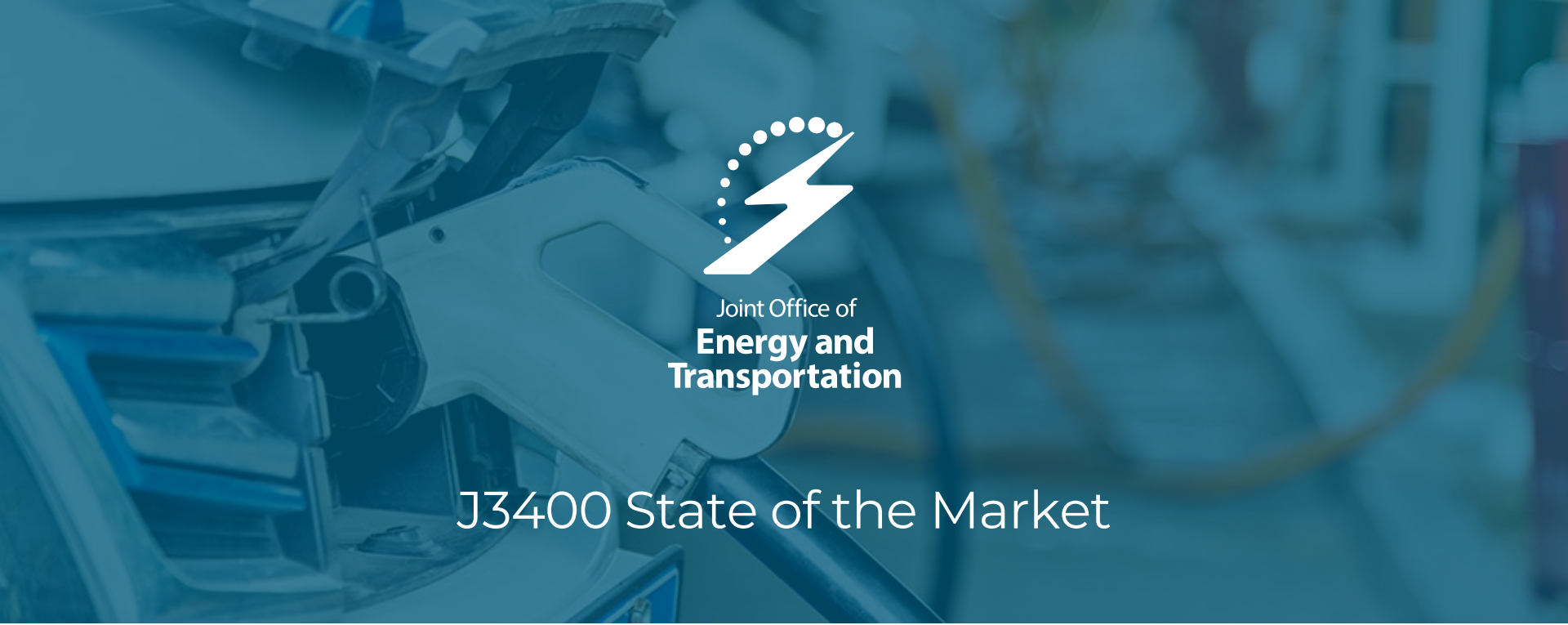


Joint Office of
Energy and
Transportation

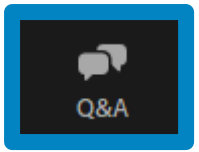
J3400 State of the Market

December 17, 2024

driveelectric.gov

Zoom Tips and Disclaimer

- Controls are located at the bottom of your screen. If they aren't appearing, move your cursor to the bottom edge.
- Submit questions using the "Q&A" window
- **Notice:** This webinar is being recorded and may be posted on the Joint Office website or used internally.
- 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 of Energy and Transportation

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.

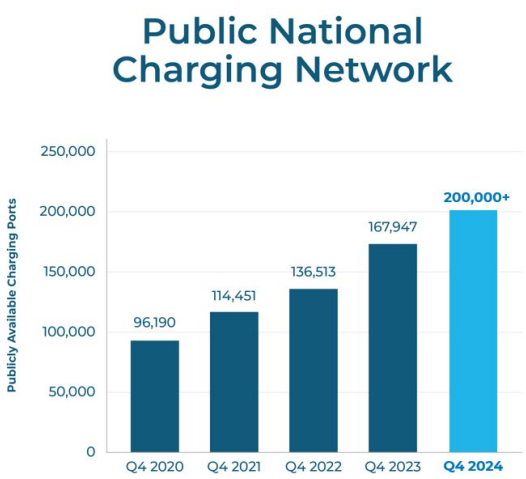
Creating Framework for National Vision of Zero-Emission Freight: With industry, NGOs, as well as state and local support, developed a framework that was embraced by stakeholders and used to prioritize billions in federal grant awards.

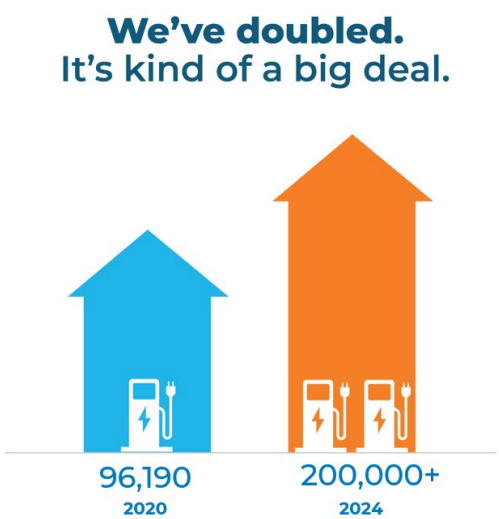
Supporting multimodal electrification: Through the two JO funding opportunities, private companies can be directly funded, and multimodal and ultra light vehicle charging solutions were prioritized.

