

DOCKETED	
Docket Number:	19-SB-100
Project Title:	SB 100 Joint Agency Report: Charting a path to a 100% Clean Energy Future
TN #:	229654
Document Title:	Senate Bill 100 Report Joint Agency Kickoff Workshop Presentation Final
Description:	***THIS DOCUMENT SUPERSEDES TN 229649***
Filer:	Harinder Kaur
Organization:	California Energy Commission
Submitter Role:	Commission Staff
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Docketed Date:	9/5/2019



SB 100 Report

Joint Agency Kickoff Workshop



Agenda

Opening Video

“Leading the Way to California’s Clean Energy Future”

Welcome and Opening Comments

Alice Reynolds, Senior Advisor for Energy, *Office of Governor Gavin Newsom*
Secretary Wade Crowfoot, *California Natural Resources Agency*

SB100 Report Principals

- Chair David Hochschild, *California Energy Commission*
- Chair Mary Nichols, *California Air Resources Board*
- Commissioner Liane Randolph, *California Public Utilities Commission*

Agency Presentations

- CARB: California’s Climate Strategy and Carbon Neutrality
- CPUC: California Clean Electricity Programs Overview
- CEC: SB100 Joint Agency Report Process and Implementation

Public Comment

Closing Remarks

Alice Reynolds

Office of Governor Gavin Newsom





Secretary Wade Crowfoot

California Natural Resources Agency





Chair David Hochschild

California Energy Commission

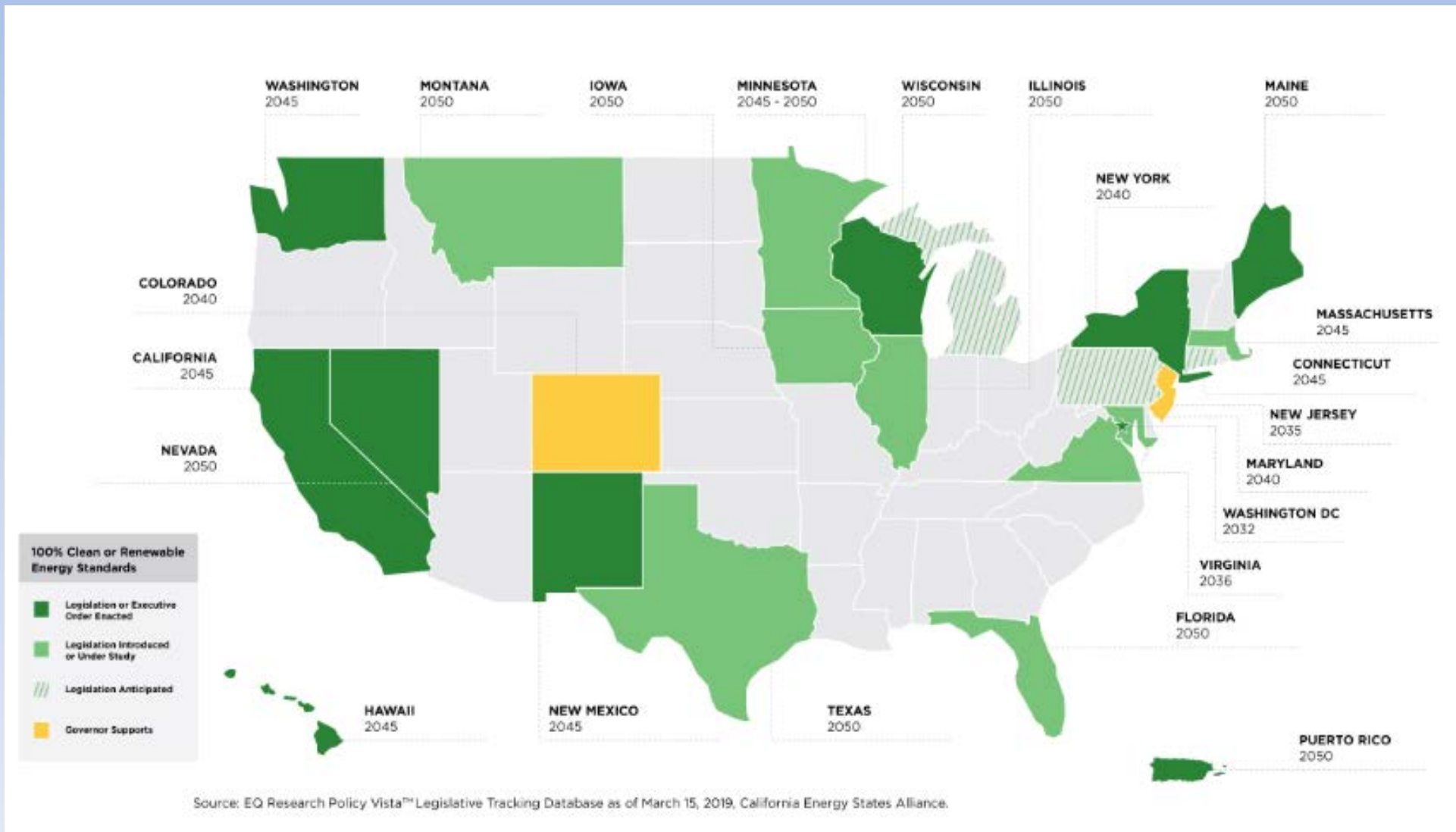


SUNRISE FROM THE WEST: SB 100 Implementation



David Hochschild
Chair
California Energy Commission

Nearly 30% of Americans Live in a Community that is Going to 100% Clean Energy

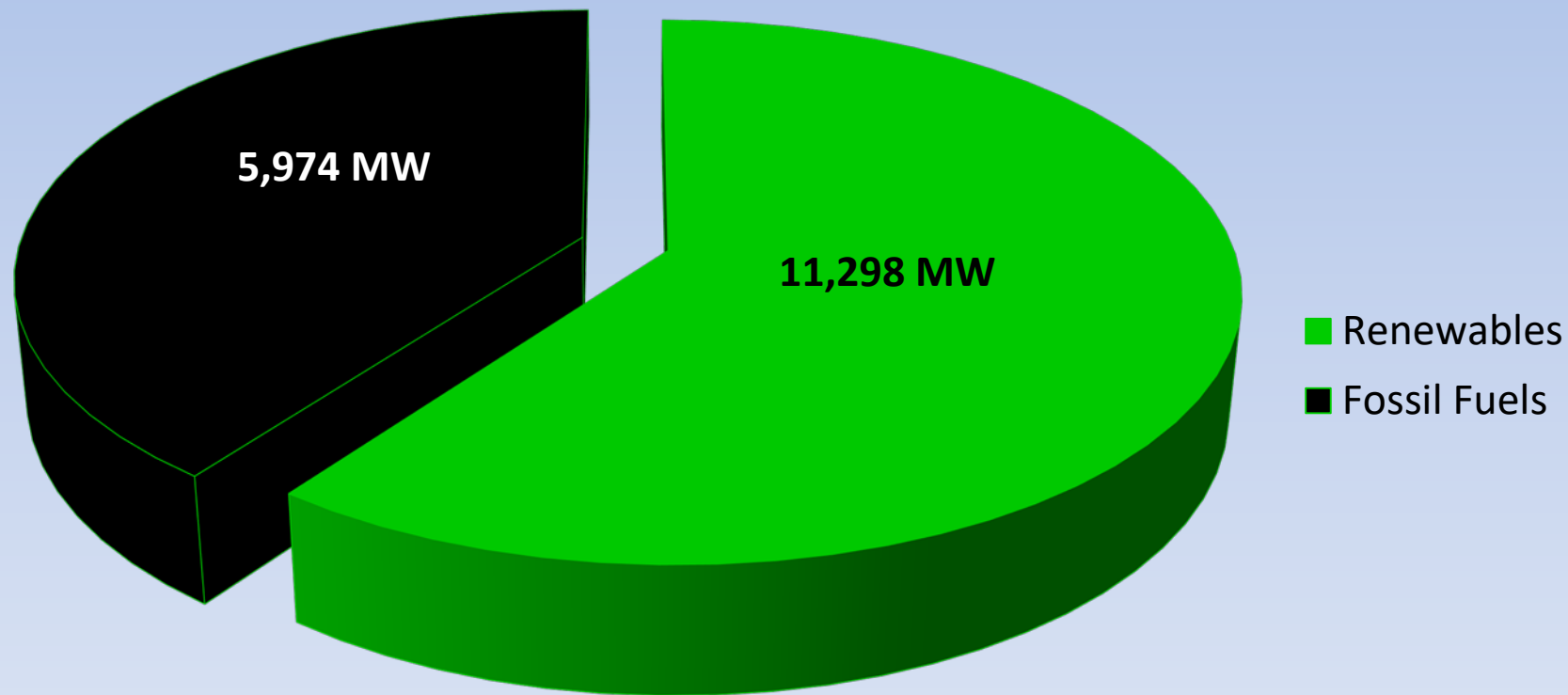


World's 5 Largest Companies Have Committed to 100% Renewable Energy

The Google logo, featuring the word "Google" in its signature multi-colored font: blue 'G', red 'o', yellow 'o', blue 'g', green 'l', and red 'e'.

Most of the New Generation Added to the Grid is Renewable Energy

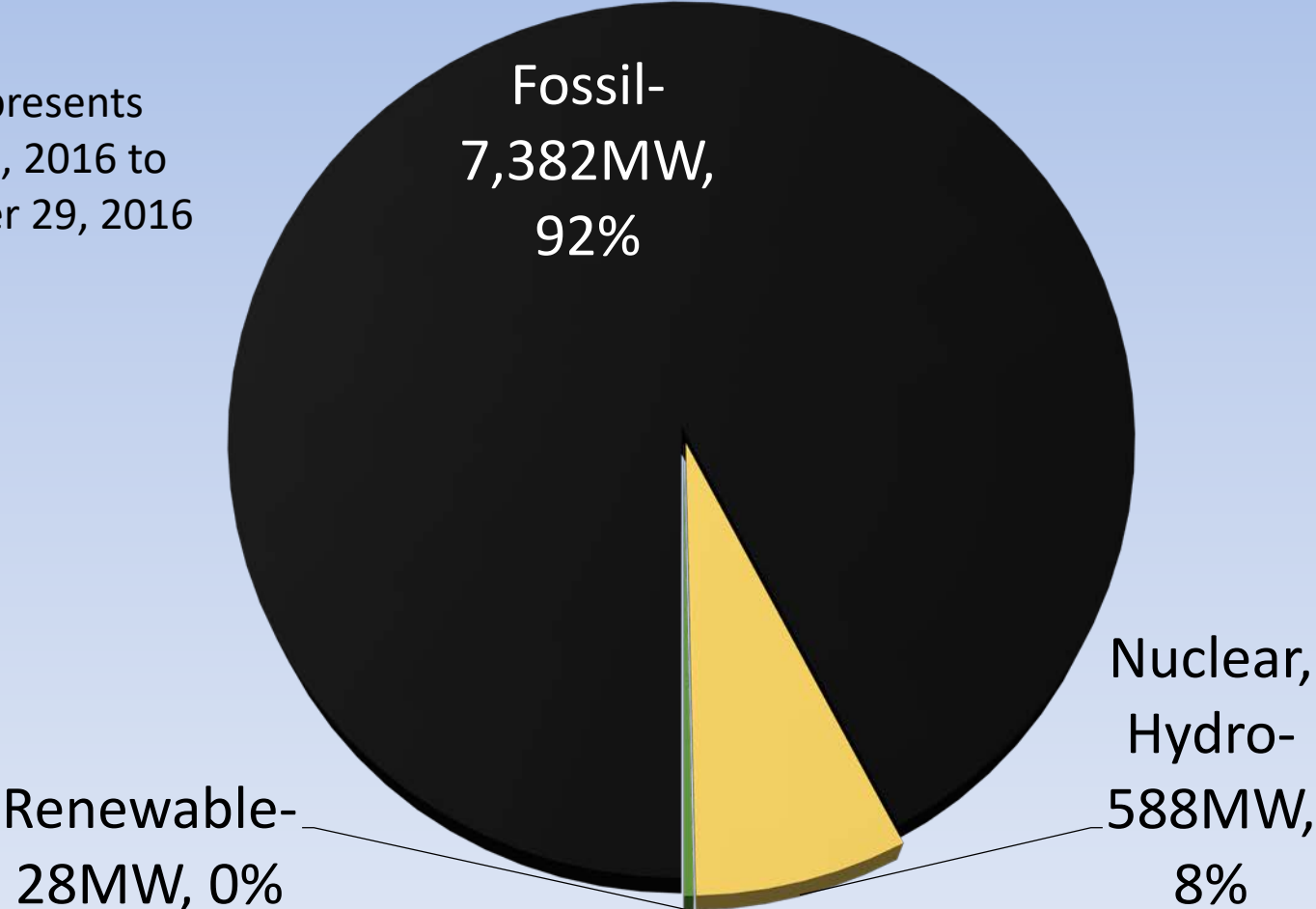
Renewables = 65% of New US Electric Generation Capacity



