April 9, 2024

The Honorable Gavin Newsom
1021 O Street, Suite 9000
Sacramento, CA 95814

RE: California Low Carbon Fuel Standard

Dear Governor Newsom:

On behalf of the Alliance for Automotive Innovation (Auto Innovators)[1], I wanted to express our continued support for California's Low Carbon Fuel Standard (LCFS).

When you announced Executive Order N-79-20 in September 2020, you charted an aggressive course for our industry towards full electrification of the light-duty vehicle sector. At this formative point in the electric vehicle (EV) transition, the LCFS stands as a critically important policy designed to support the transition while reducing the carbon intensity of those vehicles (roughly 95 percent) that are not yet electrified.[2] In fact, the LCFS program is unique in its potential to incentivize further carbon reduction. Other states continue to look to California for its leadership on this policy framework as they consider implementing their own analogous clean fuels programs.

The transition to zero emission vehicles (ZEVs)[3] for light-duty is far from complete. Despite a 25% market share for new light-duty EV purchases in 2023, substantial additional progress is needed to meet the Advanced Clean Cars (ACC) II requirements of 51% ZEV in 2028, 68% ZEV in 2030, and 100% ZEV in 2035. The LCFS framework is a vital complementary policy to incentivize and accelerate the transition to ZEVs. Eliminating or compromising the LCFS at this point could certainly make meeting the state's bold climate goals more challenging and costly to those entities bringing low-carbon solutions to the state.

In the context of climate change policy, California's LCFS is widely understood to encourage emissions reductions in an economically efficient way. Properly structured, the LCFS efficiently reduces the carbon intensity (CI) of gasoline and diesel fuel either directly or by funding low CI alternatives, such as plug-in and fuel cell electric vehicles and the required infrastructure to support the use of these vehicles. Without question, a clean fuel standard is an important part of California's overall strategy to reduce transportation-related carbon emissions, providing an important source of revenue for low-carbon transportation-related investments and

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[1] From the manufacturers producing most vehicles sold in the U.S. to autonomous vehicle innovators to equipment suppliers, battery producers and semiconductor makers – Alliance for Automotive Innovation represents the full auto industry, a sector supporting 10 million American jobs and five percent of the economy. Active in Washington, D.C. and all 50 states, the association is committed to a cleaner, safer and smarter personal transportation future. www.autosinnovate.org.

[2] https://www.autosinnovate.org/posts/papers-reports/get-connected-q4-2023

[3] ZEVs include battery, plug-in hybrid, and fuel cell electric vehicles (BEV, PHEV, and FCEV, respectively)

improvements. CARB's projections show over $100 billion in value that automakers and other businesses in the core ZEV value chain can deploy to boost expanded vehicle adoption.

As one would expect in a transformation so massive as electrifying the light-duty transportation sector, we have seen ups and downs with market acceptance of EVs. The most common reasons given by consumers for not choosing an EV are up-front vehicle cost and charging/refueling infrastructure. The LCFS is an important supportive policy that can greatly assist in resolving both of those issues, which is why the auto manufacturers that comprise Auto Innovators strongly support the LCFS and why we have continued to engage with CARB on advancing and evolving this policy so that it supports the EV transformation that underpins so much of the state of California's climate goals.

At this consequential time in the EV transition, precisely when market dynamics are creating uncertainty both for manufacturers and consumers, a robust LCFS policy is absolutely needed. The LCFS is unique in its potential to send a direct positive financial signal to our industry and accelerate EV adoption and incentivize electric vehicle miles traveled for those EVs already in the market.

We thank California for its continued leadership on LCFS policy. Please do not hesitate to contact me if you have any questions.

Sincerely,

John Bozzella
President & CEO

CC:
Ann Patterson
Lauren Sanchez
Chair Liane Randolph
CARB Board Members
Dr. Steve Cliff
AB32 Environmental Justice Advisory Committee

Enclosure:
Alliance for Automotive Innovation Q4 2023 Get Connected Report

ALLIANCE FOR AUTOMOTIVE INNOVATION

GET CONNECTED
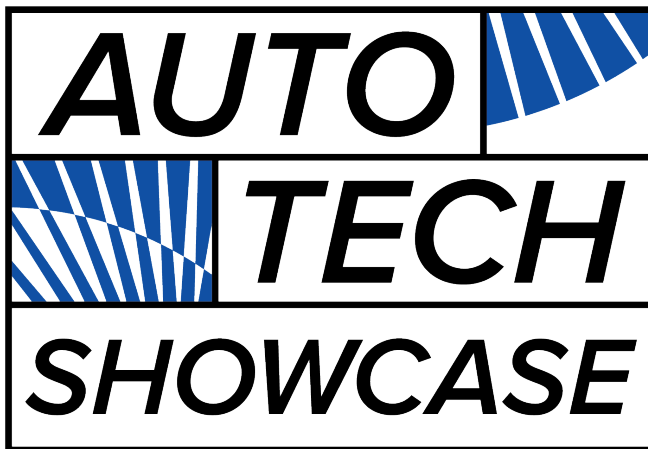
ELECTRIC VEHICLE QUARTERLY REPORT

FOURTH QUARTER, 2023

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INNOVATION ON THE ROAD

AUTO TECH SHOWCASE

Mark your calendar: **Wednesday, June 12 is our second annual Auto Tech Showcase in Washington, D.C.**

Click **HERE** for our 2023 highlights.

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Questions? Email **techshowcase@autosinnovate.org**.

ELECTRIC VEHICLE SALES OVERVIEW (2023)

In the fourth quarter of 2023, automakers sold about 377,000 electric vehicles (EVs, including battery, plug-in hybrid, and fuel cell electric vehicles) in the United States, representing 10.2 percent of overall light-duty vehicle sales. This represents a 0.1 percentage point (pp) market share increase over the third quarter of 2023 and a decrease of about 500 vehicle sales.

Year-over-year (YoY), market share increased 1.7 pp from the fourth quarter of 2022. Over 94,000 more EV units were sold than the same period in 2022, a 34 percent increase. More than 1.4 million EVs were sold in 2023, 9.5 percent of all light vehicle sales and an increased market share of 2.5 pp over 2022. The total volume of all light-duty sales in 2023 was up 12 percent from 2022, while the volume for EVs increased 51 percent (an increase of nearly 481,000 vehicles). For comparison, internal combustion engine (ICE) vehicle market share decreased by 5.5 pp during 2023 compared to 2022. [1]

EV MARKET SHARE: JANUARY 2020 - DECEMBER 2023

2.29% 2020 EV Sales
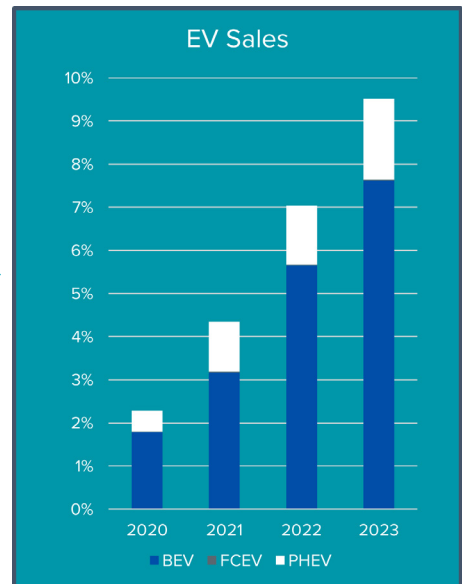4.35% 2021 EV Sales
7.03% 2022 EV Sales
9.51% 2023 EV Sales

Monthly EV Share — 2020 Average Market Share — 2021 Average Market Share — 2022 Average Market Share — 2023 Average Market Share

POWERTRAIN SALES

Year	EV	ICE/Hybrid
2020	2.3%	97.7%
2021	4.3%	95.6%
2022	7.0%	93.0%
2023	9.51%	90.5%

ICE/Hybrid ■ EV
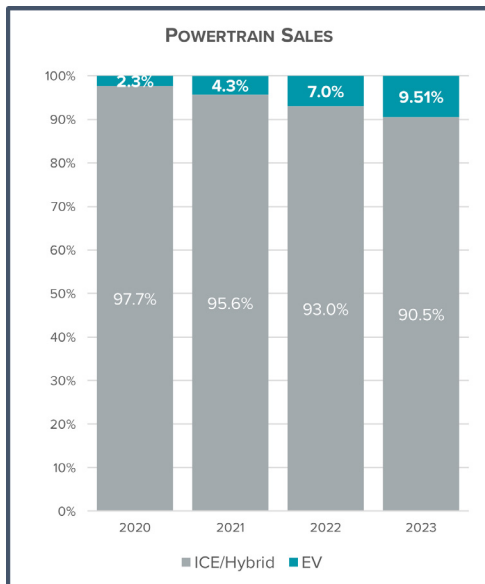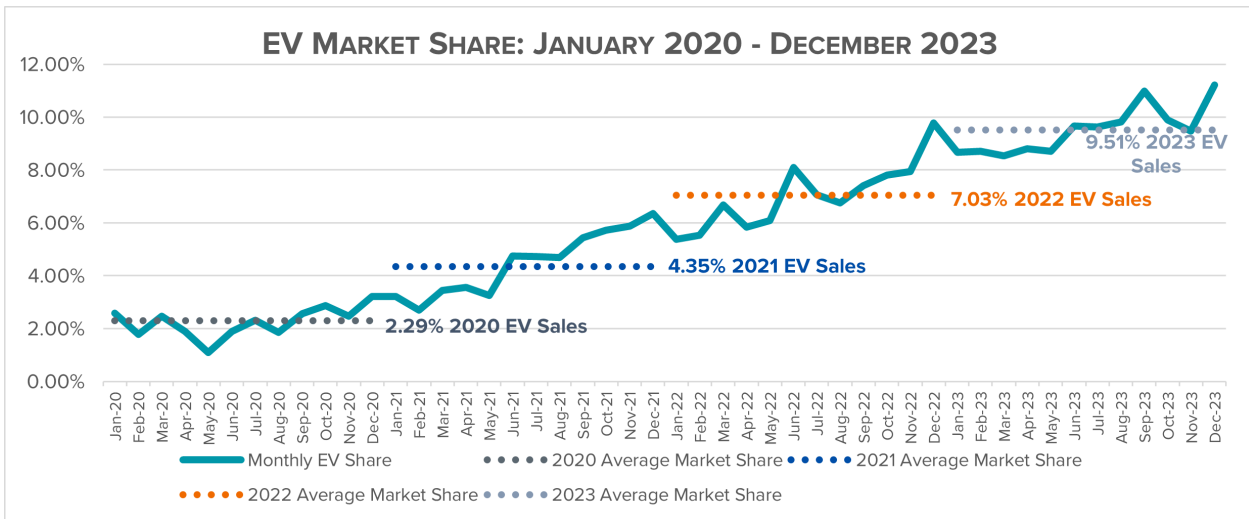
HISTORIC DATA ON EV SALES

EV Sales

BEV ■ FCEV ■ PHEV

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[1] Hybrid vehicles comprised the remainder of the gains in vehicle share.