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





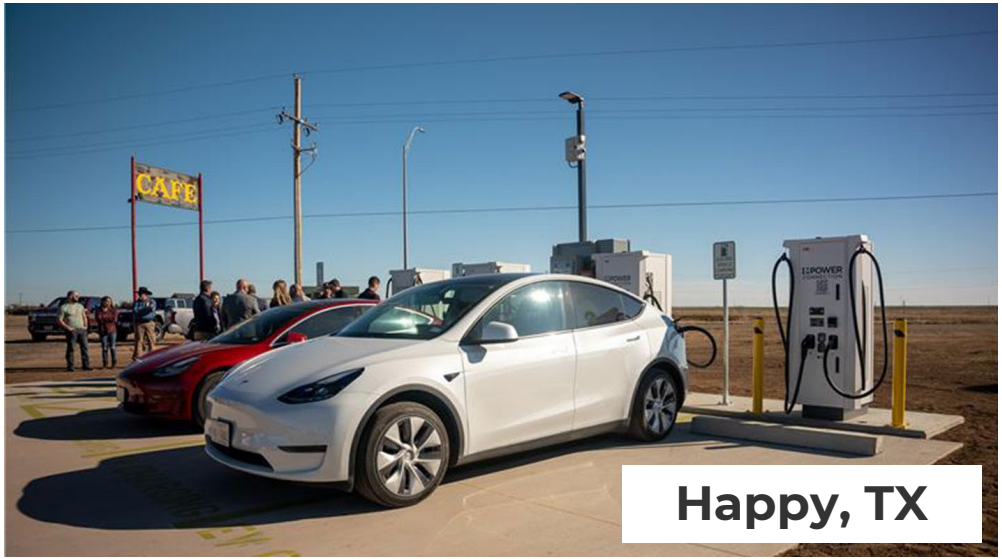
205K total publicly available charging ports

24.8K federally-funded publicly available charging ports underway

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

Electric Vehicle Charging Infrastructure Growth · Joint Office of Energy and Transportation (driveelectric.gov)

