

AB 1493 (Pavley) Briefing Package

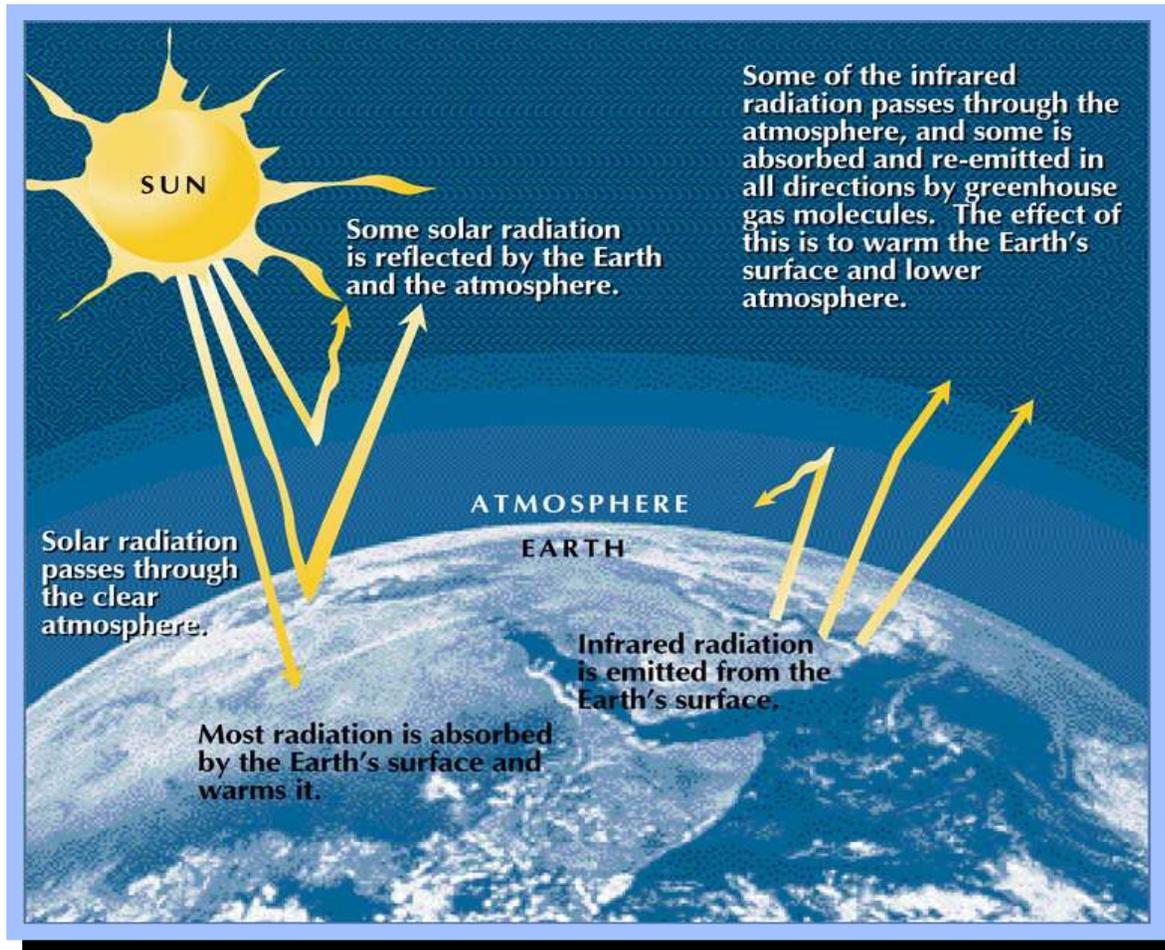
Global Warming and Greenhouse Gas Emissions from Motor Vehicles