ELECTRIC VEHICLE SALES BY SEGMENT

While passenger cars once dominated the EV market, manufacturers continue to introduce new models to satisfy a variety of consumer needs. Utility vehicle (UV) offerings continue to grow, and while electric pickup trucks are a relatively new entry to the market (making their commercial debut in September 2021), there are 5 models available now, with more expected soon. As a result, non-car segments are continuing to make gains, and in the fourth quarter of 2023, light truck (UVs, minivans, and pickups) sales comprised 78 percent of the EV market – a 10 pp increase over the fourth quarter of 2022.

Quarterly sales of BEV and PHEV UVs have grown from about 19 percent of EVs at the start of 2020 to 72 percent in the fourth quarter of 2023. Nearly 100,000 more UVs were sold in the fourth quarter of 2023 than the fourth quarter of 2022.
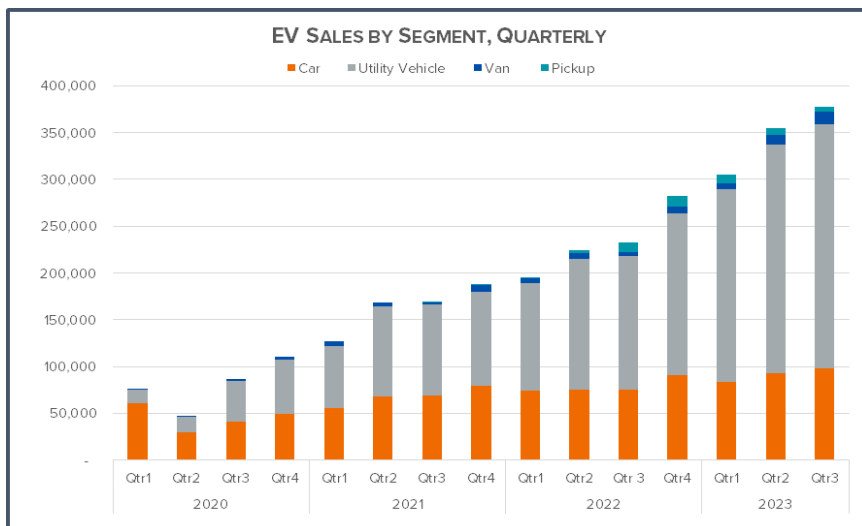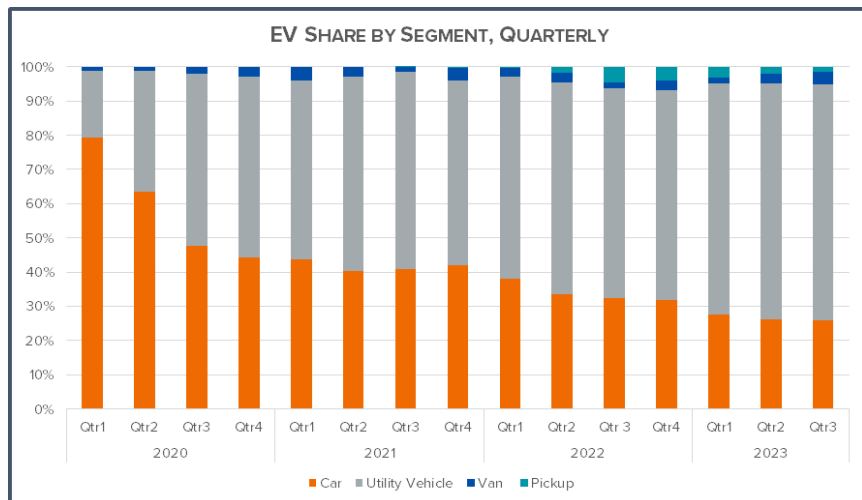
EV Share by Segment, Quarterly

EV Sales by Segment, Quarterly

Source: Figures compiled by Alliance for Automotive Innovation with new registrations for retail and fleet data provided by S&P Global Mobility covering January 1, 2020 – December 31, 2023

ELECTRIC VEHICLE TRANSACTION PRICES

The cost of the average EV in the fourth quarter of 2023 was about $51,600 while the average cost of all new light-duty vehicles in that time period was about $48,300. Year-over-year, EV prices declined more than $12,000 from the fourth quarter of 2022 while the average cost of all new light duty vehicles was mostly unchanged.[2] While increased competition in the EV market has led to some price decreases, slowing sales paired with increased inventory and incentives are also playing a part in lower transaction prices. As noted by Kelley Blue Book, "while the higher inventory levels and increased competition continue to drive down the price premium of EVs, it's important to acknowledge that EVs remain priced above mainstream non-luxury vehicles by nearly 19%.[3]"

Transaction Prices: Quarterly Averages

Legend: Electric Vehicles — Subcompact Car — Industry Average
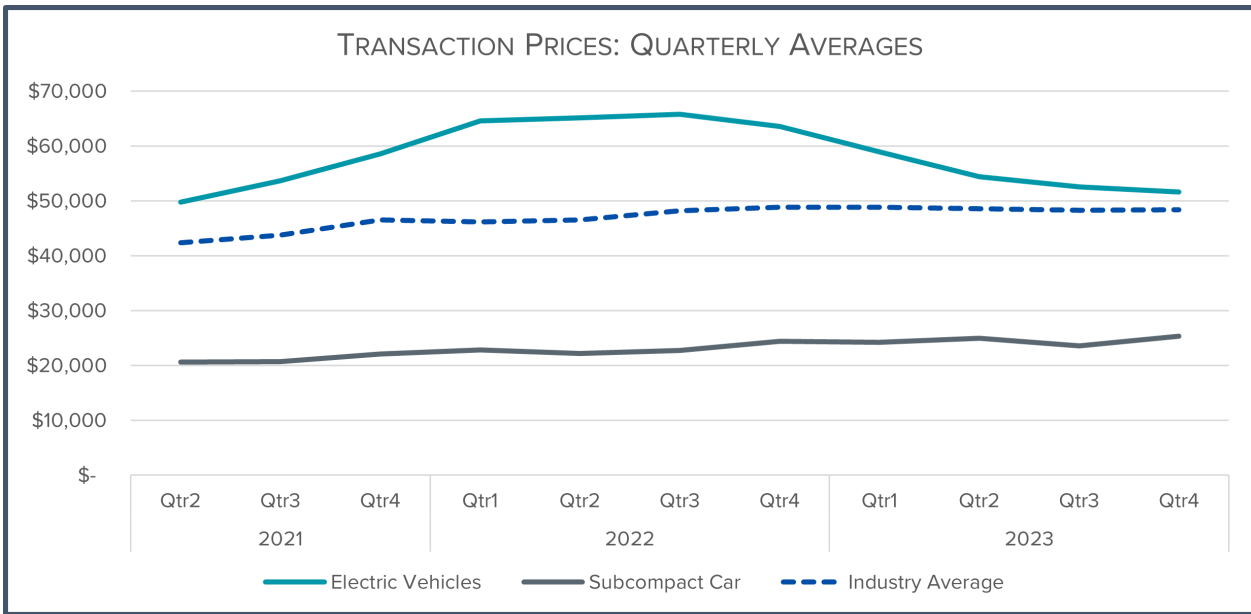
[2] Average transaction prices from Kelley Blue Book, monthly press releases
[3] Kelley Blue Book, Press Release, "New-Vehicle Average Transaction Prices Retreat for Second Straight Month, According to Latest Kelley Blue Book Estimates," 3/11/2024

ELECTRIC VEHICLE SALES BY STATE

For the Fourth Quarter of 2023

California continued to lead the nation in EV sales, with BEVs, PHEVs and FCEVs making up 25 percent of new light-duty vehicle registrations in the fourth quarter of 2023. There are currently twelve additional states[4] and the District of Columbia with new vehicle EV registrations above 10 percent. However, more than one-third of states saw a decrease in market share from the third quarter of 2023. Eighteen states lost market share from the third quarter, including California (-3.3 pp), Missouri (-2.5 pp), and Washington (-2.3 pp).

For the fourth quarter of 2023 vs the fourth quarter of 2022, the market share of new EVs registered increased in all but three states[5]. Twelve states and the District of Columbia witnessed an increased market share of EVs by 2 pp or more. Making the largest increases were Colorado (6.9 pp), Oklahoma[6] (5.6 pp), District of Columbia (5.5 pp), New York (5.4 pp), New Jersey (3.7 pp), Maryland (3.6 pp), and Vermont (3.3 pp).

MARKET SHARE CHANGE Q3 TO Q4 2023
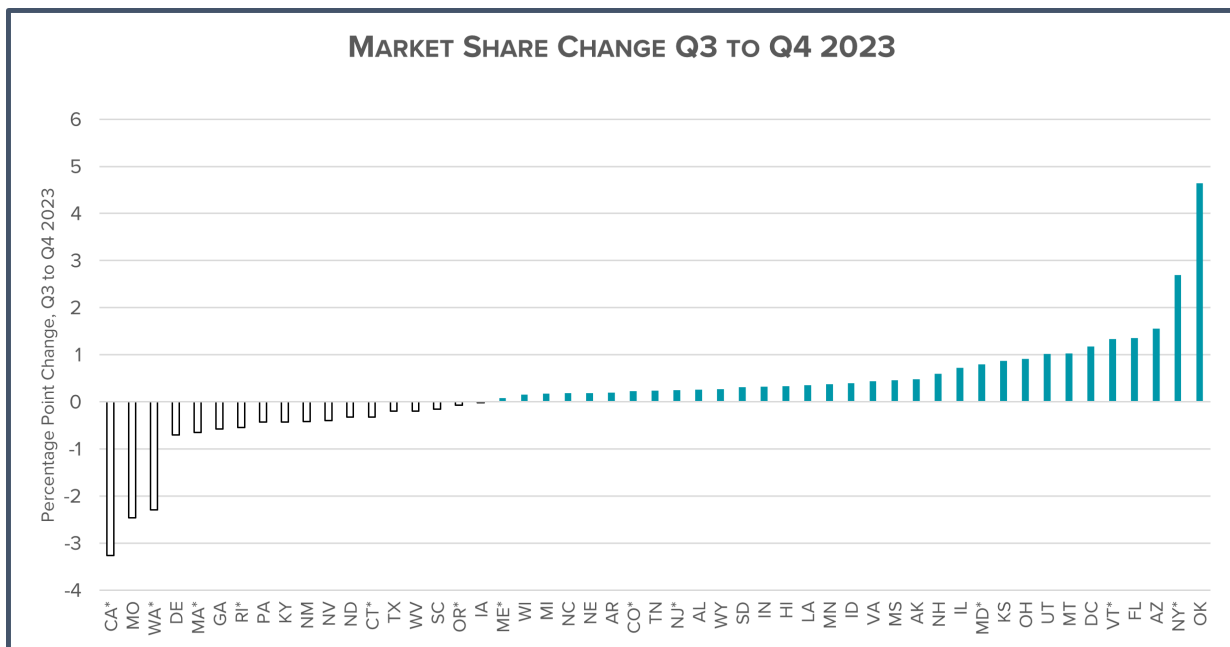
For the Full Year 2023

For the full year 2023, EV sales represented 9.5 percent of the market — a 2.5 pp increase over 2022. Nearly 26 percent of sales in California were EVs over this period, but Washington realized the greatest increase in market share, year-over-year with a 5.9 pp increase. Following Washington, the states with the largest market share gains were District of Columbia (5.8 pp), California (5.6 pp), Colorado (5.5 pp), and New Jersey (4.8 pp). Nineteen states and DC increased their year-over-year EV market share by 2 pp or more. Seventeen states increased by less than 1 pp. One state, Montana, decreased.

