Model EV Building Codes Toolkit

Vanessa Warheit, National Lead
October 5, 2023

EV CHARGING FOR ALL COALITION

Outline

- Welcome/Introduction
- Toolkit contents
- EV Infrastructure definitions
- Why EV building codes?
- Equity Considerations for multi-family housing
- Additional Considerations
- Four Principles of Equitable Multi-Family EV Codes
- Model Code language
- Resources
- Q&A

EV CHARGING FOR ALL COALITION

EVCAC's Mission

To ensure equitable, safe, and convenient access to affordable EV charging at home and/or at work, for all residents.

EV CHARGING FOR ALL COALITION

EVCAC Leadership Team

DENNIS CORELLIS, FORMER DEPUTY STATE ARCHITECT WITH CA'S DIVISION OF THE STATE ARCHITECT

MARC GELLER, CO-FOUNDER OF PLUG IN AMERICA

GUY HALL, POLICY TEAM CHAIR AT ELECTRIC VEHICLE ASSOCIATION

JARED JOHNSON, POLICY AND EXTERNAL RELATIONS SENIOR MANAGER AT ACTERRA

VANESSA WARHEIT, SENIOR PROGRAM ADVISOR AT PLUG IN AMERICA

LINDA HUTCHINS-KNOWLES, EQUITABLE E-MOBILITY ADVOCATE AND SENIOR MANAGER AT CHARGE ACROSS TOWN

DWIGHT MACCURDY, RETIRED PROJECT MANAGER AT SACRAMENTO MUNICIPAL UTILITY DISTRICT (SMUD)

MICHELLE PIERCE, FOUNDER, EV NIRVANA; EV ADVOCATE WITH INLAND EMPIRE EVA; MFH RESIDENT

BIRGITTE RASINE, CEO, LUCITA; CONTENT STRATEGY FOR TESLA OWNERS OF SILICON VALLEY; MFH RESIDENT

SVEN THESEN, FOUNDER, SVEN THESEN AND ASSOCIATES, EX PG&E, EX PENINSULA CLEAN ENERGY

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EVCAC Supporters

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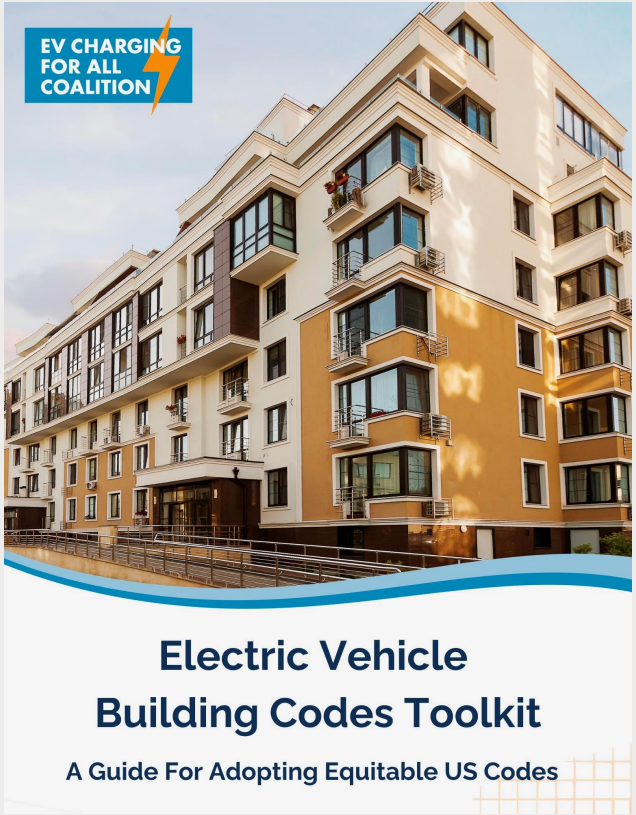

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pluginamerica.org/policy/ev-charging-for-all/ev-building-codes-toolkit/

Toolkit Contents

- What are building codes, and why do they matter?
- Best practices for EV charging at multifamily housing
  - Definitions
  - Equity Considerations
  - Additional Considerations
  - Four Principles
- Model Code Language
  - Proposed Model Codes
  - Existing EV Codes
- Additional Resources
  - Video
  - Spreadsheet Compendium
  - Webinar Recording
  - Slide Deck

EV CHARGING FOR ALL COALITION

EV Infrastructure: Definitions

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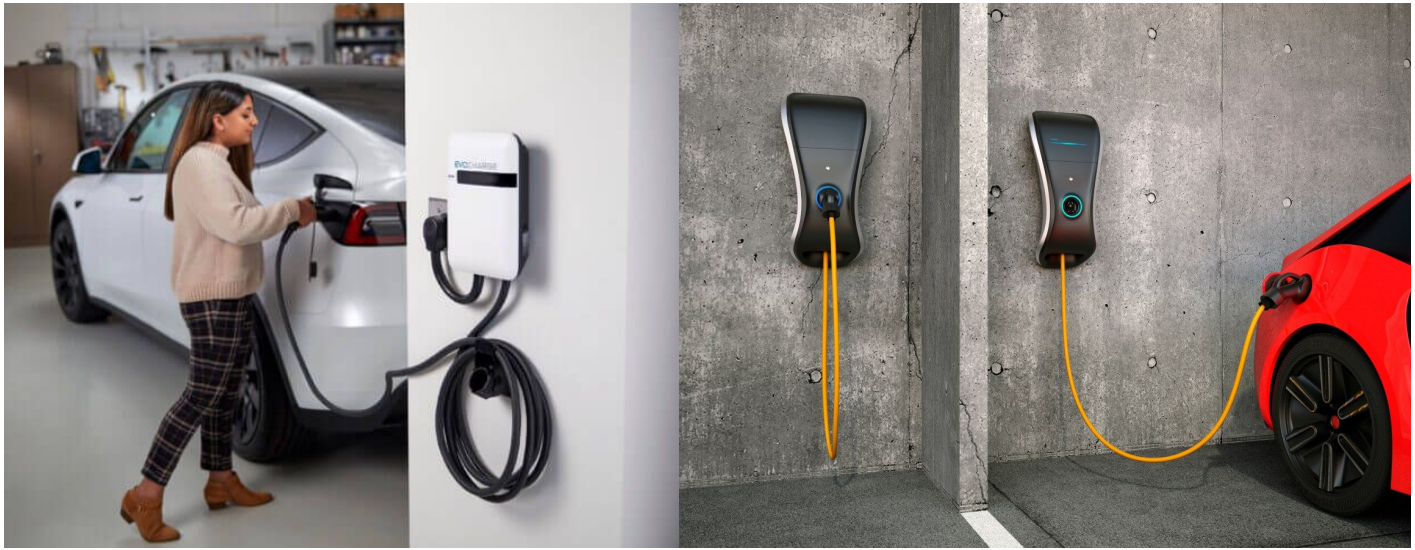
Definitions: Charging Equipment



EV Supply Equipment (EVSE)

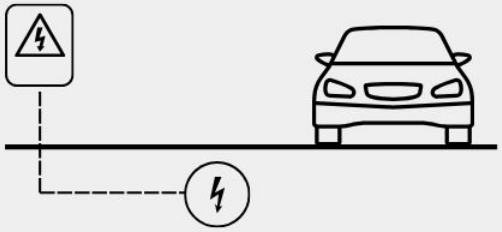
EV CHARGING FOR ALL COALITION

Definitions: Charging Equipment

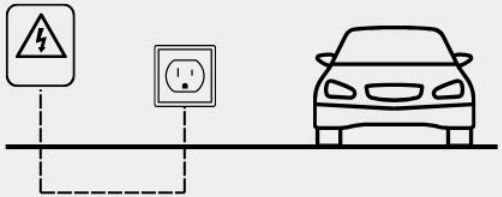
Portable EVSE Cordset

EV CHARGING FOR ALL COALITION

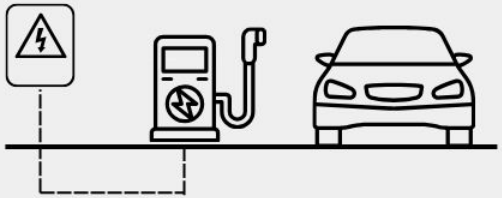
Definitions: EV Readiness



EV Capable



EV Ready



EVSE Installed

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Definitions: Readiness

Make-Ready

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Definitions: Power Delivery

Level 1 (L1)

Standard household outlet 20 Amp, 120v AC
Driving distance added: 3-4 miles/hour

Low-Power Level 2 (LPL2)

20 Amp, 208/240v AC
Driving distance added: 10-13 miles/hour

Full Level 2 (L2)

Similar to a dryer outlet. 40+ Amp, 208/240v AC
Driving distance added: 25-30 miles/hour

DC Fast Charging (DCFC)

24-350kW
Driving distance added: 72-1,200 miles/hour

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Why building codes?

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Building Codes in the US Are a Patchwork

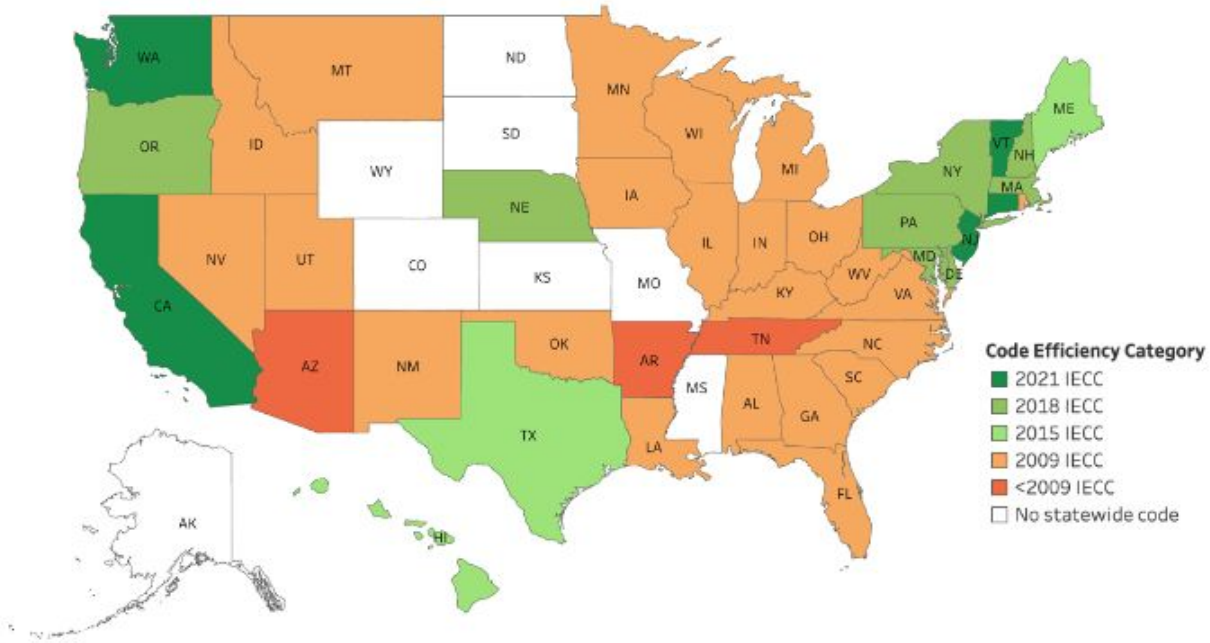

Fig. 2: Residential code efficiency varies significantly by state.[2]