Prepared by the California Environmental Protection Agency

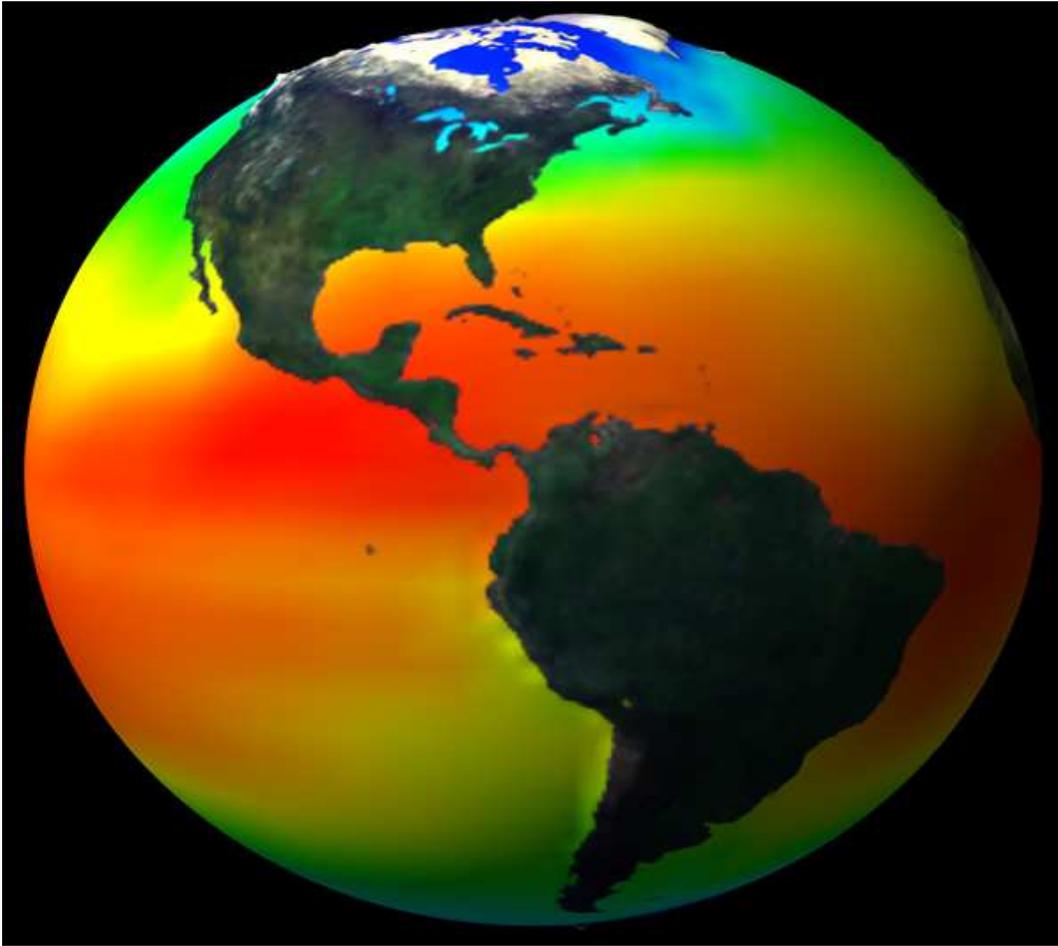


The Greenhouse Effect



Source: U.S. EPA State and Local Climate Change Outreach Kit, March 2000

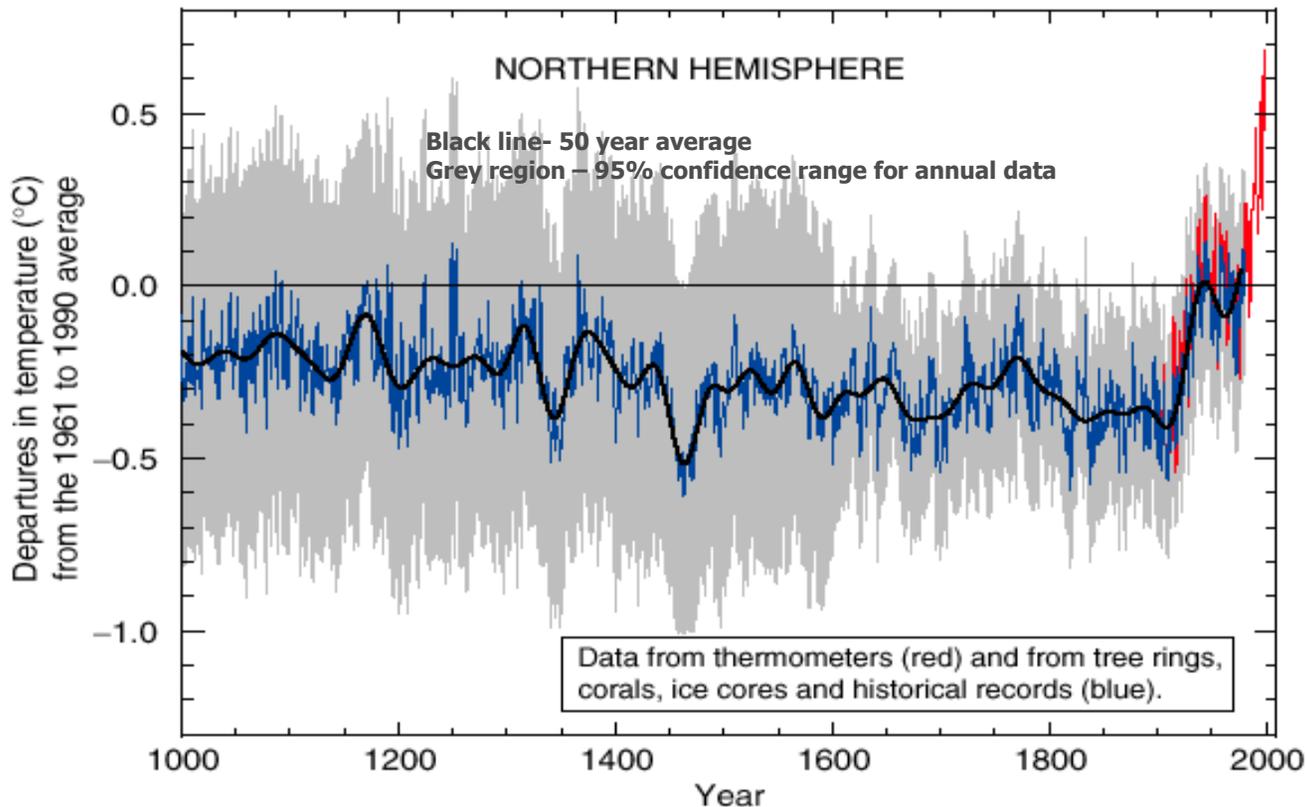
Evidence For Global Warming



- **The issue is real**
- **Discernible “first signs” are being seen now**
- **Some human-induced climate change is likely inevitable**

