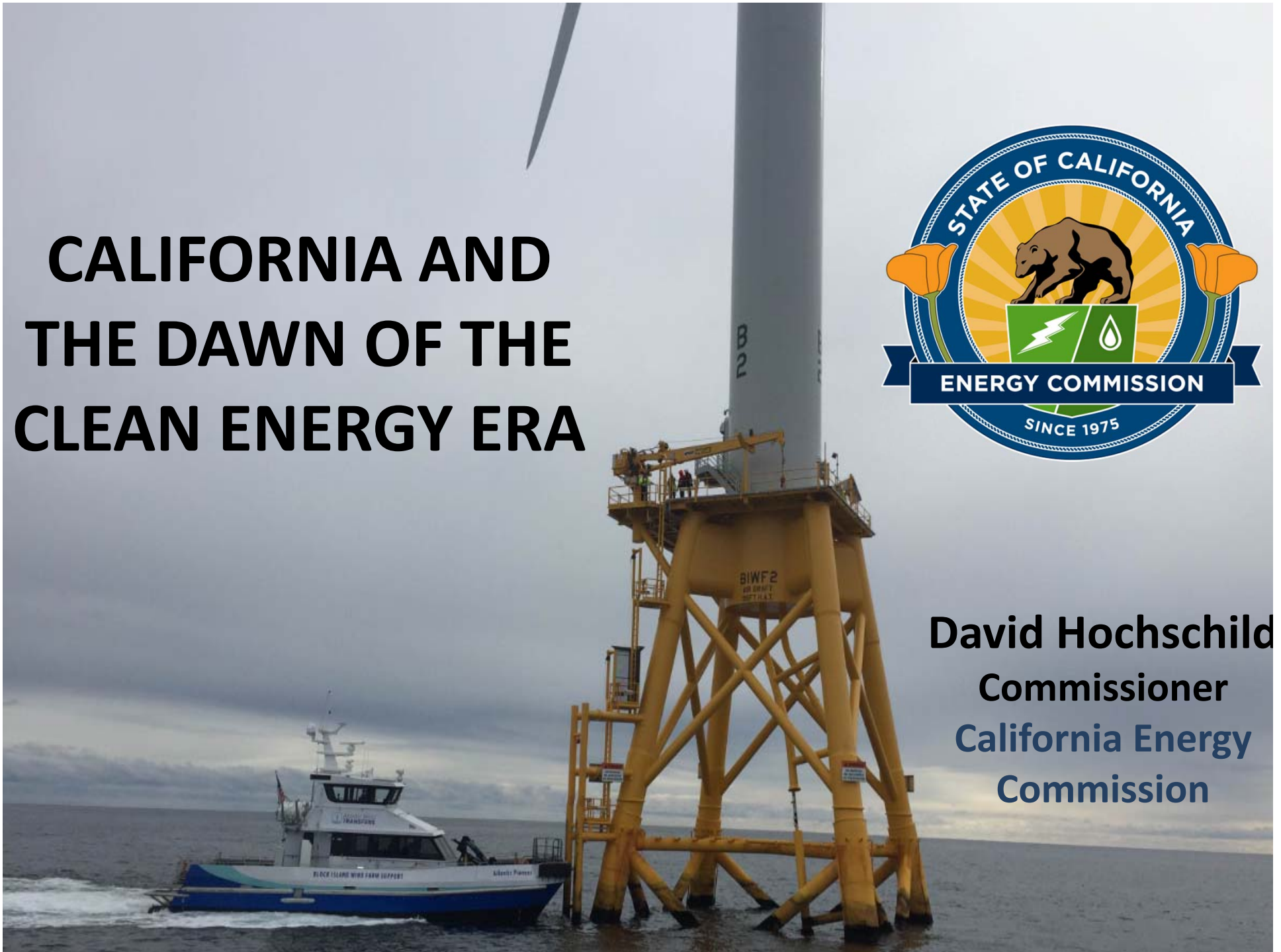


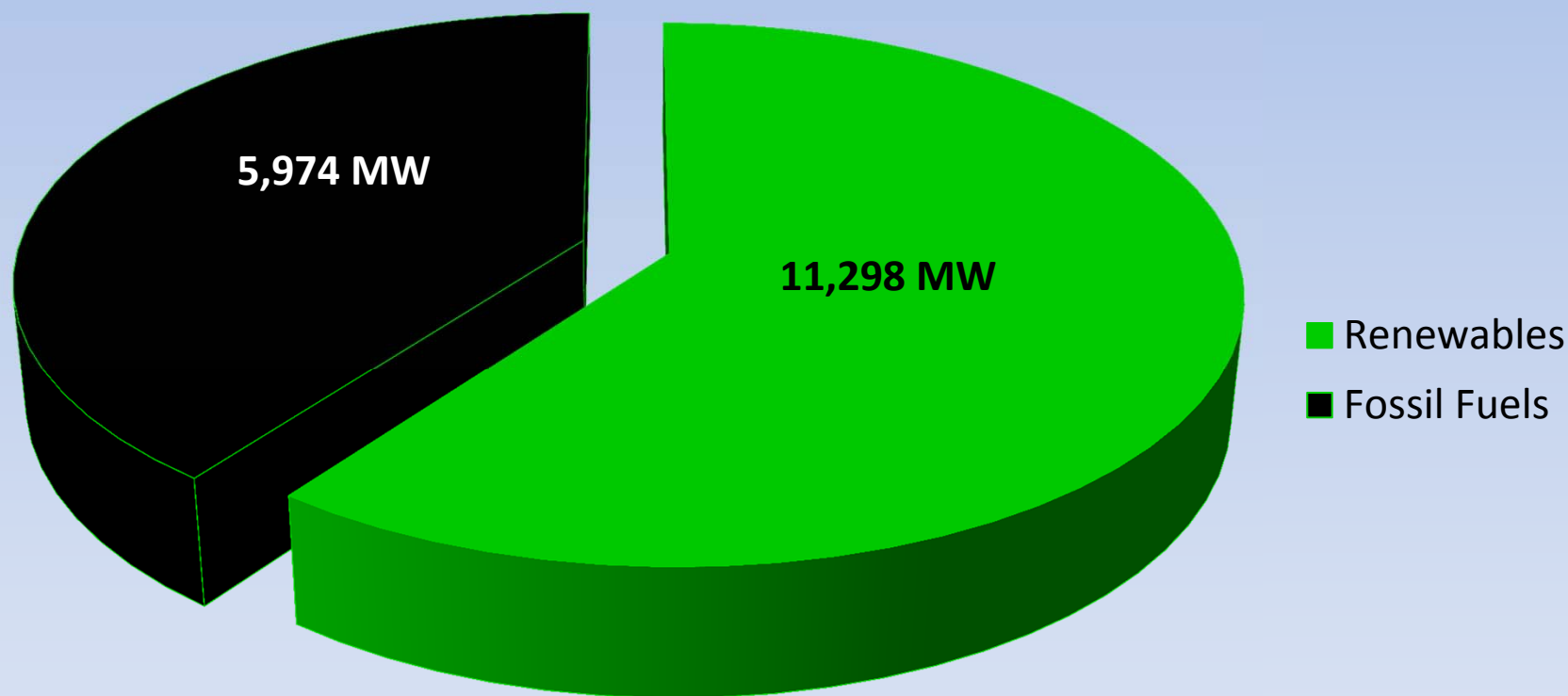
CALIFORNIA AND THE DAWN OF THE CLEAN ENERGY ERA