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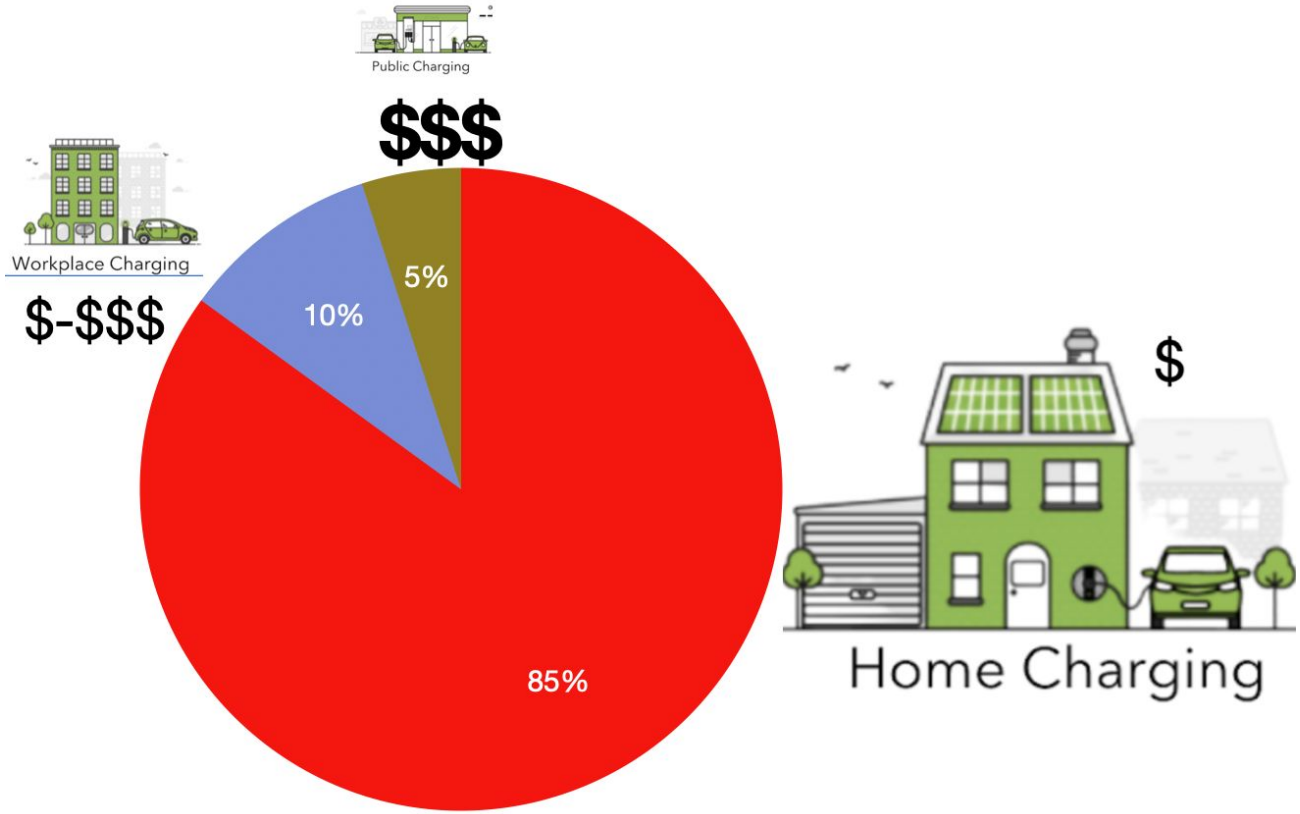
Access: “There’s No Place Like Home”



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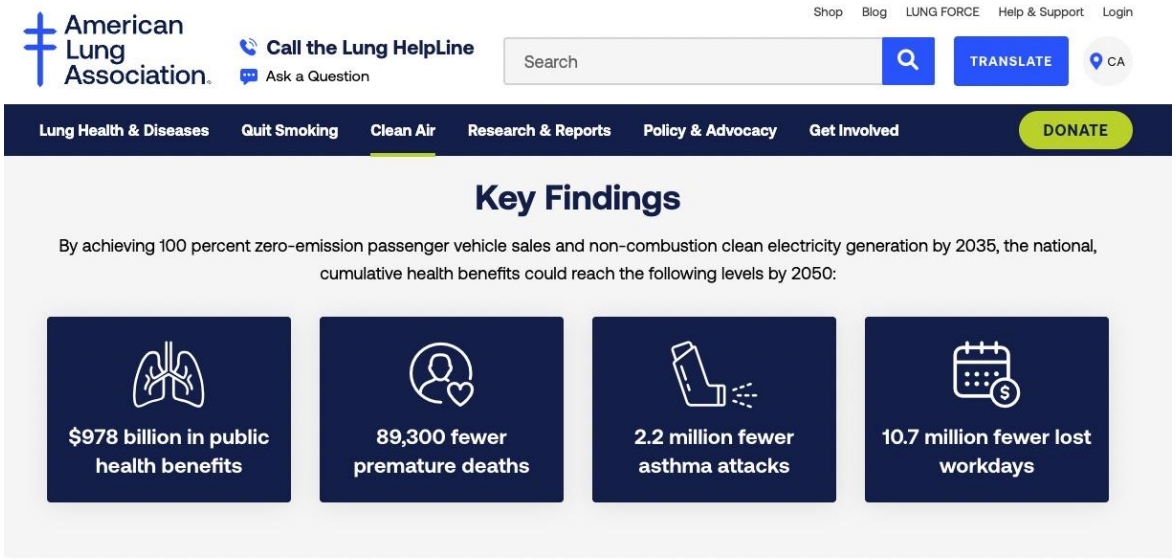
ALA: EV Policies Improve Air Quality



The transition to zero-emission technologies for transportation and electricity generation is well underway.

Important investments being made at the local, state and federal levels in consumer purchase incentives, manufacturer incentives and fueling infrastructure, along with private investment, are accelerating progress to healthier air.

Implementing strong local, state and federal policies and investments to advance zero-emission passenger vehicle sales, infrastructure and electricity will reduce regional air pollution impacts, disparities in pollution burdens and emissions of greenhouse gases that cause climate change.

EV CHARGING FOR ALL COALITION

ALA: EV Policies Improve Air Quality

Implementing strong local, state and federal **policies** and **investments** to advance zero-emission passenger vehicle sales, **infrastructure** and electricity will **reduce regional air pollution impacts**, disparities in **pollution burdens** and emissions of **greenhouse gases** that cause climate change.

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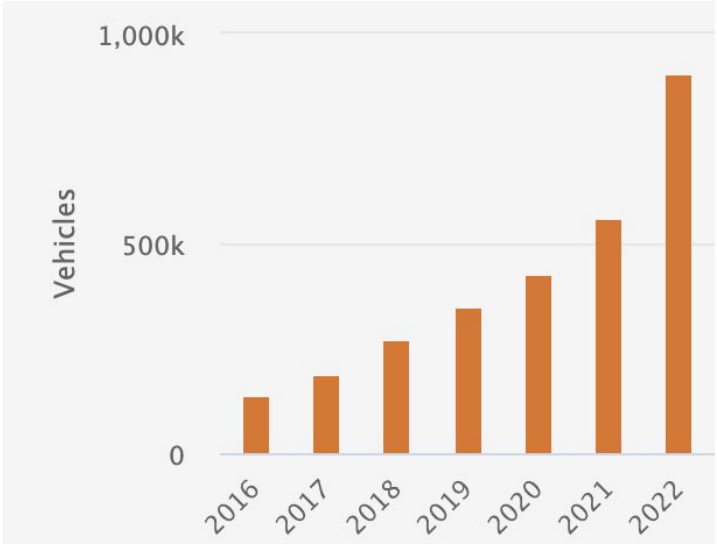
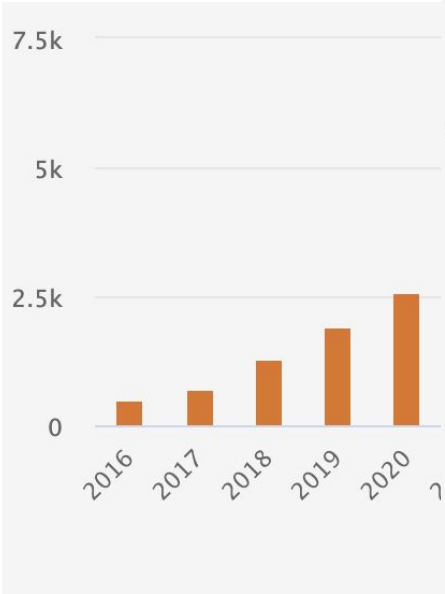
EVs are on an exponential growth curve

