

Chart of the Week: **Fast Charging Electric Vehicle Stations** **Some Considerations**

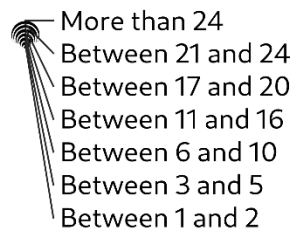
Max Pyziur
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Washington, DC



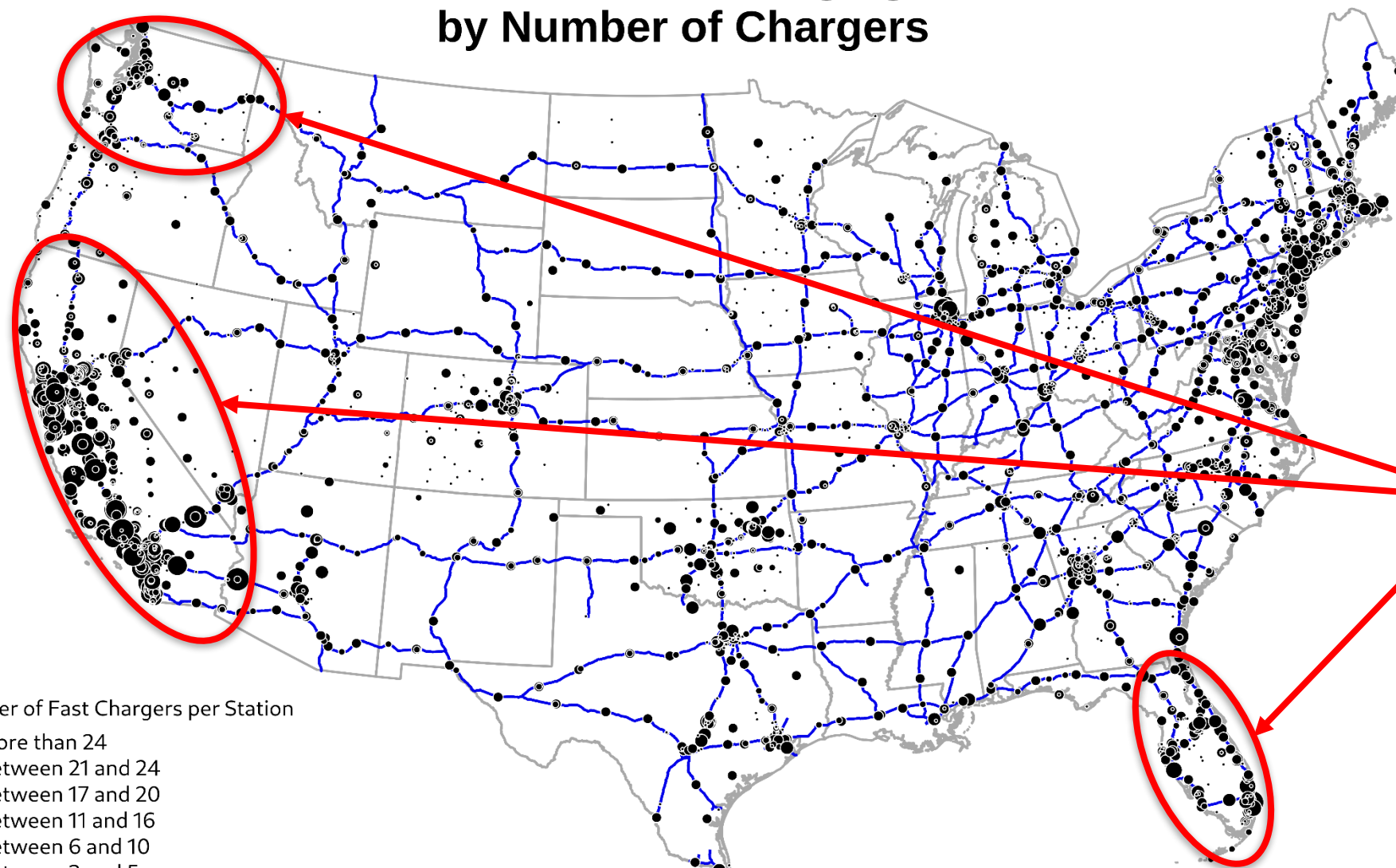
Source: Philip Cheung / NY Times

Electric Vehicle Fast Charging Stations by Number of Chargers

Number of Fast Chargers per Station



U.S. Highways
— U.S. Interstates



EV charging infrastructure by number of stations and fast chargers is concentrated in states such as California, Florida, and Washington

