



**Energy Choices:  
Non-fossil vs. Fossil**

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**The California Global Warming Solutions  
Act of 2006**

**Energy Policy Brief**  
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Updated 2/11/07





## California has taken the first step toward limiting climate change by passing Assembly Bill 32 in 2006.

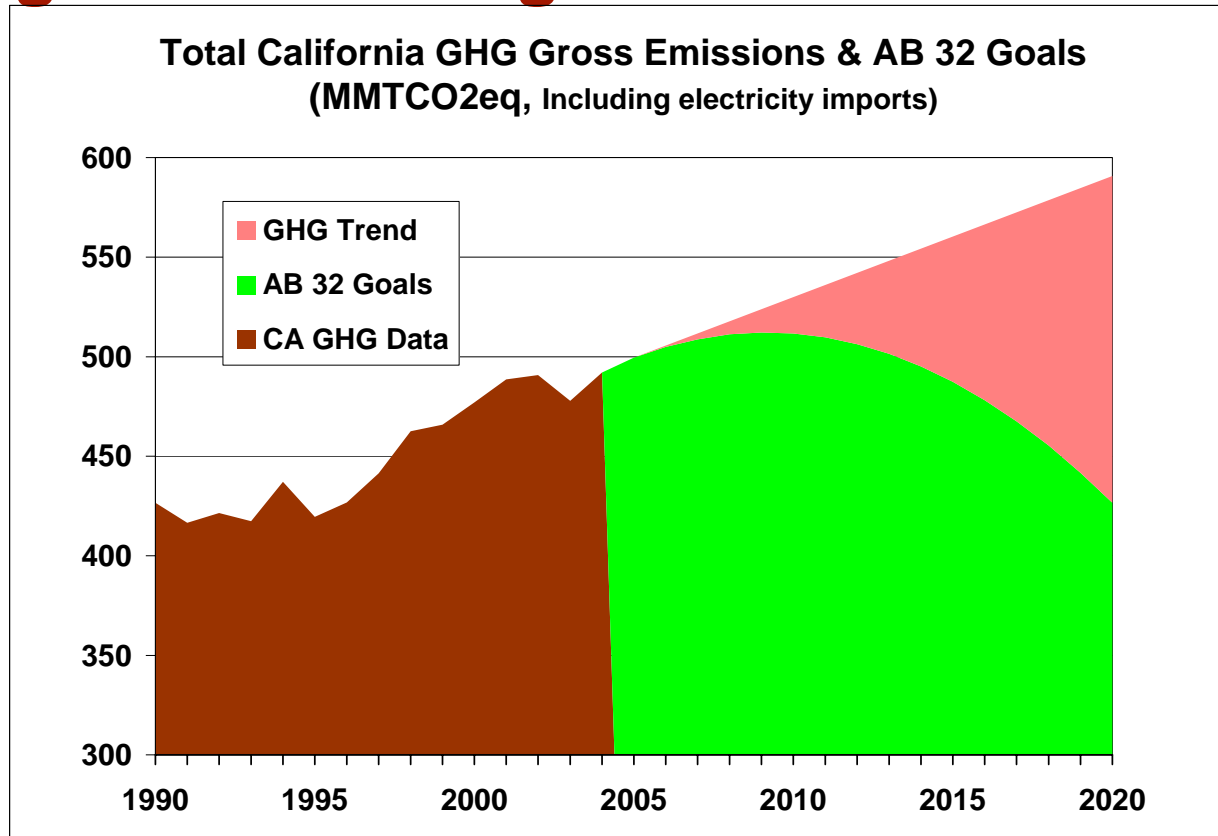
“By January 1, 2008, the state board [CARB] shall .... determine what the statewide greenhouse gas emissions level was in 1990, and approve .... a statewide greenhouse gas emissions limit that is equivalent to that level, to be achieved by 2020.”