Most of the Retirements are Fossil Energy

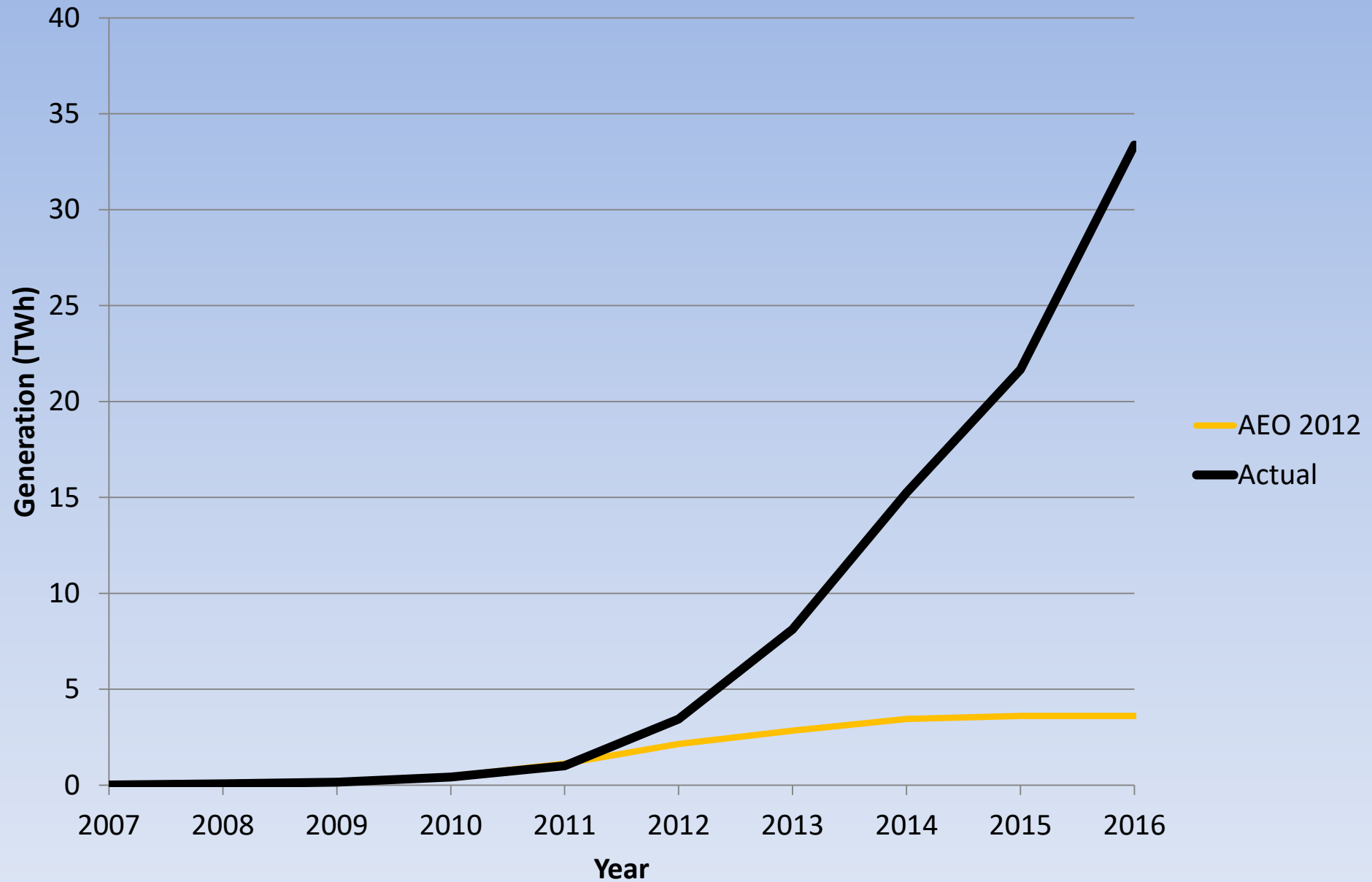
Fossil fuels = 92% of Retired US Electric Generation Capacity in 2016*

*Data represents
January 1, 2016 to
November 29, 2016



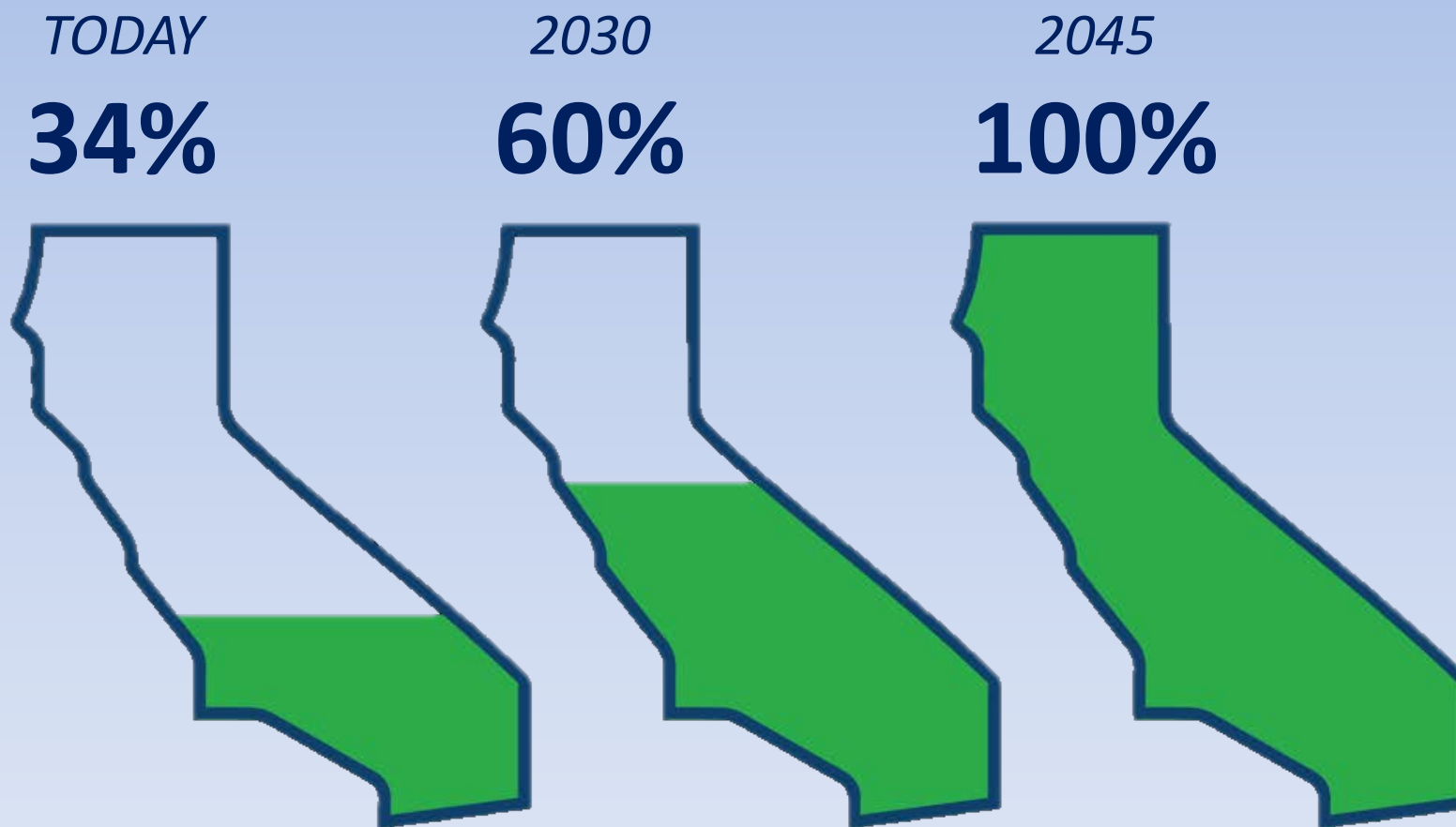
Source: EIA Electric Power Monthly, November 29, 2016. MW represent summer capacity.

US Solar PV Generation

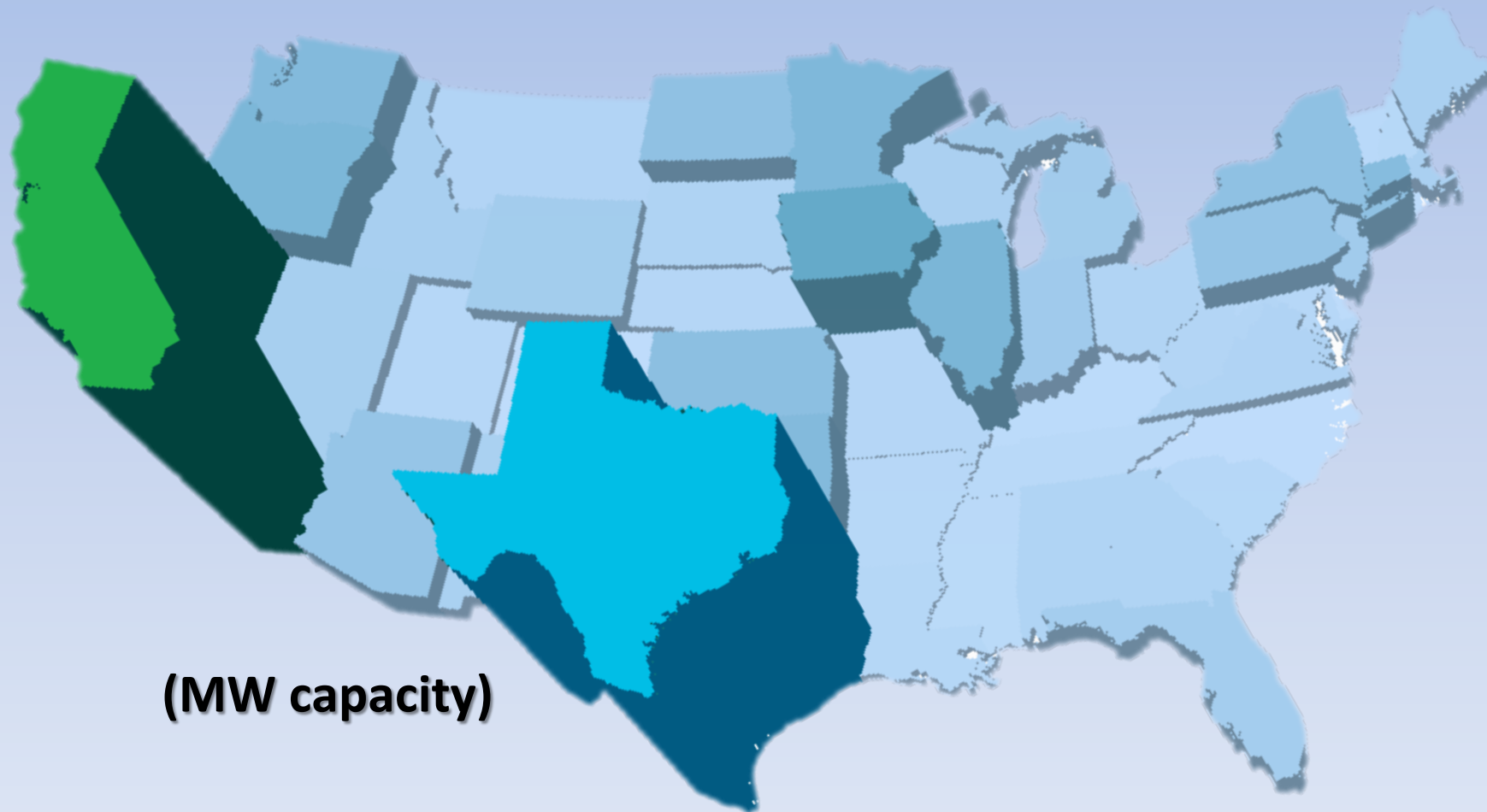


Source: EIA Annual Energy Outlook 2004-2017, EIA Electric Power Monthly July 25, 2017

California Moves to 100% Clean Energy by 2045

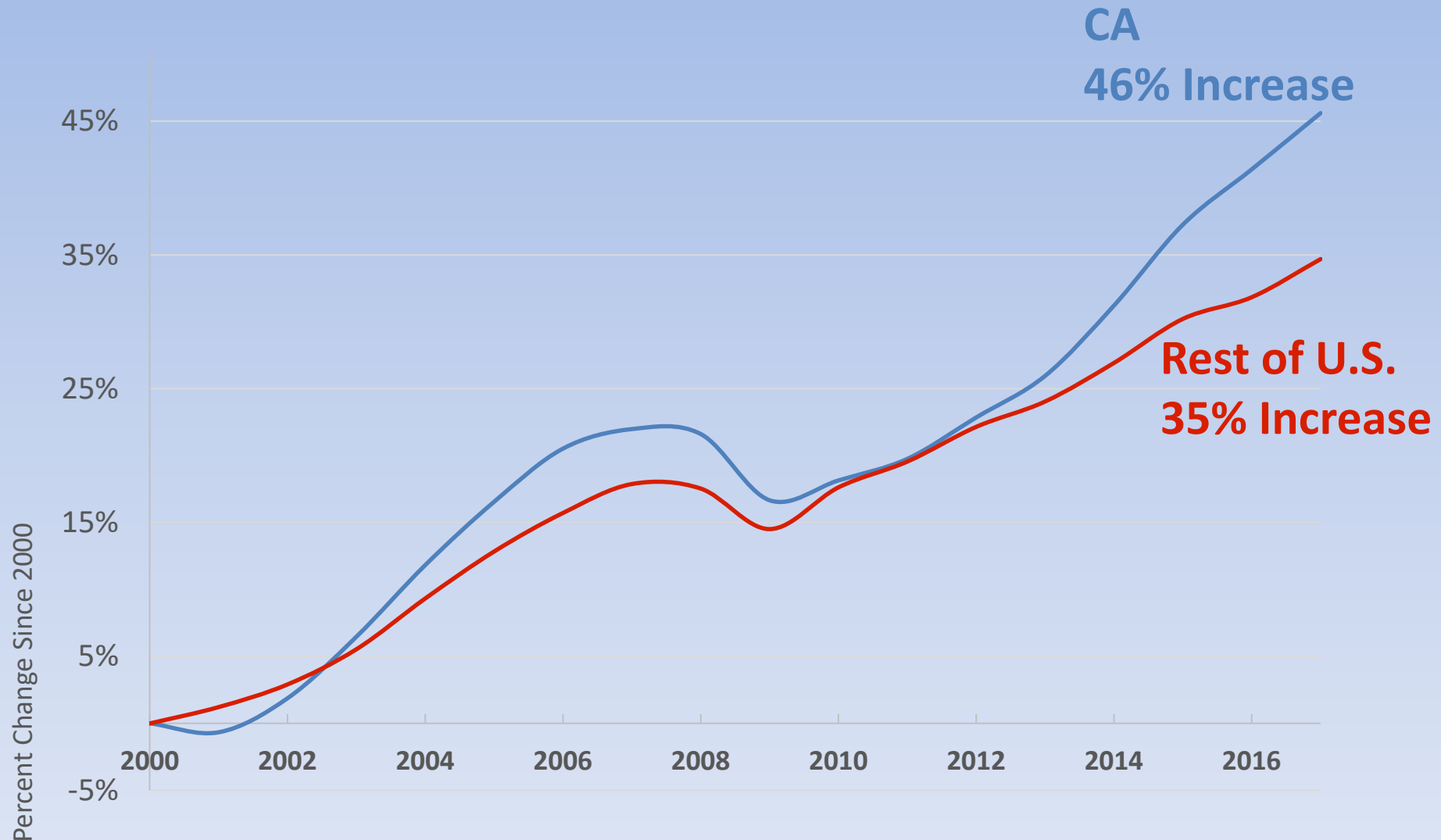


California Leads the US in Renewables Installed. What lessons have been learned?



