Electric Vehicle Charging Infrastructure Trends from the Alternative Fueling Station Locator: Second Quarter 2024

Abby Brown,[1] Jeff Cappellucci,[1] Madeline Gaus,[2] and Heather Buleje[2]

1 National Renewable Energy Laboratory
2 ICF Inc.

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Office of Energy Efficiency & Renewable Energy
Operated by the Alliance for Sustainable Energy, LLC

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List of Acronyms

7CHARGE	7Charge network
ABM	ABM network
AFDC	Alternative Fuels Data Center
AMPED_UP	AmpedUp! Networks
AMPUP	AmpUp network
APPLEGREEN	Applegreen Electric network
BN	Blink network
BP_PULSE	BP Pulse network
CCS	Combined Charging System, a connector type for DC fast charging
CFI	Charging and Fueling Infrastructure
CHAdeMO	a connector type for DC fast charging
CHARGELAB	ChargeLab network
CHARGENET	ChargeNet network
CHARGESMART_EV	ChargeSmart EV network
CHARGEUP	ChargeUp network
CHARGIE	Chargie network
CIRCLE_K	Circle K network
CPN	ChargePoint network
CPRG	Climate Pollution Reduction Grant
DAC	disadvantaged community
DC	direct current
DOE	U.S. Department of Energy
EA	Electrify America network
ENVIROSPARK	EnviroSpark network
EPA	U.S. Environmental Protection Agency
EV	electric vehicle, including all-electric and plug-in hybrid electric vehicles
EVBOLT	EVBOLT network
EVC	EV Connect network
EVCS	EV Charging Solutions network
EVGATEWAY	EvGateway network
EVMATCH	EVmatch network
EVN	EVgo network
EVPOWER	eV Power network
EVRANGE	EV Range network
EVSP	electric vehicle service provider
FCN	Francis Energy network
FLASH	FLASH network
FLO	FLO network
FPLEV	FPL EVolution network
GRAVITI_ENERGY	Graviti Energy network
HONEY_BADGER	Honey Badger network
J1772	a connector type for Level 1 and Level 2 charging

J3400	a connector type for Level 2 and DC fast charging, also known as the North American Charging Standard
JULE	Jule network
L1	Level 1
L2	Level 2
LIVINGSTON	Livingston Energy Group network
LOOP	Loop network
NACS	North American Charging Standard
NEMA	National Electrical Manufacturers Association
NEVI	National Electric Vehicle Infrastructure
NON	non-networked
NOODOE	Noodoe network
NREL	National Renewable Energy Laboratory
OC	OpConnect network
OCPI	Open Charge Point Interface
POWER_NODE	Electric Era network
POWERFLEX	PowerFlex network
POWERPUMP	PowerPump network
Q1	quarter 1, or first quarter of the calendar year
Q2	quarter 2, or second quarter of the calendar year
Q3	quarter 3, or third quarter of the calendar year
Q4	quarter 4, or fourth quarter of the calendar year
RED_E	Red E Charging network
REVEL	Revel network
RIVIAN_ADVENTURE	Rivian Adventure Network
RIVIAN_WAYPOINTS	Rivian Waypoints network
SHELL_RECHARGE	Shell Recharge network
STAY_N_CHARGE	Stay-N-Charge network
SWTCH	SWTCH Energy network
TESLA	Tesla Supercharger network
TESLAD	Tesla Destination network
TURNONGREEN	TurnOnGreen network
UNIVERSAL	Universal EV Chargers network
USPS	U.S. Postal Service
VLTA	Volta network
WATT_EV	WattEV network
ZEFNET	ZEF Energy network

Executive Summary

Electric vehicle (EV) charging infrastructure in the United States continues to rapidly change and grow. Using data from the U.S. Department of Energy's (DOE's) Alternative Fueling Station Locator (AFDC 2024b), this report provides a snapshot of the state of EV charging infrastructure in the United States in the second calendar quarter of 2024 (Q2 2024) by charging level, network, location, housing density, and disadvantaged community (DAC) designation. Additionally, this report measures the current state of charging infrastructure compared to the infrastructure requirement scenario outlined in the National Renewable Energy Laboratory's (NREL's) report, *The 2030 National Charging Network: Estimating U.S. Light-Duty Demand for Electric Vehicle Charging Infrastructure* (Wood et al. 2023). This information is intended to help transportation planners, policymakers, researchers, infrastructure developers, and others understand the rapidly changing landscape of EV charging infrastructure. This is the 18th report in a series. Reports from previous quarters can be found in the Alternative Fuels Data Center (AFDC) and NREL publication databases, as well as the AFDC Charging Infrastructure Trends page (afdc.energy.gov/fuels/electricity_infrastructure_trends.html).

In Q2 2024, the number of EV charging ports in the Station Locator grew by 6.3%, or 12,485 EV charging ports, bringing the total number of ports to 211,382. Public EV charging ports account for most of the ports in the Station Locator, and grew by 6.5% in Q2, while private EV charging ports grew by 4.4% (Figure ES-1). Notably, the most substantial percentage growth in public charging infrastructure during Q2 was in the Northeast region, with a 13.2% increase in EV charging ports. However, California continues to lead the nation in the number of public EV charging ports with 26.3% of all public charging ports in the Station Locator.

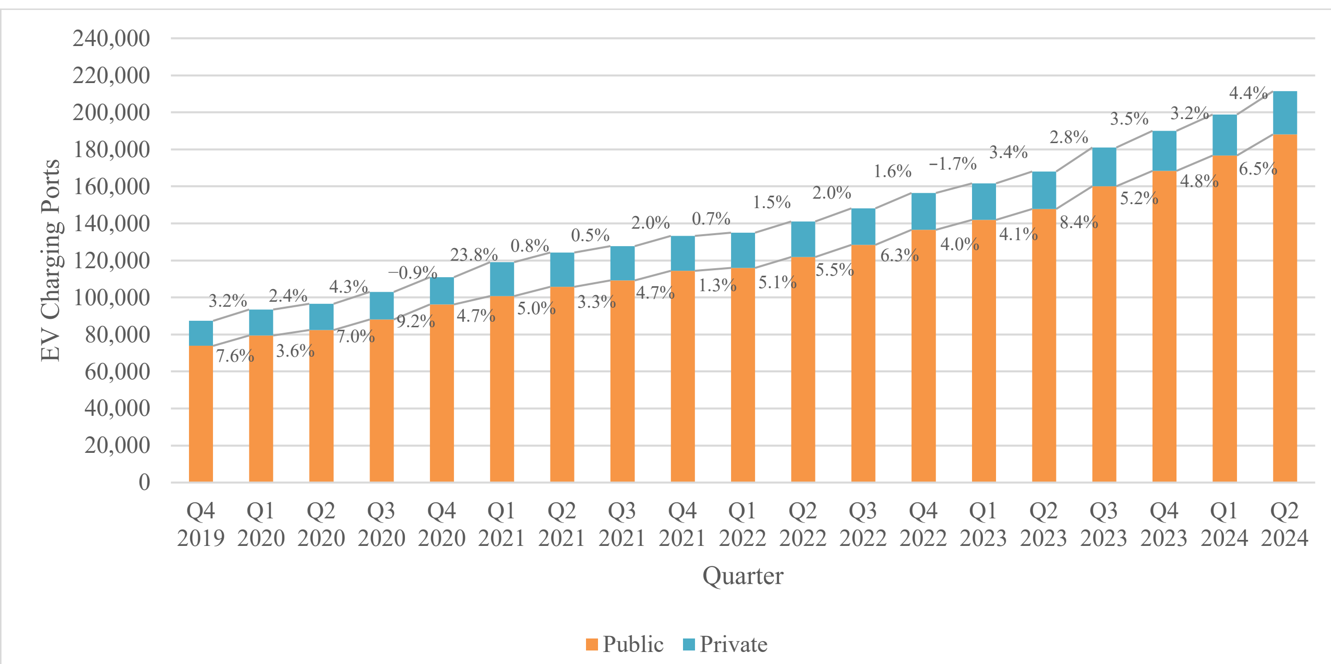

Figure ES-1. Quarterly growth of EV charging ports by access.

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

Among the public EV charging ports, direct-current (DC) fast EV charging ports grew by the largest percentage in Q2 (7.4%), representing the addition of 3,047 EV charging ports. The expansion of public DC fast EV charging ports in the Station Locator was primarily driven by new station additions in California, Texas, Florida, and New York. Meanwhile, Level 2 (L2) EV charging ports grew by 6.3%, or 8,415 ports, primarily due to installations across California, New York, California, Connecticut, and Florida. Level 1 (L1) EV charging ports increased marginally by 42 ports, or 5.1% (Figure ES-2). Further, all levels of public EV charging ports grew at a faster rate in DACs than in non-DACs.

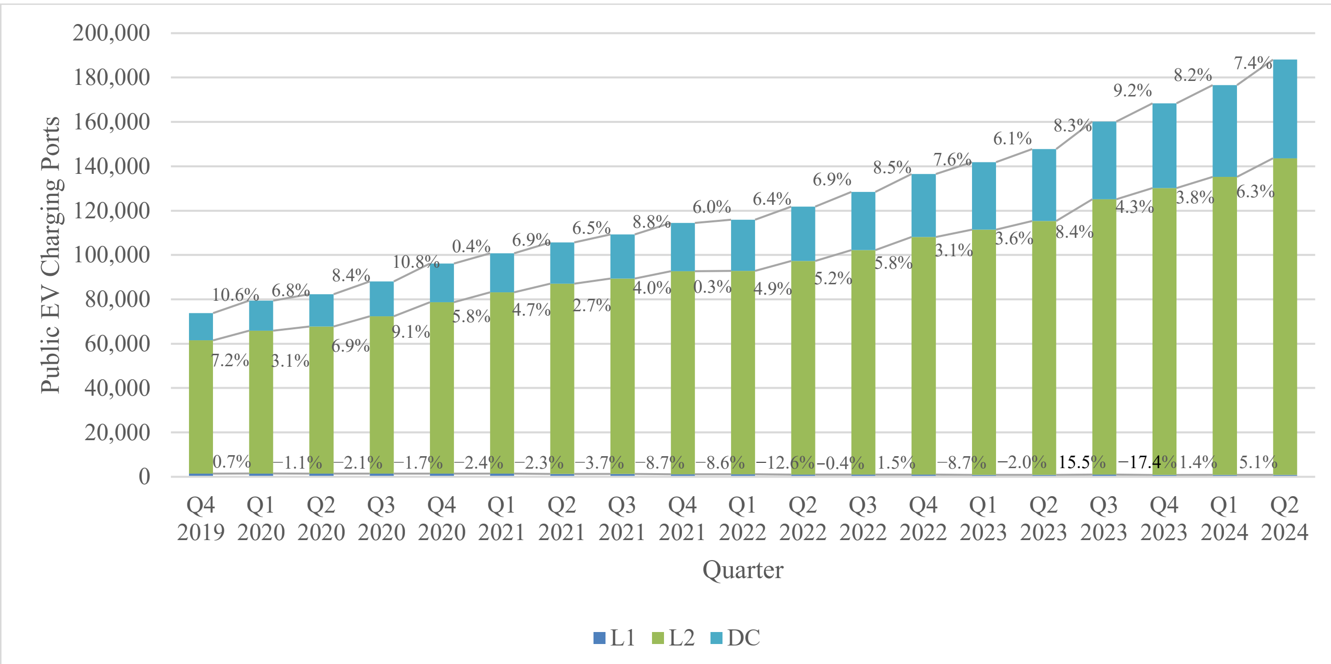

Figure ES-2. Quarterly growth of public EV charging ports by charging level.

Note: Figure excludes legacy EV charging ports that are not classified by charging level and are no longer manufactured. As of Q1, there were 26 public legacy EV charging ports in the Station Locator. Additionally, the percentages in this figure indicate the percent growth between each quarter.

DC fast EV charging ports have the highest power output among the charging levels, allowing them to charge EVs in the least amount of time. As supported by NREL's research, it is essential to deploy a dependable network of public DC fast chargers to increase consumer acceptance of EVs in the United States (Wood et al. 2023). Given the importance of DC fast port availability on consumer adoption, it is important to highlight the trends in the proliferation of these ports in the Station Locator. By way of background, the power output of DC fast EV charging ports reaches up to 500 kW. DC fast EV charging ports with power outputs between 250 kW and 349 kW are the most common in the Station Locator, and the number of DC fast EV charging ports at higher power levels is steadily increasing (Figure ES-3).

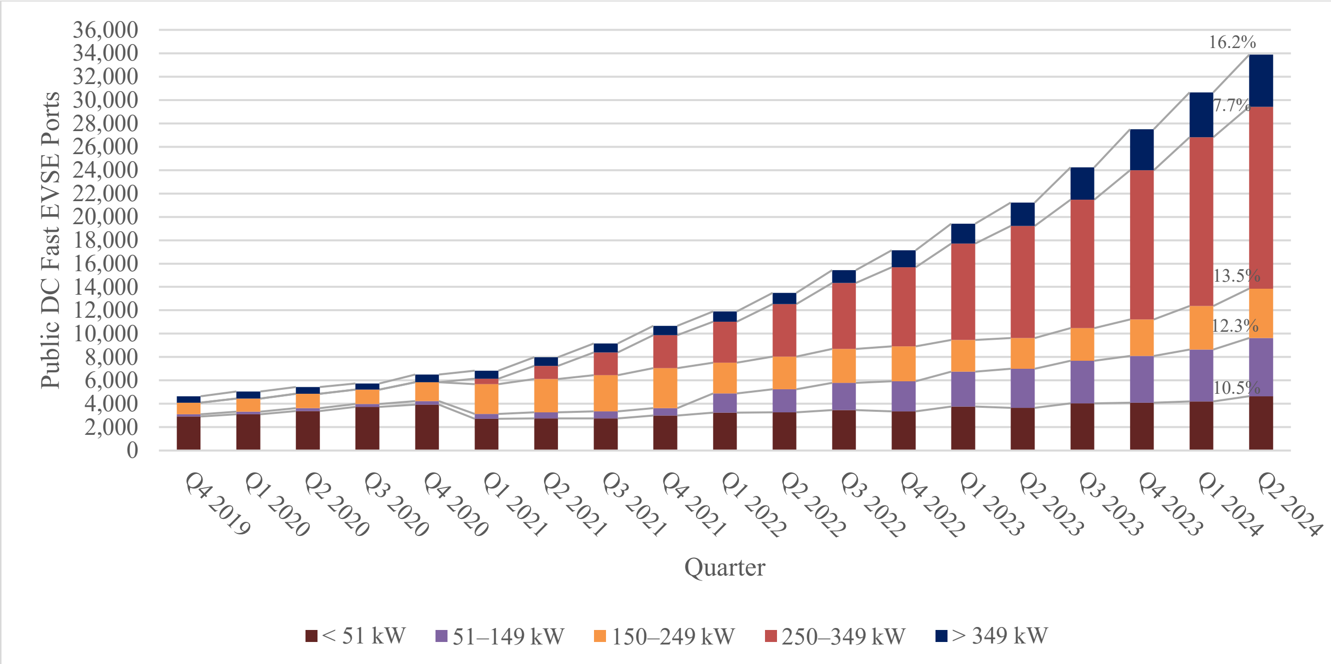

Figure ES-3. Quarterly growth of public DC fast EV charging ports by power output.

