



WELCOME TO THE 2025 SUSTAINABLE FACILITIES FORUM KEYNOTE

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Green Technology Collaboration

Resilience After the Fires



FASE / Green Technology Offices on 7 January 2025





FASE / Green Technology 30-Year Footprint In Education & Sustainability



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- > Space Science
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- > Educator Resources

Lesson Subjects

- > All Lessons
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- > Mathematics
- > Problem Solving
- > Science & Technology

Educator Resources



Subject: Science

Grade Levels: 3rd Grade, 4th Grade, 5th Grade, 6th Grade,

Synopsis: Krista Rigsbee, founder of Constructive Systems Inc., unveils solar-integrated outdoor classrooms. These innovative spaces merge STEM with education, emphasizing both sustainability and hands-on learning.

Running Time: 2:39 minutes

Related Lessons:

Title: PLANT POWER UP: ENERGY FROM THE SUN AND ENERGY TRANSFER

Topics: [Energy](#),

Next Generation Science Standards (NGSS): [Analyzing and Interpreting Data](#),

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Resilience Road Map

Companies & Careers Making a Difference



Hundreds of STEM & Environmental Literacy Career Videos and Lesson Plans To Help Connect Career Pathways



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ENVIRONMENTAL LITERACY

☐ KAY TOLIVER CLASSROOM

☐ MOVIE CLOSE-UPS

☐ SCIENCE & TECHNOLOGY

☒ SPACE SCIENCE

☐ SPORTS

☐ TRANSPORTATION

Topics

Click to Select

Common Core Standard

Click to Select

Grade Level(s)

☐ Kindergarten
 ☐ 1st Grade
 ☐ 2nd Grade
 ☐ 3rd Grade
 ☐ 4th Grade



Powering the Planet – Space Solar Power Idea

Category: ENVIRONMENTAL, SCIENCE & TECHNOLOGY, SPACE SCIENCE

The idea of solar power from space touches on science, technology, engineering, the environment, math, energy and more. Pose this concept to students to stimulate critical thinking about these issues & get them involved in the conversation.

WATCH NOW



Reliable Robots

Category: SCIENCE & TECHNOLOGY, SPACE SCIENCE

When it comes to designing robots for space, making sure that they can complete their missions is the name of the game for NASA's robotics engineers. That requires math, especially probability.

WATCH NOW



Revisiting the Moon

Category: SPACE SCIENCE

Evidence suggests there may be deposits of ice within craters at the poles of the moon. If this proves to be the case, Planetary Scientist Dr. Paul Spudis says it could possibly be "the most valuable piece of real estate in the solar system." Find out why.

WATCH NOW



Rockets and Materials Science

Category: SPACE SCIENCE



Science on Mars, Part 1

Category: SPACE SCIENCE



Science on Mars, Part 2

Category: SPACE SCIENCE



SMUD Board President, Director Gregg Fishman, Ward 3



Gregg Fishman was first elected to the SMUD Board of Directors in January 2014 and began serving in 2015. He represents Ward 3, which includes East Sacramento, much of the Arden-Arcade area, and the Campus Commons, College Glen, and Rosemont neighborhoods, as well as parts of Carmichael, Florin, Fruitridge and Vintage Park.

Gregg has been a clean energy advocate for much of his career. As a former SMUD employee he promoted wind and solar energy when they were in their infancy. At the California Independent System Operator, he led public engagement efforts supporting new wind energy farms in California. As President of the SMUD Board in 2018, he led the utility in passing its Integrated Resource Plan, hailed by the California Energy Commission as "... an ambitious road map for lowering greenhouse gas emissions in the Sacramento region."

In his varied career, Gregg was a news reporter and anchor at KFBK and KGO Radio, a public information officer at SMUD and the California Independent System Operator (California ISO), and communications coordinator for the California State Association of Counties. He currently works at Sacramento Regional Transit as the Sr. Community Relations Officer.

Gregg is an active volunteer with the Sacramento Tree Foundation and has led a neighborhood effort that has planted more than 2,000 new trees. He received an award from the MLK 365 organization for helping to make it easier to remove racially restrictive clauses from local property records. He is a 25-gallon blood donor and a frequent volunteer master-of-ceremonies for Project Ride in Elk Grove.

Sustainability Facilities Forum

May 15 , 2025

President Gregg Fishman, SMUD

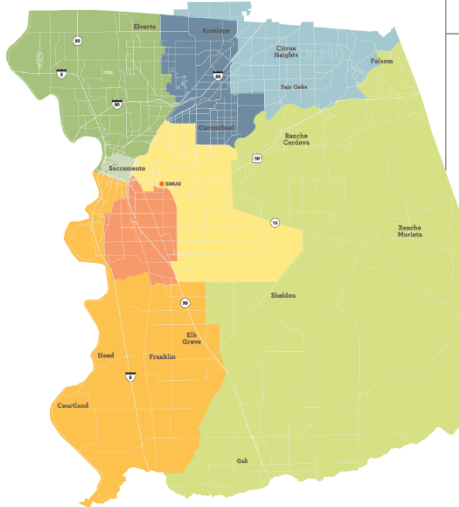
Powering forward.
Together.



About SMUD

SMUD is your community-owned, not-for-profit electric service.

6th largest
community-owned
in the U.S.



75+
Years
Est. 1946

2023
Power mix
about
78%*
carbon-free



The most
ambitious goal
of any large
utility in the
United States

~645,000 Customers

~2,300 Employees



7 member
Elected
Board of Directors

SMUD's rates are among the lowest in California,
and on average more than **50% lower** than those of neighboring PG&E.

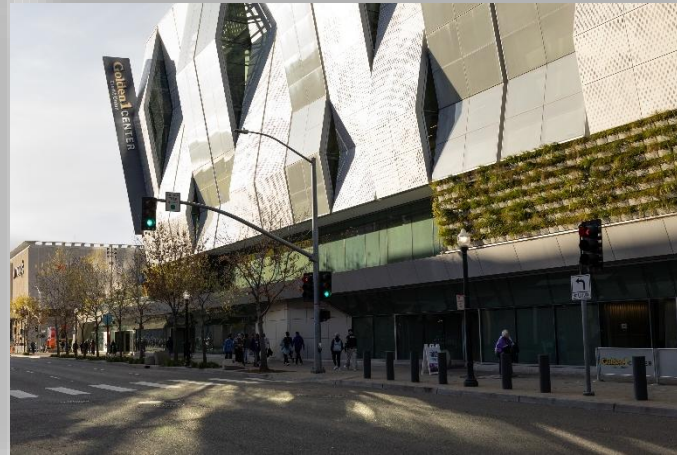
2030 Clean Energy Vision



2030 Zero Carbon Plan



Golden 1 Center



- One of the world's most sustainable arenas.
- Low-cost, hassle-free solar energy from Rancho Seco.
- New standard for LED sports lighting.



Dr. Matt Rahn
Executive Director, Wildfire Conservancy
Temecula City Council Member
Director, California State University San Marcos,
Wildfire Science and Urban Interface Program



Dr. Matt Rahn currently serves as the Executive Director for the Wildfire Conservancy, a California non-profit foundation dedicated to serving our firefighters, and protecting our communities. The Wildfire Conservancy is focused on three key areas:

- 1) Improving firefighter health and safety,
- 2) Advancing attack effectiveness, and
- 3) Promoting community resilience and awareness

He also serves on the Temecula City Council since 2014, and as Mayor in 2018 and 2022. In his academic role, Dr. Rahn serves as the Director for the California State University San Marcos program in Wildfire Science and Urban Interface and has led coursework in wildfire science, law, land use planning, statistics, water management, transportation, air quality, conservation planning, and energy.

Dr. Rahn has over two decades of experience in applied sciences and policy, with an emphasis in environmental science, biology, statistics, public policy and wildfire science. Having earned both a PhD and JD, Dr. Rahn has focused much of his work on the interface between science and policy, supporting local, state and federal programs in collaboration with lawyers, policymakers and scientists. He is currently leading the development of the west coast Center of Excellence for Firefighter Behavioral Health, located just north of Temecula, California.

Community Resilience, Sustainability, Health, and Safety

Matt Rahn, PhD, MS, JD

Executive Director – Wildfire Conservancy

Founding Director – Cal State San Marcos WUI Program

City Council Member/Mayor – City of Temecula

*Supporting our Firefighters and
the Communities they Serve*

- Established in 2019
- CA non-profit foundation
- Mission:
 - Firefighter Health and Safety
 - Attack Effectiveness
 - Community Resilience



THE WILDFIRE
CONSERVANCY

Resilience and Sustainability – Wildfire Perspectives

Sustainability, resilience, and innovation in California's built environment demands a new approach

The terms "*wildfire*" and "*fire season*" are antiquated and out of touch

They are **Wildland Urban Interface (WUI)** fires and **Urban Conflagrations**

And it is now a "**Fire Year**"



Redefining a Resilient Community

- Community development, redevelopment, and recovery demands a new approach
- We follow our core mission:
 - Firefighter Health and Safety
 - Attack Effectiveness
 - Community Resilience



Community Resilience: Preparedness, Response, and Recovery

- Maui Case Study
 - Annual WUI Day (like Great Shake Out)
 - Community Outreach/Education
 - Firefighter Training: Responding to the Interface (RTI)
 - 3-Minute Bag
- Regular Updates:
 - Code, Products, Materials, Design, Evacuation Routes, Fuels Management, Best Practices, Health and Safety



Community Resilience means Preparedness, Response, and Recovery

- Evacuation Planning and Preparation
- Find the problem before it's a problem
- Update science-based codes **and** compliance
 - It can all start with one property
 - Don't let perfection become the enemy of progress
 - Sometimes common sense still works



Firefighter Health and Safety *means* Community Health and Safety

- Research on Occupational Exposures, Cancer and Interventions
- Smoke, soot, and ash is toxic, hazardous, and carcinogenic
 - Respiratory Exposures
 - Dermal Exposures
 - Decontamination and Detoxification



Firefighter Health and Safety *means* Community Health and Safety

- Firefighters are the “canary in the coal mine”
- Risk reduction and recovery translates to others:
 - Other first, and second responders
 - Community members
 - Recovery efforts
 - Short- and long-term best practices



JANUARY IS
Fire Fighter Cancer Awareness Month

Cancer is the most dangerous under-recognized threat to the health and safety to our nation's fire fighters. It is the **#1 cause** of fire fighter line-of-duty deaths.

Fire Fighter Cancer Awareness Month is brought to you by the International Association of Fire Fighters and the Firefighter Cancer Support Network.

Community Resilience: Decrease the Risk

- Materials and design impact exposure risk and health outcomes
- Build and redevelop with risk reduction in mind
- Develop testing and certification policies
 - Sustainable does not imply safe, but maybe it should?
 - Be aware of solving one problem and creating a new one...



Cohesive Planning and Priorities

Complex Goals and Objectives

- Conservation Plans (HCPs, NCCP, recovery plans, etc.)
- Watershed Management Plans
- Air Quality Management
- Forest/Range Management
- Agricultural Preservation and Soil Management
- Cultural Resource Protection
- Disaster Plans
- Evacuation Plans
- Community Wildfire Protection Plans
- General Plans and Specific Plans
- Transportation Plans

and others...

Planning our Communities

- Conflicting or Cohesive Plans
- Tradeoffs and Compromises
- Establishing Clear Priorities and Obligations
 - Legal
 - Policy
 - Ethical
 - Moral



Attack Effectiveness

- Traditional Perspective:
 - Staffing
 - Resources
 - Tactics/Strategies
 - Technology and Tools
- Expanded Approach:
 - Community Design
 - Materials
 - Fuel Management (not just vegetation)
 - Accessibility, ingress, egress
 - Training (firefighters and community)



Final thoughts on the Los Angeles Fires

- Resilience needs to be a measurable part of the community
- We need to plan for disaster and redefine “worst case”
- We need regular reminders (WUI days)
- Enforcement/compliance are critical
- Some things we just can’t plan for, but we should try...