- Part 3, § 38550 (Division 25.5, CA Health and Safety Code)





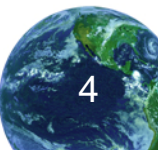
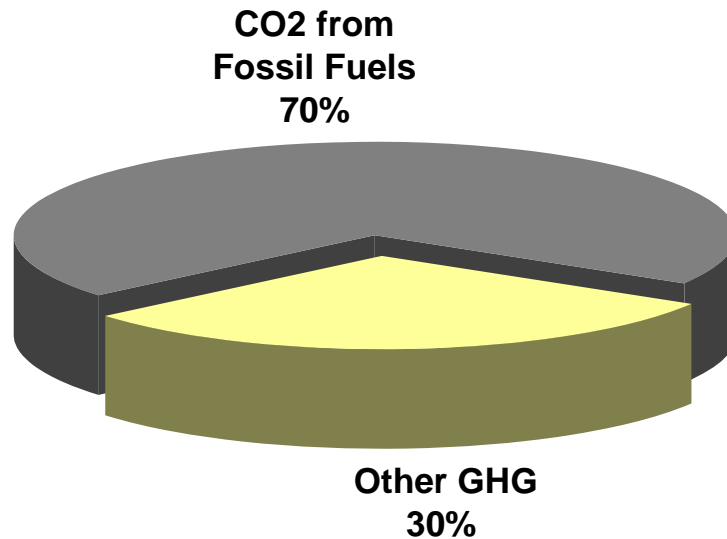
# California emissions of greenhouse gases must decrease – not increase – to limit global warming.





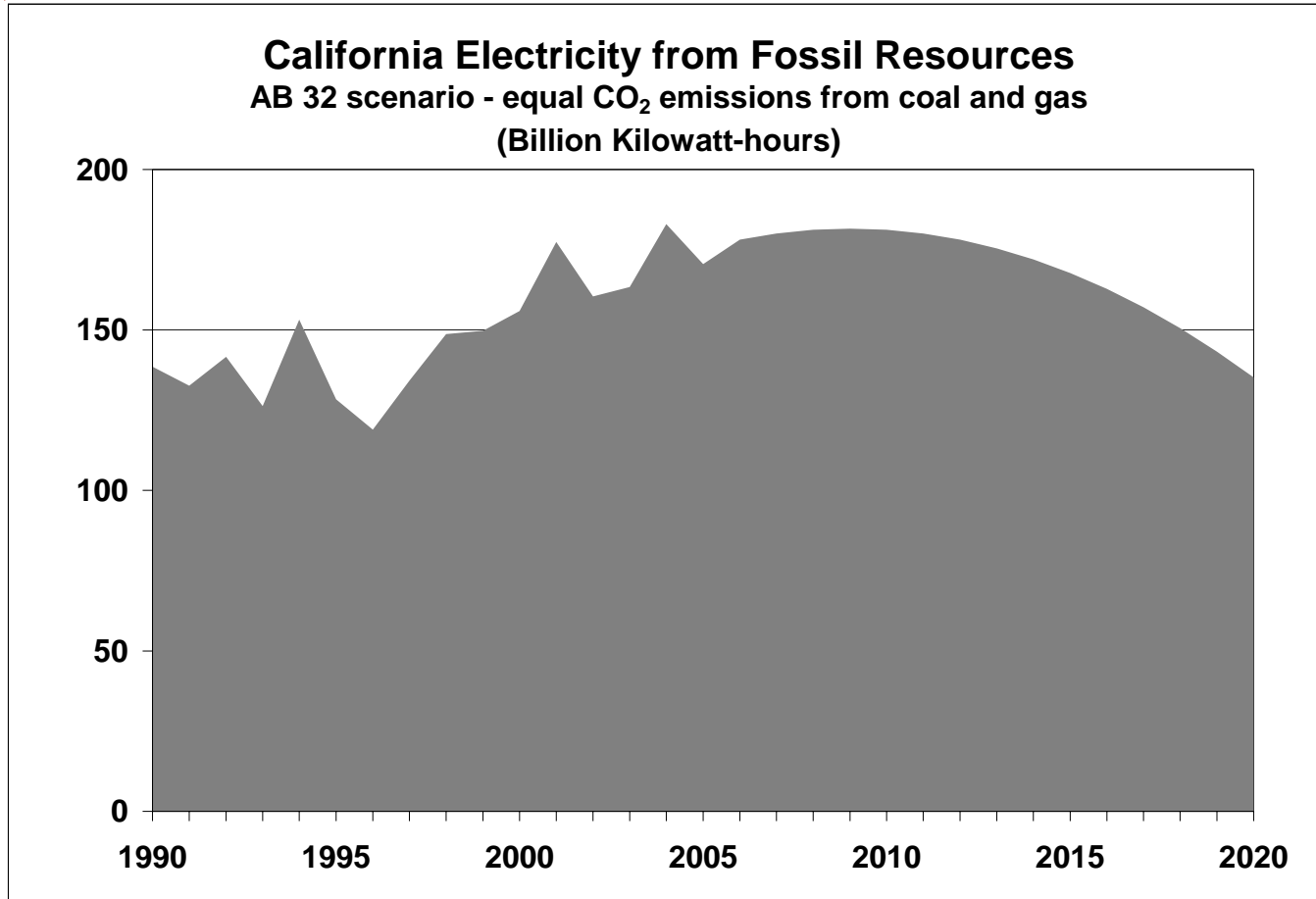
# Energy from fossil fuels causes 70% of California's greenhouse gas emissions.