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Analysis based on Census and DoE/AFDC Data

Fast Charging Electric Vehicle (EV) Stations: Some Considerations



- The development and utility of all-electric motor vehicles is predicated on the availability of both conveniently located charging stations and a robust grid.
- EV charging is available in three categories: DC Fast Charging (DCFC) which charges EVs to 80% charge within 30 minutes; Level 2 which requires 5-6 hours; and Level 3 which takes up to 20 hours to achieve the same level.
- According to DOE data, U.S. DCFC EV stations at the end of 2020 numbered almost 5,500 with over 20,000 available connections. The number of U.S. filling stations is about 125 thousand with 4 to 8 pumps per location.
- The majority of DCFCs have 1 to 2 connections; however, the largest one run by Tesla located in Firebaugh, California has 56.
- The EV charging industry lacks standardization; only Teslas can be charged at North American Tesla DCFCs due to the proprietary connectivity. In addition, vehicle connections differ by manufacturer requiring DCFC connections to have multiple types of connectors along with extensive cabling in order to reach a vehicle's particular electrical interface.
- With 42% of U.S. EVs registered in California, the state dominates U.S. charging infrastructure with number of stations and connections per facility.
- DCFC puts considerable load on electricity grids: fifty EVs charging concurrently is the equivalent load of a major commercial building.
- The expanded version of this slide deck is available at: <https://eprinc.org/chart-of-the-week/>
- For more information on this chart, please contact Max Pyziur (maxp@eprinc.org).

Additional Slides

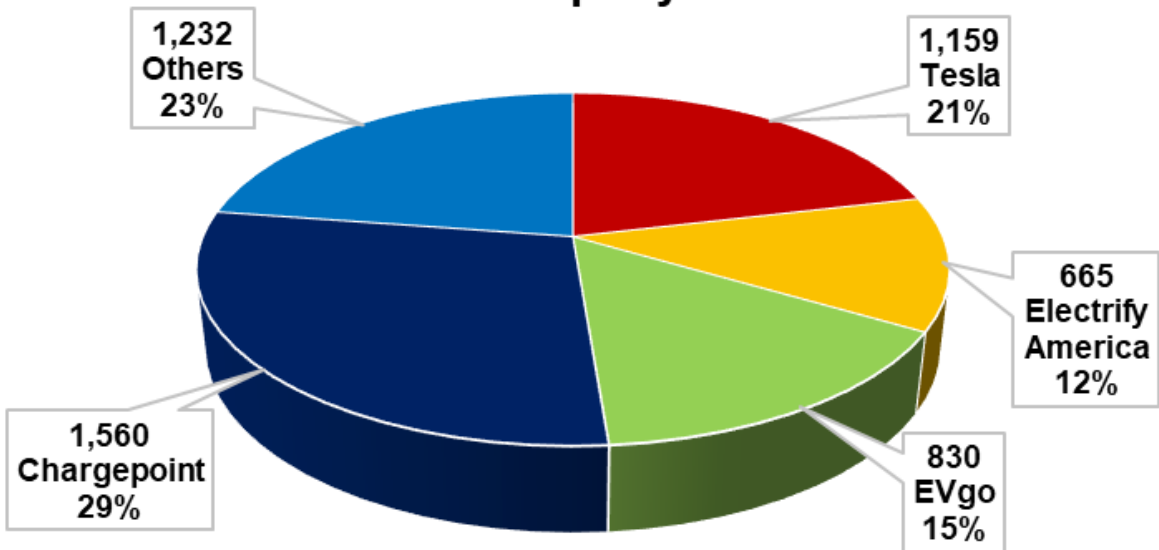
Estimate of Costs per Miles Driven

	Gasoline	Electricity			
Miles Driven		Level 1	Level 2	DC Fast Charging	
30	\$4.08	\$1.16	\$2.31	\$2.66	
100	\$13.60	\$3.86	\$7.71	\$8.86	
200	\$27.20	\$7.71	\$15.43	\$17.71	
Assumptions					
U.S. Light Duty Vehicle Average Miles per gallon (EIA)	U.S. Regular Gasoline Price per gallon (current, EIA)	U.S. EV Efficiency per mile (EPRI, EVgo)	U.S. Average Home Electricity Price per kWh (EIA - 2021)	U.S. Level 2 Electricity Price per kWh (EPRI)	U.S. DC Fast Charging Electricity Price per kWh
25.0	\$3.40	3.5	\$0.14	\$0.27	\$0.31
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Charge Time Comparison