David Hochschild
Commissioner
California Energy
Commission



Renewable Energy Represented 65% of New US Electric Generation Capacity in 2015

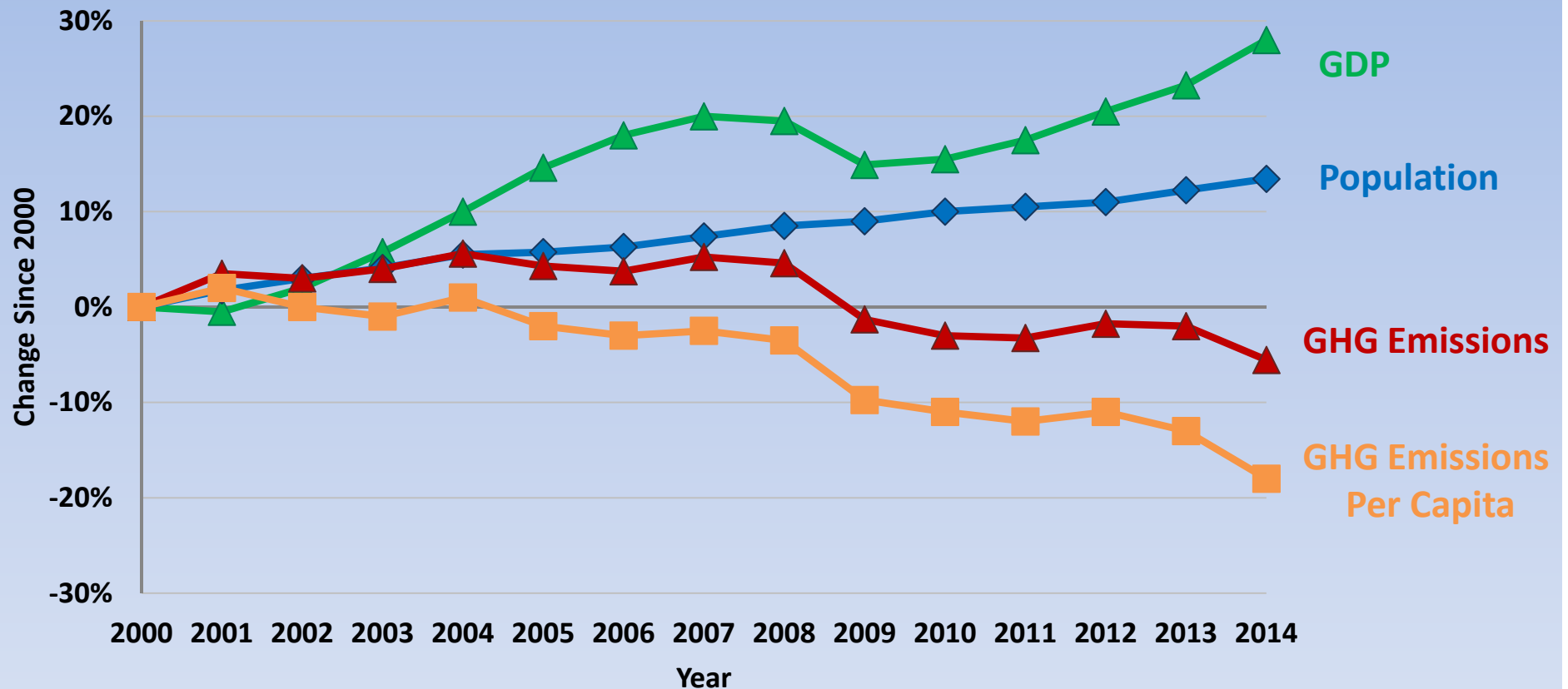


Value of Top 4 US Coal Companies Has Declined 99% Since 2011



Source: Ycharts.com

Since 2001, California's GDP Has Grown by 28% While Emissions Have Fallen by 8%



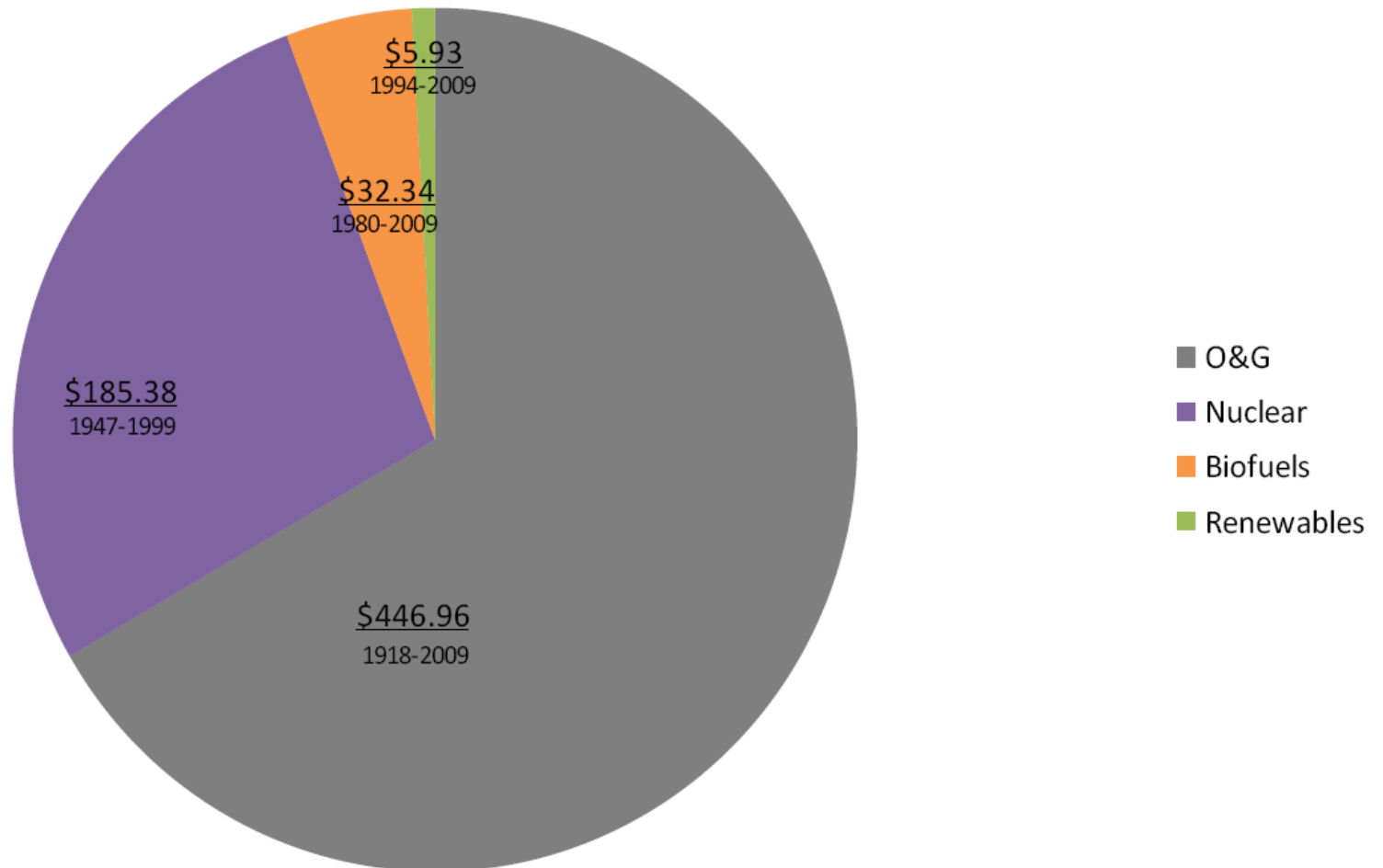
Metric	Associated 2014 Value
GDP	2.31 trillion
Population	38.7 million
GHG Emissions	441.5 MMTCO ₂ e
GHG Emissions Per Capita	11.4 metric tons CO ₂ e per person

Source: CA Air Resources Board

Winning the Game Despite an Uneven Playing Field: Federal Subsidies Have Favored Fossil Fuels