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[4] States with more than a 10 percent market share of EVs: California, District of Columbia, Washington, Colorado, Oregon, New Jersey, Maryland, Nevada, Massachusetts, Vermont, New York, Hawaii, Connecticut, and Arizona
[5] The three states are: Michigan, North Dakota, and Missouri
[6] Oklahoma is an outlier state due to fluctuating fleet vehicle registrations.
[7] *Denotes states that have adopted California's ZEV program; Oklahoma is an outlier state due to fluctuating fleet vehicle registrations.

Eleven states and the District of Columbia had an EV market share above 10 percent while four states had an EV market share under 2 percent; California was the only state above 20 percent.[8]

EV Market Share by State

Legend: 2021 | 2022 | 2023 | ─ ─ U.S. Average (2023)

1	CA*	25.71%	**11**	VT*	10.32%	**21**	GA	7.39%	**31**	KS	4.79%	**41**	MT	3.40%
2	DC	19.63%	**12**	CT*	10.19%	**22**	NC	7.03%	**32**	ID	4.75%	**42**	KY	3.34%
3	WA*	18.79%	**13**	VA*	9.73%	**23**	MN*	6.37%	**33**	OK	4.74%	**43**	IA	3.16%
4	OR*	15.42%	**14**	AZ	9.39%	**24**	PA	6.34%	**34**	WI	4.26%	**44**	AL	2.57%
5	CO*	15.14%	**15**	NY*	9.06%	**25**	TX	6.20%	**35**	OH	4.23%	**45**	AR	2.26%
6	NJ*	13.59%	**16**	DE	8.78%	**26**	ME*	6.05%	**36**	IN	4.13%	**46**	SD	2.12%
7	NV*	13.23%	**17**	UT	8.73%	**27**	MO	5.95%	**37**	MI	4.00%	**47**	WY	2.11%
8	MA*	12.04%	**18**	IL	7.80%	**28**	NH	4.91%	**38**	SC	3.88%	**48**	LA	1.98%
9	MD*	11.70%	**19**	RI*	7.75%	**29**	NM	4.89%	**39**	NE	3.72%	**49**	WV	1.77%
10	HI	11.01%	**20**	FL	7.43%	**30**	TN	4.88%	**40**	AK	3.58%	**50**	MS	1.53%
												51	ND	1.28%

2023 (Full Year) EV Market Share by State

[8] Figures compiled by Alliance for Automotive Innovation with new registrations for retail and fleet data provided by S&P Global Mobility covering January 1, 2021 – September 30, 2023
[9] *Denotes states that have adopted California's ZEV program

1% 26%

J.D. POWER

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New Light-Duty Vehicle Registrations by Powertrain, Fourth Quarter 2023

	Fourth Quarter 2023, New Light-Duty Vehicle Registrations By Powertrain				Change In Market Share (2023 Q4 vs 2022 Q4), New Light-Duty Vehicle Registrations Powertrain			
State	**Advanced Powertrain Market Share**				**Advanced Powertrain Market Share (Percentage Point Change)**			
	PHEV	BEV	FCEV	EV Total	PHEV	BEV	FCEV	EV Total
AK	0.57%	3.18%	0.00%	3.75%	-0.06	0.36	0.00	0.30
AL	0.89%	1.98%	0.00%	2.87%	0.28	0.15	0.00	0.43
AR	0.59%	1.88%	0.00%	2.47%	0.05	0.53	0.00	0.59
AZ	1.42%	8.98%	0.00%	10.40%	0.12	2.60	0.00	2.72
CA*	3.51%	21.31%	0.05%	24.87%	0.35	0.91	-0.12	1.14
CO*	4.50%	13.66%	0.00%	18.16%	1.83	5.10	0.00	6.93
CT*	3.75%	7.11%	0.00%	10.86%	1.23	0.79	0.00	2.02
DC	4.25%	16.22%	0.00%	20.47%	0.64	4.84	0.00	5.49
DE	2.35%	6.63%	0.00%	8.98%	0.84	1.24	0.00	2.08
FL	1.00%	7.76%	0.00%	8.76%	0.02	2.15	0.00	2.18
GA	1.26%	6.24%	0.00%	7.50%	0.37	0.85	0.00	1.22
HI	1.92%	9.65%	0.00%	11.57%	0.30	1.35	0.00	1.65
IA	0.90%	2.50%	0.00%	3.40%	-0.09	0.41	0.00	0.32
ID	1.66%	3.90%	0.00%	5.56%	0.23	1.27	0.00	1.50
IL	1.68%	6.87%	0.00%	8.55%	0.25	0.87	0.00	1.13
IN	1.30%	3.55%	0.00%	4.85%	0.35	0.56	0.00	0.91
KS	1.46%	4.29%	0.00%	5.75%	0.31	1.17	0.00	1.48
KY	0.74%	2.71%	0.00%	3.45%	-0.02	0.57	0.00	0.55
LA	0.82%	1.43%	0.00%	2.25%	0.28	0.20	0.00	0.48
MA*	3.86%	8.72%	0.00%	12.58%	0.92	1.41	0.00	2.33
MD*	3.65%	9.91%	0.00%	13.56%	1.44	2.21	0.00	3.64
ME*	3.21%	3.57%	0.00%	6.78%	0.86	0.37	0.00	1.22
MI	0.91%	3.25%	0.00%	4.16%	-0.42	0.41	0.00	-0.01
MN*	1.80%	5.38%	0.00%	7.18%	0.28	0.67	0.00	0.94
MO	1.21%	3.88%	0.00%	5.10%	-0.51	-0.06	0.00	-0.57
MS	0.79%	1.24%	0.00%	2.03%	0.41	0.38	0.00	0.79
MT	1.53%	2.71%	0.00%	4.24%	0.67	-0.43	0.00	0.24
NC	1.22%	6.01%	0.00%	7.23%	-0.05	1.25	0.00	1.20
ND	0.38%	0.81%	0.00%	1.18%	-0.21	0.00	0.00	-0.21
NE	1.46%	2.86%	0.00%	4.32%	0.18	0.77	0.00	0.95
NH	2.03%	3.49%	0.00%	5.52%	0.59	0.53	0.00	1.12
NJ*	2.87%	11.71%	0.00%	14.59%	1.09	2.56	0.00	3.66
NM	1.08%	4.01%	0.00%	5.10%	-0.10	0.76	0.00	0.67
NV*	1.79%	11.65%	0.00%	13.43%	0.32	0.43	0.00	0.75
NY*	3.69%	8.17%	0.00%	11.86%	1.80	3.59	0.00	5.39
OH	1.72%	3.35%	0.00%	5.07%	0.69	0.94	0.00	1.63
OK	7.39%	2.60%	0.00%	9.99%	6.34	-0.76	0.00	5.59
OR*	4.02%	12.22%	0.00%	16.24%	0.52	0.91	0.00	1.43
PA	2.31%	4.37%	0.00%	6.68%	0.94	0.16	0.00	1.10
RI*	3.76%	5.03%	0.00%	8.79%	1.67	1.07	0.00	2.74
SC	1.05%	3.01%	0.00%	4.06%	0.26	0.59	0.00	0.85
SD	0.99%	1.49%	0.00%	2.48%	0.17	0.27	0.00	0.44
TN	0.68%	4.51%	0.00%	5.19%	-0.12	1.65	0.00	1.52
TX	0.92%	5.47%	0.00%	6.39%	0.14	1.26	0.00	1.40
UT	1.97%	8.00%	0.00%	9.97%	0.45	1.32	0.00	1.77
VA*	1.57%	8.34%	0.00%	9.91%	-0.25	0.41	0.00	0.16
VT*	4.13%	8.21%	0.00%	12.34%	1.09	2.22	0.00	3.32
WA*	3.13%	16.24%	0.00%	19.37%	0.98	-0.09	0.00	0.90
WI	0.94%	3.83%	0.00%	4.77%	-0.15	0.71	0.00	0.56
WV	0.65%	1.22%	0.00%	1.87%	0.17	0.19	0.00	0.36
WY	0.91%	1.58%	0.00%	2.49%	-0.09	0.25	0.00	0.16
U.S.	**2.19%**	**8.03%**	**0.01%**	**10.23%**	**0.62**	**1.10**	**-0.02**	**1.71**

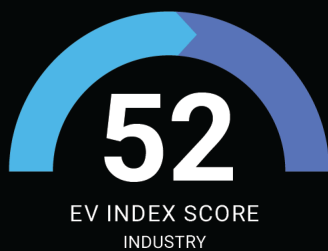*Denotes states that have adopted California's ZEV program
Source: Figures compiled by Alliance for Automotive Innovation with new registrations for retail and fleet data provided by S&P Global Mobility covering October 1 – December 31, 2022, and October 1 – December 31, 2023

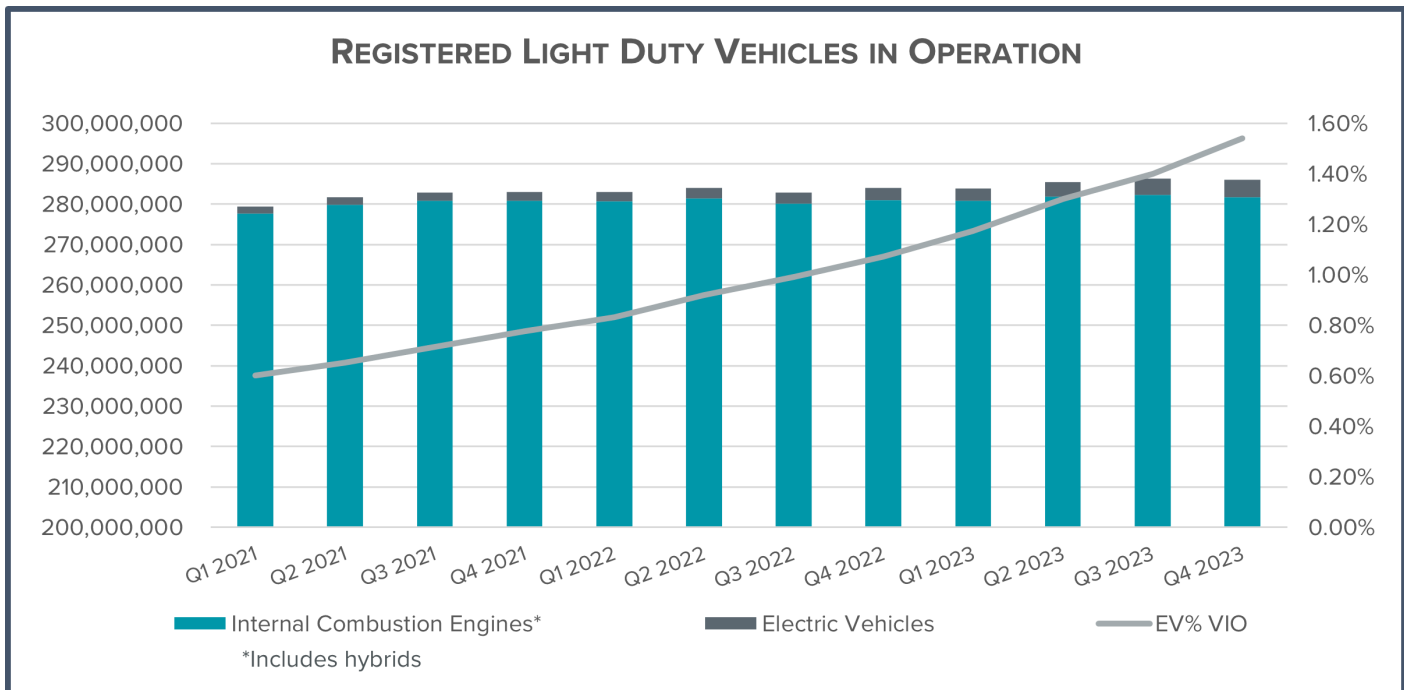**New Light-Duty Vehicle Registrations by Powertrain, Full Year 2023**