NEVI Stations Are Opening with J3400 and CCS Connectors

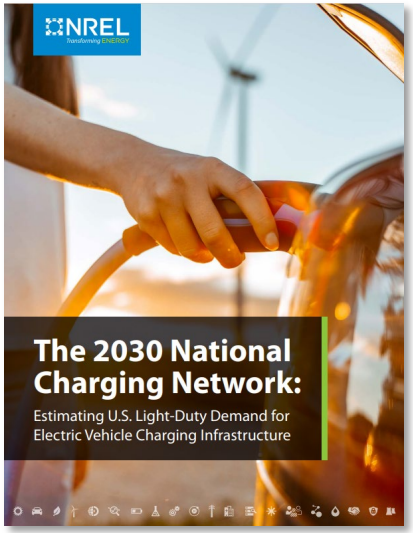


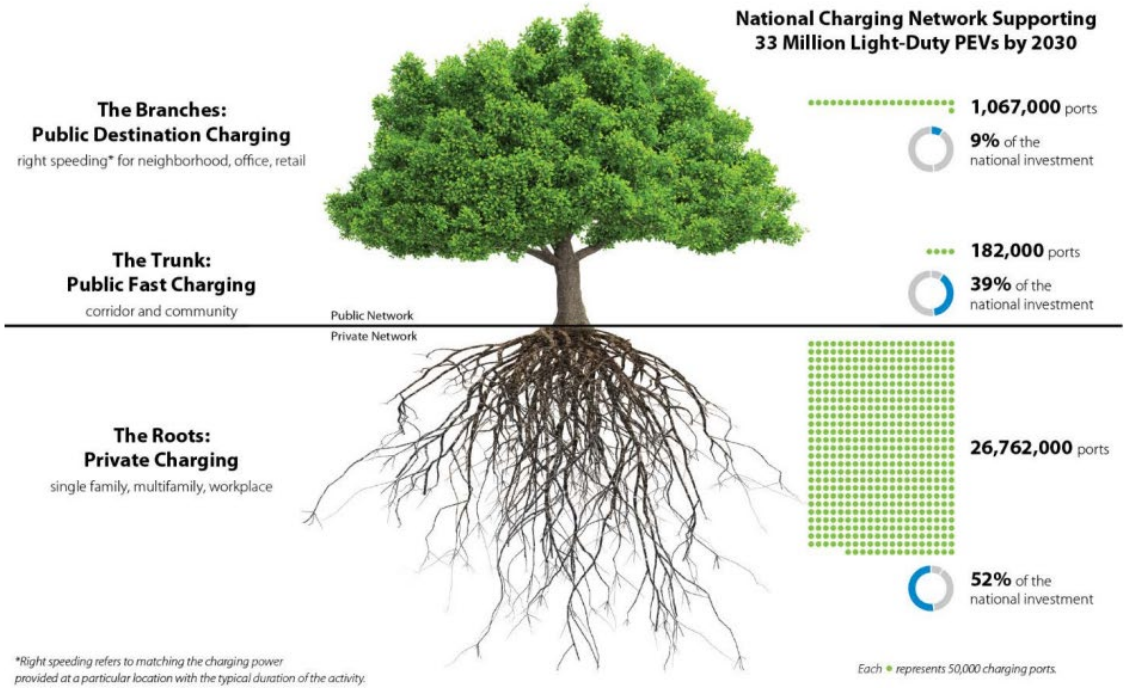
Happy, TX

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**

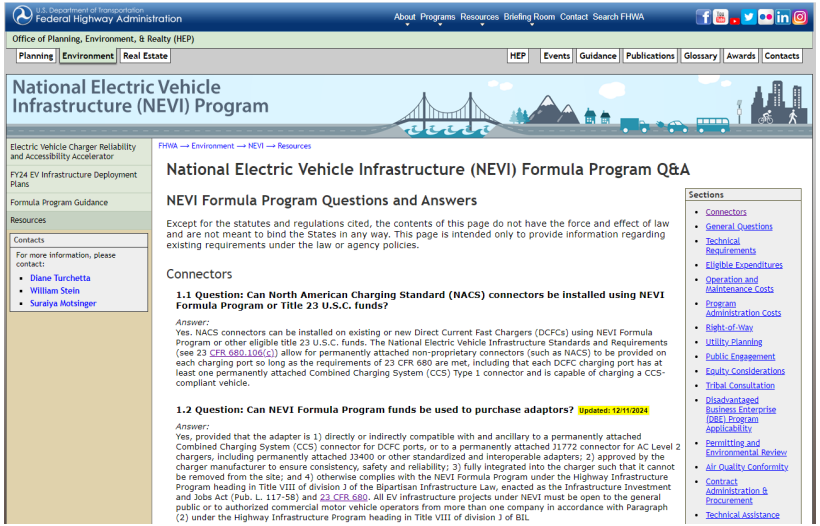


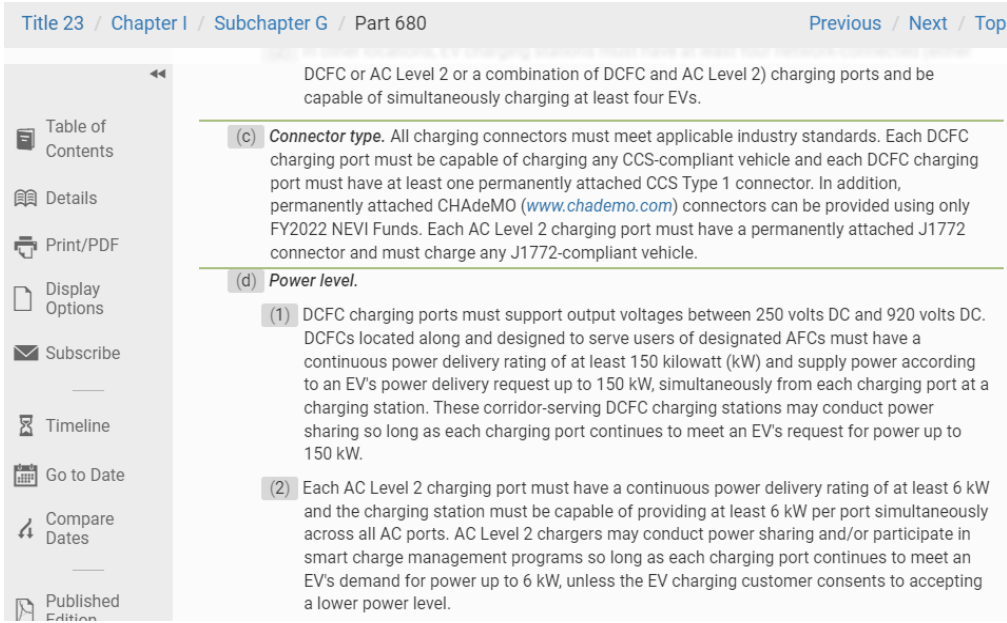


Federal Highway Administration

NEVI Program FAQ Updates

NEVI Program Updates





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

Abby Brown,
National Renewable Energy Laboratory

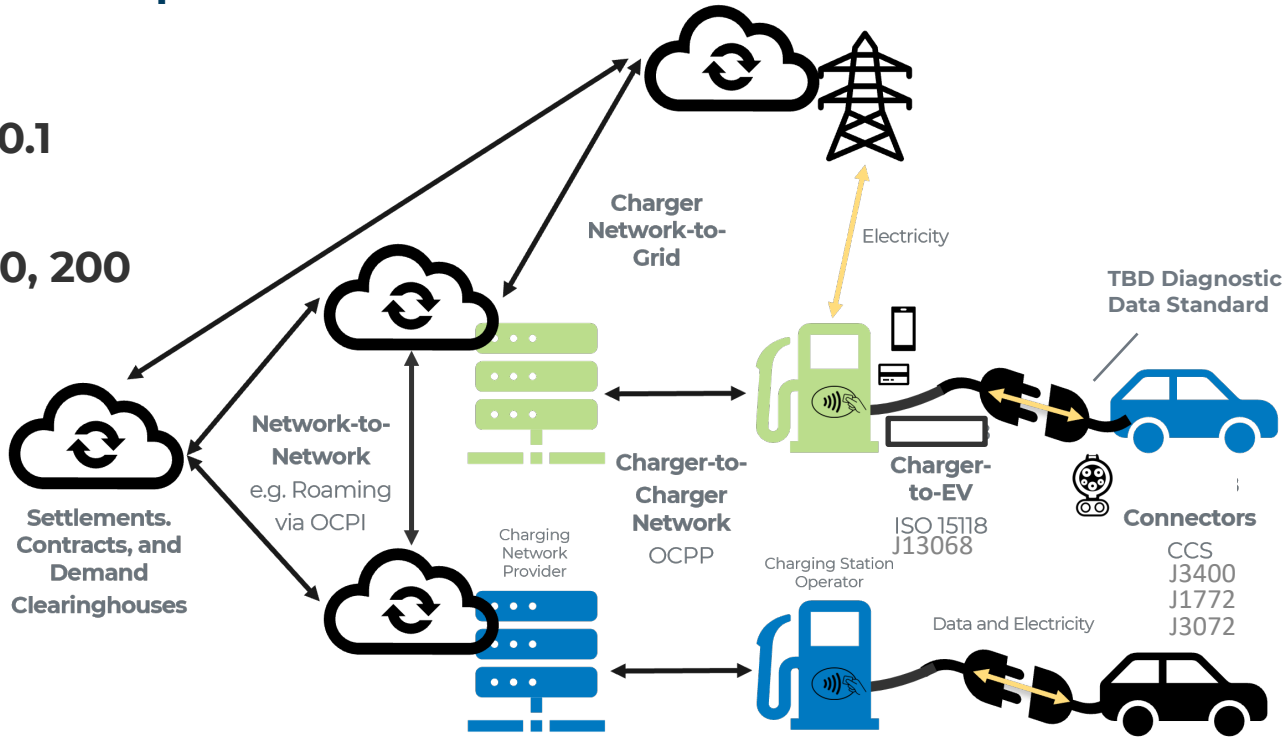
Charging Infrastructure

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



Enhancing Resilience

Evolving Vehicle-Grid Interaction

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

Managed charging technologies (e.g., V1G) help align vehicle charging with grid demand, reducing peak-hour strain and enhancing reliability.