CA 2004 Gross GHG Emissions by Type



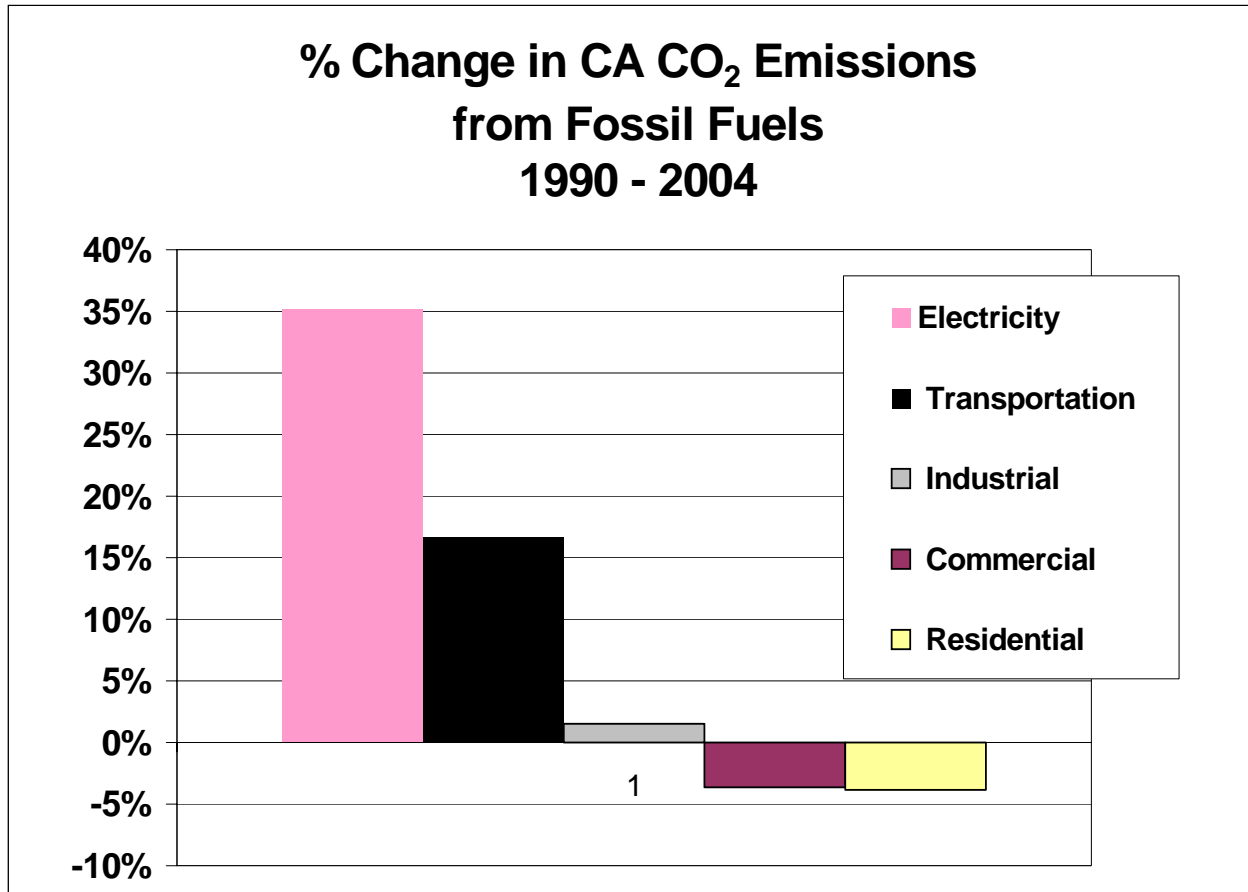


# To meet California's greenhouse gas reduction goals, the use of fossil fuels must decline.



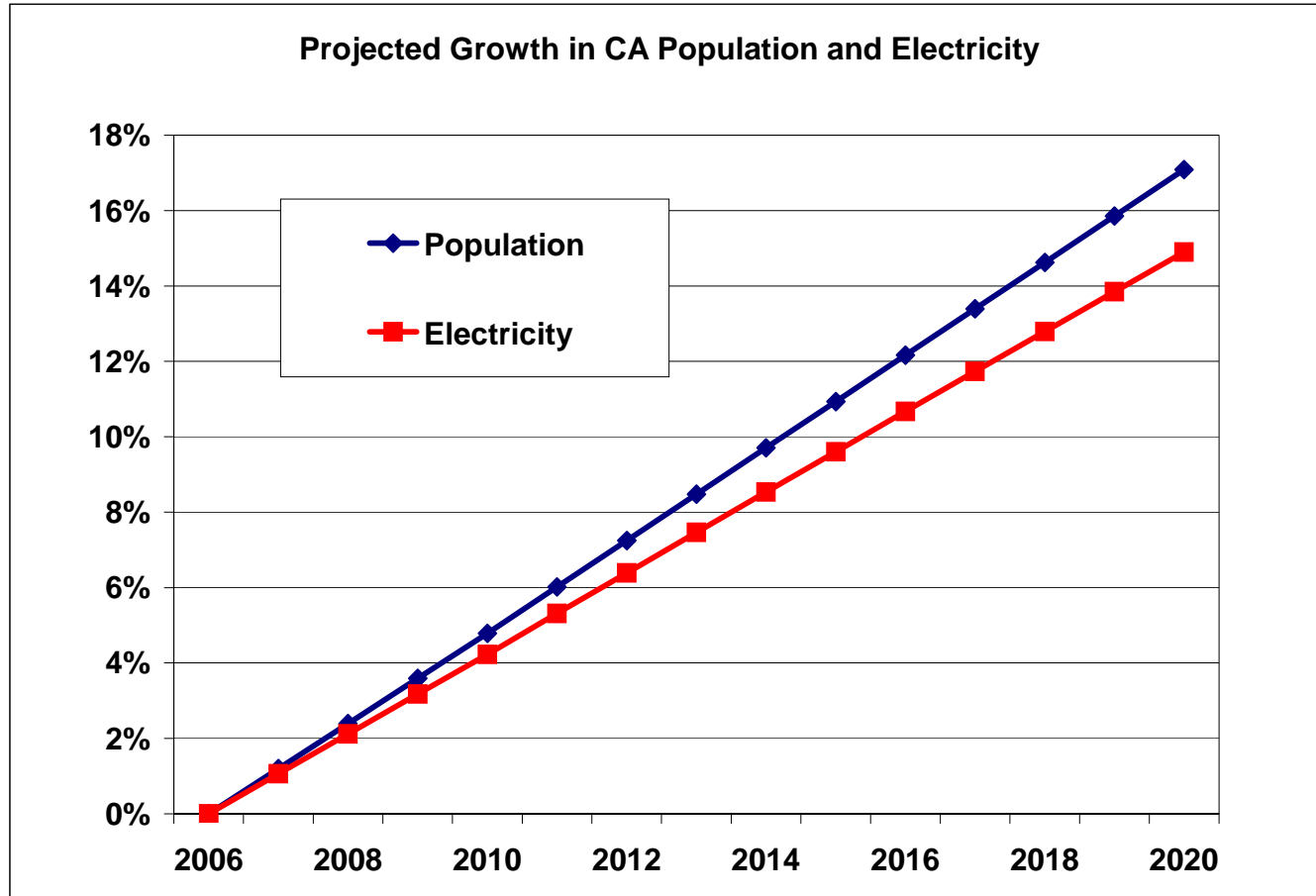


# Greenhouse gas emissions from electricity generation have grown rapidly since 1990.





# Demand for electric energy will grow as California's population increases.





**Q**

**How can California reduce the use of fossil fuels to meet its global warming goals while continuing to supply needed energy for its growing population?**