State	2023 New Light-Duty Vehicle Registrations By Powertrain (Full Year) Advanced Powertrain Market Share				Change In Market Share (2023 vs 2022 Full Year), New Light-Duty Vehicle Registrations Powertrain Advanced Powertrain Market Share (Percentage Point Change)			
	PHEV	BEV	FCEV	EV Total	PHEV	BEV	FCEV	EV Total
AK	0.78%	2.79%	0.00%	3.58%	0.17	0.67	0.00	0.84
AL	0.61%	1.96%	0.00%	2.57%	-0.11	-0.39	0.00	0.50
AR	0.53%	1.73%	0.00%	2.26%	-0.04	-0.20	0.00	0.25
AZ	1.24%	8.15%	0.00%	9.39%	-0.18	-2.59	0.00	2.77
CA*	3.46%	22.09%	0.17%	25.71%	-0.67	-4.91	0.00	5.59
CO*	4.22%	10.91%	0.00%	15.14%	-2.05	-3.40	0.00	5.46
CT*	3.44%	6.74%	0.00%	10.19%	-1.07	-1.52	0.00	2.59
DC	4.05%	15.58%	0.00%	19.63%	-0.61	-5.21	0.00	5.82
DE	2.16%	6.62%	0.00%	8.78%	-0.78	-2.38	0.00	3.16
FL	0.93%	6.50%	0.00%	7.43%	0.02	-1.63	0.00	1.61
GA	0.84%	6.54%	0.00%	7.39%	-0.04	-2.12	0.00	2.16
HI	1.26%	9.75%	0.00%	11.01%	0.50	-3.10	0.00	2.59
IA	0.88%	2.28%	0.00%	3.16%	-0.01	-0.45	0.00	0.46
ID	1.39%	3.36%	0.00%	4.75%	-0.39	-0.68	0.00	1.07
IL	1.28%	6.52%	0.00%	7.80%	-0.06	-1.58	0.00	1.64
IN	0.95%	3.18%	0.00%	4.13%	-0.09	-0.73	0.00	0.83
KS	1.03%	3.76%	0.00%	4.79%	-0.14	-1.22	0.00	1.35
KY	0.76%	2.58%	0.00%	3.34%	-0.06	-0.74	0.00	0.80
LA	0.54%	1.43%	0.00%	1.98%	-0.10	-0.33	0.00	0.44
MA*	3.96%	8.08%	0.00%	12.04%	-1.36	-2.48	0.00	3.84
MD*	2.94%	8.76%	0.00%	11.70%	-1.08	-2.75	0.00	3.84
ME*	2.81%	3.24%	0.00%	6.05%	-0.67	-0.71	0.00	1.38
MI	0.97%	3.03%	0.00%	4.00%	0.23	-0.84	0.00	0.61
MN*	1.41%	4.96%	0.00%	6.37%	-0.29	-1.33	0.00	1.62
MO	2.43%	3.52%	0.00%	5.95%	-1.31	-1.01	0.00	2.32
MS	0.48%	1.05%	0.00%	1.53%	-0.12	-0.18	0.00	0.31
MT	1.17%	2.22%	0.00%	3.40%	-0.35	0.51	0.00	-0.16
NC	1.08%	5.94%	0.00%	7.03%	-0.08	-2.08	0.00	2.16
ND	0.53%	0.76%	0.00%	1.28%	-0.17	0.02	0.00	0.15
NE	1.17%	2.55%	0.00%	3.72%	-0.16	-0.64	0.00	0.80
NH	1.73%	3.19%	0.00%	4.91%	-0.46	-0.62	0.00	1.08
NJ*	2.73%	10.85%	0.00%	13.59%	-1.10	-3.66	0.00	4.76
NM	1.16%	3.73%	0.00%	4.89%	-0.23	-0.75	0.00	0.98
NV*	1.68%	11.56%	0.00%	13.23%	-0.30	-2.72	0.00	3.02
NY*	3.49%	5.57%	0.00%	9.06%	-1.71	-1.81	0.00	3.52
OH	1.11%	3.11%	0.00%	4.23%	-0.27	-0.86	0.00	1.13
OK	3.04%	1.70%	0.00%	4.74%	-1.96	0.34	0.00	1.62
OR*	3.66%	11.75%	0.00%	15.42%	-0.64	-3.29	0.00	3.93
PA	2.14%	4.20%	0.00%	6.34%	-0.99	-0.99	0.00	1.98
RI*	3.36%	4.40%	0.00%	7.75%	-1.44	-1.14	0.00	2.58
SC	0.83%	3.05%	0.00%	3.88%	-0.04	-0.90	0.00	0.94
SD	0.87%	1.25%	0.00%	2.12%	-0.28	-0.20	0.00	0.49
TN	0.65%	4.23%	0.00%	4.88%	0.11	-1.45	0.00	1.34
TX	0.72%	5.48%	0.00%	6.20%	-0.07	-1.82	0.00	1.89
UT	1.63%	7.10%	0.00%	8.73%	-0.37	-1.31	0.00	1.68
VA*	1.38%	8.34%	0.00%	9.73%	0.17	-2.36	0.00	2.19
VT*	3.62%	6.70%	0.00%	10.32%	-0.97	-2.26	0.00	3.23
WA*	3.01%	15.77%	0.00%	18.79%	-1.26	-4.63	0.00	5.88
WI	0.92%	3.34%	0.00%	4.26%	-0.05	-0.84	0.00	0.89
WV	0.63%	1.14%	0.00%	1.77%	-0.24	-0.31	0.00	0.55
WY	0.84%	1.28%	0.00%	2.11%	-0.26	0.01	0.00	0.25
U.S.	1.87%	7.62%	0.02%	9.51%	-0.51	-1.98	0.00	2.49

*Denotes states that have adopted California's ZEV program

Source: Figures compiled by Alliance for Automotive Innovation with new registrations for retail and fleet data provided by S&P Global Mobility covering January 1 – December 31, 2022, and January – December 31, 2023

REGISTRATIONS AND INFRASTRUCTURE

Share of Registered EVs In U.S. Light-Duty Fleet Continues to Increase Incrementally. As sales of EVs increase, so does the total number of EVs operating on U.S. roads. There are now more than 4.3 million EVs in operation in the United States (1.5 percent of all light vehicles in operation). EVs represented more than 1 percent of total vehicles in operation (VIO) for the first time at the end of 2022. The EV VIO of 1.5 percent is an increase of 0.4 pp since the fourth quarter of 2022 and more than double the EV VIO from the first quarter in 2021 (0.60 percent).[10]

REGISTERED LIGHT DUTY VEHICLES IN OPERATION

Legend: Internal Combustion Engines* / Electric Vehicles / EV% VIO
*Includes hybrids

U.S. Public Charging Infrastructure: Overview

While the U.S. Department of Energy notes that roughly 80 percent of all EV charging occurs at home, reliable and convenient access to workplace and public charging and refueling stations help to support customers that purchase EVs or are considering purchasing an EV. Workplace and public charging infrastructure not only eases perceived "range anxiety" concerns but also increases consumer awareness of the technology. In addition, achieving EV market share envisioned by the Biden Administration will require moving beyond customers that have access to charging via privately-owned single-family dwellings. The bipartisan Infrastructure Investment and Jobs Act (IIJA) that was signed into law in November 2021, includes $5 billion in funding for states to establish a nationwide EV charging network along highway corridors and $2.5 billion in competitive grants to deploy publicly available EV charging and other alternative fuel stations through 2026. Here is a snapshot of publicly available EV charging and refueling infrastructure available across the United States at the end of the fourth quarter of 2023[11]:

[10] Registered vehicles in operation compiled by Alliance for Automotive Innovation with data provided by S&P Global Mobility as of December 31, 2023
[11] Charging information from U.S. Department of Energy Alternative Fuels Data Center, stations in operation as of December 31, 2023
Note: prior editions of this report excluded proprietary chargers, however Tesla opened their previously proprietary chargers in November 2022 and their "North American Charging Standard" will be widely adopted by automakers.