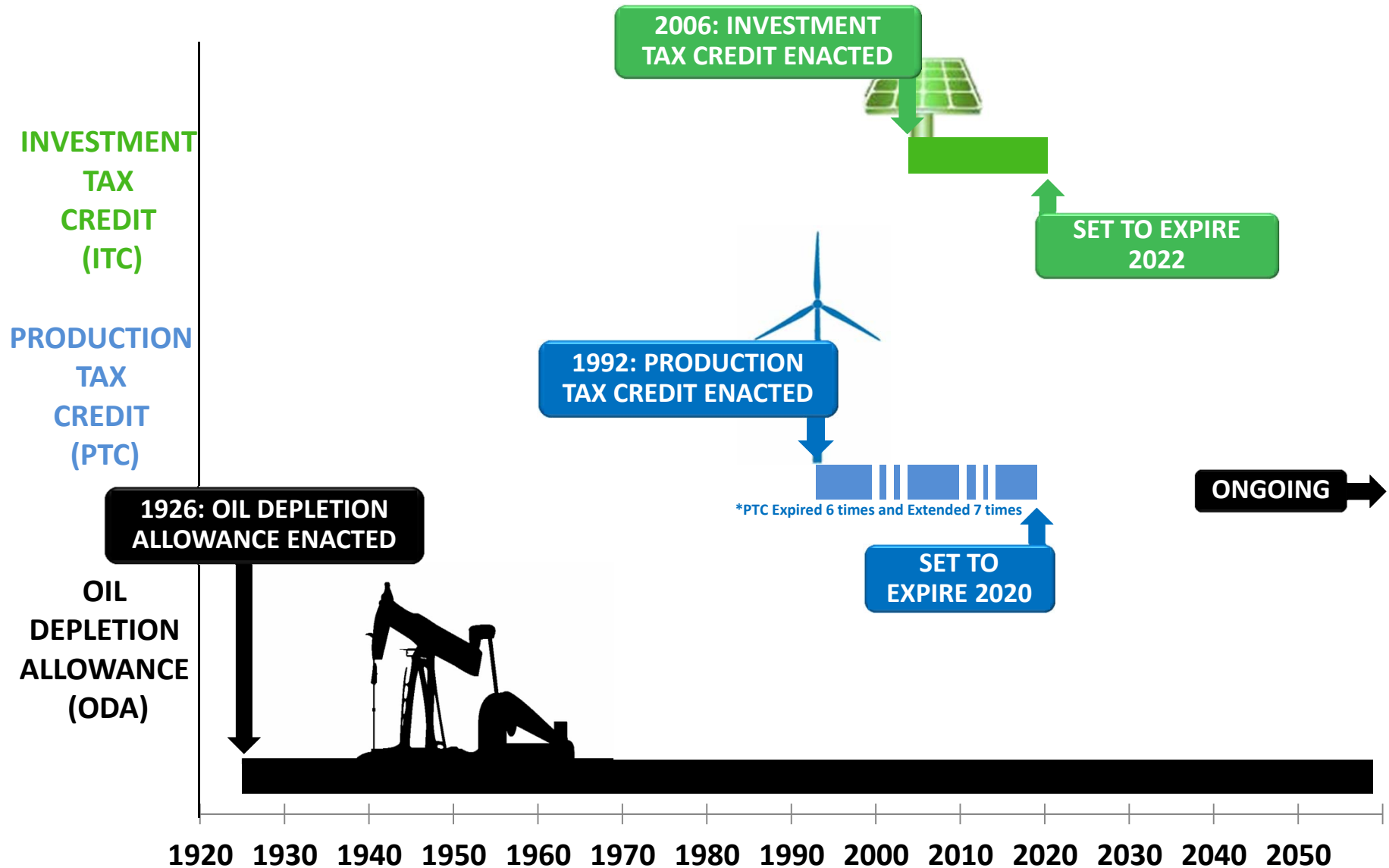
Cumulative Historical Federal Subsidies

2010\$, billions



Source: *What Would Jefferson Do?*
DBL Investors, September 2011

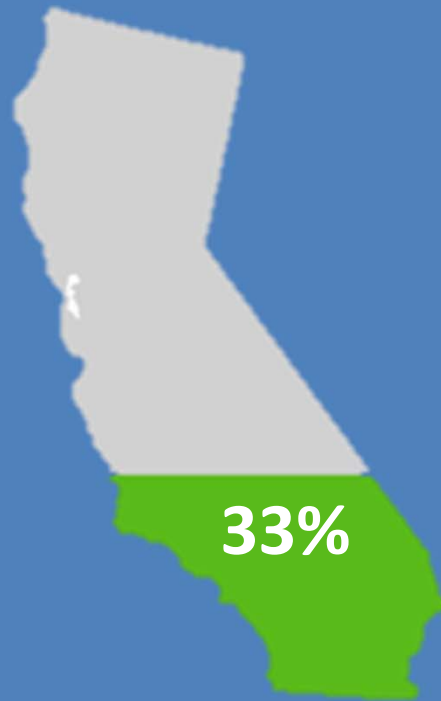
Federal Energy Subsidies



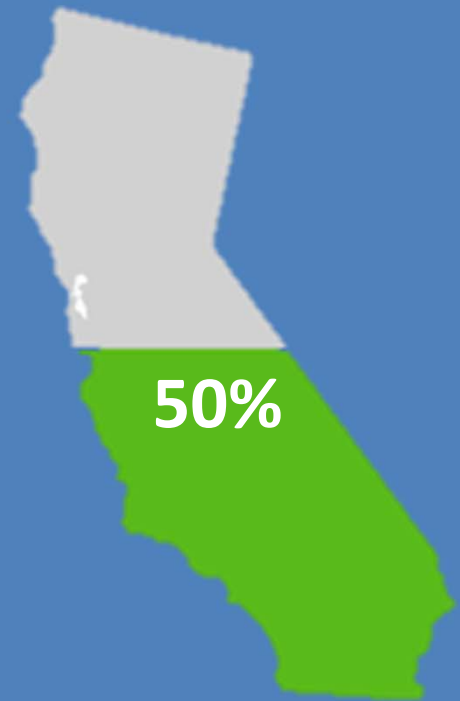
California Moves to 50% Renewables



2013

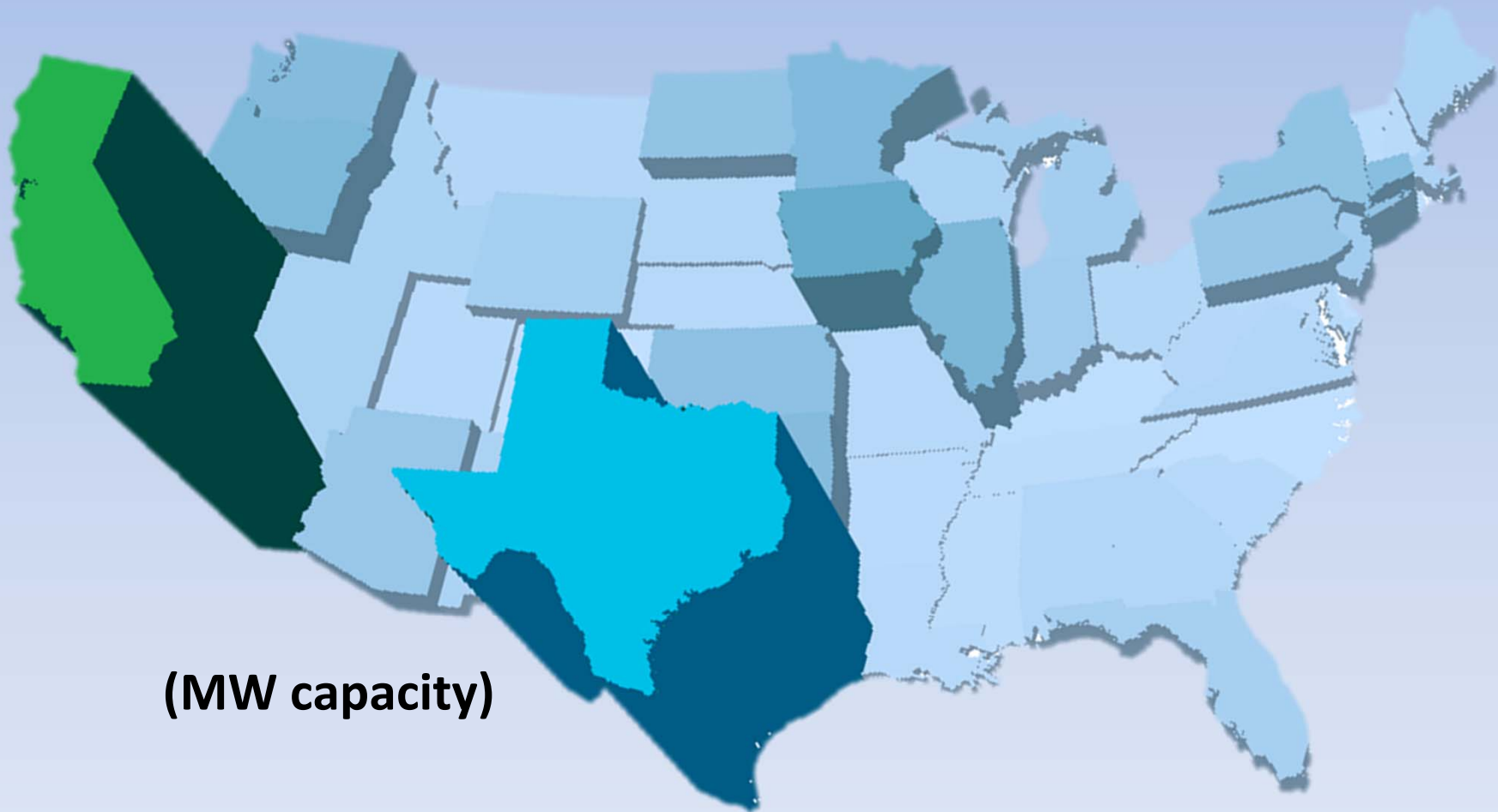


2020



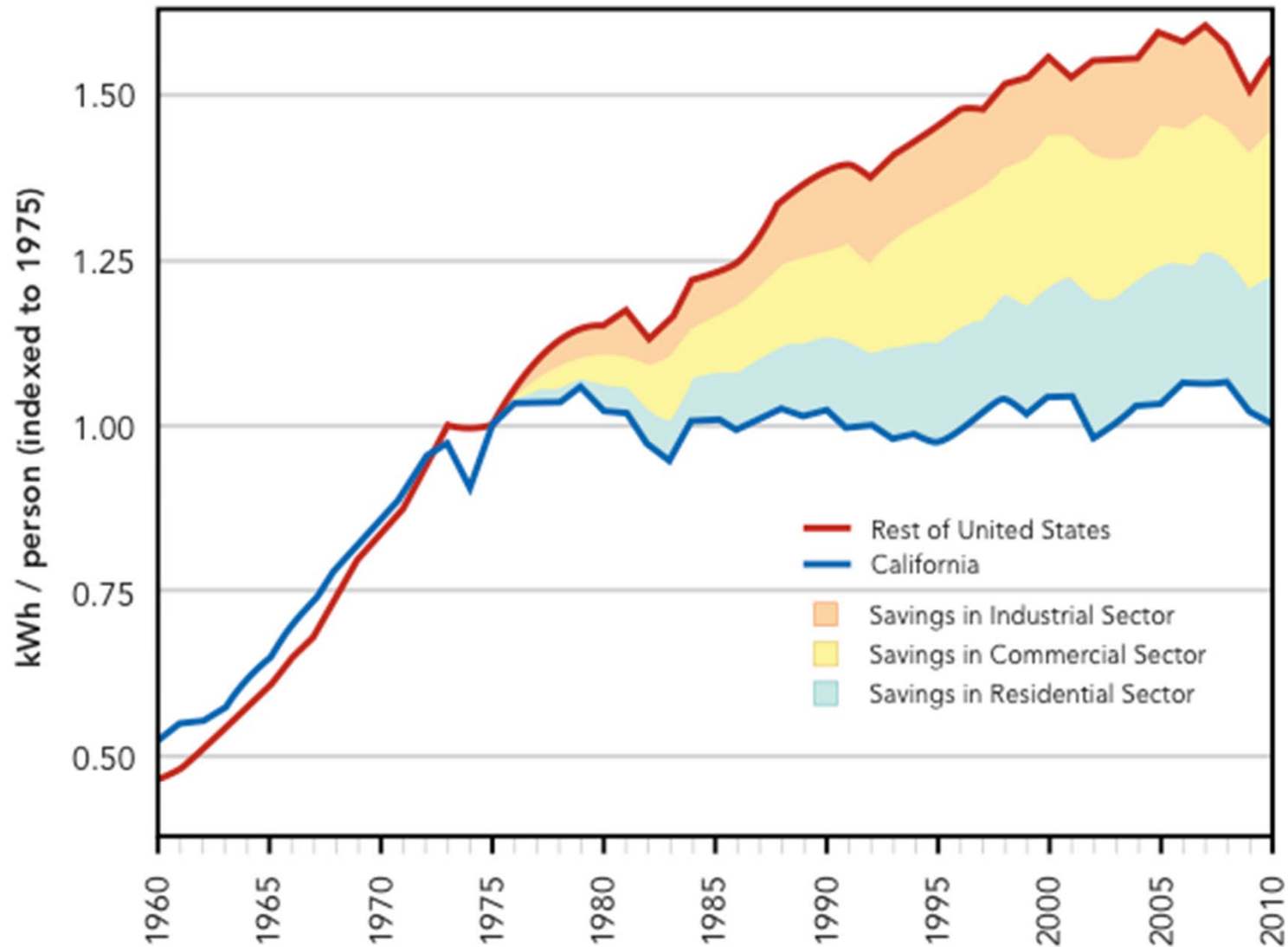
2030

California Leads the US in Renewables Installed. What lessons have been learned?



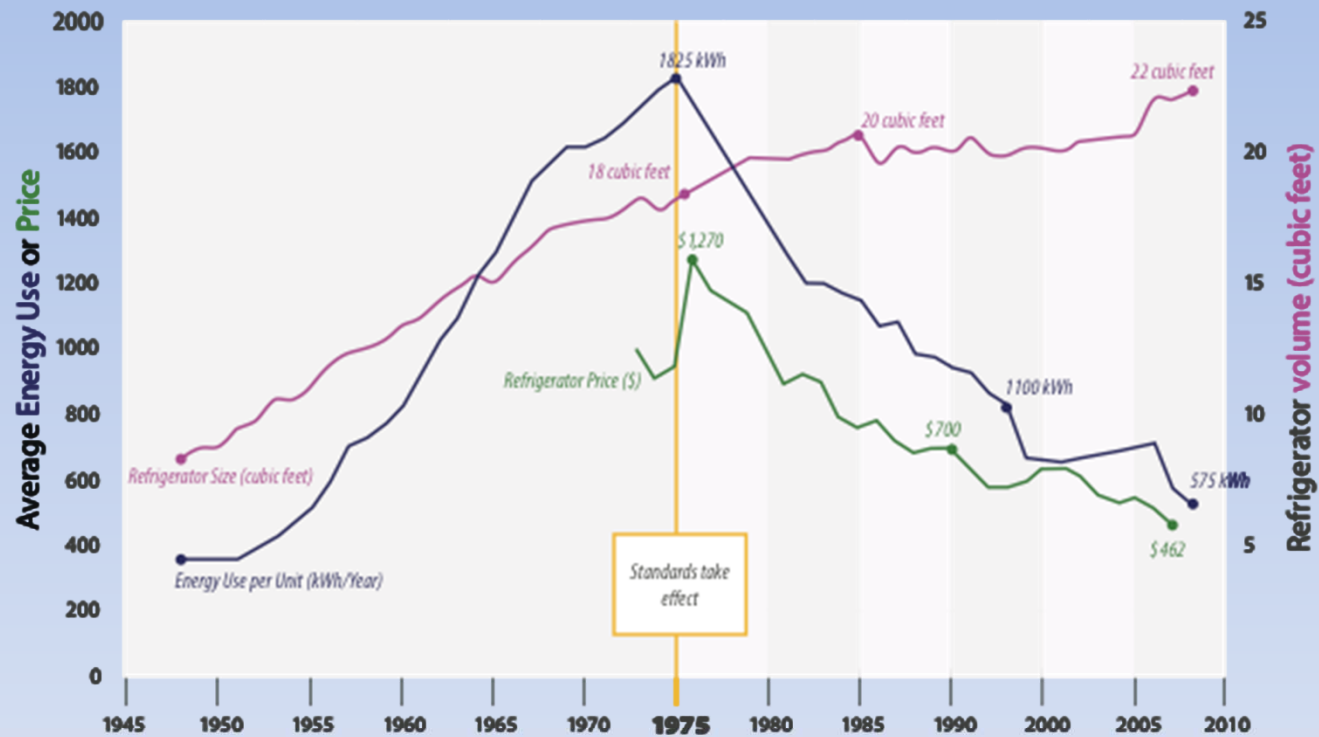
Source: Graphics based on data from the American Council On Renewable Energy (ACORE)
Renewable Energy in the 50 States (2013/2014 Editions)
<http://www.acore.org/publications/50states/>

