

Sunrise from the West: The Growth of Clean Energy in California and What It Means for the World



David Hochschild
Chair
California Energy Commission

Chinese Word for Crisis: Wei Ji

Danger

危机

Opportunity

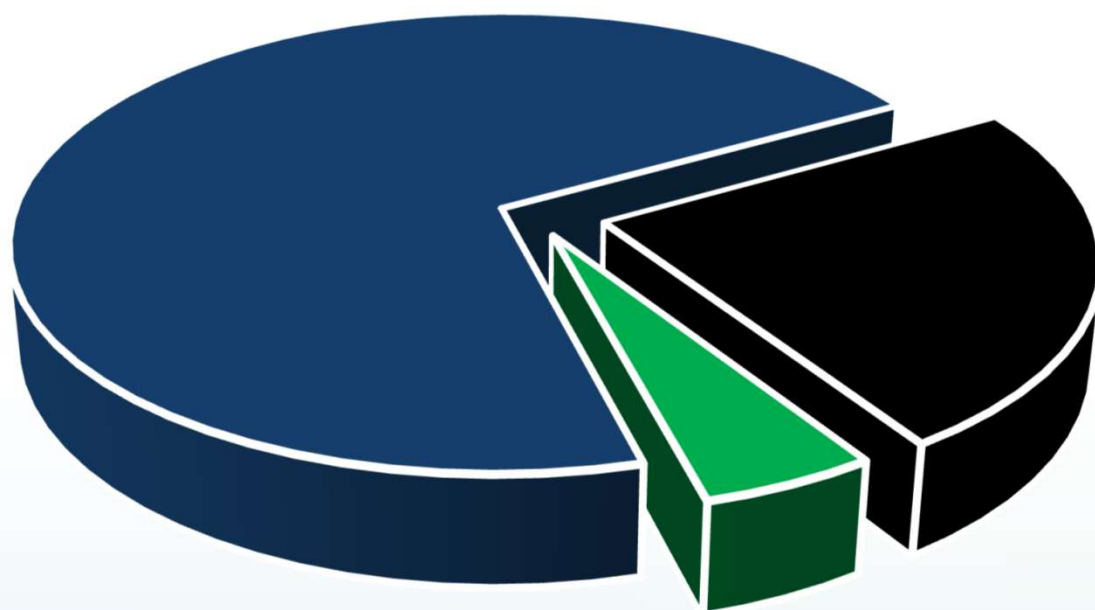
California is on track to achieve 100% clean electricity

with 59% of the state's electricity already coming from renewable and zero-carbon resources