Final thoughts on the Los Angeles Fires

- Resilience means health and safety
- We can do better at protecting our firefighters, responders, volunteers, and community
- Rapid response and assessment teams
- Health and safety measures – we can and must do better
- Post-incident response and recovery
 - Protocols for assessment, decontamination, and detoxification
 - Development of protocols and solutions
 - Adaptive management and monitoring

WildfireConservancy.org

mattrahn@wildfireconservancy.org

619-846-1916



John Kavanaugh,
Seeley International Americas





Chair David Hochschild, California Energy Commission

David Hochschild was appointed Chair of the California Energy Commission by Governor Gavin Newsom in February 2019. He fills the environmental position on the five-member Commission where four of the five members are required by law to have professional training in specific areas - engineering or physical science, environmental protection, economics, and law.

Chair Hochschild's career has spanned public service, environmental advocacy, and the private sector. He first got involved in the solar energy field in 2001 in San Francisco as a special assistant to Mayor Willie Brown where Chair Hochschild launched a citywide \$100 million initiative to put solar panels on public buildings. He also cofounded the Vote Solar Initiative, a 60,000-member advocacy organization promoting solar policies at the local, state, and federal levels. He was executive director of a national consortium of leading solar manufacturers and worked for five years at Solaria, a solar company in Silicon Valley. From 2007 to 2008, he served as a commissioner at the San Francisco Public Utilities Commission.

For his work to advance clean energy, Chair Hochschild was awarded the Sierra Club's Trailblazer Award, the American Lung Association's Clean Air Hero Award, and the U.S. Department of Energy's Million Solar Roof True Champion Award. Chair Hochschild holds a Bachelor of Arts from Swarthmore College and a Master of Public Policy from the John F. Kennedy School of Government at Harvard University. He also was a Coro Fellow in Public Affairs.



Sunrise From the West



David Hochschild
Chair
California Energy Commission

Chinese Word for Crisis: Wei Ji

Danger

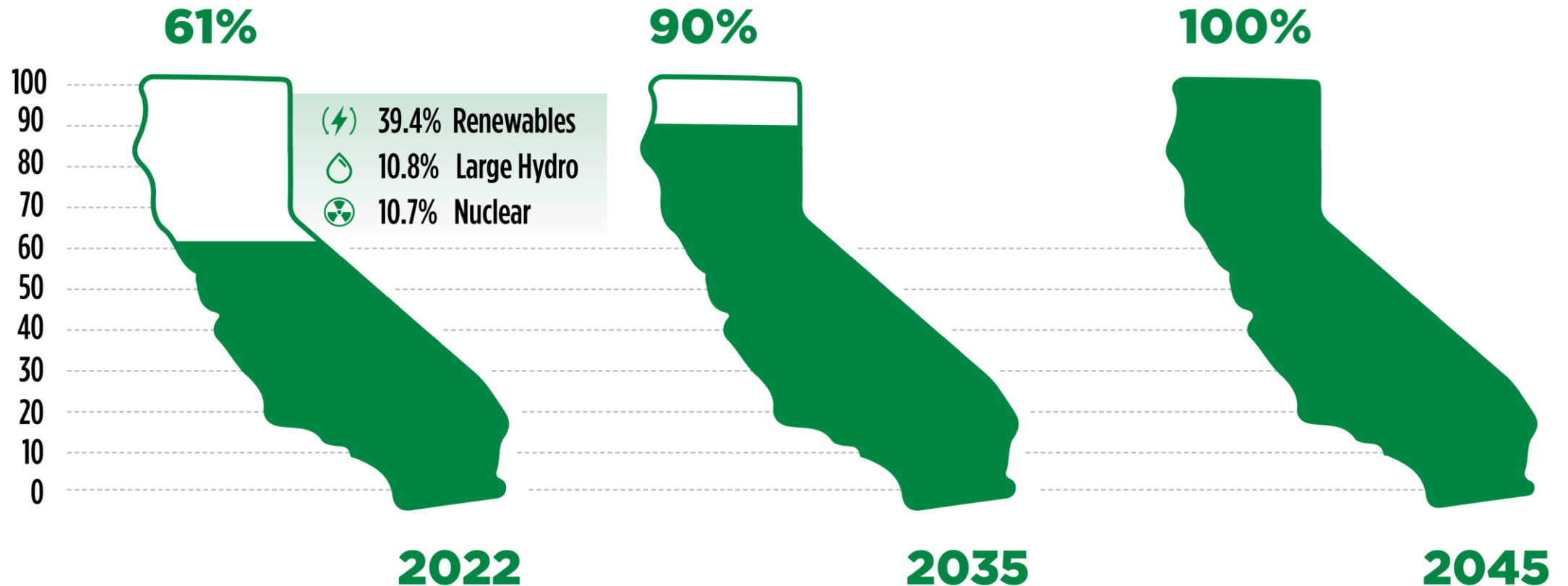
危机

Opportunity

California is on track to achieve 100% clean electricity

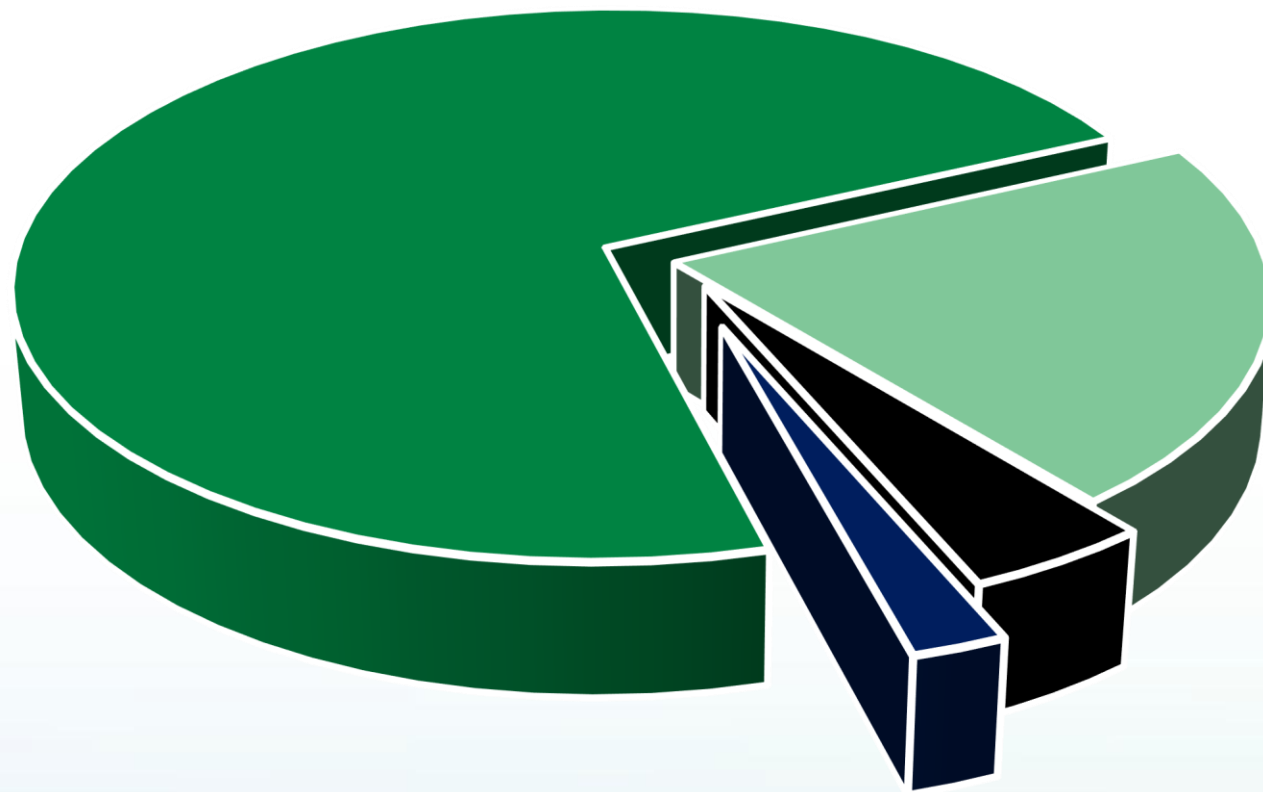
with 61% of the state's electricity already coming from renewable and zero-carbon resources

Percent renewable and zero-carbon electricity serving CA





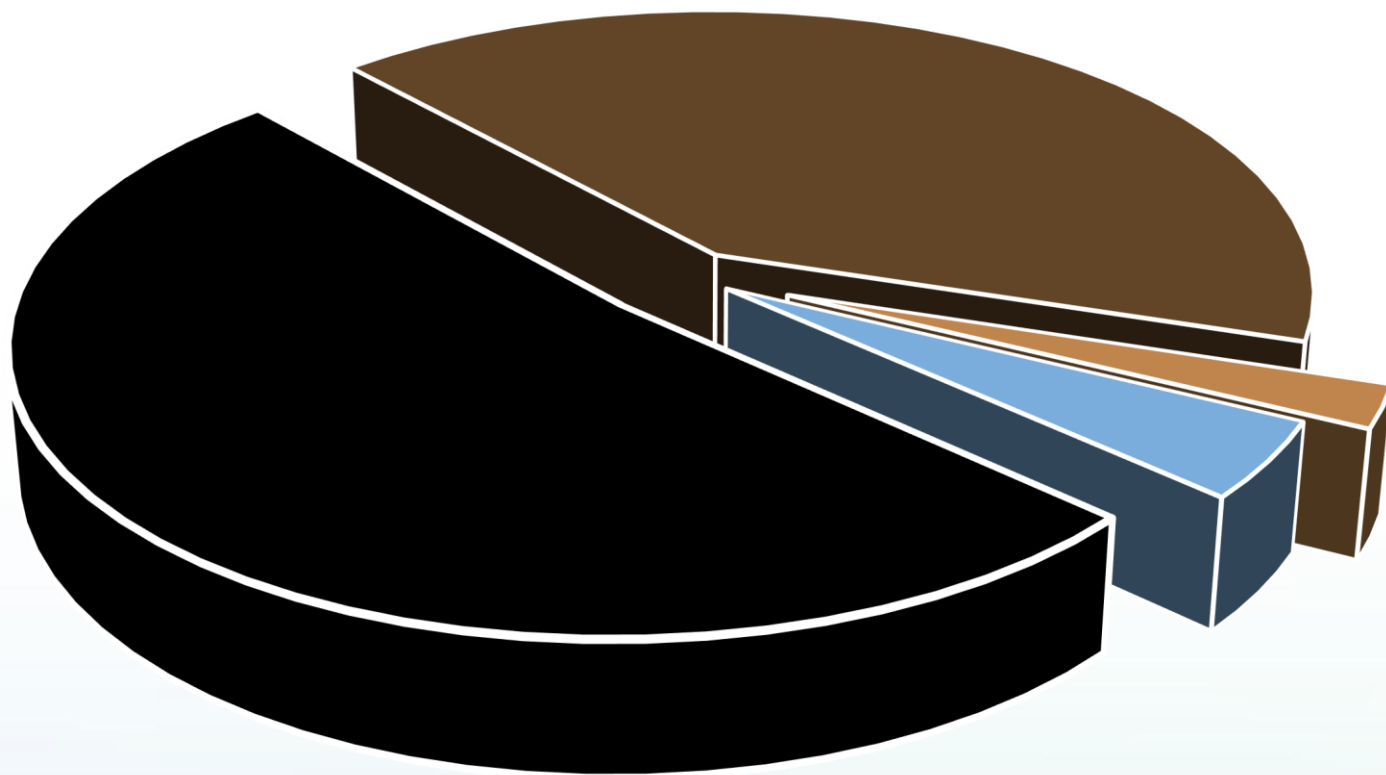
96% of New US Grid Capacity in 2024 Is Clean Energy



72%	Renewables	35.5 GW
21%	Battery storage	10.4 GW
4%	Fossil fuels	2.2 GW
2%	Nuclear	1.1 GW