California Advancing Energy Efficiency



California Advancing Energy Efficiency

New Refrigerator Use v. Time and Retail Prices





2009: The Energy Commission's
TV efficiency standards
take effect, saving Californians
\$1 billion / year

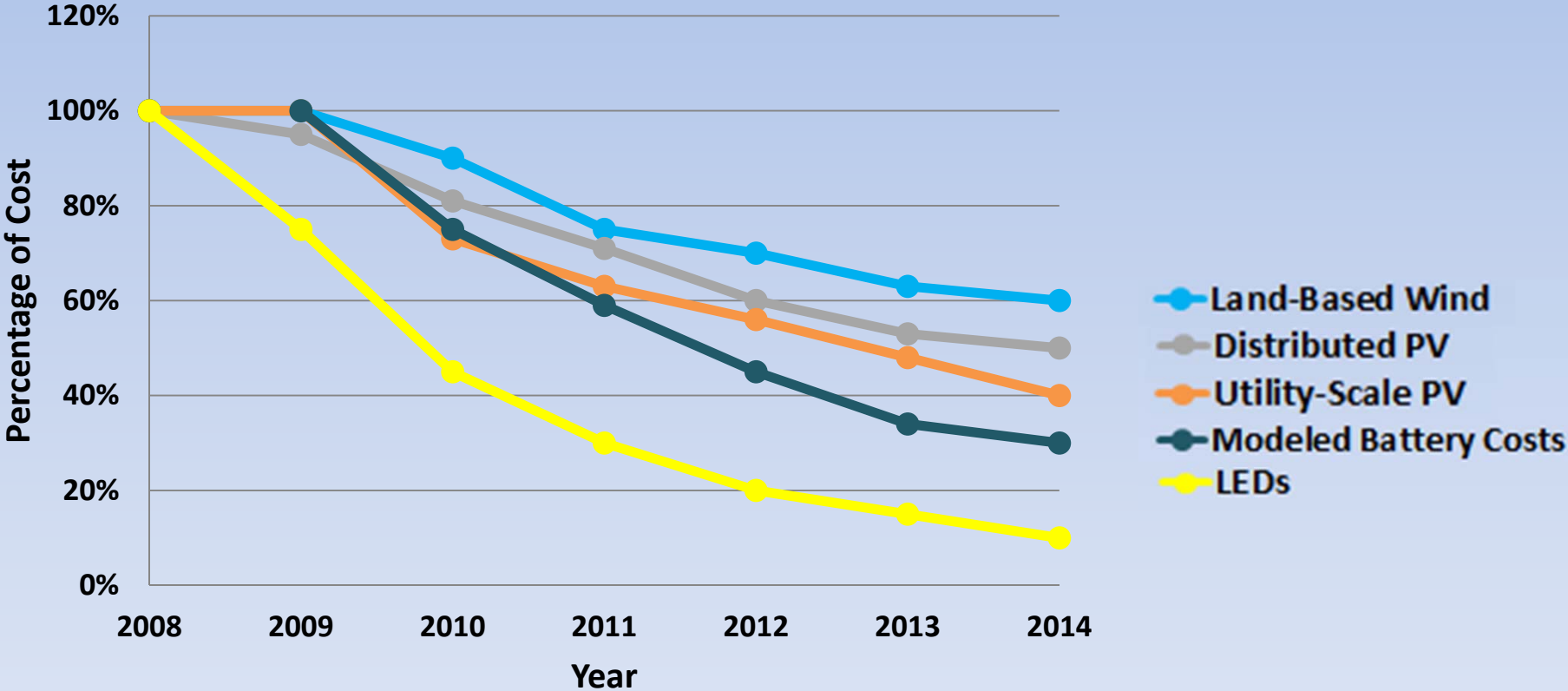


2012: The Commission's
plug-in charger
efficiency standards begin
saving Californians **\$300M / year**



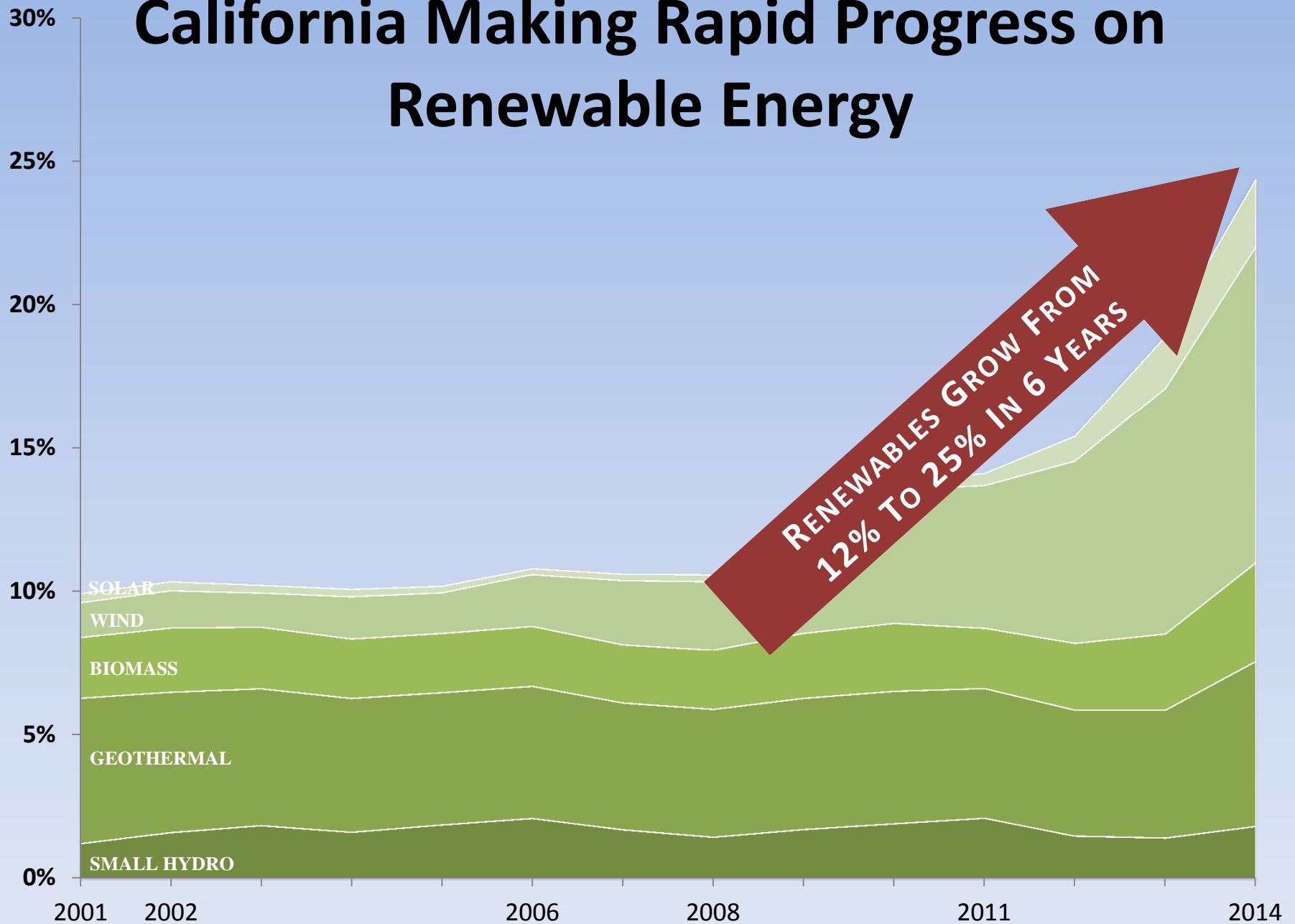
The Falling Cost of Clean Energy Technologies

Indexed Cost Reductions Since 2008



Source: DOE Report, Revolution Now, The Future Arrives for Five Clean Energy Technologies, 2015

California Making Rapid Progress on Renewable Energy



Source: California Energy Commission, Tracking Progress Report

The World's Largest Thin Film Solar PV Project

An aerial photograph showing a vast, rectangular solar farm in a desert. The solar panels are arranged in a dense grid, with a central access road. The surrounding terrain is arid and hilly, with some sparse vegetation and small structures visible in the distance.

