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Clean Energy Technologies: The California Global Warming Solutions Act of 2006

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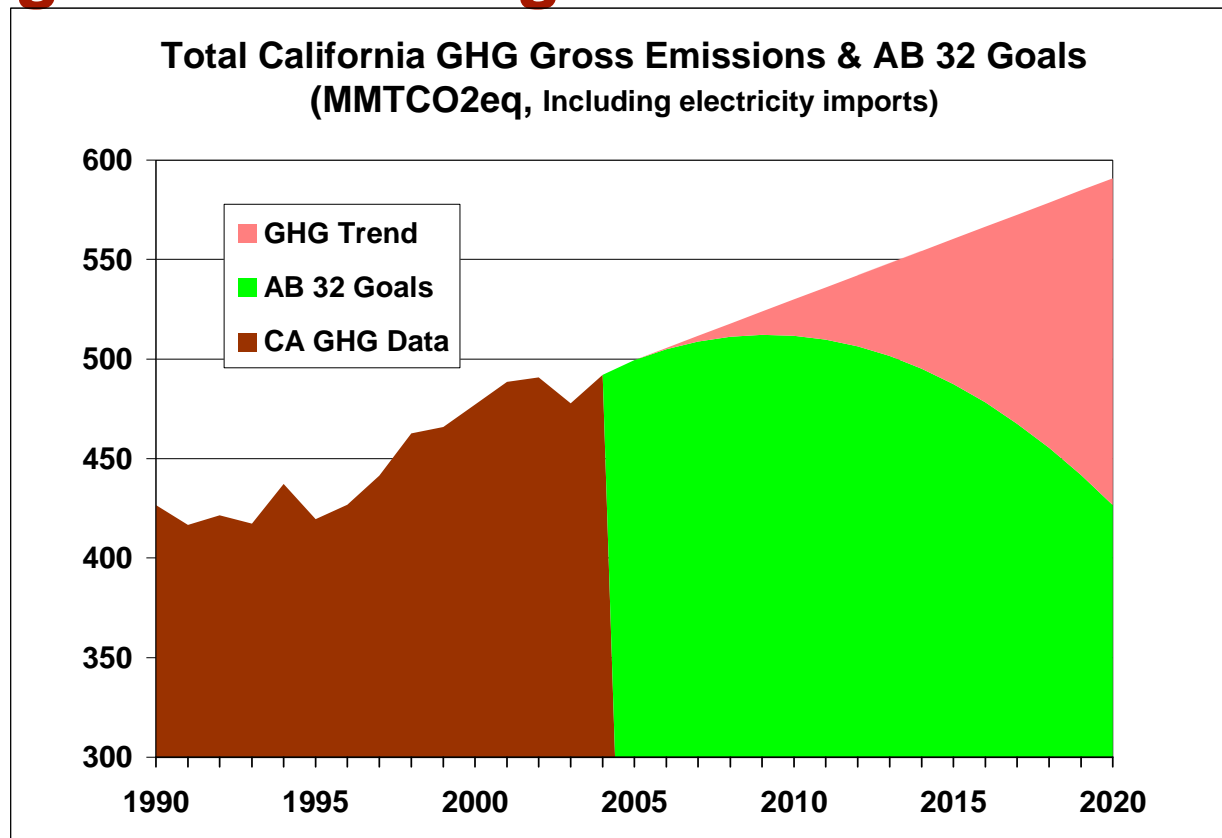


CENTER FOR ENERGY EFFICIENCY AND RENEWABLE TECHNOLOGIES, SACRAMENTO, CALIFORNIA

"Providing global warming solutions for California and the West"



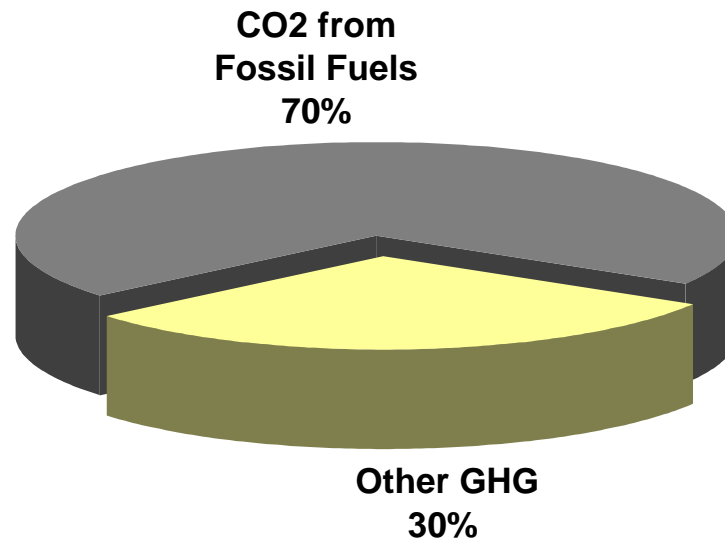
California emissions of greenhouse gases must decrease – not increase – to limit global warming.





