

# California's Energy Future – The View to 2050

A Study Conducted by the  
California Council on Science and Technology

Presentation to the CA-IRES Forum

University of California, Davis

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# The Challenge

- AB 32 Requires reducing total GHG emissions to 1990 levels by 2020 - a reduction of about 25%
- Governor's executive order S-3-05 (2005) requires an 80 % reduction below 1990 levels by 2050
- We must go from 480 mmT CO<sub>2</sub>e today to 80mmT CO<sub>2</sub>e in 40 years...
- ...While the state's population increases ~50%

# Background

- National Academies “America’s Energy Future” motivated interest in a more careful look for CA
  - In context of AB32 and the Executive Order—which provided specific goals that AEF did not have
- Focus has been on technology and capacity gaps, not cost or behavioral changes that must also be considered
  - Are there systems that meet our needs and cut emissions 80%?
  - If so, what are the barriers? What are the impacts? What is the state of technology required to do it?
- We kept ourselves honest through consistent bookkeeping of emissions across sources, carriers, and end uses

# Can we do it?

- Short answer: Yes, we can.
- We can get ~60% of the cuts with technology we largely know about.
  - Technology in use today or in demonstration.
  - Deployment will depend more on policy to incentivize the scale(s) of implementation needed.
- We can get the rest of the cuts to 80% below 1990, but it will require technical innovation and development.

# Logic→ eliminate fossil fuels\*

1. How much can we control demand through efficiency measures? → Decrease need for electricity and fuel
2. How much do we electrify or convert to hydrogen fuel ? → Increase demand for electricity, decrease demand for fuel
3. How do we de-carbonize enough electricity to meet the resulting electricity demand?  
How do we load follow? → Nuclear, CCS, Renewables  
→ Natural gas, energy storage, or demand management
4. How do we de-carbonize enough fuel (hydrocarbons or hydrogen) to meet the remaining demand? → Biofuel, fuel from electricity

\*unless the emissions are sequestered

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