

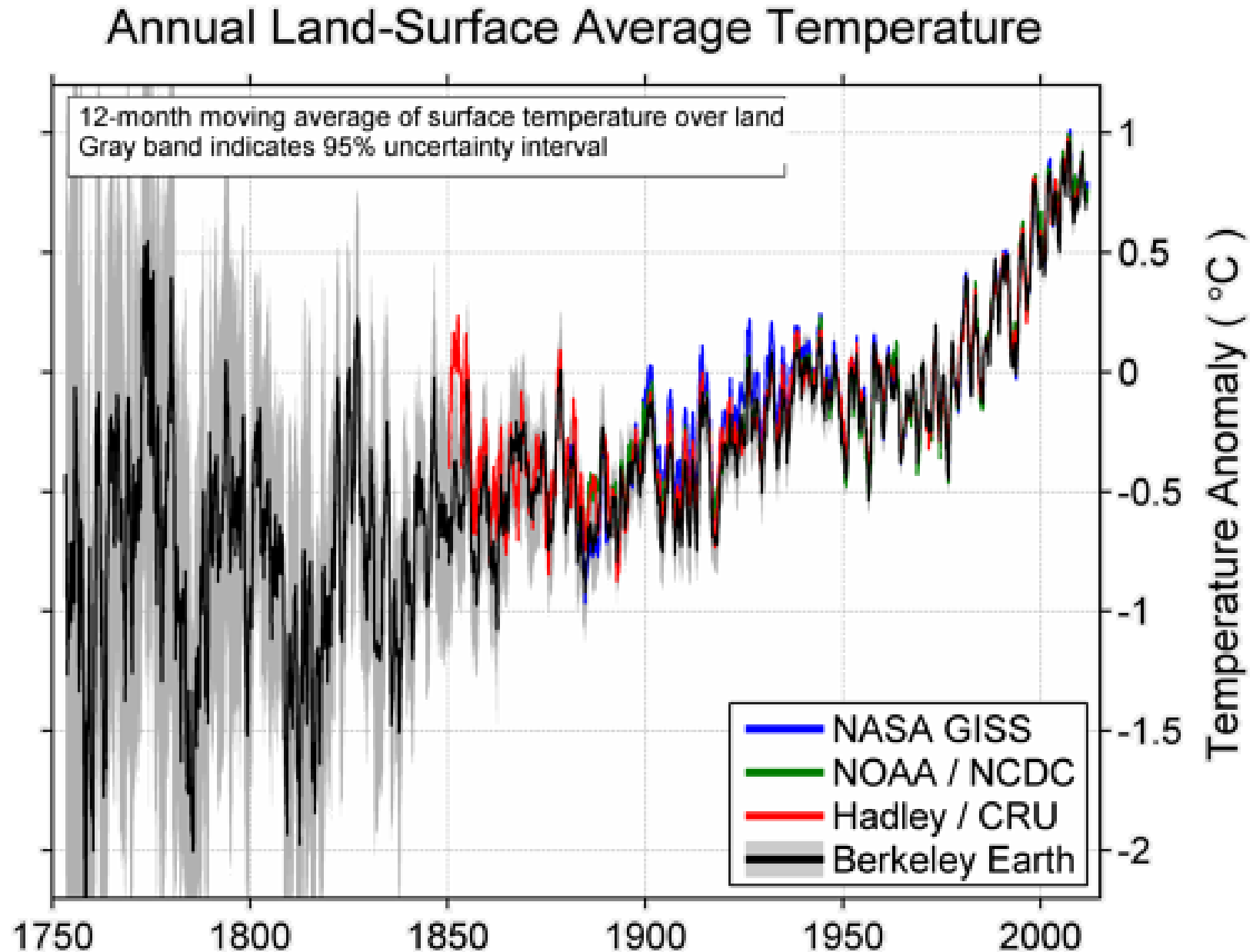
Advanced Scientific Computing Advisory Committee