Scalable Integration Initiatives

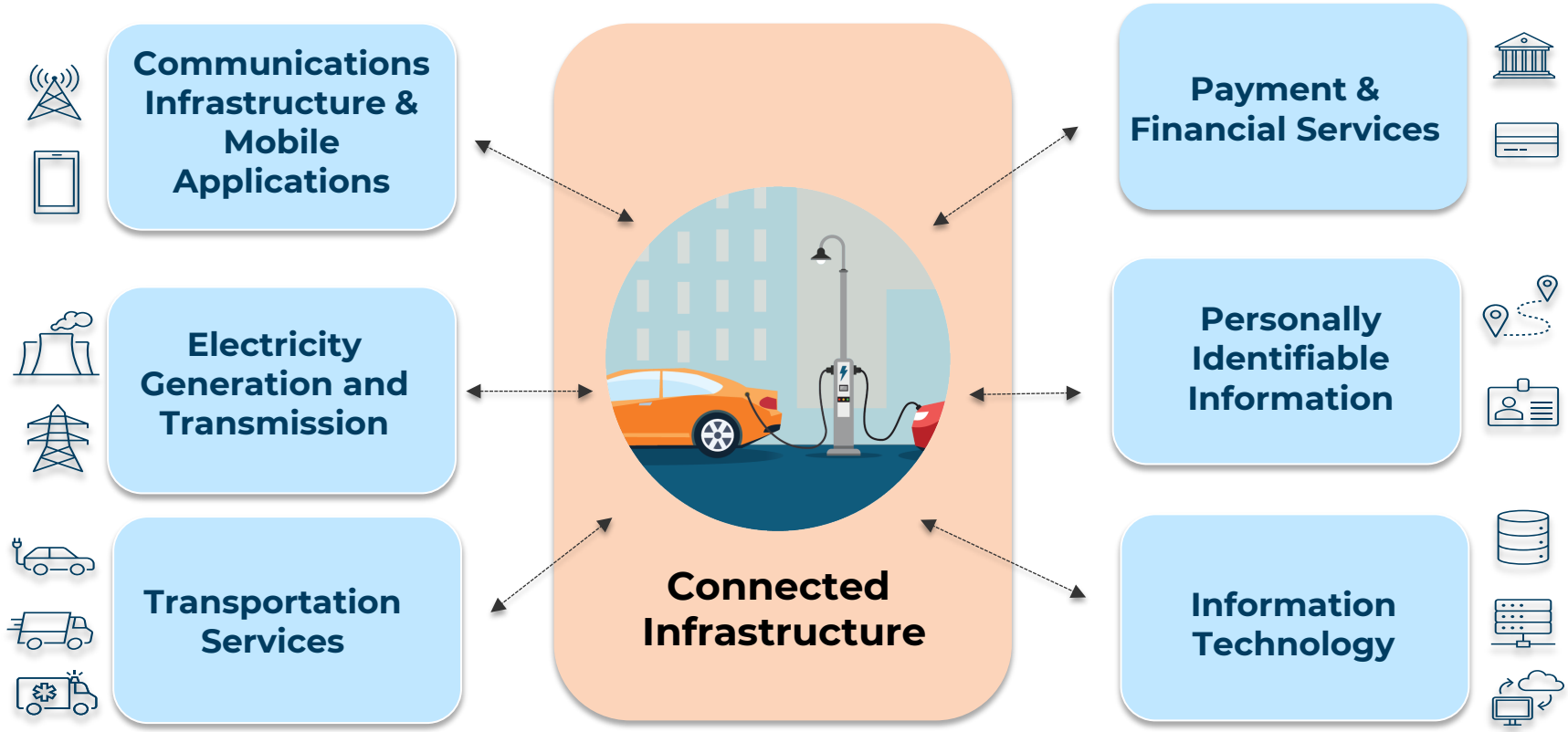
Programs like *ChargeX* and *EVs@Scale* address challenges in scaling and integrating vehicles with existing grid infrastructure.