96% of US Grid Retirements in 2024 Are Fossil Fuels

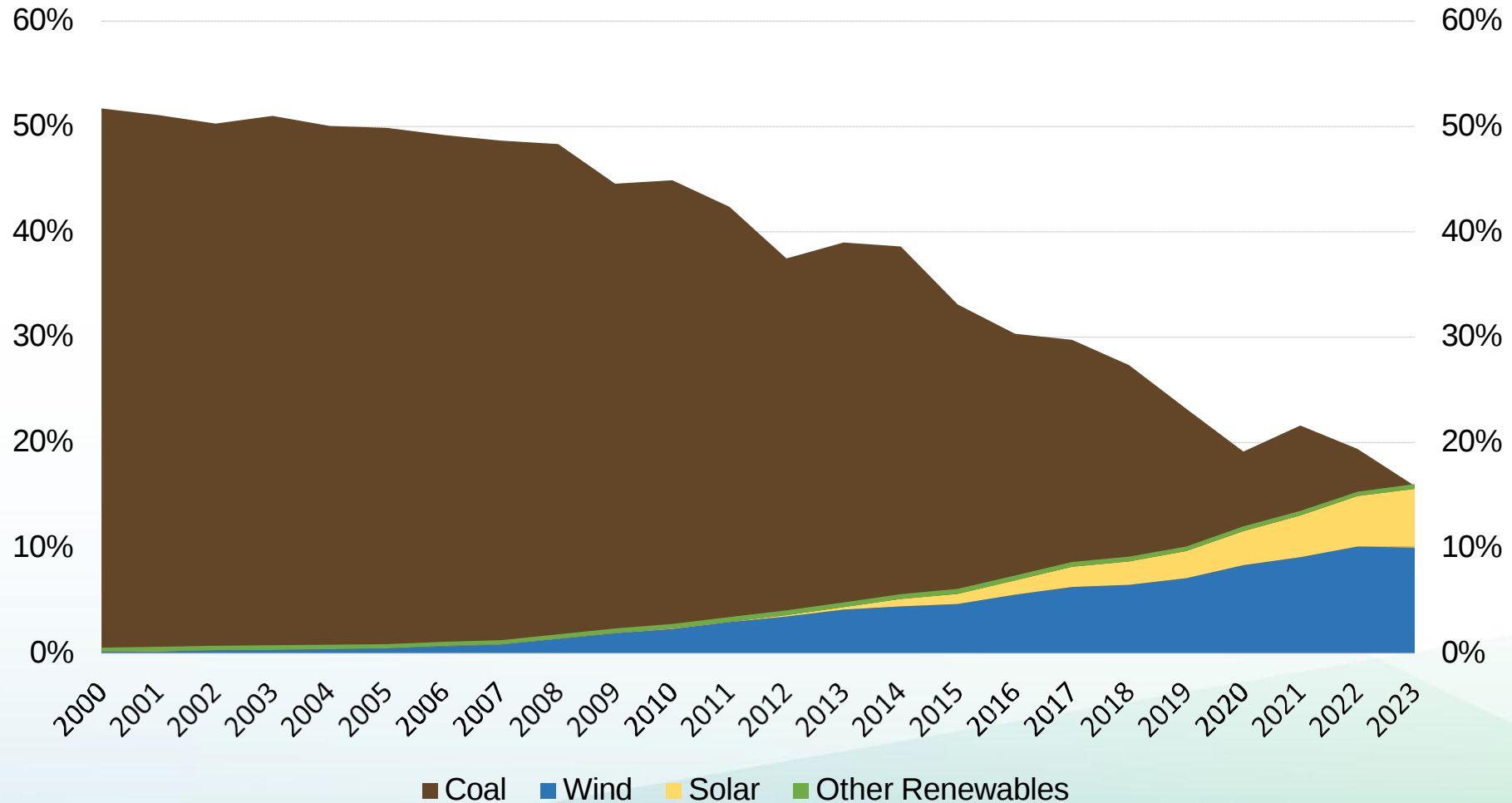


52%	Coal	4.0 GW
42%	Natural gas	3.2 GW
2%	Other fossil fuels	0.2 GW
4%	All other	0.3 GW



Since 2023, Renewables Exceed Coal on US Grid

Percent of US Energy Generation





“The people who say it can’t be done should get out of the way of the people who are doing it.”

- Chinese proverb



World's Largest Thin Film Solar PV Project

Desert Sunlight Solar Project
550 MW
Riverside County, CA

Photo: Jamey Stillings, TIME Magazine



World's Largest Geothermal Power Plant

Geysers Geothermal Power Plant
955 MW
Lake County, CA



Photo: Calpine Corporation & Geysers Power Company, LLC.



World's Third Largest Wind Project

Alta Wind Energy
1550 MW
Kern County, CA



World's Largest Solar Rooftop

Apple HQ
17 MW
Cupertino, CA



Photo: Carles Rabada
Source: CAISO



World's Largest Battery Storage Project

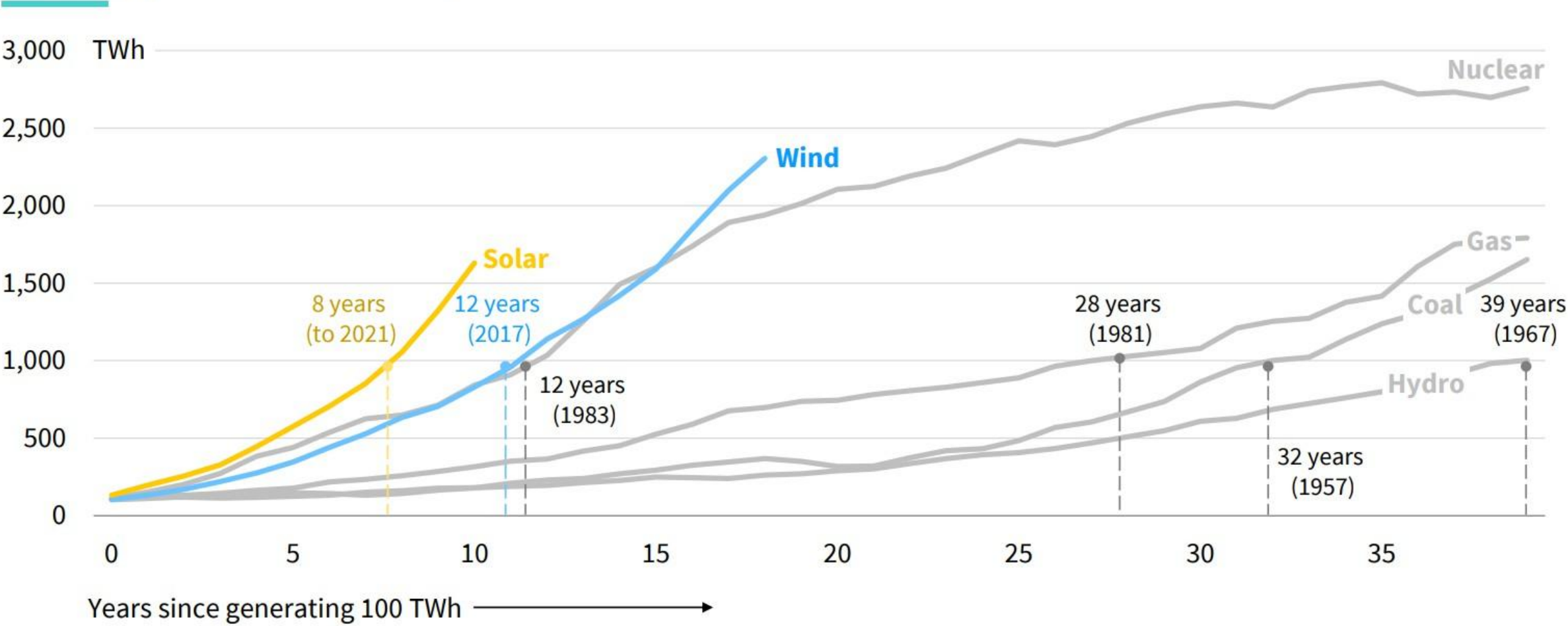


Edwards & Sanborn
3,287 MWh
Kern County, CA



Global Renewables Have Scaled at Record Speed...

Electricity generation after reaching 100 TWh

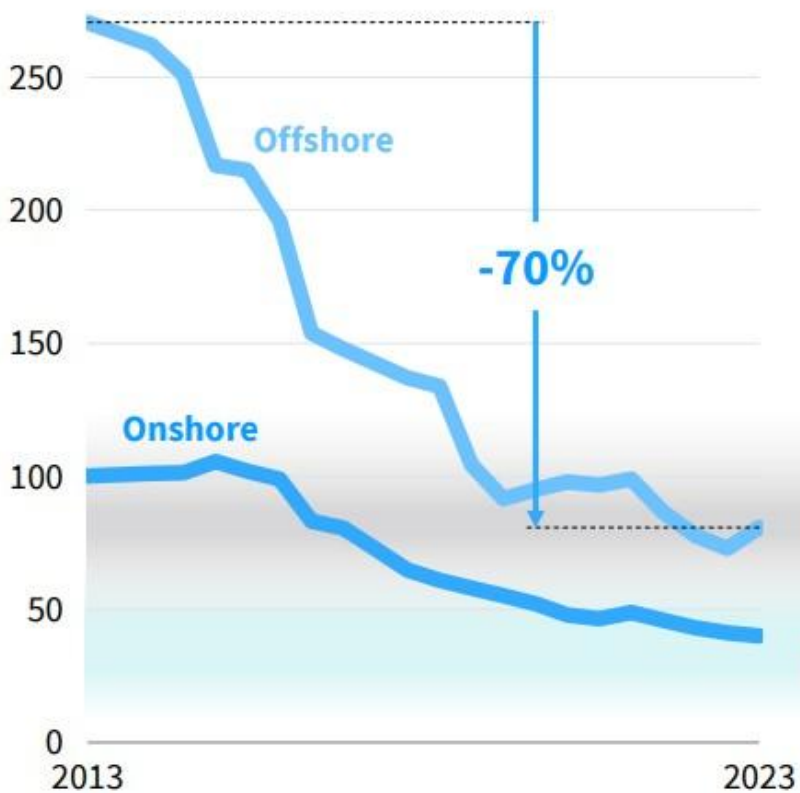




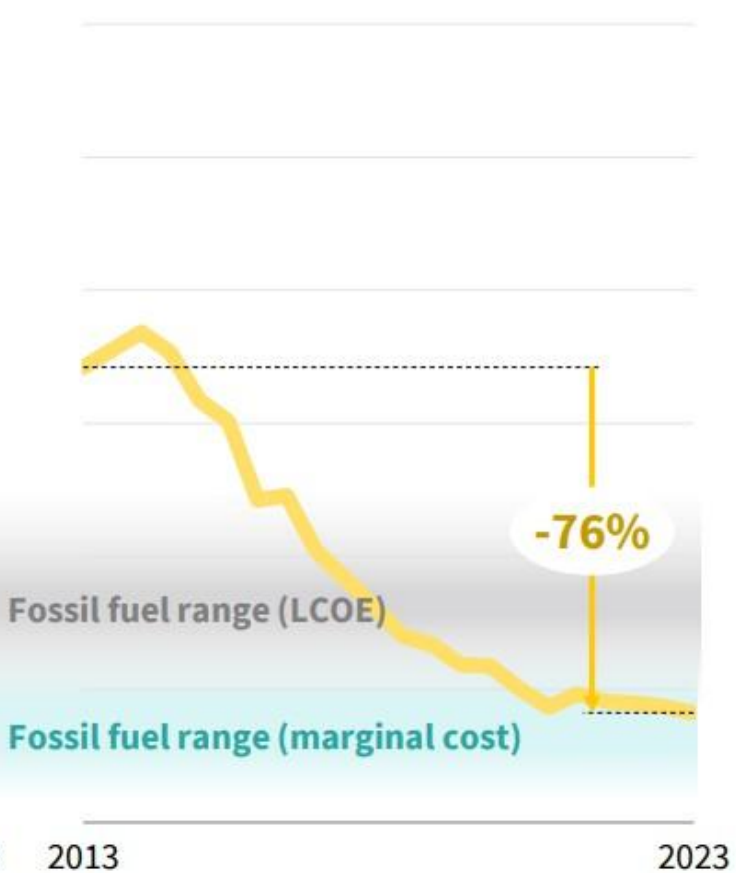
...Because Clean Energy Costs Continue to Plunge