Source: U.S. EPA State and Local Climate Change Outreach Kit, March 2000

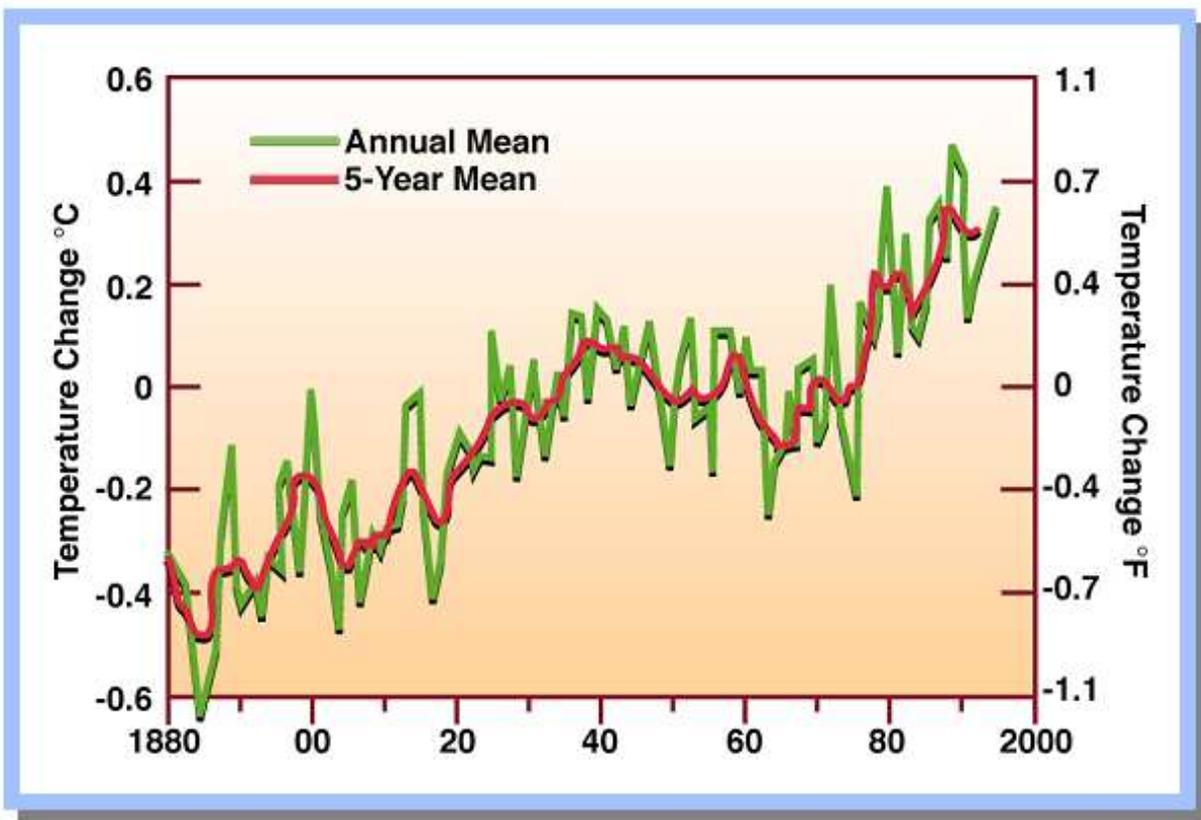
The World Is Warming



Sources: IPCC Report: Summary for Policy Makers, Climate Change 2001: The Scientific Basis
NCDC Website

- The rate and duration of warming of the 20th century has been much greater than in any of the previous nine centuries.
- Similarly it is likely that the 1990s have been the warmest decade and 1998 the warmest year of the millennium.
- At the halfway point, 2002 is the second warmest year on record.