Note: The percentages in this figure indicate the percent growth between each quarter. For an explanation of the changes seen in Q1 2021, see the Q1 2021 report (Brown, Schayowitz, and Klotz 2021).

The 2030 National Charging Network report estimates that the United States would need 182,000 DC fast EV charging ports with a power output at or above 150 kW and 1,067,000 Level 2 public EV charging ports to support a baseline scenario of 33 million EVs on the road by 2030 (Wood et al. 2023). Based on data from the Station Locator, 13.3% of the estimated DC fast EV charging ports and 13.4% of the estimated Level 2 EV charging ports are currently available to meet such charging needs.

Note that 58.4% of public DC fast EV charging ports and 7.3% of public Level 2 EV charging ports in the Station Locator are on the Tesla Supercharger and Destination networks, respectively, and are therefore currently only readily accessible (i.e., without an adapter) to Tesla vehicles. When public EV charging ports on these networks are excluded, the number of DC fast and Level 2 EV charging ports currently installed to meet the estimated charging needs of 33 million EVs on the road by 2030 decreases to 8,875 (4.9%) and 132,342 (12.4%), respectively. However, Tesla vehicles make up approximately 62% of registered all-electric vehicles as of Q2 2024 (Experian Information Solutions 2024b). Further, several auto manufacturers have plans to adopt the J3400 connector, which will make EV charging ports on the Tesla Supercharger and Destination networks accessible to a greater number of vehicles beginning with model year 2025 vehicles.

Note that these reports reflect a snapshot of the number of available and temporarily unavailable (i.e., unavailable for use for an extended period due to maintenance) EV charging ports in the Station Locator at the end of each quarter. Notable changes may be attributed to the Station Locator team's manual data collection process, as new manually added EV charging ports are counted in the quarter they are added to the Station Locator as opposed to when the infrastructure was installed.

If readers are interested in additional metrics, please email suggestions to the authors at TechnicalResponse@icf.com.

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1 Importance of Tracking Electric Vehicle Charging Infrastructure Trends

The U.S. Department of Energy's (DOE's) Alternative Fuels Data Center (AFDC) launched in 1991 in response to the Alternative Motor Fuels Act of 1988 and the Clean Air Act Amendments of 1990 (AFDC 2024a). Originally, it served as a hard copy resource for alternative fuel performance data, and then it became an internet resource in 1995. Since then, the AFDC has evolved dramatically into a robust online resource that provides a broad range of information on alternative fuels and advanced transportation technologies, including fueling and charging station data. In 2017, the National Renewable Energy Laboratory (NREL) partnered with National Resources Canada to expand the dataset to include the location of alternative fuel stations across Canada as the Electric Charging and Alternative Fuelling Stations Locator, or *Localisateur de stations de recharge et de stations de ravitaillement en carburants de remplacement* (Levene et al. 2019). The Station Locator database now includes information on public and private nonresidential alternative fueling stations in the United States and Canada. The database currently tracks ethanol (E85), biodiesel, compressed natural gas, electric vehicle (EV) charging, hydrogen, liquefied natural gas, propane stations, and renewable diesel.

Although historical data for all fuel types in the Station Locator are available, it is especially important to take an in-depth look at EV charging due to rapidly changing technology and growing infrastructure. This trend is likely to continue given the federal government's goal of building a national EV charging network of 500,000 EV charging ports by 2030 and the funds from the Bipartisan Infrastructure Law and Inflation Reduction Act to support this target. Using Station Locator data, this report explores the growth of both public and private EV charging infrastructure in the United States for the second calendar quarter of 2024 (Q2 2024). This is the 18th report in a series.[1] Reports from previous quarters can be found in the AFDC and NREL publication databases as well as the AFDC Charging Infrastructure Trends page (afdc.energy.gov/fuels/electricity_infrastructure_trends.html).

Note that these reports reflect a snapshot of the number of available and temporarily unavailable (i.e., unavailable for use for an extended period due to maintenance) EV charging ports in the Station Locator at the end of each quarter. Therefore, notable changes may be attributed to the manual data collection process, as new manually added EV charging ports are counted in the quarter in which they are added to the Station Locator as opposed to when the infrastructure was installed.

1.1 EV Charging Data Fields

Current charging infrastructure in the Station Locator is classified into the following categories:

- **Public:** A broad category that includes EV charging located in publicly accessible areas or along highway corridors. Public EV charging infrastructure is generally accessible to any EV driver, though this includes some stations with certain qualifications, such as those that are

[1] The report methodology has not changed since its inception; however, different reports have been used to project future charging infrastructure needs (Section 1.2) as newer projections have become available, and new sections have been added to the report over time.

made available to the public after business hours or that require payment through a specific application. Additionally, stations that are reserved for patrons of a business—such as guests of a hotel, visitors of a museum, or customers of a retail store—are classified as public restricted access.

- **Workplace:** EV charging intended to provide charging to employees during the workday. Workplace charging infrastructure is accessible only to employees of a business and is therefore classified as private in the Station Locator.
- **Commercial/fleet:** EV charging intended to provide charging for electric fleet vehicles, including municipal/private fleets, car sharing, and transportation network companies. Fleet charging infrastructure is classified as private in the Station Locator.

The Station Locator does not maintain data on single-family residential charging and has minimal, yet expanding, data on charging at multifamily housing. EV charging infrastructure at multifamily housing is also classified as private in the Station Locator. See Section 2.2.3 for additional details.

The Station Locator counting logic aligns with the hierarchy defined in the Open Charge Point Interface (OCPI) protocol: station locations, EV charging ports, and connectors (EVRoaming Foundation 2020), as shown in Figure 1 and described below. Therefore, the Station Locator counts the number of EV charging ports at each station location.

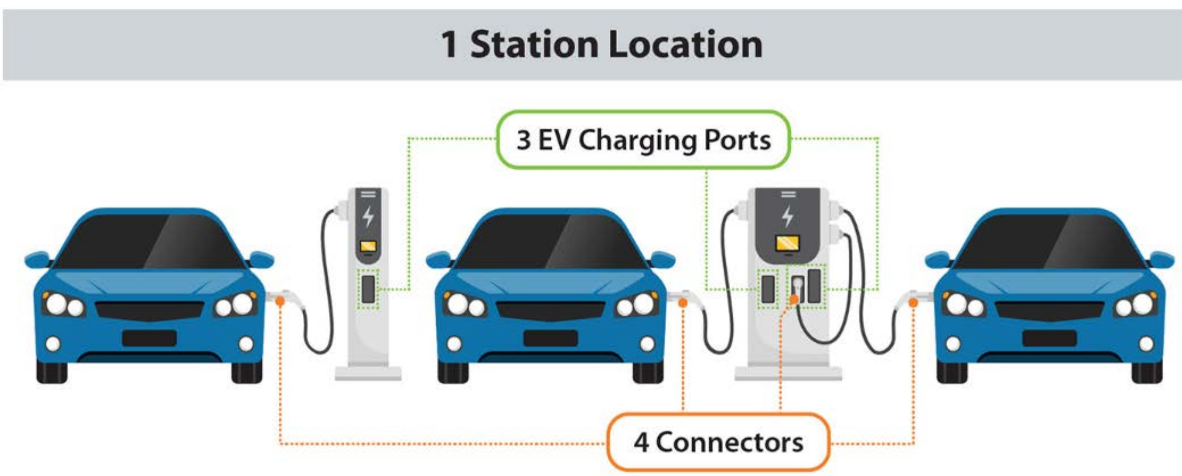

Figure 1. EV charging infrastructure hierarchy.

Source: AFDC (2024d)

The following fuel-specific fields are tracked in the Station Locator for EV charging stations (AFDC 2024c):

- EV charging information:
    - Station location: A site with one or more EV charging ports located at the same address
    - EV charging port count: The number of outlets or ports available to simultaneously charge vehicles. An EV charging port provides power to charge only one vehicle at a time even though it may have multiple connectors. The unit that houses EV charging ports is sometimes called a charging post, which can have one or more EV charging ports.

- EV charging port type:
  - Level 1 (L1): 120 V; 1 hour of charging = 5 miles of range.[2] The Station Locator counts standard 120-V alternating current (AC) outlets as Level 1 EV charging ports only if the outlet is specifically designated for EV charging.
  - Level 2 (L2): 240 V; 1 hour of charging = 25 miles of range.[3]
  - Direct current (DC) fast: 480+ V; 30 minutes of charging = 100–200+ miles of range.[4]
- Connectors (number and type): What is plugged into a vehicle to charge it. Multiple connectors and connector types can be available on one EV charging port, but only one vehicle will charge at a time.
  - J1772: For L1 and L2 charging.[5]
  - Combined Charging System (CCS): For DC fast charging for most vehicle models[6]
  - CHAdeMO: For DC fast charging for select vehicle models
  - J3400: For all charging levels for Tesla vehicles, also referred to as the North American Charging Standard (NACS).[7]
- Network
- Manufacturer
- Power output (kW).

- Open date
- Workplace
- Pricing
- Power sharing
- On-site renewable electricity source.

These fields and the associated definitions are used in the analysis that follows.

1.2 Projecting Future Charging Infrastructure Needs

"Executive Order 14037: Strengthening American Leadership in Clean Cars and Trucks," issued in August 2021, requires that 50% of all new passenger vehicles and light trucks sold in the United States be zero-emission vehicles, including EVs and fuel cell electric vehicles, by 2030 (Executive Office of the President 2021b). The baseline scenario in NREL's report, *The 2030*

[2] This assumes a power output of 1.9 kW. The actual range per hour of charging depends on the power capacity, which can vary by vehicle and battery state of charge.
[3] This assumes a power output of 6.6 kW. The actual range per hour of charging depends on the power capacity, which can vary by vehicle and battery state of charge. An L2 unit can range from 2.9- to 19.2-kW power output.
[4] The power output of DC fast EV charging ports varies and can provide up to 500 kW. The actual range per hour of charging depends on the power capacity, which can vary by vehicle and battery state of charge.
[5] For L1 charging, most EVs will come with an L1 cordset, so no additional charging equipment is required. On one end of the cord is a standard NEMA) connector (e.g., NEMA 5-15, which is a common three-prong household plug), and on the other end is an SAE J1772 standard connector (often referred to simply as J1772). The J1772 connector plugs into the car's J1772 charge port, and the NEMA connector plugs into a standard NEMA wall outlet.
[6] The CCS connector is a standard developed by SAE International, similar to the J1772 standard.
[7] In December 2023, SAE International completed its standardization of the Tesla-developed NACS connector as SAE J3400. Several automotive manufacturers plan to make their model year 2025 EVs compatible with J3400, as discussed throughout this report (Joint Office of Energy and Transportation 2024b).

National Charging Network: Estimating U.S. Light-Duty Demand for Electric Vehicle Charging Infrastructure, projects there will be 33 million EVs on the road by 2030 (Wood et al. 2023). The NREL report estimates that approximately 28 million EV charging ports—including 1.2 million public EV charging ports and 26.8 million private EV charging ports—will be required by 2030 to support this fleet. NREL arrived at these estimates using the EVI-Pro, EVI-RoadTrip™, and EVI-OnDemand modeling tools, as well as assumptions on:

- Vehicle adoption
- Fleet composition (90% all-electric vehicles and 10% plug-in hybrid electric vehicles by 2030)
- Technology attributes
- Driving and charging behavior (90% of EVs have reliable access to residential charging by 2030, and therefore most charging occurs at home).

The remainder of this section focuses on how today's public charging infrastructure measures up against the needed public infrastructure in this baseline scenario.[8]

The 1.2 million public EV charging ports modeled by NREL include 182,000 DC fast EV charging ports with a power output of 150 kW or greater and 1,067,000 Level 2 EV charging ports (Wood et al. 2023). As of Q2, there were 24,241 public DC fast EV charging ports with a power output of 150 kW or greater and 142,734 public Level 2 EV charging ports in the Station Locator.[9] Based on data in the Station Locator in Q2, 13.3% of the estimated DC fast EV charging ports and 13.4% of the estimated Level 2 EV charging ports have been installed to support the infrastructure needs of the 2030 fleet.

Note that a large share of the public DC fast EV charging ports (58.4%) and a small portion of the Level 2 EV charging ports (7.3%) are on the Tesla Supercharger and Destination networks, respectively. As such, these ports are not readily accessible to non-Tesla drivers without the use of an adapter, and some are not available to non-Tesla drivers even with an adapter. When public EV charging ports on the Tesla networks are excluded, the number of DC fast and Level 2 EV charging ports currently installed to support the 2030 fleet drops to 8,875 (4.9%) and 132,342 (12.4%), respectively (Figure 2). However, as of June 30, 2024, 62% of registered all-electric vehicles on the road were Teslas (Experian Information Solutions 2024b). Further, as discussed throughout this report, several auto manufacturers have plans to adopt the J3400 connector, which will make EV charging ports on the Tesla Supercharger and Destination networks accessible to a greater number of vehicles beginning with model year 2025 vehicles. Currently, 0.01% (221) of DC fast charging ports on the Tesla Supercharger network are equipped with a Magic Dock, discussed further in Section 2.1.1.

[8] Wood et al.'s (2023) private infrastructure scenario includes EV charging ports at single-family residences, which, as noted in Section 1.1, are not tracked in the Station Locator. Further, as discussed in Section 2.2, private EV charging data in the Station Locator may be underrepresented. Given the Station Locator's robust public EV charging dataset, this section focuses on Wood et al.'s (2023) public infrastructure scenario only.
[9] As discussed in Section 2.1.1, power output data are currently only available for 76.2% of public DC fast EV charging ports in the Station Locator; therefore, the number of DC fast EV charging ports with a power output of 150 kW or greater is likely underrepresented.