**Desert Sunlight Solar
Project
550 MW
Riverside County, CA**

The World's 3rd Largest Silicon PV Project

Solar Star Project
579 MW
Kern County, CA

The World's Largest Solar Thermal Power Plant (Tower)

Ivanpah Solar Thermal Project
393 MW
San Bernardino County, CA



The World's Largest Solar Thermal Power Plant (Trough)

Solar Energy Generating System (SEGS)

354 MW

San Bernardino County, CA



The World's Largest Geothermal Power Plant

Geysers Geothermal Power Plant
955 MW
Lake County, CA

The World's Largest Wind Project

Alta Wind Energy Center
1550 MW
Kern County, CA





California Leads the Nation in Biomass Energy Generation

Honey Lake Biomass Plant
Lassen County, CA

Case Study in Reducing Impacts: Vasco Wind Energy Center Repowering

432 small turbines
removed and
replaced with
34 new turbines



Vasco Wind Energy Center, 78MW
Contra Costa County

**RESULT: Energy production tripled
& avian mortality cut by 70%**

Largest Manufacturing Plant in CA Produces Electric Vehicles

Tesla employs over
15,000 people



Tesla Factory
Fremont, CA



**ALMOST 250,000
ELECTRIC VEHICLES
IN CALIFORNIA
TODAY**

New Solar Home Construction Growing Rapidly

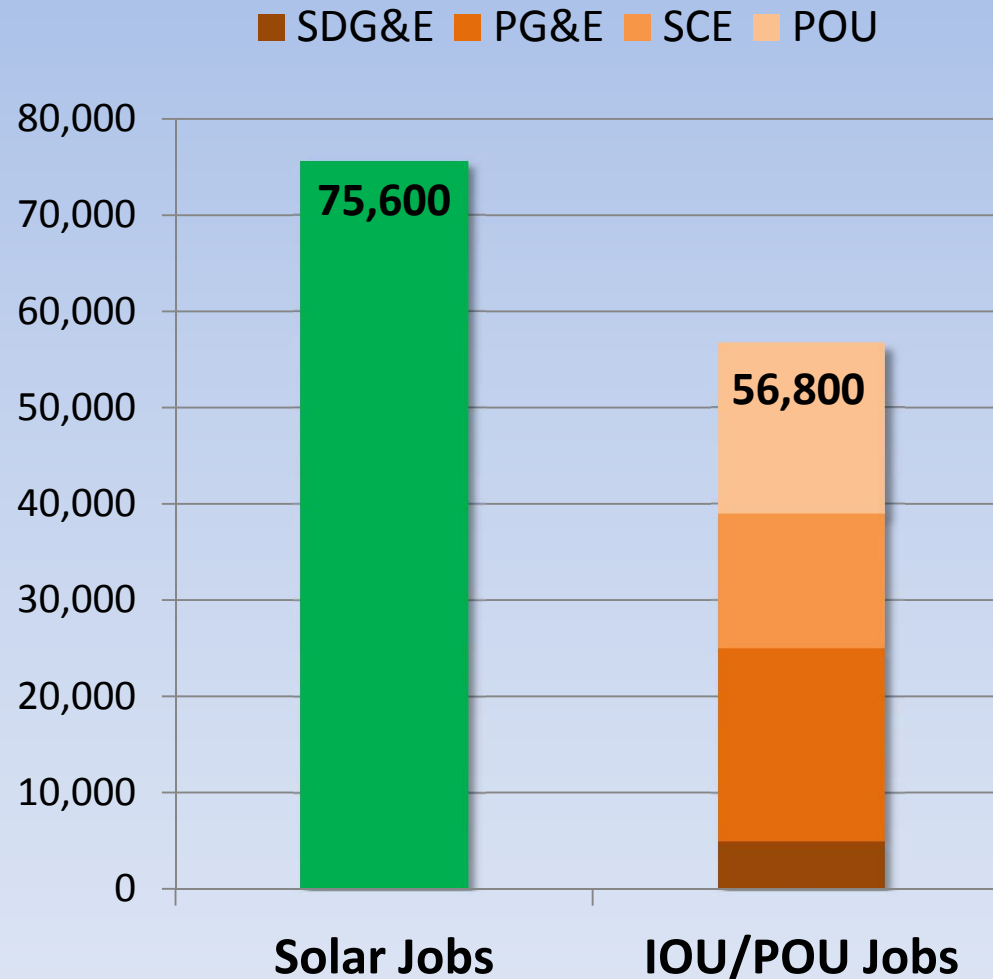


**Zero Energy Community
Rocklin, CA**

27% of new homes in
Southern CA
built with solar



More Californians Work in the Solar Industry Than for All Utilities Combined



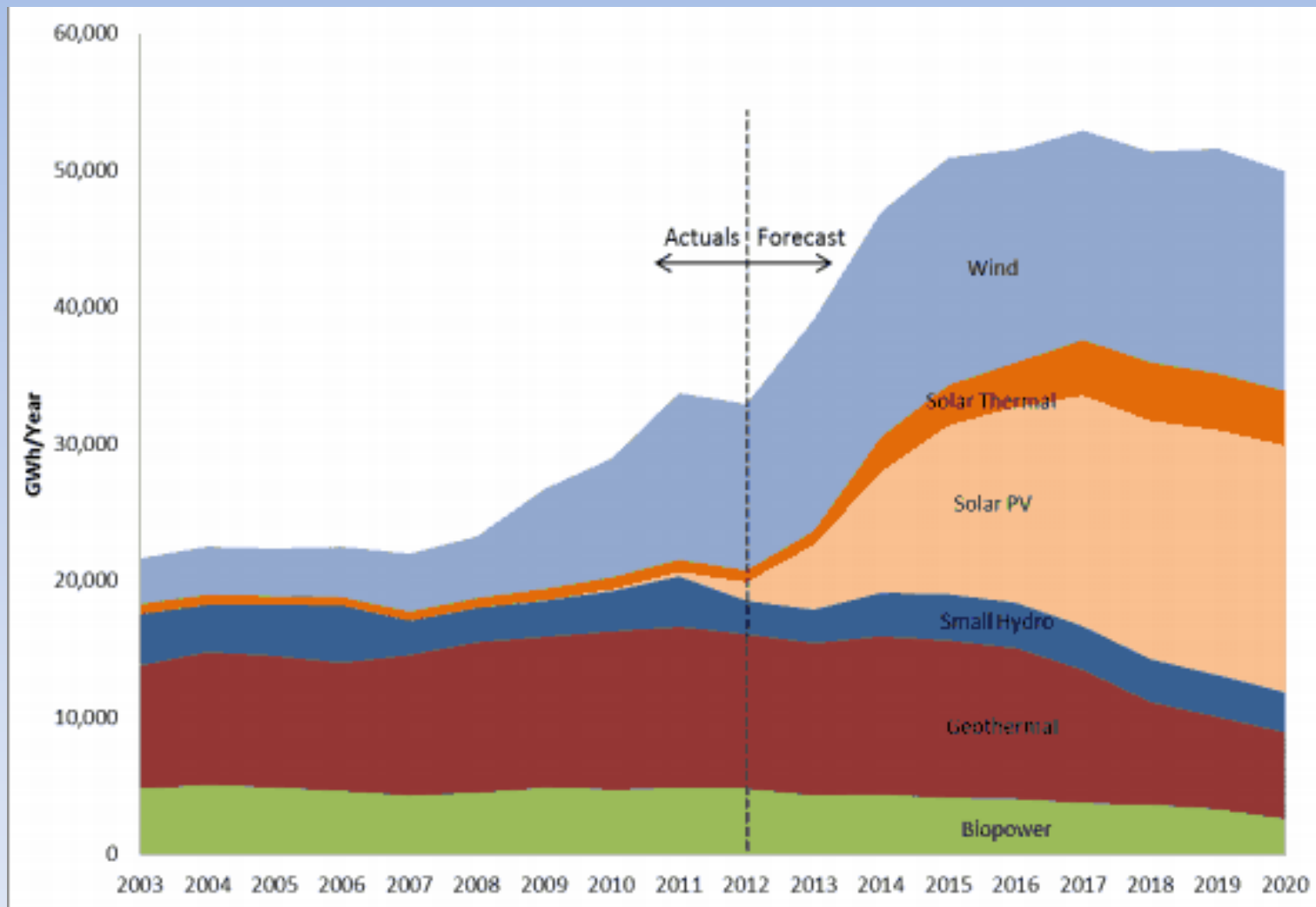
Sources:

Solar Foundation, 2015 Solar Jobs Census

U.S. Securities and Exchange Commission, Form 10-K, 2014

<http://www.sec.gov/edgar/searchedgar/companysearch.html>

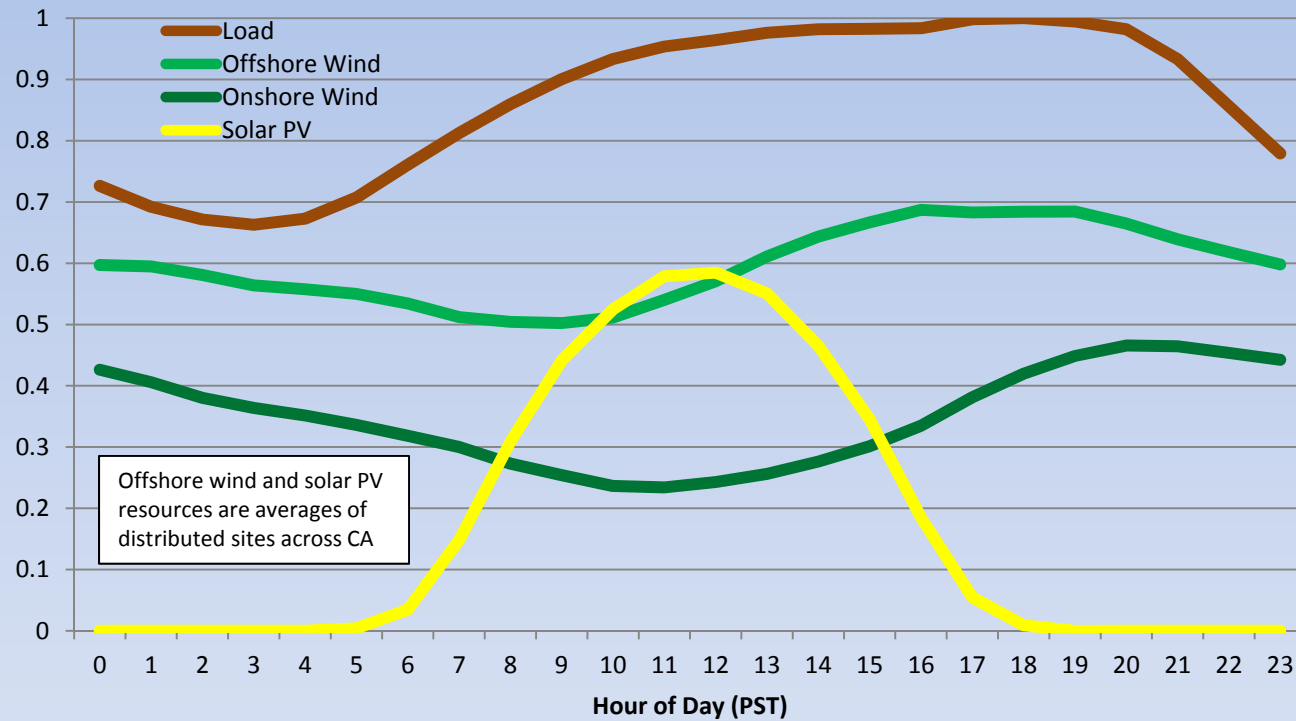
Solar Expected to be half of all Renewable Energy in California by 2020



