently attached J1772 connector for AC Level 2 chargers, including permanently attached J3400 or other standardized and interoperable adaptors; 2) approved by the charger manufacturer to ensure consistency, safety and reliability; 3) fully integrated into the charger such that it cannot be removed from the site; and 4) otherwise complies with the NEVI Formula Program under the Highway Infrastructure Program heading in Title VIII of division 1 of the Bipartisan Infrastructure Law, enacted as the Infrastructure Investment and Jobs Act (Pub. L. 117-58) and 23 CFR 680. All EV infrastructure projects under NEVI must be open to the general public or to authorized commercial motor vehicle operators from more than one company in accordance with Paragraph (2) under the Highway Infrastructure Program heading in Title VIII of division 1 of BIL.

Sections

- Connectors
- General Questions
- Technical Requirements
- Eligible Expenditures
- Operation and Maintenance Costs
- Program Administration Costs
- Right of Way
- Utility Planning
- Public Engagement
- Equity Considerations
- Tribal Consultation
- Disadvantaged Business Enterprise (DBE) Program Applicability
- Permitting and Environmental Review
- Air Quality Conformity
- Contact Administration & Documentation
- Technical Assistance

Title 23 / Chapter I / Subchapter G / Part 680

Previous / Next / Top

DCFC or AC Level 2 or a combination of DCFC and AC Level 2) charging ports and be capable of simultaneously charging at least four EVs.

(c) **Connector type.** All charging connectors must meet applicable industry standards. Each DCFC charging port must be capable of charging any CCS-compliant vehicle and each DCFC charging port must have at least one permanently attached CCS Type 1 connector. In addition, permanently attached CHAdeMO (www.chademo.com) connectors can be provided using only FY2022 NEVI Funds. Each AC Level 2 charging port must have a permanently attached J1772 connector and must charge any J1772-compliant vehicle.

(d) **Power level.**

(1) DCFC charging ports must support output voltages between 250 volts DC and 920 volts DC. DCFCs located along and designed to serve users of designated AFCs must have a continuous power delivery rating of at least 150 kilowatt (kW) and supply power according to an EV's power delivery request up to 150 kW, simultaneously from each charging port at a charging station. These corridor-serving DCFC charging stations may conduct power sharing so long as each charging port continues to meet an EV's request for power up to 150 kW.

(2) Each AC Level 2 charging port must have a continuous power delivery rating of at least 6 kW and the charging station must be capable of providing at least 6 kW per port simultaneously across all AC ports. AC Level 2 chargers may conduct power sharing and/or participate in smart charge management programs so long as each charging port continues to meet an EV's demand for power up to 6 kW, unless the EV charging customer consents to accepting a lower power level.

Table of Contents

Details

Print/PDF

Display Options

Subscribe

Timeline

Go to Date

Compare Dates

Published Edition

Presenters and Topics



Sarah Hipel,

Joint Office of Energy
& Transportation

Technology and
Standardization as
Policy Drivers

Frank

Menchaca, SAE

Standardization
Process

Sam

Abuelsamid,

Guidehouse
Insights

EV Market

Joann Zhou,

Argonne
National
Laboratory

Vehicle Sales

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National Renewable
Energy Laboratory