Most Of The New Generation Added To The Grid is Renewable Energy



71%	Renewable	28,100 MW
24%	Fossil Fuels	9,700 MW
5%	Nuclear	2,200 MW

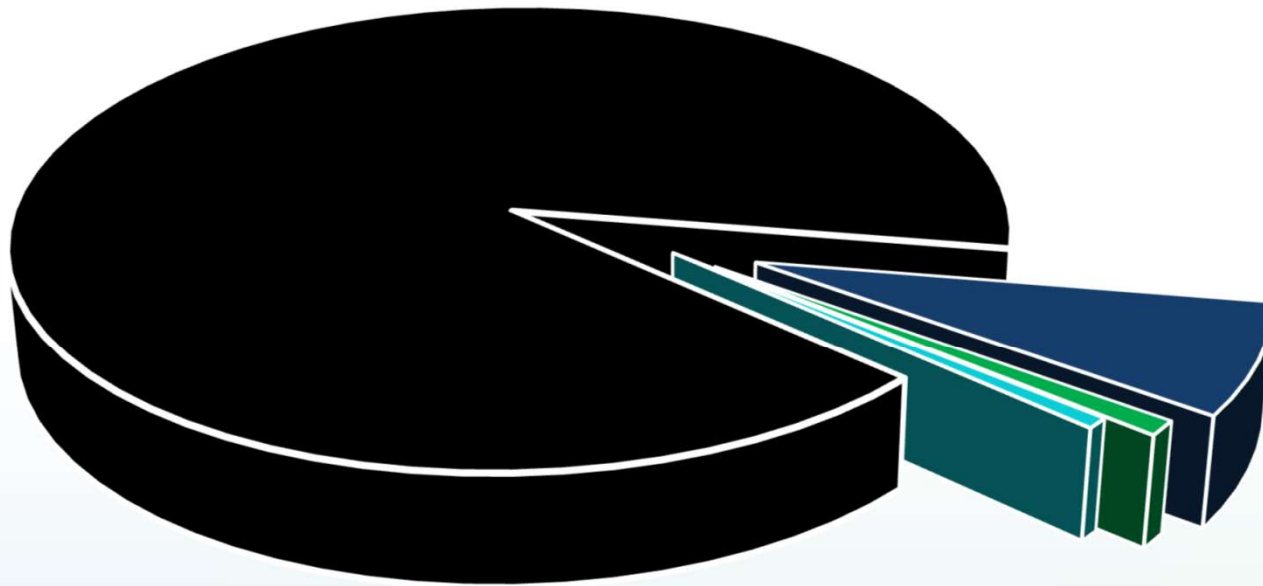
• 1st Qtr • 2nd Qtr • 3rd Qtr •

Source: U.S. Energy Information Administration - EIA - Independent Statistics and Analysis



Most Retirements Are Fossil Energy

Fossil fuels = 92% of Retired US Electric Generation Capacity in 2022



6.7%	Nuclear	769 MW
1%	Renewable	113 MW
0.4%	Batteries	40 MW
92%	Fossil Fuels	10,576 MW

Source: U.S. Energy Information Administration - EIA - Independent Statistics and Analysis https://www.eia.gov/electricity/monthly/xls/table_6_04.xlsx