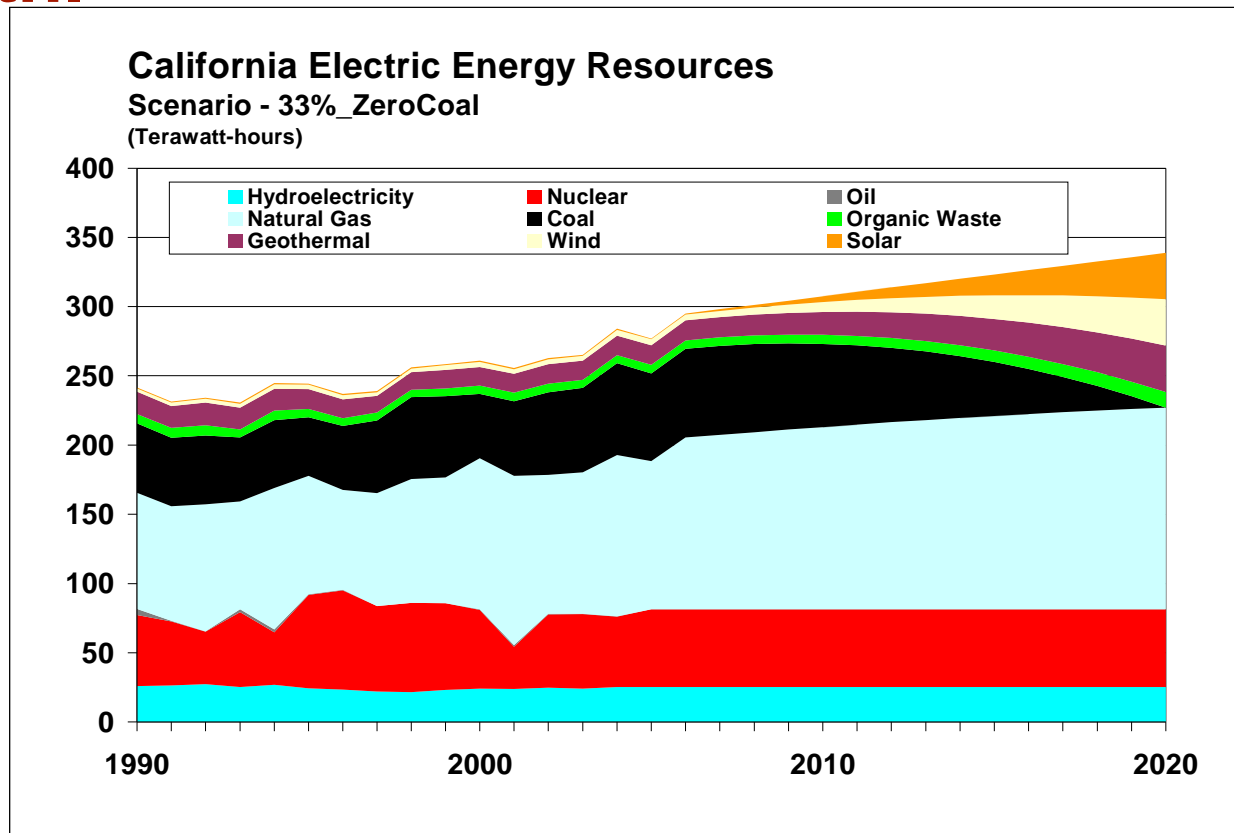
Energy from fossil fuels causes 70% of California's greenhouse gas emissions.