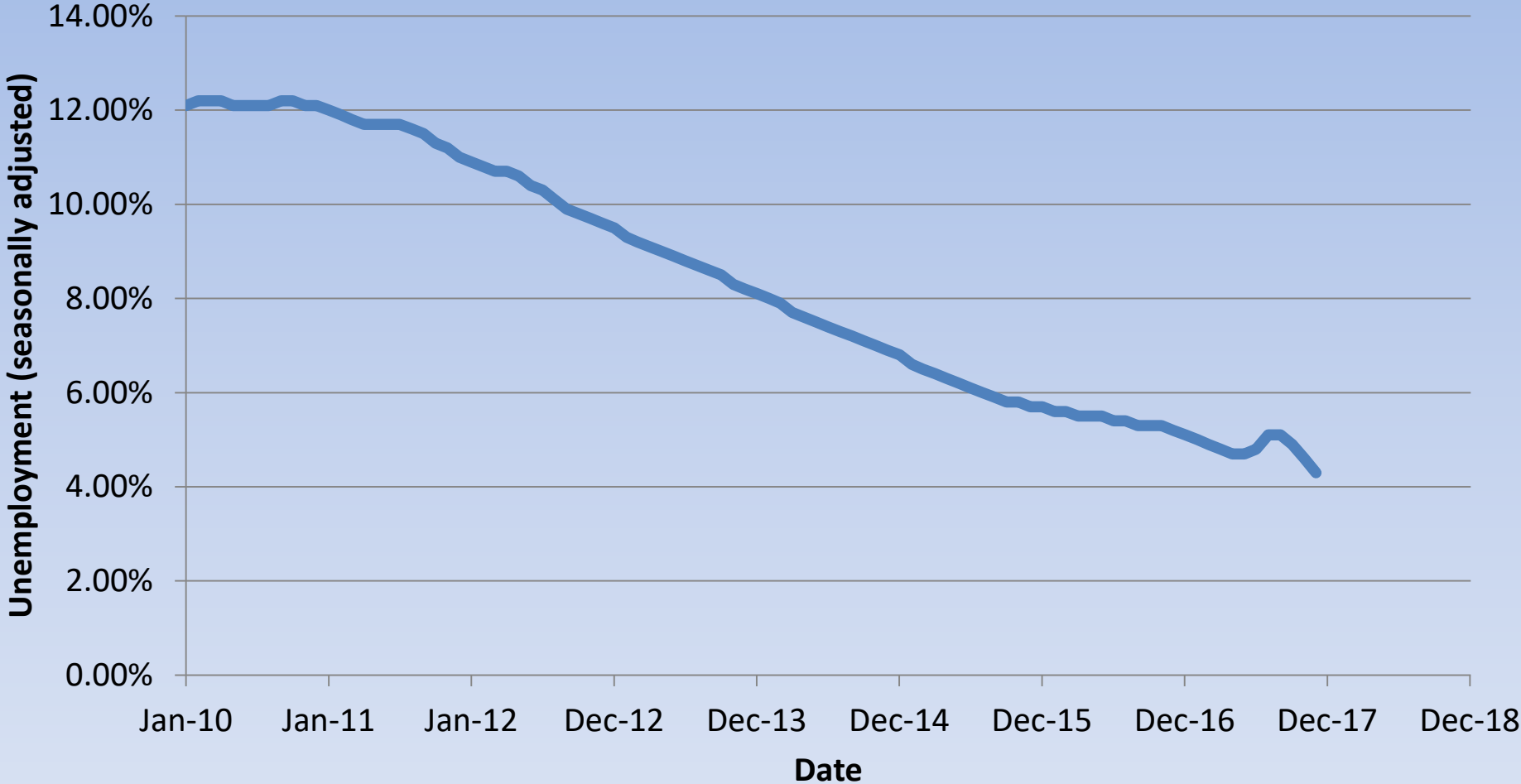
Source: Graphics based on data from the American Council On Renewable Energy (ACORE)
Renewable Energy in the 50 States (2013/2014 Editions)
<http://www.acore.org/publications/50states/>

California's GDP is growing faster than the Nation's



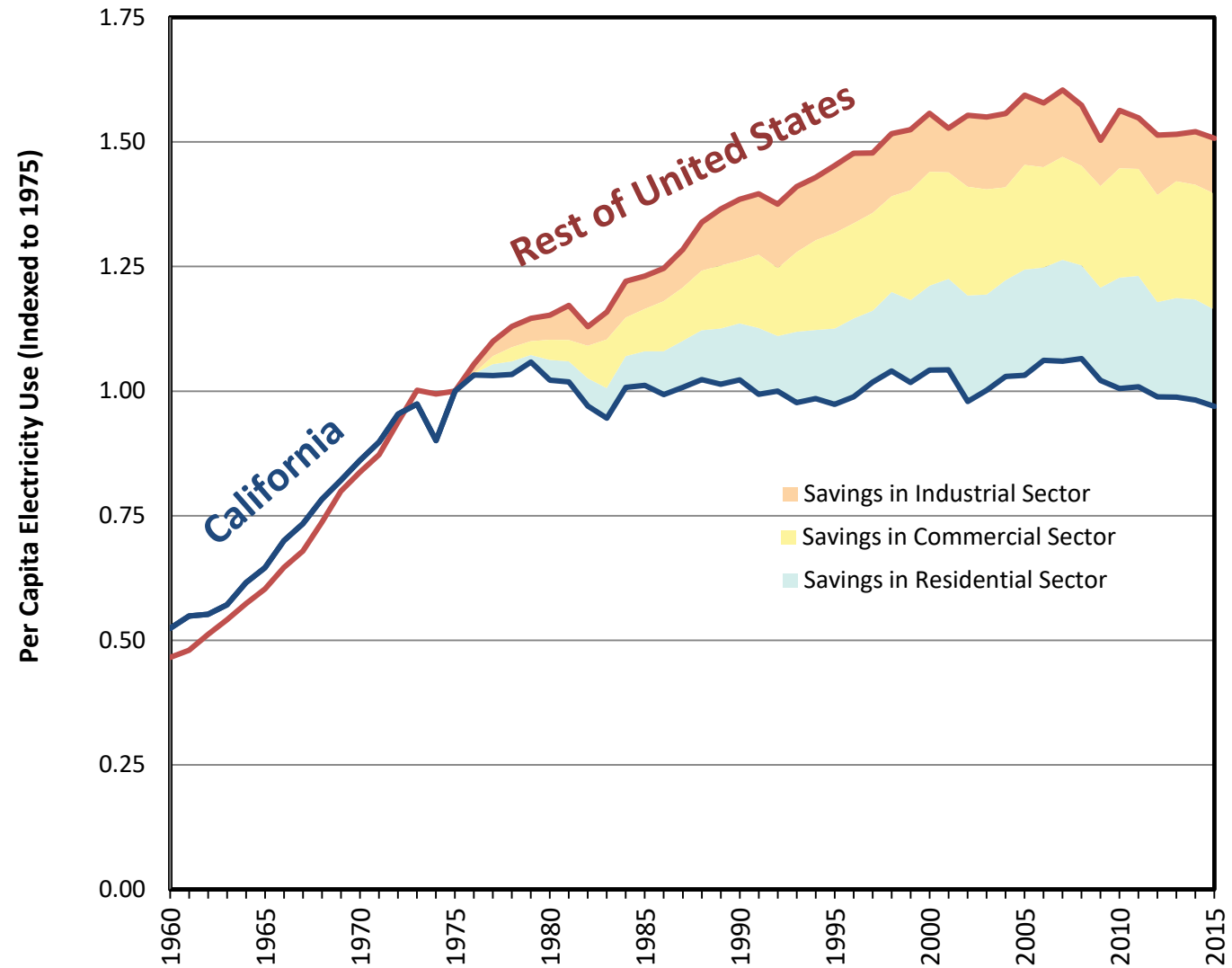
Source: U.S. Bureau of Economic Analysis, California Department of Finance, Real GDP by state (millions of chained 2009 dollars)

California Unemployment Falls to 4%



Source: "Unemployment Rate and Labor Force Data Table," State of California Employment Development Department, Jan 22, 2018. <http://www.labormarketinfo.edd.ca.gov/data/unemployment-and-labor-force.html>

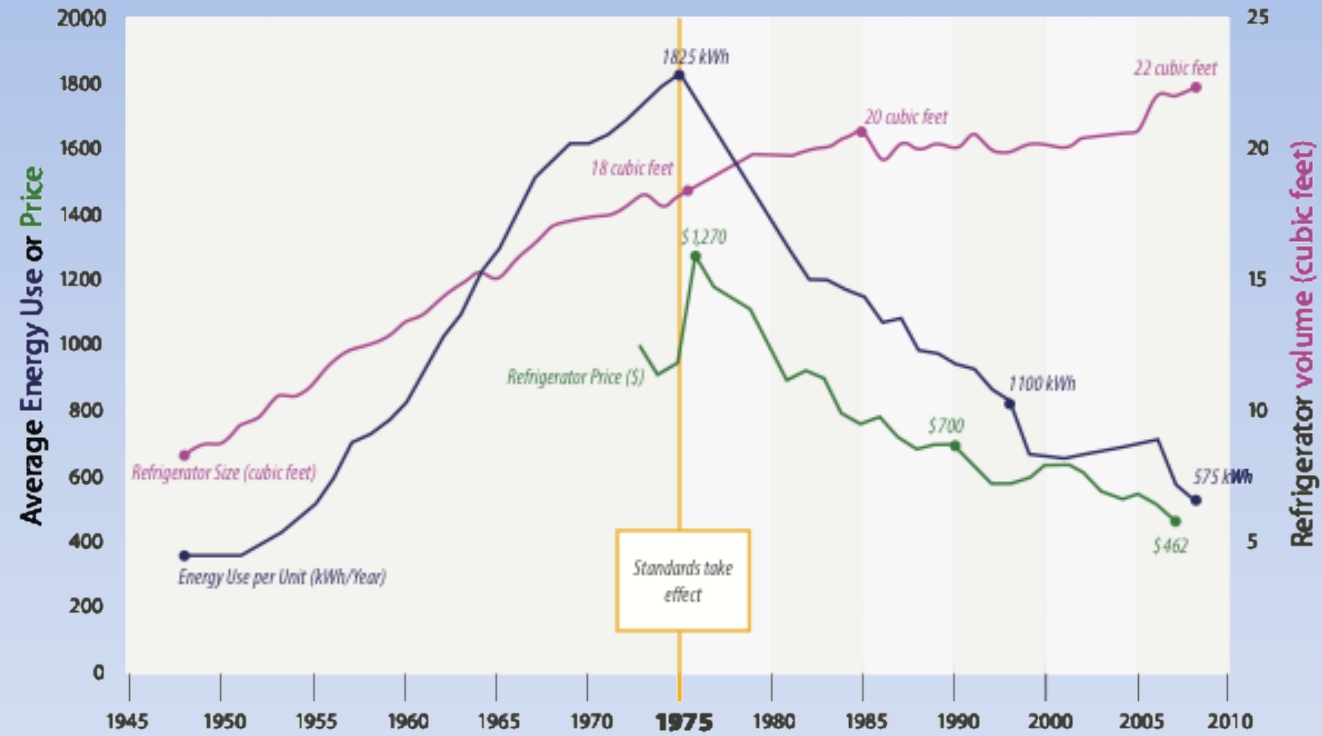
California Advancing Energy Efficiency



Source: EIA, SEDS database (2017)