“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



World's Largest Geothermal Power Plant



Geysers Geothermal Power Plant
955 MW
Lake County, CA



World's Largest Solar Rooftop



Apple HQ
17 MW
Cupertino, CA



World's Largest Battery Storage Project

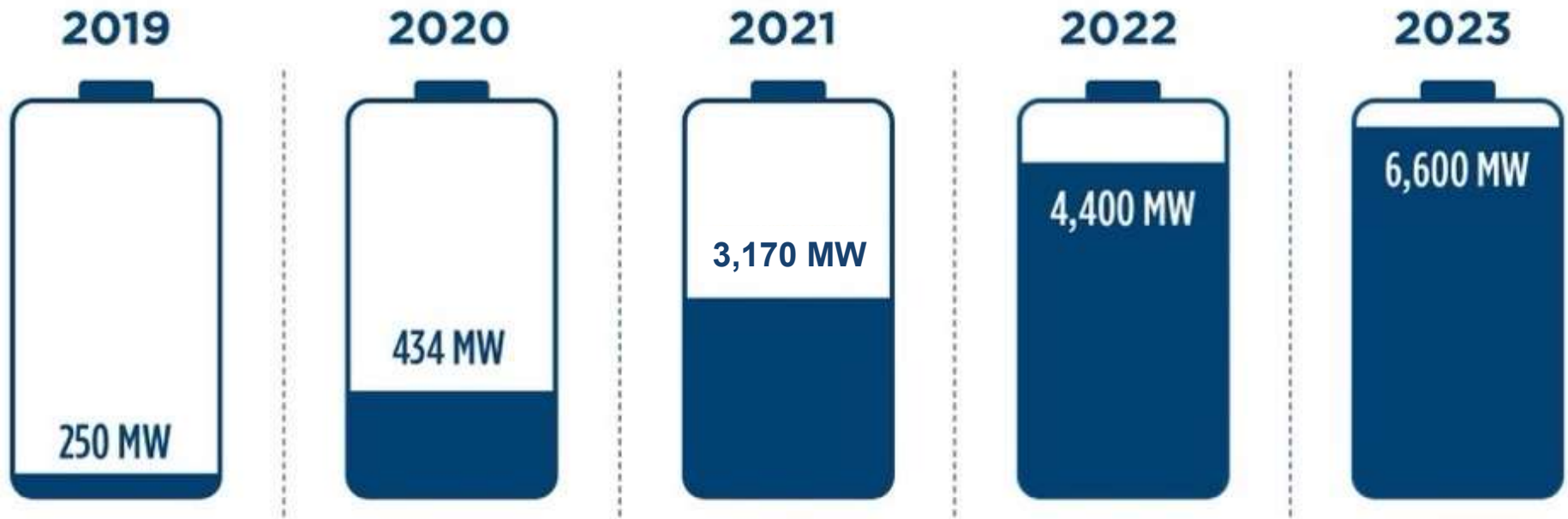


**Moss Landing Energy Storage Facility
400 MW / 1600 MWh
Monterey County, CA**



Growth in California's Battery Storage Resources

California has increased battery storage by **757%** in only four years





World's Second Largest Wind Project



**Atlas Wind Energy
1550 MW
Kern County, CA**



Case Study in Reducing Impacts

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%



Electric Semi-Trucks Take the Road



**Frito Lay Warehouse
Modesto, CA
500 Mile Range Tesla Electric Semi
2 Hour Charging Time**



Larger scale EV charging: 98 stalls at Coalinga EV charger station





2020: Governor Newsom Signs 100% zero emission vehicle mandate

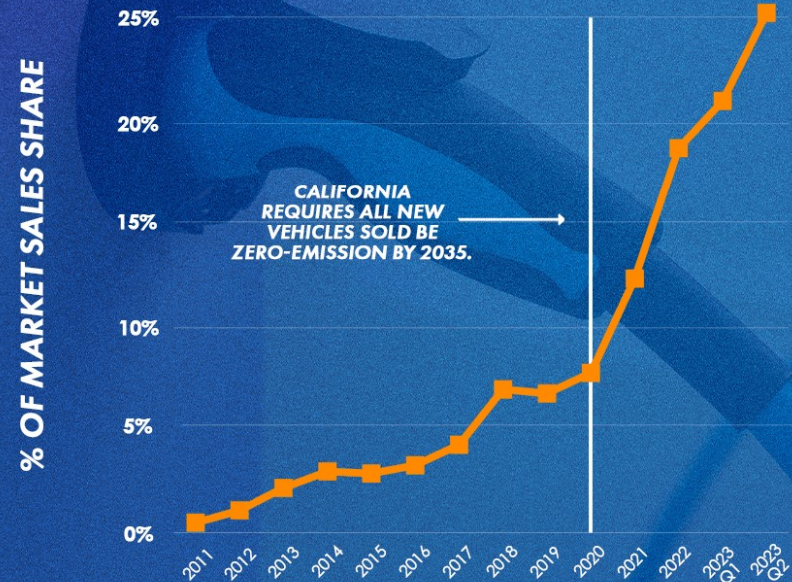




ZEV Takeoff

- CA Hits 1.5M ZEVs sold 2 years early
- 10,000 EV fast chargers deployed this year
- 27% of new cars purchased were ZEVs