Electric Vehicle Registrations

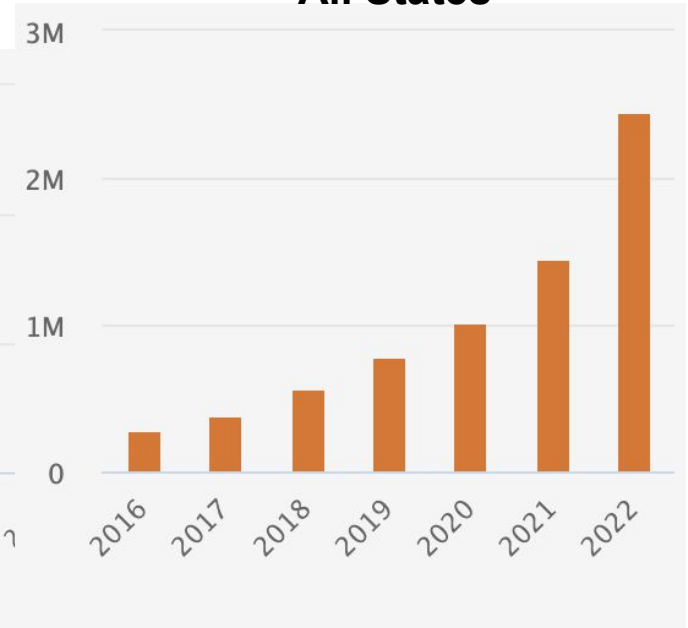
California



New Mexico

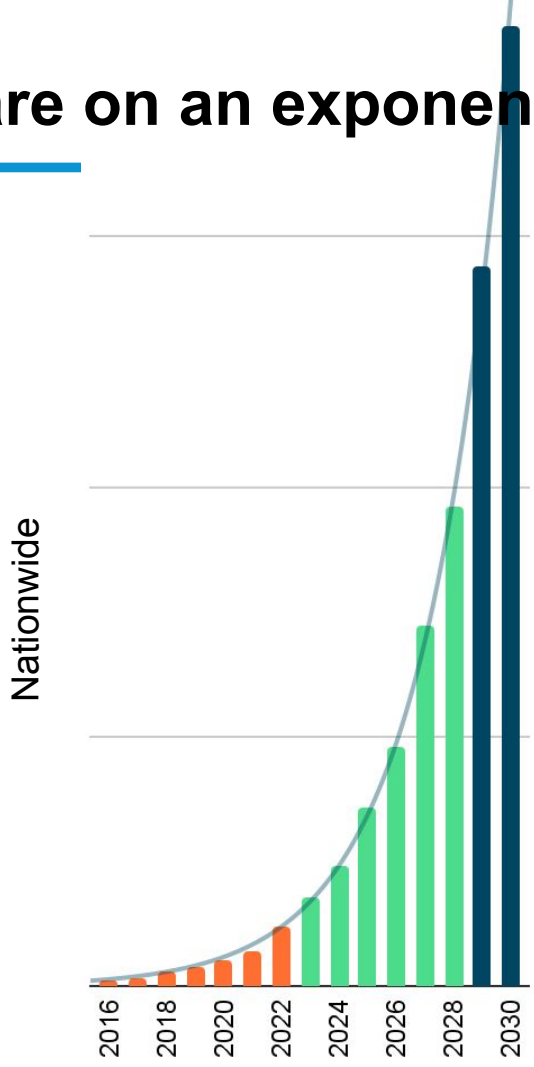


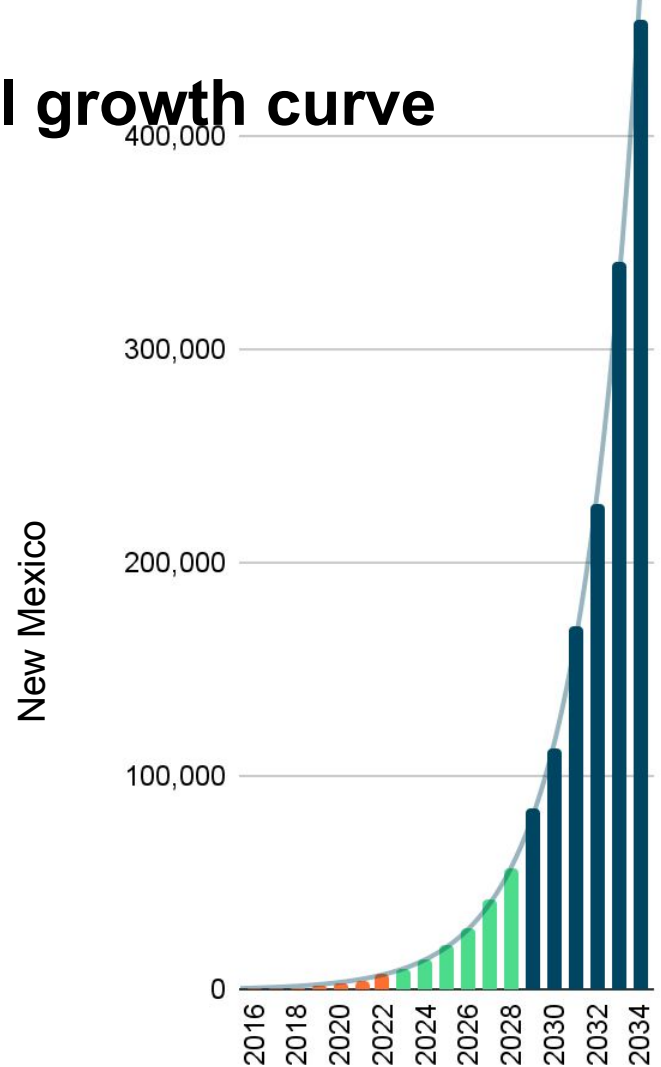
All States



EV CHARGING FOR ALL COALITION

EVs are on an exponential growth curve





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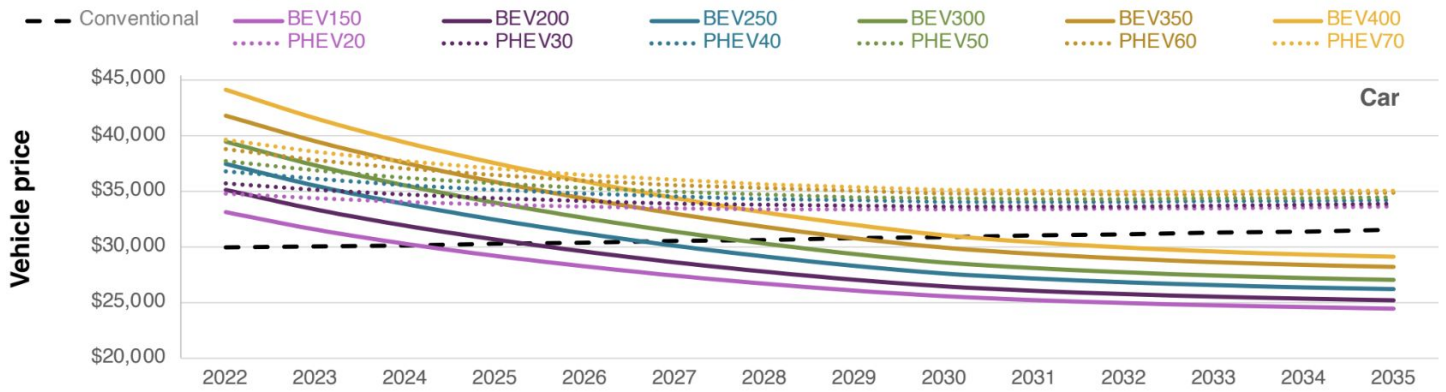
EVs - Least-Cost Option by 2025



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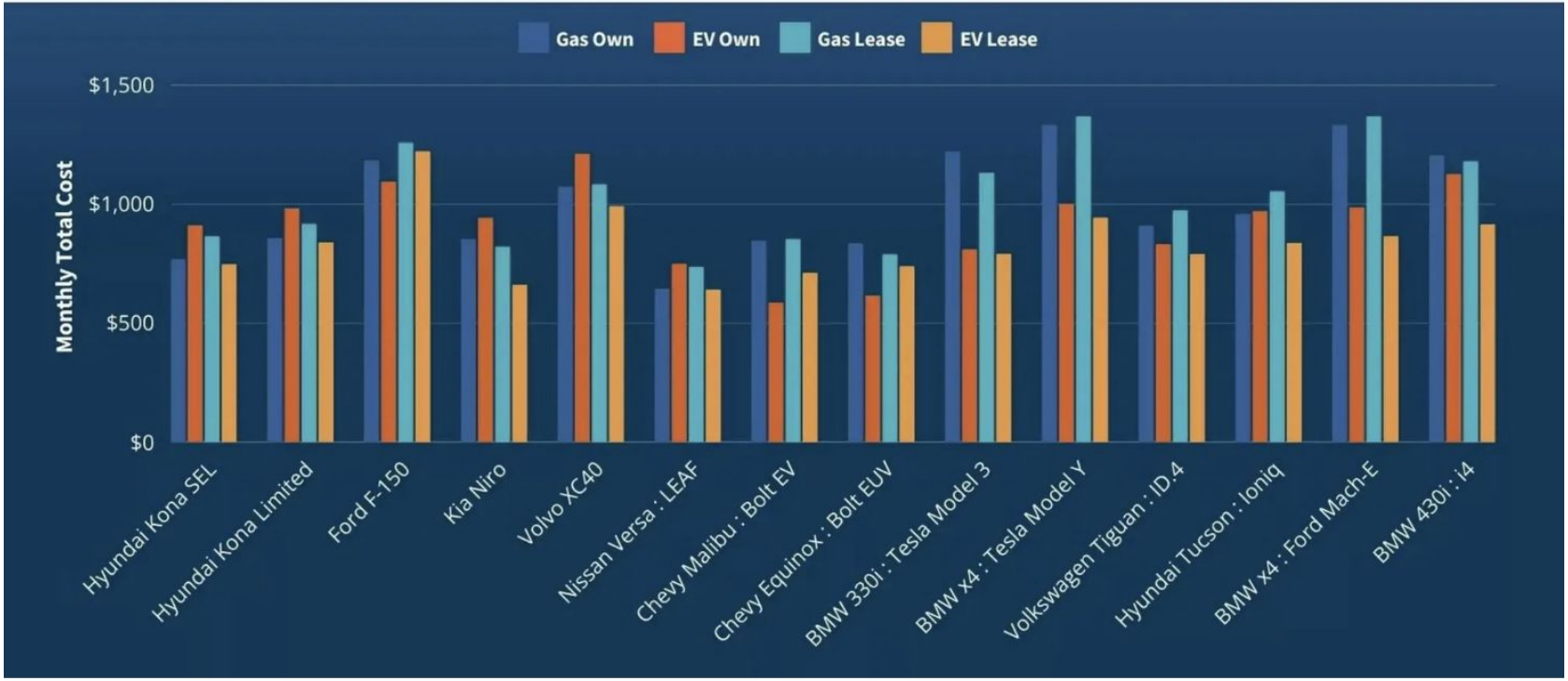
… or actually, make that 2023

Leasing an electric vehicle is the cheapest option for new car buyers

ENERGY INNOVATION
POLICY & TECHNOLOGY LLC®



Massive Federal Investments

The New York Times

Energy Dept. Announces $12 Billion to Help Factories Convert to Electric Cars

The grants and loans, provided under the 2022 Inflation Reduction Act, are meant to keep autoworkers' jobs in their communities.