Charging
Infrastructure

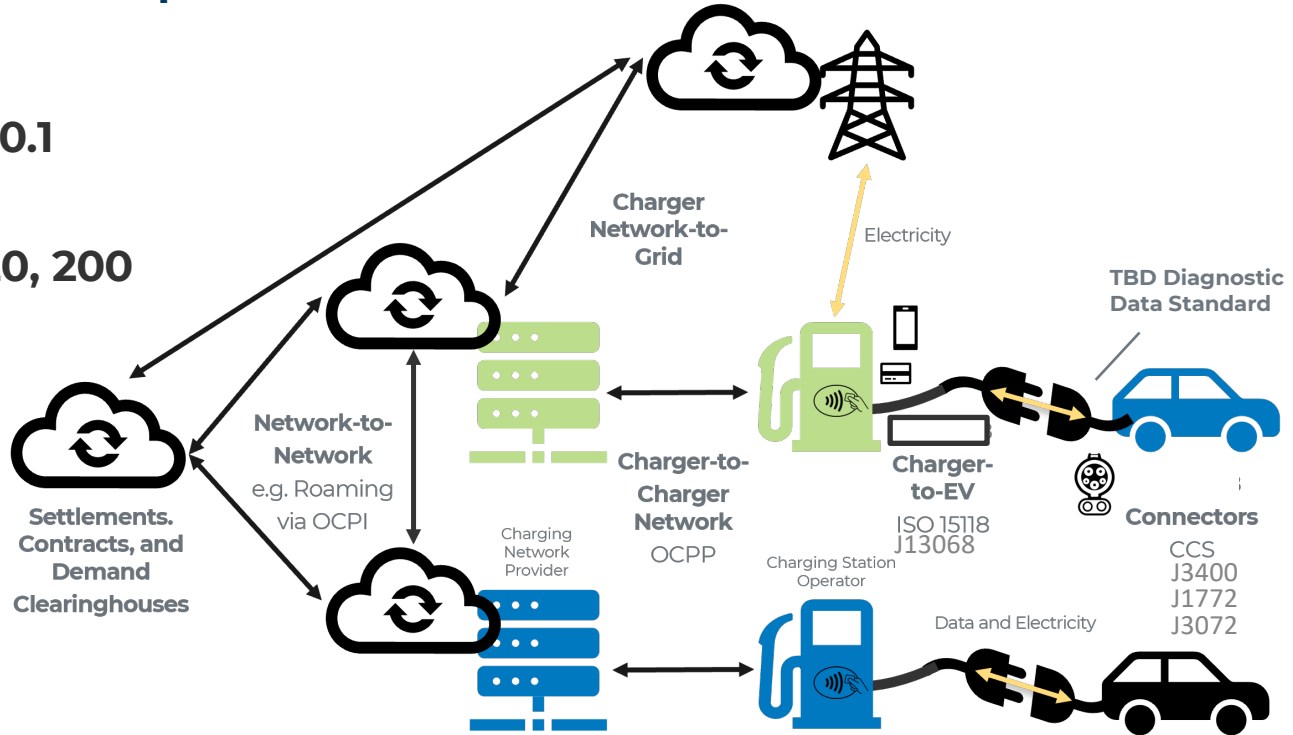


Technology as Policy Driver

Current Standards

A system ripe for simplification

- ❑ OCPP 1.6J, 2.0.1
- ❑ OCPI 2.2.1
- ❑ ISO 15118-2, 20, 200
- ❑ J1772
- ❑ J3400
- ❑ J3068
- ❑ J3072



Public Key Infrastructure (PKI)

Enhancing

Resilience



Evolving Vehicle-Grid Interaction

Modern vehicles engage with the grid in unprecedented ways, transforming the energy ecosystem.

Managed charging technologies (e.g., VIG) help align vehicle charging with grid demand, reducing peak-hour strain and enhancing reliability.

Scalable Integration Initiatives

Programs like *ChargeX* and *EVs@Scale* address challenges in scaling and integrating vehicles with existing grid infrastructure.

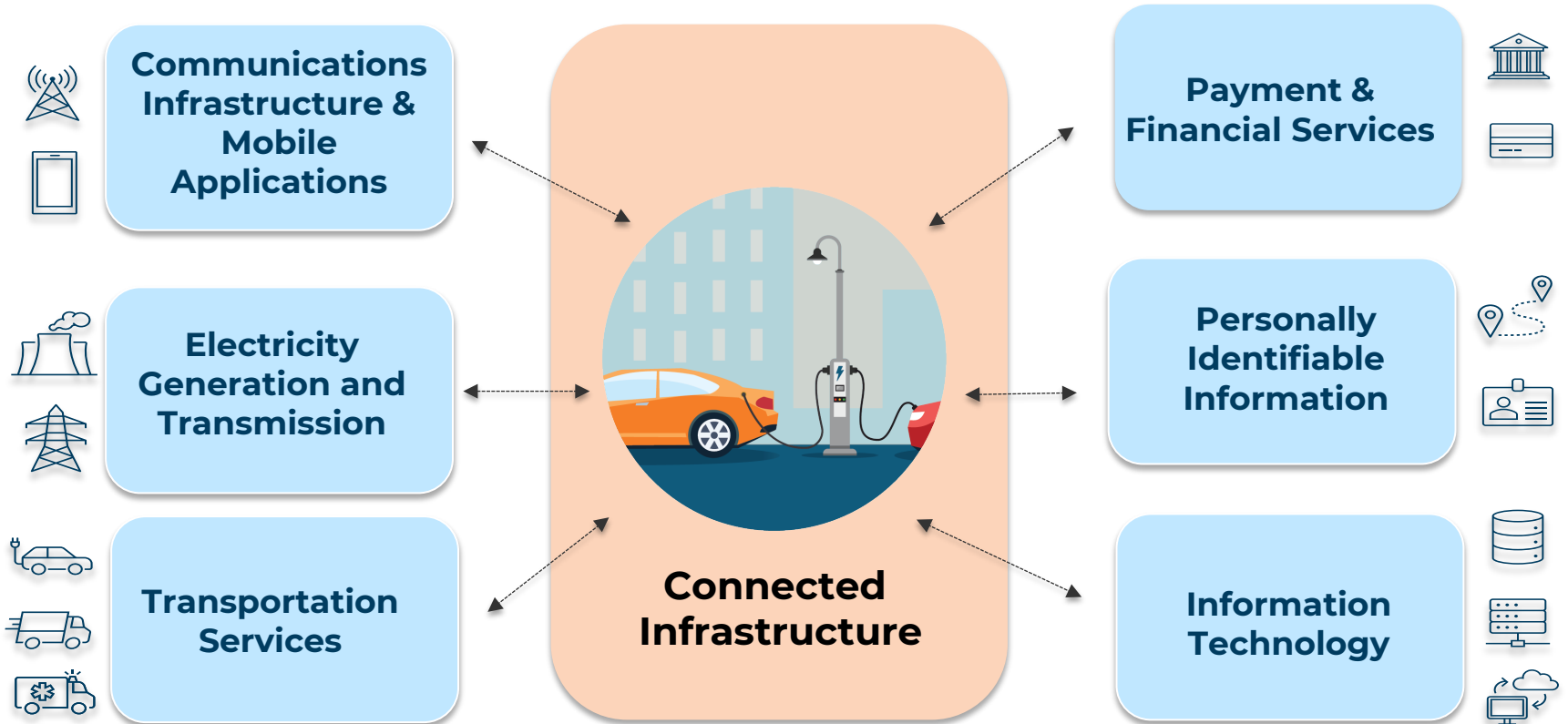
These efforts ensure a secure, modern grid capable of adapting to evolving energy demands.