August 14, 2012

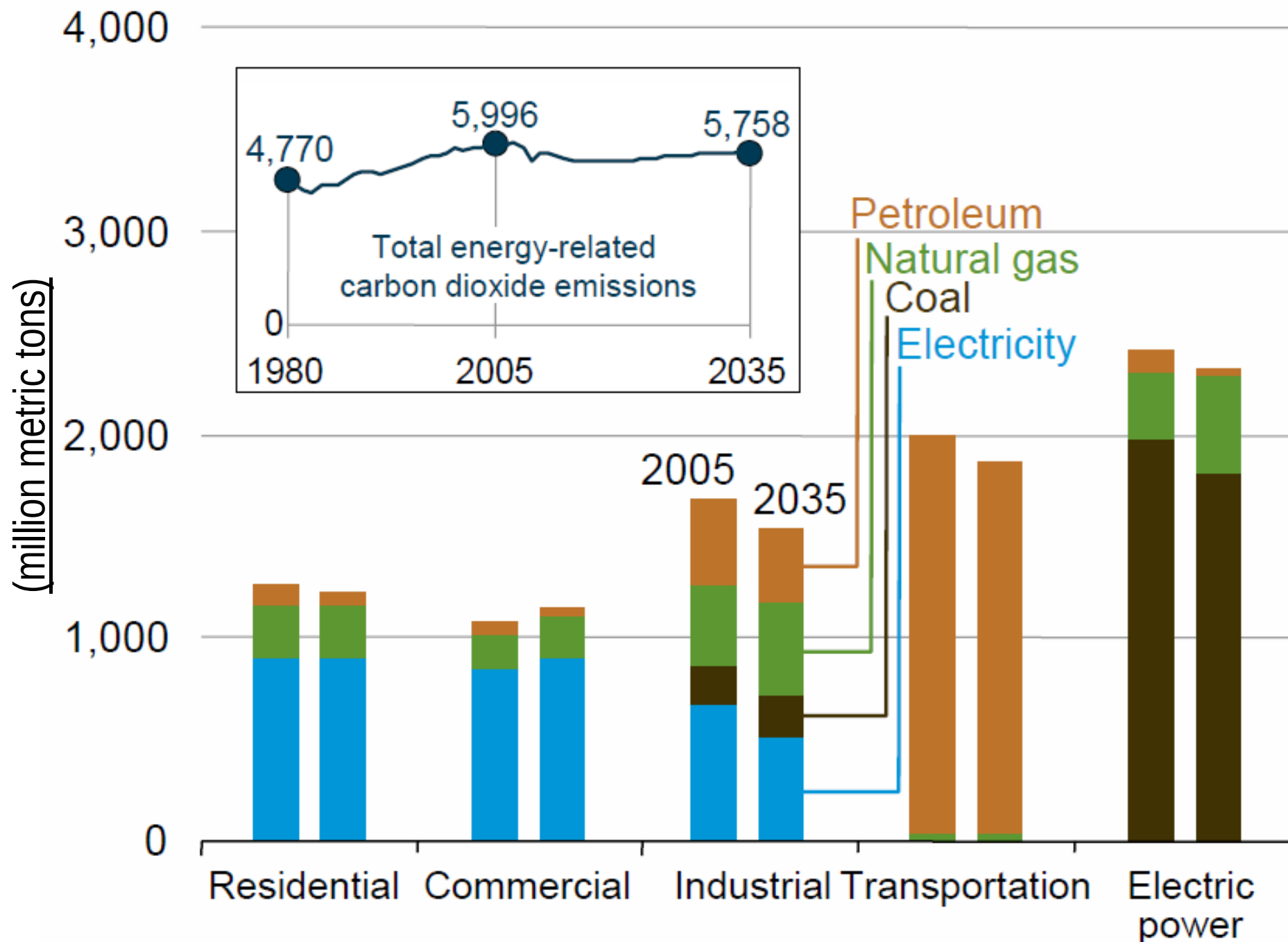
**Dr. William Brinkman
Director, Office of Science
US Department of Energy**