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



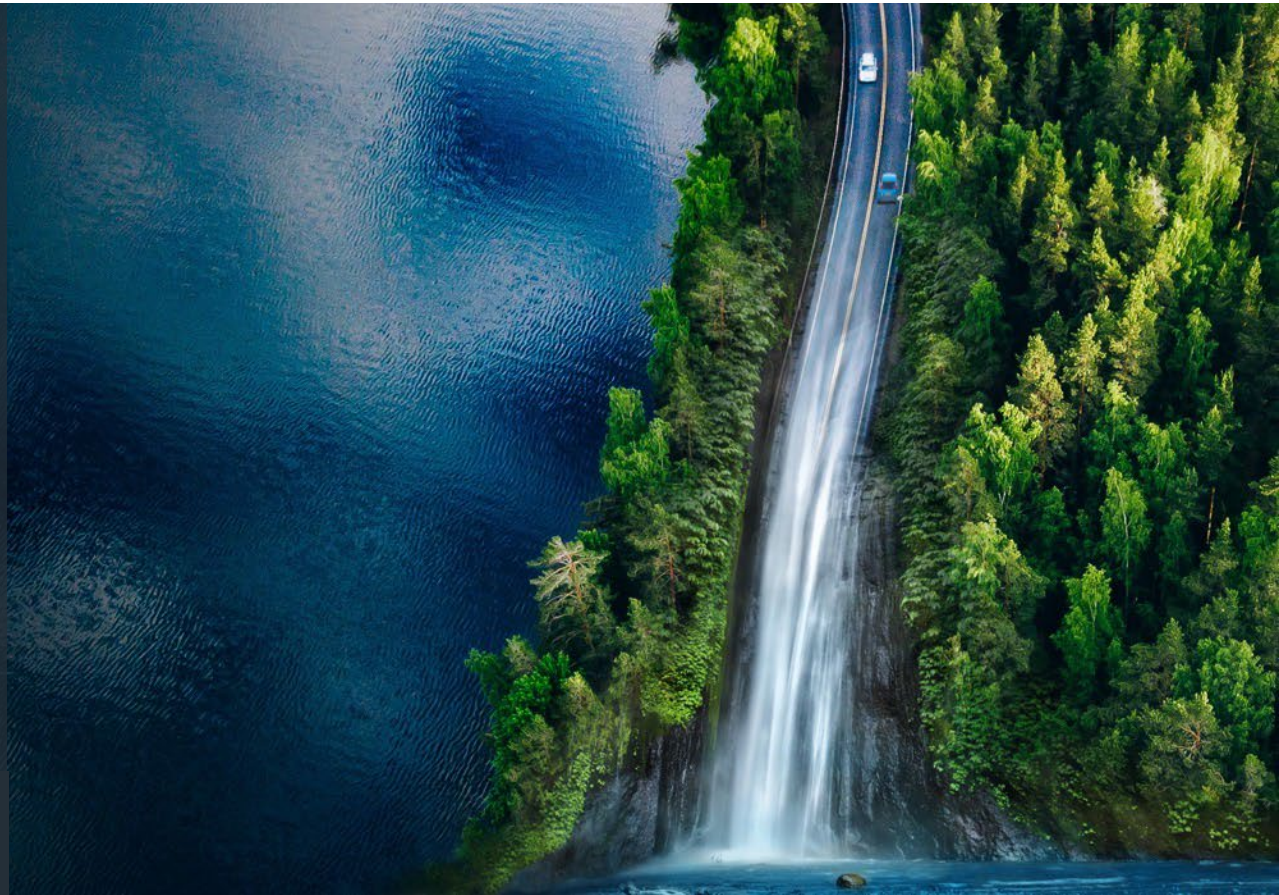
Details of the Standardization Process

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?

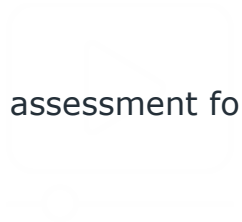
Mobility, Advanced™

- 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 to 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 re-hired, 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 3rd 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

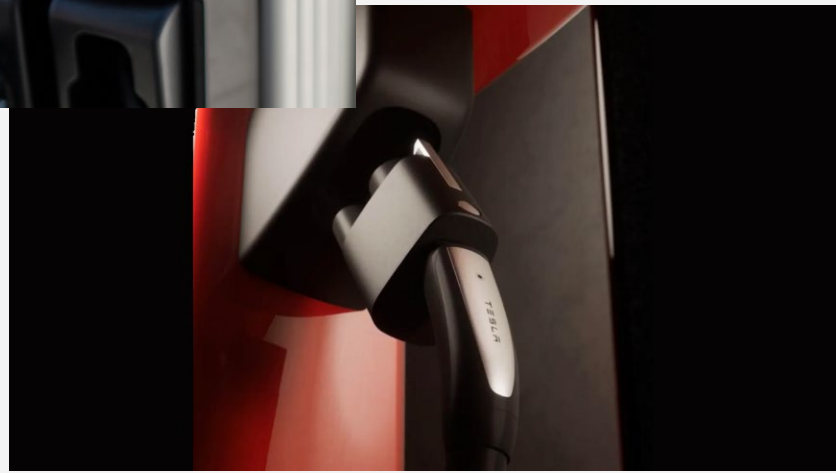
ChargePoint Omni Port & Tesla Magic Dock

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



DECEMBER 23, 2024

Ionna Breaks Ground on First Station

- The multi-OEM joint venture Ionna has broken ground on its 1st "Rechargery" 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 Rechargerys at at least 50 locations, 3 to open in 2024

Hyundai Motor Group and Lucid Launch J3400

- Kia EV6 and Hyundai Ioniq 5 were spotted testing at Supercharger station with native J3400 ports
- MY25 Ioniq 5 and EV6 built in US come with native J3400, Kia EV9 and Hyundai Ioniq 9 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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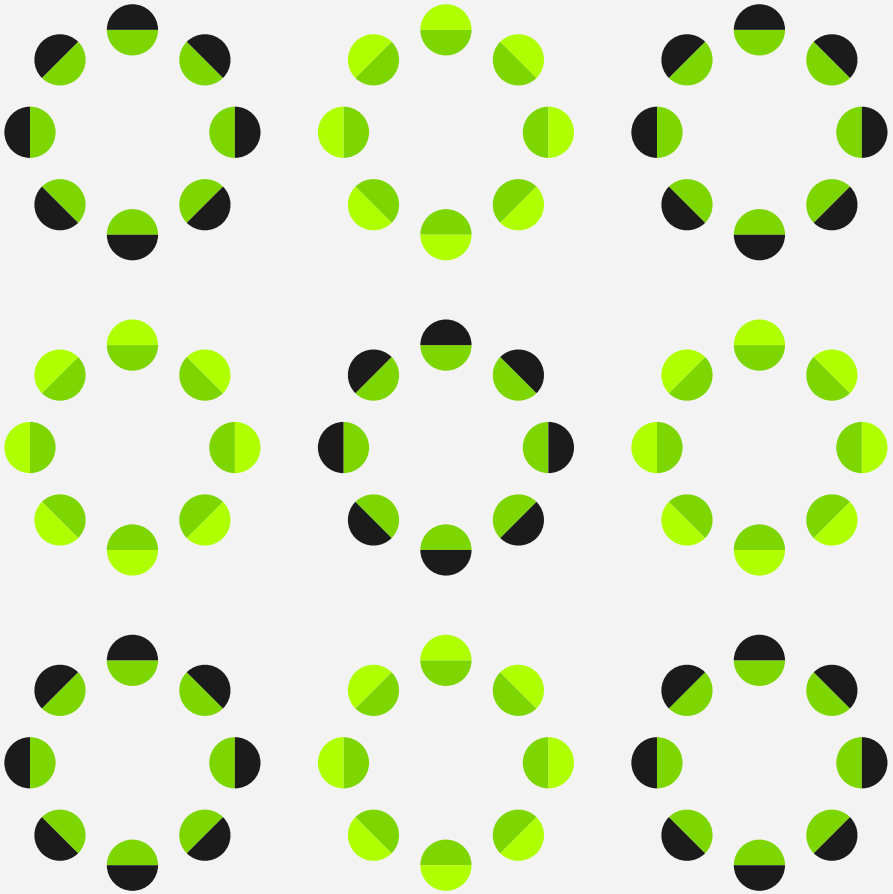
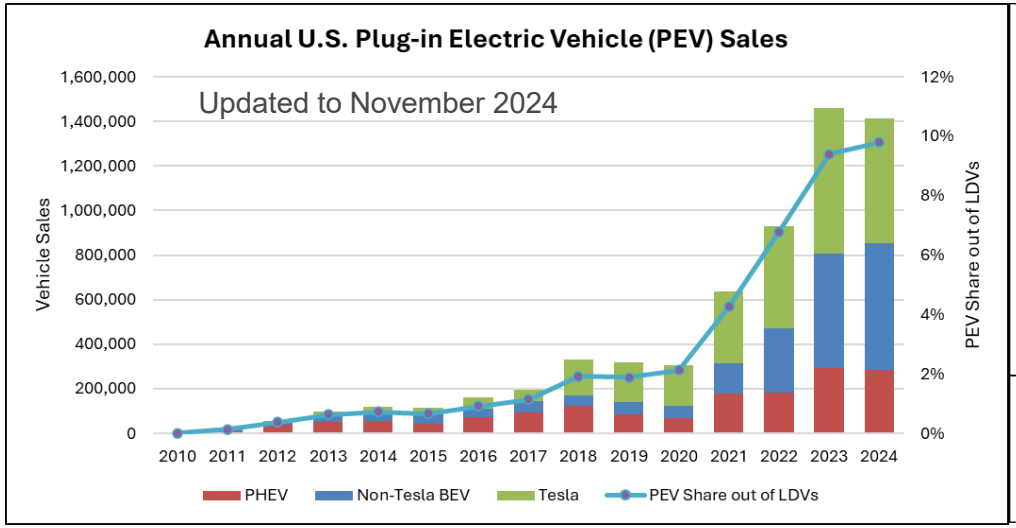
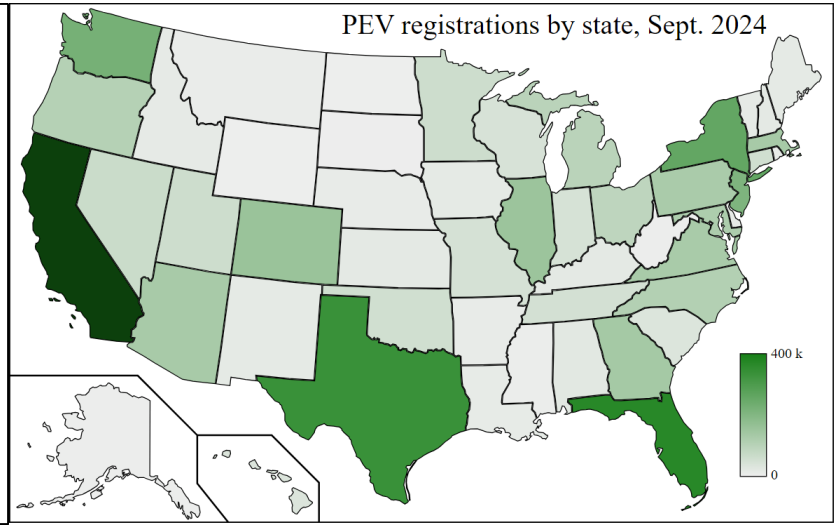