**A**

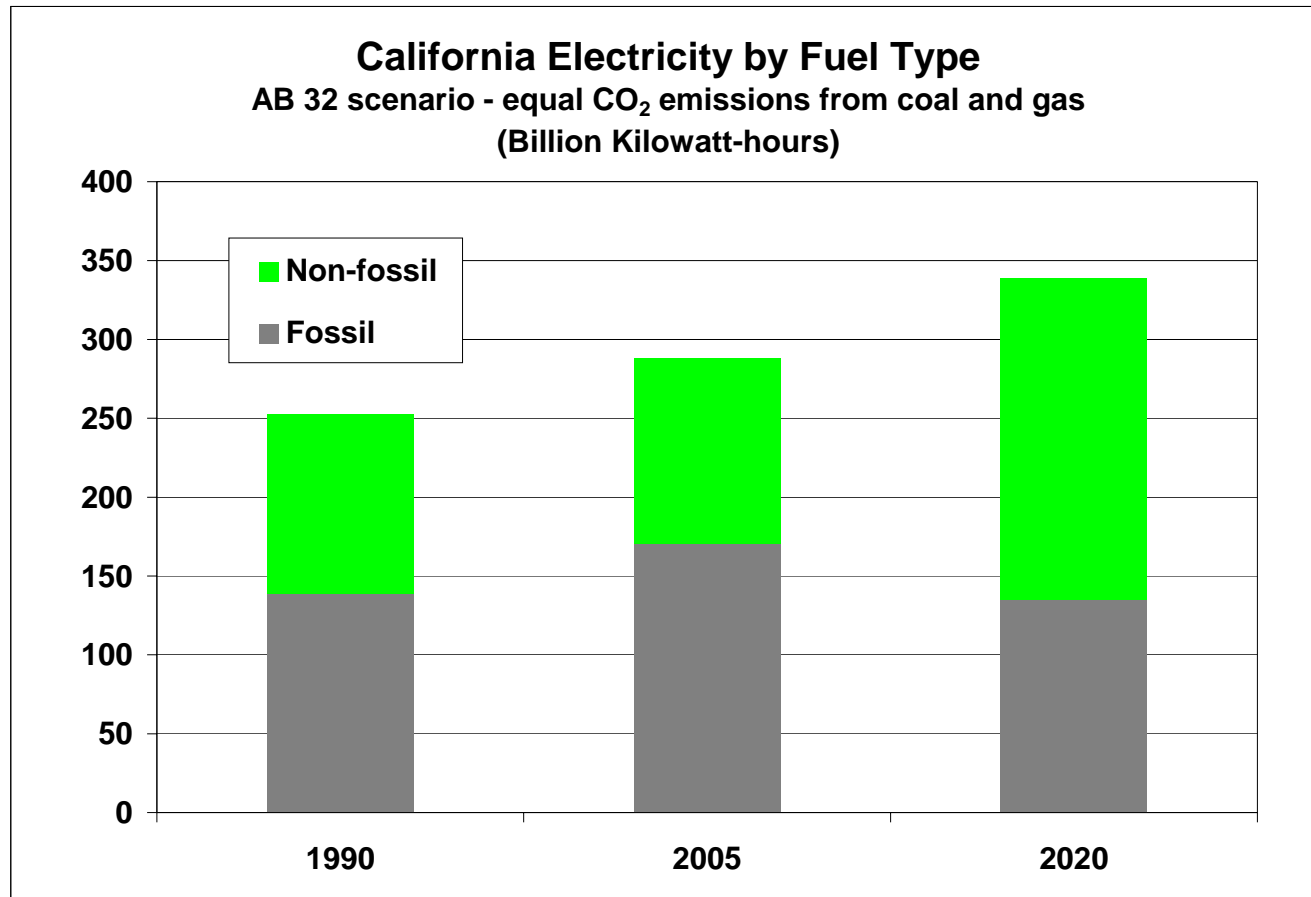
**California must increase reliance on its non-fossil energy resources. There is no other technically feasible and cost-effective option.**