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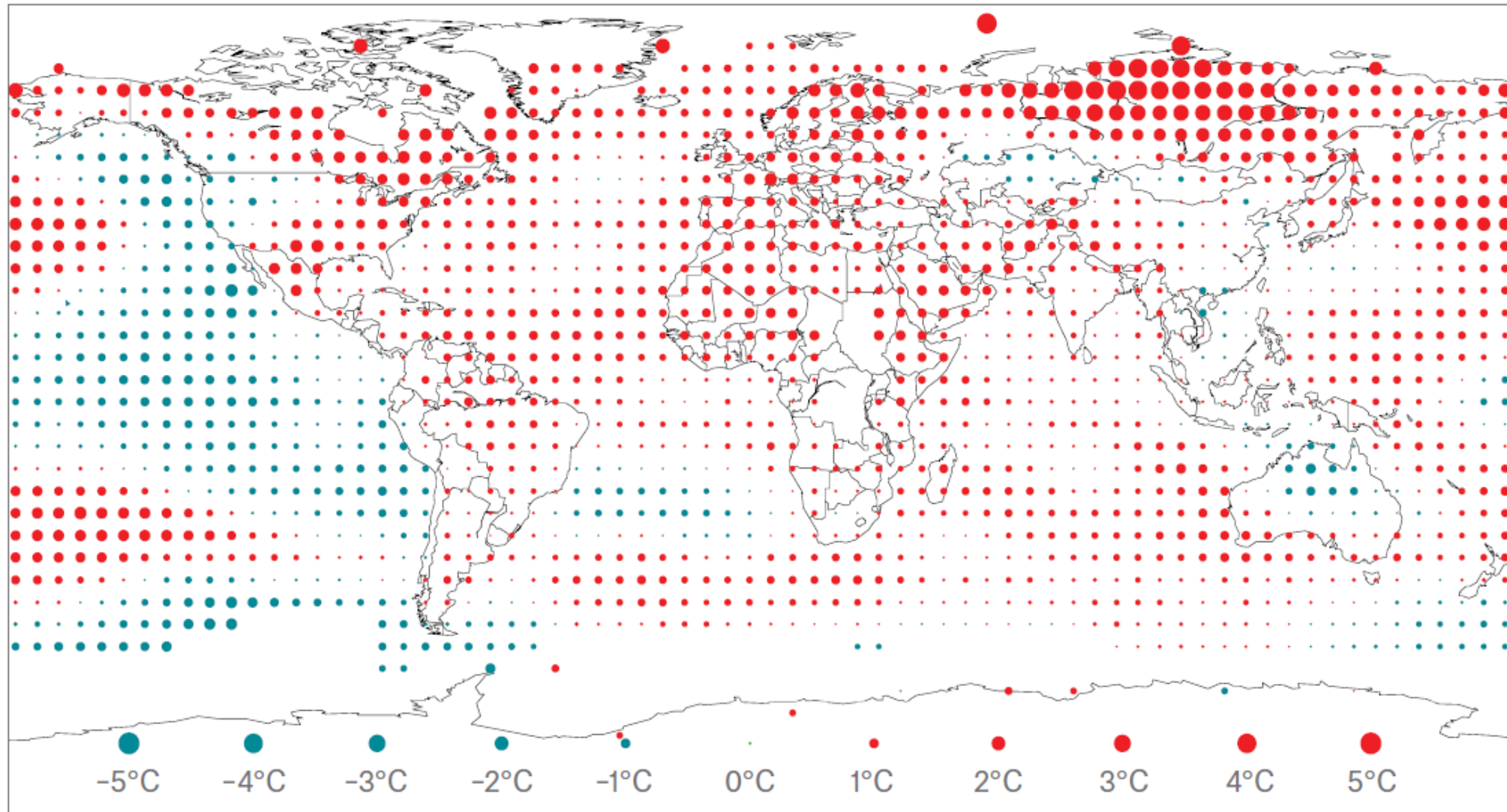
Global Average Temperature Increases with CO₂