EV Sales

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

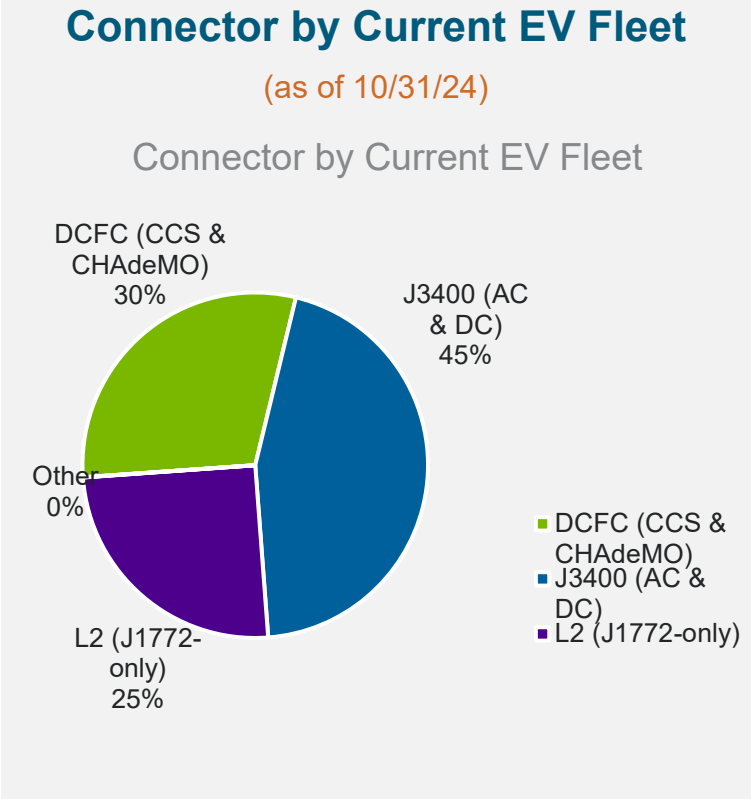




Argonne NATIONAL LABORATORY

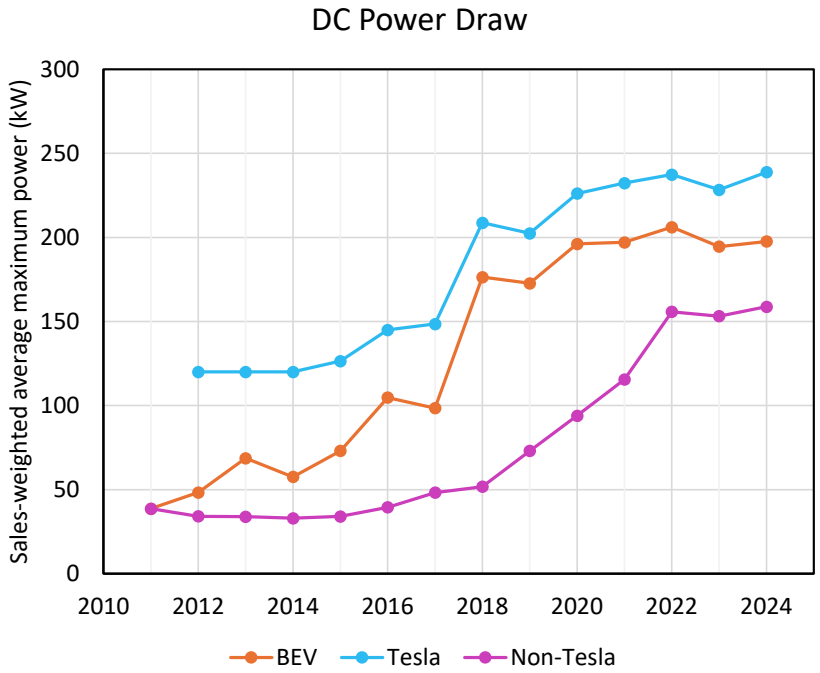
Snapshot of Current EV Charging Connector Market