	Typical Location	Rate (kW)	Miles per Charging Time	Typical Total Charging Time
Level 1	Home	1.4 - 1.9	3-5 miles of range per hour	20 hours
Level 2	Public	3.3 - 19.2	8-24 miles of range per hour	5-6 hours
DC Fast Charging	Public	50-350	3-18 miles of range per minute	15-30 minutes
Analysis based on EPRI Data			EPRINC	

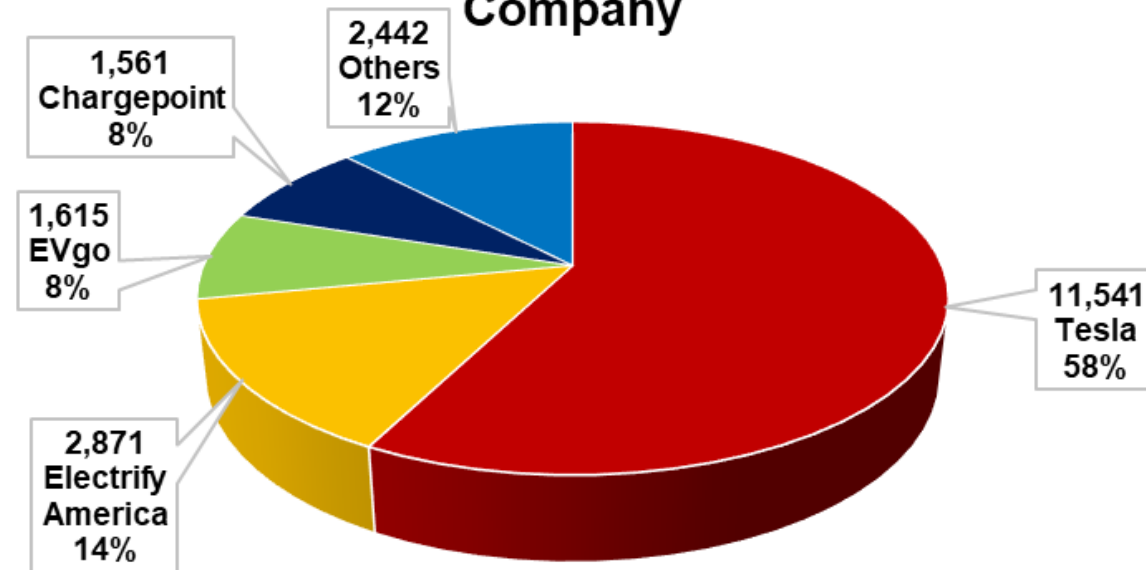
U.S. Fast Charging EV Stations by Company