Observed Global Surface Air Temperatures

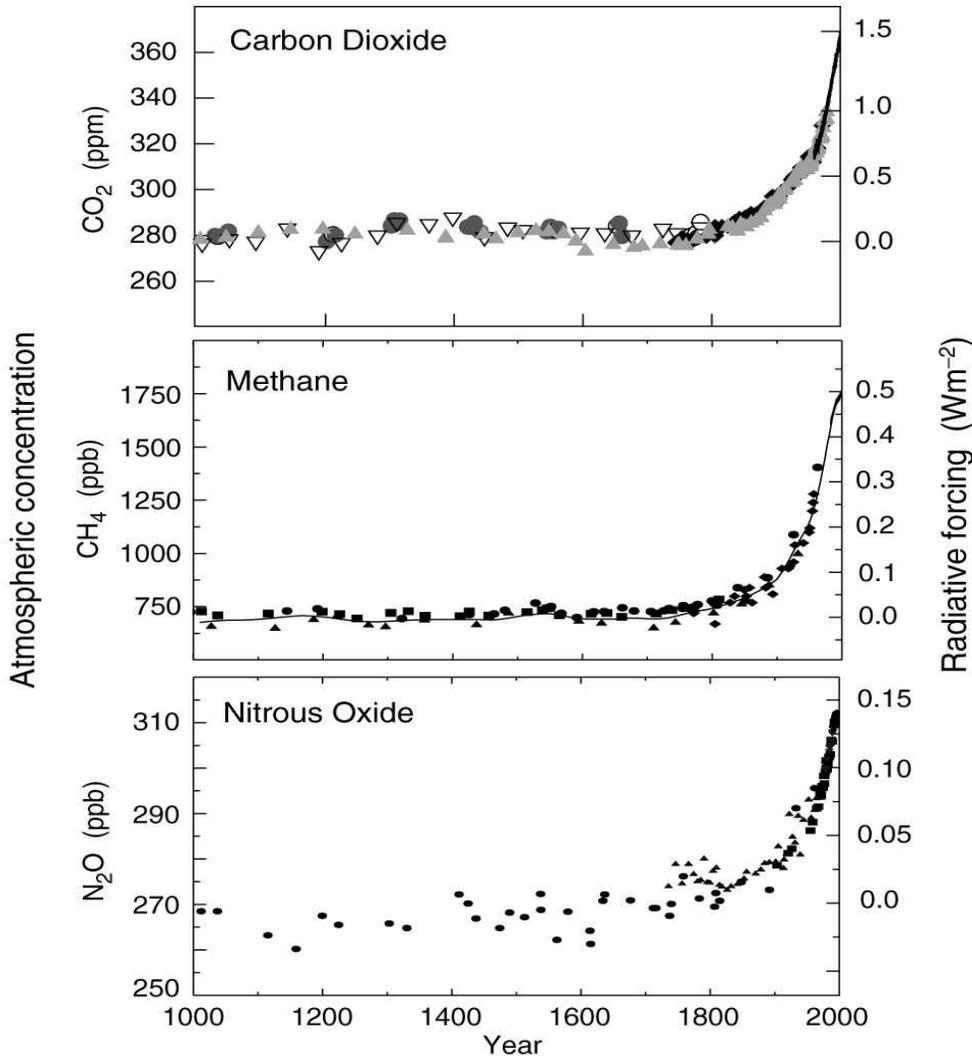


- **+1 °C (almost 2 °F) since 1880**
- **Melting of glaciers**
- **Sea level rose 4-8"**
- **+2 to 6 °F predicted by 2100**

Source: Adapted from NASA Goddard Institute for Space Studies, New York

Industrial Era Has Changed The Atmosphere

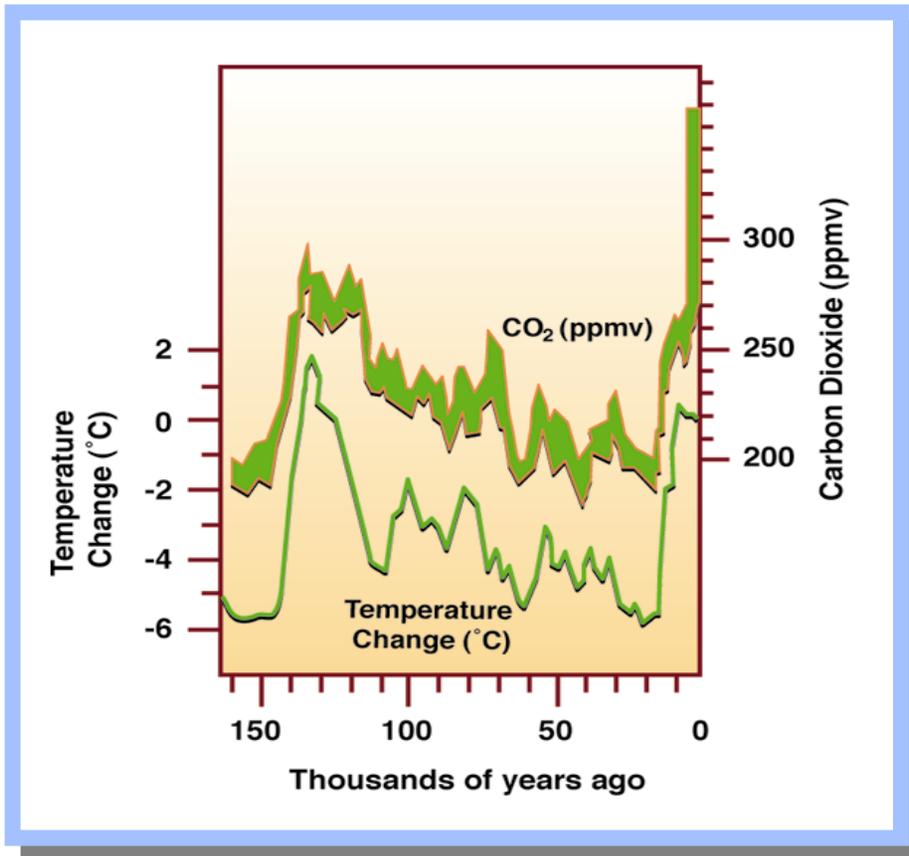
(a) Global atmospheric concentrations of three well mixed greenhouse gases