National Competitiveness

Advancing grid resiliency supports reliable energy delivery and strengthens national competitiveness in a rapidly changing global energy landscape.



ORIGINS AND TARGETS OF MALICIOUS ACTIVITY SURROUNDING CONNECTED INFRASTRUCTURE





Details of the Standardization Process

SAE J3400

A standard.

Its impact.

A new way of thinking
and doing.

Frank Menchaca



How J3400 came about

Mobility, Advanced™

- The Bipartisan Infrastructure Law (BIL) and National Electric Vehicle Infrastructure (NEVI) catalyzed development of EV charging.
- But infrastructure needed further standardization to scale:
 - CHAdeMO. CCS1. NACS.
- In Spring 2023, several large manufacturers (Ford, GM, Mercedes, Stellantis) announced they were making NACS-connected vehicles.
- With so many new chargers going into the ground, NACS needed to be standardized to permit drivers to use both Tesla and non-Tesla charging network.
- This had to be done quickly to allow interoperability for new stations.
- The Joint Office and SAE International partnered to develop and write a standard quickly.

What was different about this?

Mobility, Advanced™

- Most standards are written when technology or approach are settled.
- This was written as technology and delivery approach were still unfolding
- Why does this matter?
 - Even though—or maybe precisely because—things were unsettled, manufacturers still needed guidance.
 - Industry reached consensus quickly about what would be competitive vs. non-competitive.
 - This enabled standardization and policy to unfold together.

A new model

Mobility, Advanced™

- While most standards will evolve in the traditional way, the J3400 model showed emerging technologies and delivery can be normalized.
- This can be done by working iteratively, in an agile manner: deciding what is important for industry to reach an objective piece by piece vs. all at once.
- Other examples include:
 - Mineral traceability for batteries.
 - Carbon footprint measurements/lifecycle assessment for materials.
 - Recycling.



Market Trends

DECEMBER
2024

Status of J3400 Adoption in the US

Sam Abuelsamid
Principal Analyst
Guidehouse Insights

It's Still Early

In late May 2023, Ford became the first major OEM to announce it would adopt the NACS/J3400 charge port and support for Tesla Superchargers

By February 2024, almost all other OEMs had followed suit

February 29, 2024 Ford started pushing OTA update for Superchargers and taking orders for J3400 CCS adapters

Two Weeks Later, Rivian did the same



Musk Throws Out A Speed Bump

In May 2024, Elon Musk fired the entire 500 person Supercharger team as part of a round of thousands of layoffs

Many were later rehired, but for much of the year, OEMs working on implementation had calls and emails to Tesla go unanswered

This significantly slowed the rollout of Supercharger support for most OEMs



Adapters Arrive

By June 2024 Tesla made adapters were starting to arrive to Ford customers

Lectron and A2Z were also offering 3^d party adapters

The J3400 to CCS adapters only support DC charging, no AC

Both the Lectron and Tesla adapters have had recalls due to manufacturing issues

Ford is now shipping Lectron adapters to its customers



ChargePoint Omni Port & Tesla Magic Dock

Tesla began slowly deploying the Magic Dock in March 2023 and has gradually expanded availability

Includes J3400 to CCS adapter in dispenser

Vehicles with Plug&Charge can use without app, others must use Tesla app to initiate and pay

ChargePoint announced Omni Port (CCS to J3400 adapter) enable charging all EVs whichever port they have



Ionna Breaks Ground on First Station

The multi-OEM joint venture Ionna has broken ground on its 1st “Recharger” in Apex, NC

The site will feature 10 bays with both CCS and J3400 cables

800V/400kW chargers

Sites will feature a lounge, restrooms, food and beverage and WiFi

Partnering with Sheetz for Rechargers at least 50 locations, 3 to open in 2024



Hyundai Motor Group and Lucid Launch J3400

Kia EV6 and Hyundai Ioniq5 were spotted testing at Supercharger station with native J3400 ports