Forbes

FORBES > BUSINESS > ENERGY

Inflation Reduction Act Benefits: Electric Vehicle Tax Incentives For Consumers And U.S. Automakers

BENZINGA Our Services News Markets Ratings Ideas Yield Money Alts Crypto Cannabis Jobs

SPY	QQQ	SPIKE	BTC/USD	DIA	GLD	TLT
427.67 ▼ 0.2%	358.64 ▲ 0.18%	17.35 ▼ 0.46%	26920.32 ▼ 0.6666%	335.03 ▼ 0.47%	171.51 ▼ 0.99%	88.25 ▼ 0.49%

Report: U.S. Electric Vehicle Investments Experiencing Rapid Increase

by PRNewswire

September 8, 2023 10:25 AM | 3 min read

Find it on Apple News

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DOE: Light Duty vehicles will be Battery Electric

Technology solutions for travel modes to reach a net-zero economy in 2050

1 icon represents limited long-term opportunity
2 icons represents large long-term opportunity
3 icons represents greatest long-term opportunity

	BATTERY/ELECTRIC	HYDROGEN	SUSTAINABLE LIQUID FUELS
Light Duty Vehicles (49%)*	●●●	—	TBD
Medium, Short-Haul Heavy Trucks & Buses (~14%)	●●	●	●
Long-Haul Heavy Trucks (~7%)	●	●●●	●●
Off-road (10%)	●●	●	●
Rail (2%)	●●	●●	●●
Maritime (3%)	●	●● †	●●●
Aviation (11%)	●	●	●●●
Pipelines (4%)	●●	TBD	TBD
Additional Opportunities	• Stationary battery use • Grid support (managed EV charging)	• Heavy industries • Grid support • Feedstock for chemicals and fuels	• Decarbonize plastics/chemicals • Bio-products
RD&D Priorities	• National battery strategy • Charging infrastructure • Grid integration • Battery recycling	• Electrolyzer costs • Fuel cell durability and cost • Clean hydrogen infrastructure	• Multiple cost-effective drop-in sustainable fuels • Reduce ethanol carbon intensity • Bioenergy scale-up

* All emissions shares are for 2019

† Includes hydrogen for ammonia and methanol

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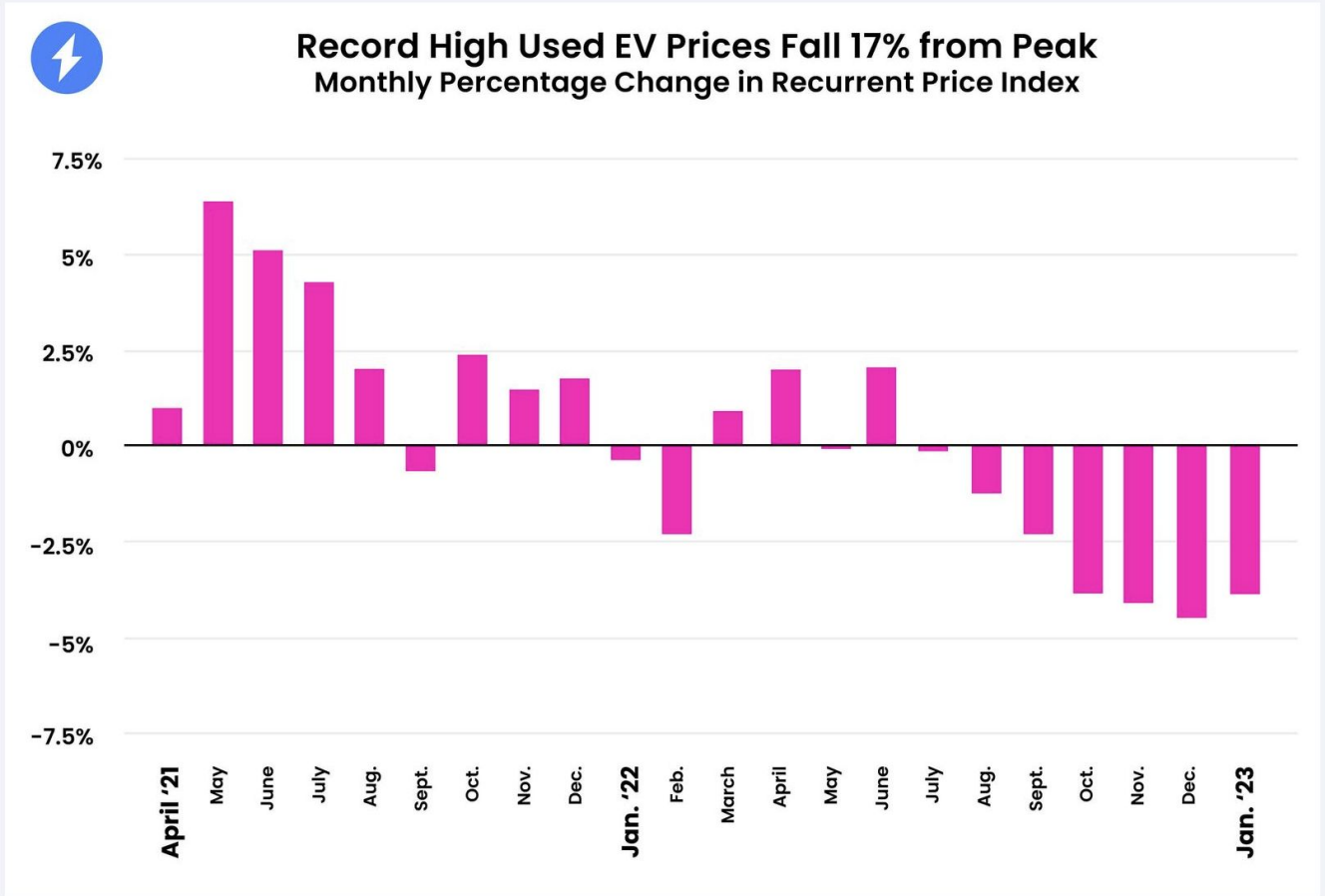
Used EV Prices Are Dropping



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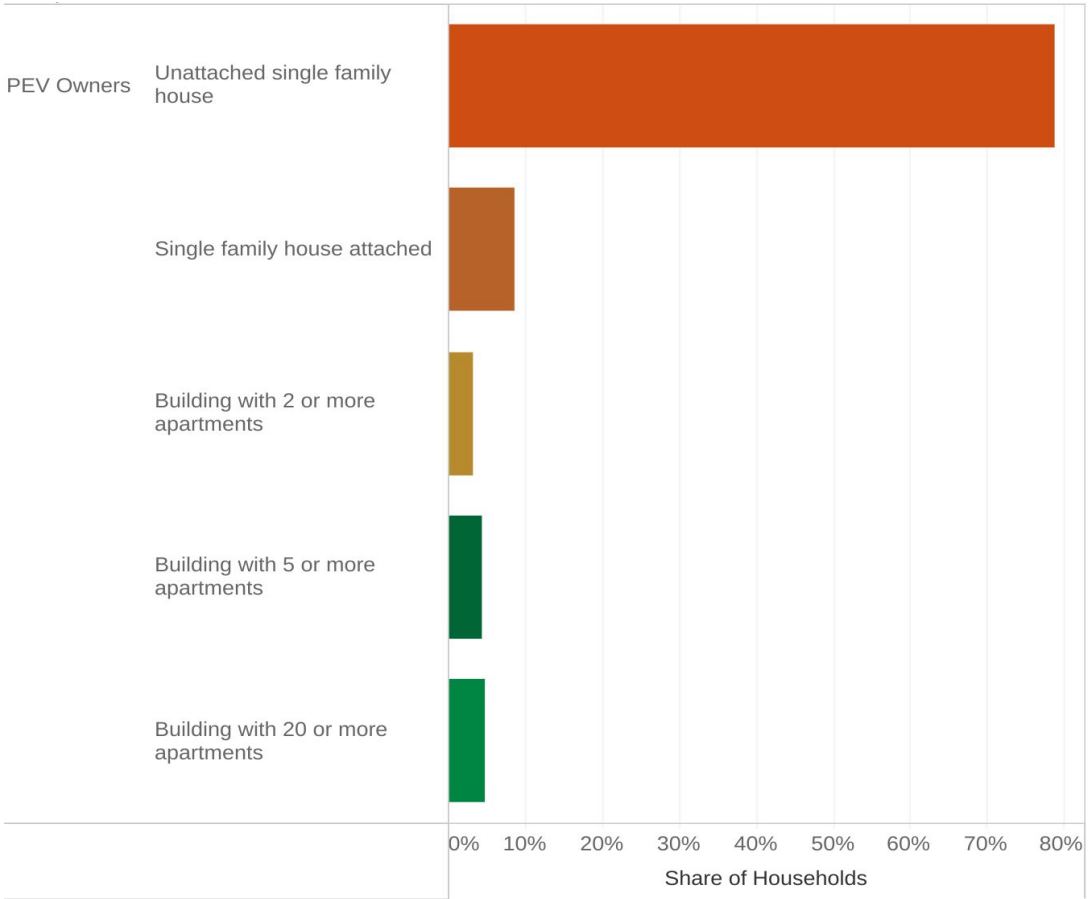
California PEV Owners by Housing Type



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Equity Considerations For Multi-Family Housing