- **Carbon dioxide, methane, nitrous oxide, and other pollutants cause global warming**
- **IPCC concludes increase in these gases is a result of human activities**

Source: IPCC Report: Summary for Policy Makers,
Climate Change 2001: The Scientific Basis

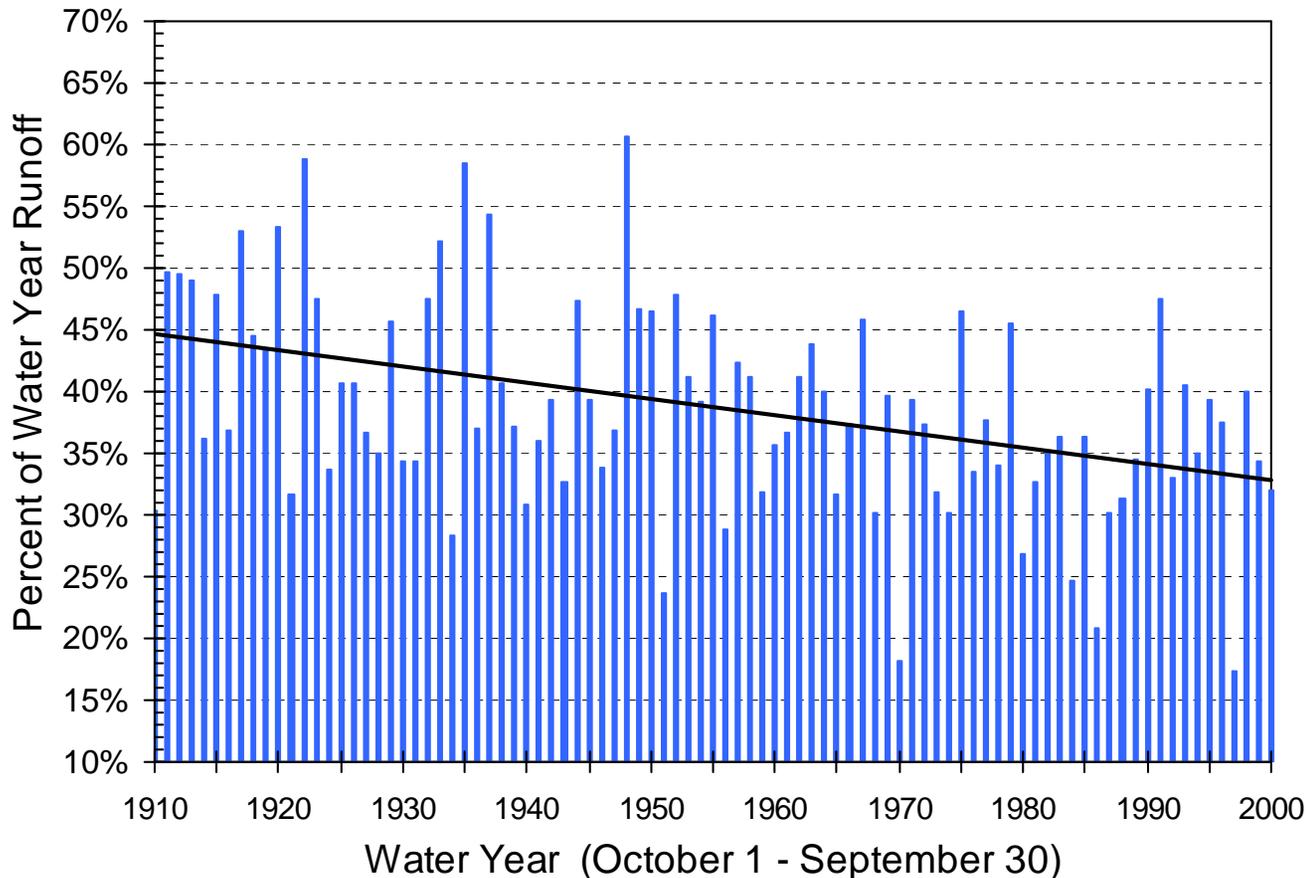
Temperature Tracks Carbon Dioxide



- **Ice core records show the current rate of increase and levels are unprecedented**

Source: Adapted from Office of Science and Technology Policy,
Climate Change State of Knowledge, October 1997