Source: CPUC RPS Report

Wind and Solar Generation Complement Each Other

Normalized Hourly Average Onshore Wind, Offshore Wind, and Solar PV Contributions to California's Electricity Demand



The Future of Energy Storage: 1.3 GW by 2020



\$5 B Tesla Battery Factory under construction

Storage as the Great Facilitator



- CEC has invested \$34M into 60 different energy storage projects throughout California

The Latest Solar Customers: The President and the Governor



Toward the Electrification of Almost Everything and 100% Renewables



9000 Electric Vehicle Charging Stations in CA

Map of Level 2 charging stations
(not including privately owned
chargers)



Source: PlugShare.com, US Department of Energy
Alternative Fuels Data Center

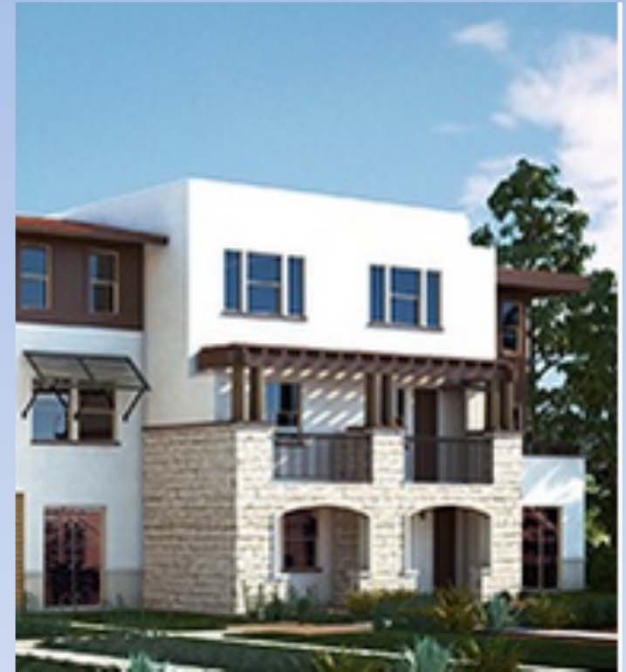
**Map Source: PlugShare
(June 2016)**

Stanford University Converts Space and Water Heating from Natural Gas to Electricity



**Reduces water use and GHG emissions by 2/3
and annual energy bills by 1/3**

Now Selling: The All-Electric Home



CityVentures all-electric homes
Bellflower, CA

Companies Committing to 100% Renewable Energy

Google



Over 30 US military bases in CA Representing approximately \$130B annually to the California Economy



**Navy: 50% Renewables
by 2020**

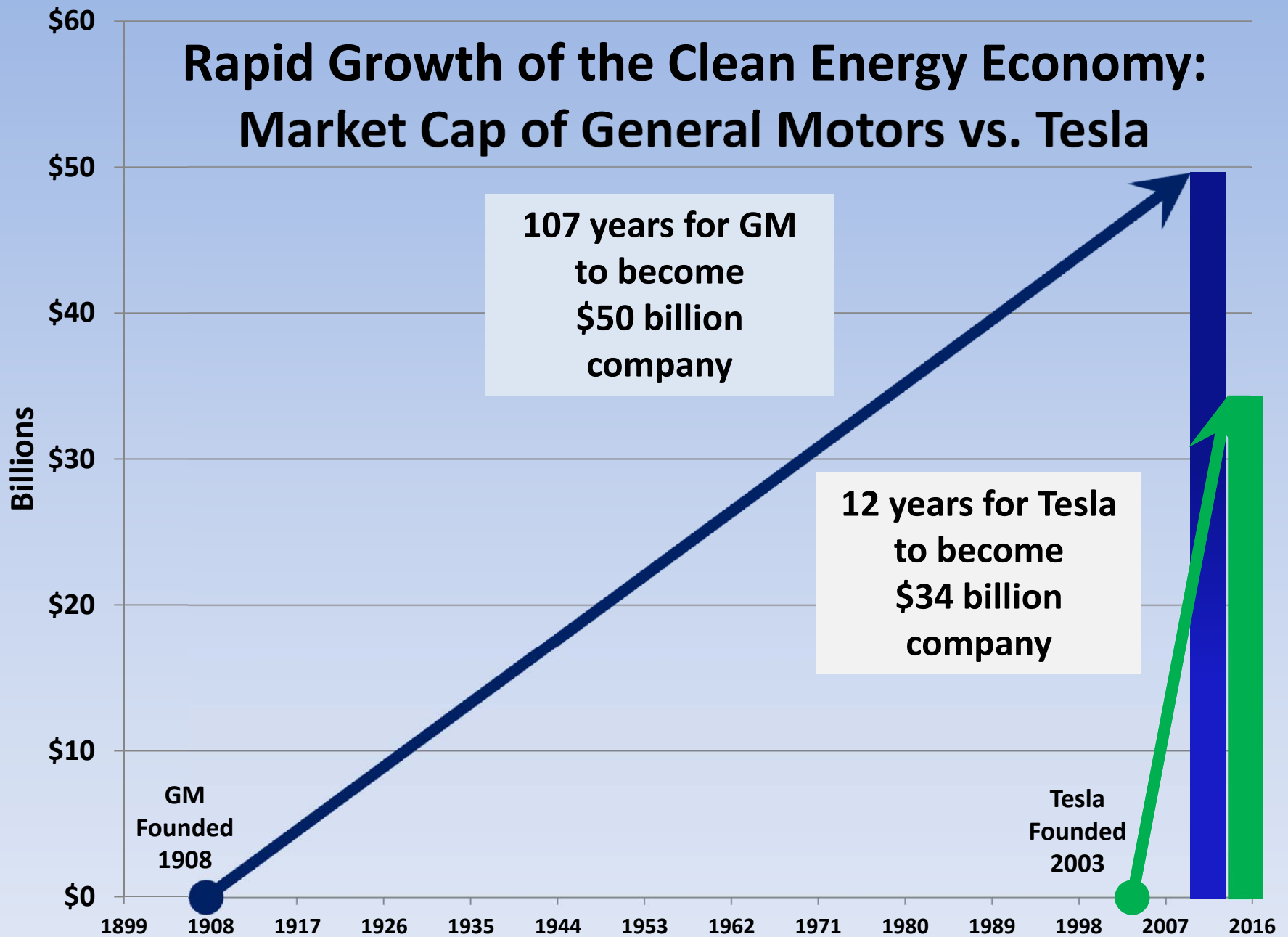
**Marines: Zero Fossil
Fuels on Bases
by 2025**

Source: California Energy Commission, 2014
Geographic Information Systems Data

High Speed Rail is Coming to California and it will be 100% Powered by Renewables...