CA 2004 Gross GHG Emissions by Type



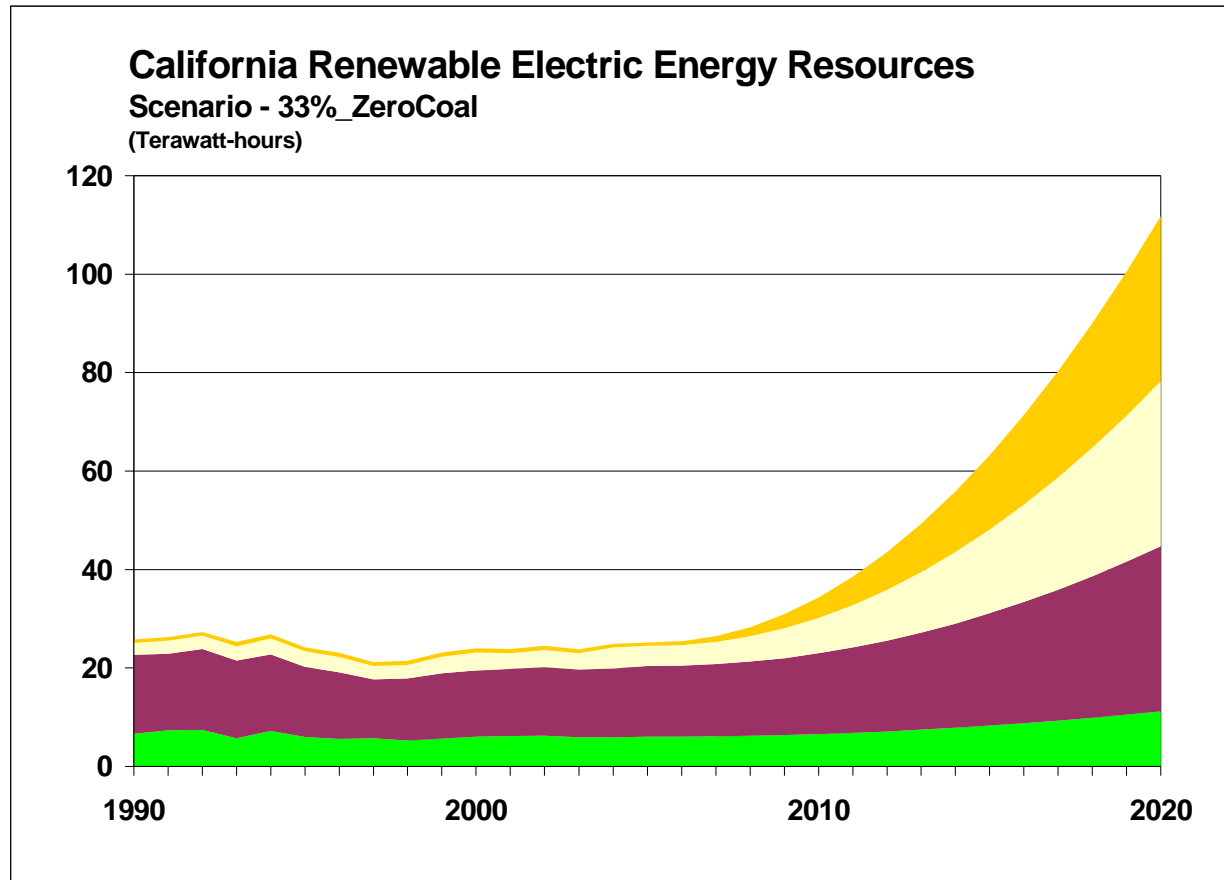


To limit climate change, California's electricity increasingly will come from the sun, wind and the Earth.





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





Substantial new infrastructure is required

Estimated new generation capacity (megawatts)

- **Geothermal** **2,400**
 - **Wind** **10,000**
 - **Solar** **11,000**
-

- **Wind requires ~ 6,500 1.5 MW turbines**
- **Solar requires ~ 110 sq. miles of collectors**
- **Total requires ~ 16 high voltage transmission lines plus collection system**





CSP Systems

The Solar Two Power Tower
experiment at Barstow, CA





1-MW Arizona Trough Plant





64 MWe Solargenix Solar Electric Plant: Boulder City, NV





Wind Turbines





Collector Types Used for Advanced Solar Thermal

Parabolic Trough



Flat Plate



Evacuated Tube



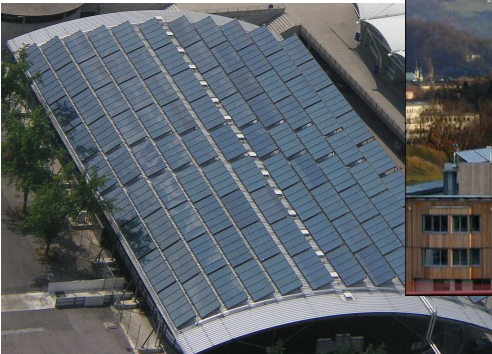


AST Is a Proven Technology Currently Not In Widespread Use In the USA



100's of projects in the U.S. in the 70's& 80's.