Our Principal Reservoir - The Sierra Snow Pack - Is Shrinking



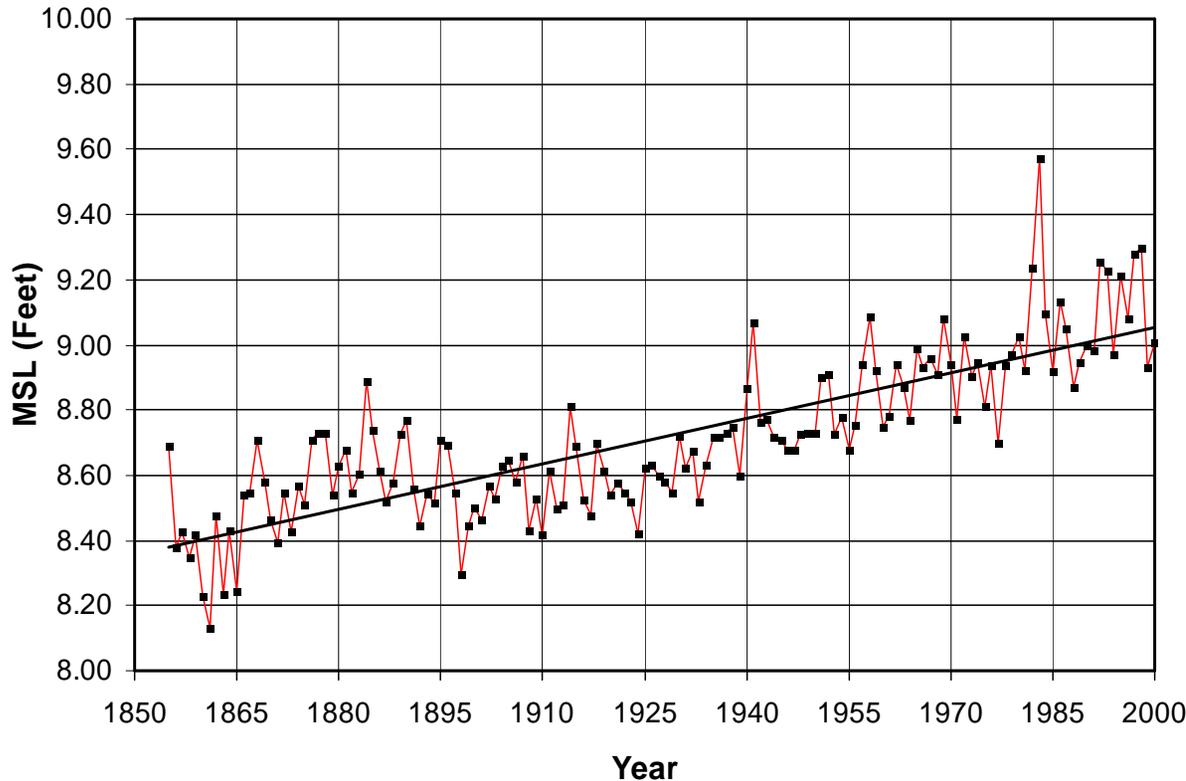
Warmer Winters Have:

- **Reduced snow pack**
- **Led to earlier snow melt**
- **Decreased spring runoff by 10%**
- **Major effects on water supply, Cal Fed, and Delta system**

Sacramento River Runoff (1910-2000) - April to July as a Percent of Total Runoff

Source: California Environmental Protection Agency, Environmental Protection Indicators for California, 2001