US energy-related CO2 emissions by sector and fuel, 2005 and 2035

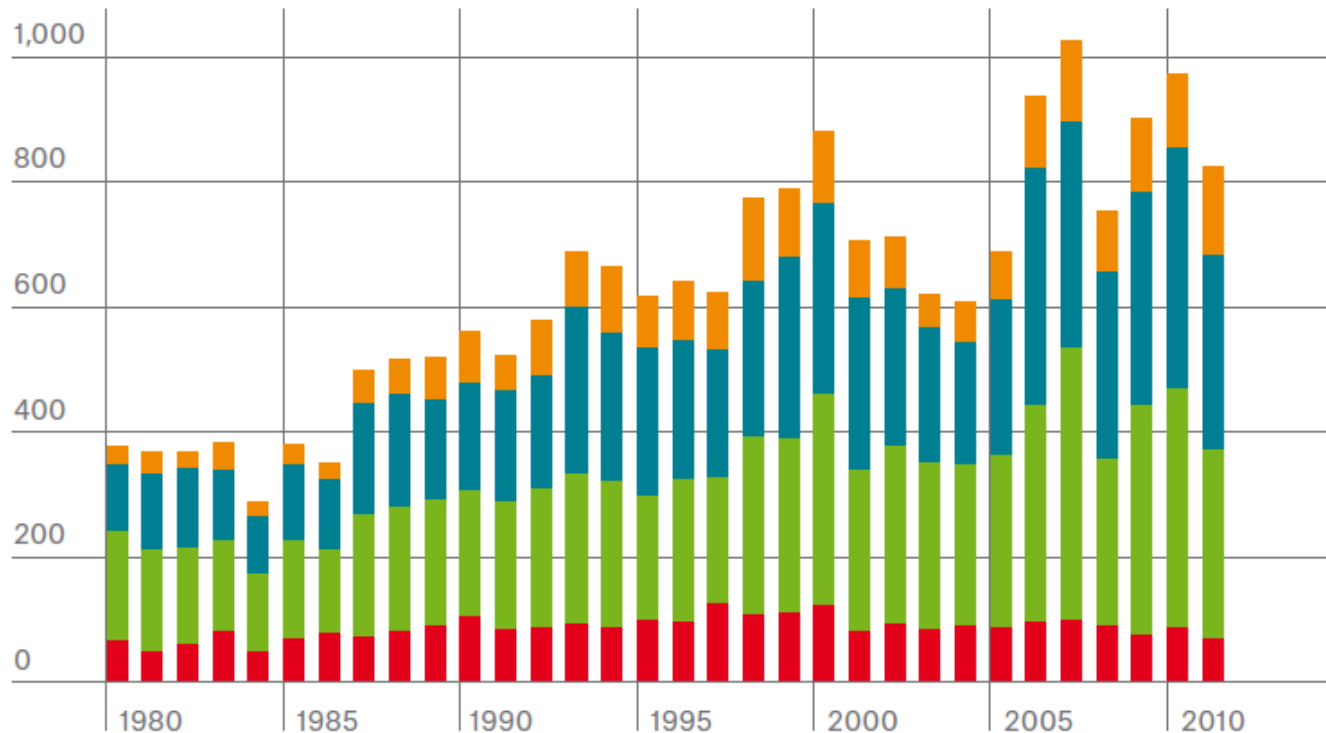


Regional mean annual temperature anomalies for 2011 with respect to a 1971-2000 base period



Number of Natural Catastrophes 1980-2011

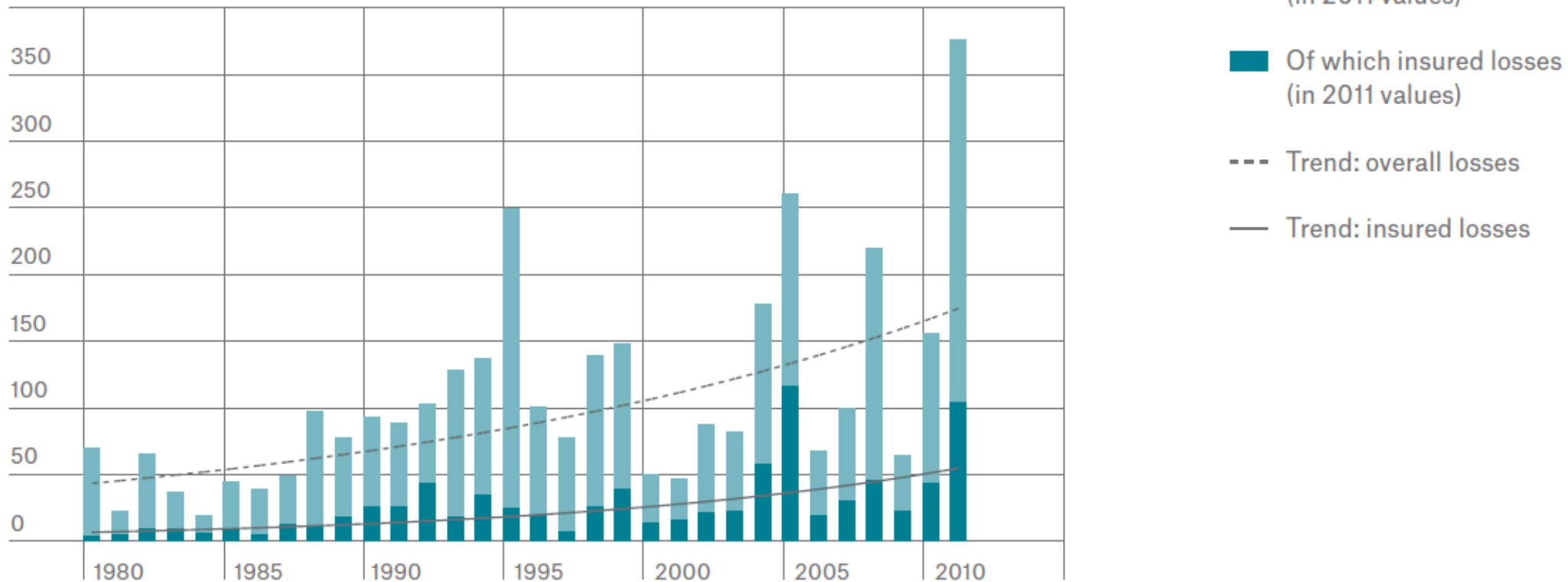
Number of natural catastrophes 1980-2011