Level 2: 52,344 Locations, 121,920 EVSE Ports
DC Fast: 8,892 Locations, 37,922 EVSE Ports
Hydrogen Refueling: 54 Stations (53 are in California)
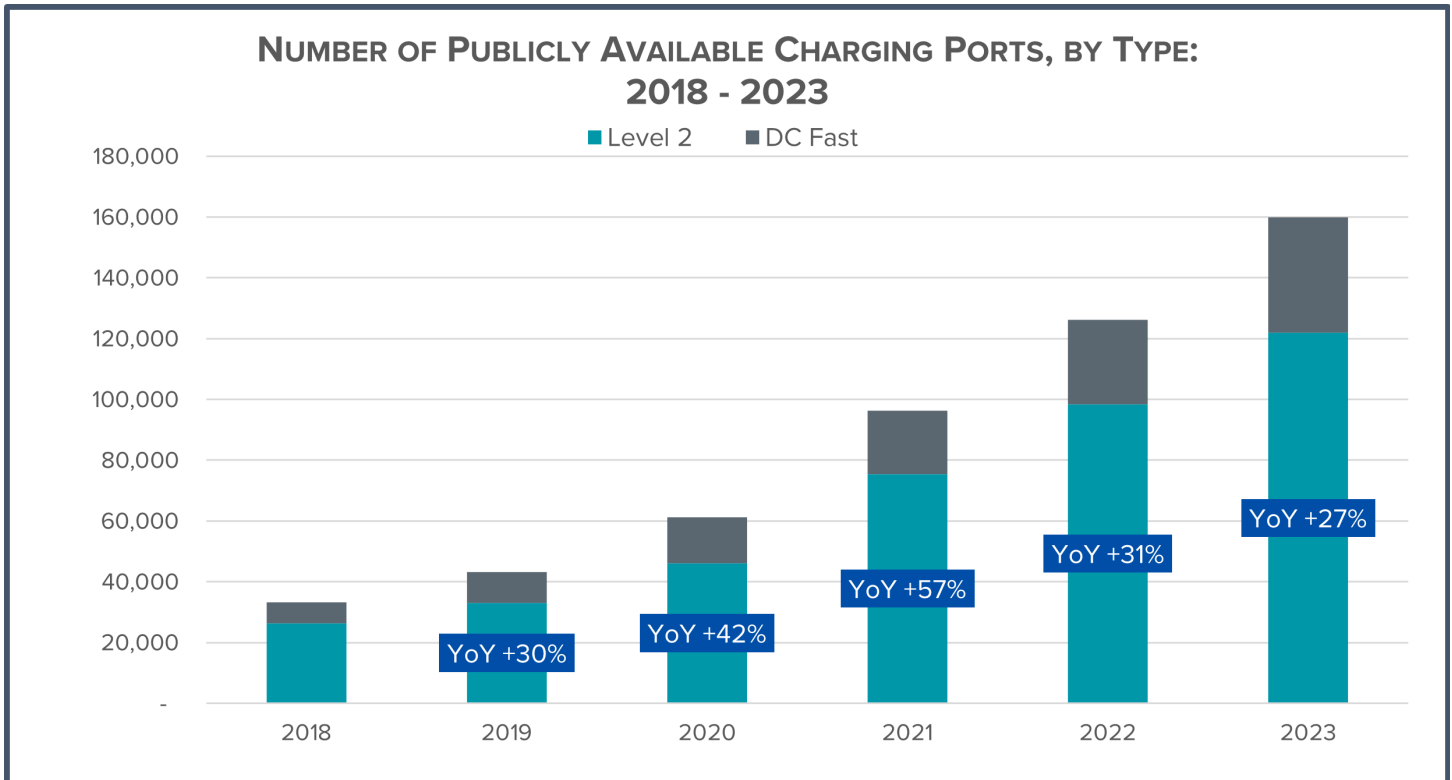*U.S. Total: 60,065 [12] Locations, 159,842 EVSE Ports*

See Recommended Attributes for EV Charging Stations

Level 2 Chargers and DC Fast Chargers. Both Level 2 and DC Fast charging play important roles in electrifying the light-duty vehicle fleet. However, the key difference between Level 2 and DC Fast chargers is how quickly each will charge an EV's battery. Level 2 equipment is common for home, workplace, and public charging with longer dwell times. Level 2 chargers can fully charge a BEV from empty in 4-10 hours and a PHEV from empty in 1-2 hours. DC Fast charging equipment enables rapid charging of BEVs in 20 minutes to 1 hour along heavy-traffic corridors, in city centers, at transportation hubs, and fleet depots. Wider installation of both Level 2 chargers, DC Fast chargers, and hydrogen fueling will be necessary to support wider-scale adoption of EVs. The number of public Level 2 charging increased 24 percent at the end of 2023 over 2022. DC Fast chargers increased 37 percent. Total charging ports increased 27 percent in 2023. (For context, EV sales increased 51 percent from 2022 to 2023.)[13]

Through March 12, 2024, Nearly Two-Thirds of Installed DC Fast Charging Ports Were Tesla (North American Charging Standard)[14]:

DC FAST CHARGERS INSTALLED		
Type	**Ports**	**%Total**
Tesla	24,644	63%
CCS Combo	14,379	37%
Total	39,023	100%

After Tesla opened their previously proprietary chargers (in November 2022), at least 18 EV manufacturers have announced that they will move to Tesla's North America Charging Standard.

NUMBER OF PUBLICLY AVAILABLE CHARGING PORTS, BY TYPE: 2018 - 2023

■ Level 2   ■ DC Fast

YoY +30%
YoY +42%
YoY +57%
YoY +31%
YoY +27%

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[12] Some station locations have both Level 2 and DC Fast installed.
[13] Charging information from U.S. Department of Energy Alternative Fuels Data Center, stations in operation as of 12/31/2023
[14] Charging information from U.S. Department of Energy Alternative Fuels Data Center, 3/12/2024; does not include J1772 or CHAdeMO connectors

NUMBER OF CHARGING PORTS, BY TYPE AND STATE (2023)

■ Level 2 ■ DC Fast
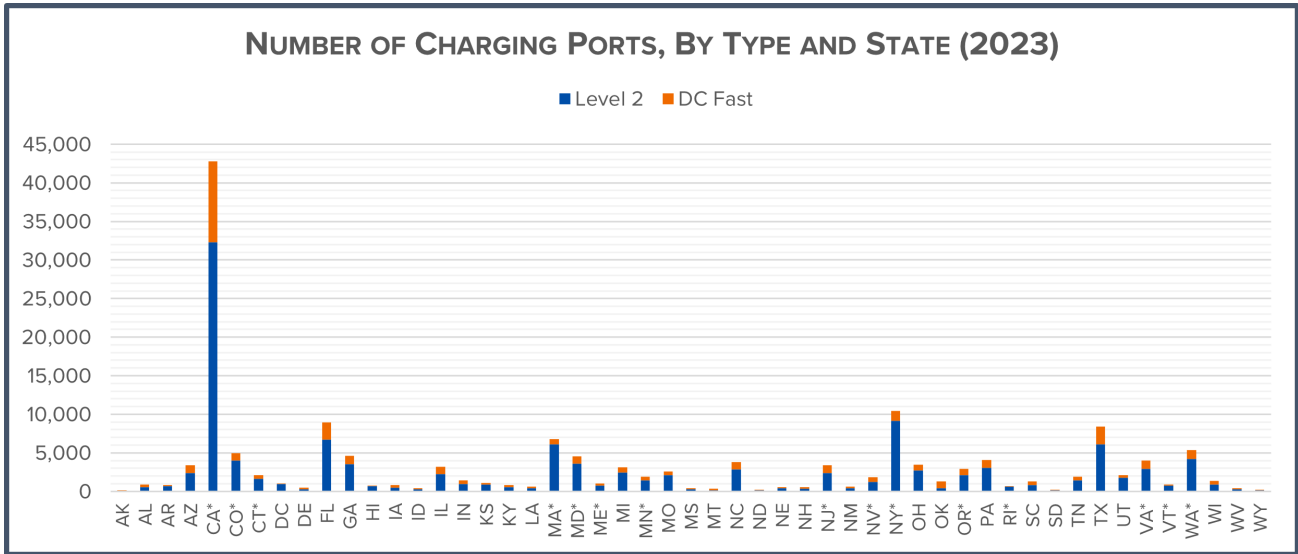
Infrastructure Investment Necessary

An assessment by the U.S. National Renewable Energy Laboratory (NREL) released in June 2023 estimated that a network of 28 million charging ports would be neces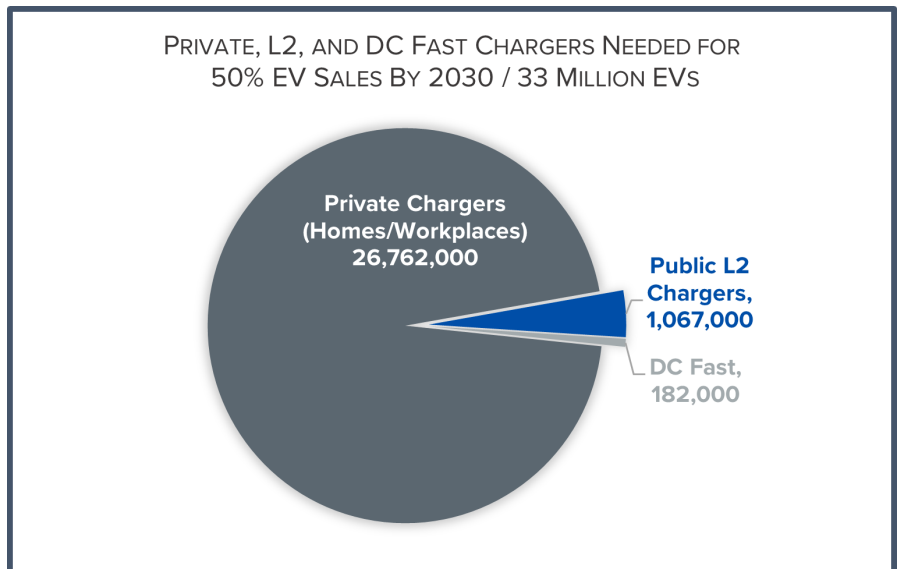sary to support 50 percent EV sales by 2030 (and 33 million EVs on the road).[16] NREL estimates that 96 percent of those charging ports would be privately accessible L1 and L2 chargers located at single-family homes, multifamily properties, and workplaces. The remaining 4 percent (1,249,000 ports) would be split between public L2 and high-speed DC Fast charging ports, with L2 making up 85 percent of those public chargers.

PRIVATE, L2, AND DC FAST CHARGERS NEEDED FOR 50% EV SALES BY 2030 / 33 MILLION EVS

Private Chargers (Homes/Workplaces) 26,762,000

Public L2 Chargers, 1,067,000

DC Fast, 182,000

At the end of 2023, there were about 160,000 public charging ports across the country and 4.3 million EVs on the road. Total installed public charging ports are about 13 percent of the needed estimate to support EV penetration by 2030.

More than 1 million additional public chargers (945,000 L2 and 144,000 DC Fast) will need to be installed to satisfy the necessary infrastructure estimate. This means that between the end of 2023 and December 31, 2030, 437 chargers need to be installed every day, for the next 7 years. Or 3 chargers every 10 minutes through the end of 2030.