Sea Level Is Rising Along California's Coast

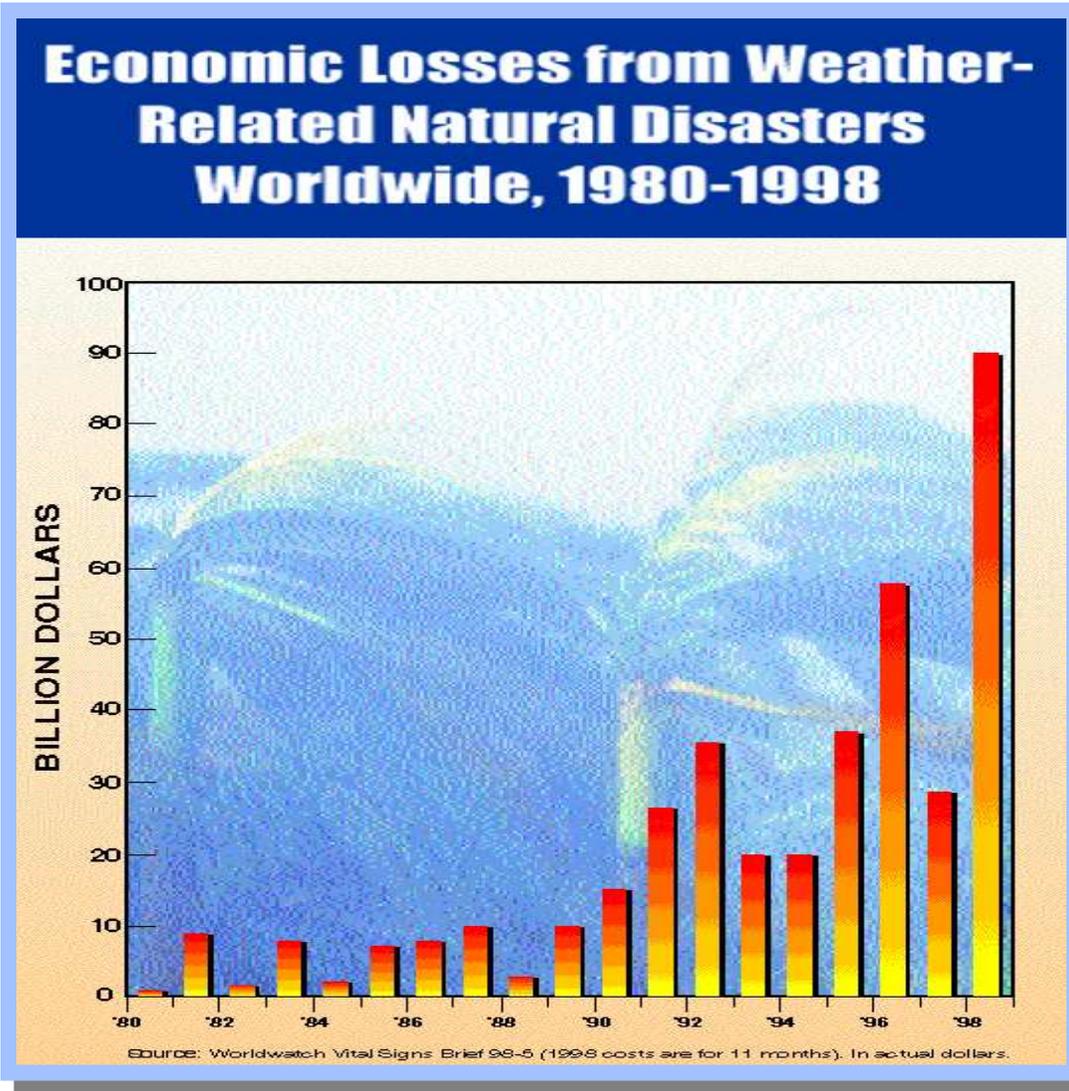


San Francisco Yearly Mean Sea Level (1855-2000)

Source: California Environmental Protection Agency, Environmental Protection Indicators for California, 2001

- CA has already seen a **7" rise in 150 years**
- **Concerns over levee stability and salt water intrusion**
- **IPCC projects 4-35" sea level rise by 2100**
- **Present Delta system may not be viable at upper end of range**