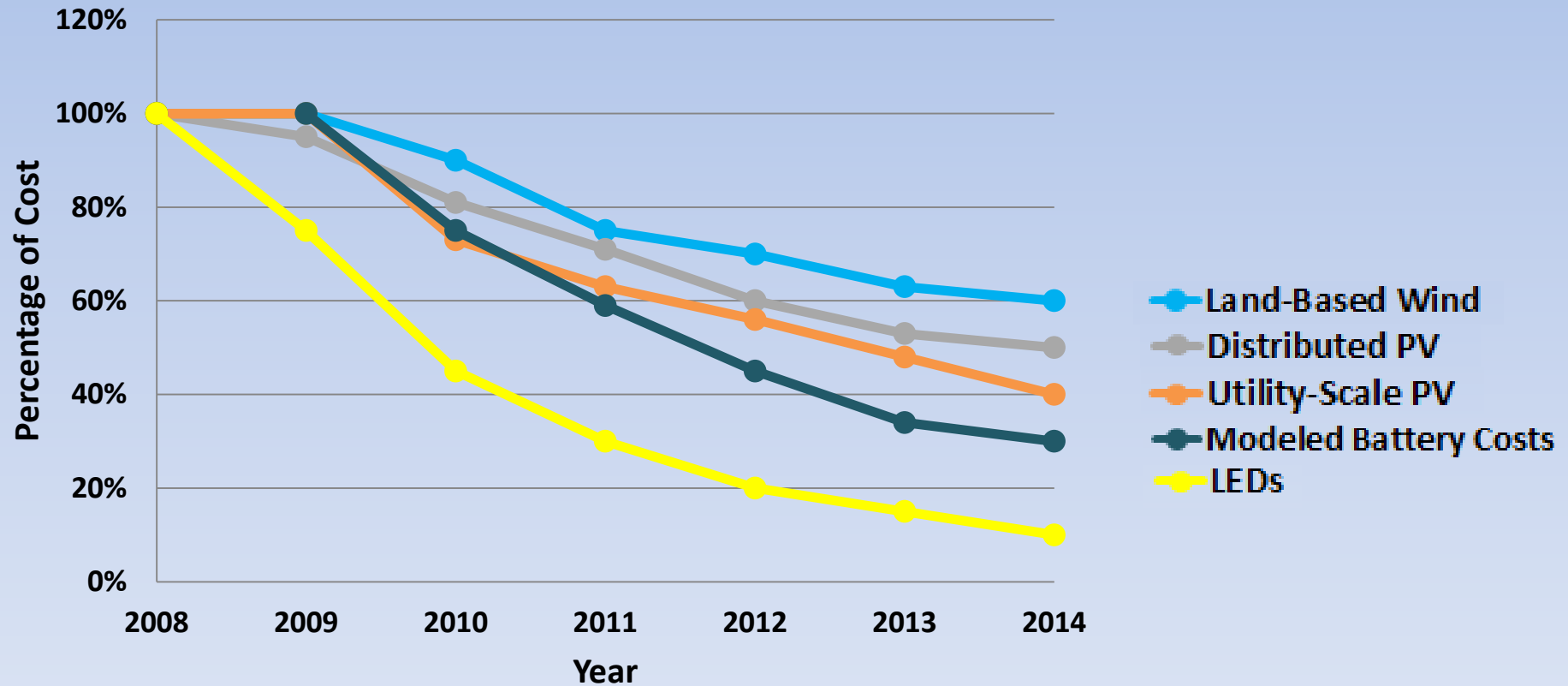
California Advancing Energy Efficiency

New Refrigerator Use v. Time and Retail Prices



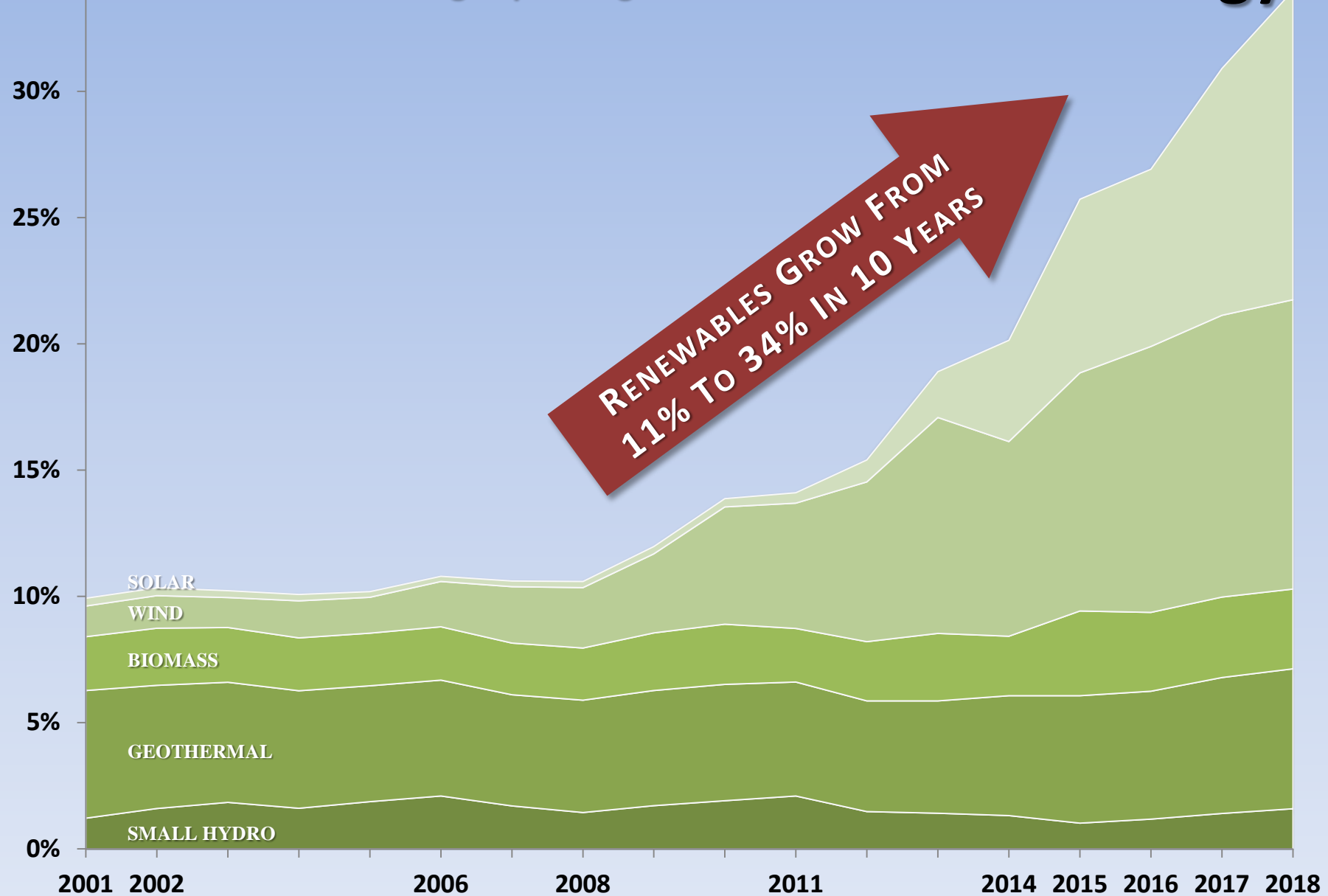
The Falling Cost of Clean Energy Technologies

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



The World's Largest Wind Project

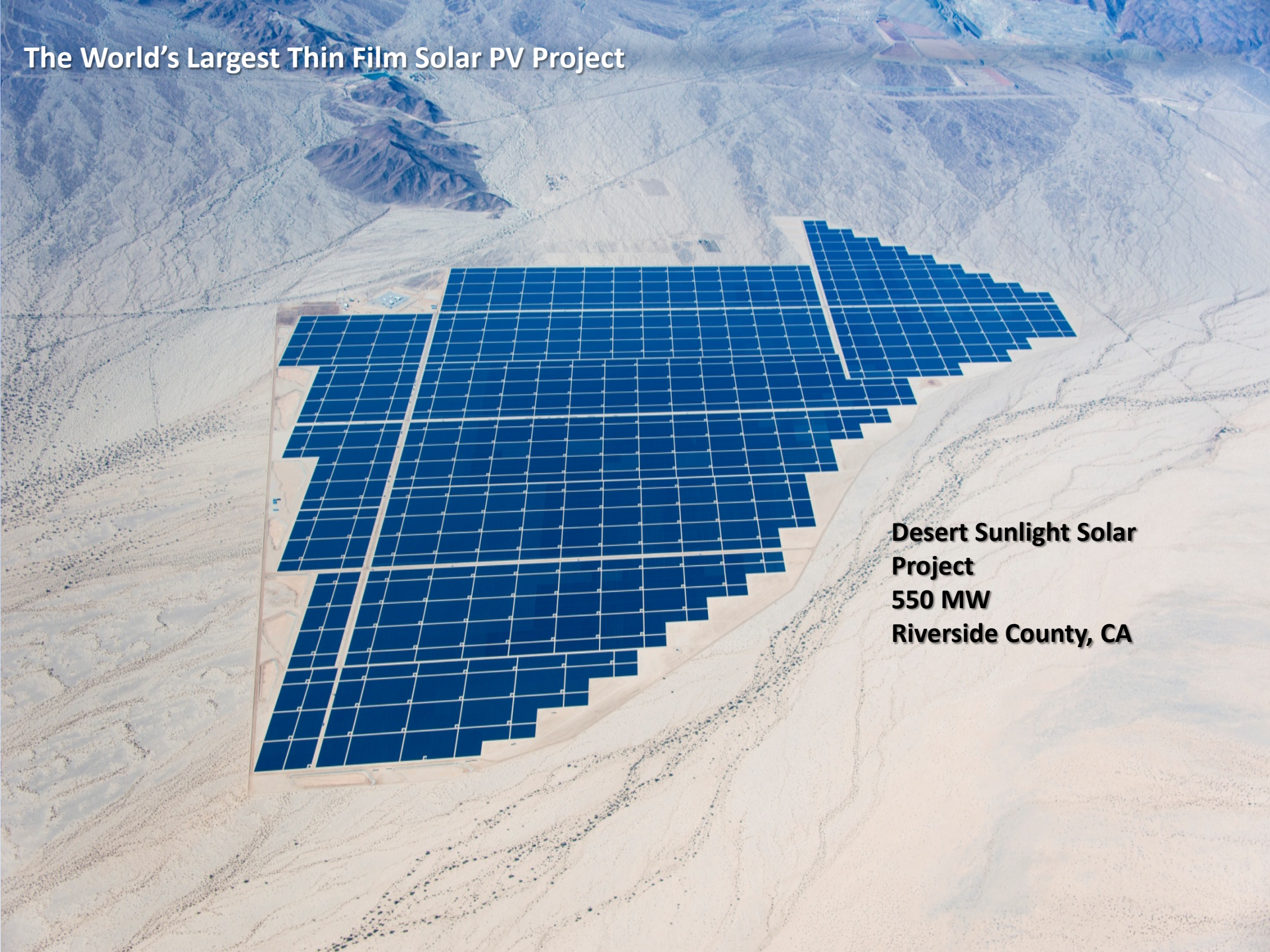
Alta Wind Energy Center
1550 MW
Kern County, CA



The World's Largest Geothermal Power Plant

Geysers Geothermal Power Plant
955 MW
Lake County, CA

The World's Largest Thin Film Solar PV Project



**Desert Sunlight Solar
Project
550 MW
Riverside 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



World's Largest Solar Rooftop

Apple HQ
Cupertino, CA
17MW



World's 2nd Largest Lithium-Ion Battery Storage Project



Escondido Storage Project
120 MWh
San Diego, CA

California Leads the Nation in Biomass Energy Generation

Honey Lake Biomass Plant
Lassen County, CA

Offshore Wind: CA's New Renewable Resource?



Rhode Island's 30MW Deepwater Wind Project is the first offshore wind project completed in the US.

Largest Manufacturing Plant in CA Produces Electric Vehicles

Tesla employs 45,000
people



Tesla Factory
Fremont, CA



**627,000
ELECTRIC VEHICLES
IN CALIFORNIA
TODAY**

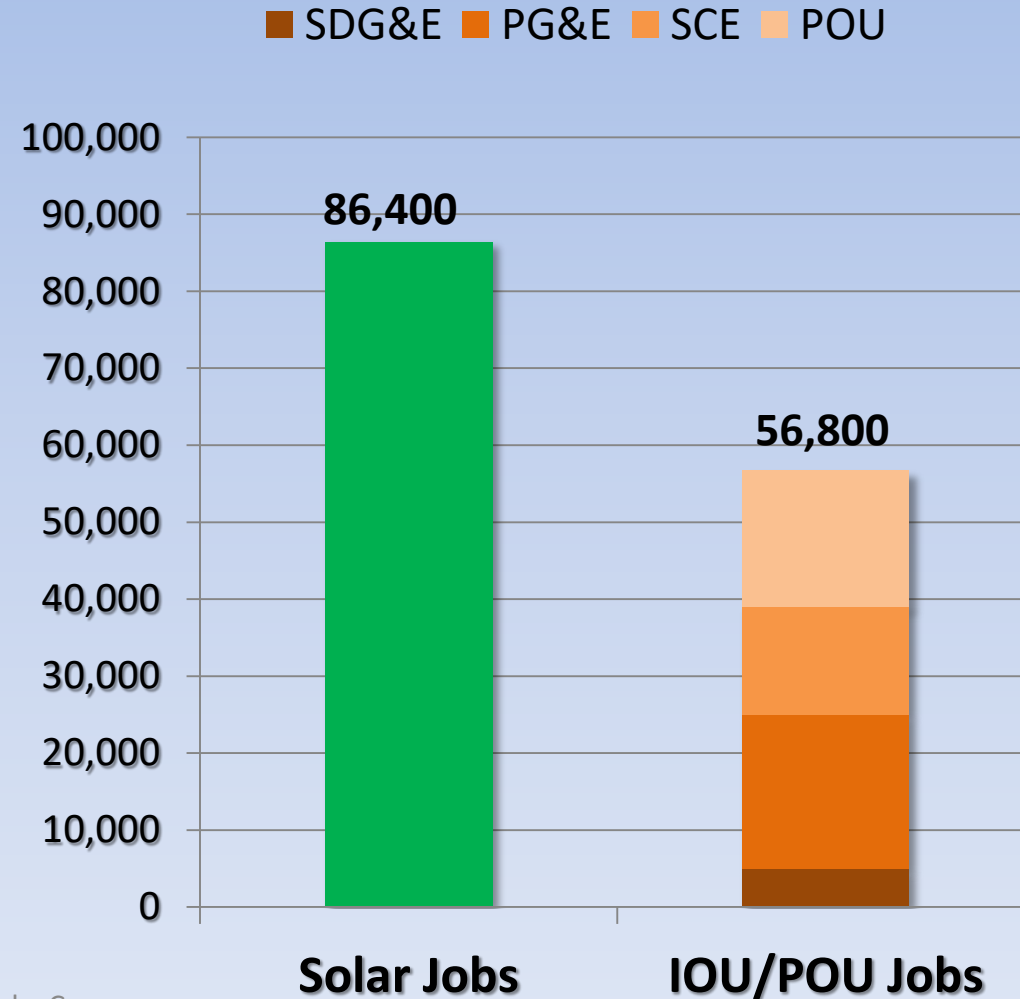
Tesla Inc.'s Model 3 plug-in electric car is the third most-purchased vehicle in the state

CA Vehicle sales, first half of 2019

1. Honda Civic	39,000
2. Toyota Camry	33,600
3. Tesla Model 3	33,000
4. Ford F-series	25,000



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



Sources:

Solar Foundation, 2017 Solar Jobs Census

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

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

2019: CA Reaches 1 M Solar roofs

2020: Solar Required for all New Homes



**Zero Energy Community
Rocklin, CA**



Electrification is Rapidly Expanding



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

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



FOSSIL FUEL DECLINE: ONLY ONE OIL COMPANY REMAINS IN THE TOP TEN LIST COMPANIES....