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[15] Charging information from U.S. Department of Energy Alternative Fuels Data Center, stations in operation as of 12/31/2023; *Denotes states that have adopted California's ZEV program.
[16] National Renewable Energy Laboratory, "The 2030 National Charging Network: Estimating U.S. Light-Duty Demand for Electric Vehicle Charging Infrastructure," June 2023
[17] National Renewable Energy Laboratory, "The 2030 National Charging Network: Estimating U.S. Light-Duty Demand for Electric Vehicle Charging Infrastructure," June 2023

1,249,000 PUBLIC CHARGERS NEEDED TO SUPPORT 50% EV SALES BY 2030 / 33 MILLION EVS
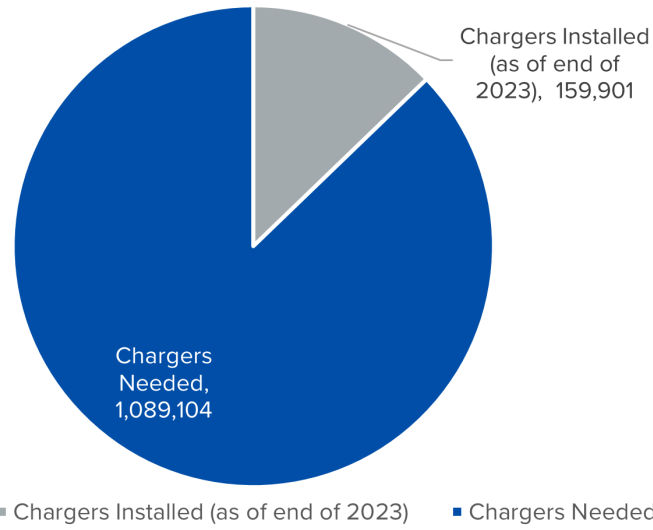
Chargers Installed (as of end of 2023), 159,901

Chargers Needed, 1,089,104

■ Chargers Installed (as of end of 2023) ■ Chargers Needed

Between the end of 2023 and December 31, 2030, 437 chargers need to be installed every day, for the next 7 years. Or 3 chargers every 10 minutes through the end of 2030

The Cost of This Substantial Infrastructure Necessity Will Largely Fall on Consumers and Commercial Real Estate Owners as They Install Home and Workplace Charging. According to NREL a national capital investment of $53–$127 billion in charging infrastructure is needed by 2030 (including as much as $72 billion for private residential charging) to support 33 million EVs. The [18] large range of potential costs is a result of variable and evolving equipment and installation costs across charging networks, locations, and site designs[19]. Notably, the estimates exclude the cost of grid upgrades and distributed energy resources. The estimated cumulative capital investment includes[20]:

» $22–$72 billion for privately accessible Level 1 and Level 2 charging ports

» $27–$44 billion for publicly accessible fast charging ports

» $5–$11 billion for publicly accessible Level 2 charging ports

Infrastructure Disparities by Geography

Geographic disparities in charging infrastructure are pervasive. At the end of 2023, nearly 27 percent of all public charging infrastructure was in California, which had 35 percent of all registered EVs.

Alliance for Automotive Innovation participates in EV policy development at the federal and state level via the Joint Office of Energy and Transportation's Electric Vehicle Working Group, through its lithium-ion battery recycling policy framework, recommendations for attributes of EV charging stations, and implementation of the Inflation Reduction Act's EV tax credits[21].

Installed Charging

California 27%

All Other States 73%
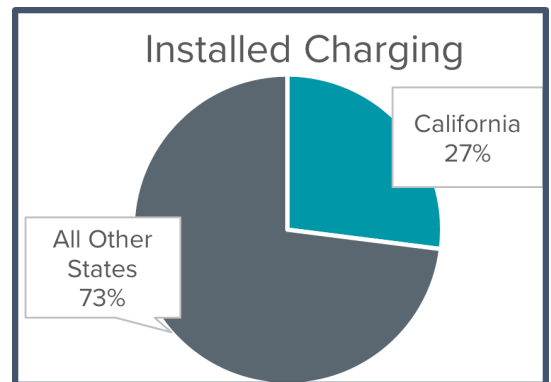
[18] National Renewable Energy Laboratory, "The 2030 National Charging Network: Estimating U.S. Light-Duty Demand for Electric Vehicle Charging Infrastructure," June 2023

[19] Various state and federal incentives are available to consumers or businesses that install EV charging infrastructure, including from power utilities.

[20] National Renewable Energy Laboratory, "The 2030 National Charging Network: Estimating U.S. Light-Duty Demand for Electric Vehicle Charging Infrastructure," June 2023

[21] Alliance for Automotive Innovation, Blog, What We Know (and Don't Know) About the New EV Tax Credit Rules, 12/20/2022; Alliance for Automotive Innovation, Blog, Foreign Entity of Concern: Finally... Some Clarity, 12/1/2023

Vehicles in Operation and Charging by State

	EV Level 2	EV DC Fast	H2** Fueling	Total	Percent EVs of Total VIO***	Share of Registered EVs****	EVs Per Charger	EVs Per 10K Residents
Public Charging Outlets And Registered EVs (as of 1/1/2024)								
AK	83	30	-	113	0.57%	0.08%	29	44.49
AL	569	353	-	922	0.31%	0.37%	17	32.91
AR	668	121	-	789	0.30%	0.19%	11	27.80
AZ	2,357	1,005	-	3,362	1.59%	2.51%	32	151.99
CA*	32,308	10,461	53	42,822	4.85%	34.85%	35	382.45
CO*	4,017	944	-	4,961	2.03%	2.56%	22	195.38
CT*	1,666	414	-	2,080	1.45%	1.03%	21	124.86
DC	979	55	-	1,034	3.21%	0.25%	11	156.07
DE	290	197	-	487	1.22%	0.26%	23	115.49
FL	6,737	2,177	-	8,914	1.45%	6.34%	31	129.14
GA	3,495	1,104	-	4,599	1.05%	2.29%	22	94.55
HI	702	44	1	747	2.64%	0.69%	40	211.31
IA	496	313	-	809	0.43%	0.32%	17	43.51
ID	289	137	-	426	0.62%	0.28%	29	70.41
IL	2,254	968	-	3,222	1.16%	2.66%	36	90.56
IN	931	516	-	1,447	0.56%	0.79%	24	51.39
KS	880	221	-	1,101	0.53%	0.36%	14	53.16
KY	579	215	-	794	0.37%	0.35%	19	33.61
LA	415	219	-	634	0.29%	0.25%	17	23.65
MA*	6,099	682	-	6,781	1.91%	2.42%	16	152.37
MD*	3,575	956	-	4,531	1.80%	2.12%	20	152.28
ME*	786	221	-	1,007	1.03%	0.32%	14	103.35
MI	2,436	697	-	3,133	0.76%	1.50%	21	64.95
MN*	1,420	452	-	1,872	0.90%	1.08%	25	83.67
MO	2,135	437	-	2,572	0.61%	0.81%	14	57.48
MS	279	115	-	394	0.17%	0.11%	13	16.66
MT	174	170	-	344	0.39%	0.15%	19	59.98
NC	2,832	982	-	3,814	0.90%	1.99%	23	83.10
ND	117	88	-	205	0.19%	0.03%	7	19.79
NE	385	154	-	539	0.45%	0.22%	18	49.65
NH	359	176	-	535	1.08%	0.33%	27	106.73
NJ*	2,378	999	-	3,377	2.08%	3.52%	45	171.33
NM	400	230	-	630	0.69%	0.32%	22	65.89
NV*	1,226	620	-	1,846	2.18%	1.26%	30	180.75
NY*	9,140	1,321	-	10,461	1.67%	4.44%	18	98.55
OH	2,706	751	-	3,457	0.63%	1.54%	19	57.18
OK	438	838	-	1,276	1.00%	1.06%	36	116.35
OR*	2,095	806	-	2,901	2.21%	1.97%	29	203.64
PA	3,088	997	-	4,085	0.90%	2.28%	24	77.25
RI*	591	91	-	682	1.18%	0.23%	15	96.03
SC	813	458	-	1,271	0.49%	0.60%	21	51.43
SD	122	102	-	224	0.27%	0.06%	12	30.43
TN	1,451	478	-	1,929	0.60%	0.95%	21	60.69
TX	6,130	2,282	-	8,412	1.02%	5.75%	30	86.99
UT	1,777	352	-	2,129	1.57%	1.09%	22	150.22
VA*	2,926	1,100	-	4,026	1.28%	2.26%	24	114.96
VT*	784	112	-	896	2.14%	0.27%	13	189.06
WA*	4,239	1,099	-	5,338	2.49%	4.01%	33	230.79
WI	911	419	-	1,330	0.61%	0.76%	25	56.88
WV	261	137	-	398	0.26%	0.09%	10	22.72
WY	132	106	-	238	0.27%	0.04%	7	30.88
U.S.	**121,920**	**37,922**	**54**	**159,896**	**1.52%**	**100.00%**	**27**	**132.70**

REGISTRATIONS

EV registrations as a share of all registered light-duty vehicles are 1.5 percent (as of December 31, 2023). There are about 286 million registered light-duty vehicles in the U.S.

At the end of 2023, California accounted for 35 percent of all registered light-duty EVs in the U.S.

States with highest portion of total EVs registered:

1. CA* (1,512,858, 4.85%)
2. DC (10,963, 3.21%)
3. HI (30,016, 2.64%)
4. WA* (173,911, 2.49%)
5. OR* (85,341, 2.21%)
6. NV* (54,847, 2.18%)
7. VT* (11,841, 2.14%)
8. NJ* (152,627, 2.08%)
9. CO* (111,282, 2.03%)
10. MA* (105,169, 1.91%)
11. MD* (92,017, 1.80%)

States with worst ratio of registered EVs per public charger:

1. NJ*
2. HI
3. OK
4. IL
5. CA*
6. WA*
7. AZ
8. FL
9. NV*
10. TX

Read more about automakers plans for an **ELECTRIC FUTURE HERE**

*Denotes states that have adopted California's ZEV program; **Hydrogen count denotes stations
*** VIO is vehicles in operation; **** State share of U.S. Total
Source: Figures compiled by Alliance for Automotive Innovation with registered vehicle data provided by S&P Global Mobility as of September 30, 2023; Charging information from U.S. Department of Energy Alternative Fuels Data Center, as of 9/30/2023
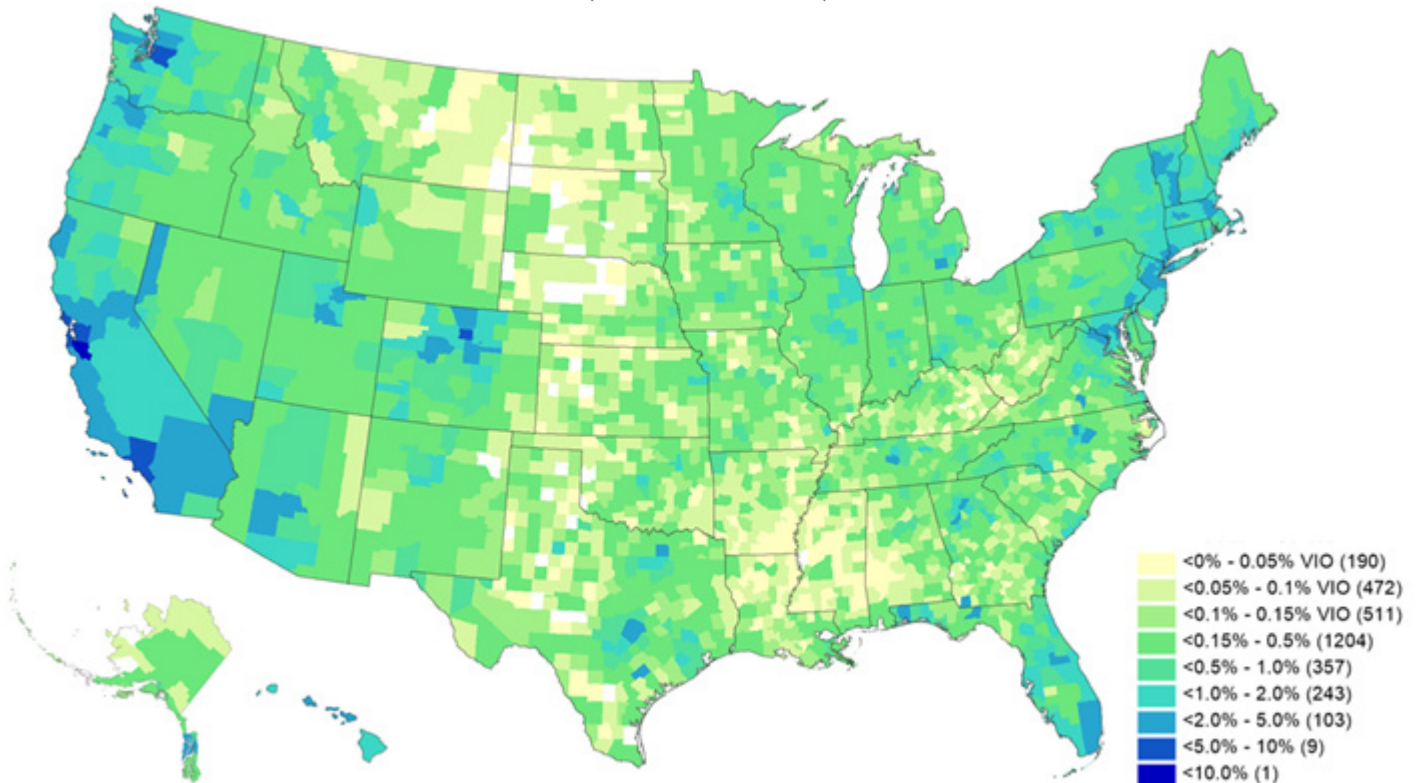
SPOTLIGHT ON:
GEOGRAPHIC DISTRIBUTION OF EVs AND INFRASTRUCTURE