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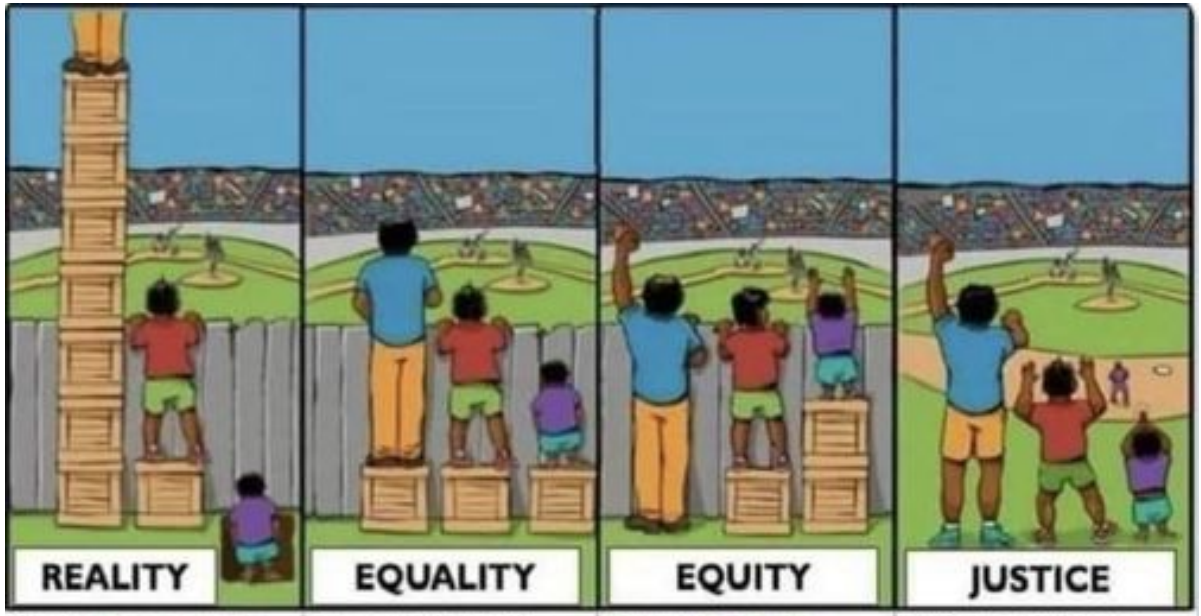
Equity and Environmental Justice



REALITY	EQUALITY	EQUITY	JUSTICE
One gets more than is needed, while the other gets less than is needed. Thus, a huge disparity is created.	The assumption is that everyone benefits from the same supports. This is considered to be equal treatment.	Everyone gets the support they need, which produces equity.	All 3 can see the game without supports or accommodations because the cause(s) of the inequity was addressed. The systemic barrier has been removed.

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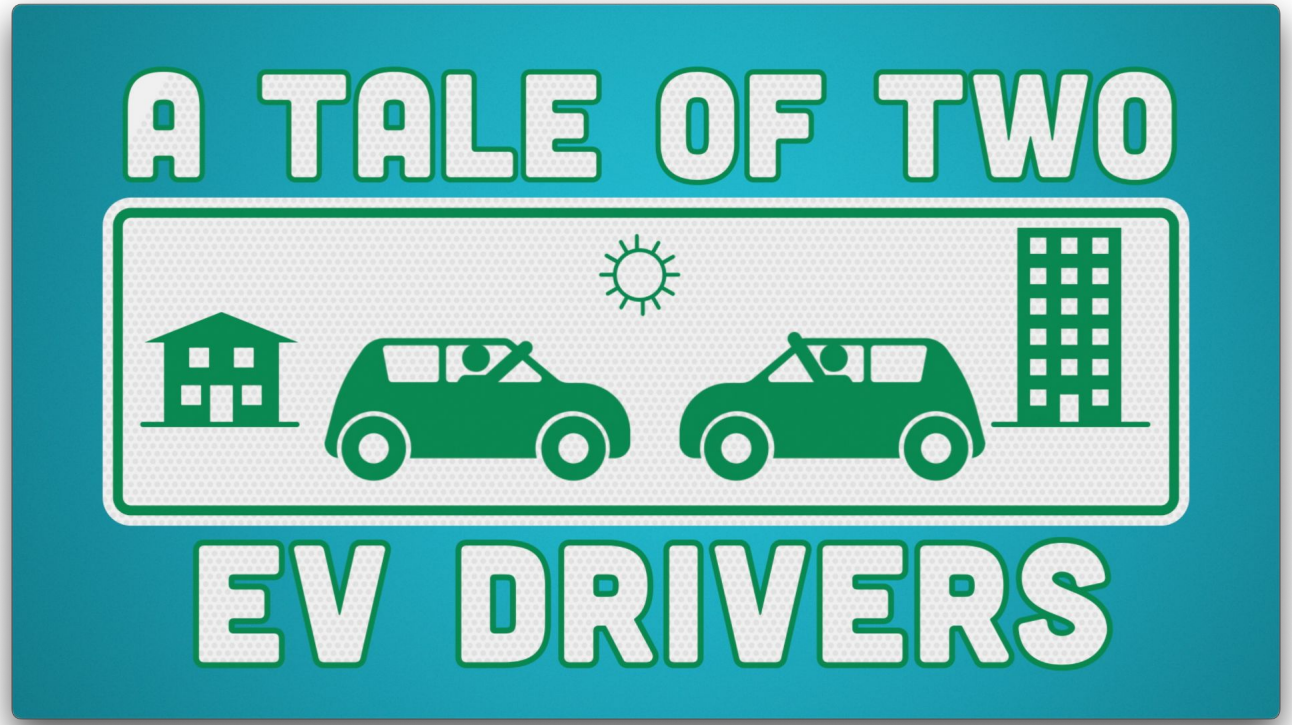
Equity and Environmental Justice



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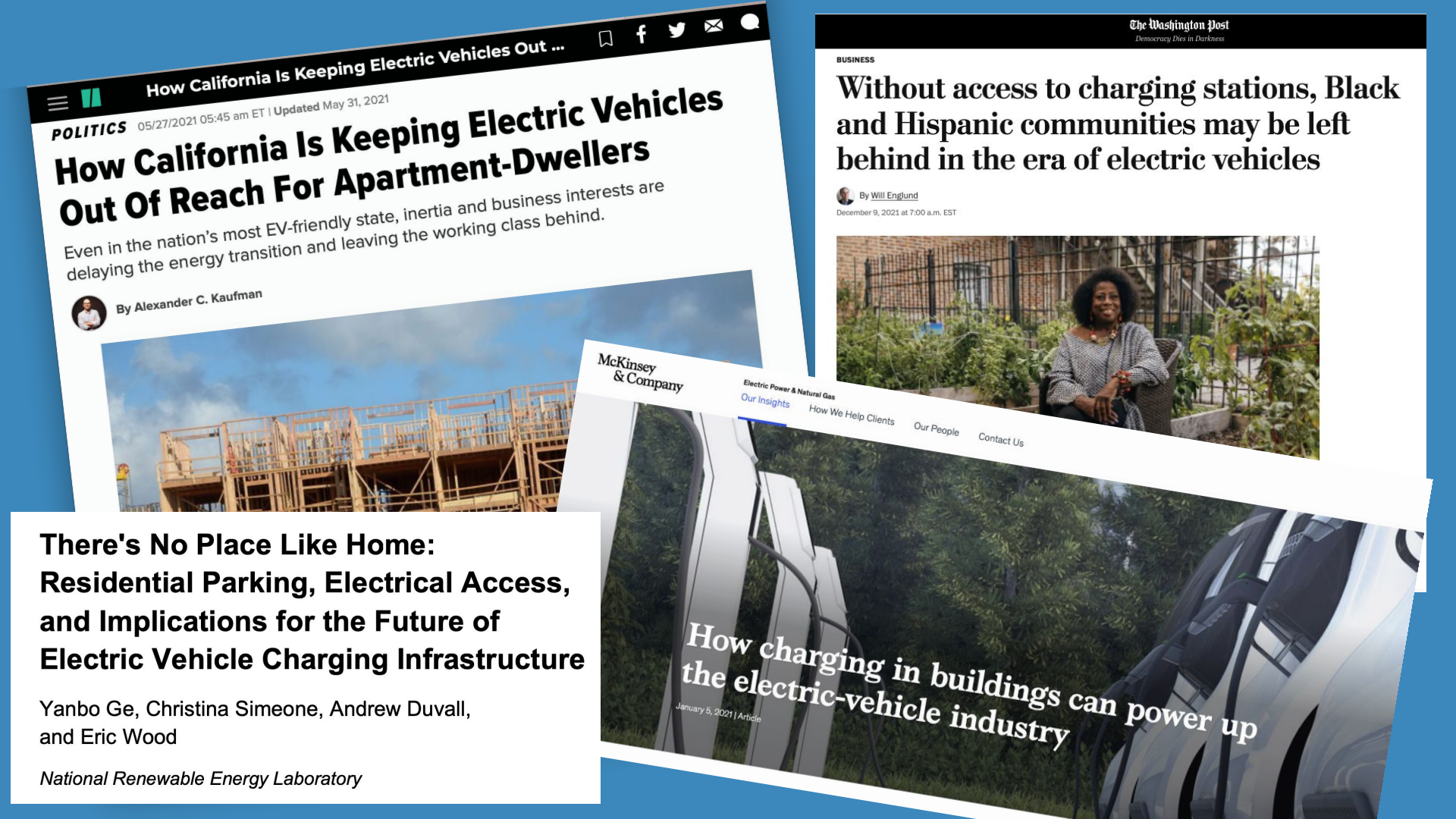
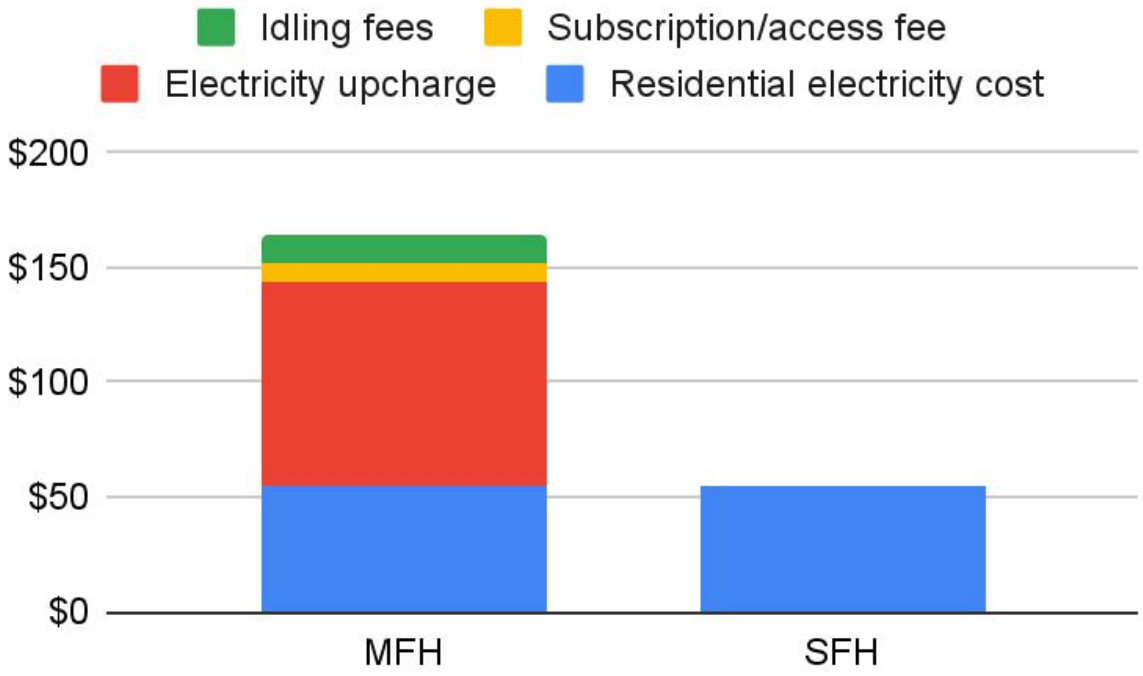