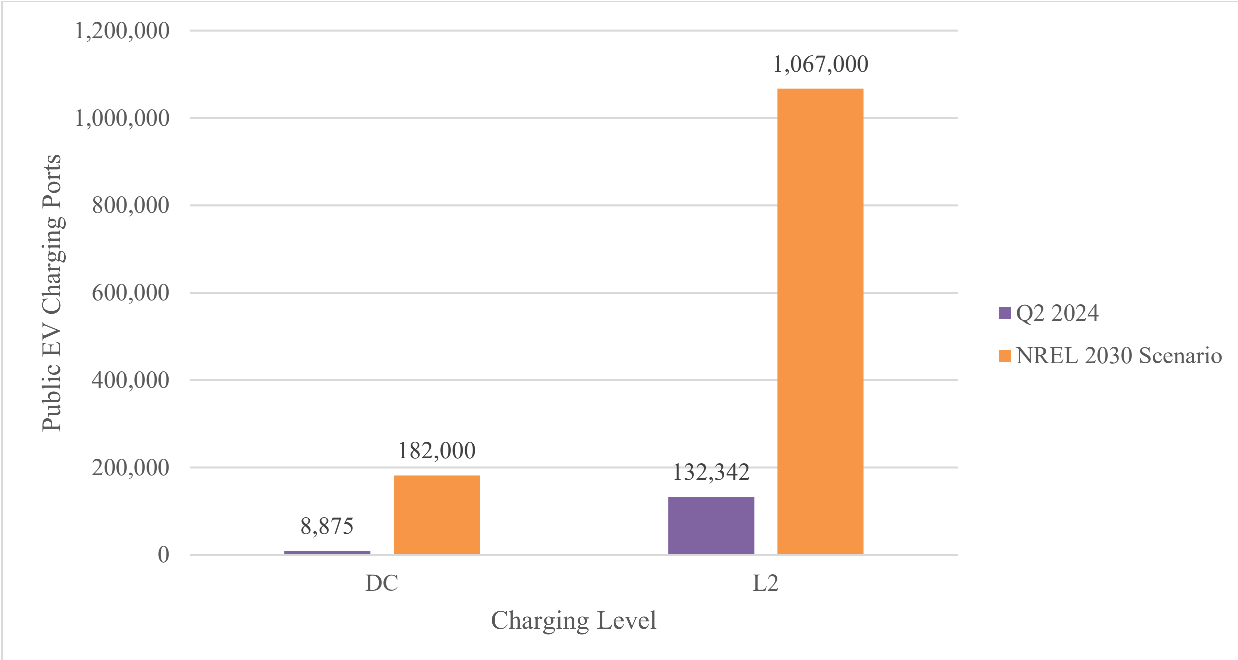

Figure 2. Current availability of public charging (excluding Tesla-only) versus NREL's scenario of 2030 public infrastructure requirements in the United States

By 2030, Wood et al.'s baseline scenario also estimates that there will need to be 0.6 public DC fast EV charging ports and 3.2 public Level 2 EV charging ports per 100 EVs. As of June 30, 2024, there were approximately 5.2 million EVs on the road in the United States (Experian Information Solutions 2024b). In Q2, the ratios of public DC fast and Level 2 EV charging ports per 100 EVs were 0.5 and 2.7, respectively. These ratios include EV charging ports on both the Tesla Supercharger and Destination networks (Table 1). Using Wood et al.'s estimated ratios of the number of public DC fast and Level 2 EV charging ports per 100 EVs as a proxy for how much infrastructure is sufficient to meet charging needs in 2030, Table 1 suggests that, as of Q2, the deployment of public DC fast and Level 2 EV charging ports falls short. However, 15.9% of the projected 33 million light-duty EVs in NREL's analysis were on the road as of Q2. As EV registrations continue to grow each quarter, and especially if EV adoption levels increase in line with the study by Wood et al., public EV charging port installations will need to ramp up significantly to keep up with demand.

Table 1. Current Public EV Charging Ports per 100 EVs Versus NREL's Scenario of 2030 Infrastructure Requirements in the United States

Port Level	EV Charging Ports per 100 EVs in Q2 2024	EV Charging Ports per 100 EVs Needed in 2030 To Support 33 Million EVs
DC fast	0.5	0.6
L2	2.7	3.2

2 EV Charging Infrastructure Trends

The purpose of this report is to identify EV charging infrastructure trends for Q2 of 2024. EV charging ports in the Station Locator increased by 6.3%, or 12,485 ports, between Q1 and Q2 2024. Public EV charging ports, which account for most of the EV charging ports in the Station Locator (89.0%), increased by 11,504, or 6.5%, while private EV charging ports increased by 981, or 4.4% (Figure 3). Since the first iteration of this report in Q4 2019, EV charging ports in the Station Locator have grown by 124,030, or approximately 142%.

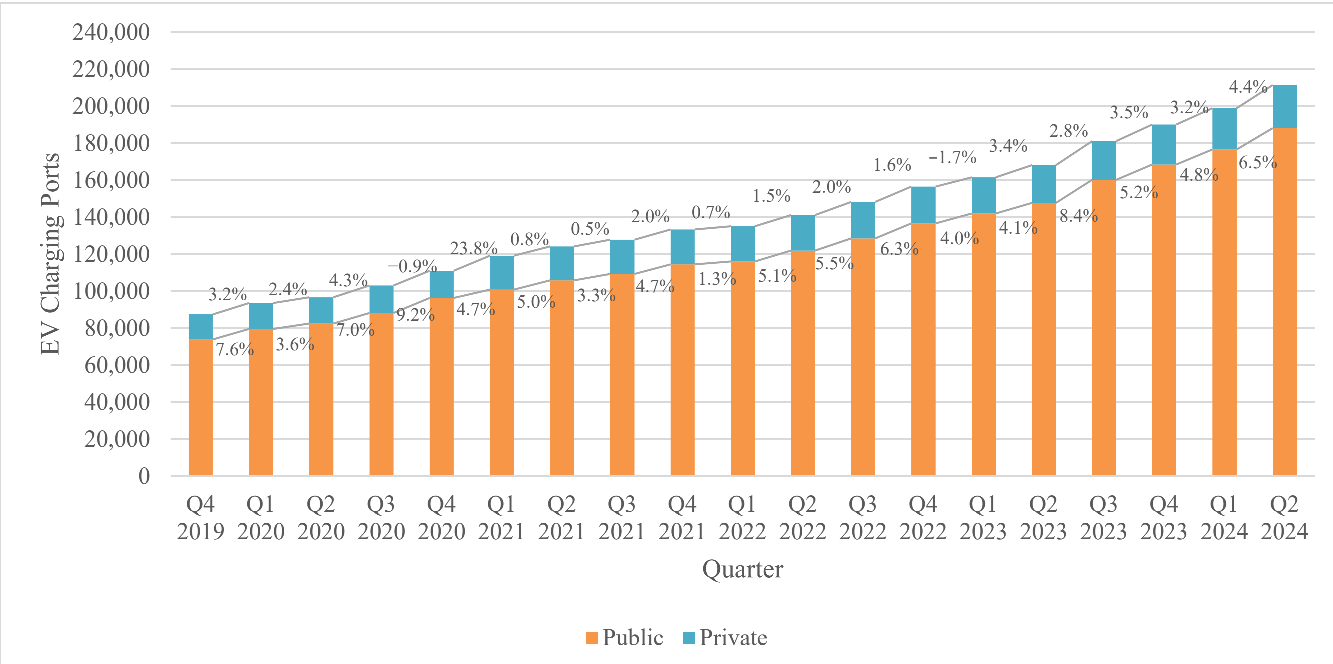

Figure 3. Quarterly growth of EV charging ports by access.

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

The following sections break down the growth of public and private EV charging ports further to highlight differences in growth across various metrics in Q2 2024, including access, charging level, network, geographic region, state, fleet charging, and charging at multifamily housing facilities. Because the number of EV charging ports represents the number of vehicles that can charge simultaneously at an EV charging station, this report focuses on EV charging port growth.

2.1 Public Charging Trends

As previously mentioned, public EV charging refers to EV charging stations that are available to all EV drivers and located in publicly accessible locations, such as commercial locations or along highway corridors. In Q2 2024, there were 188,096 public EV charging ports in the Station Locator. Between Q1 and Q2 2024, the number of public EV charging ports increased by 6.5%, or 11,504 public EV charging ports. The following sections break down the growth of public EV charging ports by charging level, network, region, state, housing density, and disadvantaged community (DAC) designation.

2.1.1 By Charging Level

As shown in Figure 4, most public EV charging ports in the Station Locator are Level 2, followed by DC fast and Level 1. However, in almost every quarter since Q4 2019, DC fast ports have increased by the greatest percentage compared to other charging levels (Figure 4). Public DC fast EV charging ports grew by 7.4% in Q2 2024, representing the addition of 3,047 EV charging ports. The rise in DC fast EV charging ports in Q2 is primarily driven by new station additions in California, which represent 27.8% of new DC fast EV charging ports in the Station Locator. The next largest increases in new DC fast EV charging ports were in Texas, Florida, and New York, which represent 6.6%, 6.4%, and 6.1% of new DC fast EV charging ports in Q2, respectively. Meanwhile, public Level 2 EV charging ports grew by 6.3% between Q1 and Q2 2024, equivalent to the addition of 8,415 ports. Similar to the increase in DC fast charging ports and consistent with the trend seen in Q1 2024, the rise in public Level 2 EV charging ports was primarily due to new station additions across California, which made up 21.4% of the new public Level 2 charging ports added to the Station Locator. This is followed by New York (13.8%), Connecticut (7.7%), and Florida (7.08%). Public Level 1 EV charging ports increased by 5.1%, representing the addition of 42 ports (Figure 4). This growth can be attributed to a large update received from EvGateway in Q2, as discussed in Section 2.1.2.

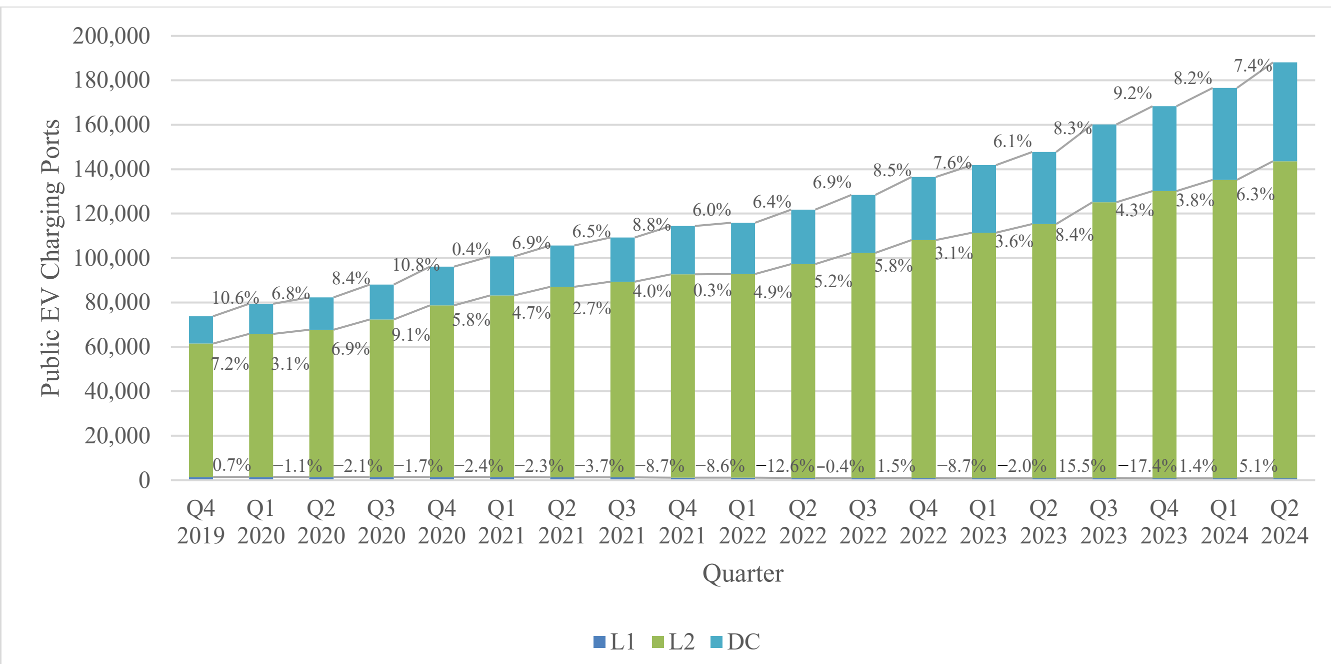

Figure 4. Quarterly growth of public EV charging ports by charging level.

Note: Figure excludes legacy EV charging ports that are not classified by charging level and are no longer manufactured. As of Q2, there were 26 public legacy EV charging ports in the Station Locator. Additionally, the percentages in this figure indicate the percent growth between each quarter.

Compared to Level 1 and Level 2 EV charging ports, DC fast EV charging ports have the highest power output among the charging levels, allowing them to charge EVs in the least amount of time. One conclusion drawn from NREL's report, *The 2030 National Charging Network: Estimating U.S. Light-Duty Demand for Electric Vehicle Charging Infrastructure,* is that deploying a dependable network of public DC fast chargers is essential for driving EV adoption in the United States (Wood et al. 2023). Therefore, it is important to highlight trends in the growth of DC fast EV charging ports in the Station Locator. While Level 1 EV charging ports typically have a power output of around 1–2 kW, and Level 2 EV charging ports can operate at up to 19.2 kW, the power output of DC fast EV charging ports varies and can provide up to 500 kW.

Note that as of Q2, power output data are available for 76.2% of the 44,470 public DC fast EV charging ports in the Station Locator, up from 37.8% of public DC fast EV charging ports in Q4 2019. Thus, Figure 5 is based on power output data for 33,871 DC fast EV charging ports.[10] Additionally, if a DC fast EV charging port has two connectors with different power outputs, only the maximum power output is counted in Figure 5.

In a departure from Q1 2024, the largest increase in the quantity of DC fast EV charging ports occurred in those with a power output of 350 kW or greater (16.2%), as shown in Figure 5. These new stations were added across more than a dozen networks, though primarily on the EVgo and WattEV networks in California. Across all EV charging networks, the states that saw the next largest increase in DC fast EV charging ports with a power output of 350 kW or greater were New York, Texas, Ohio, and Utah.

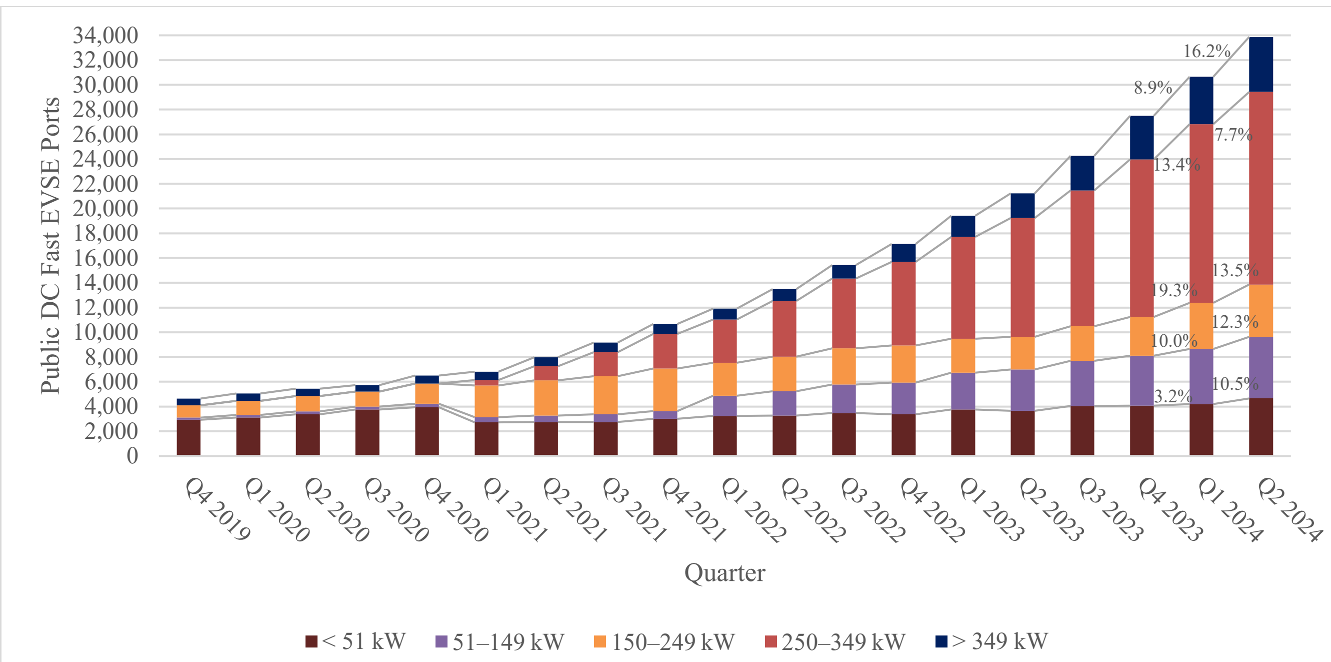

Figure 5. Quarterly growth of public DC fast EV charging ports by power output.