Electric Vehicle Registrations by County

There are 3,152 counties and independent districts in the United States with more than 286 million vehicles in operation (VIO) – 4.3 million of which are electric. While it stands to reason that more populous states and counties would be home to more vehicles, the uptake of EVs does not follow the same pattern. For instance, California is home to nearly 11 percent of U.S. vehicles, but accounts for 35 percent of all electric vehicle registrations. By contrast, Texas, the state with the second highest number of registered vehicles represents 8.6 percent of total U.S. VIO but only 5.8 percent of electric vehicles in the country.

Half of all registered EVs are located within just 39 counties (1.2 percent of counties), while 53 counties have zero registered EVs. Only 356 counties (11 percent) have an EV VIO rate greater than 1 percent.

ELECTRIC VEHICLE REGISTRATIONS AS A PERCENT OF TOTAL VEHICLES IN OPERATION
### (*BY COUNTY, 2023*)

Legend:
- <0% - 0.05% VIO (190)
- <0.05% - 0.1% VIO (472)
- <0.1% - 0.15% VIO (511)
- <0.15% - 0.5% (1204)
- <0.5% - 1.0% (357)
- <1.0% - 2.0% (243)
- <2.0% - 5.0% (103)
- <5.0% - 10% (9)
- <10.0% (1)

COUNTIES WITH THE HIGHEST RATE OF EV VEHICLES IN OPERATION

Rank	County	State	% County EV VIO	Rank	County	State	% County EV VIO
1	SANTA CLARA	CA	10.32%	6	ORANGE	CA	7.00%
2	SAN MATEO	CA	9.94%	7	CONTRA COSTA	CA	6.46%
3	MARIN	CA	9.69%	8	LOS ANGELES	CA	5.35%
4	SAN FRANCISCO	CA	9.23%	9	KING	WA	5.15%
5	ALAMEDA	CA	8.20%	10	BOULDER	CO	5.01%

Registrations of EVs tend to be highest in wealthier counties. The counties with the highest EV registration rates (top 10 percent | 314 counties), are also some of the wealthiest – more than half (54 percent) are in the top ten percent for median household income. The average median household income for the top ten percent of EV VIO counties is $77,770. Conversely, for the counties with the lowest percent of EVs of county VIO, the average median income is $45,435. The national median household income is $74,580

ELECTRIC VEHICLE REGISTRATIONS AS A PERCENT OF TOTAL VIO AND MEDIAN HOUSEHOLD INCOME
(Height represents percent of EV VIO and color represents median household Income)

$30,000 | $140,000
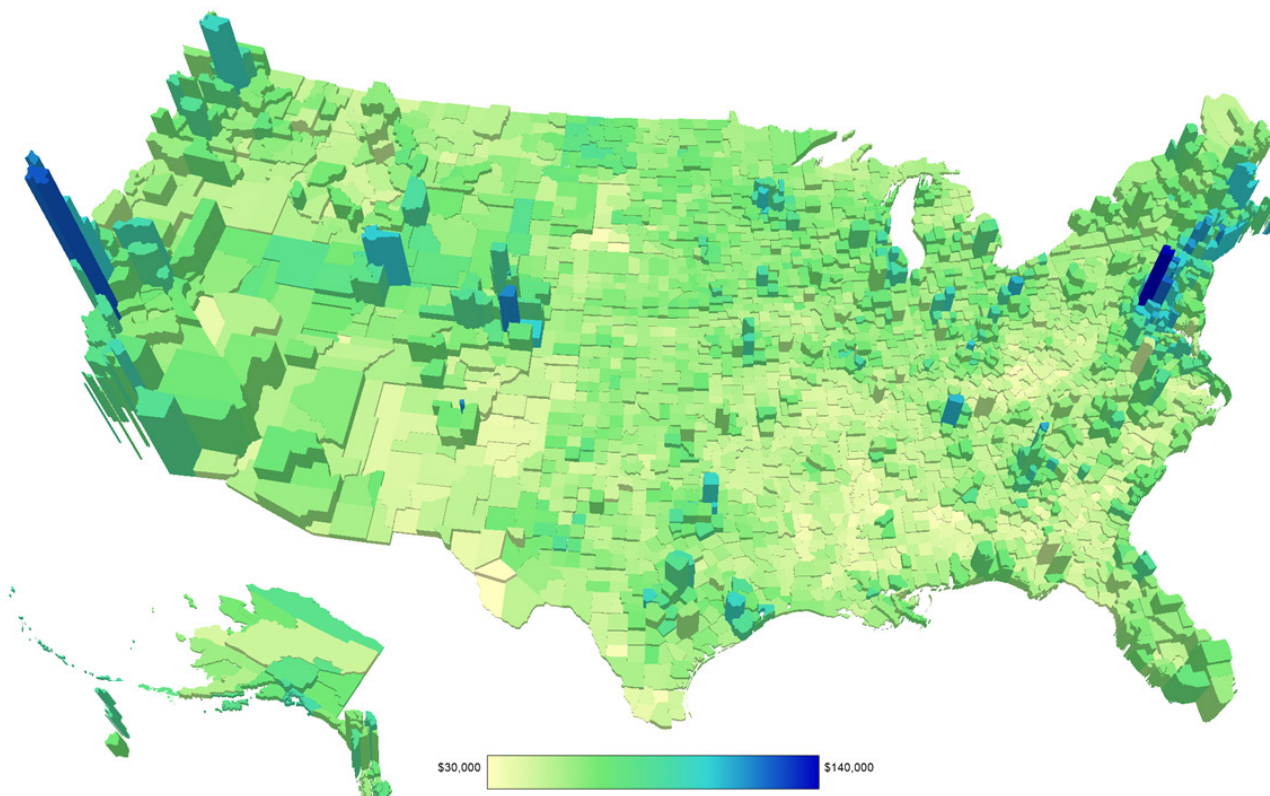
Geographic Distribution of Charging Infrastructure

At the end of 2023, there were about 160,000 public charging ports across the country and 4.3 million EVs on the road, a ratio of 27 EVs per charger. While progress has been made installing public charging across the country, disparities persist. At the end of 2022, 39 percent of all U.S. counties had zero chargers installed – at the end of 2023, that number was 31 percent (983 counties with NO public charging).
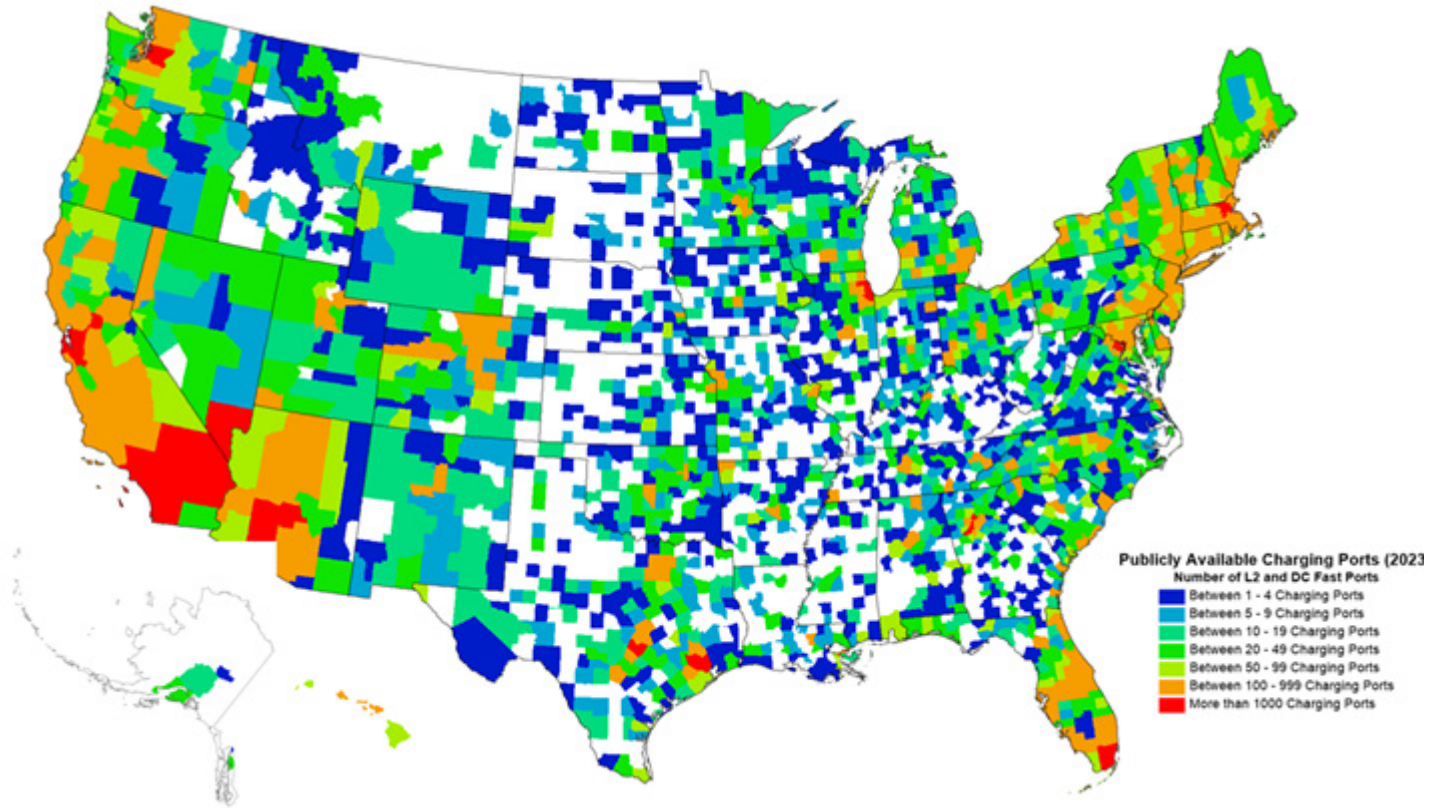
Counties with five or fewer charging ports account for more than half of all counties (53 percent). That number is an improvement from 2022's 63 percent.