MY25 Ioniq5 and EV6 built in US come with native J3400, Kia EV9 and Hyundai Ioniq9 get J3400 in coming months

Lucid Gravity has launched in December 2024 with J3400



Other OEMs Likely Switching Later in 2025

By end of 2024, Volvo, Polestar, GM, Nissan had enabled software updates to allow Supercharger access

Most still not including Plug&Charge support so either OEM or Tesla app is required to manage and pay for charging


Other OEMs are expected to come online in 2025 and switch to J3400 ports for MY26 and after


Only V3+ Superchargers supported




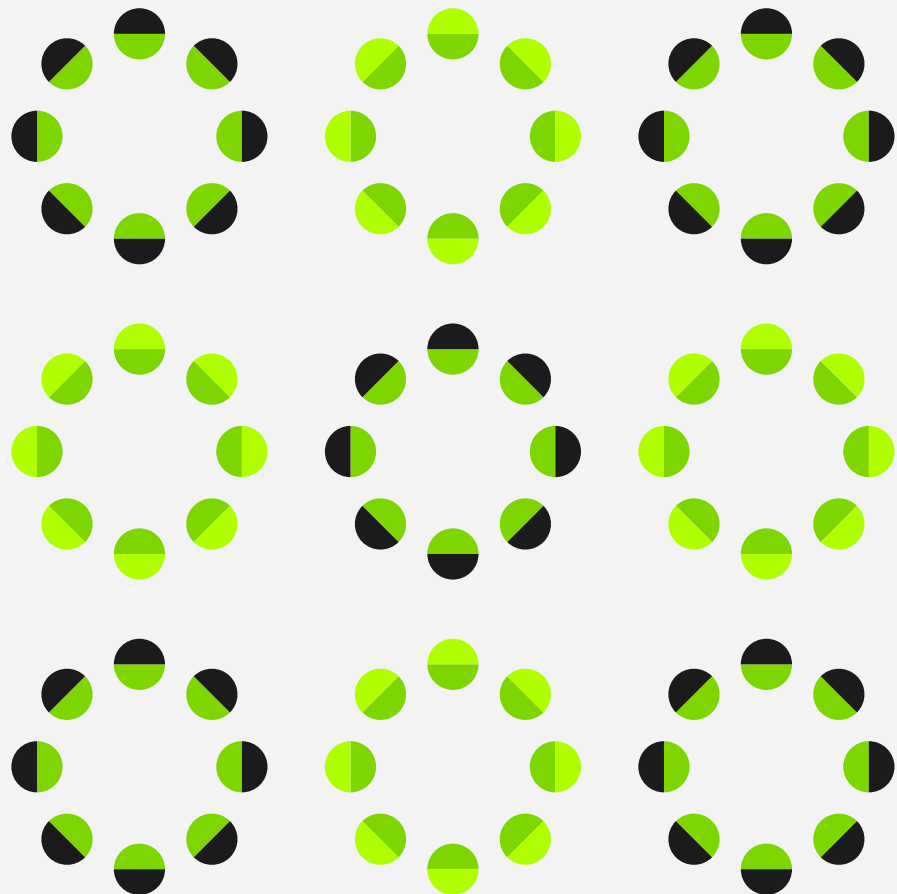
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A scenic landscape of a mountain valley. The foreground is filled with dark, jagged rocks and patches of vibrant green grass. A narrow stream flows through the valley. In the middle ground, a small, calm lake is nestled between rolling green hills. The background features more distant mountain peaks under a dramatic sky with heavy, grey clouds and a bright, golden sunset or sunrise breaking through the clouds. A green geometric shape, resembling a stylized 'A' or a triangle with a vertical line through it, is overlaid on the scene, with its top points near the sun and its base on the valley floor.