Note: The percentages in this figure indicate the percent growth between each quarter. For an explanation of the changes seen in Q1 2021, see the Q1 2021 report (Brown, Schayowitz, and Klotz 2021).

There are currently three types of connectors available for DC fast chargers: CHAdeMO, CCS, and J3400. As noted in Section 1.1, not all EVs are compatible with each connector type. Most EV models entering the market today can charge using the CCS connector, while the all-electric

[10] The remaining 23.8% of public DC fast EV charging ports are primarily on the Tesla Supercharger network. The Station Locator team is working to close this gap by requesting these data from Tesla and site hosts of non-networked stations.

Nissan LEAF and Mitsubishi Outlander plug-in hybrid electric vehicles are the only models still available in the United States with the CHAdeMO connector standard. Currently, only Tesla vehicles can charge with the J3400 connector without the use of an adaptor. However, the EV industry has announced plans for widespread adoption of the J3400 connector, and many model year 2025 EV models will be manufactured with the J3400 standard (Joint Office of Energy and Transportation 2024b). Tesla has launched the Magic Dock at several Tesla Supercharger stations, which allows non-Tesla vehicles with the CCS standard to charge at Tesla Superchargers. Additionally, Tesla sells adapters that allow Tesla vehicles to charge at non-Tesla DC fast chargers with a CCS or CHAdeMO connector, and a growing number of auto manufacturers are working with Tesla to provide their customers with adapters so that they can begin charging at Tesla stations with J3400 connectors this year. For this report, however, the following excludes data on adapters and rather focuses on the EV charging ports that are native to vehicles and charging hardware.

As of June 30, 2024, approximately 62% of registered all-electric vehicles in the United States were Teslas and therefore compatible with the J3400 connector, 34% were compatible with the CCS connector, and 4% were compatible with the CHAdeMO connector (Experian Information Solutions 2024b).[11] Of the 52,893 DC fast connectors in the Station Locator as of Q2, CCS connectors grew by the largest percentage (14.7%), followed by J3400 connectors (4.3%) (Figure 6). Despite CHAdeMO-compatible vehicles making up the smallest percentage of registered EVs, the number of CHAdeMO connectors in the Station Locator continued to grow (4.3%) in Q2. One possible reason for this continued growth is that, historically, some grant and incentive programs have required that public DC fast stations have both CHAdeMO and CCS connectors available to be eligible for funding. Additionally, there continue to be older EV models on the road with the CHAdeMO standard. However, CHAdeMO connectors continue to make up a smaller share of public DC fast connectors each quarter. Between Q4 2019 and Q1 2024, the share of DC fast connectors that were CHAdeMO in the Station Locator declined from 22.1% to 16.9%.

[11] These figures exclude plug-in hybrid electric vehicles because most are not compatible with DC fast EV charging ports.

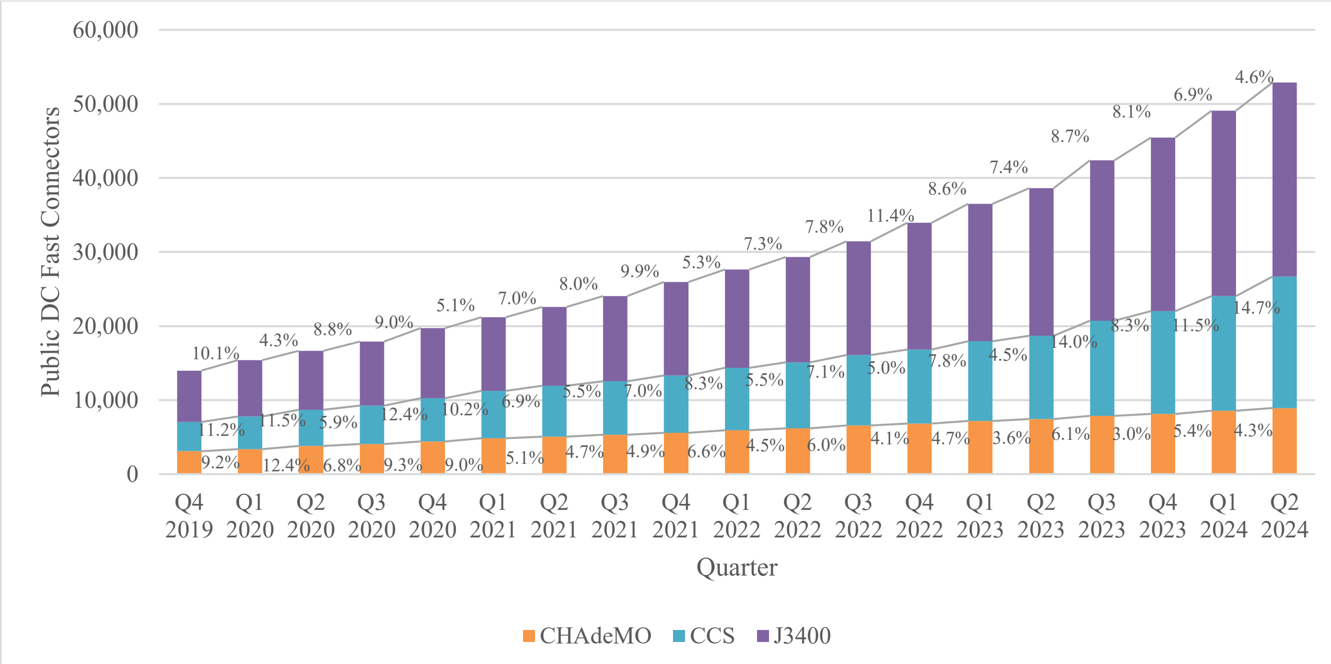

Figure 6. Quarterly growth of public DC fast connectors by type.

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

2.1.2 By Network

The Station Locator team collaborates with most major EV service providers (EVSPs) to gather EV charging infrastructure data for the Station Locator. As of Q2, the Station Locator incorporates stations from the 52 networks listed below, 18 of which update nightly through an API (marked with asterisks). Stations from five new networks were added to the Station Locator in Q2: ABM, Applegreen Electric, ChargeSmart EV, PowerPump, and WattEV. In addition, the Station Locator contains non-networked (NON) station data, which includes stations that were previously networked.

- 7Charge (7CHARGE)
- ABM (ABM)*
- AmpedUp! Networks (AMPED_UP)
- AmpUp (AMPUP)
- Applegreen Electric (APPLEGREEN)
- Blink (BN)*
- bp pulse (BP_PULSE)*
- ChargeNet (CHARGENET)
- ChargeLab (CHARGELAB)
- ChargePoint (CPN)*
- ChargeSmart EV (CHARGESMART_EV)*
- ChargeUp (CHARGEUP)*
- Chargie (CHARGIE)
- Circle K (CIRCLE_K)
- Electrify America (EA)*
- EnviroSpark (ENVIROSPARK)
- EVBOLT (EVBOLT)
- EV Charging Solutions (EVCS)
- EV Connect (EVC)*
- EV Range (EVRANGE)*
- EvGateway (EVGATEWAY)
- EVgo (EVN)*
- EVmatch (EVMATCH)
- eV Power (EVPOWER)
- FLASH (FLASH)*
- FLO (FLO)*
- FPL EVolution (FPLEV)
- Francis Energy (FCN)*
- Graviti Energy (GRAVITI_ENERGY)

- Honey Badger (HONEY_BADGER)
- Jule (JULE)
- Livingston Energy Group (LIVINGSTON)
- Loop (LOOP)
- Noodoe (NOODOE)
- OpConnect (OC)*
- PowerFlex (POWERFLEX)
- PowerNode (POWER_NODE)
- PowerPump (POWERPUMP)
- Red E Charging (RED_E)
- Revel (REVEL)
- Rivian Adventure Network (RIVIAN_ADVENTURE)*
- Rivian Waypoints (RIVIAN_WAYPOINTS)*
- Shell Recharge (SHELL_RECHARGE)*
- Stay-N-Charge (STAY_N_CHARGE)
- SWTCH Energy (SWTCH)
- Tesla Destination (TESLAD)
- Tesla Supercharger (TESLA)
- TurnOnGreen (TURNONGREEN)
- Universal EV Chargers (UNIVERSAL)
- Volta (VLTA)*
- WattEV (WATT_EV)
- ZEF Energy (ZEFNET)

In line with preceding quarters, the ChargePoint network continued to have the most public EV charging ports in the Station Locator in Q2, with 68,936 EV charging ports, or 36.8% of all EV charging ports in the Station Locator. Level 2 EV charging ports continue to make up most of ChargePoint's network (95.2%). The pattern of Level 2 EV charging ports comprising the majority of the overall share of ports is observed across various networks in the Station Locator, with the exception of the 7Charge, Applegreen Electric, BP Pulse, ChargeNet, Circle K, Electrify America, EVgo, eV Power, Francis Energy, FPL EVolution, Jule, Loop, PowerNode, Rivian Adventure Network, Revel, Tesla Supercharger, and WattEV networks (Figure 7). These networks predominantly, if not completely, comprise DC fast EV charging ports. In Q1, the Tesla Supercharger network continued to comprise the largest share of public DC fast EV charging ports across the networks in the Station Locator (58.4%), followed by Electrify America (9.6%), EVgo (7.6%), and ChargePoint (7.3%) (Figure 8).

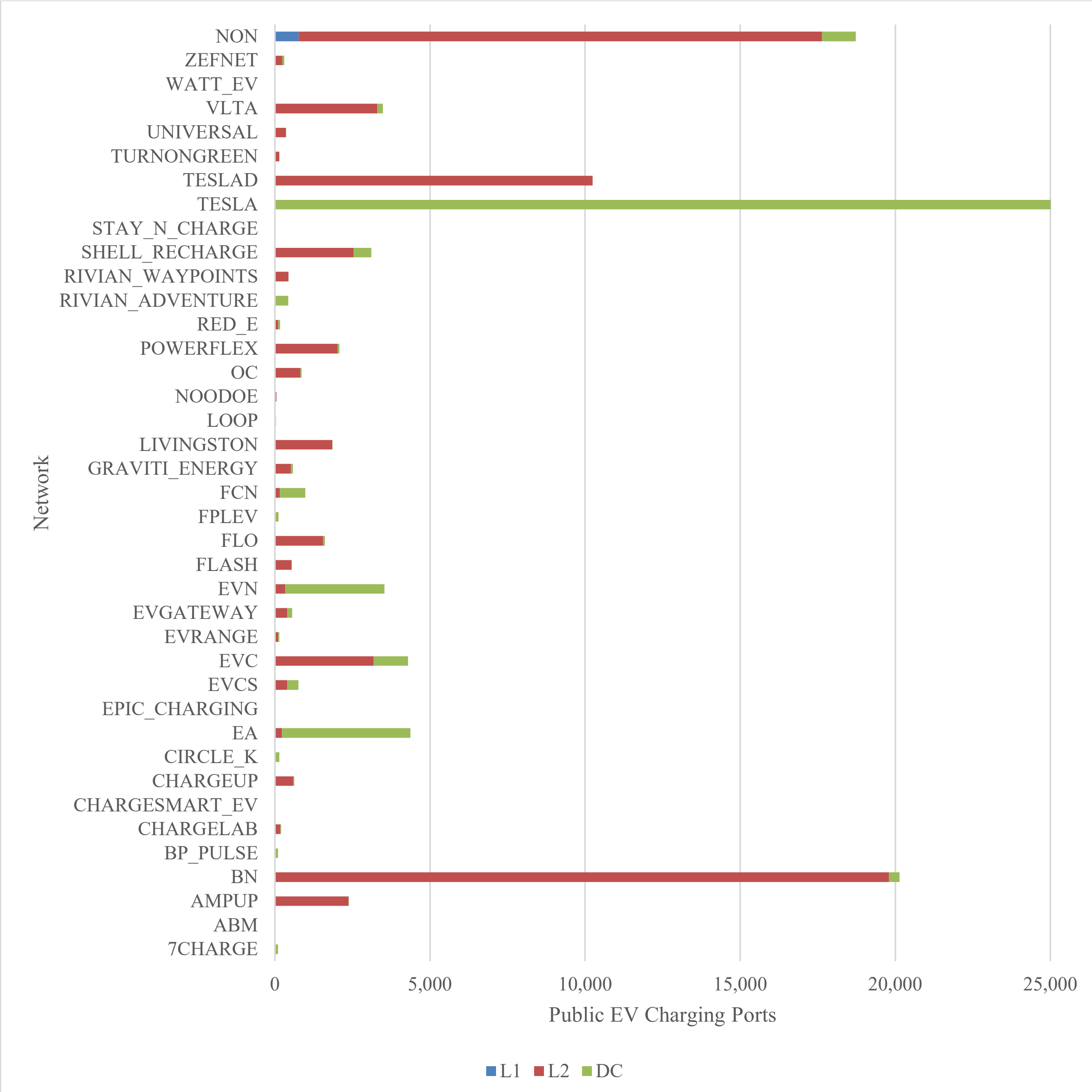

Figure 7. Breakdown of public EV charging ports by network and charging level in Q2 2024.

Note: ChargePoint is excluded from this figure. The size of its network is much larger than others and therefore skews the graph. Further, this graph only includes charging networks with more than 100 EV charging ports in the Station Locator. Finally, please see the full names of each network and their acronym on pages 10 and 11.