ZEV SALES IN CALIFORNIA





US Automaker Market Cap April 2023

Tesla
\$578B

Ford - \$50B

GM - \$50B

Stellantis (formerly Chrysler) - **\$54B**



Clean Transportation Program Funding

2009-2023

Program Outcomes

68%

Funding located in disadvantaged or low-income communities

\$1.1B

Matched funding

32,000

Trainees and trainers

24,500

EV Chargers installed or planned to install

86

Grants for regional and local planning

107

Public hydrogen stations funded

40

Manufacturing facilities funded



New CEC Funding: ZEV Infrastructure

Multiyear Budget Agreement



\$870 Million

ZEV Infrastructure Grants



\$670 Million

Clean Trucks, Buses and
Off-Road Equipment



\$525 Million

Drayage Trucks



\$410 Million

School Buses



\$300 Million

Equitable At-Home Charging



\$250 Million

ZEV Manufacturing



\$130 Million

Ports



\$100 Million

Emerging Opportunities



\$60 Million

Transit Buses

**\$3.3
BILLION
TOTAL**

July 2023



Off-grid Solar/battery EV charger

EV Arc Charger
Beam Energy
San Diego, CA





Lithium Valley



**Controlled Thermal Resources
Imperial County, California**



Doing Lithium Recovery in CA

Salt-flat brine evaporation ponds

Water evaporation and chemical lithium extraction



30,000 acres

Open pit mining

Crushing and acid leaching lithium extraction



3,000 acres

Geothermal brine

Lithium recovery from brine via ion-exchange + clean energy production



30 acres

Land impact to produce 20,000 tons of lithium



Toward 25 GW of Offshore Wind



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





California's vs World's Leading Economies

Year	Rank	Country	\$ In Billions
2022	#1	UNITED STATES	\$25,347
	#2	CHINA	\$19,912
	#3	JAPAN	\$4,912
	#4	GERMANY	\$4,257
	#5	CALIFORNIA	\$3,559
	#6	INDIA	\$3,535
	#7	UNITED KINGDOM	\$3,376
	#8	FRANCE	\$2,937
	#9	CANADA	\$2,221
	#10	ITALY	\$2,058



NBC  **BAY AREA**

CALIFORNIA

**California to Become the Fourth
Largest Economy in the World:
Report**



Most Productive Auto Manufacturing Plant in the US: Tesla Factory in Fremont, CA Making 2000 Electric Vehicles/Day

Tesla employs 47,000 people in California



Tesla Factory Fremont, CA



1.5 Million Zero-Emission Sold in California

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



- **Adding 728 MW of rooftop solar every year**
- **Over the last 10 years CA has added 2.8 billion square feet of cool roof top solar**

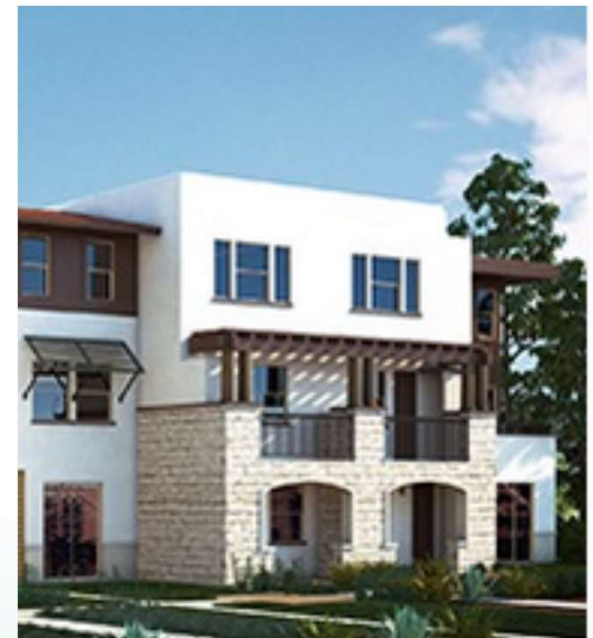


Electrification of Almost Everything



Now Selling: The All-Electric Home

State investing ~\$1 B over 5 years in equitable building decarb



CityVentures all-electric homes, Bellflower, Ca



Port of San Diego: Moving to 100% Electrification

Electric Harbor Cranes &
Electric Tugboat





From Diesel to Electric in 2024





High Speed Rail is Coming To California and It Will Be 100% Powered By Renewables





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 reason so many doctors enjoy them. Camels have quick, cool, mildness, pack after pack, and it's never accompanied by any other cigarette. Ask me, or any other doctor, and I'll tell you. Camels for 30 days and you'll see. Camels please your taste, keep you alert, and your throat as your steady smoker. You'll see how enjoyable a cigarette can be!

THE DOCTORS' CHOICE IS AMERICA'S CHOICE!