- Geophysical events: Earthquake, volcanic eruption
- Meteorological events: Tropical storm, winter storm, severe weather, hail, tornado, local storm
- Hydrological events: Storm surge, river flood, flash flood, mass movement (landslide)
- Climatological events: Heat-wave, cold wave, wildfire, drought

Overall Losses and Insured Losses 1980-2011 (\$ billion)

Overall losses and insured losses 1980-2011 (US\$ bn)



Tesla – 300 miles per charge car



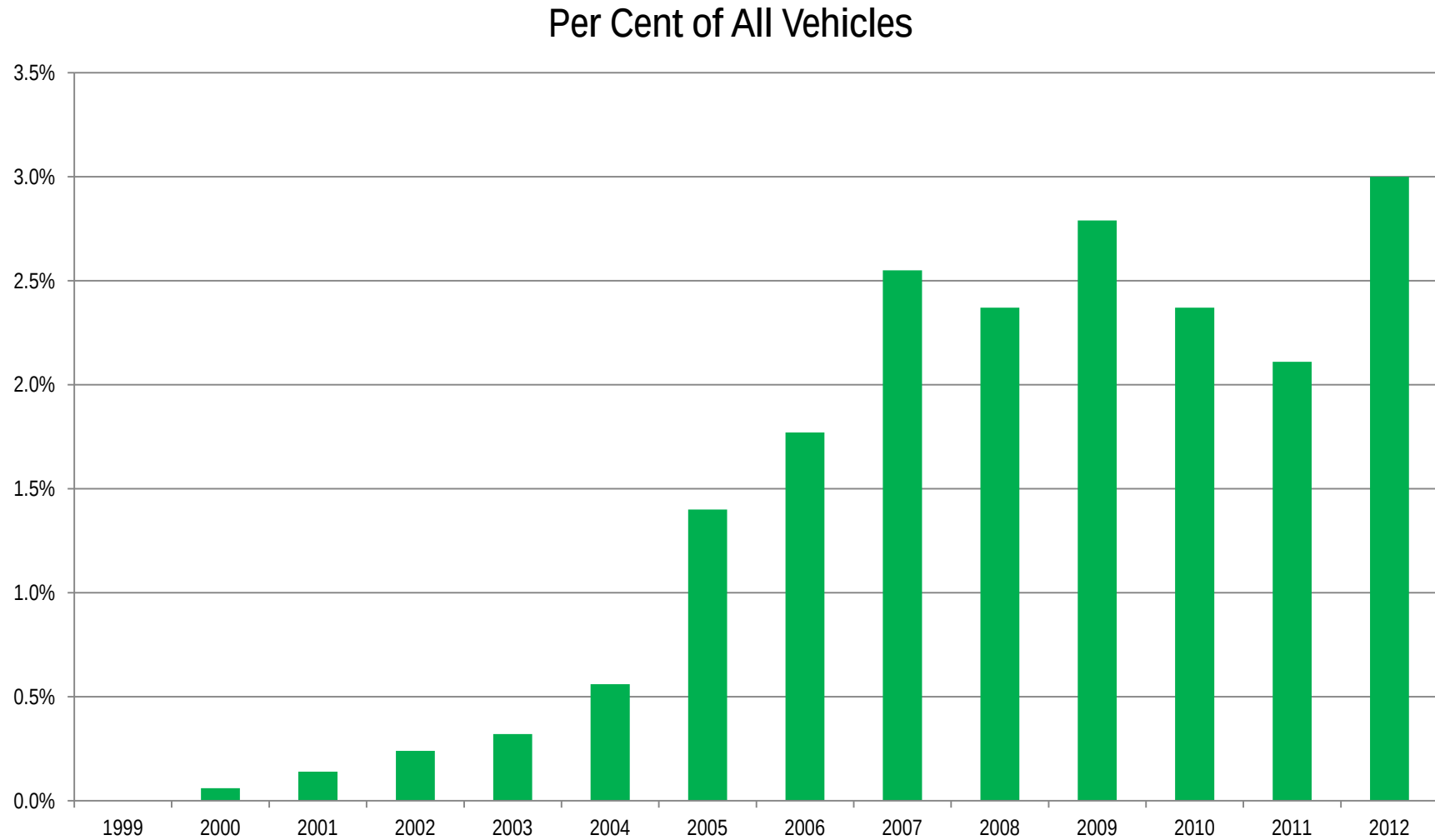
The Tesla Is One Hot Car

Four models

40 kWh	60 kWh	85kWh	85 kWh	
			performance	
160mi	230 mi	300 mi	300 mi	
6.5 sec	5.9 sec	5.6 sec	4.4sec	zero to sixty
110 mph	120mph	125mph	130mph	

Recharges at 62 miles per hour-has a supercharger

