

Achieving Shared Climate Goals



Drew Bohan
Executive Director
California Energy Commission
March 7, 2019



California Energy Commission

Current Commissioners

Four commissioners, appointed for five-year, staggered terms



David Hochschild

Chair



Janea Scott

Vice Chair



Karen Douglas

Commissioner



Andrew Mcallister

Commissioner



CLIMATE SUMMIT

WHAT IF IT'S
A BIG HOAX AND
WE CREATE A BETTER
WORLD FOR NOTHING?

- ENERGY INDEPENDENCE
- PRESERVE RAINFORESTS
- SUSTAINABILITY
- GREEN JOBS
- LIVABLE CITIES
- RENEWABLES
- CLEAN WATER, AIR
- HEALTHY CHILDREN
- ETC. ETC.

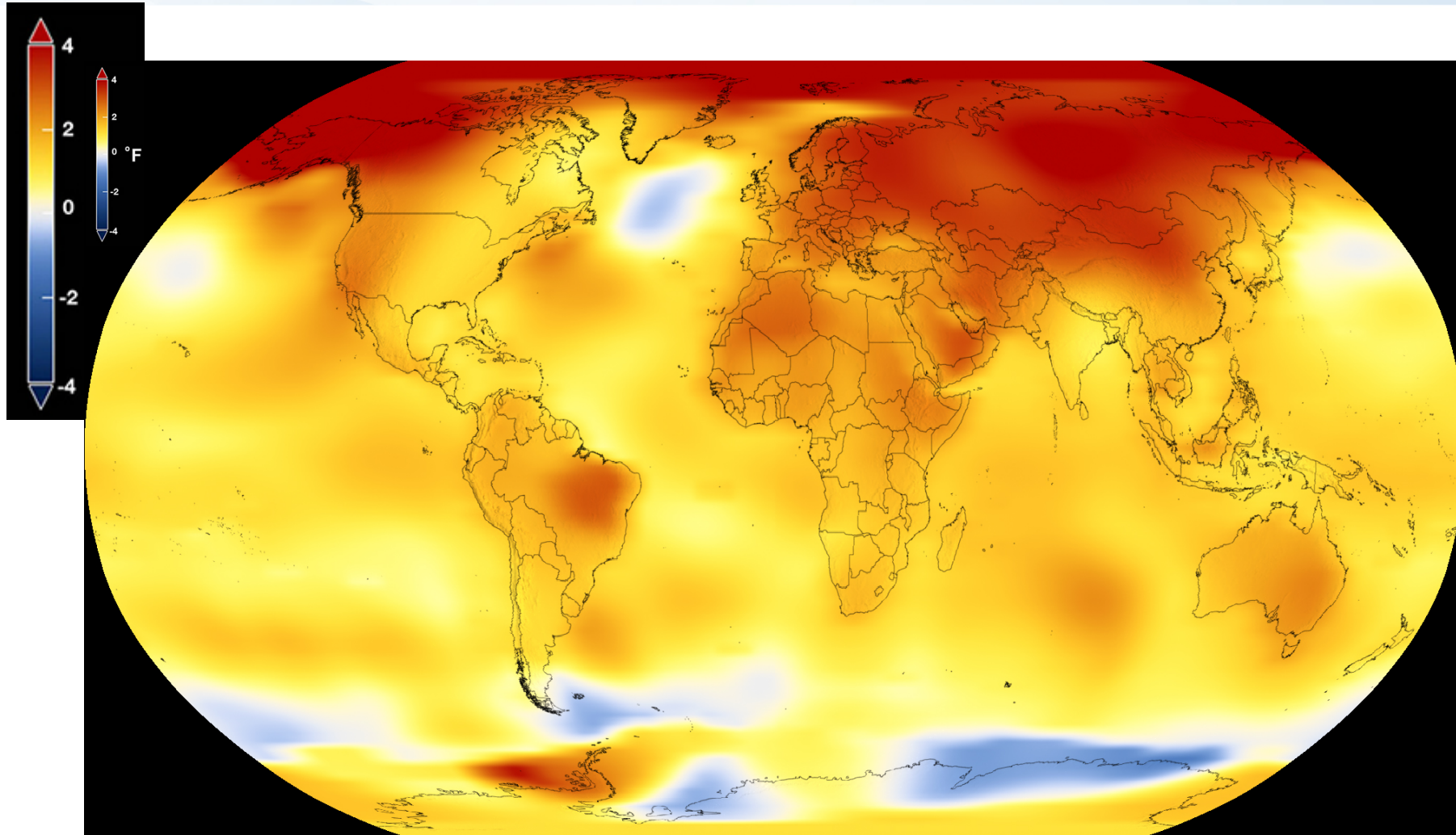


10/19 USA TODAY

YSL
Pitt



Global Average Temperatures: 1951-1980 vs. 2013-2017



Source: NASA/GSFC/Scientific Visualization Studio



Camp Fire (Northern California, 2018)



Deadliest and most destructive fire in California history:

- 85 deaths
- Nearly 19,000 structures destroyed
- More than 153,000 acres burned



Southern California's Beaches

Up to 2/3 of Southern California's beaches could be lost by late this century due to combined impacts of storms and sea level rise.

Brown band in figure below shows range of potential erosion with 25 cm to 2 m of sea level rise.



Source: USGS, Google Earth. As published in LA Times, "Southern California's coastal communities could lose 130 feet of cliffs this century as sea levels rise Jun 27, 2018.