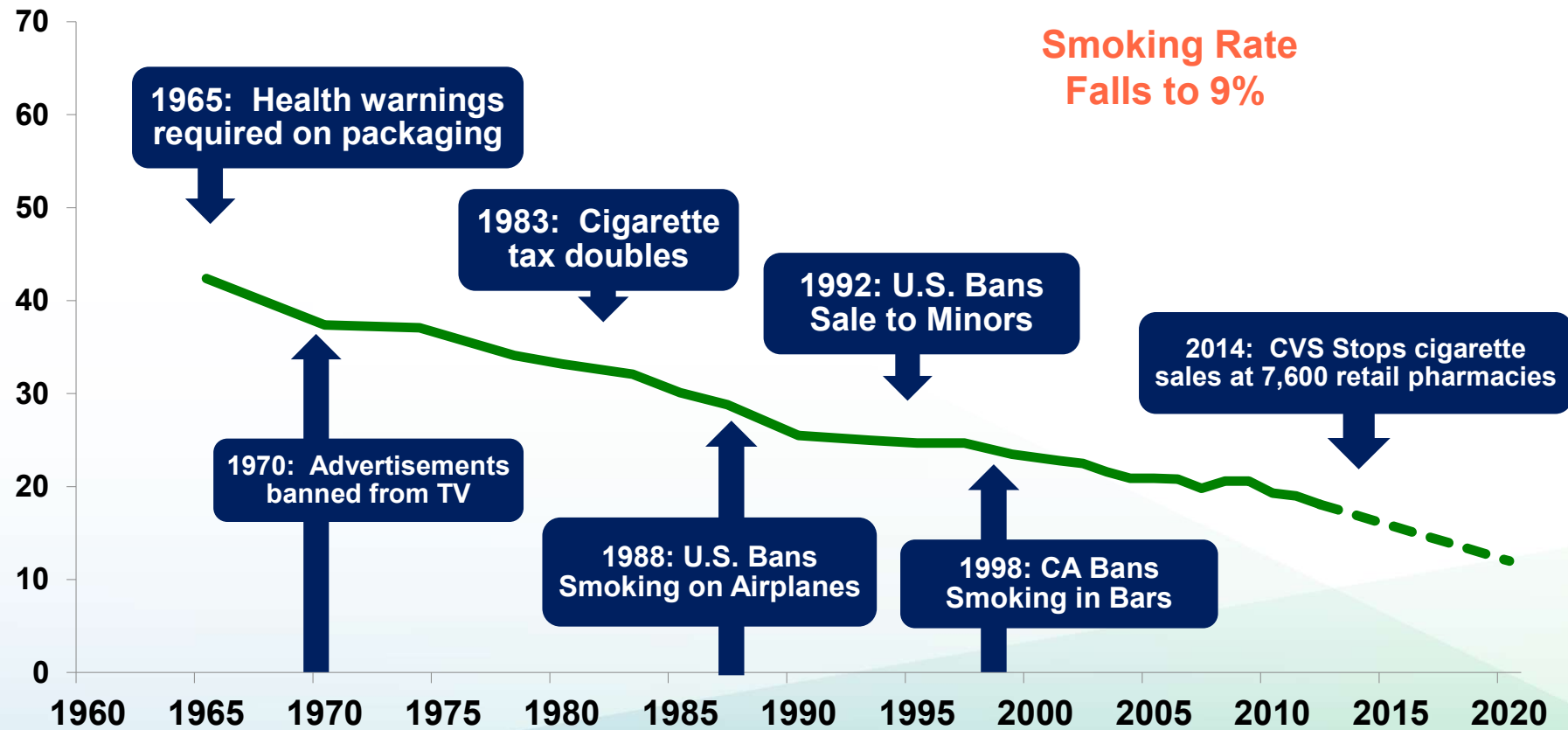
For 30 days, test Camels in your "If-Zone" (If for Throat, If for Taste)

An advertisement for Camel cigarettes. It features a central image of a doctor in a white coat sitting at a desk and smoking. To the right is a pack of Camel cigarettes. Below the main text are three small portraits of men, likely doctors, and a small illustration of a woman smoking. The overall layout is clean and professional, typical of mid-20th-century advertising.



Source: Centers for Disease Control and Prevention (CDC), 2014
http://www.cdc.gov/tobacco/data_statistics/tables/trends/cig_smoking/index.htm

Percent of Americans Who Smoke





Oldest Tree in the World

Great Basin Bristlecone Pine Tree

Methusela Tree
Inyo County, CA
4,854 years old





Tallest Tree in the World

Hyperion Tree
Humboldt County, CA
380 feet tall



The Largest Tree in the World



**General Sherman Tree
Sequoia National Park
Tulare County, CA**