1978	1988	1998	2008	2018
General Motors \$3337.5M	IBM \$5258.0M	General Motors \$178.17B	Exxon Mobil \$466.28B	Walmart \$500.34B
IBM \$2719.4M	Exxon Mobil \$4840.0M	Ford Motors \$153.62B	Walmart \$378.48B	Exxon Mobil \$244.36B
Exxon Mobil \$2423.0M	Ford Motors \$4625.0M	Exxon Mobil \$122.38B	Texaco \$267.64	Berkshire Hathaway \$242.14B
Ford Motors \$1672.8M	Texaco \$4407M	Walmart \$119.30B	Conoco Phillip \$246.18B	Apple \$229.23B
General Electric \$1088.2M	General Motors \$3551.0M	General Electric \$90.84B	General Electric \$181.58B	UnitedHealth \$201.16B
Chevron \$1016.4M	General Electric \$2915.0M	IBM 78.51B	General Motors \$148.98B	McKesson \$198.53B
Mobil \$1004.7M	AT&T \$2044.0M	Chrysler \$61.15B	Ford Motors \$145.11B	CVS Health \$184.77B
Texaco \$930.8M	DuPont \$1786M	Mobil \$59.98B	AT&T \$124.03B	Amazon.com \$177.87B
Gulf Oil \$752.0M	Chrysler \$1290M	Altria Group \$56.11B	Bank of America \$75.70B	AT&T \$160.55B
Chrysler \$163.2M	Mobil \$1258M	AT&T \$53.26B	Citigroup, Inc. \$51.60B	General Motors \$157.31B

Source: Forbes Fortune 500 list, top ten companies by revenue

CALIFORNIA CLEAN JOBS

California has

5x

more clean energy jobs
than fossil fuel jobs.

Nearly

4 in 10

solar jobs in America
are in California.

Statewide, there were

512,934

jobs in the clean
energy industry in 2018.

Thank you



David Hochschild

California Energy Commission

David.hochschild@energy.ca.gov

Chair Mary Nichols

California Air Resources Board





Commissioner Liane Randolph

California Public Utilities Commission

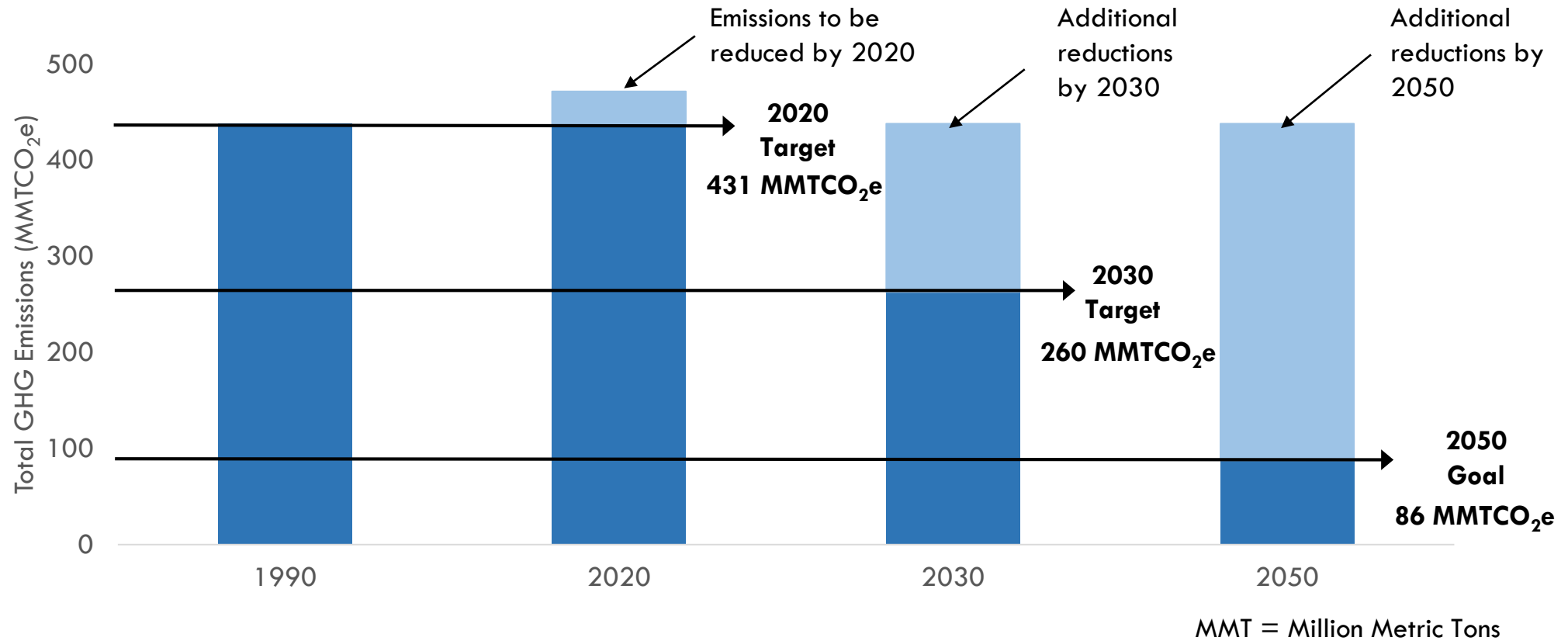
A decorative graphic at the bottom of the page consisting of overlapping, semi-transparent shapes in shades of blue and green, creating a modern, abstract design.

California's Climate Strategy and Carbon Neutrality

Rajinder Sahota
California Air Resources Board



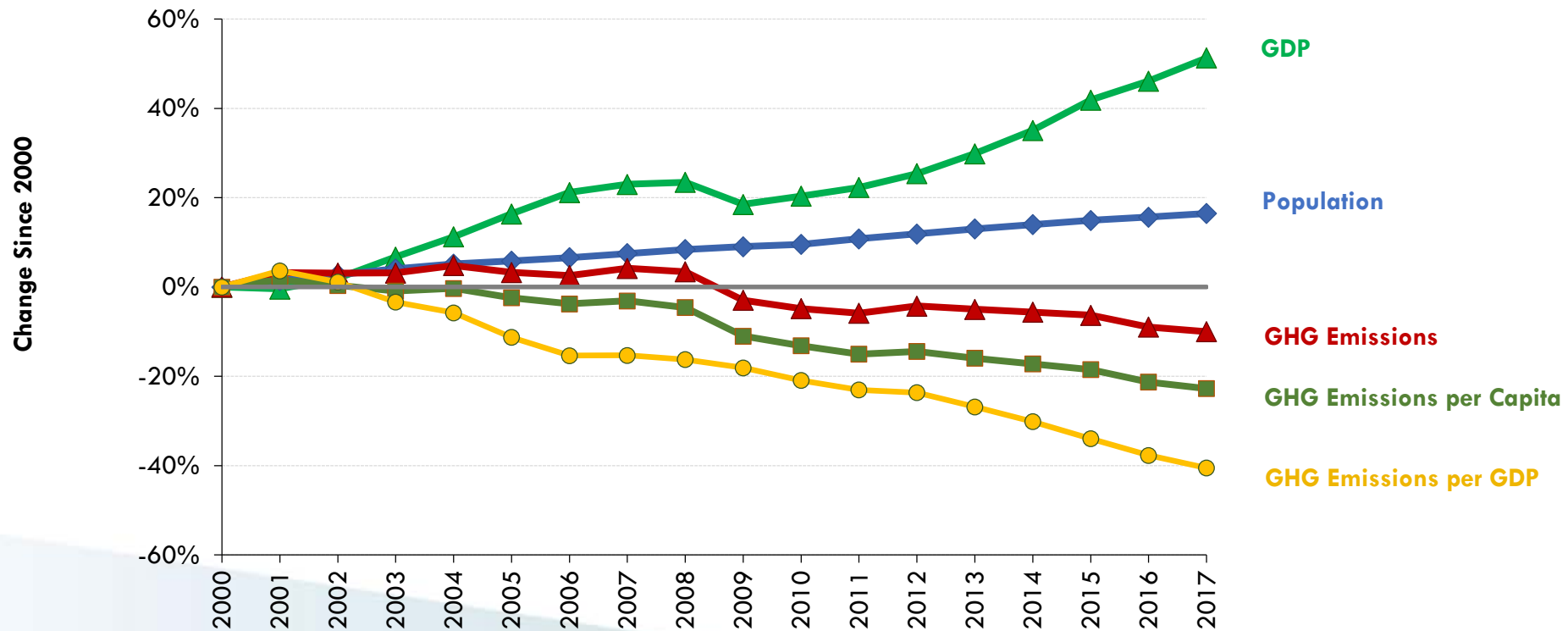
California's GHG Emissions Reduction Targets



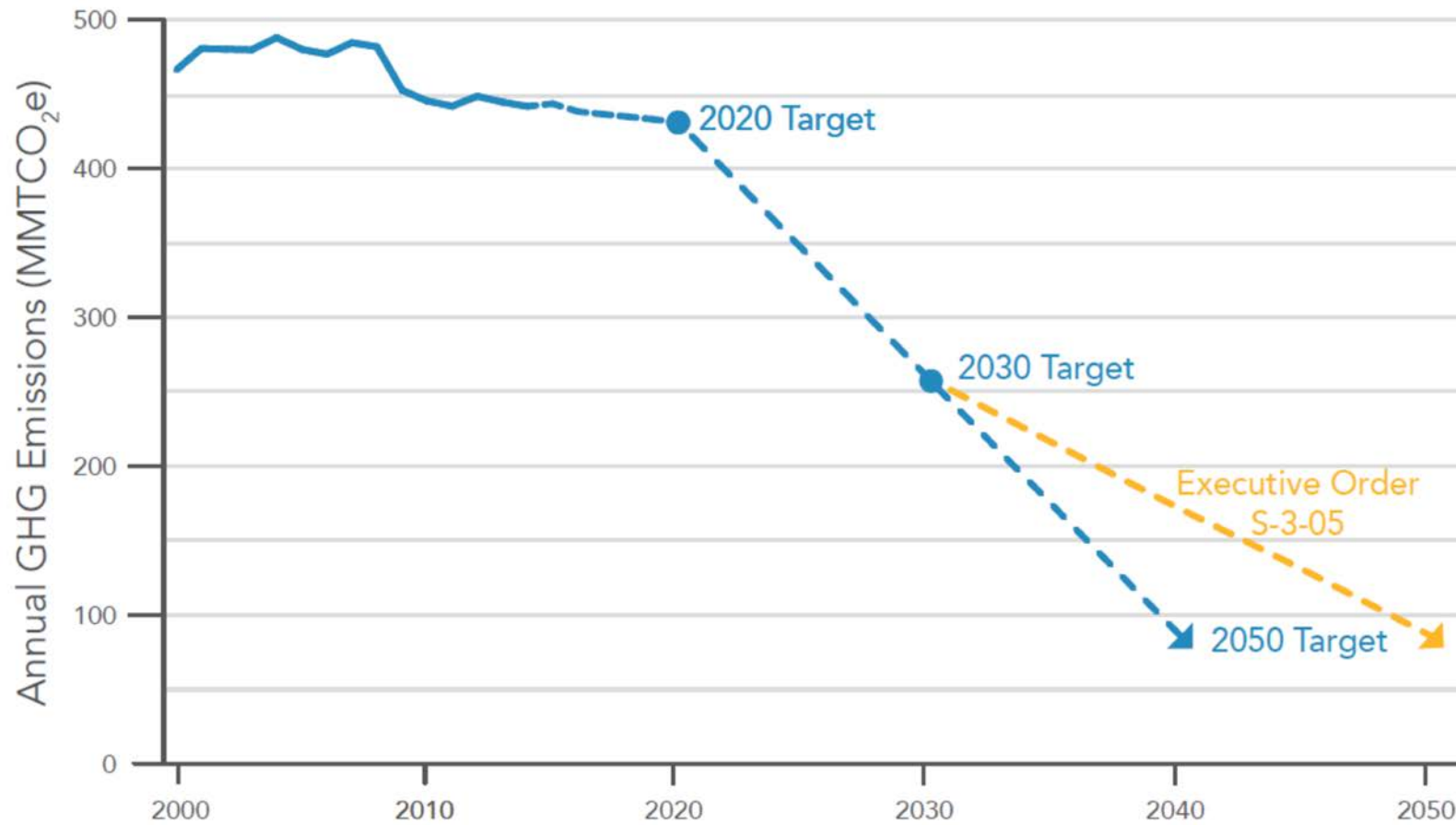
Source: CARB, 2018

Statewide Trends of Emissions and Indicators

Change in California GDP, Population and GHG Emissions since 2000



Plotting California's Path Forward





2017 Climate Change Scoping Plan Policy Portfolio



Double building efficiency



Cleaner freight and goods movement



50% renewable power**



Slash potent "super-pollutants" from dairies, landfills and refrigerants



More clean, renewable fuels



Cap emissions from transportation, industry, natural gas, and electricity



Cleaner zero or near-zero emission cars, trucks, and buses



Invest in communities to reduce emissions



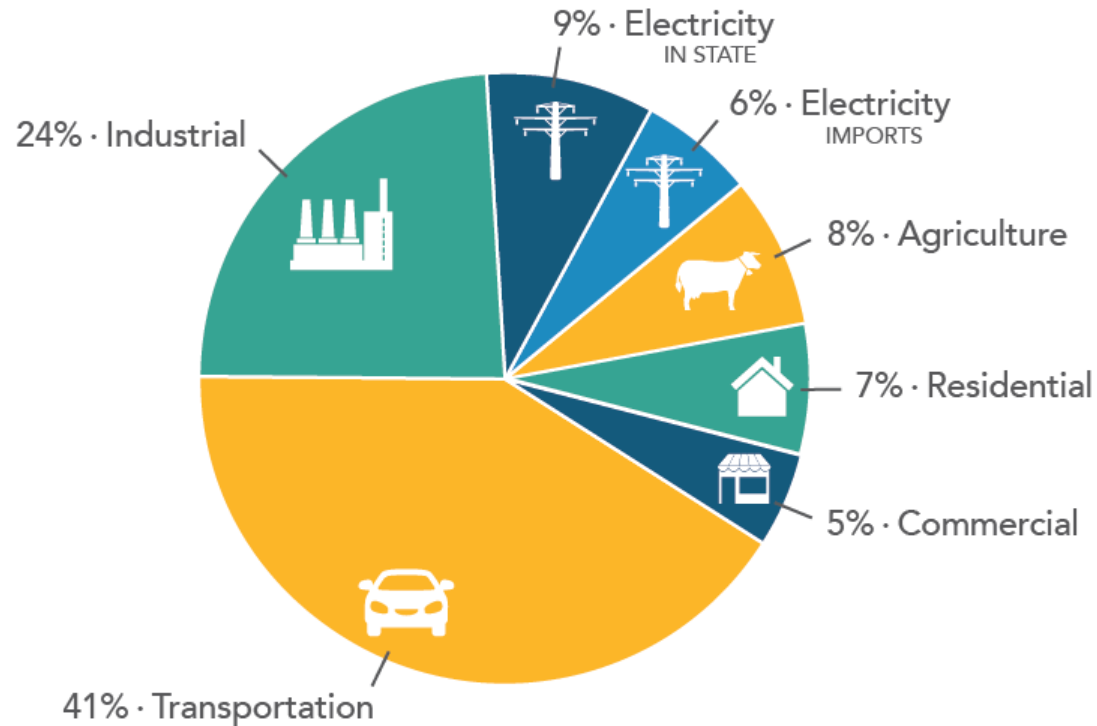
Walkable/bikeable communities with transit



Protect and manage natural and working lands

**In 2018, SB 100 increased the RPS to 60% by 2030


Transportation Remains a Key Focus




424.1 MMTCO₂e
2017 TOTAL CA EMISSIONS

California is home to

NEARLY **50%**
OF THE ZEVs
IN THE U.S.