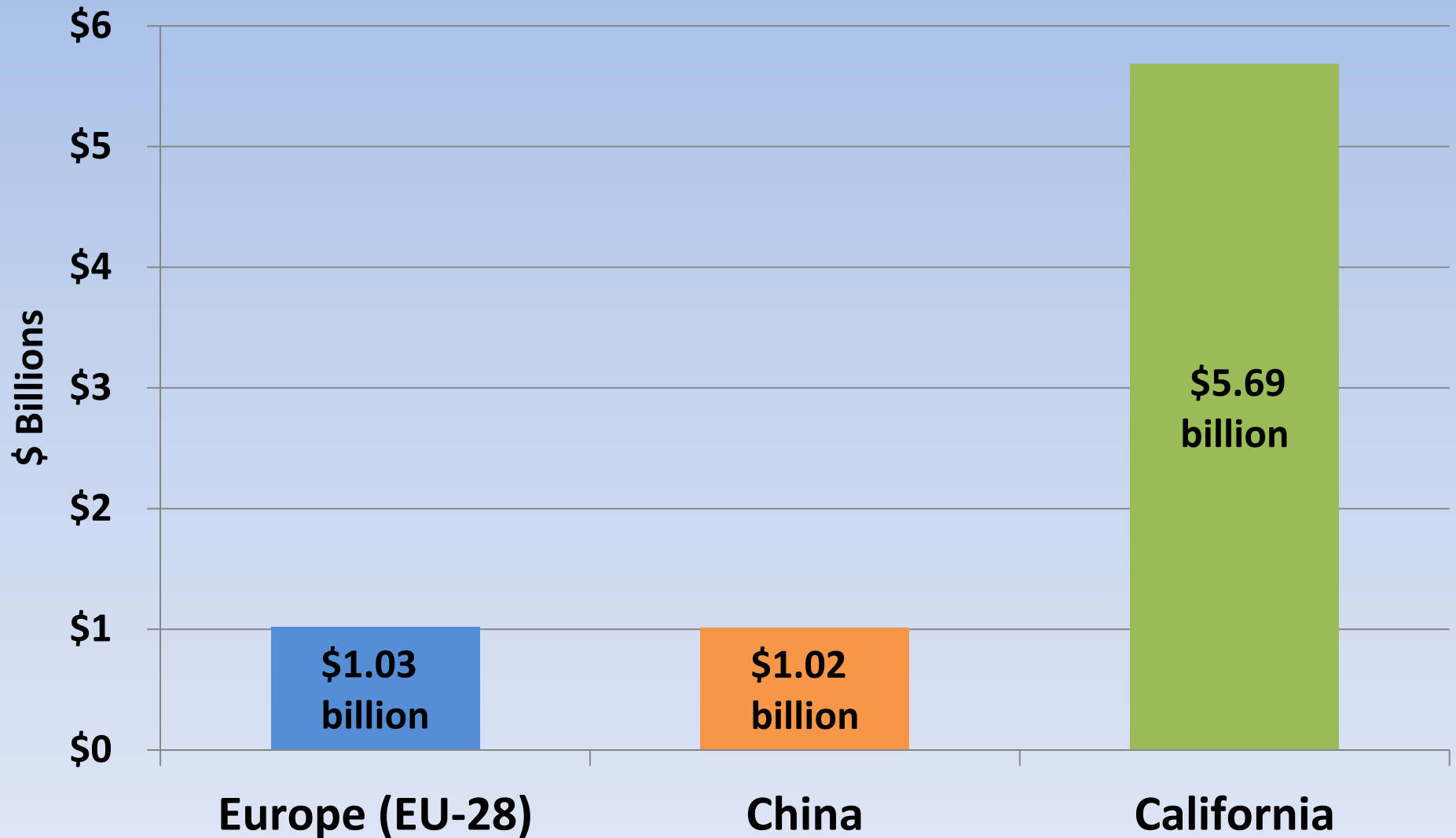


Rapid Growth of the Clean Energy Economy: Market Cap of General Motors vs. Tesla



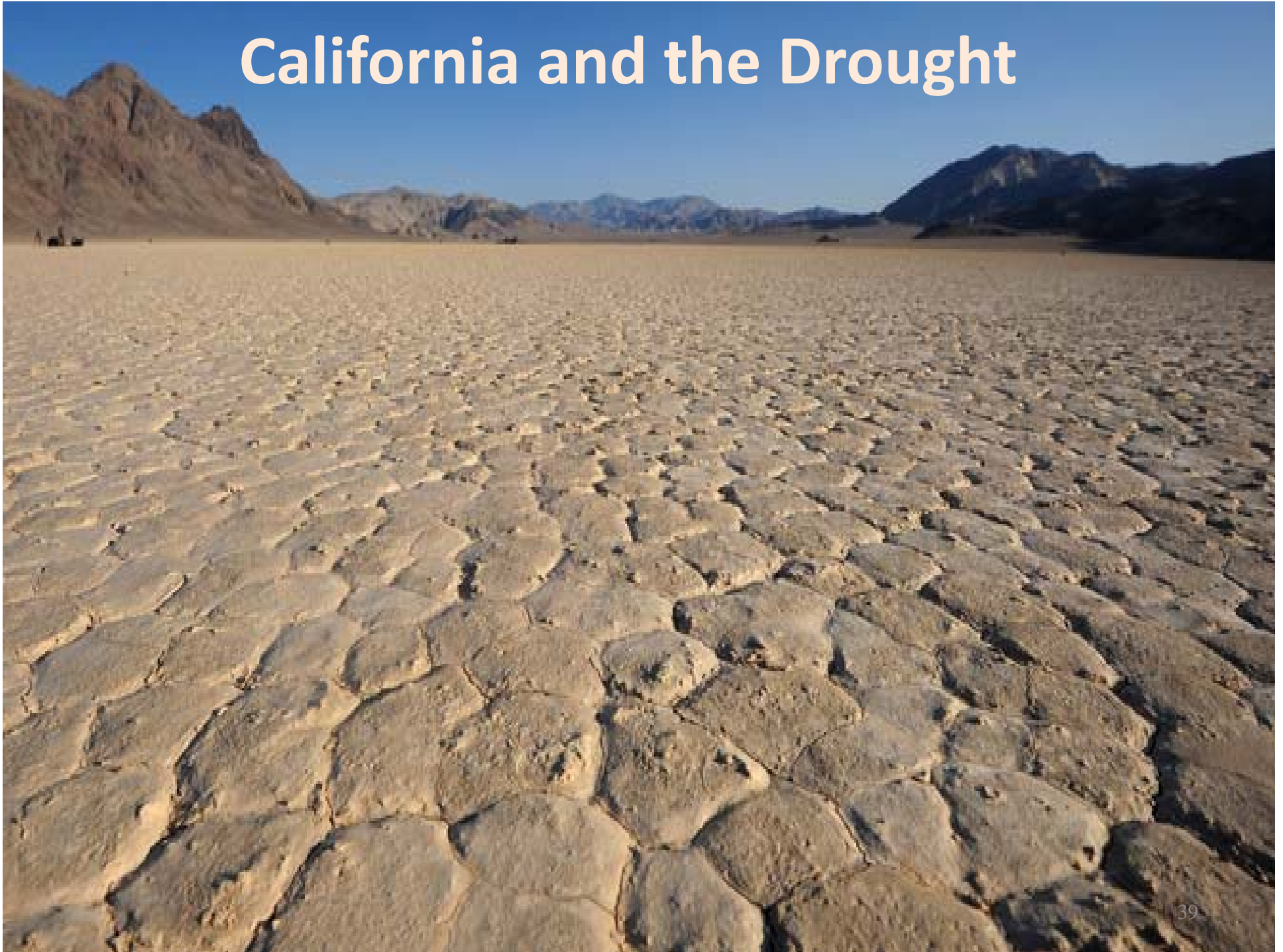
Based on market value as of 8/5/15

More Cleantech VC Investment into CA than all of Europe and China Combined



Source: Next 10 California 2014 Green Innovation Index

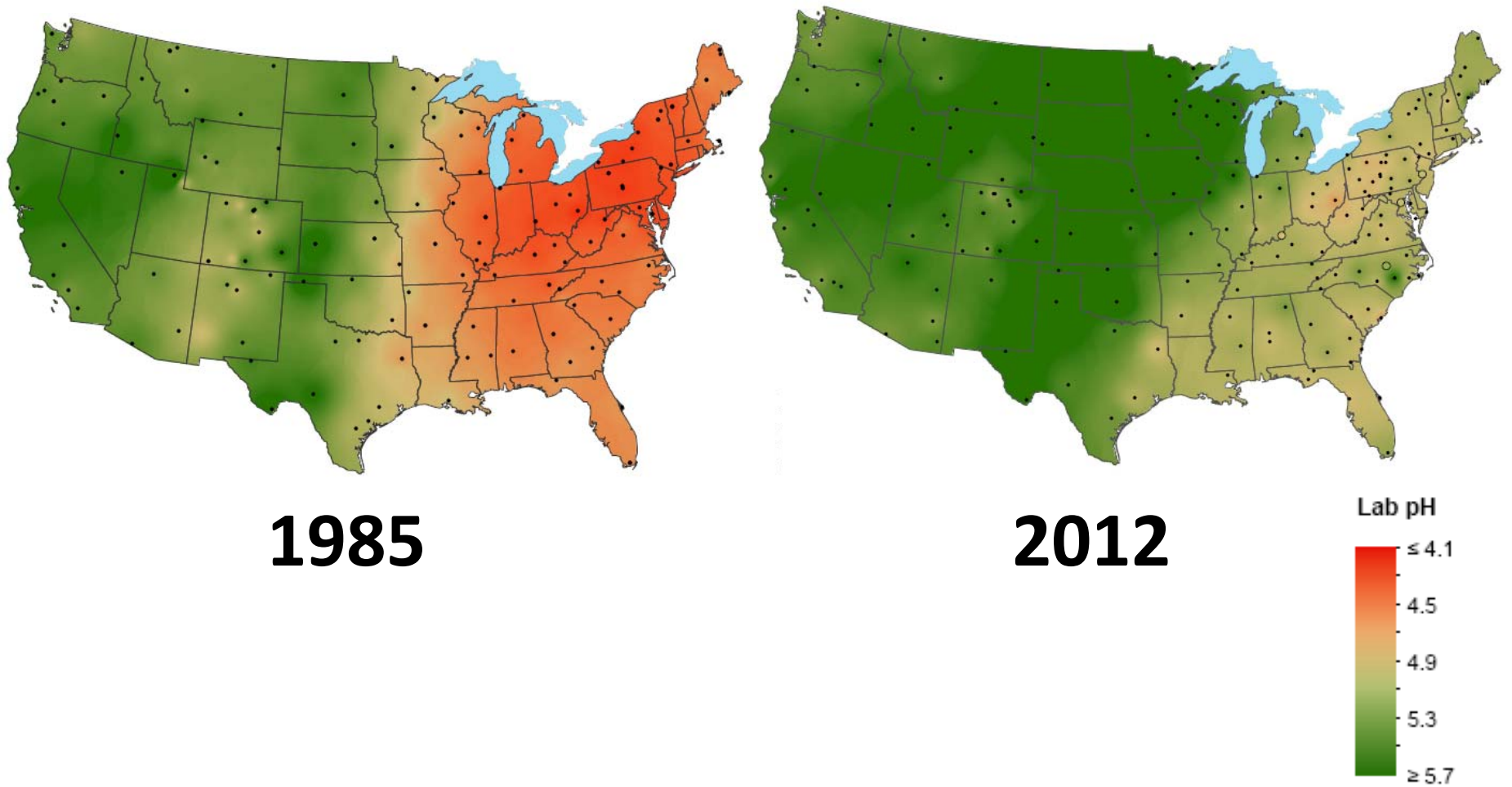
California and the Drought



Drawing Lessons From Successful Campaigns: The Story of Acid Rain



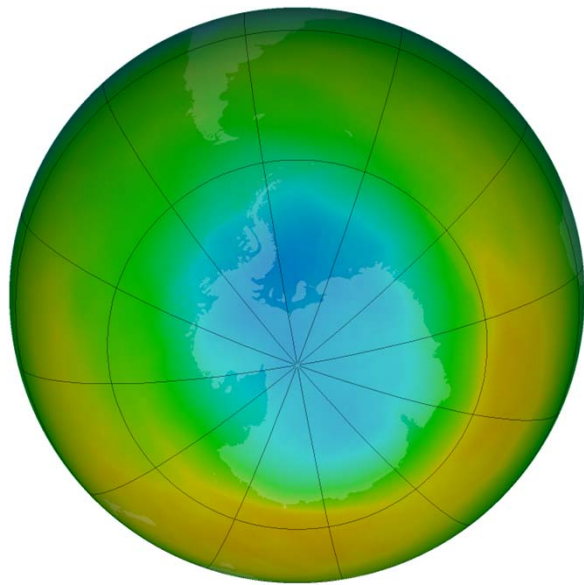
Reduction in Acid Rain



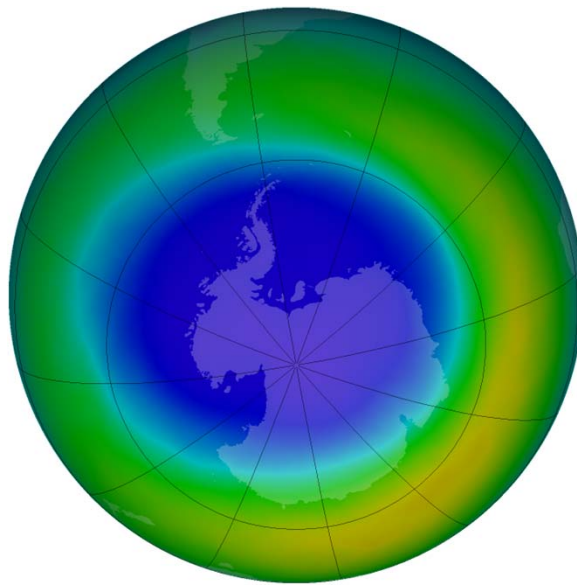
1985

2012

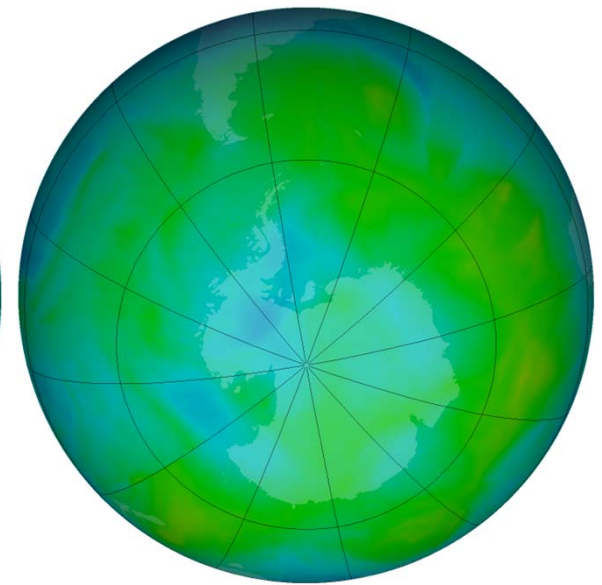
The Ozone Hole



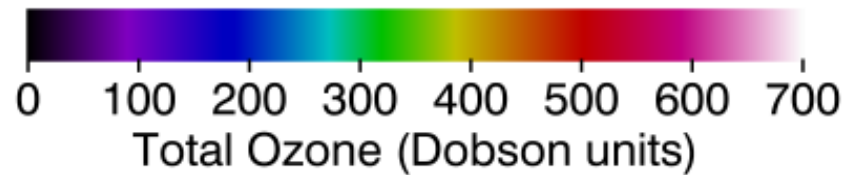
1979



2013



**2050
(expected)**



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 smoke. You'll see how enjoyable a cigarette can be!