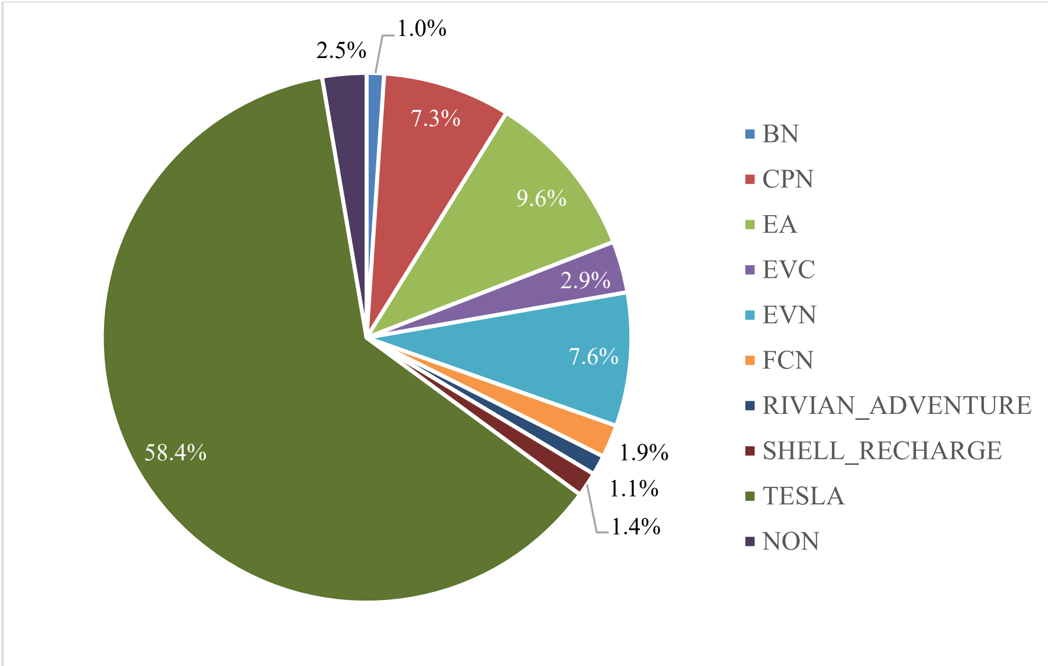

Figure 8. Breakdown of public DC fast EV charging ports by network in Q2 2024.

Note: Figure excludes networks that comprise less than 1% of public DC fast EV charging ports.

Table 2 presents the percent growth of each network over the last four quarters. The Noodoe (1,696.2%), Stay-N-Charge (975.0%), and Loop (773.5%) networks experienced the most growth in Q2, representing the addition of 882, 78, and 263 EV charging ports, respectively. The growth of the Noodoe network between Q1 and Q2 2024 can be attributed to the integration of the network's API, allowing for nightly updates. The large growth seen on the Stay-N-Charge and Loop networks in Q2 2024 are a result of the Station Locator's manual data collection process, as noted in Section 1. The manual data collection process also contributed to the large growth on the EvGateway (403.6%), PowerNode (350.0%), Chargie (64.7%), and ChargeLab (61.5%) networks.

In contrast, there was a decrease in the number of public EV charging ports in Q2 among the EV Range (-20.9%), Graviti Energy (-3.6%), and OpConnect (-1.7%) networks. The decrease in EV Range ports was largely due to a data sharing issue that has since been resolved. These EV charging ports will be added back in the Q3 2024 report. The decrease for Graviti Energy reflects the reclassification of EV charging ports from available to planned. These EV charging ports were not removed from the Station Locator, but they are excluded from this report, and therefore it appears as a decrease on the network. Finally, OpConnect's decrease in port counts is largely due to Level 2 ports closing in Hawaii, California, and Oregon.

Table 2. Growth of Public EV Charging Ports by Network Over the Last Four Quarters

Network	Q3 2023 Growth	Q4 2023 Growth	Q1 2024 Growth	Q2 2024 Growth
7CHARGE	43.5%	15.2%	35.5%	2.9%
AMPUP	1.1%	24.7%	1.4%	14.1%
AMPED_UP	0.0%	0.0%	0.0%	0.0%
BN	238.5%	2.8%	4.8%	2.3%
BP PULSE	N/A	N/A	N/A	50.0%
CHARGELAB	2.3%	14.3%	0.0%	61.5%
CHARGENET	N/A	N/A	N/A	0.0%
CHARGEUP	255.6%	1,825.0%	1.3%	45.7%
CHARGIE	0.0%	0.0%	0.0%	64.7%
CIRCLE_K	46.2%	26.3%	50.0%	11.1%
CPN	4.0%	3.7%	4.0%	2.1%
EA	12.1%	4.3%	1.6%	3.0%
ENVIROSPARK	N/A	N/A	100%	0.0%
EVBOLT	N/A	N/A	N/A	0.0%
EVC	6.1%	5.5%	7.2%	9.2%
EVCS	11.4%	3.3%	0.0%	28.0%
EVGATEWAY	7.8%	1.7%	53.0%	403.6%
EVMATCH	N/A	−1.8%	−32.4%	26.7%
EVN	−0.4%	8.2%	6.6%	5.6%
EVPOWER	N/A	N/A	N/A	0.0%
EVRANGE	62.0%	5.5%	3.0%	−20.9%
FCN	−19.2%	81.2%	0.5%	0.6%
FLASH	−51.0%	25.2%	40.8%	26.0%
FLO	7.7%	9.3%	13.0%	10.1%
FPLEV	0.0%	4.9%	42.4%	29.8%
GRAVITI_ENERGY	141.4%	−1.4%	0.7%	−3.6%
HONEY_BADGER	N/A	N/A	N/A	0.0%
JULE	N/A	0.0%	0.0%	30.0%
LIVINGSTON	1.4%	−0.3%	27.1%	42.6%
LOOP	N/A	200.0%	3.0%	773.5%
NOODOE	2,000.0%	128.6%	8.3%	1,696.2%
OC	−9.1%	9.8%	2.5%	−1.7%
POWER_NODE	N/A	N/A	0.0%	350.0%
POWERFLEX	0.9%	13.2%	31.3%	3.6%

Network	Q3 2023 Growth	Q4 2023 Growth	Q1 2024 Growth	Q2 2024 Growth
RED_E	17.1%	61.5%	7.1%	9.6%
REVEL	N/A	0.0%	0.0%	0.0%
RIVIAN_ADVENTURE	36.2%	26.2%	12.5%	15.7%
RIVIAN_WAYPOINTS	12.2%	40.4%	16.3%	4.1%
SHELL_RECHARGE	11.9%	0.4%	−1.7%	12.2%
STAY_N_CHARGE	N/A	N/A	100%	975.0%
SWTCH	26.4%	17.6%	68.6%	2.7%
TESLA	8.6%	8.1%	6.9%	3.8%
TESLAD	0.2%	0.7%	1.7%	1.5%
TURNONGREEN	N/A	N/A	N/A	27.4%
UNIVERSAL	2.5%	9.2%	32.6%	23.5%
VLTA	2.3%	6.6%	1.8%	4.8%
ZEFNET	46.0%	7.4%	11.2%	48.9%
NON	0.6%	1.8%	0.0%	0.6%
Total	**8.4%**	**5.2%**	**4.8%**	**6.5%**

Note: N/A indicates that a network was not yet in the Station Locator in the quarter and therefore did not experience growth. Table excludes networks that were added to the Station Locator in Q2 2024.

2.1.3 By Region

The regional growth of public EV charging infrastructure was analyzed by dividing the country into the same seven regions used by the Clean Cities and Communities coalition network (Figure 9) (Clean Cities and Communities Coalition Network 2024a). See the Q1 2020 report for more information about the Clean Cities and Communities coalition network (Brown et al. 2020).

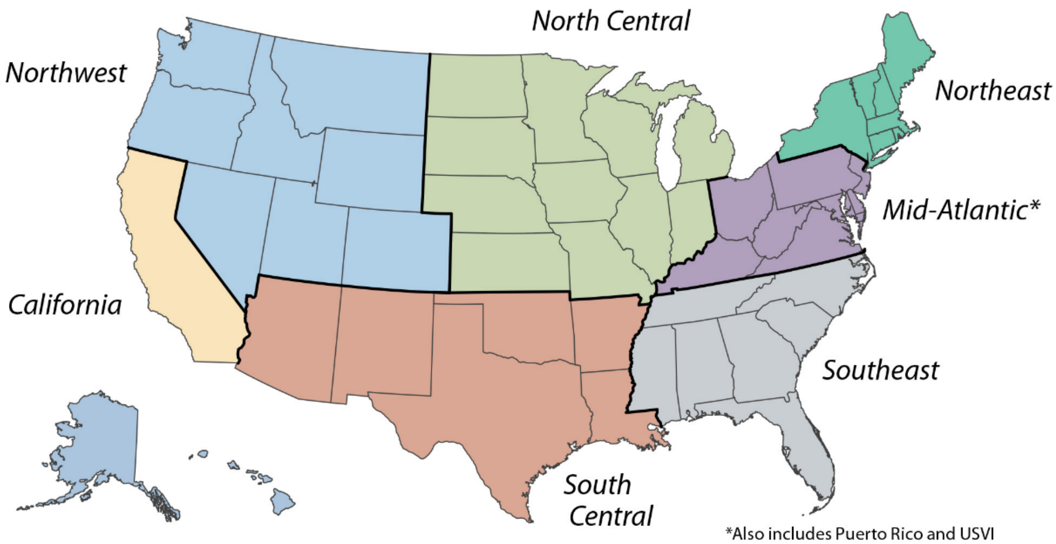

Figure 9. Clean Cities and Communities regions.

Source: Clean Cities and Communities Coalition Network (2024b)

As depicted in Figure 10, the California region continues to maintain the largest share of the country's public EV charging ports (26.3%) as of Q2. However, the Northeast region experienced the largest percentage growth (13.2%) as well as the largest actual growth of new EV charging ports (3,263). Growth in the Northeast region is mainly attributed to new Level 2 additions on the ChargePoint, EvGateway, Noodoe, and PowerFlex networks, along with the addition of DC fast EV charging ports on the Tesla Supercharger, Loop, and WattEV networks. The expansion of public DC fast EV charging ports in Q2 2024 outpaced that of Level 2 EV charging ports in all Clean Cities and Communities regions except for South Central (Clean Cities and Communities 2024b) (Table 3).

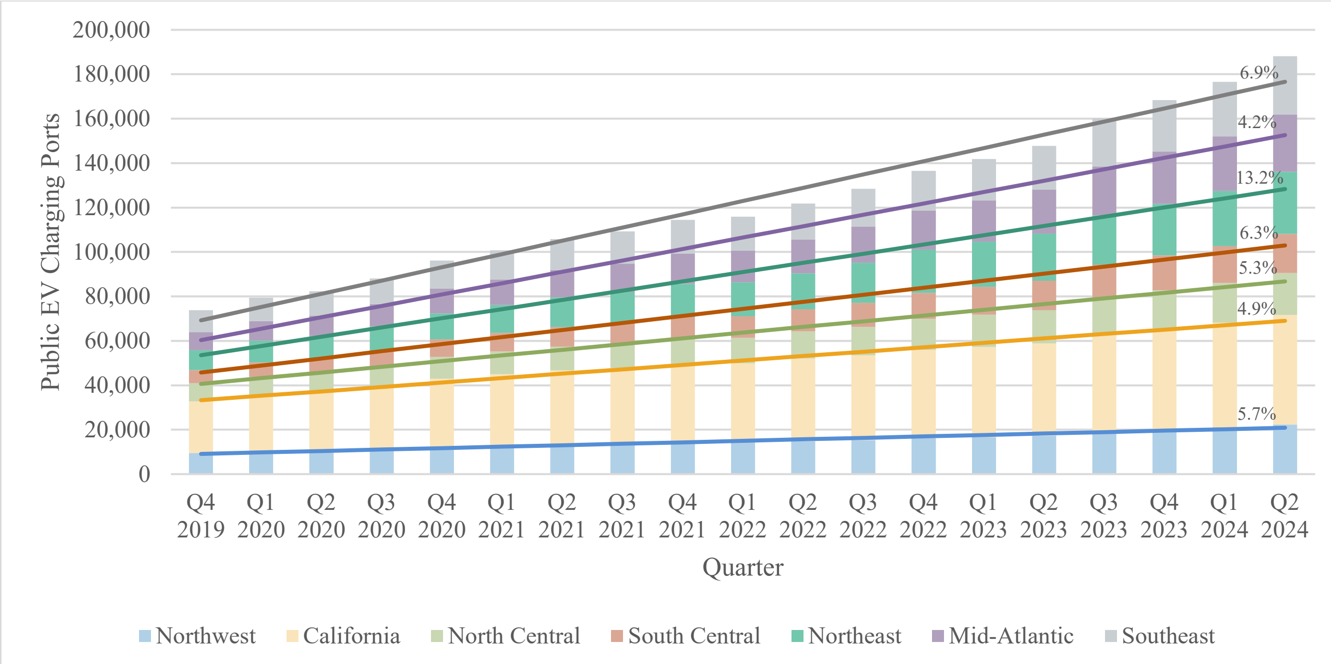

Figure 10. Quarterly growth of public EV charging ports by Clean Cities and Communities region.

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

Table 3. Growth of Public L2 and DC Fast EV Charging Ports by Clean Cities and Communities Region in Q2 2024

Clean Cities and Communities Region	Level 2 EV Charging Port Growth	DC Fast EV Charging Port Growth
California	4.2%	7.0%
Mid-Atlantic	4.0%	4.9%
North Central	4.2%	8.6%
Northeast	13.1%	13.7%
Northwest	5.5%	6.1%
Southeast	6.6%	8.2%
South Central	6.6%	5.9%

2.1.4 By State

To track the growth of EV charging ports by state, the Station Locator team calculated the number of public EV charging ports per 100 light-duty EV registrations in each state. The team chose this metric to compare charging infrastructure development across states on a basis that accounts for differing EV deployments by state. The District of Columbia is considered a state for this analysis, though U.S. territories, such as Puerto Rico, are excluded. The vehicle registration data are based on Experian's registration information as of Dec. 31, 2023 (Experian Information Solutions 2024a).

In Q2, Connecticut, New York, Utah, Delaware, and North Carolina were the five states with the most significant percentage growth of EV charging ports per 100 EVs, all surpassing the growth rate of the United States as a whole (6.5%) (Table 4). The growth seen in Connecticut is due to new Level 2 EV charging port installations on a variety of networks, most notably the EvGateway and ChargePoint networks, and the reclassification of Level 2 EV charging ports from private to public on the Livingston Energy network. Likewise, the growth in New York was driven by new Level 2 EV charging port installations on a variety of networks, most notably ChargePoint, ChargeSmart EV, and Livingston Energy, and Livingston Energy reclassifying Level 2 EV charging ports from private to public during their API integration. Finally, the growth in Utah is largely due to new installations on several networks, including EvGateway and ChargePoint.

Table 4. Top Five States With the Largest Growth of EV Charging Ports per 100 EVs in Q2 2024[12]

State	EV Charging Ports per 100 EVs in Q1 2024	EV Charging Ports per 100 EVs in Q2 2024	Growth of EV Charging Ports per 100 EVs in Q2 2024
Connecticut	5.3	7.4	40.2%
New York	5.6	6.4	15.4%
Utah	4.7	5.3	13.2%
Delaware	5.1	5.8	13.1%
North Carolina	4.9	5.4	10.2%

2.1.5 By Housing Density

To better understand where EV charging infrastructure is being deployed, the Station Locator team analyzed the growth of EV charging ports in urban, suburban, and rural areas across the United States. The Station Locator team used the U.S. Department of Housing and Urban Development's Urbanization Perceptions Small Area Index for this analysis. The index classifies census tracts as urban, suburban, or rural based on how American Housing Survey respondents described their neighborhood (U.S. Department of Housing and Urban Development Office of Policy Development and Research 2022). Based on the survey, approximately 27% of census tracts are urban, 52% are suburban, and 21% are rural. However, urban census tracts account for only approximately 1.3% of the United States' land area, whereas suburban and rural tracts account for 6.2% and 92.6%, respectively.