There's No Place Like Home: Residential Parking, Electrical Access, and Implications for the Future of Electric Vehicle Charging Infrastructure

Yanbo Ge, Christina Simeone, Andrew Duvall, and Eric Wood

National Renewable Energy Laboratory

A Tale of Two EV Drivers



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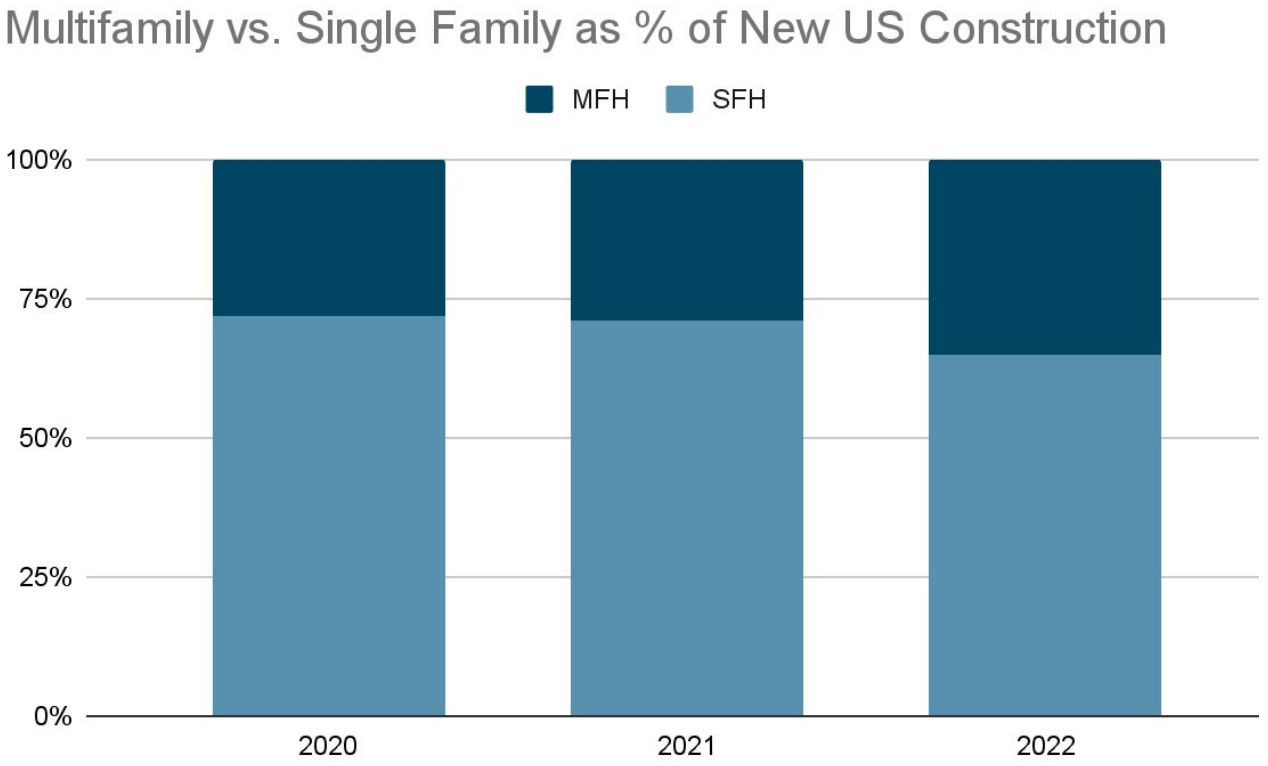
More Multi-Family Housing…



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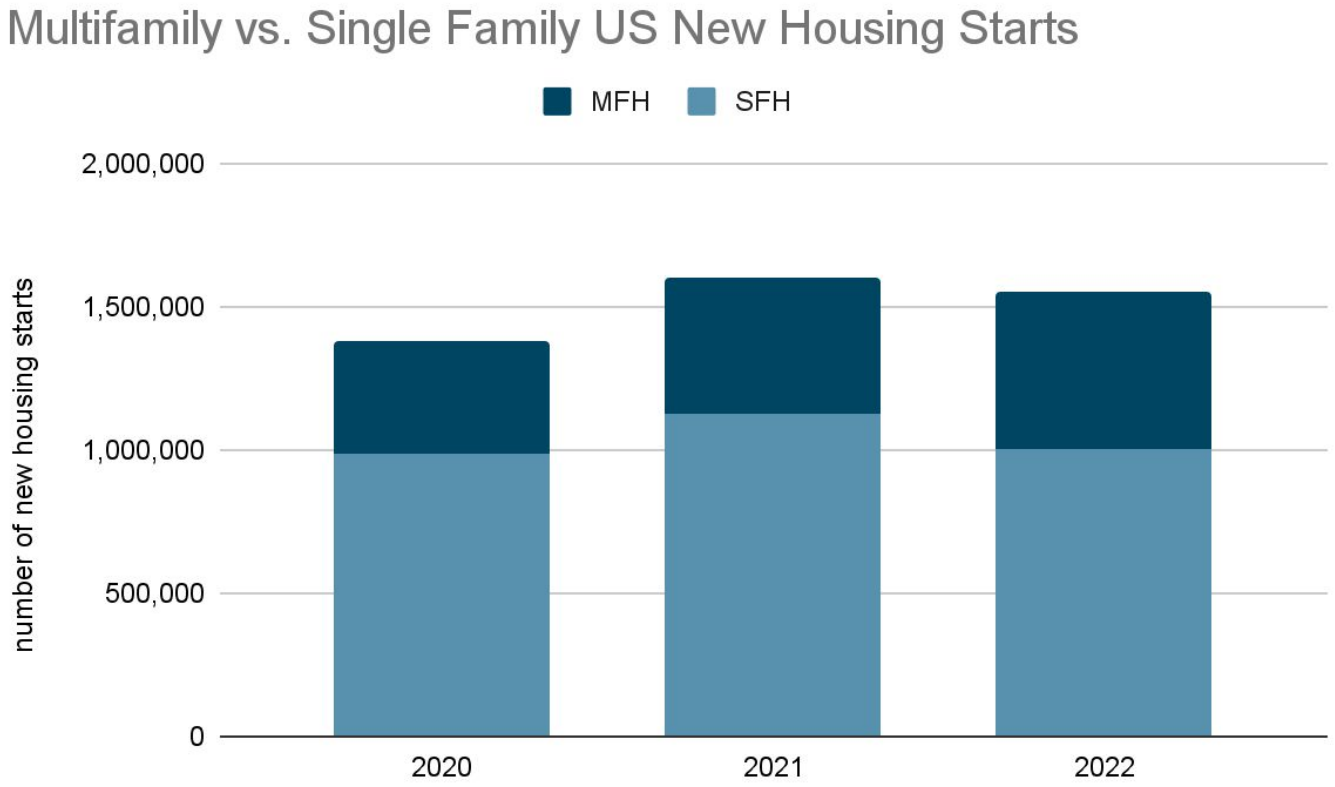
… Means More Parking



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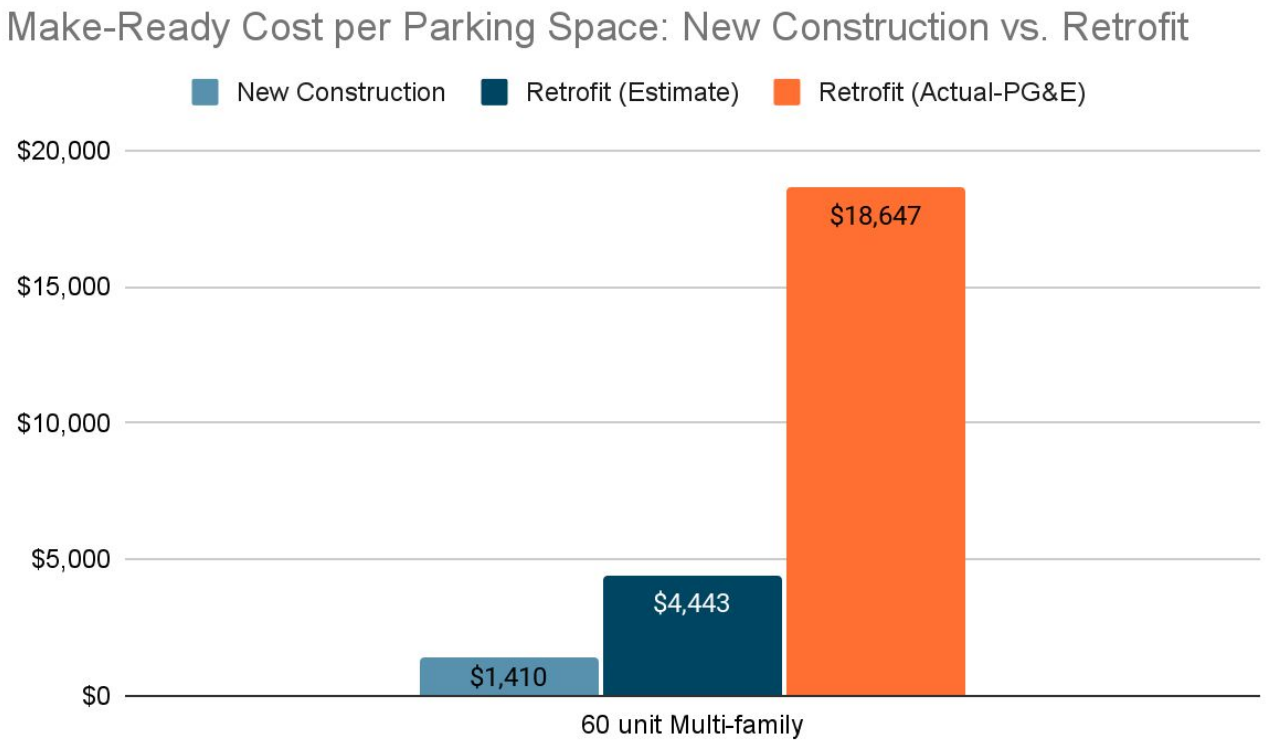
New Construction Is Least Cost Option