40%
OF NORTH AMERICAN
CLEAN FUEL
INVESTMENTS



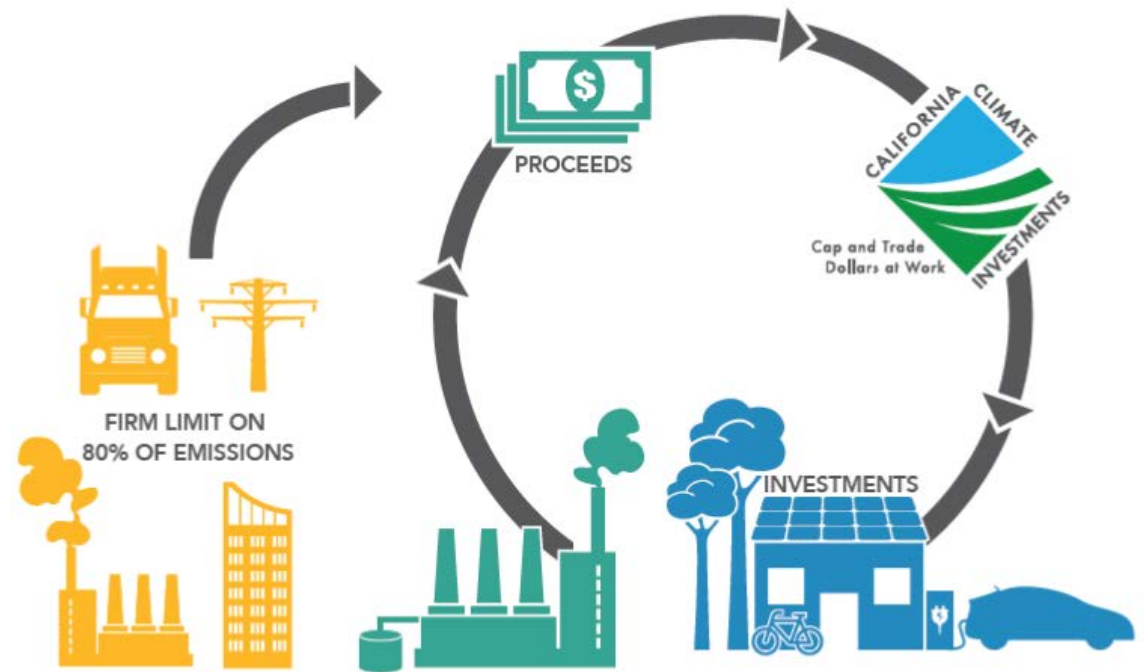
&

90% OF TOTAL U.S. INVESTMENT IN
CLEAN TRANSPORTATION

Low Carbon Transportation Program Investments

- Clean Vehicle Rebate Program (CVRP)
- Clean Vehicle Assistance Program
- Transportation Equity Projects to Increase Access
- Clean Truck and Bus Voucher Incentive Project
- Freight projects: demonstrations and early commercial pilots for clean engines and facilities

CALIFORNIA'S CARBON PRICING & INVESTMENTS OVERVIEW



Framing the Path Forward

IPCC Report – Carbon neutrality
by 2045 may hold global
warming to 1.5°C



Some regions are net emitters;
others are sinks



Carbon Neutrality by 2045



Reduce fossil energy and NWL
emissions; evaluate potential sinks

California Carbon Neutrality (CO₂e)

Today



AB 32 GHG Inventory



Conversion

Natural & Working
Lands Inventory

Minimize emissions

Transition from source to sink

Mid-century



Both categories emit GHGs

No net GHG emissions



2019 Engagement

- Technical workshops to explore topic areas on achieving carbon neutrality
 - Energy demand and supply
 - Transformation across economic sectors (i.e., transportation, industrial)
 - Options and support for sequestration activities
- Continued collaboration
 - State and local agencies
 - Academics and researchers
 - International partners

Thank You

- Climate Change Scoping Plan
 - <https://ww3.arb.ca.gov/cc/scopingplan/scopingplan.htm>
- Carbon Neutrality Workshops
 - <https://ww3.arb.ca.gov/cc/scopingplan/meetings/meetings.htm>

California Clean Electricity Programs Overview

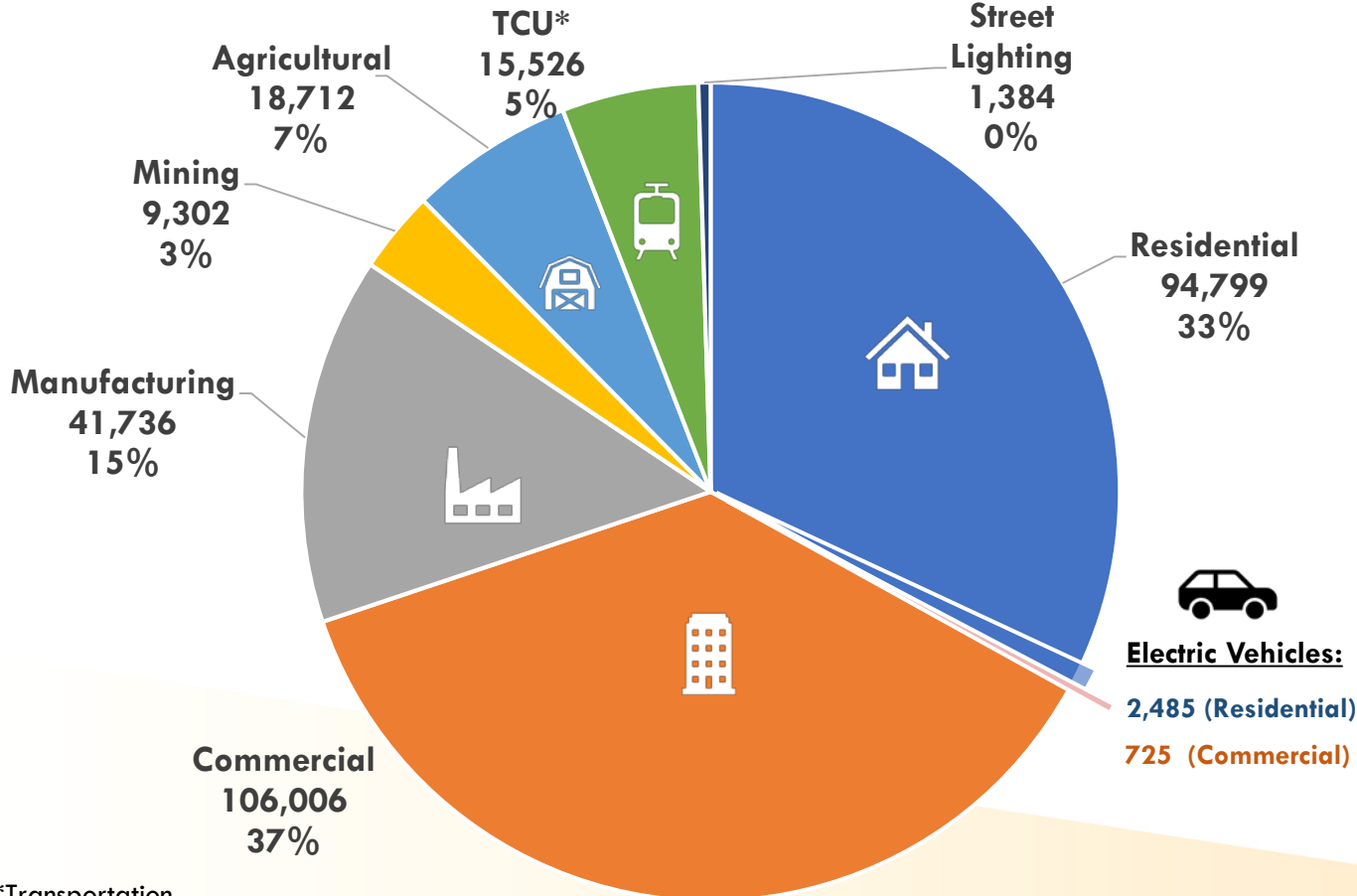
Simon Baker
California Public Utilities Commission





Climate Change Mitigation in California's Electricity Sector

2018 Statewide Electricity Consumption by Sector (GWh, %)



*Transportation, Communications & Utilities

Source: California Energy Commission, 2018 IEPR Update, Mid Demand Forecast

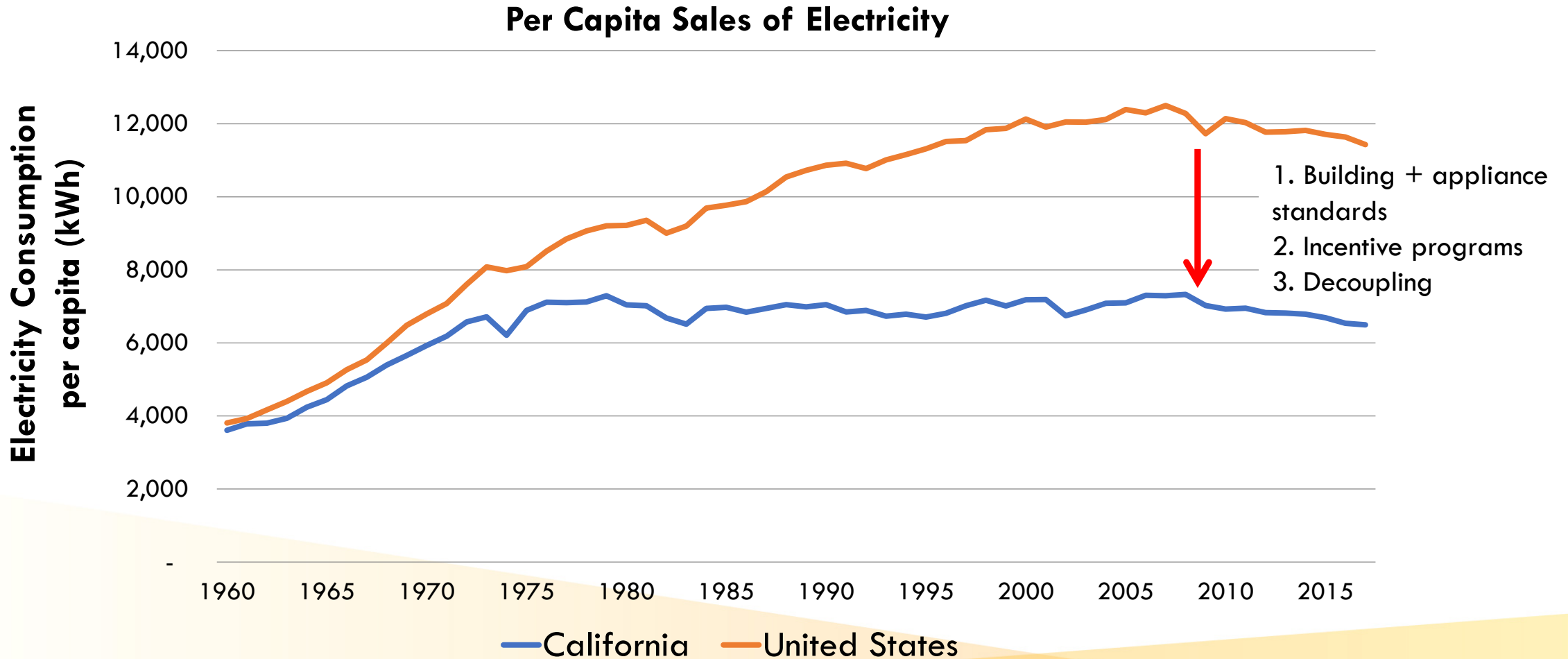
Programs

Program Domains

Programs	Customer	Grid
✓ Energy efficiency 	●	
✓ Rooftop solar 	●	
✓ Renewable energy (RPS) 		●
✓ Building electrification 	●	
✓ Transportation electrification 	●	●
✓ Research & development 	●	●