- 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

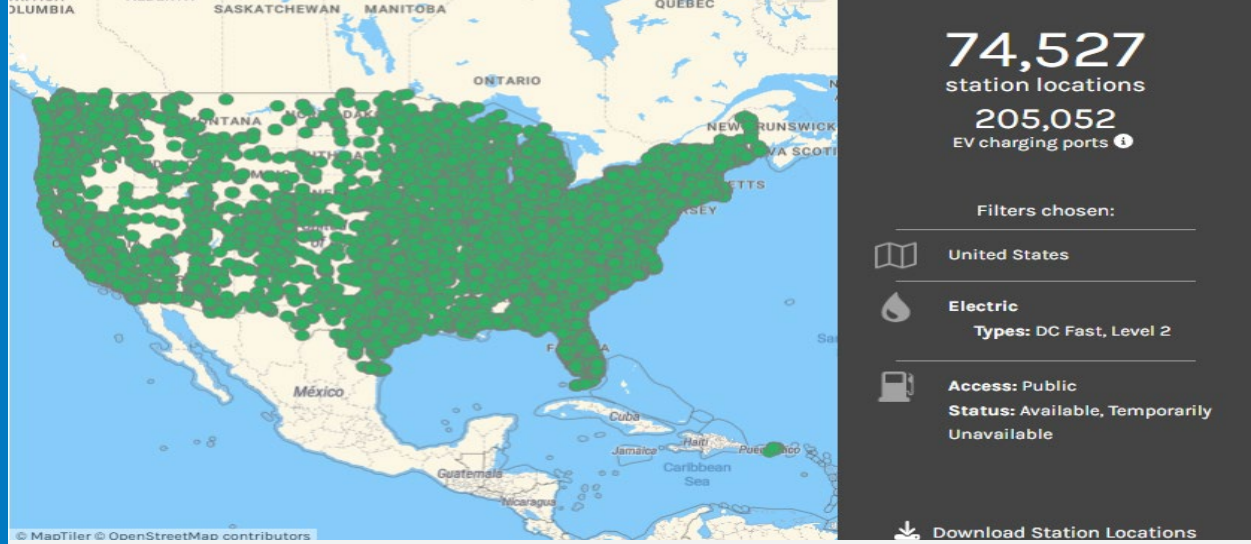
Overview of Alternative Fueling Station Locator
Current Connector Landscape
J3400 by Network

U.S. Department of Energy

Station Locator

Part of the Alternative Fuels Data Center (AFDC)