Wind

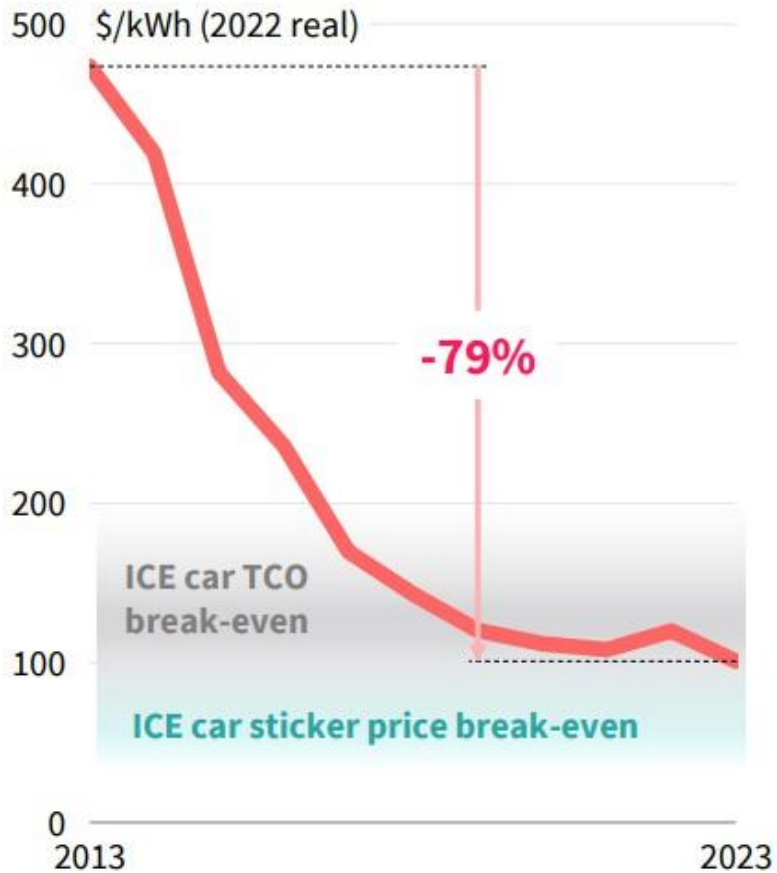
300 \$/MWh LCOE (2022 real)



Solar



Battery costs



Graphic: Rocky Mountain Institute

Date: Bloomberg New Energy Finance

Note: LCOE is the levelized cost of energy, or the average cost of generation over asset's life



Case Study: Solar Deployment Over Last 20 Years



In 2004, the world installed a GW of solar every **year**.

By 2010, it installed another GW every **month**.

By 2016, it installed another GW every **week**.

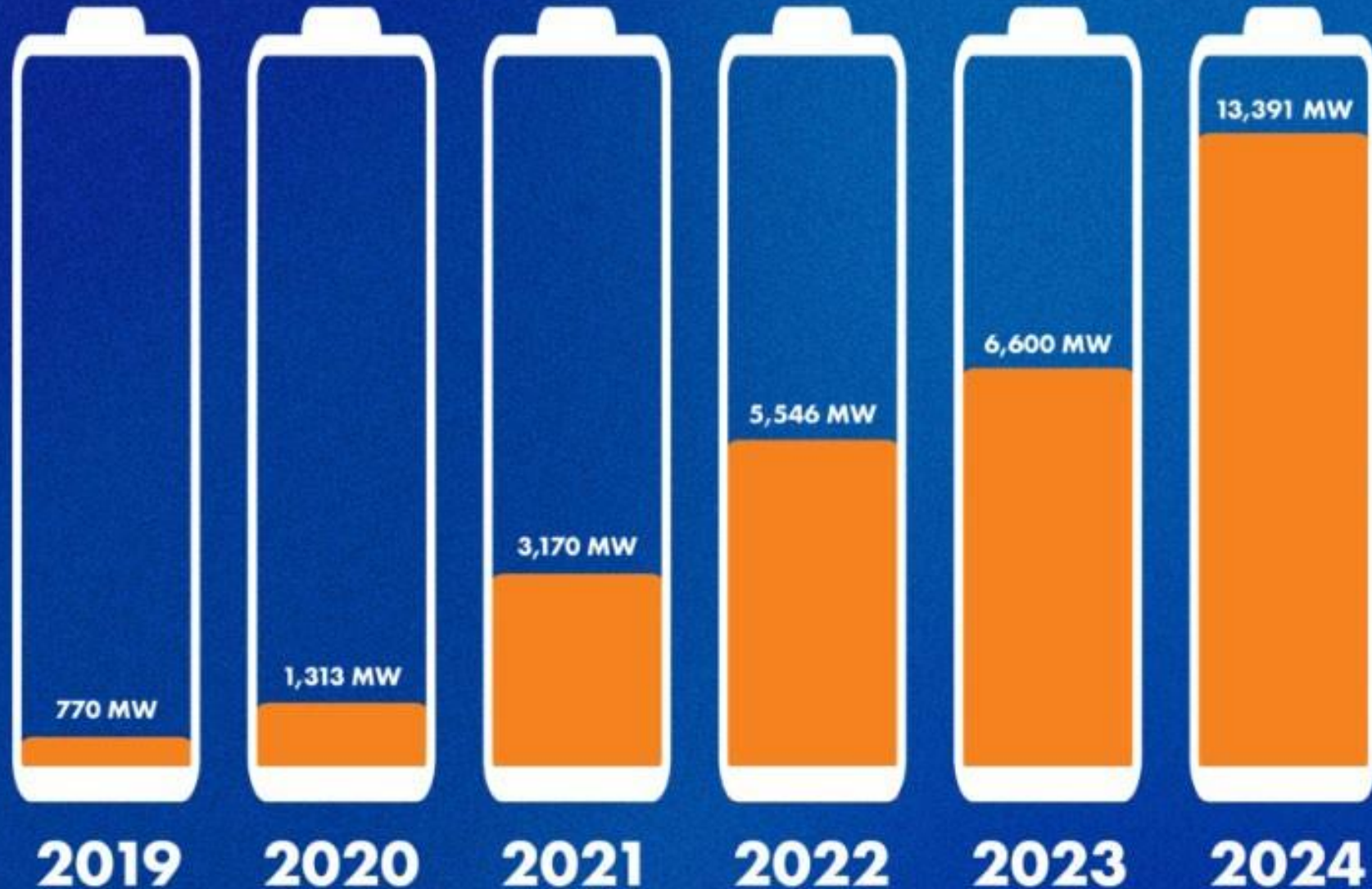
By 2023, it installed another GW every **day**.

By 2024, it installed another GW every **half day**.

Today, new solar is the largest driver of capital investment on the grid, in excess of \$500B per year.