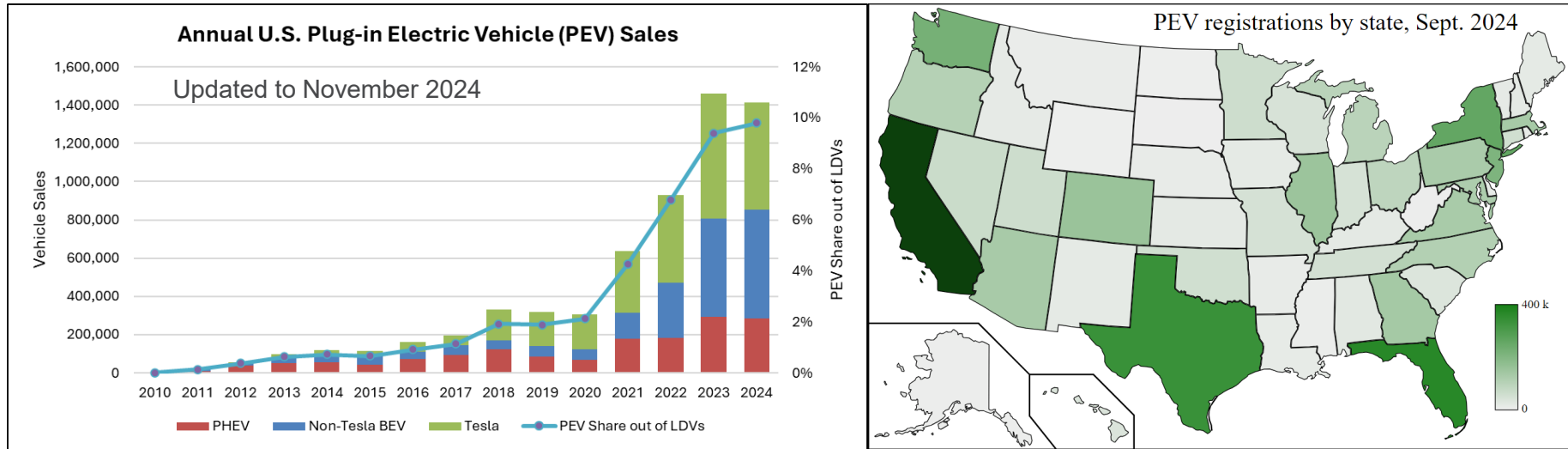
Thank You

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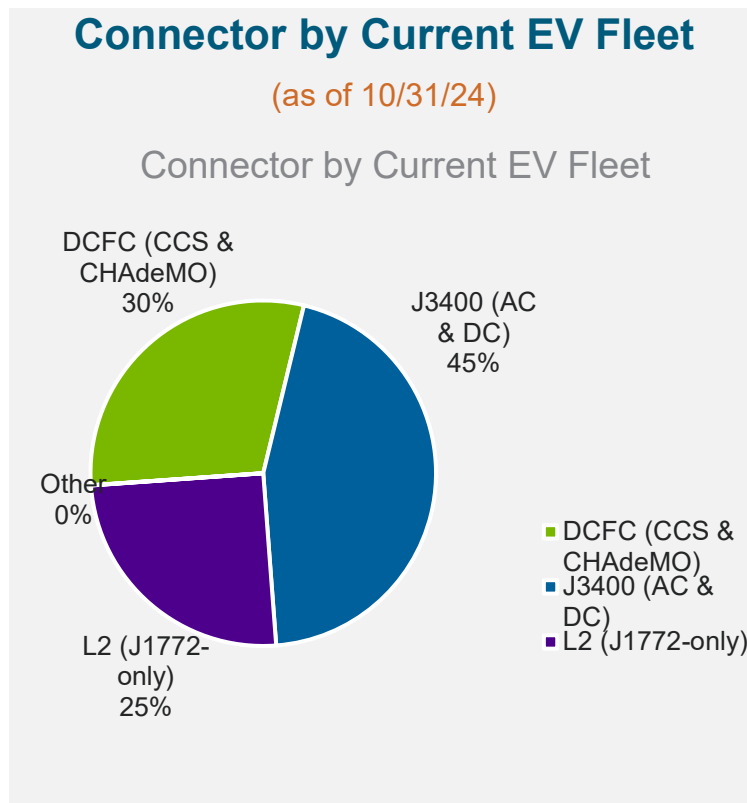
EV Sales

Currently, Only Tesla Vehicles Can Use a J3400 Charger Without an Adapter



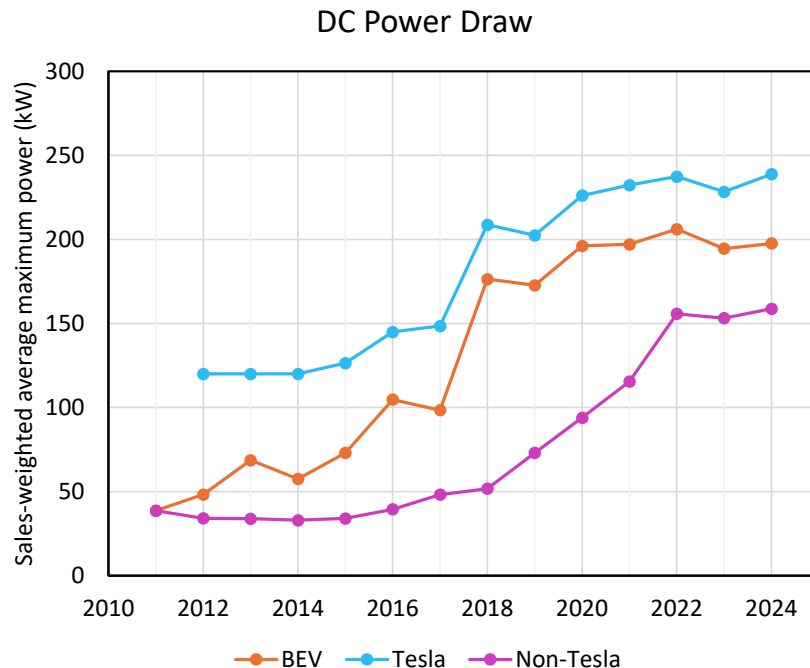
Snapshot of Current EV Charging Connector Market