Government Policy Drives Change

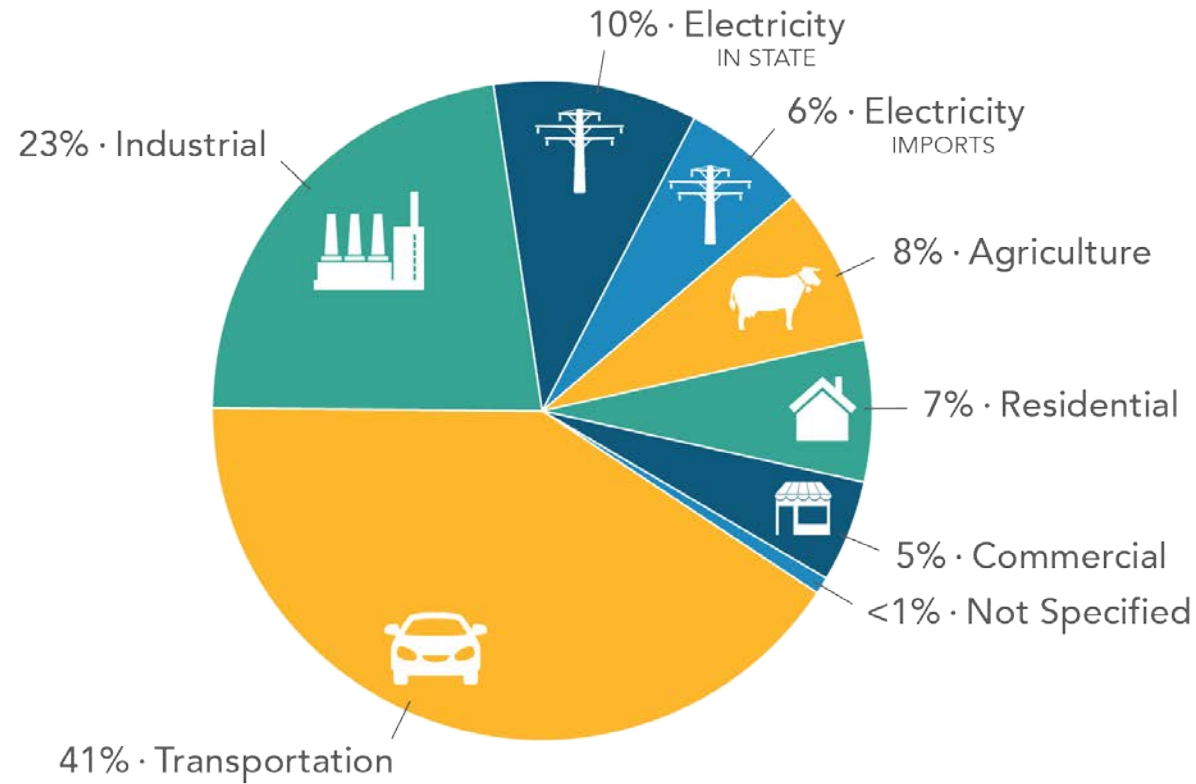


Goal: GHG Reduction

- **2020:** Reduce to 1990 levels (AB 32; 2006)
- **2030:** Reduce to 40% below 1990 levels (SB 32; 2016)
- **2045:** Carbon-free economy (Exec Order; 2018)



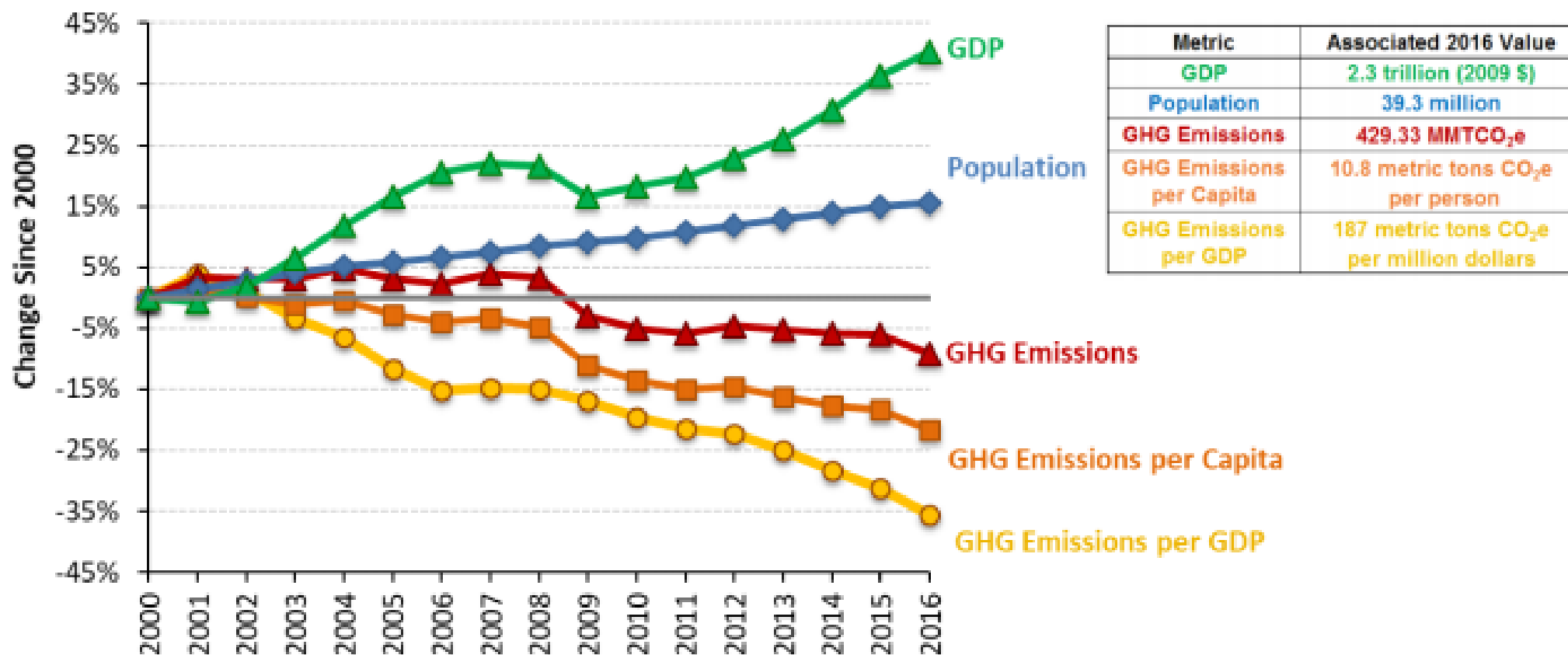
GHG Emissions by Economic Sector



429.4 MMTCO₂e
2016 TOTAL CA EMISSIONS



California meets 2020 GHG Target 4 Years Early





Goal: Renewable Energy

- **60%** renewable electric generation by 2030 (SB 100; 2018)
- **100%** carbon free electric generation by 2045 (SB 100)