Hybrid Sales 1999-2012 (per cent)



Energy Frontier Research Centers

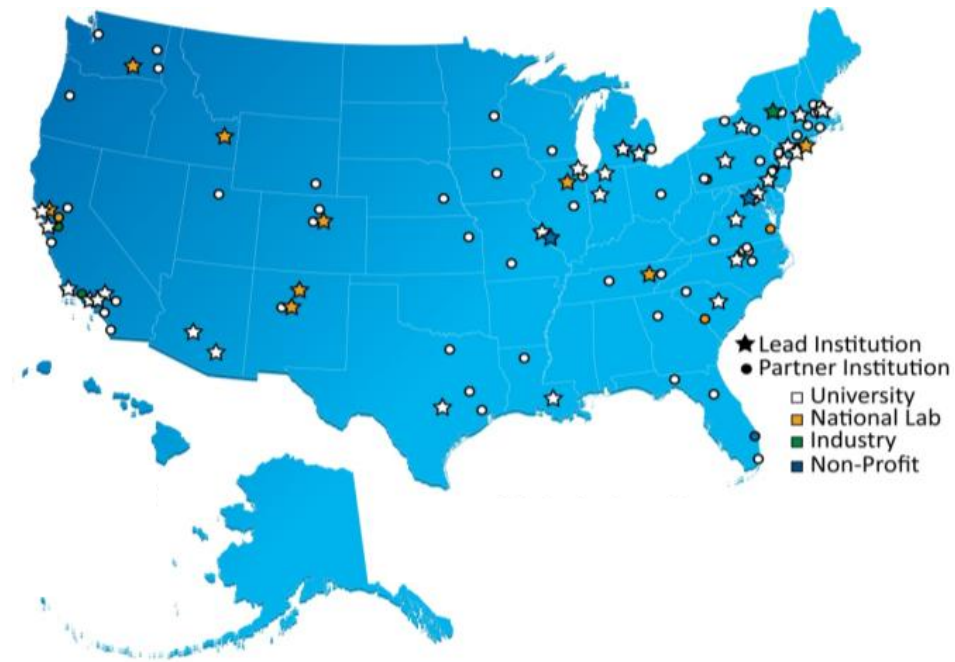
Grand Challenge and Use-Inspired Research

46 EFRCs in 35 states were launched in Fall 2009

- Science crosscuts energy-use-inspired and grand challenge research
- ~850 senior investigators and ~2,000 students, postdoctoral fellows, and technical staff at ~115 institutions
- >250 scientific advisory board members from 13 countries and >40 companies

Impact to date (~2.5 years):

- >2,400 peer-reviewed papers including more than 60 publications in *Science* and *Nature*.
- > 125 patents applications, nearly 55 additional patent/invention disclosures, and 22 licenses
- >30 companies have benefitted from EFRC research results