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Additional considerations

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Battery Life

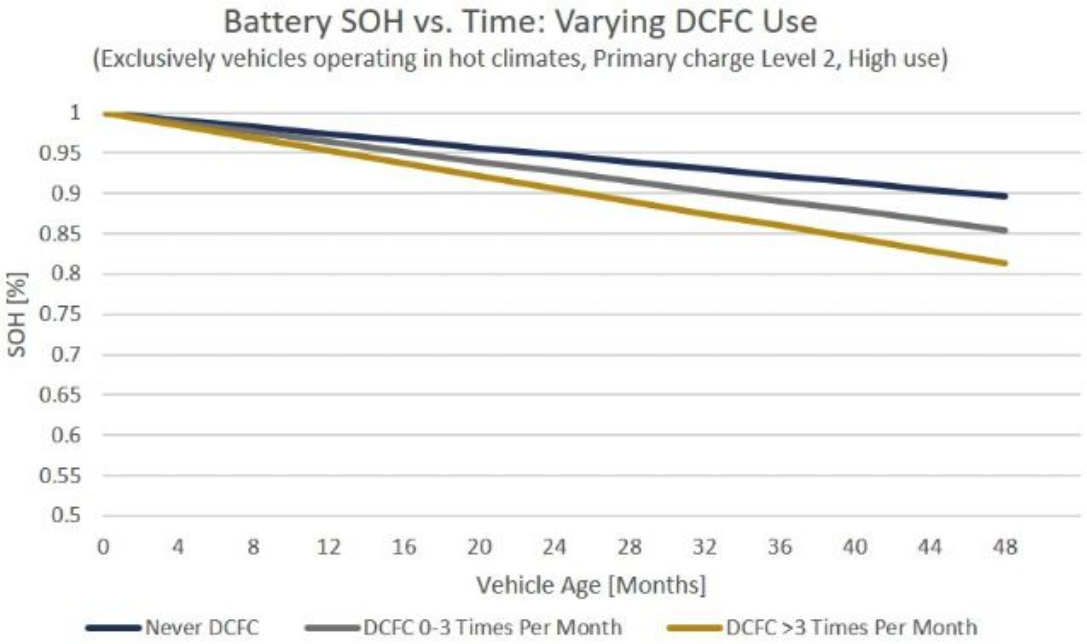

Figure 8: Battery degradation appears to be strongly correlated with DCFC use for vehicles in seasonal or hot climates.

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Dwell Time

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Electric Grid Constraints

EV’s are actually good for the grid!

- Represent a tiny % of overall electricity demand
- Can easily charge during times of peak supply and low demand (load shifting)
- Can supply backup power (Vehicle-to-Grid or V2X)

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Resilience

electrek

Exclusives | Autos | Alt. Transport | Autonomy | Energy | Tesla Shop

FORD F-150 LIGHTNING BIDIRECTIONAL CHARGING

How electric vehicles help keep the lights on with bidirectional charging during extreme weather events

Peter Johnson | Nov 8 2022 - 11:03 am PT | 0 Comments

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OPINION

Keep pushing on EV two-way charging

The feature enables massive batteries to power homes during blackouts, heat waves and other periods of high energy demand.

By the Editorial Board of the Los Angeles Times | AUGUST 20, 2023 — 6:00PM

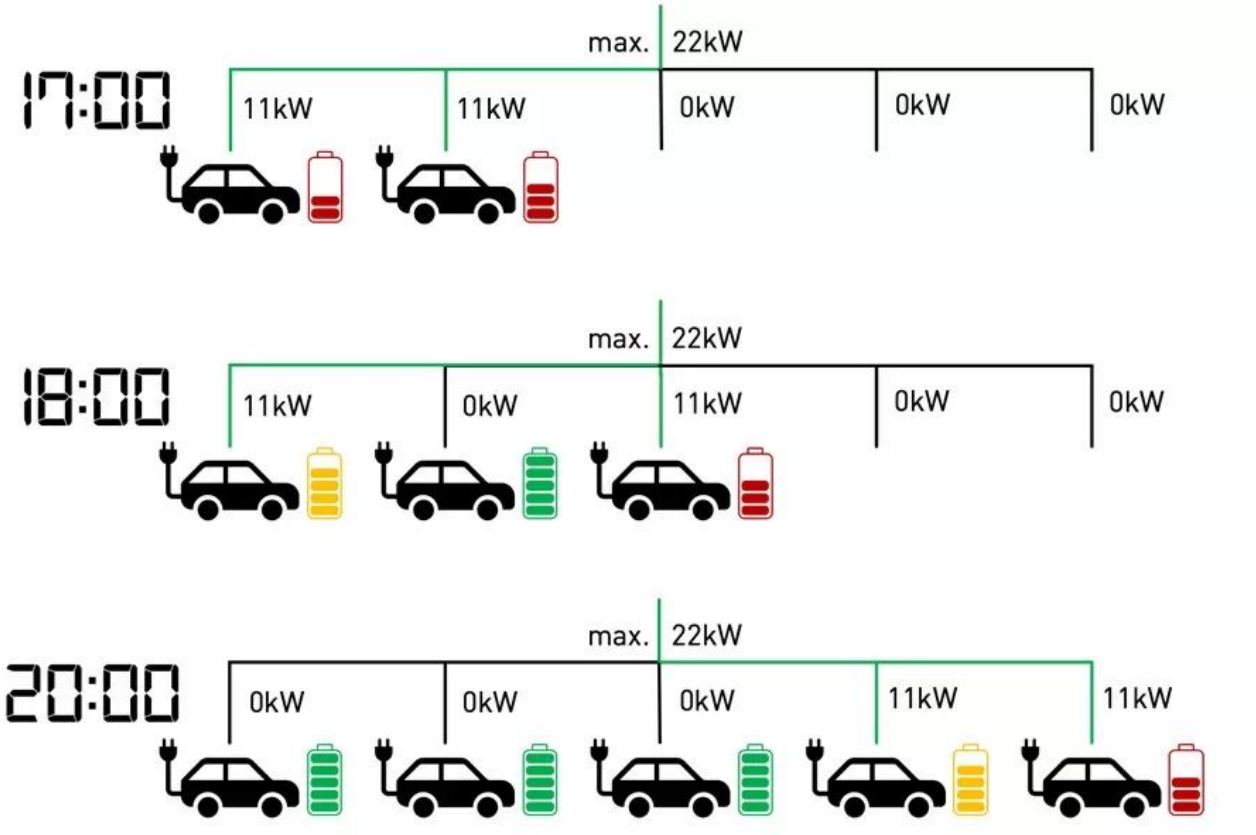
LIPO CHING, TNS

Two Teslas charge in a public garage in Palo Alto, Calif.

Efforts to give the nation's growing fleet of electric vehicles a second job as backup power sources got a significant boost this month.

General Motors announced Aug. 8 that all of its electric vehicles will have two-way charging capability by model year 2026, with some available by 2024. The feature, known as vehicle-to-home, enables their massive batteries to power homes during blackouts, heat waves and other periods of high

Load Management



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Four Principles of Equitable Multi-Family EV Codes

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The Four Principles of Equity-Centered MFH Code

1) Provide each household unit that has parking with at least one EV Ready space

2) Require at least Low-Power Level 2 & Receptacles, not necessarily EVSE

3) Wire receptacle/EVSE directly to corresponding unit's panel or meter

4) Install prominent signage at each EV Ready space

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Model Codes

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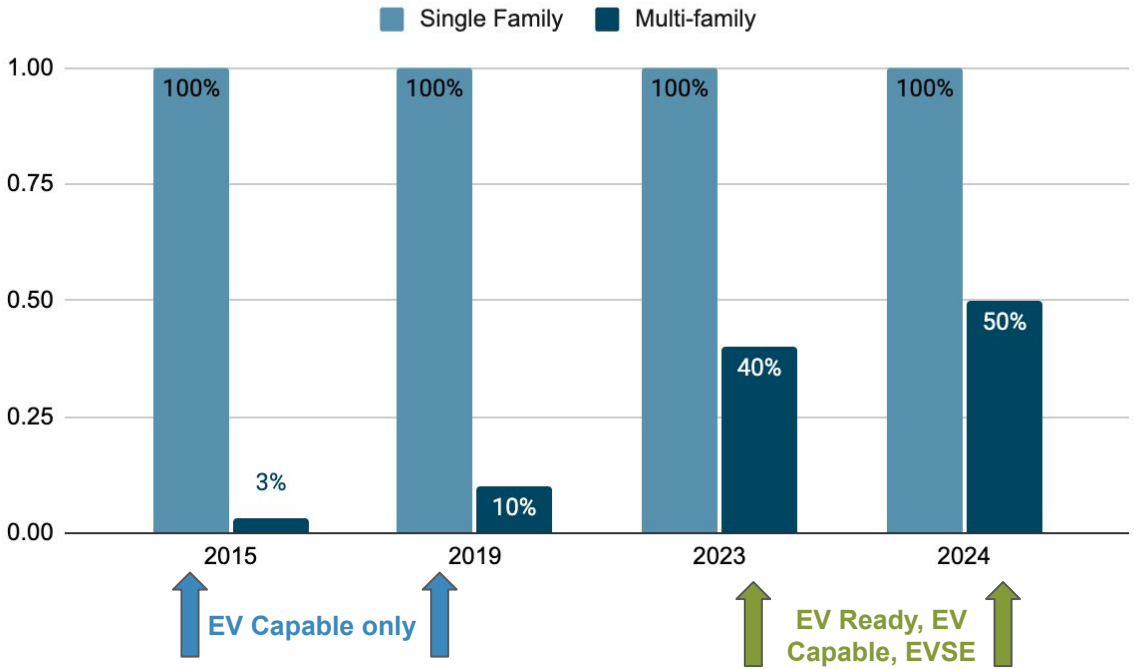
EV Readiness in California