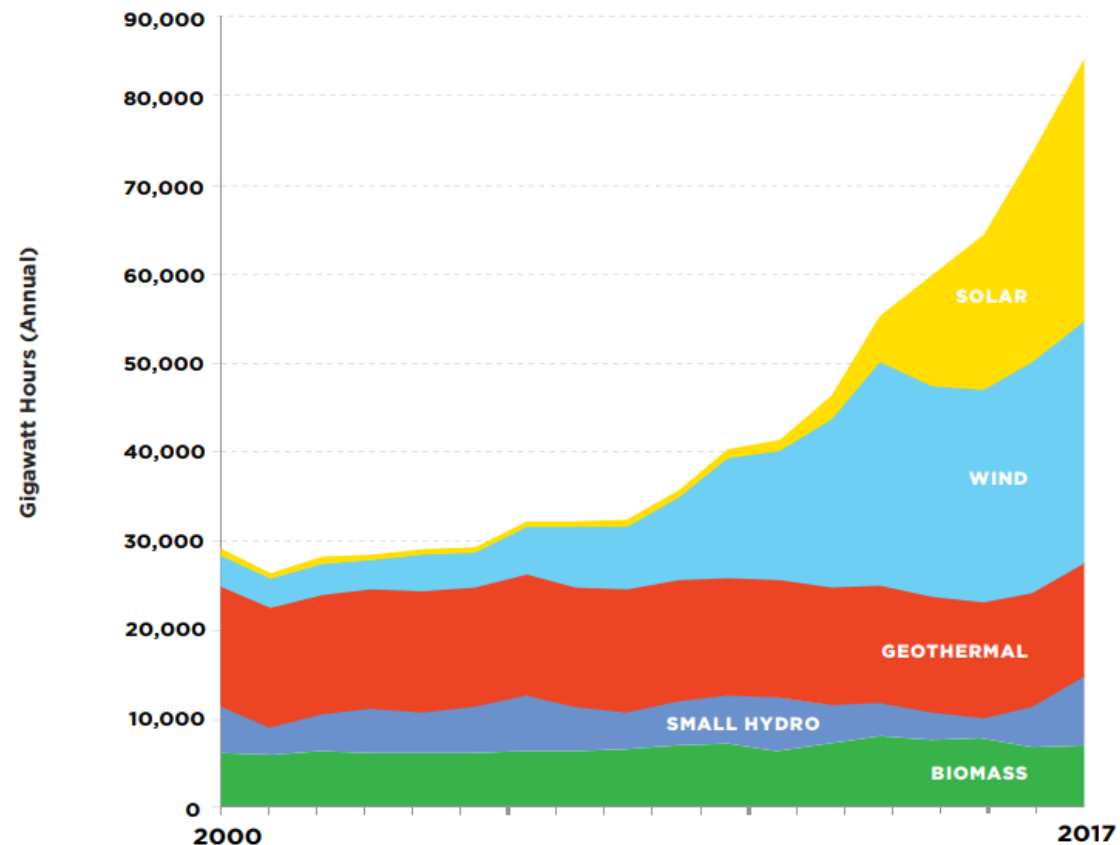


Growth in Renewables/RPS

Renewables grow from
12% to 34%
from 2008 to 2018

Cost of solar has
decreased 78%
since 2010

RENEWABLE ENERGY GENERATION



California Requires Zero Net Electricity for all New Homes by Jan 1, 2020



Zero Energy Community
Rocklin, CA



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





Goal: Energy Efficiency

- California Building Standards
- Doubling Energy Efficiency in Buildings (SB 350)
- California Appliance Standards