■ Solar Energy

■ Combustion

■ Bio-Fuels

■ Catalysis

■ Energy Storage

■ Solid State Lighting

■ Geosciences for Energy Applications

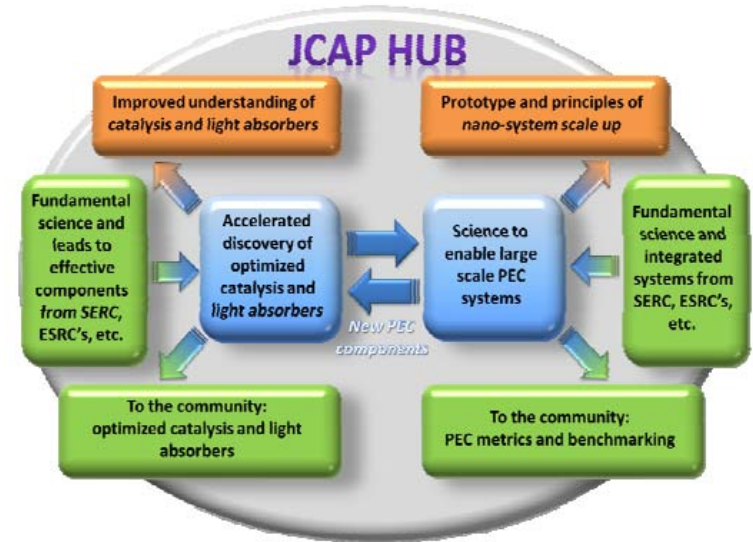
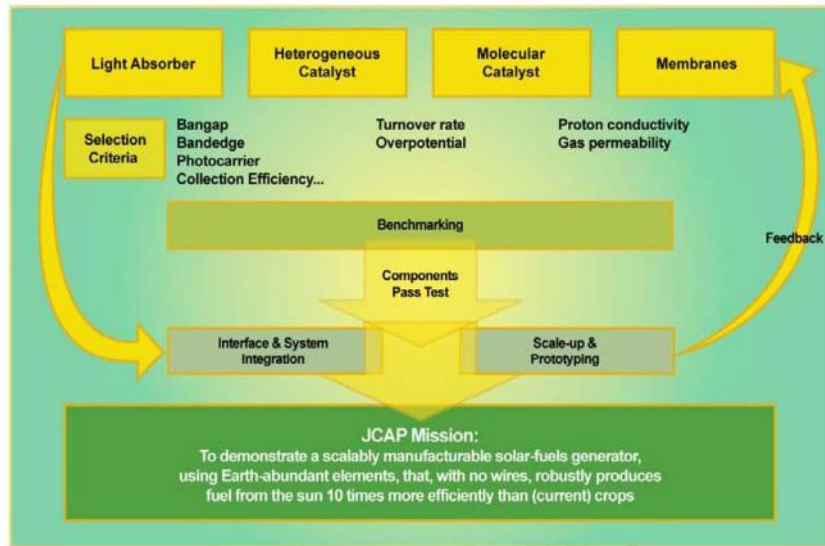
■ Superconductivity

■ Advanced Nuclear Energy Systems

■ Materials Under Extreme Environment

■ Hydrogen

Fuels from Sunlight Hub: Joint Center for Artificial Photosynthesis (JCAP)



JCAP Mission: To demonstrate a scalable, manufacturable solar-fuels generator using Earth-abundant elements, that, with no wires, robustly produces fuel from the sun ten times more efficiently than (current) crops.

JCAP R&D will focus on:

- Robustness of components
- Accelerating the rate of catalyst discovery for solar fuel reactions
- Discovering earth-abundant, robust, inorganic light absorbers with optimal band gap
- System integration, benchmarking, and scale-up

JCAP's role as a solar fuels Hub:

- Incorporating the latest discoveries from the community (EFRCs, single-PI or small-group research)
- Providing metrics and benchmarking to the community

Other hubs or hub like structures

Existing:

- **Biofuel Centers – (Science)**
 - Joint BioEnergy Institute
 - BioEnergy Science Center
 - Great Lakes Bioenergy Research Center
- **Energy Efficient Buildings Hub (EERE)**
- **Consortium for Advanced Simulation of Light Water Reactors (Nuclear Energy)**

Coming soon:

- **Battery Hub (Science, EERE and ARPA-E)**
 - **Critical Materials Hub (EERE, Science ARPA-E)**
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