- 45% of the Plug-in EVs on the road in the U.S. can use J3400 chargers without an adaptor
- Several vehicle manufacturers have announced adopting the J3400 connector as early as 2025
- J3400 connector standard supports both AC and DC charging



Maximum Acceptable Charging Power for New EV Models Is Increasing

- Changes in the sales-weighted average maximum charging power are typically driven more by the introduction of new vehicle models
- No significant changes since 2022





Station Locator & J3400

Abby Brown

National Renewable Energy Laboratory

12.17.24

Overview of Alternative Fueling Station Locator

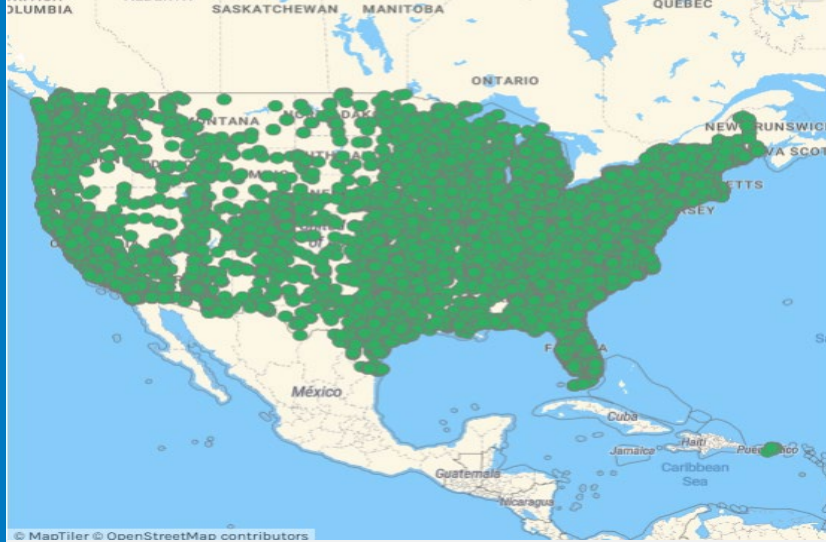
Current Connector Landscape

J3400 by Network

U.S. Department of Energy Station Locator

Part of the Alternative
Fuels Data Center
(AFDC)

afdc.energy.gov/stations



74,527

station locations

205,052

EV charging ports

Filters chosen:



United States



Electric

Types: DC Fast, Level 2



Access: Public

Status: Available, Temporarily
Unavailable

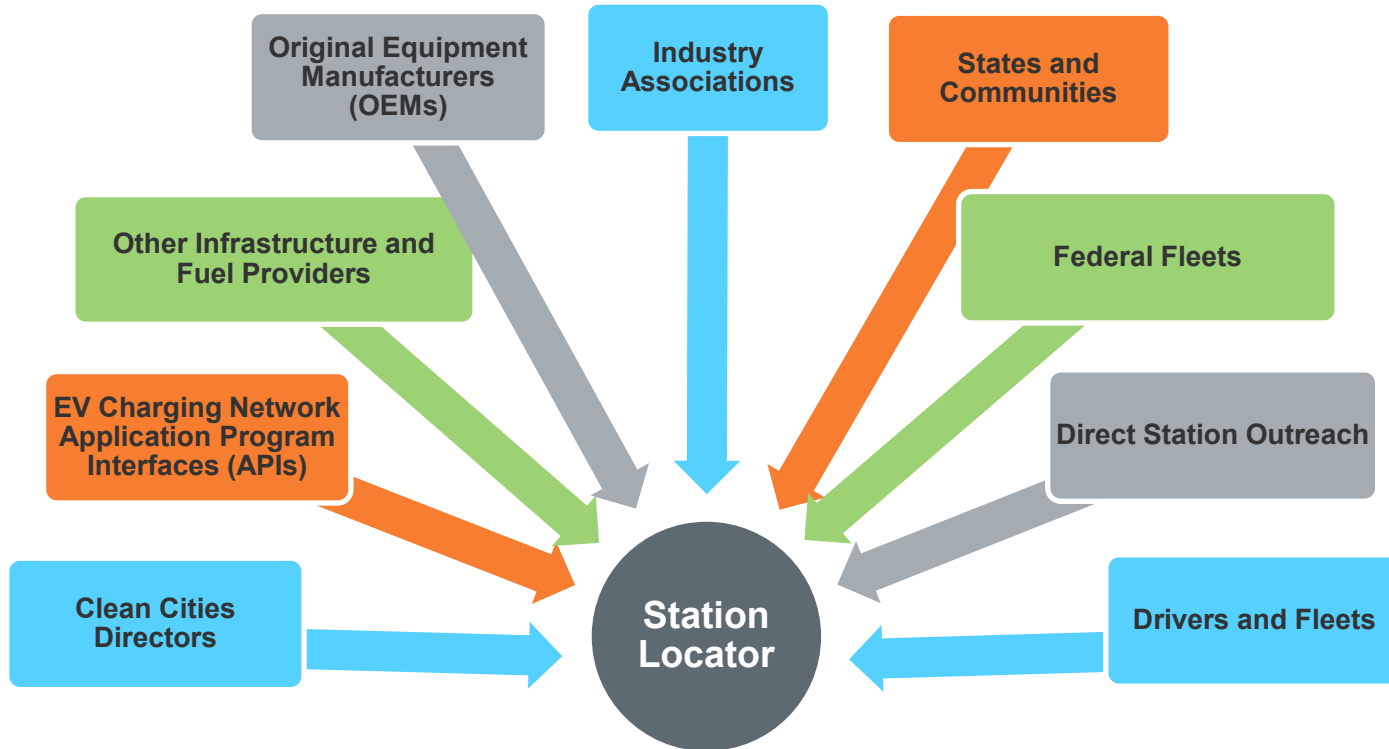


Download Station Locations

Provides location information and additional fuel data on alternative fueling stations in the United States and Canada.

- The fuels tracked in the Station Locator include:
 - **Electric vehicle (EV) charging stations**
 - **Hydrogen**
 - **Biodiesel** – blends of 20% (B20) and higher, at any time of the year
 - **Ethanol (E85)** – high-level ethanol-gasoline blends; we also track if these stations sell mid-level blends
 - Compressed natural gas (**CNG**) and liquified natural gas (**LNG**)
 - Liquified petroleum gas (LPG), or **Propane**
 - And now, **renewable diesel**

How is the Database Updated?