New Record: CA Hits 13,000 MW of Energy Storage

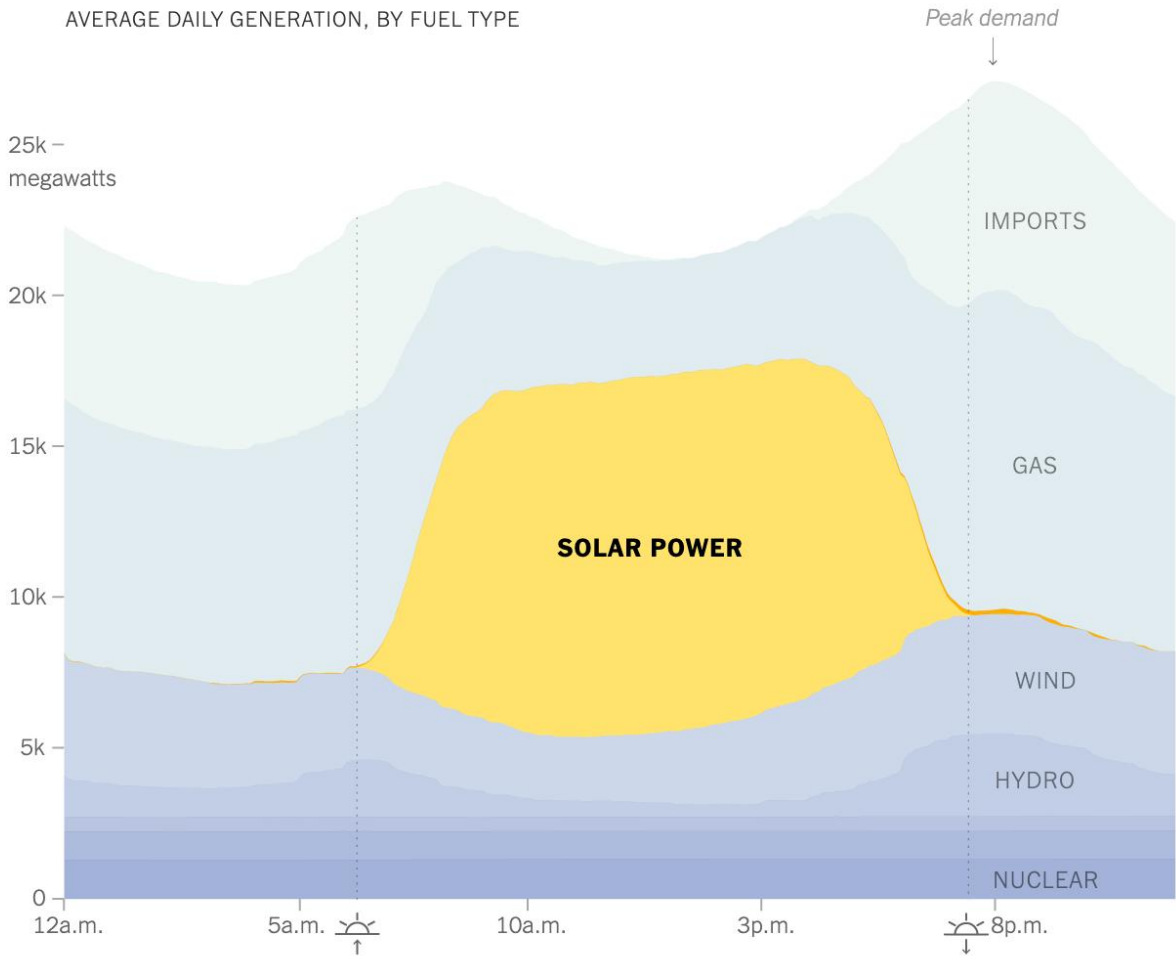




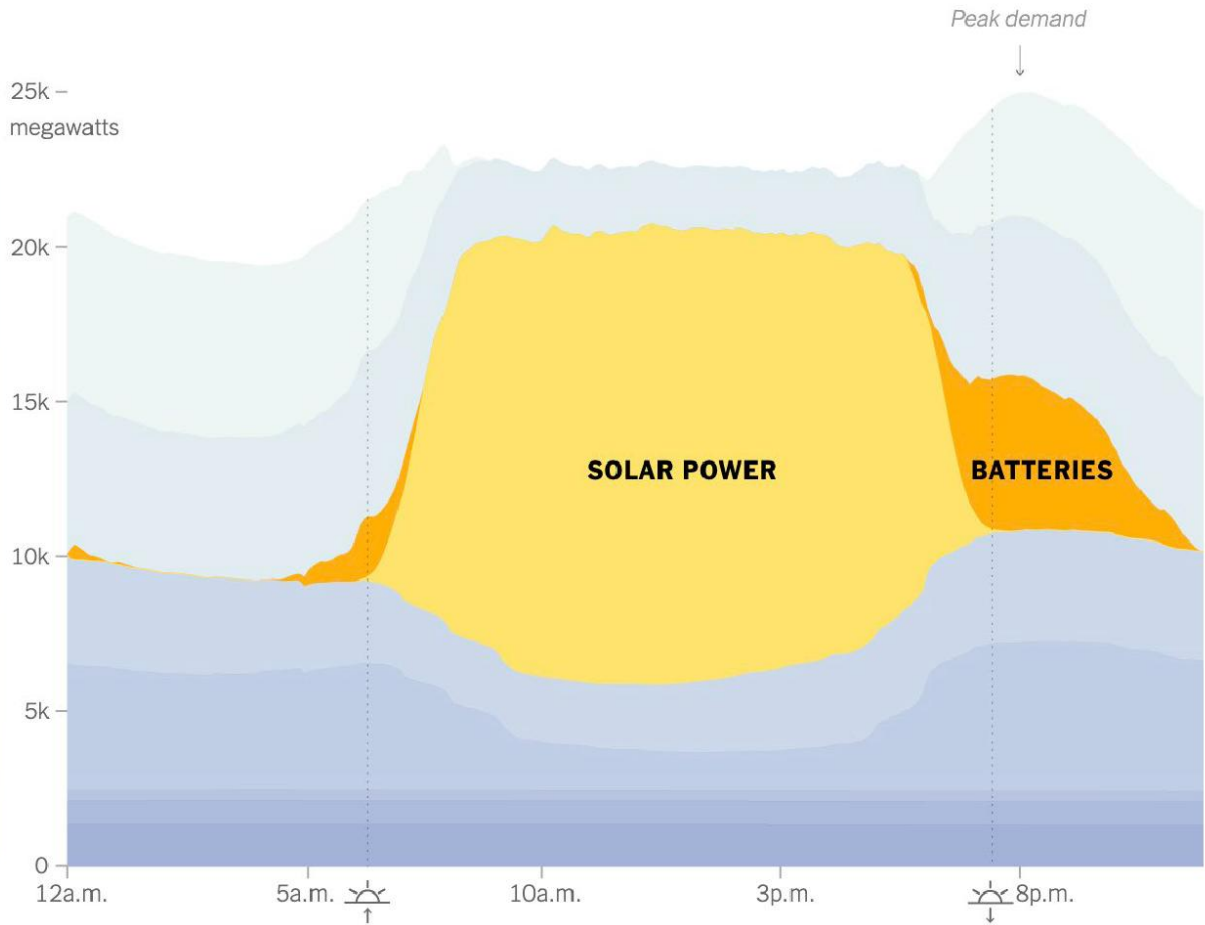
California Grid in 2021 vs. 2024

How California powered itself in April 2021 ...

AVERAGE DAILY GENERATION, BY FUEL TYPE

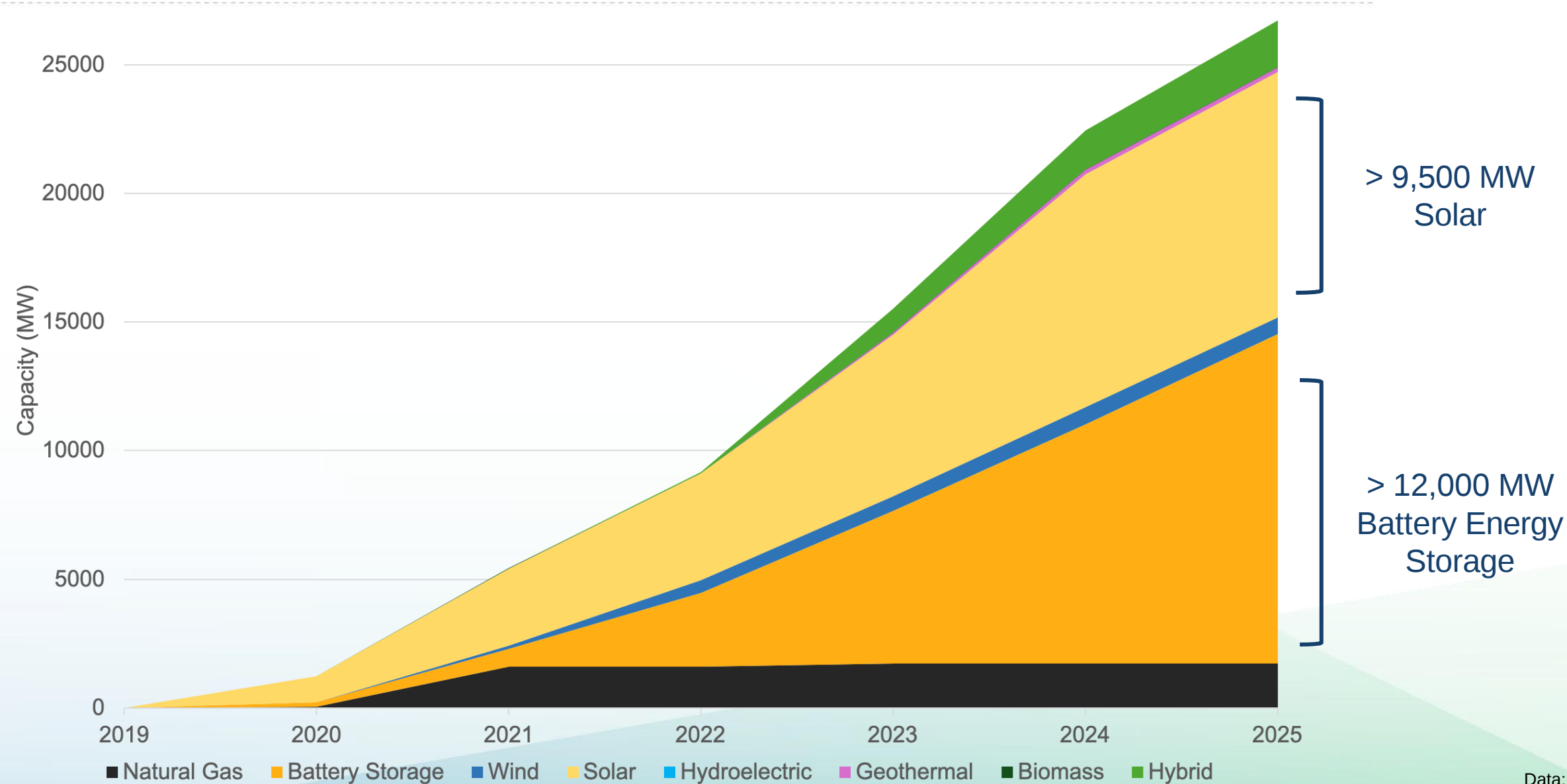


and in April 2024.



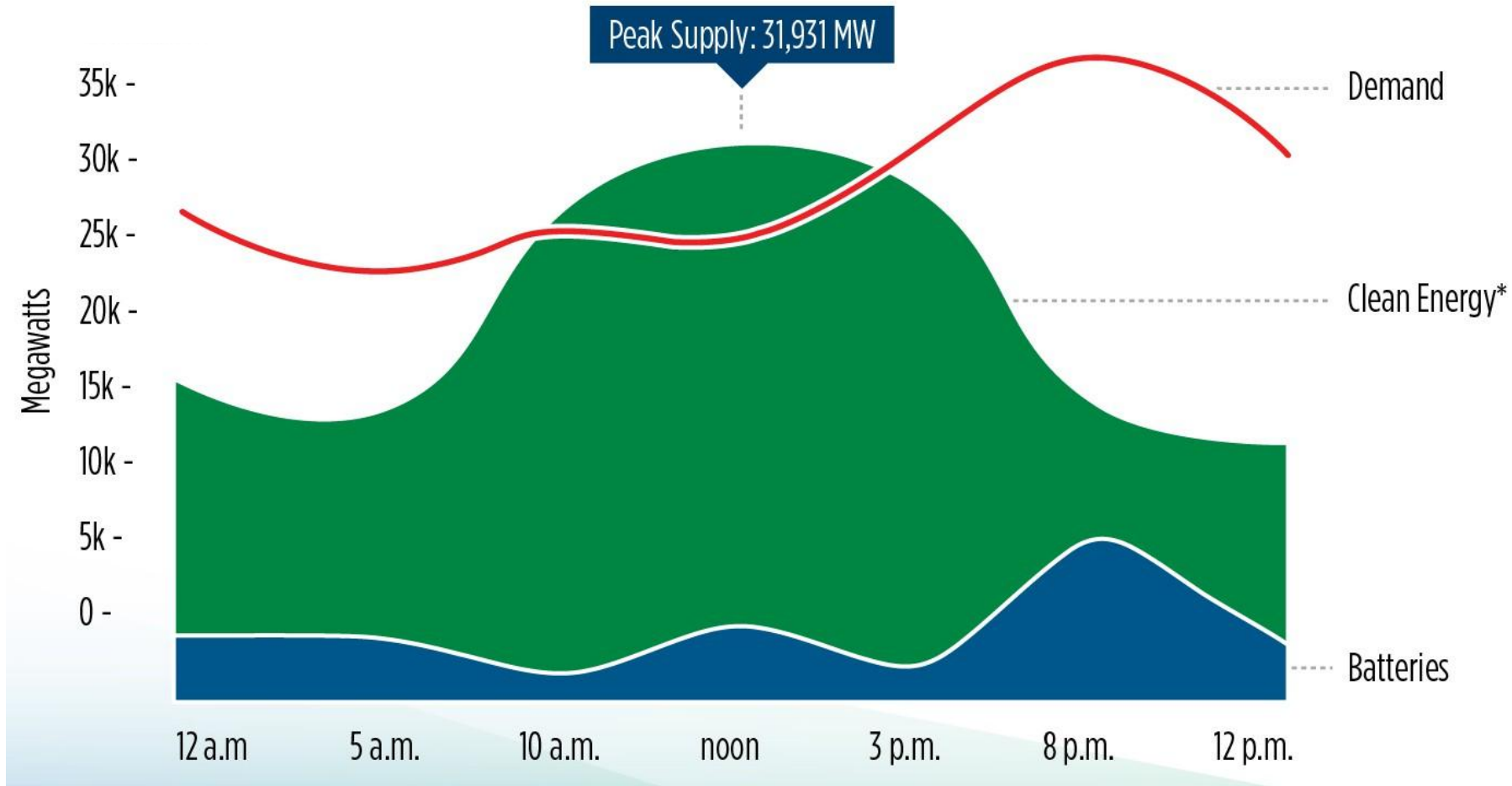


Newsom Administration Energy Progress: 27 GW of New Capacity in CA Added Since 2019





New Record: 100% Clean Energy on 219 Days



Sample Day
July 31, 2024

* Clean energy sources counted include small hydro, solar, wind, biomass, geothermal, nuclear, and large hydro.

Note: Analysis is limited to CAISO territory
Data: CAISO



Case Study: Reducing Impacts of New Wind Energy

Vasco Wind Energy Center Repowering | 78 MW, Contra Costa County



432 Small Turbines Removed and replaced with 34 new turbines



Results: Energy production tripled and avian mortality cut by 70%



Next Up: Towards 25 GW of Offshore Wind by 2045

California's Offshore Wind Goals

- 5 GW by 2030
- 25 GW by 2045

Enough electricity to power up to 25 million homes by mid-century.