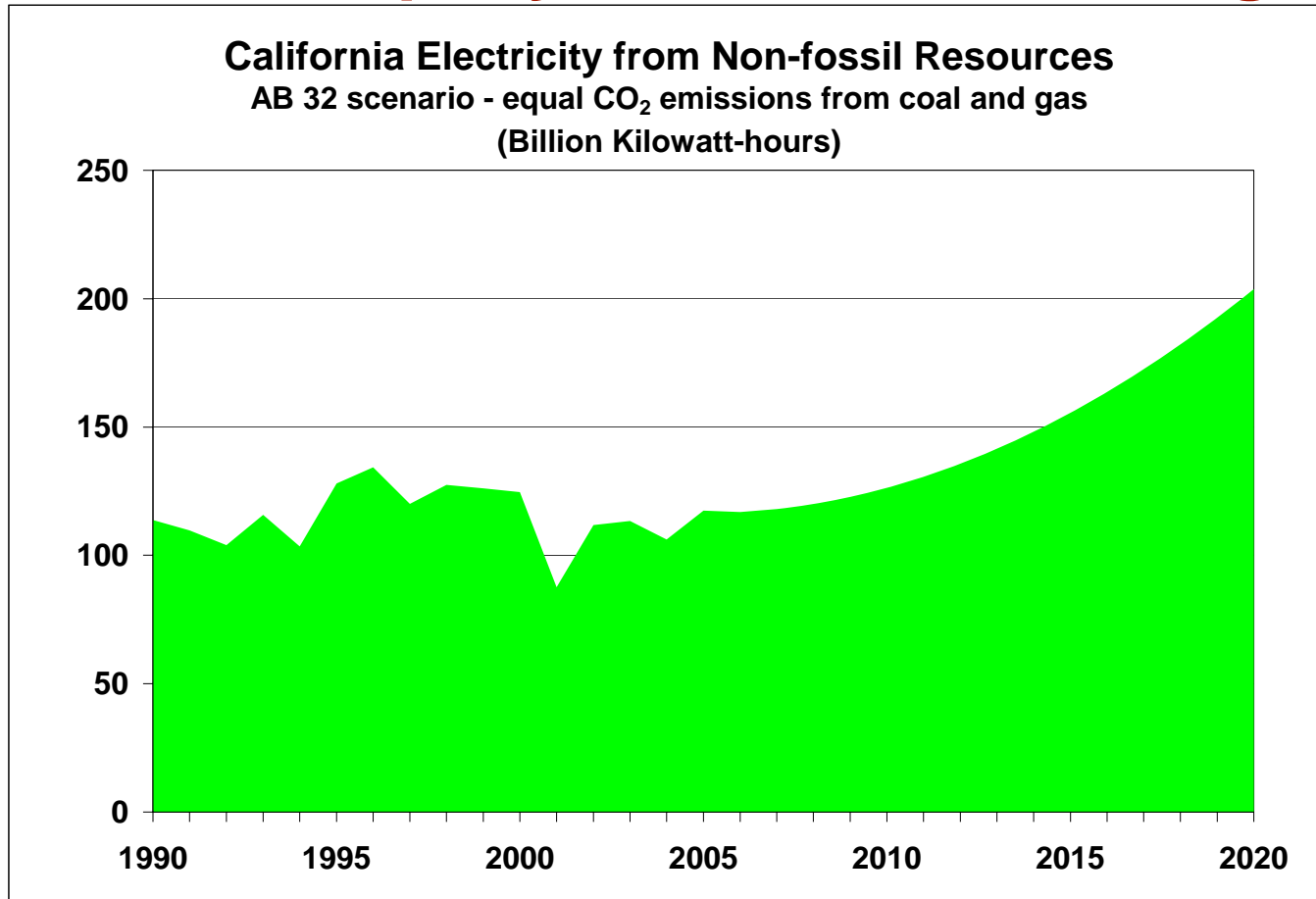


# More of California's electricity must be generated from non-fossil energy resources.





# California electricity from non-fossil resources must increase rapidly to meet the AB 32 goals.





## Commercially available non-fossil energy resources are:

### Energy Source

Falling water

Atomic nuclei

Sunlight

Wind

Earth

Vegetation

### Technology

Hydroelectricity

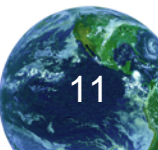
Nuclear

Solar

Wind

Geothermal

Biomass





## **Additional hydroelectricity or nuclear power is unlikely in California before 2020.**

**California rivers have already been dammed, and future water resources are at risk from climate changes.**

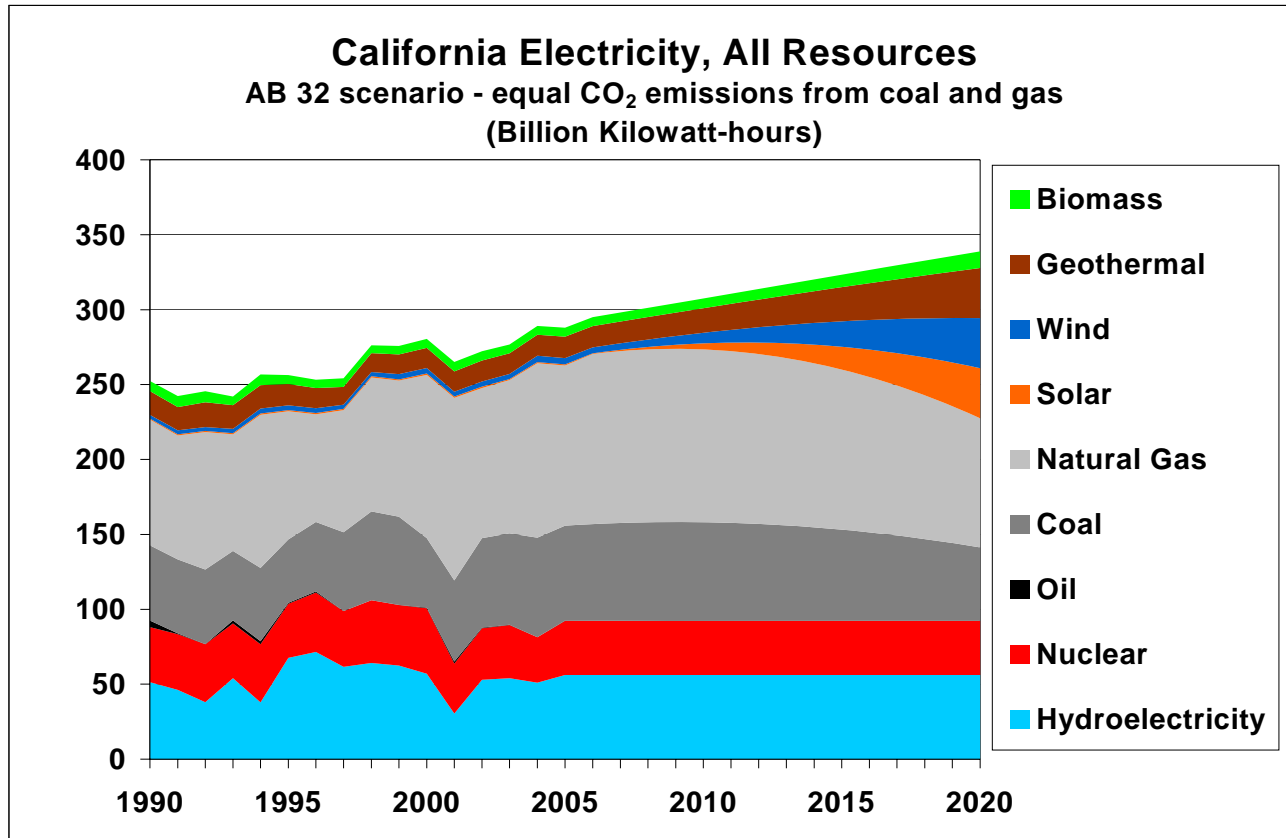
**California has prohibited new nuclear plants until a solution is found to the radioactive waste storage problem.**

**Permitting and construction of new hydroelectric or nuclear facilities could not be accomplished by 2020, even if these resources were available.**





# To limit climate change, California's electricity increasingly will come from the sun, wind and the Earth.





## **Scenario sensitivities: Increasing end use efficiency can reduce growth in electricity consumption.**

**This scenario assumes that the slight downward  
historical trend in per capita consumption continues.**

**Increasing efficiency decreases the need for new  
generation resources.**

**Adoption of electric vehicles would increase electricity  
demand but could reduce emissions from the  
transportation sector.**





## **Scenario sensitivities: Coal-fired power may decrease more rapidly than assumed.**

**This scenario assumes that emissions from coal and natural gas are reduced equally.**

**Greater reductions in the use of coal would allow more natural gas to be used while still meeting the climate change goals.**





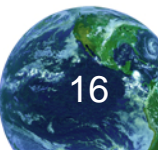
## **Scenario sensitivities: The efficiency with which natural gas is used to generate electricity may increase.**

**This scenario assumes that 8,500 BTU of gas is required to generate one kilowatt-hour of electricity on average, and that that heat rate remains constant.**