As shown in Figure 11, public EV charging ports are predominantly located in suburban census tracts, followed by urban and rural tracts. DC fast EV charging ports showed the largest growth by percentage across all density categories compared with Level 2 EV charging ports, while Level 1 EV charging ports decreased in rural areas and increased moderately in urban and suburban areas. DC fast EV charging ports grew by the largest percentage in urban areas (8.9%), followed by suburban and rural areas (8.1% and 7.8%, respectively).

[12] See Appendix A for the growth of EV charging ports per 100 EVs in all states in Q2.

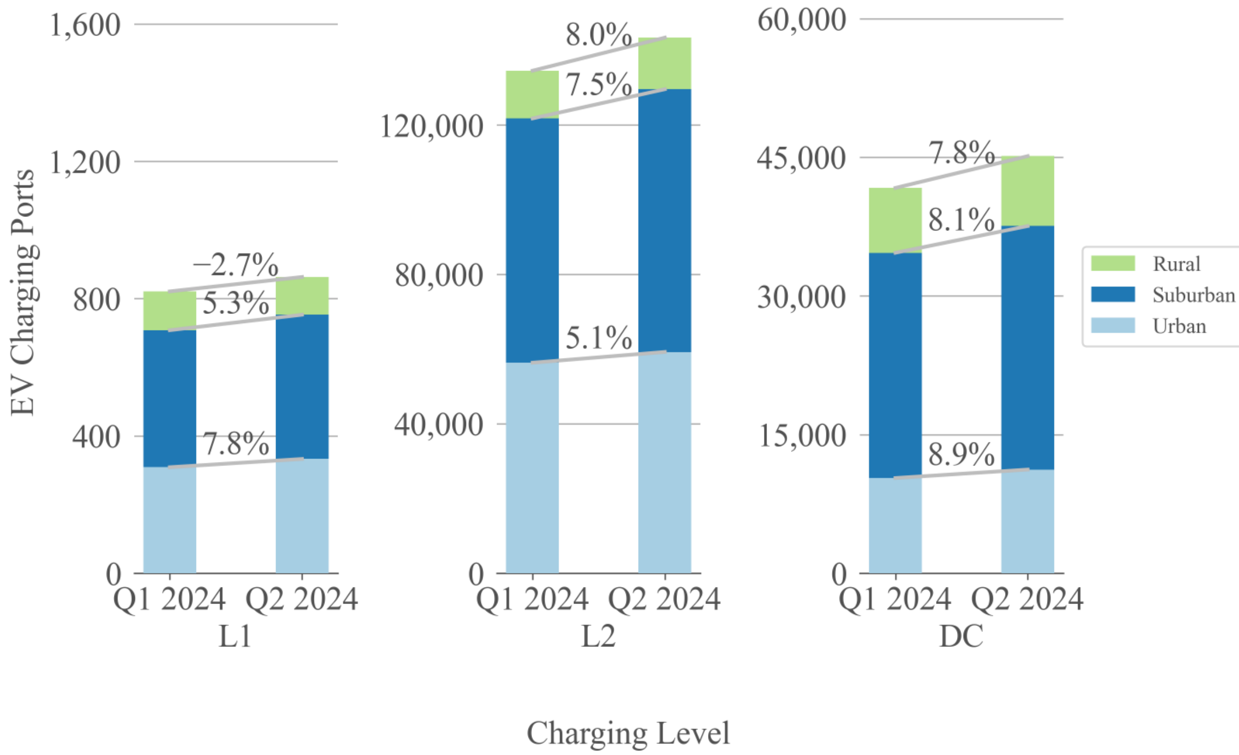

Figure 11. Q2 2024 growth of public EV charging ports by neighborhood type and charging level.

Note: These graphs are not to scale.

2.1.6 By DAC Designation

"Executive Order 14008: Tackling the Climate Crisis at Home and Abroad," issued in 2021, ensures that the benefits of federal climate investments flow to communities that have been historically underserved and disproportionately burdened by climate change, pollution, and environmental hazards (Executive Office of the President 2021a). The Justice40 Initiative, which came out of Executive Order 14008, directs 40% of the overall benefits of certain federal investments, including the National Electric Vehicle Infrastructure (NEVI) Formula Program, to DACs (The White House 2022). This section focuses on the growth of EV charging ports in both DACs and non-DACs for comparison. The map in Figure 12 shows the census tracts classified as DACs across the United States.

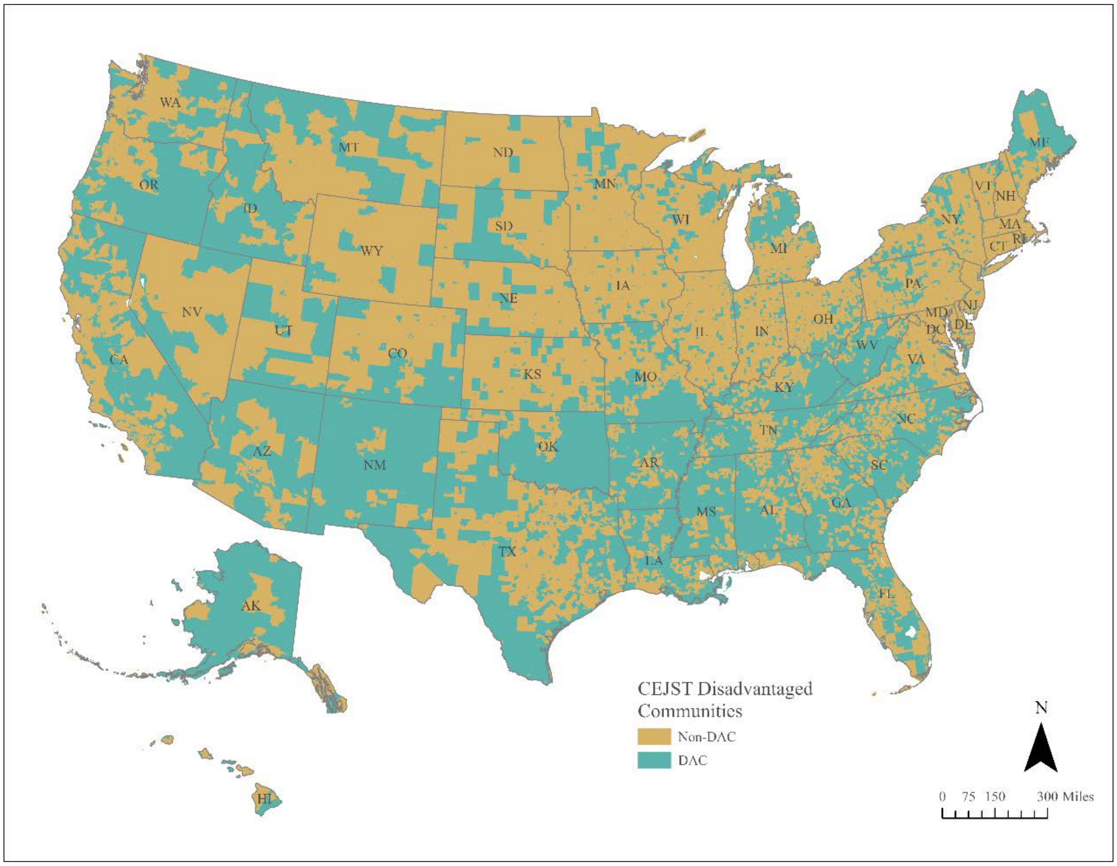

Figure 12. DACs across the United States.

Note: Alaska and Hawaii are not to scale.

The Station Locator team used the Council on Environmental Quality's Climate and Economic Justice Screening Tool for this section of the analysis. GIS shapefiles with these data are hosted by the Council on Environmental Quality (2024). The DAC shapefile was prepared by aggregating several social, economic, and environmental features into a spatial dataset. The data used by this analysis account for census tract-level indicators under several categories of burdens: climate change, energy, health, housing, legacy pollution, transportation, workforce development, and water and wastewater.

Overall, 24.6% of public EV charging ports across all charging levels are in DACs, up slightly from 24.2% from the previous quarter. As shown in Figure 13, the growth of DC fast and Level 2 EV charging ports in DACs slightly outpaced the growth in non-DACs. There was a slight increase of Level 1 ports in non-DACs and a significant 10.3% increase in DACs.

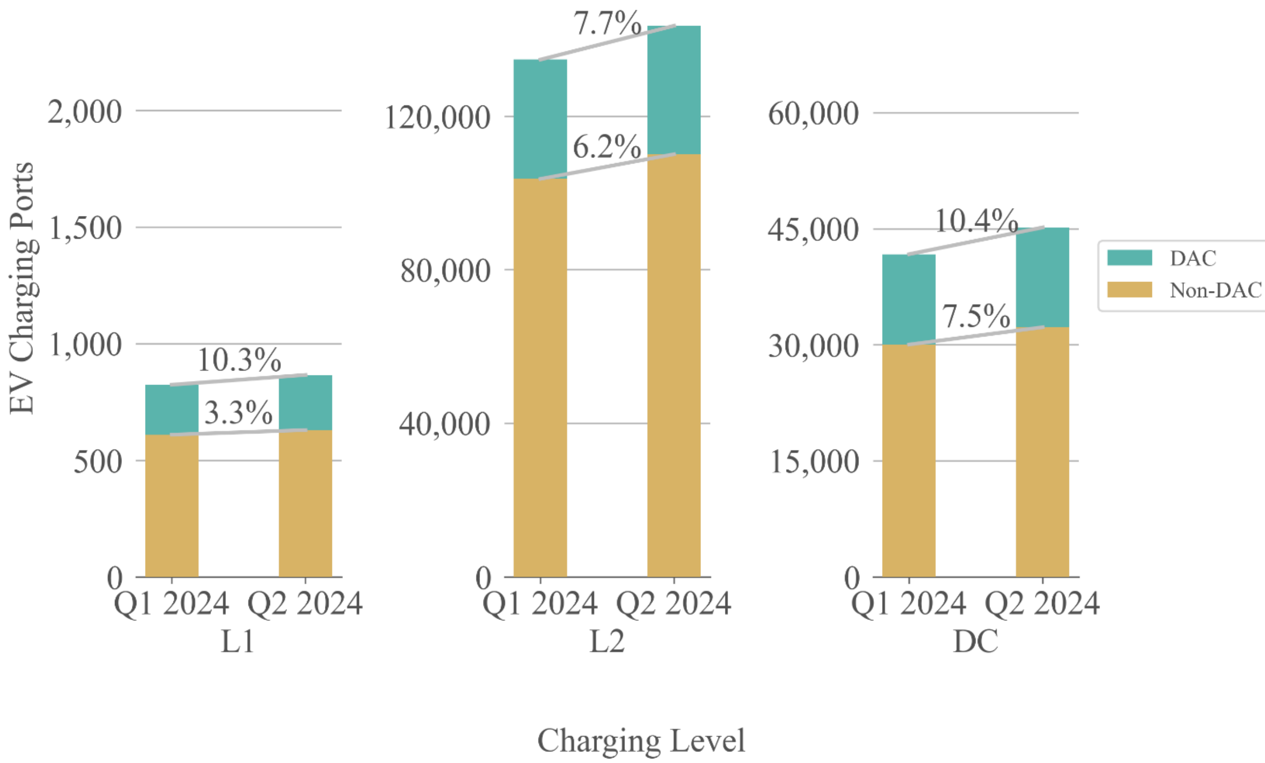

Figure 13. Q2 2024 growth of public EV charging ports by DAC designation and charging level.

Note: These graphs are not to scale.

2.2 Private Charging Trends

Private EV charging refers to EV charging stations that are available only to certain drivers for specific purposes, such as charging for transit fleets or employee-only charging at workplaces. In Q2 2024, the Station Locator experienced a 4.4% increase in private EV charging ports compared to the preceding quarter. Specifically, between Q1 and Q2 2024, private EV charging ports increased from 22,305 to 23,286, a difference of 981 EV charging ports. The following sections break down the growth of private EV charging ports by level, as well as by three specific types: workplace, multifamily housing, and fleet charging.

Note that although the Station Locator team proactively seeks out new station openings to include, the opening of private charging stations may not necessarily be shared publicly. The Station Locator team therefore relies on Clean Cities and Communities coalitions, industry partners, and Station Locator users to share this information. Due to the challenge in collecting these data, private, nonresidential charging stations are likely underrepresented in the Station Locator. However, the Station Locator team is continually working to improve data collection in these areas.

2.2.1 By Charging Level

Most of the private EV charging ports in the Station Locator are Level 2, comprising 88.1% of all private EV charging ports (Figure 14). In Q2, the growth of private EV charging ports was primarily driven by the addition of 879 Level 2 EV charging ports, representing an increase of

4.5% (Figure 14). More than half of the new private Level 2 EV charging ports were added on the AmpUp and EVCS networks, and most of these were in California. Similar to Q1 2024, although private Level 2 EV charging ports grew by the largest number of new installations, private DC fast EV charging ports grew by the largest percentage (22.4%), representing the addition of 100 EV charging ports. Nearly half of new private DC fast EV charging ports were added on the ABM network. Meanwhile, Level 1 EV charging ports increased by 2 EV charging ports, or 0.1%.

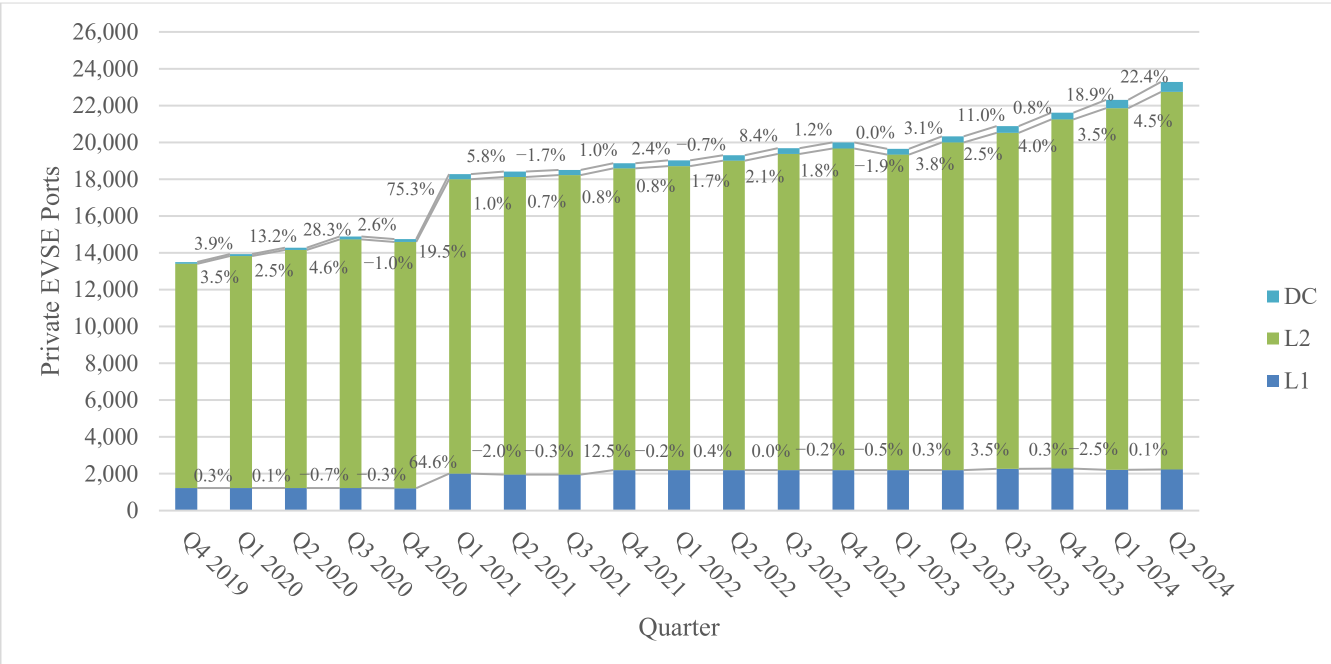

Figure 14. Quarterly growth of private EV charging ports by charging level.