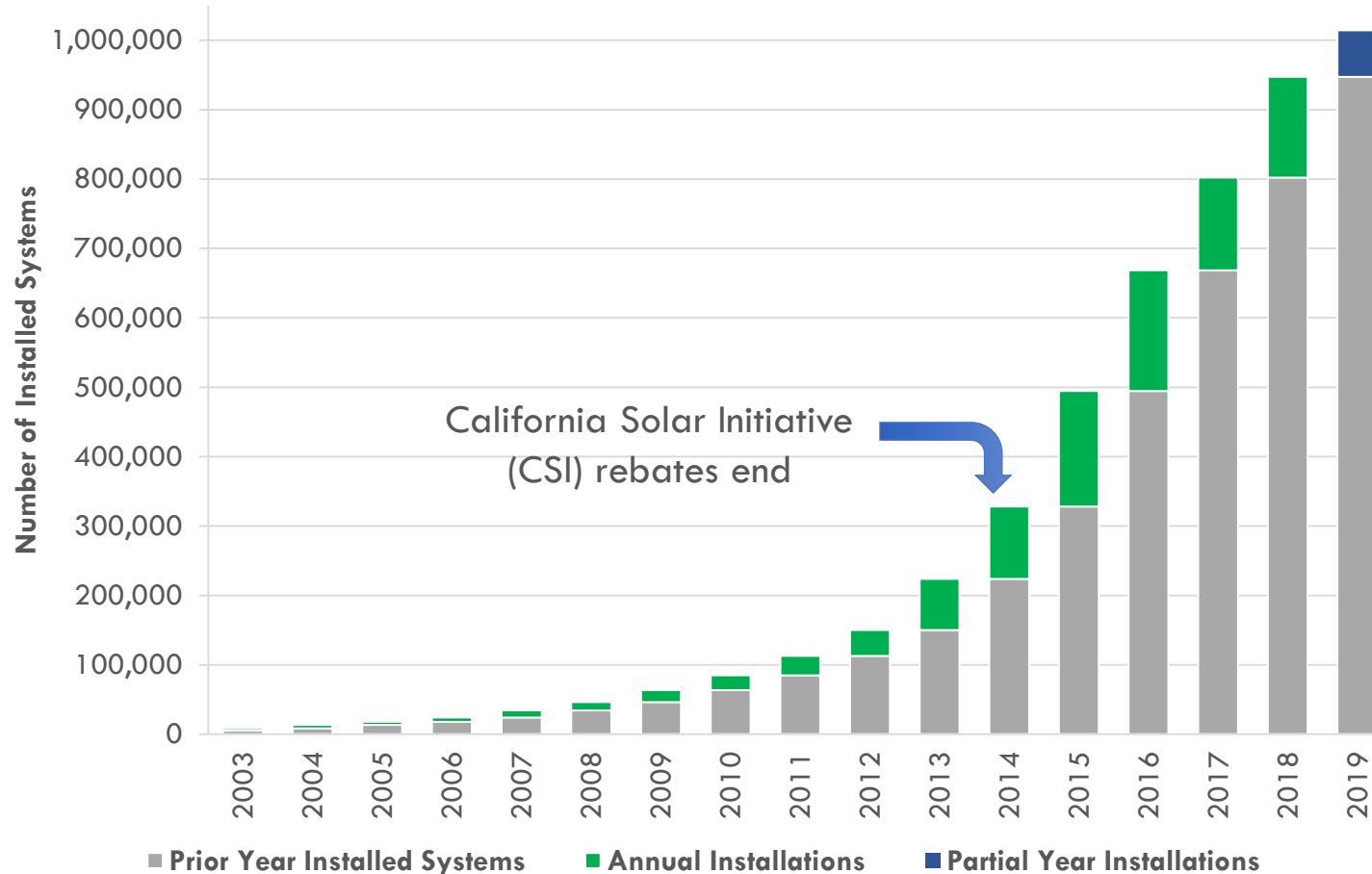
Energy efficiency + rooftop solar driving down the demand curve





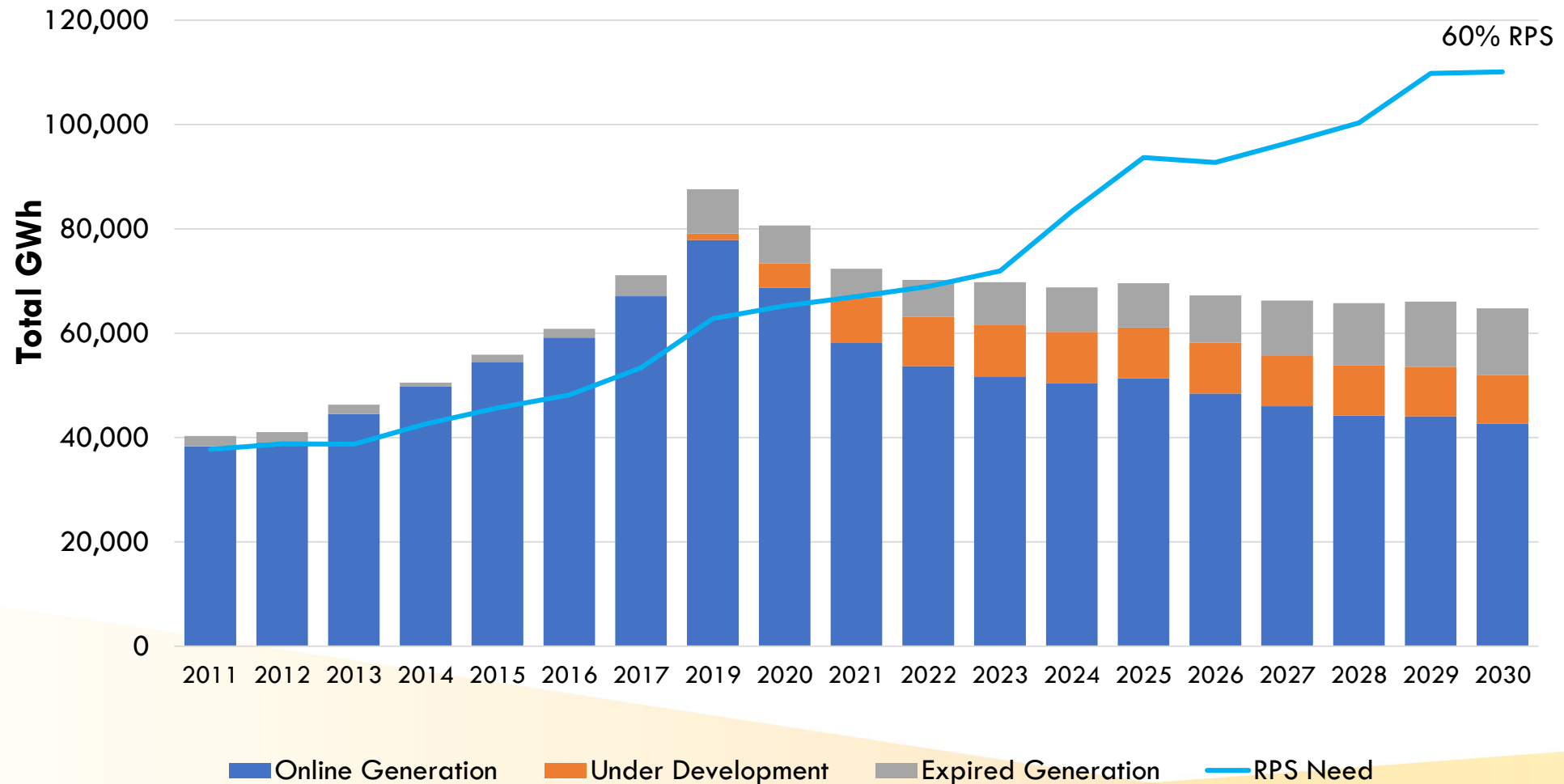
Growth in Customer-Sited Solar PV Installations Statewide in California

Number of Installed BTM PV Systems in California (Through June 2019)



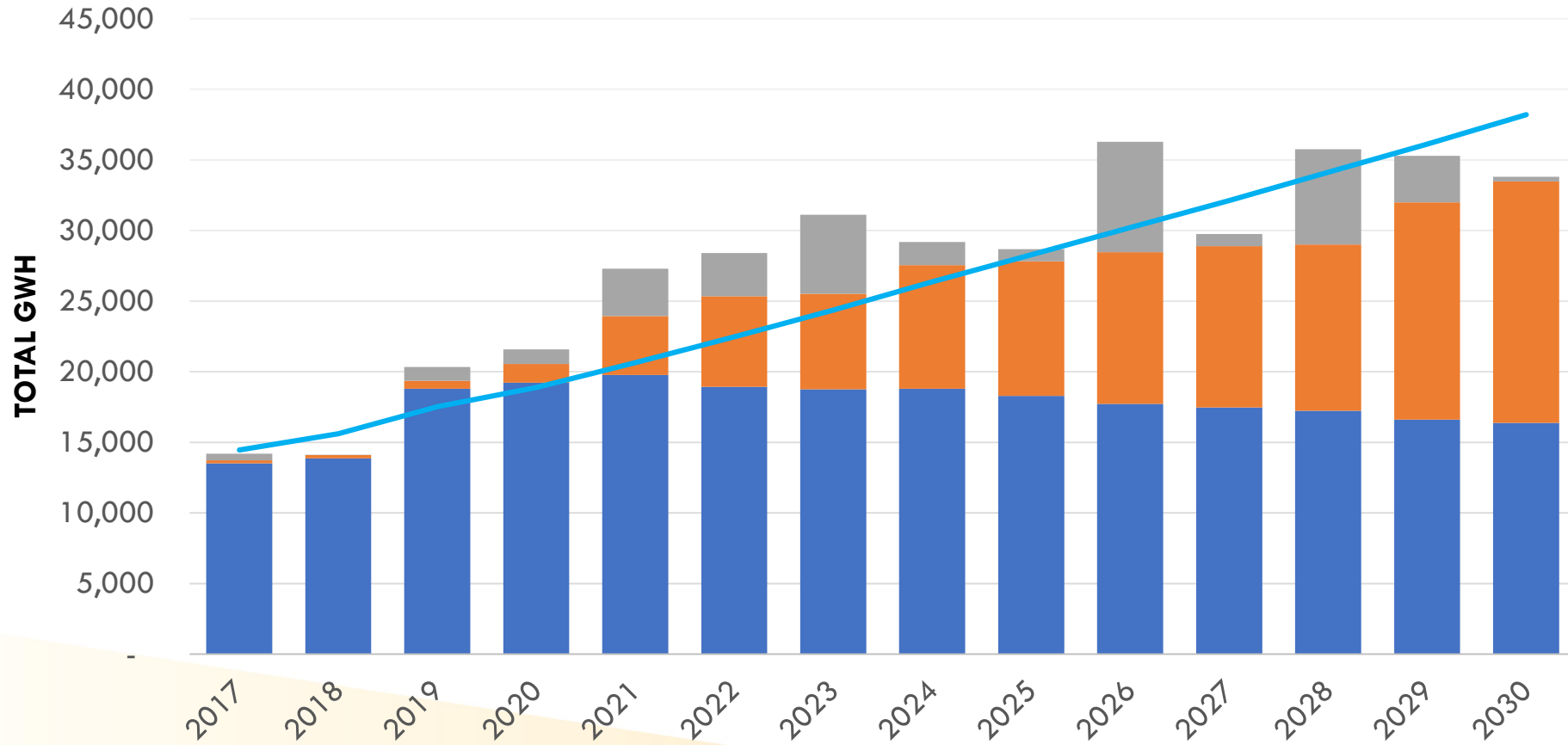


Aggregated CPUC-Jurisdictional Load Serving Entity Forecast Need and Progress Towards 60% RPS by 2030





Aggregated Publicly Owned Utility Forecast Need and Progress Toward 60% RPS by 2030

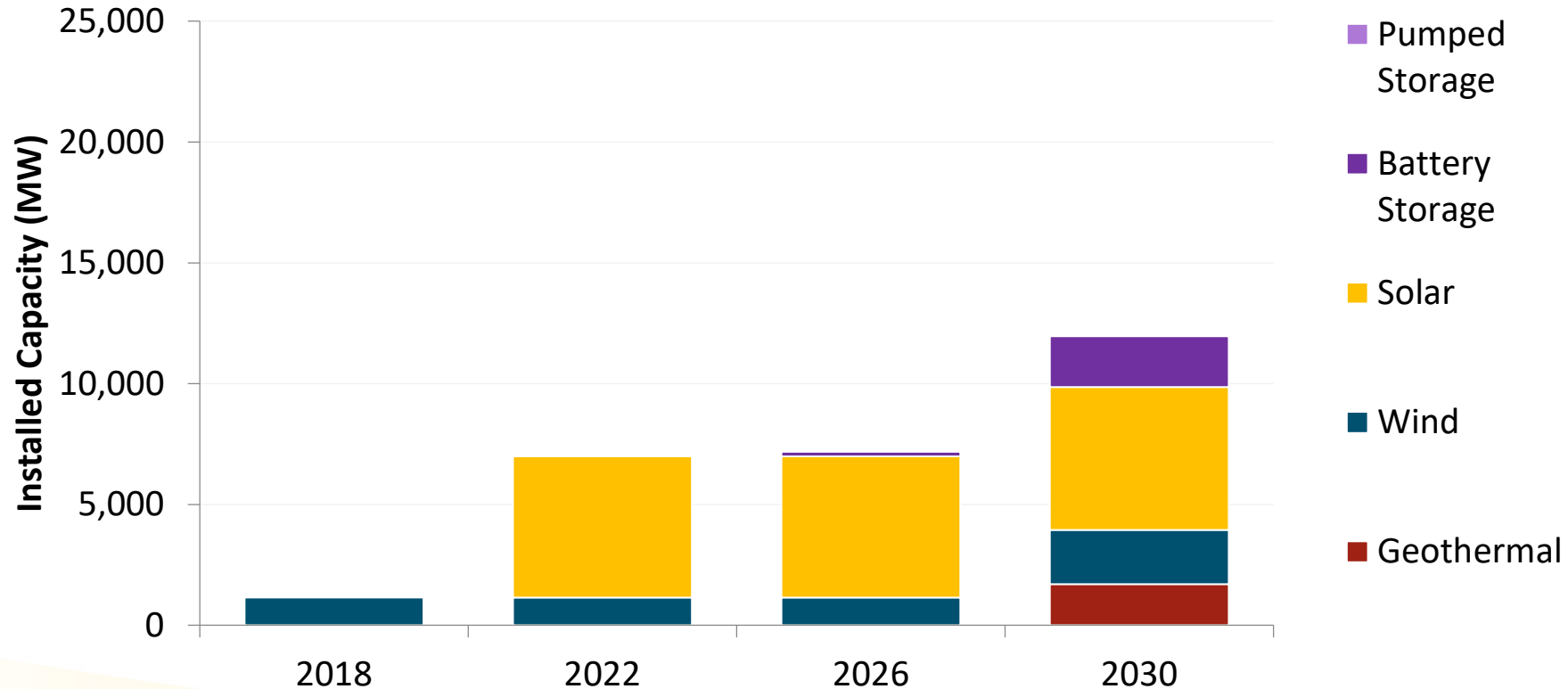


Data from the 16 largest POU's IRPs only; reflects planning prior to passage of 60% RPS

■ Online Generation ■ Under Development ■ Expired Generation — RPS Need



CPUC-Adopted 2018 Preferred System Portfolio for Integrated Resource Planning



- Achieves the Commission-adopted electric sector GHG planning target of 42 million metric tons by 2030
- Contains ~12,000 megawatts of new renewable and storage resources by 2030



Building Electrification Programs & Proceedings

- **Senate Bill 1477 (Stern, 2018)**
 - CPUC Building Decarbonization proceeding
- **San Joaquin Valley Pilots**
- **“Fuel substitution” test**
- **Self Generation Incentive Program**
- **Assembly Bill 3232**
- **Zero emission buildings goal**

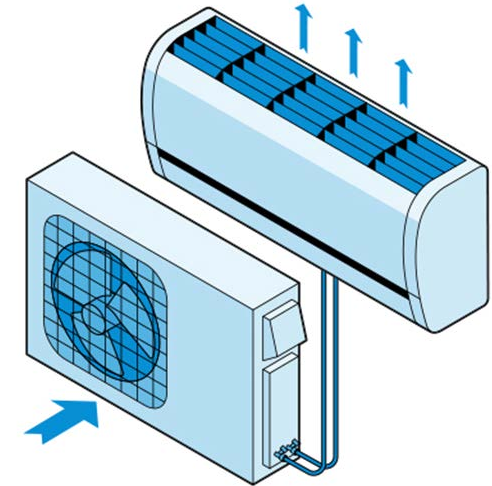


Illustration of heat pump “mini-split” heating and AC system.