Connector Type Trends: Quarterly Growth

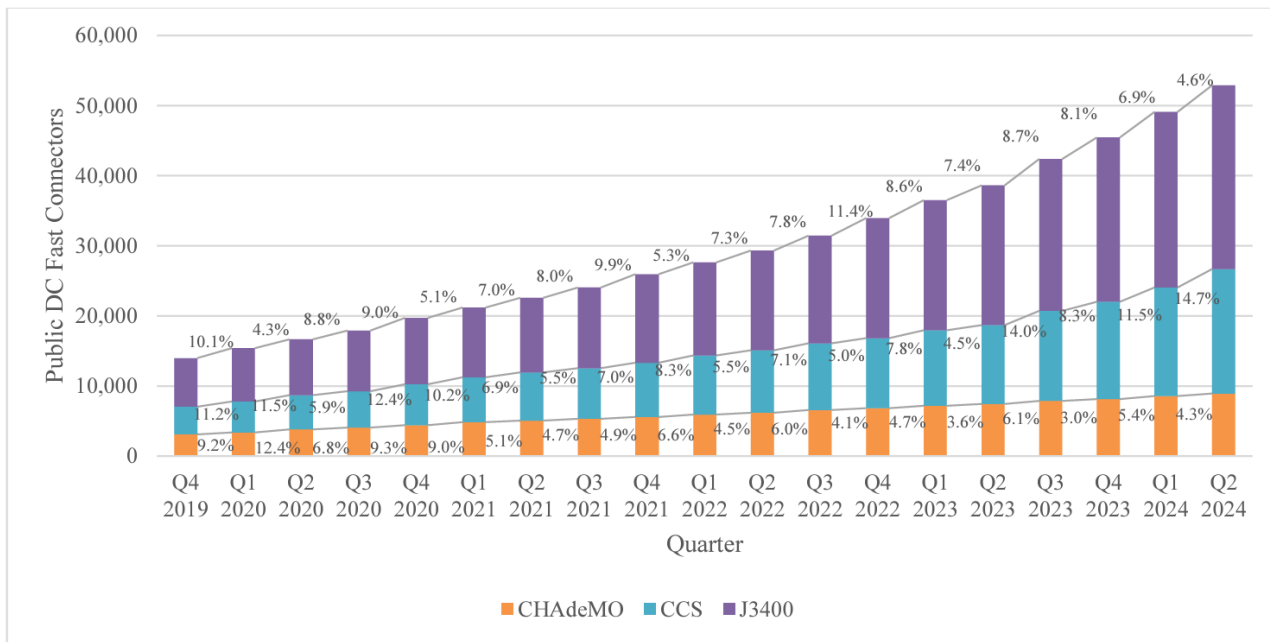


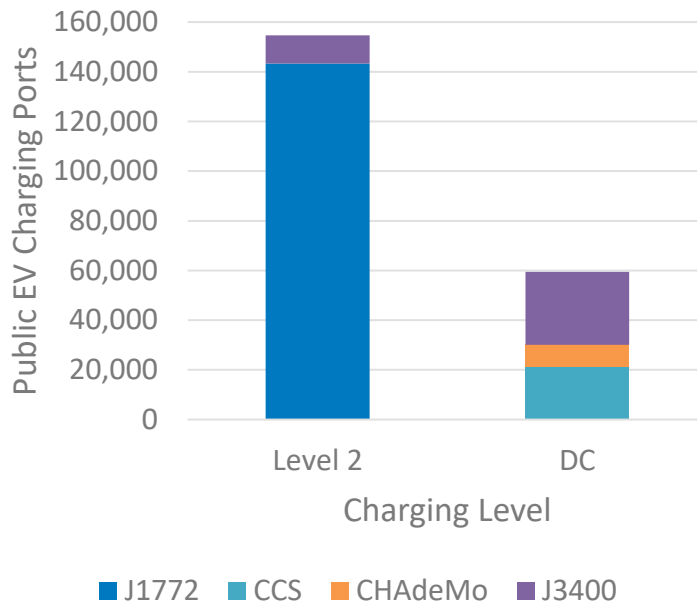
Figure 6. Quarterly growth of public DC fast connectors by type.

Note: The percentages in this figure indicate the percent growth between each quarter.

Source: [Q2 2024 EV Charging Infrastructure Trends report](#)

Current Connector Type Counts

Connector Types at Public EV Charging Ports

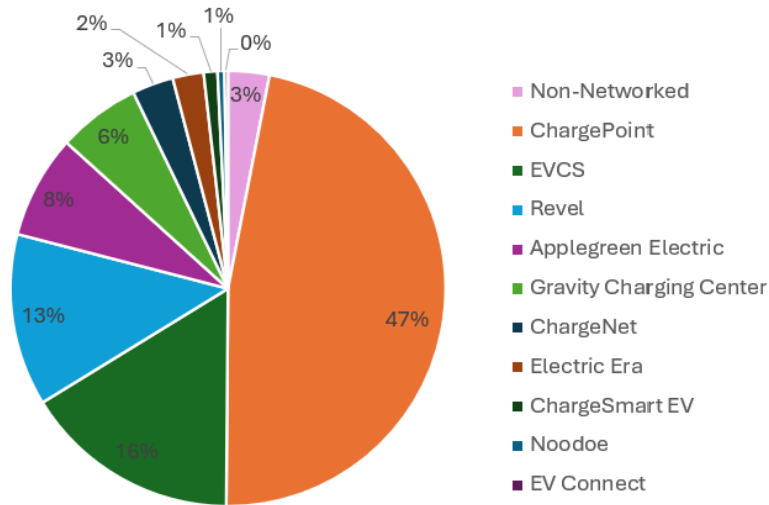


J3400 connectors are currently available at:

- 7% of public Level 2 charging ports (11,405 charging ports)
- **58% of public DC fast charging ports (29,350 charging ports)**

Networks with the J3400 Connector

Network Breakdown of Public DC Fast Ports with the J3400 Connector*



*Tesla Supercharger is excluded.

| Network | J3400, CCS, CHAdeMO | J3400, CCS | J3400 Only | Total Port Count |
|-------------------------|---------------------|--------------|---------------|------------------|
| Applegreen Electric | 28 | 0 | 2 | 30 |
| ChargeNet | 12 | 0 | 0 | 12 |
| ChargeSmart EV | 0 | 0 | 4 | 4 |
| ChargePoint | 0 | 184 | 0 | 184 |
| Electric Era | 1 | 8 | 0 | 9 |
| EV Connect | 0 | 0 | 1 | 1 |
| EVCS | 0 | 36 | 27 | 63 |
| Gravity Charging Center | 0 | 24 | 0 | 24 |
| Noodoe | 0 | 0 | 2 | 2 |
| Revel | 0 | 50 | 0 | 50 |
| Tesla Supercharger | 0 | 974 | 27,985 | 28,959 |
| Non-networked | 0 | 8 | 4 | 12 |
| Total Port Count | 41 | 1,284 | 28,025 | 29,350 |

Reference Links

AFDC Station Locator: afdc.energy.gov/stations

EV Charging Infrastructure Trends:
afdc.energy.gov/fuels/electricity-infrastructure-trends

Questions?

- abby.brown@nrel.gov
- technicalresponse@icf.com



Questions and Answers



Useful Resources



NEVI FAQ

[National Electric Vehicle Infrastructure \(NEVI\) Formula Program Q&A](#)

Station Locator

[Alternative Fuels Data Center: Alternative Fueling Station Locator](#)

ChargeX Report

[Recommended Actions to Improve Adapter Safety](#)

EV Sales

[Light Duty Electric Drive Vehicles Monthly Sales Updates](#)

Funding Opportunities

[Funding Opportunities](#)

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