Note: Figure excludes legacy EV charging ports that are not classified by charging level and are no longer manufactured. As of Q2, there were two private legacy EV charging ports in the Station Locator. Additionally, the percentages in this figure indicate the percent growth between each quarter. Finally, the large increase in Q1 2021 is primarily attributed to the addition of federally owned EV charging ports from NREL's Federal Fleets team.

2.2.2 Workplace Charging

Workplace EV charging infrastructure consists of charging stations that are private and designated exclusively for employee use. In the Station Locator, the vast majority (95.4%) of private workplace EV charging ports are Level 2 (Figure 15). This is expected because employees typically use workplace chargers while their vehicles are parked for an extended period at work, making rapid charging less necessary. As previously noted, data on private workplace charging ports in the Station Locator are likely underrepresented.

In Q2, 186 Level 2 EV workplace charging ports were added to the Station Locator, representing a growth rate of 1.8% (Figure 15). New private workplace Level 2 EV charging ports were added across California, Colorado, Ohio, Pennsylvania, and Texas, most of which are on the EvGateway network. Meanwhile, the count of private workplace DC fast charging EV charging ports increased by 3, representing a growth rate of 0.8% and bringing the total number of DC fast EV charging ports to 93. Finally, Level 1 EV charging ports increased by 3 EV charging ports, or 3.7%.

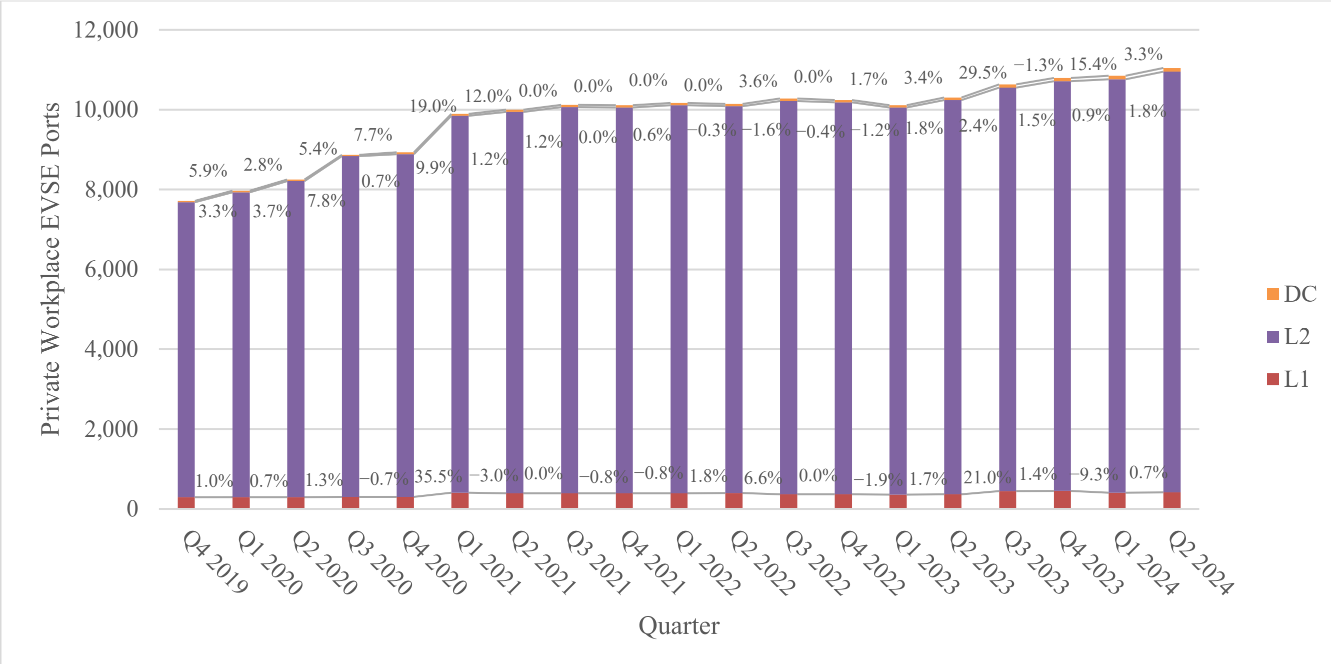

Figure 15. Quarterly growth of private workplace EV charging ports by charging level.

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

2.2.3 Multifamily Housing Charging

The Station Locator team continues to prioritize capturing private charging infrastructure installed at multifamily housing that is available for resident use only. As of Q2, EV charging ports at multifamily housing constituted 9.8% of private EV charging ports in the Station Locator. As shown in Figure 16, multifamily housing EV charging ports in the Station Locator are either Level 1 or Level 2, with the overwhelming majority (99.2%) being Level 2. While the number of Level 1 multifamily housing EV charging ports remained unchanged between Q1 and Q2 2024, Level 2 multifamily EV charging ports decreased by 7.5%, or 182 ports (Figure 16). In particular, New York saw a decrease of 520 EV charging ports, and Connecticut saw a decrease of 92 EV charging ports due to Livingston Energy reclassifying EV charging ports from private to public. Despite the overall decrease in Level 2 EV charging ports, the Station Locator added 122 new Level 2 EV charging ports in Q2, all of which are on the AmpUp network.

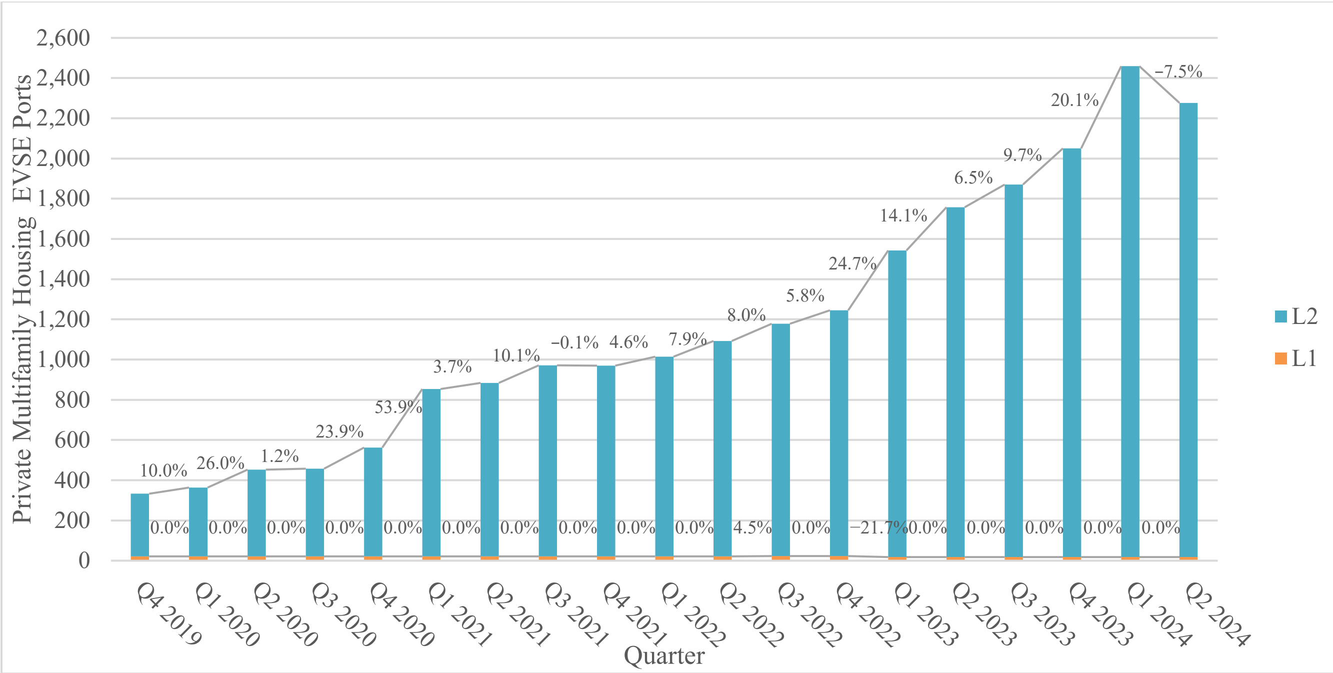

Figure 16. Quarterly growth of private multifamily housing EV charging ports by charging level.

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

2.2.4 Fleet Charging

The Station Locator team collects data on whether stations are dedicated fleet charging stations through outreach to station owners and operators. If they are, the team categorizes the types of vehicles that charge at the station based on Federal Highway Administration (FHWA) weight classes (i.e., light-duty, medium-duty, or heavy-duty vehicles). As of Q2 2024, the team has collected this information for 93.5% of private EV charging ports in the Station Locator, of which 36.0% are being used for fleet charging purposes. Note that some fleet EV charging ports are also used by employees and are therefore counted as workplace EV charging ports in Section 2.2.2 as well.

Figure 17 displays the breakdown of these EV charging ports by fleet type and charging level. The fleet type indicates the largest vehicle type that uses the station as of Q2 based on the types of vehicles in the fleet, though smaller vehicle types may charge at the station as well. The majority of EVs on the road are light-duty vehicles, such as sedans, SUVs, and pickup trucks; unsurprisingly, the majority of fleet charging EV charging ports are used to charge light-duty vehicles (Figure 17). Additionally, the majority of fleet charging EV charging ports are Level 2 (75.1%).

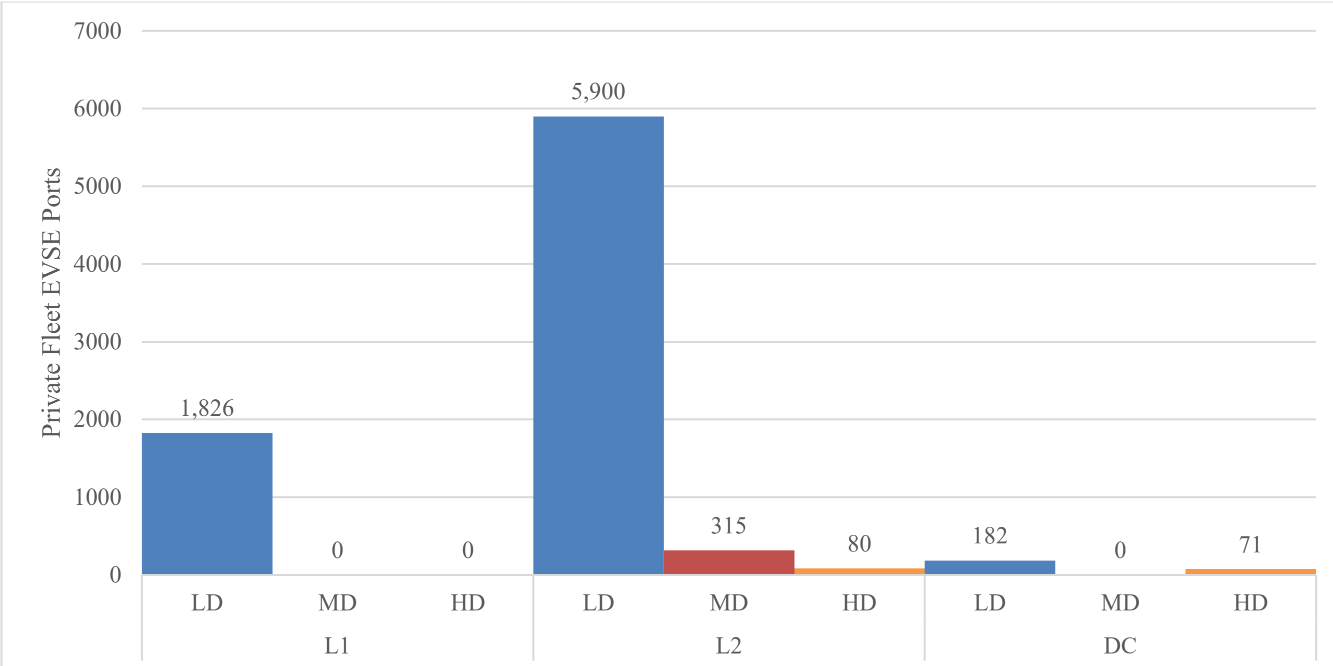

Figure 17. Breakdown of private fleet EV charging ports by charging level and fleet type in Q2 2024.

Note: LD = light-duty, MD = medium-duty, and HD = heavy-duty

The Station Locator team continues to expand its private fleet data collection efforts, especially for fleets that are installing charging infrastructure for medium- and heavy-duty vehicles, such as school bus fleets and public transit fleets. Additionally, the Station Locator team is tracking the development of medium- and heavy-duty charging infrastructure and will collect additional data, such as new connector types, as the technology evolves and is deployed.

3 Developments That Could Impact Future Quarters

Federal funding opportunities and changes in the landscape of the EV charging market characterized Q2 2024. First, Vermont and Utah opened their first NEVI Formula Program-funded EV charging stations, joining Ohio, New York, Pennsylvania, Hawaii, and Maine (Joint Office of Energy and Transportation 2024a). Funded by the Bipartisan Infrastructure Law and discussed in previous reports, the NEVI Formula Program provides funding to states to strategically deploy EV charging infrastructure. States must first build charging stations along FHWA-designated Alternative Fuel Corridors to build out a national network and ensure a convenient, affordable, reliable, and equitable charging experience for all users. Further, states must develop the infrastructure according to the NEVI Standards and Requirements final rule published in Q1 2023, including communicating the price for charging in dollars per kilowatt-hour (kWh) (FHWA 2023). In Q2, Nebraska became one of the last states to implement a public utility definition that allows for networks and site hosts to begin charging customers by the kWh with the passage of Legislative Bill 1317, removing a barrier to EV charging infrastructure development in the state under this program (Nebraska Legislature 2024).