**More efficient gas-fueled generation technologies are commercially available.**

**Widespread deployment of efficient fuel cell technologies could reduce emissions substantially.**

**Combined heat and power applications could reduce emissions in sectors other than electricity as well.**







## **Sensitivities:**

**Carbon dioxide emissions from new coal-fired generation may be captured and ‘sequestered’.**

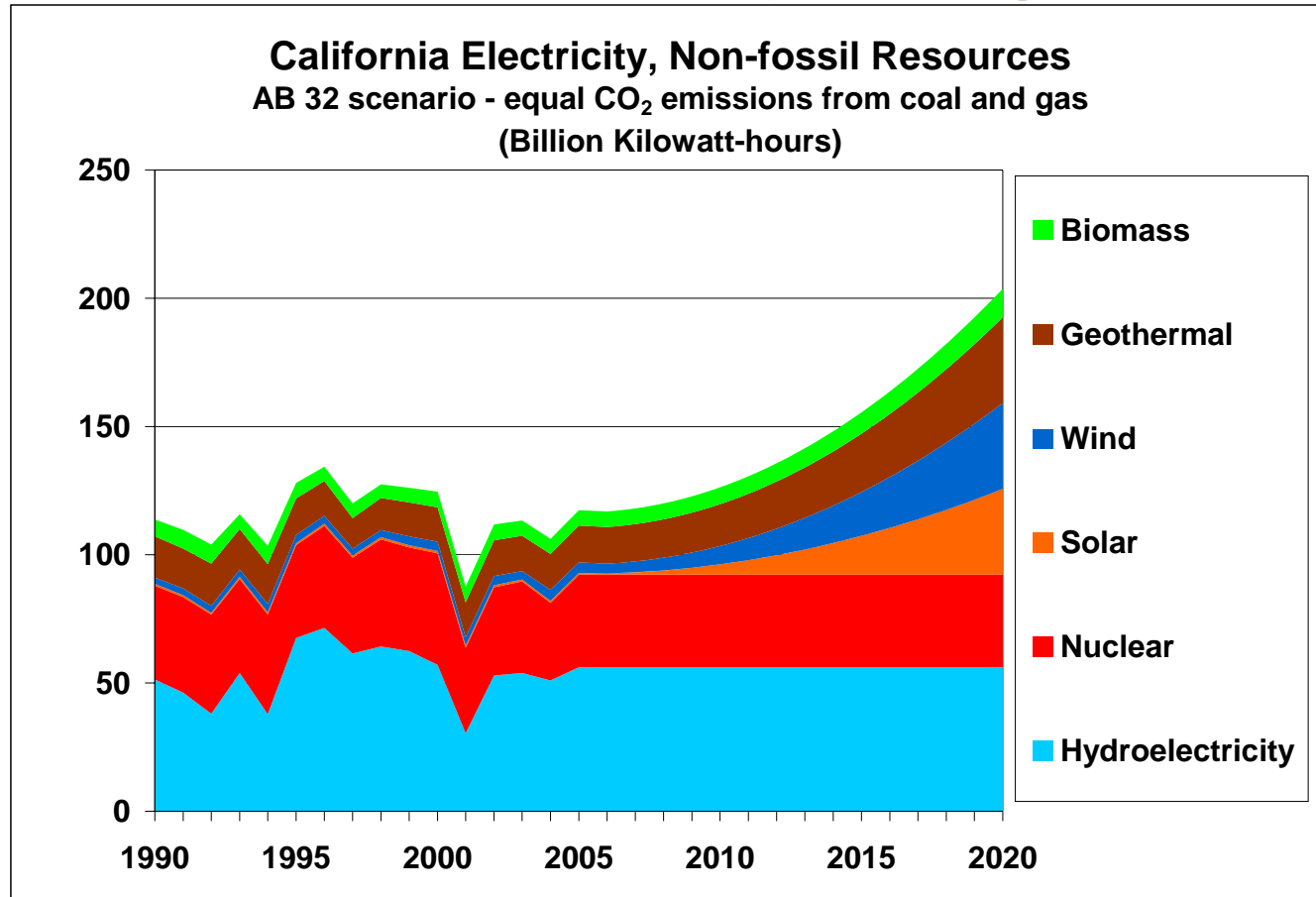
**This scenario assumes that emissions of greenhouse gases per kilowatt-hour of electricity from coal-fired plants does not change.**

**New technologies are being demonstrated for coal-fired power plants to capture and permanently store the carbon dioxide created.**





# The challenge facing California is to develop its non-fossil resources quickly enough.





# California Has Chosen Non-fossil Energy The California Global Warming Solutions Act of 2006

California has chosen wisely.

In the future, the people of California will have –

- **More energy from the sun, wind, and the Earth.**
- **Less energy from coal, oil and natural gas.**

Working together, we can limit global warming.