New Floating Offshore Wind Technology



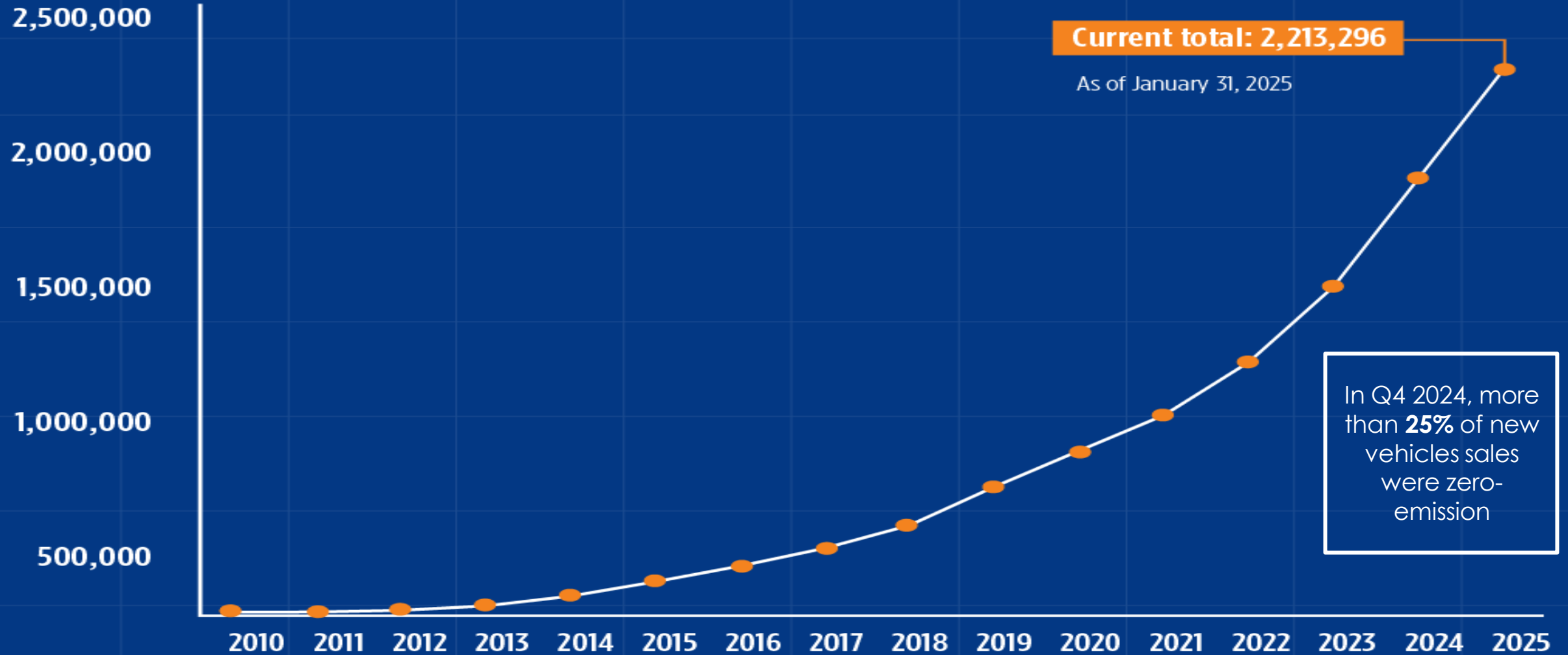


2020: Governor Newsom Signs Mandate for 100% of New Vehicles to be Zero Emission by 2035



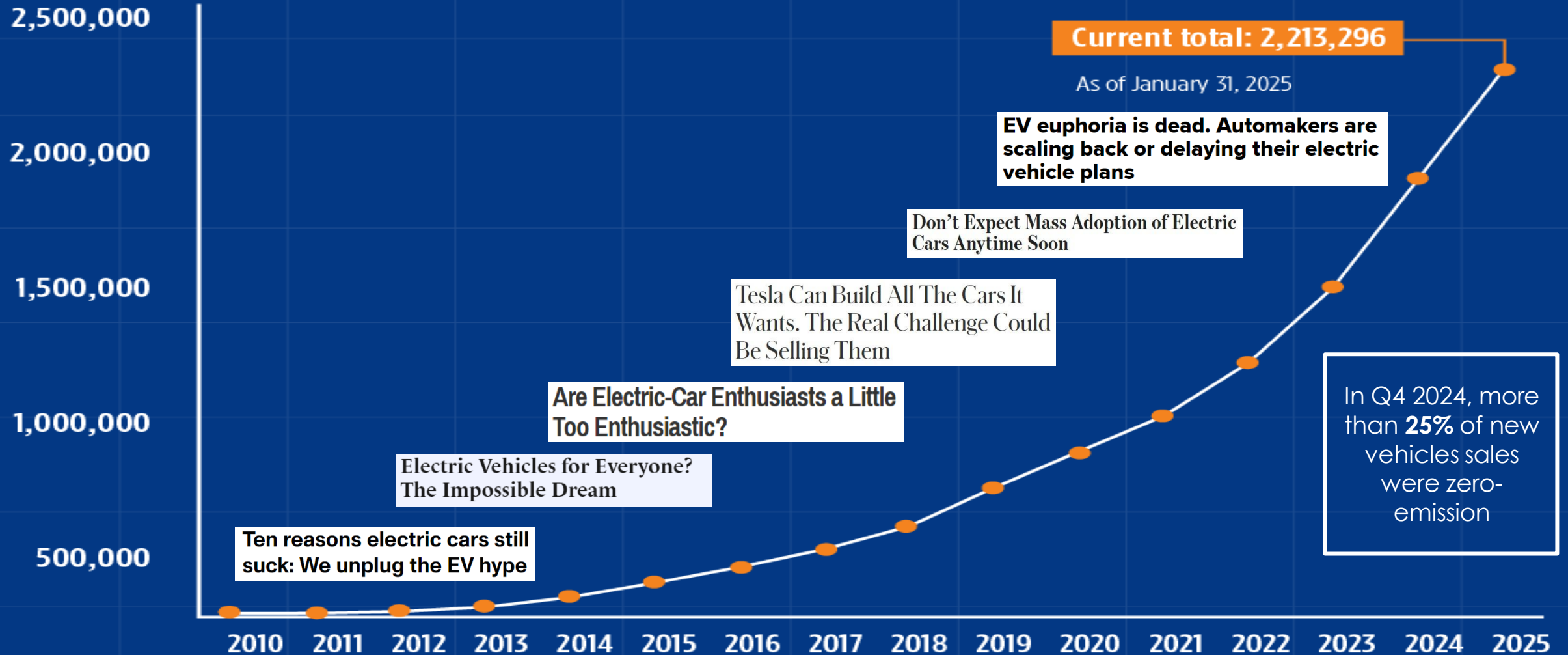


California Passes 2M Electric Vehicles on the Road





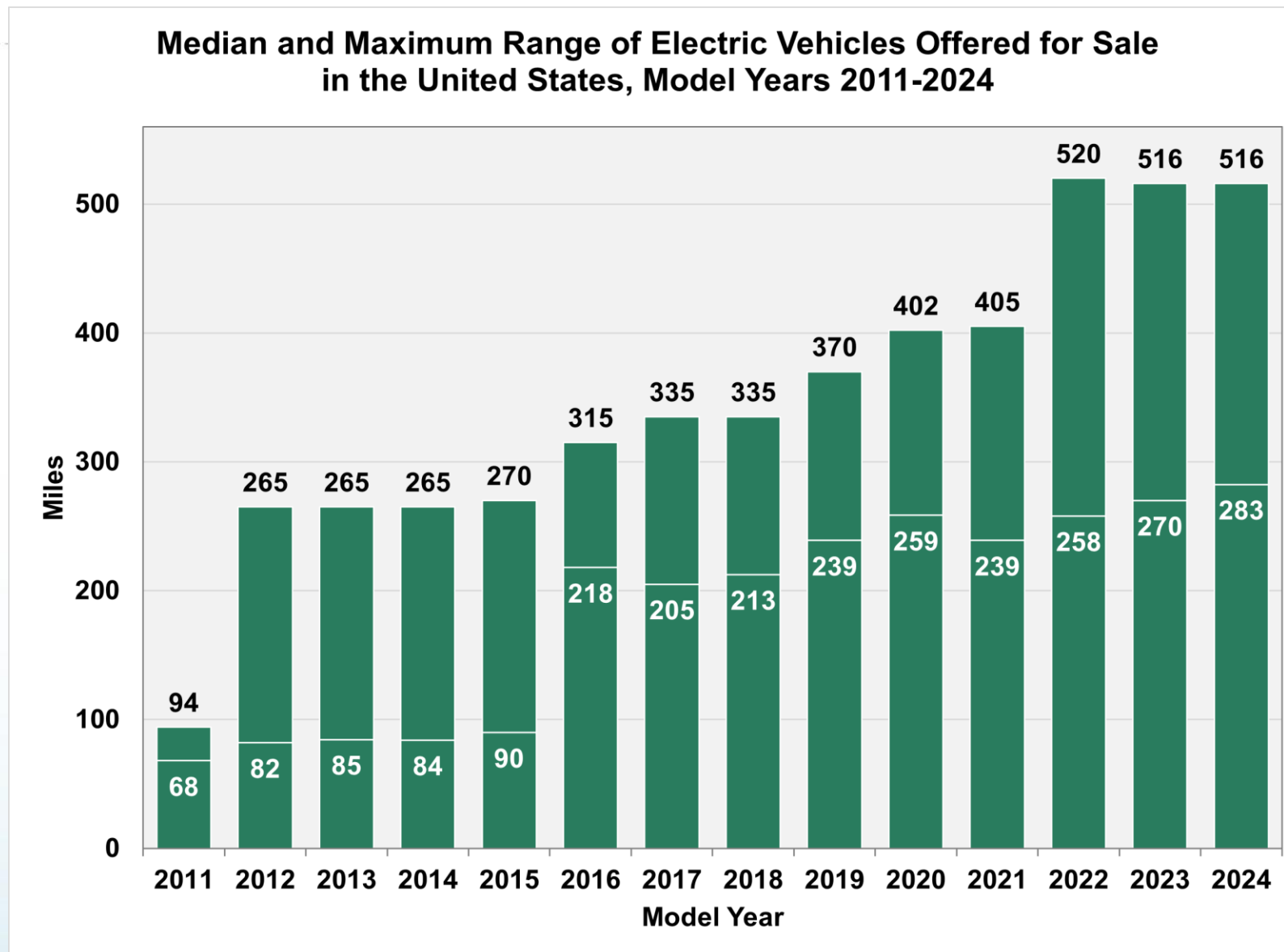
EV Progress: Focus On The Signal, Not The Noise



Note: Headlines centered approximately around year of publication. Based on RMI visual.