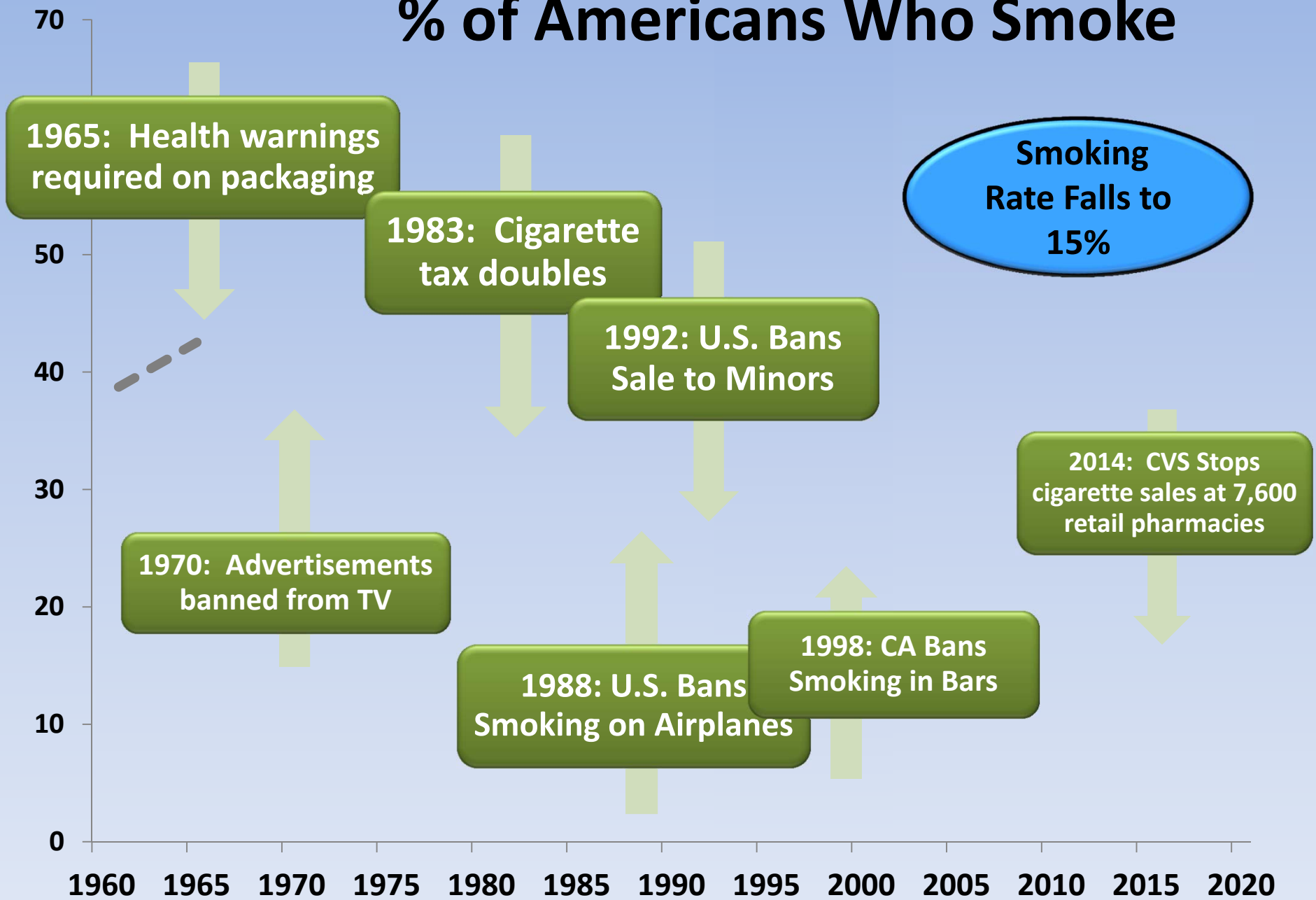
THE DOCTORS' CHOICE IS AMERICA'S CHOICE!

DR. JAMES H. HARRIS, JR., M.D., University of California, Los Angeles
DR. ROBERT H. HARRIS, M.D., University of California, Los Angeles
DR. WALTER HARRIS, M.D., University of California, Los Angeles

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



% of Americans Who Smoke



Source: Centers for Disease Control and Prevention (CDC), 2014

http://www.cdc.gov/tobacco/data_statistics/tables/trends/cig_smoking/index.htm

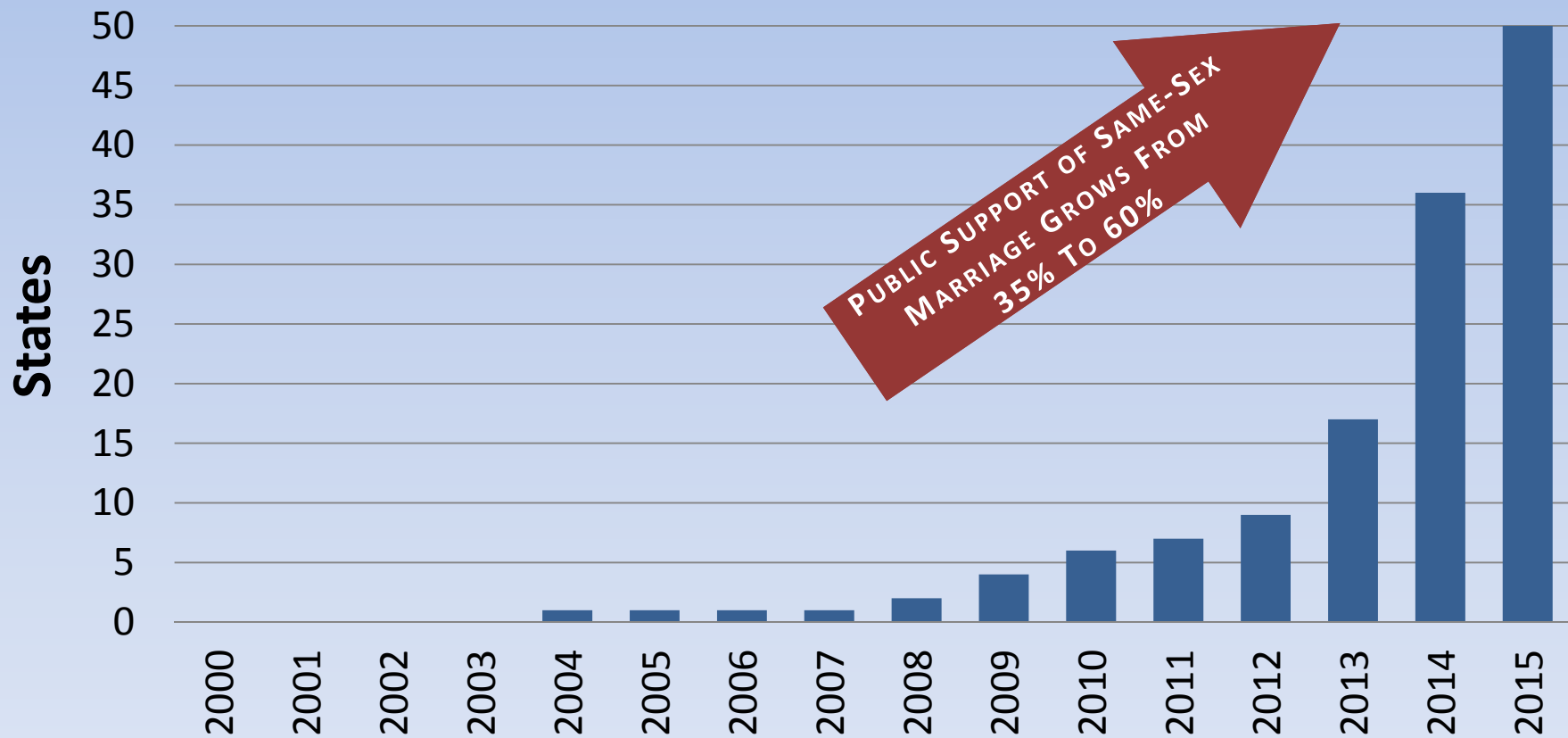


iPhone was first released in 2007



What Can the Climate Change Movement Learn from the Marriage Equality Movement?

States Where Same-Sex Marriage is Allowed



The Largest Tree in the World



**Sequoia National Park
California**



Thank you



David Hochschild
California Energy Commission
David.hochschild@energy.ca.gov