All Measures Must Be **Cost-Effective.**

2019 Residential Building Energy Efficiency Standards

\$19,000 SAVINGS OVER A 30 YR. MORTGAGE | INITIAL COST \$9,500



SOLAR PHOTOVOLTAIC SYSTEM

Promote installing solar photovoltaic systems in newly constructed residential buildings. The systems include smart inverters with optional battery storage. This will increase the self-utilization of the electricity generated to power the home's electricity loads including plug-in appliances. California is the first state in the nation to require smart systems on homes.



DEMAND RESPONSE COMPLIANCE OPTIONS

Encourage battery storage and heat pump water heaters that shift the energy use of the house from peak periods to off-peak periods. Utilities moving to time-of-use pricing assists the grid to meet the state's climate change goals and helps homes reduce energy bills.



HEALTHY INDOOR AIR QUALITY

Enable using highly efficient filters that trap hazardous particulates from both outdoor air and cooking and improve kitchen ventilation systems. Moving air around and in and out of the home while filtering out allergens and other particles makes the home healthier.



BUILDING ENVELOPE

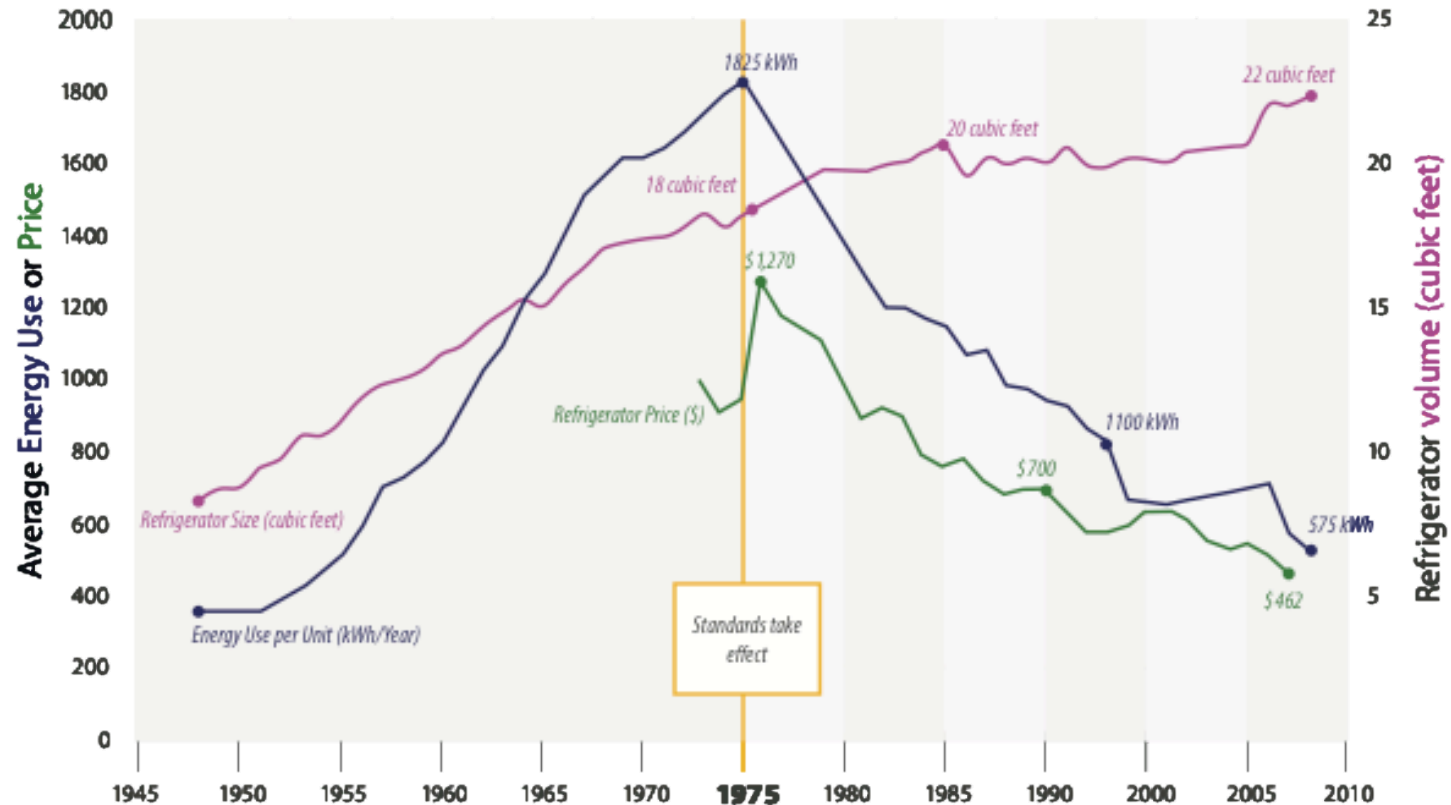
Strengthen insulation in attics, walls and windows to improve comfort and energy savings. Keeping the heat out during the summer and warm air during the winter makes a home more resilient to climate change.