EVs Are Going Farther Than Ever





Larger-Scale EV Charging Infrastructure

**Tesla Supercharger
Coalinga, CA
98 EV Charging Stalls**



**Electrify America Station
San Francisco, CA
20 Indoor EV Charging Stalls**





Largest Port Based Truck Charging Depot in the World

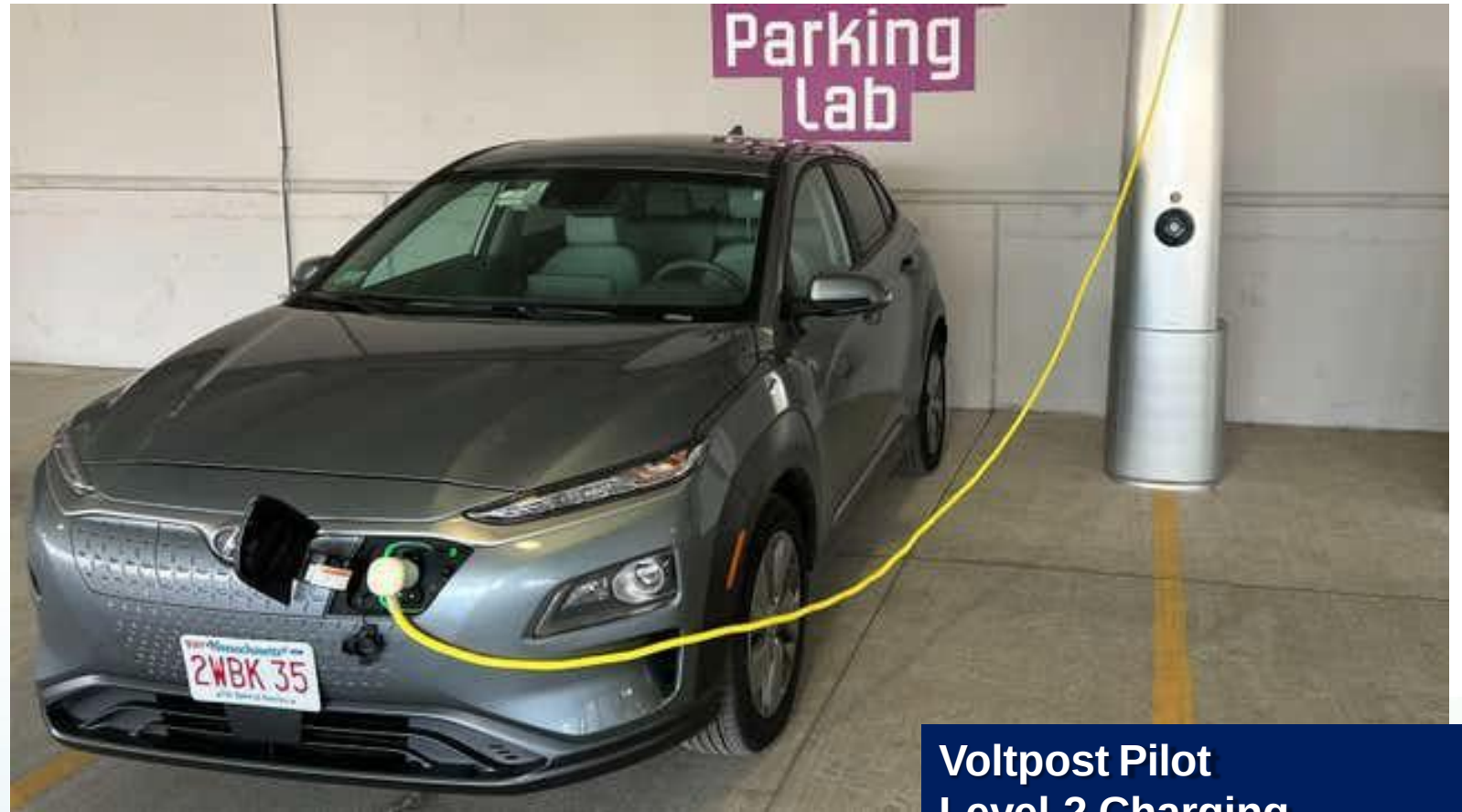
**Forum Mobility Harbor Depot
Port of Long Beach, CA
Able to charge 44 trucks
simultaneously**

**Partnership with Climate United to
purchase up to 500 class 8 electric
trucks—the largest single order of
these trucks in US history**





Lamppost EV Charging Platforms



**Voltpost Pilot
Level 2 Charging**



Off-Grid Solar EV Charger with Battery

EV Arc Charger
Beam Energy
San Diego, CA





Battery-Integrated EV Charger



Performance Food Group Gilroy, CA

- 15 FreeWire chargers, capable of charging 30 ZEV tractors



Electric Semi-Trucks Take the Road



**Frito Lay Warehouse
Modesto, CA**

- 500 Mile Range Tesla Electric Semi
- 2 Hour Charging Time



Vehicle-to-Grid Electric School Buses

Oakland Unified School District

- 74 ZEV buses from Zum
- Bidirectional charging





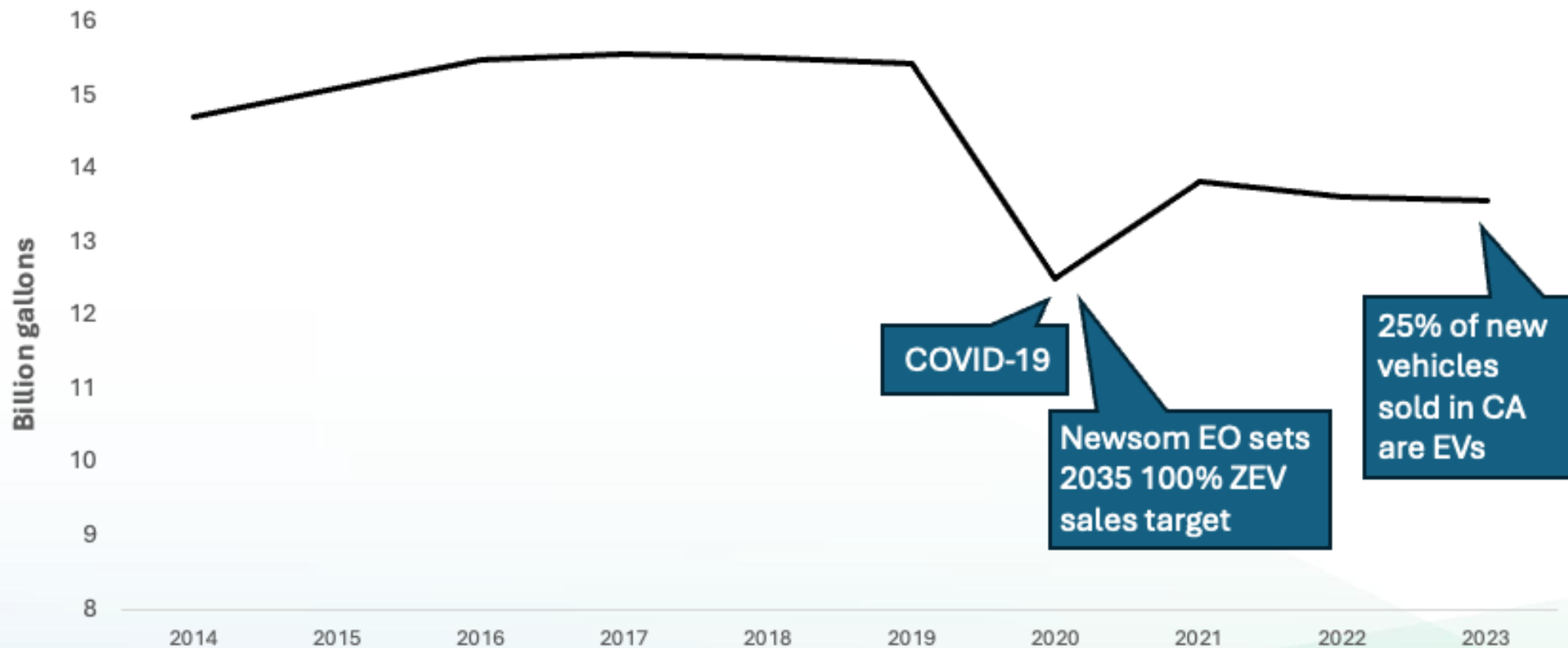
First Fully Electric Class 6 Armored Vehicles

LOOMIS in partnership with LA-based electric truck manufacturer Xos





Gasoline Consumption in CA Has Already Peaked





Electric Vehicle Chargers in California



37,983 New

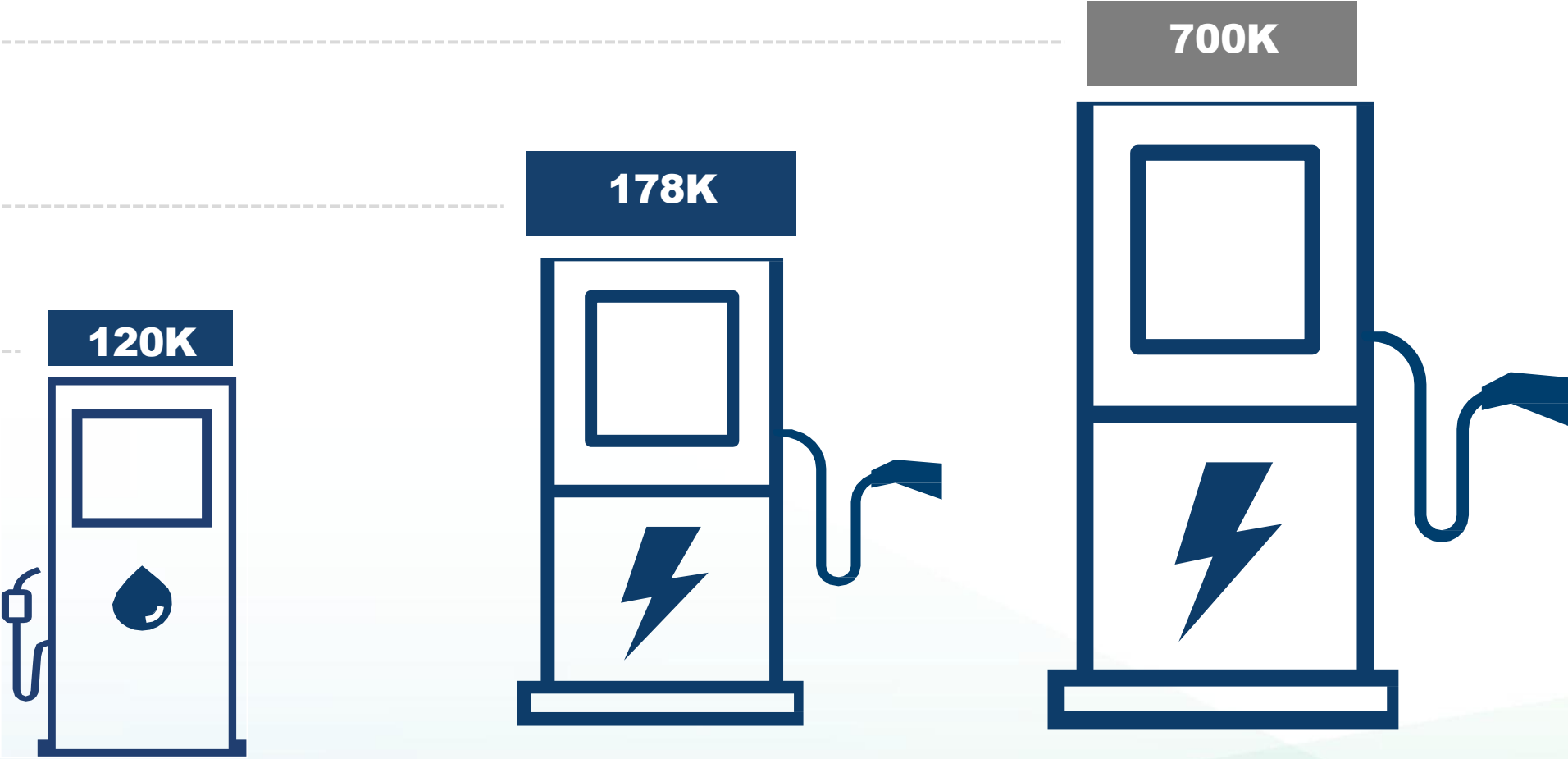
35,554 Built Pre-2024

Source:
California Energy Commission

Note:
Growth for year 2019-2020 due to addition of shared private charger data; and 2023-2024 due to new charger installations and additional data sources for charger counts.



CA Now Has More EV Chargers Than Gas Nozzles



Est. Gasoline Nozzles

Public & Shared EV Chargers

Est. Home EV Chargers

Not to scale

Source: CEC
Note: Estimate is conservative, as EV chargers often have more than one charging cable



Lithium Valley



**Controlled Thermal Resources
Imperial County, California**



California's vs World's Leading Economies

2012

Rank	Country
#1	UNITED STATES
#2	CHINA
#3	JAPAN
#4	GERMANY
#5	FRANCE
#6	UNITED KINGDOM
#7	BRAZIL
#8	RUSSIAN FEDERATION
#9	ITALY
#10	CALIFORNIA

2025

Rank	Country
#1	UNITED STATES
#2	CHINA
#3	GERMANY
#4	CALIFORNIA
#5	JAPAN
#6	INDIA
#7	UNITED KINGDOM
#8	FRANCE
#9	ITALY
#10	CANADA

1900. Where is the First Car?



1913. Where is the Last Horse?





California Energy Commission Solar Mandate

2020: Solar Required on All New Homes | **2023:** Solar Required on All New Buildings





California Energy Commission Building Code

2025: Bringing Heat Pumps Mainstream for Space & Water Heating

Heat Pump Water Heater



BY THE NUMBERS

\$100 BILLION

avoided energy costs over the last 50 years from the CEC's efficiency standards for buildings and appliances

70% amount of California's electricity used by homes and businesses

25% amount of the state's total greenhouse gas (GHG) emissions that homes and businesses are responsible for

\$4.8 BILLION

statewide energy cost savings expected from the standards for 2025



Map of the United States showing the percentage of the population with a bachelor's degree by state. The map uses a color scale from dark blue (1-10%) to light gray (41-51%).