Analysis Based on AFDC-DOE Data

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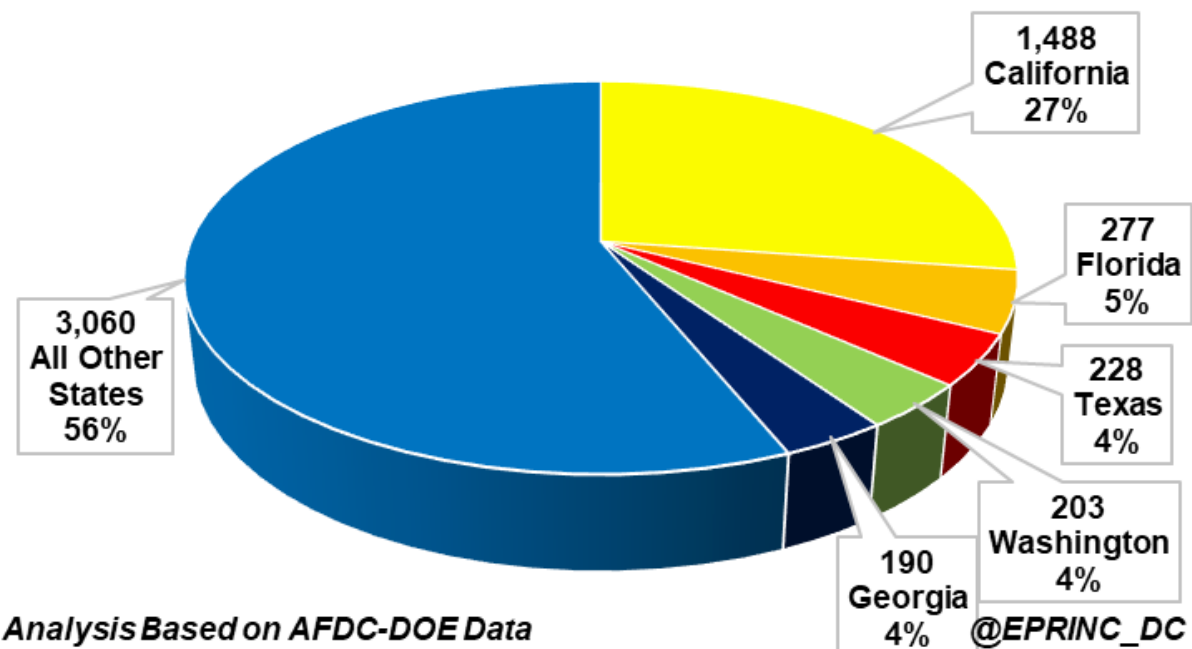
U.S. Fast Charging EV Connections by Company