Transportation Electrification (TE) Investments & Programs

- Investor-owned utility ratepayer investments (CPUC)
 - ~\$1B authorized
 - ~\$800M under review
- \$100M annually for Clean Transportation Program (CEC)
- CCI Low Carbon Transportation Program (CARB)
 - \$1.7B in through FY 2018-19
 - Additional \$485M in 2019-20
 - Over 80 percent has supported TE





Programs and Initiatives in Disadvantaged Communities (DACs)

- SB 350 Barriers Report
 - CEC Energy Equity Indicators
- CPUC and CEC SB 350 Disadvantaged Communities Advisory Group
- Bill assistance programs
- Weatherization programs
- Solar programs
- Budget “carve-outs” – Various programs
- CPUC Environmental and Social Justice Action Plan





Electric Program Investment Charge (EPIC) Research & Development - Overview

- CPUC established in 2011, funded by utility customers
 - Funded at \$555M for 2018-2020 investment period
- Administered by the CEC (80% of funds), PG&E, SCE, and SDG&E (together, 20% of funds)
- Program areas
 - Applied Research and Development (CEC only)
 - Technology Demonstration and Deployment (CEC + IOUs)
 - Market Facilitation (CEC only)
- CEC Focal Areas: renewable, efficiency, grid-scale storage, resilience & reliability, climate science & adaptation, innovation.





Thank you

SB100 Joint Agency Report Process and Implementation

Siva Gunda
California Energy Commission





Joint Agency Report

In consultation with CA balancing authorities, through a public process, issue a joint agency report by January 1, 2021 and at least every four years after that includes:

- **Review of the policy** focusing on: technologies, forecasts, then-existing transmission, and maintain safety, environmental and public safety protection, affordability, and system/local reliability
- Evaluation identifying potential **benefits and impacts on system/local reliability**
- Evaluation identifying the nature of any **anticipated financial cost and benefits** to electric, gas, and water utilities, including customer rate impacts and benefits
- **Barriers and benefits** of achieving the policy
- **Alternative scenarios** to achieve the policy with estimated cost and benefits

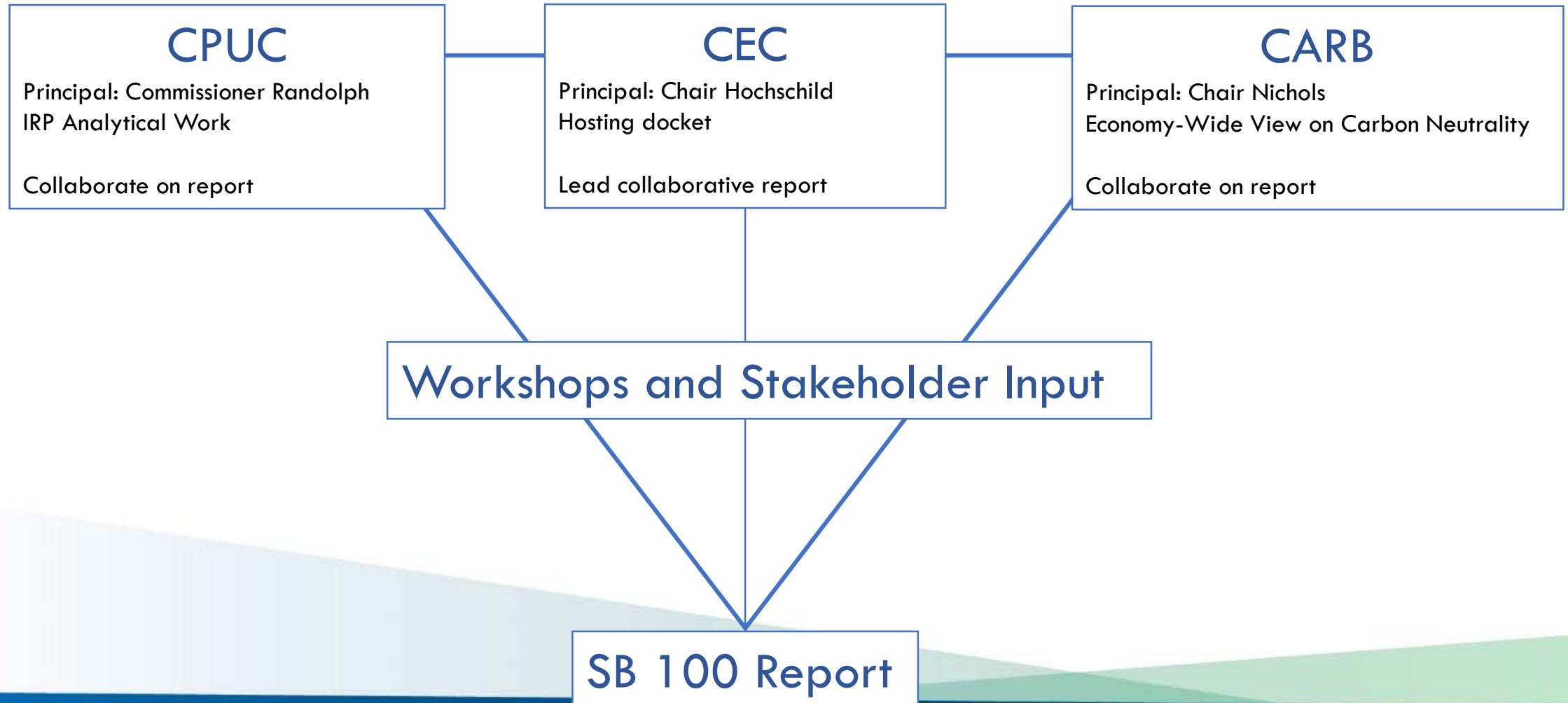


Joint Agency Report Goals

- Meet the joint agency report statutory requirements
- Provide direction to the electricity market
- Coordinate the planning processes of the State Agencies
- Form consensus on interpretation of statute
 - e.g. definition of “zero-carbon resources”



Interagency Coordination





Timeline

Fall 2019: Scoping Workshops

Spring 2020: Finish SB 100 workshops/feedback from stakeholders

Summer 2020: Draft report available for comment

Fall 2020: Approval by CEC, CPUC, CARB

By January 1, 2021: Submit report to the Legislature



Workshop Topics

- Scoping Workshops Sept/Oct 2019
- Tentative SB 100 Workshop Topics Fall 2019-Spring 2020
 - Scenarios and Technologies for a Clean Energy Future
 - Electricity System Modeling
 - Affordability
 - Equity
 - Environmental Protection
 - Infrastructure and System Management Needs
 - Reliability Needs
 - System Resilience
- Additional feedback from workshops in other proceedings



Workshop Topics

Scoping Workshops

- Sept 30th Sequoia Room, Fresno Council of Governments
- Oct 8th SCAQMD Auditorium, Diamond Bar, CA
- TBD Arcata or Eureka



SB 100 Website

- Events
- Related Links
- Subscribe to Listserv
- Submit comments

<https://www.energy.ca.gov/programs-and-topics/topics/renewable-energy/joint-agency-report-sb-100>

Joint-Agency Report - SB 100

Senate Bill (SB) 100 established a landmark policy requiring renewable energy and zero-carbon resources supply 100 percent of electric retail sales to end-use customers by 2045. It requires the California Energy Commission (CEC), California Public Utilities Commission (CPUC), and California Air Resources Board (CARB) to prepare a report.

Under the policy, California's renewable energy and zero-carbon resources supply 100 percent of electric retail sales to end-use customers and 100 percent of electricity procured to serve state agencies by December 31, 2045. The policy requires the transition to a zero-carbon electric system does not cause or contribute to increases of greenhouse gas emissions elsewhere in the western electricity grid.

SB 100 requires the CEC, CPUC, and CARB to complete a joint agency report to the Legislature evaluating the 100 percent zero-carbon electricity policy, as described below. The report will be developed using a public process and qualitative and quantitative analyses to address the requirements and intent of the statute.

In consultation with all California balancing authorities and as part of a public process, the three agencies will issue a report to the Legislature by January 1, 2021, and at least every four years afterward. The joint report shall include:

1. A review of the 100 percent zero-carbon policy focused on technologies, forecasts, then-existing transmission, and the maintenance of safety, environmental and public safety protection, affordability, and system and local reliability.
2. An evaluation identifying the potential benefits and impacts on system and local reliability associated with achieving the policy.
3. An evaluation identifying the nature of any anticipated financial costs and benefits to electric, gas, and water utilities, including customer rate impacts and benefits.
4. The barriers to, and benefits of, achieving the policy.
5. Alternative scenarios in which the policy can be achieved and the estimated costs and benefits of each scenario.

EVENTS

AUG 29 Webinar: Battery and Energy Storage Systems Added to the Energy Commission's Solar Equipment Lists
August 28, 2019 | 04:00 PM - 05:30 PM
Webinar
The California Energy Commission (CEC) is adding new equipment lists for Battery and Energy Storage Systems (ESS) to its solar equipment lists.

SEP 05 Joint Agency Workshop on the Senate Bill 100 Report
September 5, 2019 | 10:00 AM - 01:00 PM
California Secretary of State Building - First Floor Auditorium
The California Energy Commission (CEC) will jointly conduct a workshop with the California Public Utilities Commission (CPUC) and the California Air Resources Board (CARB) to kick off the process for developing the joint-agency report required by Senate Bill (SB) 100, the "100 Percent Clean Energy Act of 2018" (de León, Chapter 312, Statutes of

SEP 10 Staff Pre-Rulemaking Workshop on Proposal to Amend Regulations
September 10, 2019 | 10:00 AM - 01:00 PM
Art Rosenfeld Hearing Room
California Energy Commission staff will conduct a workshop to solicit

SEP 11 Energy Commission Business Meeting
September 11, 2019 | 10:00 AM - 03:00 PM
Art Rosenfeld Hearing Room
The Energy Commission will hold its regularly scheduled business meeting. The agenda is usually available about 10 business days

RENEWABLE ENERGY

- Funding Renewable Energy
- Joint-Agency Report - SB 100
- Offshore Renewable Energy
- Renewable Energy Resources
- Solar Energy
- Solar Equipment Lists

CONTACT

[Terra Weeks](#)

RELATED LINKS

- [Senate Bill 100](#)
- [California Air Resources Board - Carbon Neutrality](#)
- [California Air Resources Board - Scoping Plan](#)
- [California Public Utilities Commission - IRP Process](#)

SUBSCRIBE

100 Clean Energy

First Name *

Last Name *

Email *

SUBSCRIBE

CATEGORIES

Topic
Renewables

Program
Integrated Energy Policy Report - IEP



Submit Comments to Docket 19-SB-100

The screenshot shows the California Energy Commission website interface. At the top, there is a navigation bar with the CA.GOV logo and the California Energy Commission name. Below this is a menu with links for Home, About Us, Analysis & Stats, Efficiency, Funding, Power Plants, Renewables, Research, and Transportation. The main content area is titled "Docket Log" and includes the docket number (19-SB-100), project title ("SB 100 Joint Agency Report: Charting a path to a 100% Clean Energy Future"), and generation date (8/29/2019 1:28:15 PM). Below the header, there is a filter section with checkboxes for "Documents", "Comments", and "Transcripts", and a search icon. The main part of the page is a table with the following data:

↓ TN #	Docketed Date	Document Title	Exhibit #	To	From
229511	8/22/2019	Notice of Joint Agency Workshop On The Senate Bill 100 Report *** THIS DOCUMENT SUPERSEDES TN 229505 *** - Thursday, September 5, 2019, 10:00 a.m. 5 page(s)		CEC/Docket Unit	California Energy Commission
229505	8/22/2019	Notice Of Joint Agency Workshop On The Senate Bill 100 Report *** THIS DOCUMENT REPLACES TN 229511 *** - Thursday, September 5, 2019 5 page(s)		CEC/Docket Unit	California Energy Commission
229470	8/15/2019	Memo to Open New Docket 1 page(s)		CEC/Docket Unit	California Energy Commission

At the bottom of the page, there is a footer with links for Accessibility, Conditions of Use, and Privacy Policy, and a copyright notice for 2016 State of California.



Thank you

- Submit comments to CEC Docket 19-SB-100
- Visit the SB 100 Joint Agency Report webpage:
<https://www.energy.ca.gov/programs-and-topics/topics/renewable-energy/joint-agency-report-sb-100>