California Advancing Energy Efficiency

New Refrigerator Use v. Time and Retail Prices





Goal: 5 Million ZEVs by 2030





California Transportation Statistics

ZEVs: 537,000 cars and trucks; about half of all in the US

Chargers: ~20,000 public, 1000s of business, 1000s of residential

Hydrogen: 39 public hydrogen stations open for business; another ~30 funded

GHG Emissions: ~50% from transportation (including refining)

Air Quality: Severe non-attainment for ozone in San Joaquin Valley and South Coast; cars/trucks emit 80% of NO_x, 95% of diesel particulates

NO NEW ICEs SOLD:

AUSTRIA
2020

INDIA
2030

SCOTLAND
2032

CHINA
2040

NETHERLANDS
2025

IRELAND
2030

BRITAIN
2040

FRANCE
2040





ICE VEHICLE BAN:

<i>Copenhagen, DM</i>	2019
<i>Oslo, NW</i>	2019
<i>Oxford, EN</i>	2020
<i>Auckland, NZ</i>	2030
<i>Barcelona, SP</i>	2030
<i>Cape Town, SA</i>	2030
<i>Heidelberg, GE</i>	2030
<i>LA, USA</i>	2030
<i>Milan, IT</i>	2030
<i>Quito, EC</i>	2030
<i>Seattle, USA</i>	2030
<i>Vancouver, CA</i>	2030
<i>British Columbia, CA</i>	2040

DIESEL BAN:

LONDON, EN
2020

ATHENS, GR
2025

MEXICO CITY, MX
2025

ROME, IT
2024

MADRID, SP
2025

PARIS, FR
2020





Goal: Invest in the Future

**\$150 million per year
in electricity and natural
gas research**



Goal: Invest in the Future

Electric Program Investment Charge - \$130M/yr

- ▶ Energy Efficiency & Demand Response
- ▶ Renewable Energy & Adv. Gen.
 - ▶ Smart Communities
- ▶ Smart Grid, Storage, DER
- ▶ Environmental
 - ▶ Climate Adaptation and Infrastructure Risk Reduction
- ▶ Electric Vehicle Grid Integration
- ▶ Market Facilitation
- ▶ Water-Energy-Food Nexus

Natural Gas R&D- \$24M/yr

- ▶ Energy Efficiency
- ▶ Renewable Energy & Adv. Gen.
- ▶ Pipeline Safety
- ▶ Environmental
 - ▶ Methane Leakage
 - ▶ Climate Adaptation and Infrastructure Risk Reduction
- ▶ NG Transportation



Current EPIC Portfolio:

Creating a Smart DER Future

Zero Net Energy Communities



Higher Mix of Renewable Energy Integration



Energy Storage



Plug-In Electric Vehicles



Renewable
Forecasting
& Modeling



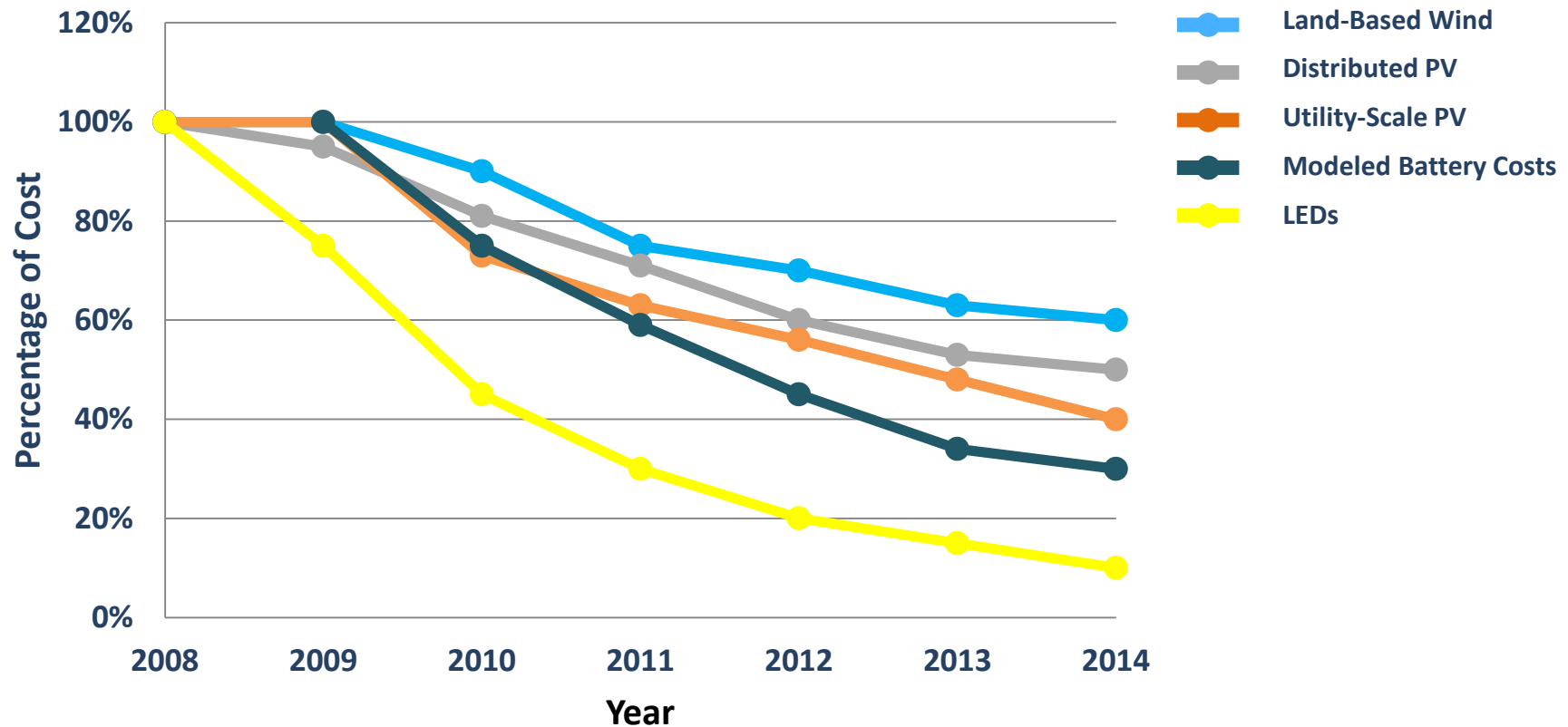
Innovation Ecosystem **cyclotronroad**





The Falling Cost of Clean Energy Technologies

Indexed Cost Reductions Since 2008



1900: Where is the first car?



1913: Where is the last horse?



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Thank you!

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