Also funded by the Bipartisan Infrastructure Law, FHWA released a Notice of Funding Opportunity for Round 2 of the Charging and Fueling Infrastructure (CFI) Discretionary Program, reserving $1.3 billion dollars, including a set-aside from the NEVI Formula Program, to accept applications from new and returning applicants (FHWA 2024). As with the first round, CFI funding will be used to install EV charging and alternative fueling infrastructure in communities via Community Charging and Fueling Grants and along FHWA-designated Alternative Fuel Corridors via Alternative Fuel Corridor Grants. The growth of EV charging ports funded by the NEVI Formula Grant Program and the CFI Discretionary Program will be included in this report beginning in Q3 2024.

More developments in the planning and deployment of EV charging infrastructure could arise in future quarters due to progress made under the FHWA Carbon Reduction Program. This formula program provides funding to states to develop carbon reduction strategies in the transportation sector to reduce on-road highway emissions, including certain transit and transportation alternatives projects, advanced transportation technology, and alternative fueling equipment acquisitions (U.S. Department of Transportation 2024a). While each state's Carbon Reduction Strategy was reviewed and certified by FHWA in Q1 2024, some states have begun releasing solicitations under the program in Q2 2024. FHWA also released a document summarizing best practices noted in states' Carbon Reduction Strategies in April 2024, including investment in and deployment of EV charging infrastructure (U.S. Department of Transportation 2024b).

To further support states in developing their charging infrastructure, the Joint Office of Energy and Transportation (Joint Office) published the "Public Electric Vehicle Charging Infrastructure Playbook," a resource designed to help communities plan and build zero-emission transportation infrastructure (Joint Office 2024b). The Joint Office also announced the Communities Taking Charge Accelerator funding opportunity, a $54 million investment in community e-mobility and clean energy, targeted specifically to address the issues of no home charging; micro-, light-, and medium-duty fleets; and managed charging (Joint Office 2024a). The rollout of EV charging infrastructure funded under this program could affect the trends in public and fleet charging infrastructure seen in future reports.

Additionally, the U.S. Environmental Protection Agency (EPA) announced awards for the 2023 Clean School Bus Rebate Program, contributing nearly $900 million to the deployment of alternative fuel school buses, of which funding for nearly 3,400 vehicles among 564 awardees will be devoted to the acquisition of electric school buses (EPA 2024a). In tandem with the Clean School Bus Rebate Program, EPA announced the novel Clean Heavy-Duty Vehicles Program, which is designed to fund the replacement of Class 6 and 7 heavy-duty vehicles with zero-emission vehicles, including school buses (EPA 2024b). The rollout of zero-emission heavy-duty vehicles will likely stimulate demand for a more robust network of charging infrastructure dedicated to freight, school, and transit vehicle traffic.

In March 2024, awardees of the EPA Climate Pollution Reduction Grant (CPRG) Program Planning Grants, including state and local governments, Tribes, and territories receiving funding, were required to submit Priority Climate Action Plans (EPA 2024c). These preliminary documents are intended to detail greenhouse gas emissions reduction strategies the awardees intend to implement, including transportation projects. CPRG awardees will be using these funds to support the deployment of infrastructure in tandem with increased zero-emission vehicle traffic in their states and communities. In the private sector, some EV automakers and charging manufacturers left the market or scaled back operations in Q2 2024. Fisker filed for bankruptcy in June 2024, while Tritium DCFC Limited entered into receivership in April (Borrás 2024; Sriram 2024). As a result, other manufacturers may make up a larger portion of reported EV charging infrastructure in future reports; however, the Station Locator does not currently require the reporting of manufacturing information for EV charging ports.

Finally, the Station Locator data collection and management processes will continue to impact future EV charging port counts as well. As noted in Section 1.1, the Station Locator team's counting logic aligns with the hierarchy defined in the OCPI protocol: station locations, EV charging ports, and connectors (EVRoaming Foundation 2020). The Station Locator therefore counts the number of EV charging ports at each station location. As of Q2, all manually collected data, as well as EV charging ports on the ABM, Blink, BP Pulse, ChargePoint, ChargeSmart EV, ChargeUp, Electrify America, EV Connect, EVCS, EVgo, EV Range, FLASH, FLO, Francis Energy, Livingston Energy, Noodoe, OpConnect, Rivian Adventure Network, Rivian Waypoints, Shell Recharge, Volta and ZEF networks, are counted according to the OCPI logic. Additionally, NREL is continuously working with EVSPs to add new APIs to the Station Locator to help keep the Station Locator as up to date as possible. Finally, the Station Locator team is making a concerted effort to collect power data for all DC fast EV charging ports and may add new fields to the Station Locator to support Bipartisan Infrastructure Law funding initiatives. This new information will continue to make the Station Locator as useful as possible to stakeholders and allow for additional analysis for these reports.

4 Conclusion

This report summarizes the changes in EV charging infrastructure in the Station Locator in Q2 2024, covering the growth of public EV charging by charging level, network, region, state, housing density, and DAC designation. Additionally, this report analyzes the growth of private EV charging based on charging level and use type (i.e., workplace, multifamily housing, and fleet). Amid the increase in EV registrations and national interest paid to the deployment of EV charging infrastructure, this report summarizes areas of growth and opportunity against national targets and growing demand for both public and private EV charging infrastructure. This report is intended to complement other national efforts to increase charging accessibility, reliability, and convenience for Americans using the national EV charging portfolio.

Overall, there was a 6.3% increase in the number of EV charging ports in the Station Locator in Q2, including a 6.5% increase in public EV charging ports and a 4.4% increase in private EV charging ports. Consistent with past reports, public Level 2 charging infrastructure continues to make up the majority of public EV charging ports in the Station Locator (75.9%), but public DC fast EV charging ports continue to grow at a greater rate than Level 2 EV charging ports (7.4% versus 6.3% in Q2). This was also seen in private EV charging ports, where the total number of new Level 2 EV charging ports outpaced the total number of new DC fast EV charging ports, but DC fast EV charging ports increased by a larger percentage (22.4% versus 4.5%). Across Clean Cities and Communities regions, California continues to house the largest percentage of total public EV charging ports in the Station Locator (26.3%), but the highest percentage growth in EV charging ports occurred in the Northeast region (13.2%). Further, in all Clean Cities and Communities regions except for the South Central region, the growth of public DC fast EV charging ports outpaced Level 2 EV charging ports this quarter.

Based on NREL's report, *The 2030 National Charging Network*, which projects the required number of public EV charging ports to support 33 million EVs on the road by 2030, the current availability of DC fast and Level 2 EV charging ports to meet the projected requirements is 13.3% and 13.4%, respectively. Note that 58.4% of public DC fast EV charging ports and 7.3% of public Level 2 EV charging ports in the Station Locator belong to the Tesla Supercharger and Destination networks and are therefore only readily accessible (i.e., without an adapter) to Tesla vehicles. When public EV charging ports on the Tesla networks are excluded, the number of DC fast and Level 2 EV charging ports currently installed to meet the projected 2030 requirements decreases to 8,875 (4.9%) and 132,342 (12.4%), respectively. However, with the adoption of the J3400 charging standard by vehicle and charging hardware manufacturers, the Station Locator team expects to see these numbers increase over the next couple of years, especially for DC fast EV charging ports.

Since the first iteration of this report in Q4 2019, the total number of EV charging ports in the Station Locator has grown by 142%, or 124,030 EV charging ports. Of these, 73.4% are Level 2 EV charging ports, 26.3% are DC fast EV charging ports, and 0.3% can be attributed to the growth of Level 1 EV charging ports. If readers are interested in additional metrics, please email suggestions to the authors at TechnicalResponse@icf.com.

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Appendix A. EV Charging Ports Growth by State

Table A-1. Q2 2024 Growth of Public EV Charging Ports per 100 EVs by State

State	EV Charging Ports per 100 EVs in Q1 2024	EV Charging Ports per 100 EVs in Q2 2024	Growth of EV Charging Ports per 100 EVs in Q2 2024
AK	3.6	3.7	5.0%
AL	5.7	6.2	10.2%
AR	8.6	9.5	9.3%
AZ	3.3	3.5	5.0%
CA	3.0	3.1	4.9%
CO	4.7	4.9	3.3%
CT	5.3	7.4	40.2%
DC	11.0	10.5	–4.5%
DE	5.1	5.8	13.1%
FL	3.4	3.7	8.1%
GA	5.2	5.3	1.5%
HI	2.9	2.9	1.1%
IA	6.2	6.6	6.4%
ID	3.7	4.1	8.9%
IL	2.8	3.0	5.7%
IN	4.4	4.6	5.6%
KS	7.6	7..9	3.1%
KY	5.0	5.3	5.0%
LA	6.2	6.6	7.4%
MA	6.9	7.2	5.0%
MD	5.3	5.3	0.0%
ME	7.7	7.9	2.5%
MI	4.6	4.8	4.8%
MN	4.1	4.4	8.8%
MO	7.6	7.8	3.1%
MS	7.9	8.2	3.9%
MT	6.0	6.2	4.4%
NC	4.9	5.4	10.2%
ND	13.1	13.8	5.7%
NE	5.9	6.0	1.7%
NH	3.7	4.0	9.6%
NJ	2.3	2.5	7.7%

State	EV Charging Ports per 100 EVs in Q1 2024	EV Charging Ports per 100 EVs in Q2 2024	Growth of EV Charging Ports per 100 EVs in Q2 2024
NM	5.0	5.4	8.0%
NV	3.8	4.1	6.4%
NY	5.6	6.4	15.4%
OH	5.6	5.9	5.5%
OK	2.8	2.8	-0.9%
OR	3.7	3.9	6.0%
PA	4.6	4.9	5.8%
RI	7.9	7.7	–3.0%
SC	5.2	5.7	10.2%
SD	8.6	9.2	7.4%
TN	5.2	5.5	5.9%
TX	3.6	3.9	7.4%
UT	4.7	5.3	13.2%
VA	4.2	4.4	4.8%
VT	7.8	8.6	10.2%
WA	3.3	3.5	5.1%
WI	4.2	4.5	5.1%
WV	10.6	10.7	0.9%
WY	13.7	14.3	6.5%

Appendix B. EV Charging Data Sources

As previously mentioned, the Station Locator team has been collecting data on alternative fueling stations since the 1990s and therefore has historical EV charging station data for several years that can serve as a baseline for more analysis. See the first report in this series for the growth of EV charging ports and EV charging stations in the Station Locator from January 2010 through January 2020 (Brown et al. 2020).

The National Renewable Energy Laboratory (NREL) and its data collection contractor and collaborator, ICF, use a variety of methods to gather and verify EV charging data in the Station Locator. Electric vehicle service providers (EVSPs), responsible for managing a network of EV charging stations (Figure B-1), share data directly with the Station Locator team and are the largest data source for EV charging in the Station Locator. In addition, data are collected through industry outreach efforts, contributions from Clean Cities and Communities coalition directors, and other manual methods.

Non-Networked Stations

Non-networked EV charging stations are not connected to the internet and provide basic charging functionality without advanced communications capabilities. Because of this, non-networked charging is generally free or offered as an amenity for those who pay for parking or to access a business.

Networked Stations

Networked EV charging stations are connected to the internet via a cable or wireless technology and can communicate with the back-end computer system of an EVSP. Being connected to a network lets station owners or site hosts manage who can access stations and control how much it costs drivers to charge their vehicle. An EVSP typically manages a group of networked EV charging stations, otherwise known as a network, and may use its communication capabilities to communicate directly with drivers, other EVSPs, or utilities; monitor and share real-time station status; broadcast location information; collect and store usage data; control access; or facilitate payment. Networks also have a dedicated platform that allows users to locate EV charging stations as well as initiate and pay for charging events.

Figure B-1. Non-networked vs. networked EV charging stations

B.1 Data From Charging Network APIs

Prior to 2014, NREL manually collected all EV charging data, including EV charging stations managed by EVSPs. In 2014, to keep up with the rapid growth of charging infrastructure, NREL began incorporating daily updates on networked charging station data directly from EVSPs, when available. NREL does this by accessing the network's API and importing each network's API data into the database. Using APIs ensures the efficiency, accuracy, and completeness of the data are maintained.

Table B-1 shows a timeline of the integration of the network APIs into the Station Locator data management process, including the integration of Open Charge Point Interface (OCPI)-based APIs. See Section 1.1 for more information on the OCPI protocol.

Table B-1. Timeline of API Integrations in the Station Locator

Date	Network
January 2014	Blink, ChargePoint, SemaConnect
February 2015	Webasto
August 2015	EVgo
June 2018	Shell Recharge
April 2019	Electrify America
October 2019	EVgo (OCPI)
January 2020	FLO
August 2020	OpConnect (OCPI)
January 2021	ChargePoint (OCPI), Shell Recharge (OCPI)
June 2022	Rivian Adventure Network (OCPI), Rivian Waypoints (OCPI)
September 2022	EV Connect (OCPI)
December 2022	Blink (OCPI), SemaConnect (OCPI)
January 2023	Volta (OCPI)
April 2023	FLASH (OCPI)
September 2023	EV Range (OCPI)
October 2023	ChargeUp (OCPI), FLO (OCPI)
November 2023	Francis Energy (OCPI)
January 2024	BP Pulse (OCPI)
April 2024	ABM, EVCS, Noodoe, ZEF Energy
May 2024	Livingston Energy
June 2024	ChargeSmart EV

As of the end of Q2, there were 75,128 available and temporarily unavailable public and private charging stations in the database that were available on the Station Locator or accessible via API or data download (AFDC 2024b). Of those, approximately 81.3% are automatically updated daily via EVSP-provided APIs, whereas the rest are managed and updated manually.

The Station Locator team is working with additional EVSPs to access and integrate existing APIs or provide them with best practices on developing an API if they have not yet automated their data sharing. This will help ensure station data are as current and accurate as possible while also increasing the efficiency of the EV charging data update process.

B.2 Manually Collected Data

For non-networked (i.e., not connected to the internet) EV charging stations, data sources include trade media, Clean Cities and Communities coalition directors, a “Submit New Station” form on the Station Locator website, EV charging station manufacturers, electric utilities, original equipment manufacturers, state and municipal governments, private companies, and others. The Station Locator team regularly monitors news outlets for press releases on new EV charging station openings and seeks out more information, as appropriate, to confirm and add the EV charging data to the Station Locator.

The Station Locator team also receives semiregular data in the form of spreadsheets from EVSPs that have networked stations but do not currently have an API available. In Q2, the Station Locator team received an updated list of stations from the SWTCH network. Additionally, the team receives regular updates from Chargeway that include stations on all networks. The team is greatly appreciative of our partners' continued collaboration and willingness to share regular data updates.

Finally, Clean Cities and Communities coalitions (see Section 2.1.3) proactively provide information on station updates and additions throughout the year. Coalitions also serve as a valuable on-the-ground resource for stations that ICF is not able to confirm through normal station confirmation processes. Unconfirmed stations are sent to coalitions throughout the year for confirmation; if the coalition is not able to provide any additional information, the station is subsequently removed from the Station Locator.