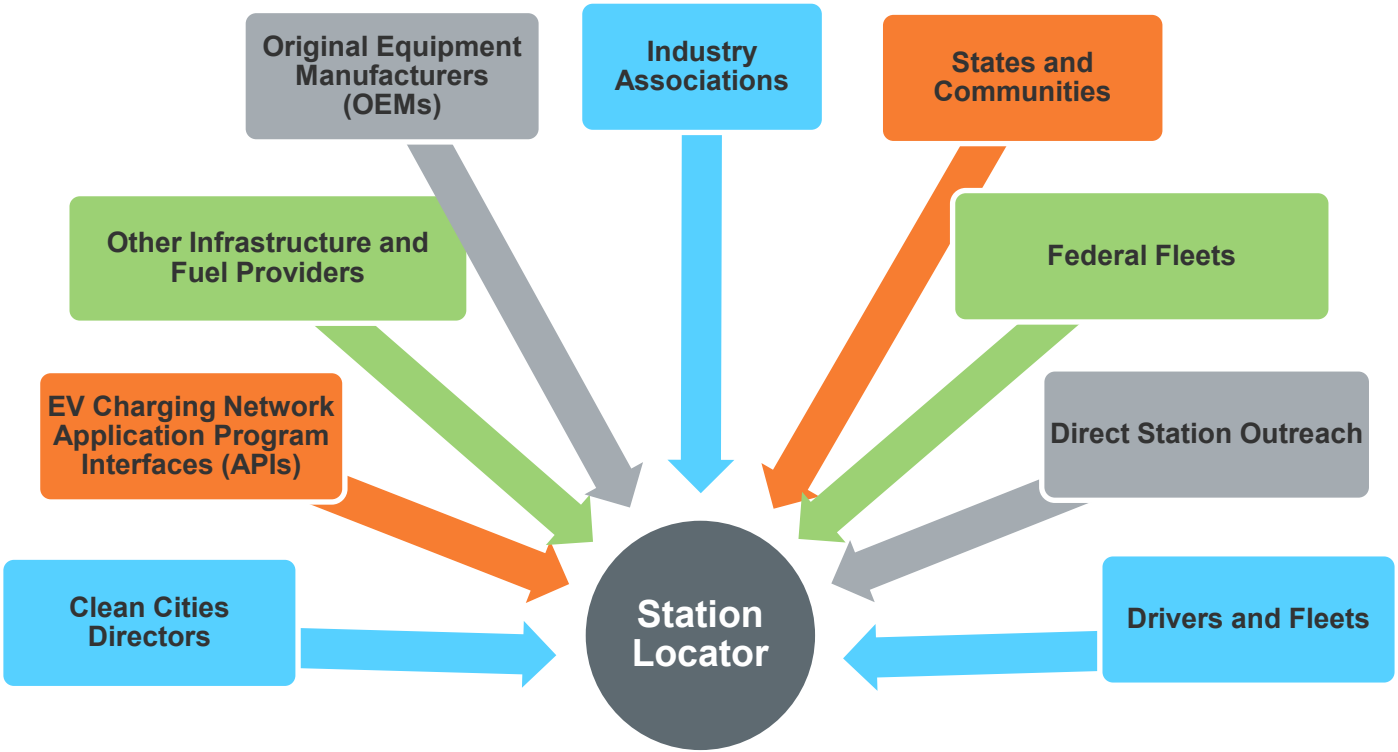
afdc.energy.gov/stations



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

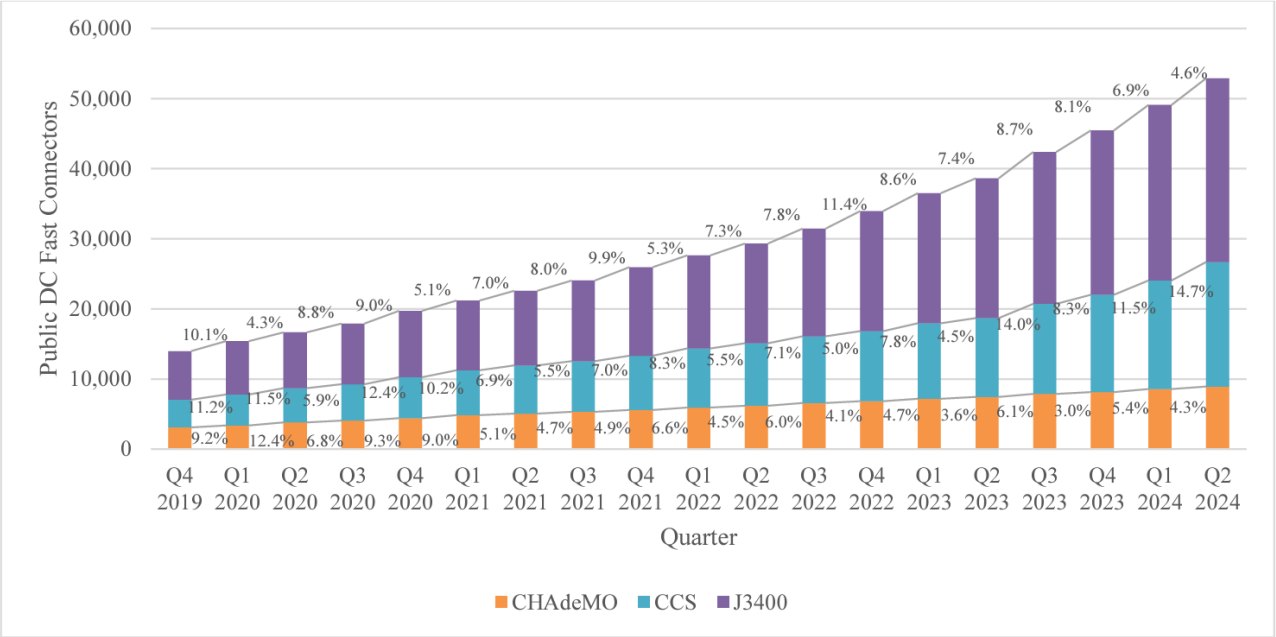
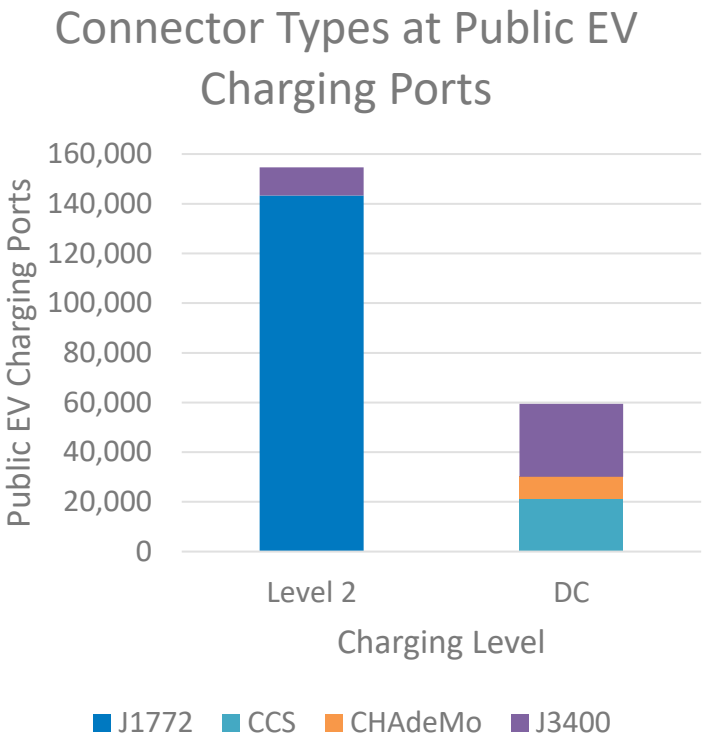


Figure 6. Quarterly growth of public DC fast connectors by type.

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

Source: [Q2 2024 EV Charging Infrastructure Trends report]

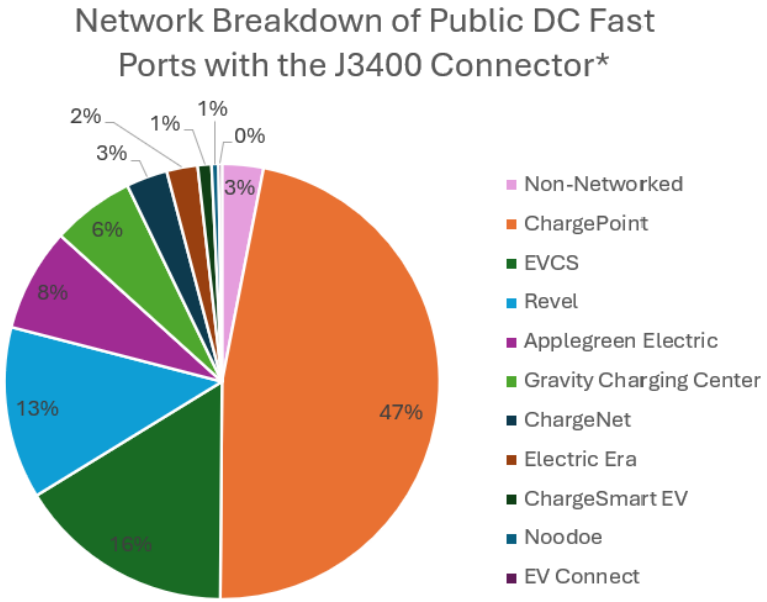
Current Connector Type Counts



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	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**

**Tesla Supercharger is excluded.*

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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