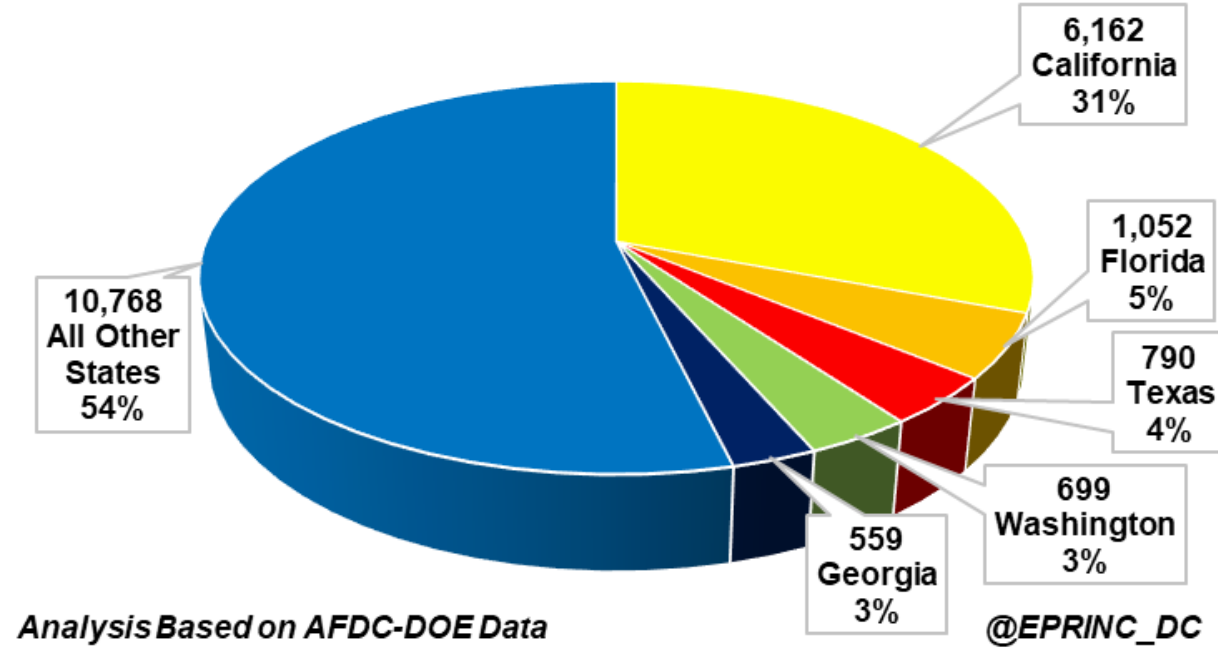
Analysis Based on AFDC-DOE Data

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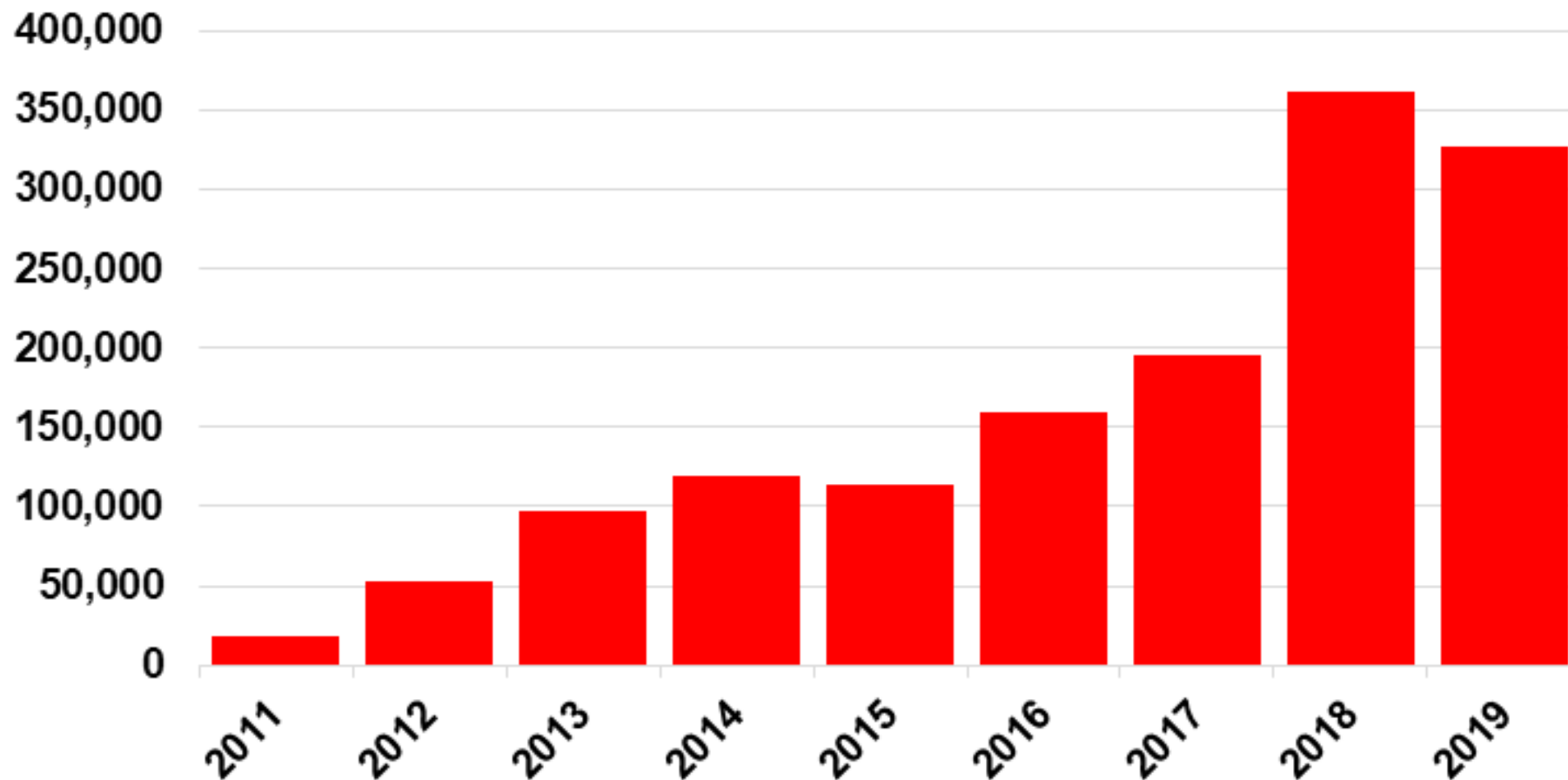
U.S. Fast Charging Stations by State



U.S. Fast Charging Connections by State



U.S. Plug-in Electric Vehicle Sales



Analysis Based on AFDC-DOE Data

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Number of EV Registrations by State