CALGreen Building Code

Percentage of EV Access Required in New Construction



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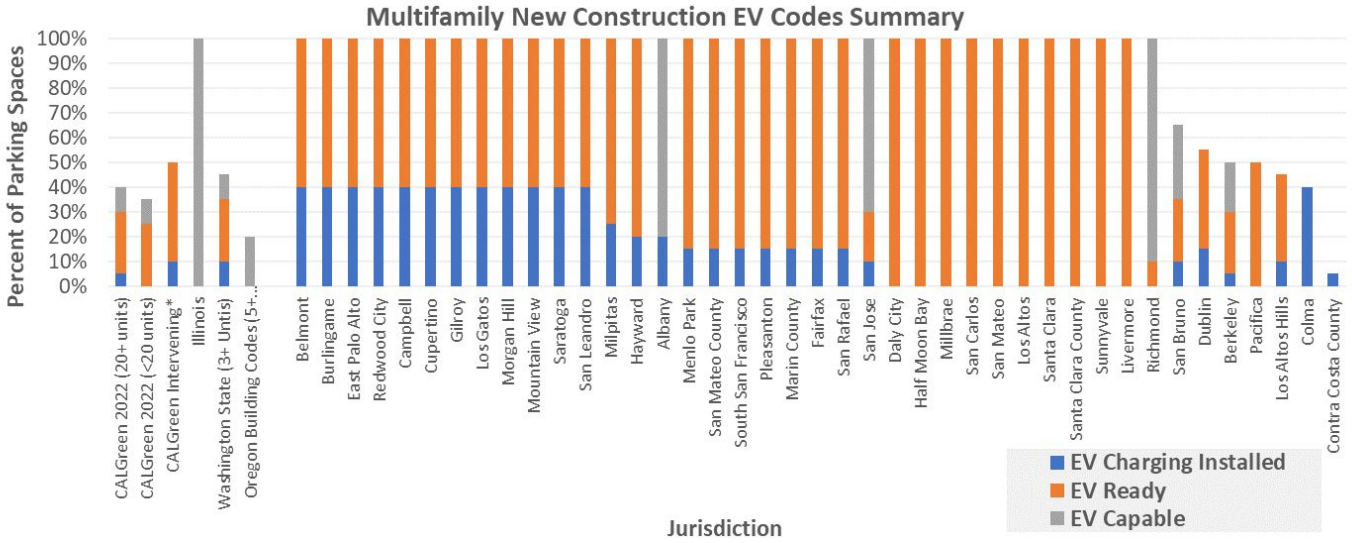
Multifamily Residential Buildings

State codes in **California**, **Washington**, **Illinois**, and **Oregon** target **20% to 55% of total spaces.**

Many jurisdictions adopting EV Reach Codes in **Northern California** require **100% of parking spaces to be either EV Capable, EV Ready, or EVSE installed**.



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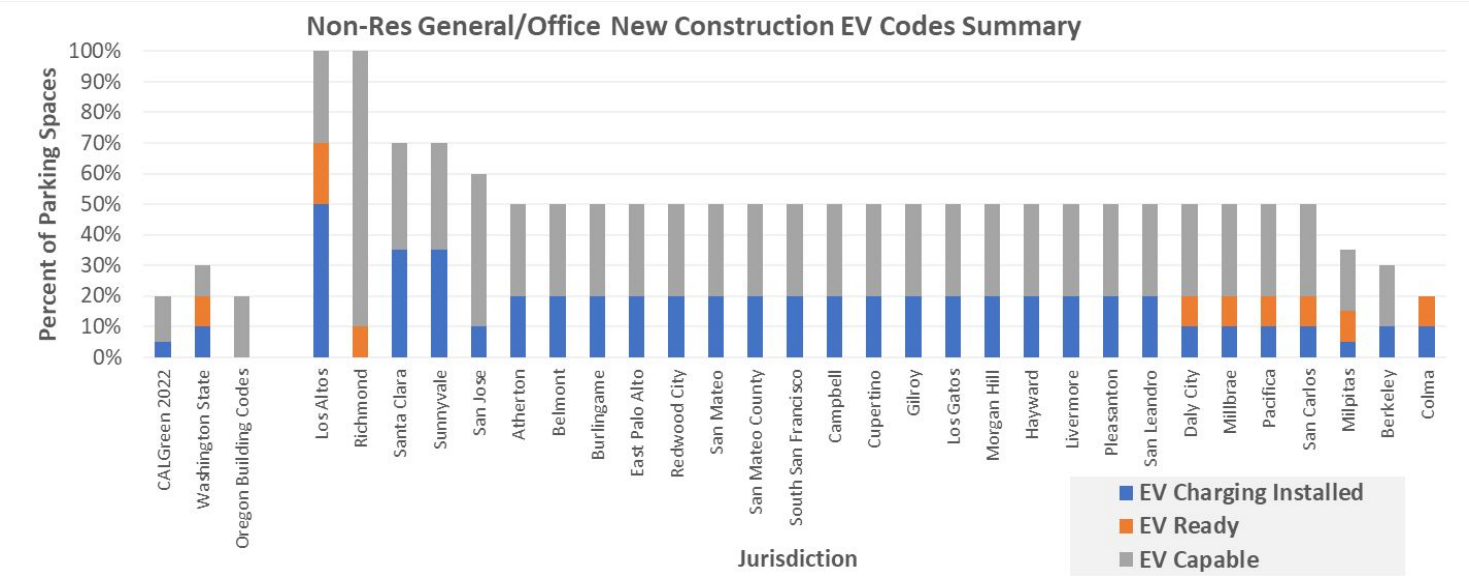
*CALGreen Intervening Cycle codes, *if approved,* would go into effect July 2024.

Commercial/Non-Residential buildings:

State codes in **CA**, **OR**, **WA** range from **20% to 30% of total spaces**.

The majority of **Northern California** local jurisdictions with EV Reach codes require **50% of parking spaces to be either EV Capable, EV Ready, or have EVSE installed** for non-residential/office buildings.

Of those, many set their code to be **20% EVSE and 30% EV Capable.**



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IECC Amendments

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Additional Resources

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State by state codes

File Edit View Insert Format Data Tools Extensions Help

State	Authority	Statewide EV Code Provisions	State Current EV Rules URL	Cities with EV codes (Local adoptions of energy codes - in select states only)	Sample City EV code URL (Home Rule & Reach Code states only)	Commercial Building Energy Code	Residential Building Energy Code	EV Ready Definition (DRAFT 2024 IECC language or different?)	Code Adoption Agency	Stakeholder Engagement Resources	Cycle (synopsis of when the codes are reviewed (periodically?), and what cycle they're in)	Resource Folder w/ state specific notes	Primary Contact	Secondary Contact	Regional/Local EV Advocates
Alabama	Reach code	No	N/A	Helena	https://cityofhelena.org/wp-content/uploads/2023/02/Ordinance-911-2023_-EV_Infrastructure.pdf	ASHRAE Standard 90.1-2013	2015 IECC with Amendments	N/A	Alabama Energy Residential Codes Board (administered by ADECA - Alabama Department of Economic and Community Affairs)	Public Meeting Notices (all Alabama agencies)	Currently Enforcing: ASHRAE 90.1-2013 commercial and 2015 IECC amended residential Next Code Adoption: "It is more probable to update [the code] to the 2018 or 2021." Codes Review Timeline: no set timeline, "codes are reviewed as needed".	Alabama toolkit	Karl D. Frost Energy Efficiency Unit Chief Energy Division (334) 242-5322	Maureen Neighbors Division Chief, Energy Division Alabama Department of Economic and Community Affairs P.O. Box 5690 Montgomery, AL 36104 United States (334) 242-5290 terri.adams@adeca.alabama.gov	https://cleanenergy.org/by-state/ https://energyalabama.org/advocacy/ William Bryan Built Environment Project Manager Southeast Energy Efficiency Alliance (SEEA) United States 404-602-9633 wbryan@seealliance.org
Alaska	Home rule	No	N/A	N/A	N/A	None Statewide; see AHFC Building Energy Efficiency Standard 2018 (based on 2018 IECC with Alaska specific amendments) **State offers recommendations and technical assistance, but has no mandatory statewide code (home rule).	None Statewide; see AHFC Building Energy Efficiency Standard 2018 (based on 2018 IECC with Alaska specific amendments) **State offers recommendations and technical assistance, but has no mandatory statewide code (home rule).	N/A	Alaska Housing Finance Corporation (residential)	Alaska Housing Finance Corporation :: Board Meetings	Currently Enforcing: none (2018 IECC state BEES standard - Building Energy Efficiency Standard) Next Code Adoption: possibly 2021 IECC for BEES standard? Codes Review Timeline: 3 years?	Alaska Codes Resources	R. Scott Waterman State Energy Program Manager AK Housing Finance Corporation 4300 Boniface Parkway P.O. Box 101020 Anchorage, AK 99510-1020 United States (907) 330-1234 swaterma@ahfc.us	N/A	https://juneauev.org/
American Samoa	Non-state	No	N/A	N/A	N/A	None Statewide (Uniform Building Code - no online link available)	None Statewide (Uniform Building Code - no online link available)	N/A	Legislature handles standards, Gov. Public Works Dept. handles Uniform Building Codes	Building Branch Division | AMERICAN SAMOA GOVERNMENT – DEPARTMENT OF PUBLIC WORKS Government Contact Form	Currently Enforcing: none Next Code Adoption: unknown Codes Review Timeline: unknown	American...	Reupena Tagaloa Director, Territorial Energy Office American Samoa Government Pago Pago, AS 96799 United States (684) 699-1101 basstinc@gmail.com	Fala Leasilagi Deputy, Territorial Energy Office American Samoa Government United States (684) 699-2835 fleasiolagi@yahoo.com	N/A
Arizona	Home rule	No	N/A	Tucson Flagstaff Sedona	Tuscon Flagstaff Sedona Scottsdale (EVSE definition p.7,	None Statewide (home rule)	None Statewide (home rule)	N/A	State Energy Code Advisory Commission and State Legislature	Arizona Legislature Calendar Search Contact Your Legislator	Currently Enforcing: none statewide (home rule) Next Code Adoption: unknown Codes Review Timeline: no set schedule	Arizona EV Code Resources	Thomas Sahhar Manager, Energy & Transportation rces Arizona Department of Administration 100 North 15th Ave., Suite 400	N/A	https://www.swenergy.org/arizona/ https://scottsdaleeva.com/ https://www.route66eva.org/ https://www.facebook.com/PhoenixEAA/ http://tucsonelectricvehicle.org

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Thank you!

info@chargingforall.org

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