Legend:

- 1-10
- 11-20
- 21-30
- 31-40
- 41-51

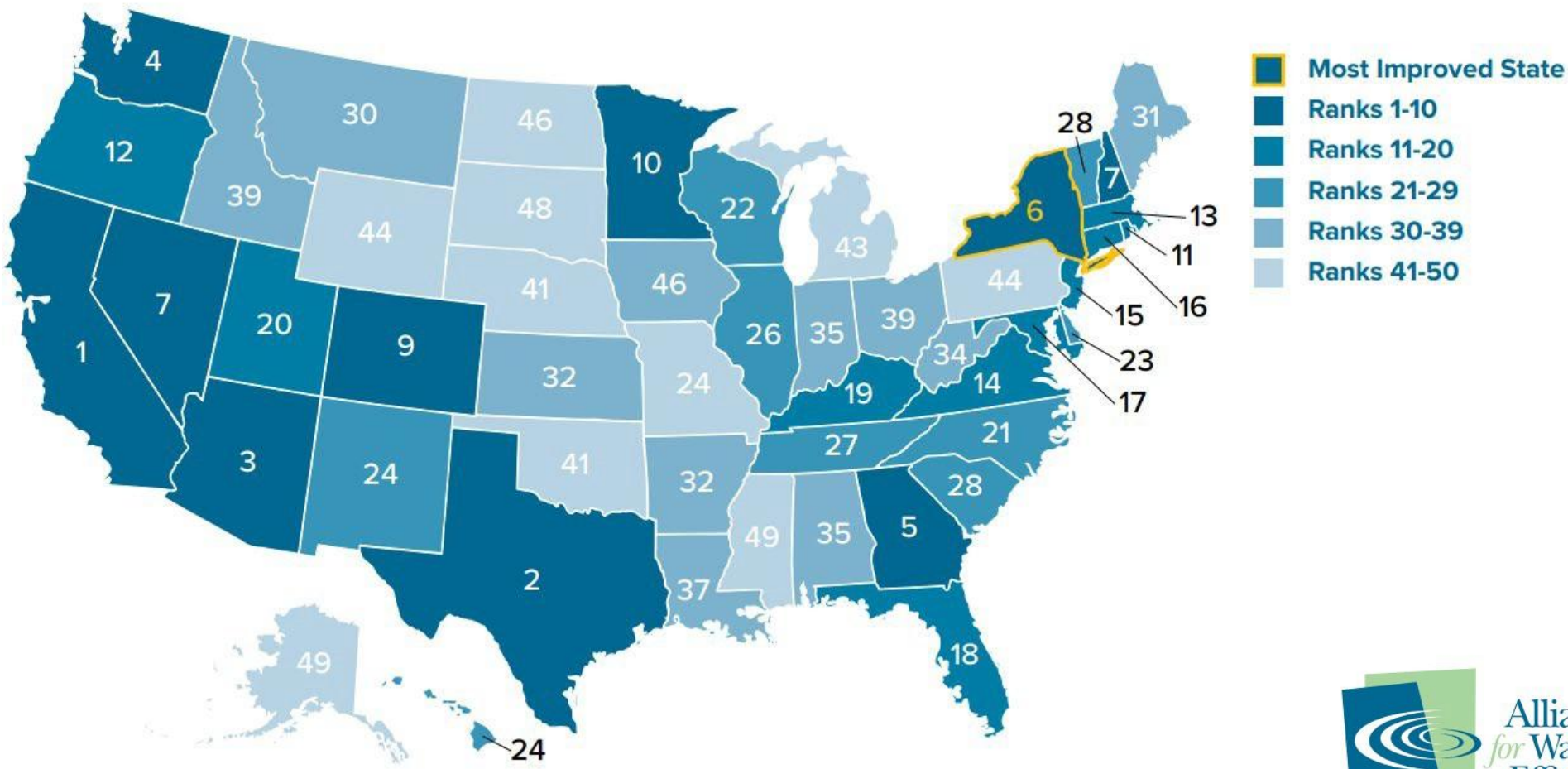
ACEE



California #1 in US for Water Efficiency

2022 State Rankings Map

**States with the same score are tied for that ranking*





Electrification of Almost Everything



Electric Induction Cooktop

Channing Street Copper Company
Berkeley, CA





Street Sweeping Goes Electric

CalTrans EV Street Sweeper
Davis, CA





Electrification of Public Safety

**Tesla Police Fleet
South Pasadena, CA**



**Ford F-150 Lightning Police Fleet
Fort Bragg, CA**





Electrification of the Waterfront



Electric Harbor Cranes, Electric Tugboat & Electric Ferry



Caltrain: From Diesel to Electric in 2024





Coming Soon: Electric Air Taxis

Archer Aviation
plans to launch commercially
in CA in the next two years





Smoking In the US



According to repeated nationwide surveys,

More Doctors Smoke **CAMELS** than any other cigarette!

Doctors in every branch of medicine were asked, "What cigarette do you smoke?" The brand named most was Camel!

You'll enjoy Camels for the same reasons so many doctors enjoy them. Camels have cool, cool mildness, pack after pack, and a flavor unmatched by any other cigarette. Make this sensible test: Smoke only Camels for 30 days and see how well Camels please your taste, how well they suit your throat as your steady smoker. You'll see how enjoyable a cigarette can be!

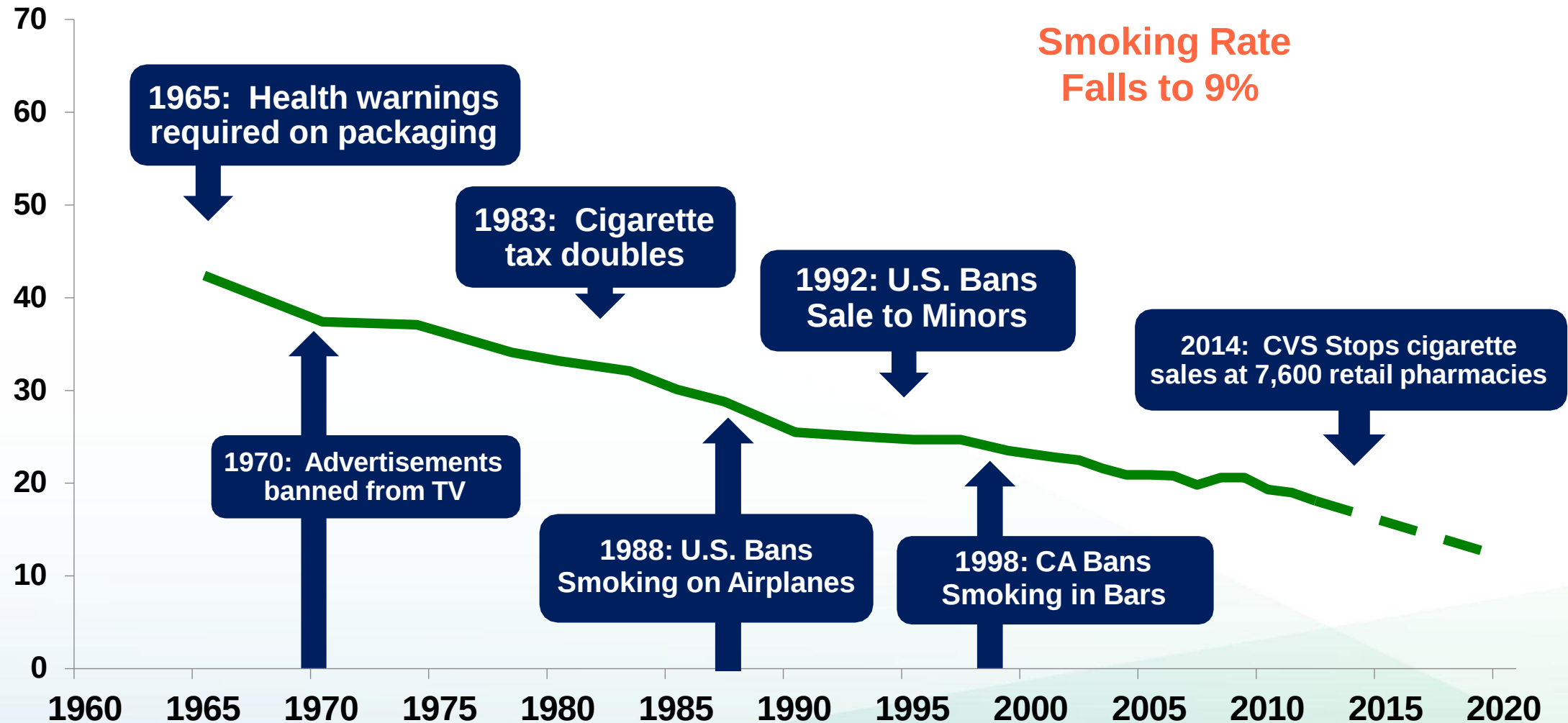
THE DOCTORS' CHOICE IS AMERICA'S CHOICE!

For 30 days, test Camels in your "I-Zone" ("I" for Throat, "I" for Taste).





Percent of Americans Who Smoke





A Milestone: Klamath River Flows Freely Again

Klamath River Iron Gate Dam



Before



After



Join us for the Leadership Awards
Luncheon at 11:30 am in Memorial Hall

House Keeping Notes



Green Expo Quest

#210 California Conservation Corps	#203 Constructive Systems Inc.	#202 Epson America, Inc.	#204 First Note Finance Inc.
#206 KOMPAN	#201 KYA	#105 MBTechnology	#123 Raptor Technical LLC
#200 Sealey International Americas	#211 SmartWaste, Inc.	#122 Sysarco Energy Solutions	#209 Varegy
	#205 Vision Quality Coatings	#207 Whitson CM	

Participation Rules

- Collect a sticker from each participating booth
- Complete all contact information at the bottom of this card
- Return card to the Registration by 3:45 PM
- Listen for your name at 4:00 PM in the Expo
- Acceptance of a prize by a public official may constitute acceptance of a reportable gift.
- There are 1st, 2nd and 3rd place prizes.

First and Last Name _____
 Company _____
 Cell Phone _____
 Email _____



JOIN US!

California State University, Sacramento Sustainability Tours at the Sustainable Facilities Forum!

With the University right across the street from the Forum, (4 minute drive with plenty of parking) we have organized two (2) special tours of California State University, Sacramento's Tschannen Science Building (LEED Gold) & The WELL Athletic Center (LEED Gold) along with the Bioconversion & Agricultural Collaborative Yard and Garden!

- Glass interior walls to increase natural light and used as whiteboards

The WELL Athletic Center (LEED Gold)

- Flooring made from Heineken bottles
- Walls made from sunflower seeds
- Rooftop solar
- Large inflatable skylights
- Library lighting retrofit project (cut building energy use by 54%)
- Low Impact Development Sites

Date: May 15, 2025

Time: 4:15pm - 5:15pm

RSVP Required: [SIGN UP HERE](#)

First come first serve, limited capacity Sign up now!

After the tour, we'd love for you to join us for drinks at Bike Dog Brewery, 1210 66th St, Sacramento, CA 95819, just across the street—completely optional and pay-as-you-go!

Show your Badge to get \$2 off beers!!

1. BAC Yard/ Garden Tour (Max 60)

- 1 acre garden with mixture of annual and perennial and plants
- Discussion of what we grow in the garden, why it exists, and where the food goes
- Aquaponics
- Hornet Honey and our apilary program
- The Tiny House
- Campus composting (vermicompost, hot compost, wind row)
- Chomp anaerobic digester
- Largest campus solar array (1.5MW)

2. Buildings Tour (Max 30-40)

Tschannen Science Building (LEED Gold)

- Integrated lighting system
- Study areas made from felled campus trees
- Specialized laboratory hood ventilation system



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