Some still in operation but most taken out of service after several years when energy prices got so low that the owners no longer cared about maintaining the systems.



1000's of projects in the EU, China and Japan over the last 20 years.

Eligible under Federal Tax Credit. Added to Arizona renewable portfolio in 2004.

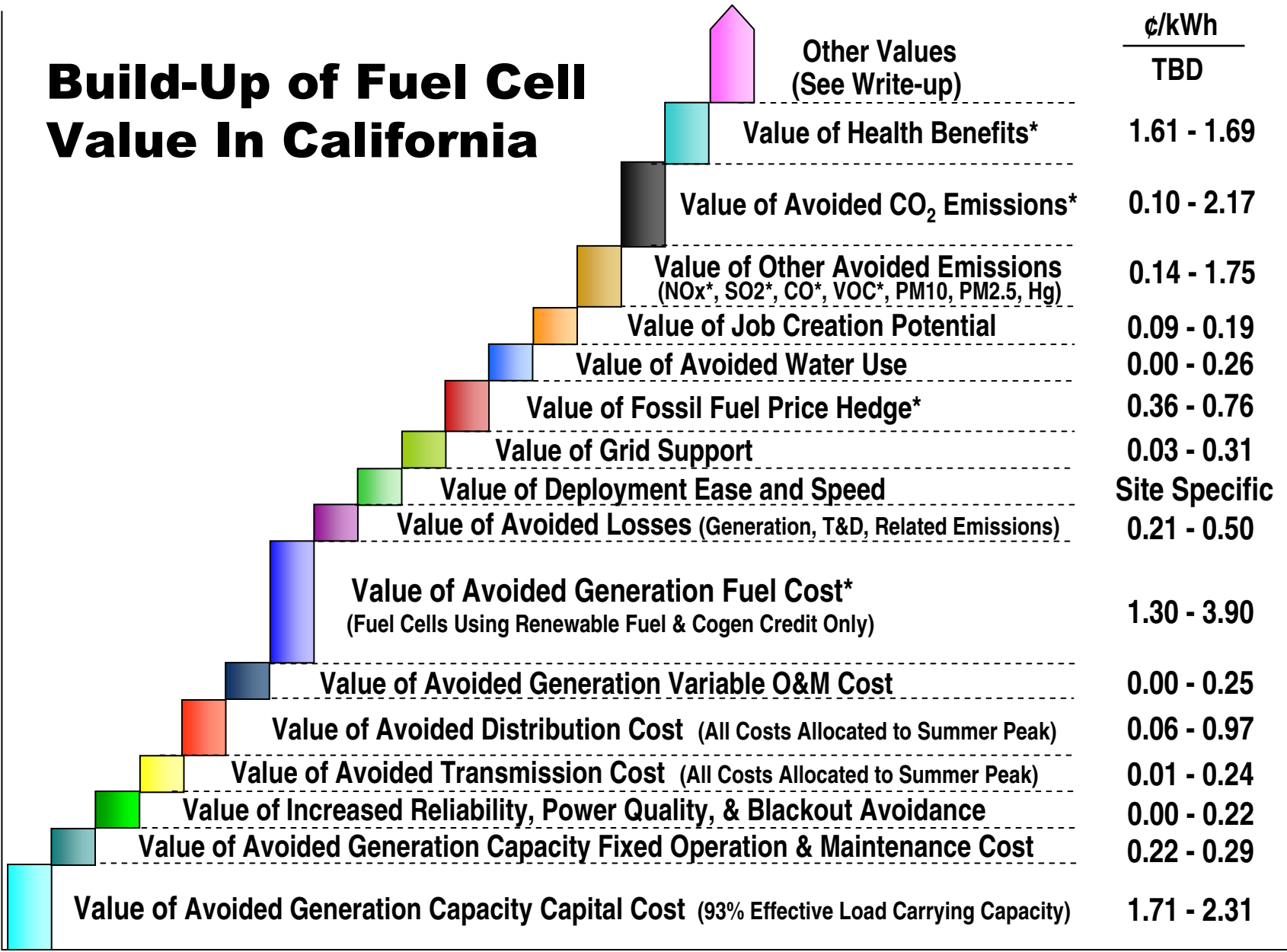




Stationary Fuel Cells



Build-Up of Fuel Cell Value In California



6/7/2007

RANGE OF TOTAL FUEL CELL VALUE:

5.8 – 15.8¢/kWh

* Indicates inclusion of Cogen Credit