The top 25 counties[22] with the most public charging ports installed accounted for one-third of all available U.S. charging.

At the end of 2023, more than half of the counties (52 percent) had NO DC Fast charging installed; nearly one quarter (24 percent) of the counties had access to only 1 port. California is home to 28 percent of all DC Fast ports.

[22] See Appendix A for list of counties.

AVAILABLE U.S. PUBLIC CHARGING AT THE END OF 2023

Publicly Available Charging Ports (2023)
Number of L2 and DC Fast Ports

- Between 1 - 4 Charging Ports
- Between 5 - 9 Charging Ports
- Between 10 - 19 Charging Ports
- Between 20 - 49 Charging Ports
- Between 50 - 99 Charging Ports
- Between 100 - 999 Charging Ports
- More than 1000 Charging Ports

ELECTRIC VEHICLES AS A PERCENT OF TOTAL VIO AND AVAILABLE CHARGING
(Height represents percent of EV VIO and color represents public charging)
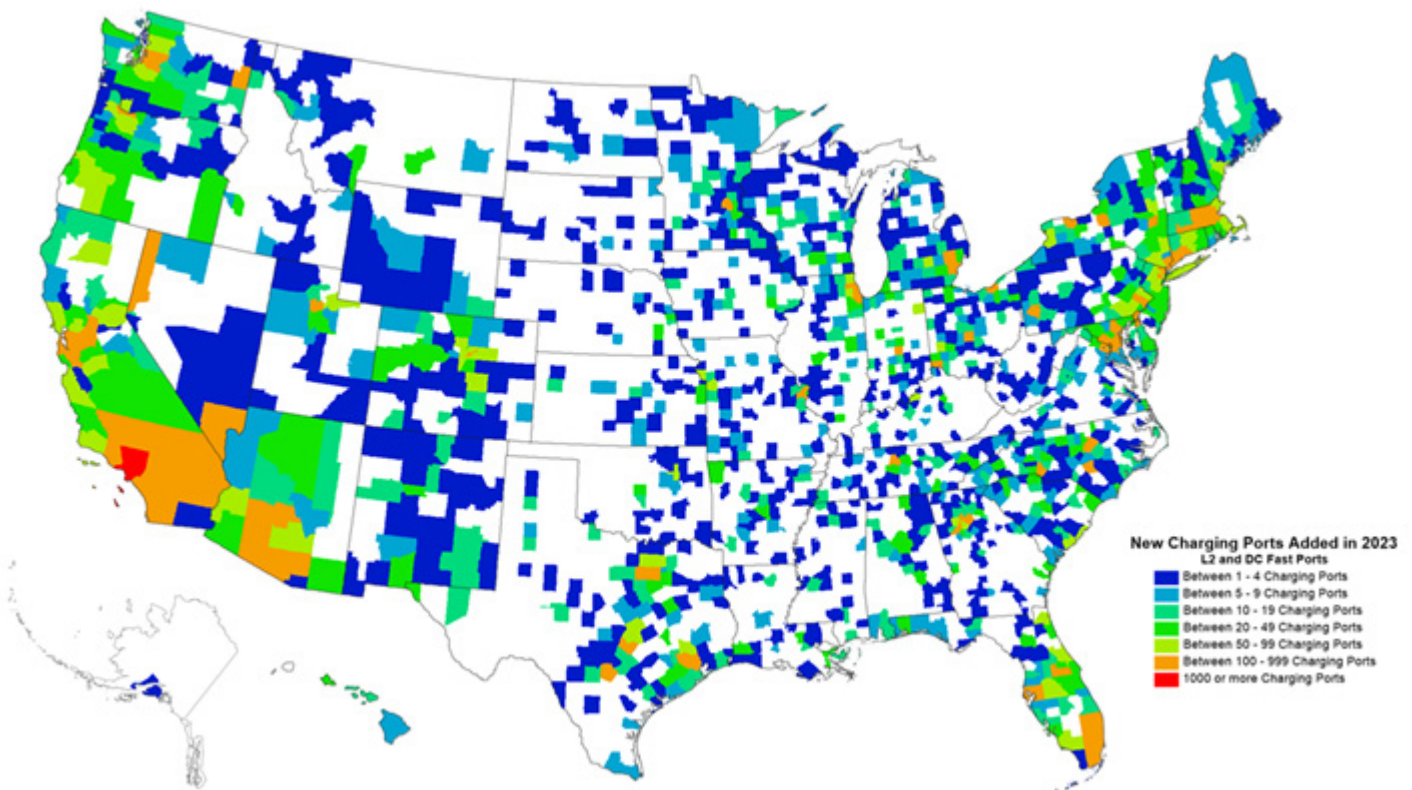

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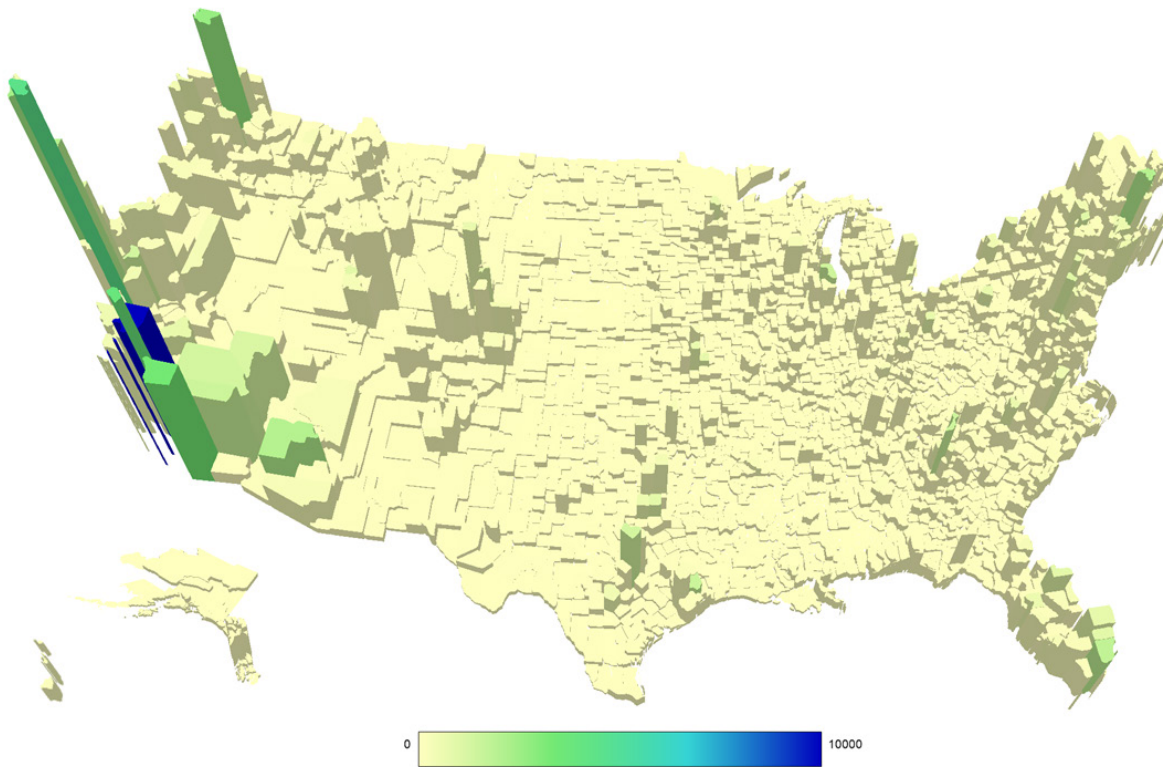
New Infrastructure Not Distributed Equally

In 2023, 22,591 Level 2 and 10,432 DC Fast chargers were added around the country for a total of 33,023 new chargers. With 1.4 million new EVs added to the roads in 2023, that amounts to a ratio of 43 new EVs for every new public port – worse than the current ratio of 27 EVs per charger.

Progress is being made (ninety counties installed their first chargers in 2023), however charging installations are still highly concentrated:

> » 12 percent of counties added no new charging.

> » 40 percent of counties added fewer than ten new charging ports.

> » One-third of all new charging ports were installed in just 32 counties[23].

> » 20 percent of all new charging ports were installed in California.

> » 21 percent of all new DC Fast charging ports were installed in California.

NEW U.S. PUBLIC CHARGING IN 2023

New Charging Ports Added in 2023
L2 and DC Fast Ports
- Between 1 - 4 Charging Ports
- Between 5 - 9 Charging Ports
- Between 10 - 19 Charging Ports
- Between 20 - 49 Charging Ports
- Between 50 - 99 Charging Ports
- Between 100 - 999 Charging Ports
- 1000 or more Charging Ports

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[23] See Appendix B for a list of counties.

APPENDICES

Appendix A

The top 25 counties with the most public charging ports installed:

1. Los Angeles, CA
2. Santa Clara, CA
3. Orange, CA
4. San Diego, CA
5. King, WA
6. San Mateo, CA
7. Maricopa, AZ
8. Middelsex, MA
9. Alameda, CA
10. Miami-Dade, FL
11. Riverside, CA
12. Harris, TX
13. Fulton, GA
14. Cook, IL
15. Sacramento, CA
16. San Bernardino, CA
17. Travis, TX
18. Suffolk, MA
19. Clark, NV
20. New York, NY
21. Fairfax, VA
22. Contra Costa, CA
23. District of Columbia, DC
24. San Francisco, CA
25. Albany, NY

Appendix B

One-third of all new charging ports were installed in just 32 counties:

1. Los Angeles, CA
2. San Diego, CA
3. Orange, CA
4. King, WA
5. Harris, TX
6. Maricopa, AZ
7. Santa Clara, CA
8. Middlesex, MA
9. Clark, NV
10. Almadea, CA
11. Orange, FL
12. San Bernardino, CA
13. Fairfax, VA
14. Miami-Dade, FL
15. San Mateo, CA
16. Mecklenburg, NC
17. Suffolk, MA
18. San Francisco, CA
19. Allegheny, PA
20. New Haven, CT
21. Cook, IL
22. Arlington, VA
23. Riverside, CA
24. Wake, NC
25. Travis, TX
26. Fulton, GA
27. Hillsborough, FL
28. Tarrant, TX
29. Multnomah, OR
30. Oakland, MI
31. District of Columbia, DC
32. Norfolk, MA