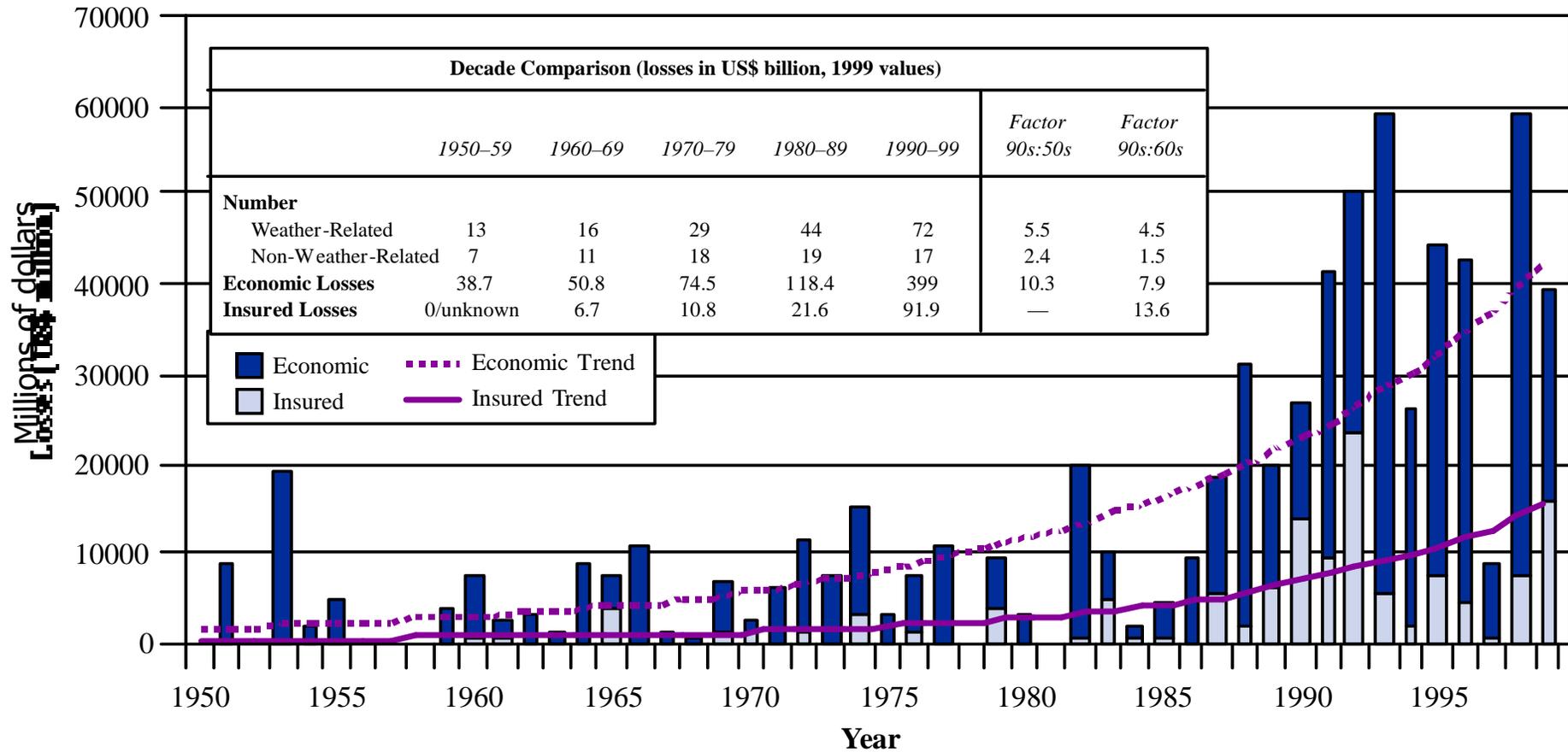
Extreme Weather Events Are Increasing



Causing Billions of Dollars in Damages

Source: World watch Vital Signs Brief 98-5 (1998 costs are for 11 months). In actual dollars.

Global Disaster-Related Losses



Source: IPCC Working Group II Third Assessment Report, 2001

Human Activities Can Intensify The Greenhouse Effect



Transportation



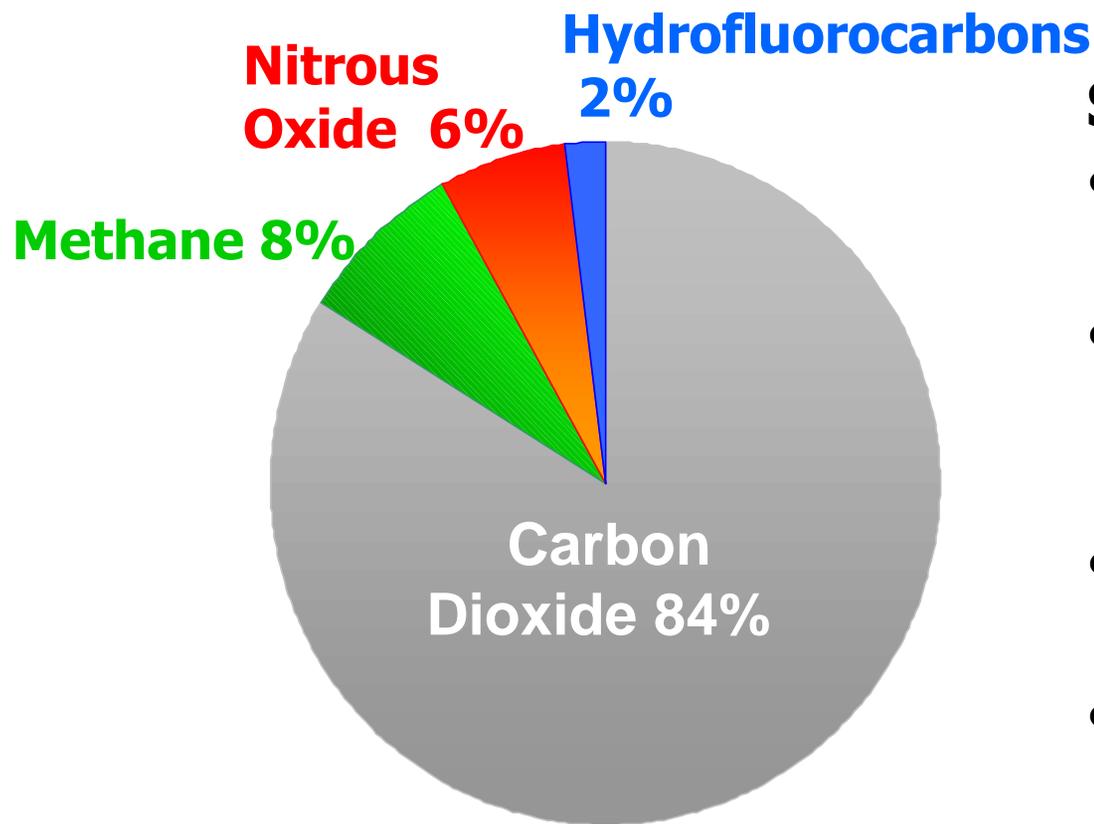
Industry



Utilities

Source: U.S. EPA State and Local Climate Change Outreach Kit, March 2000

1999 California Greenhouse Gas Emissions

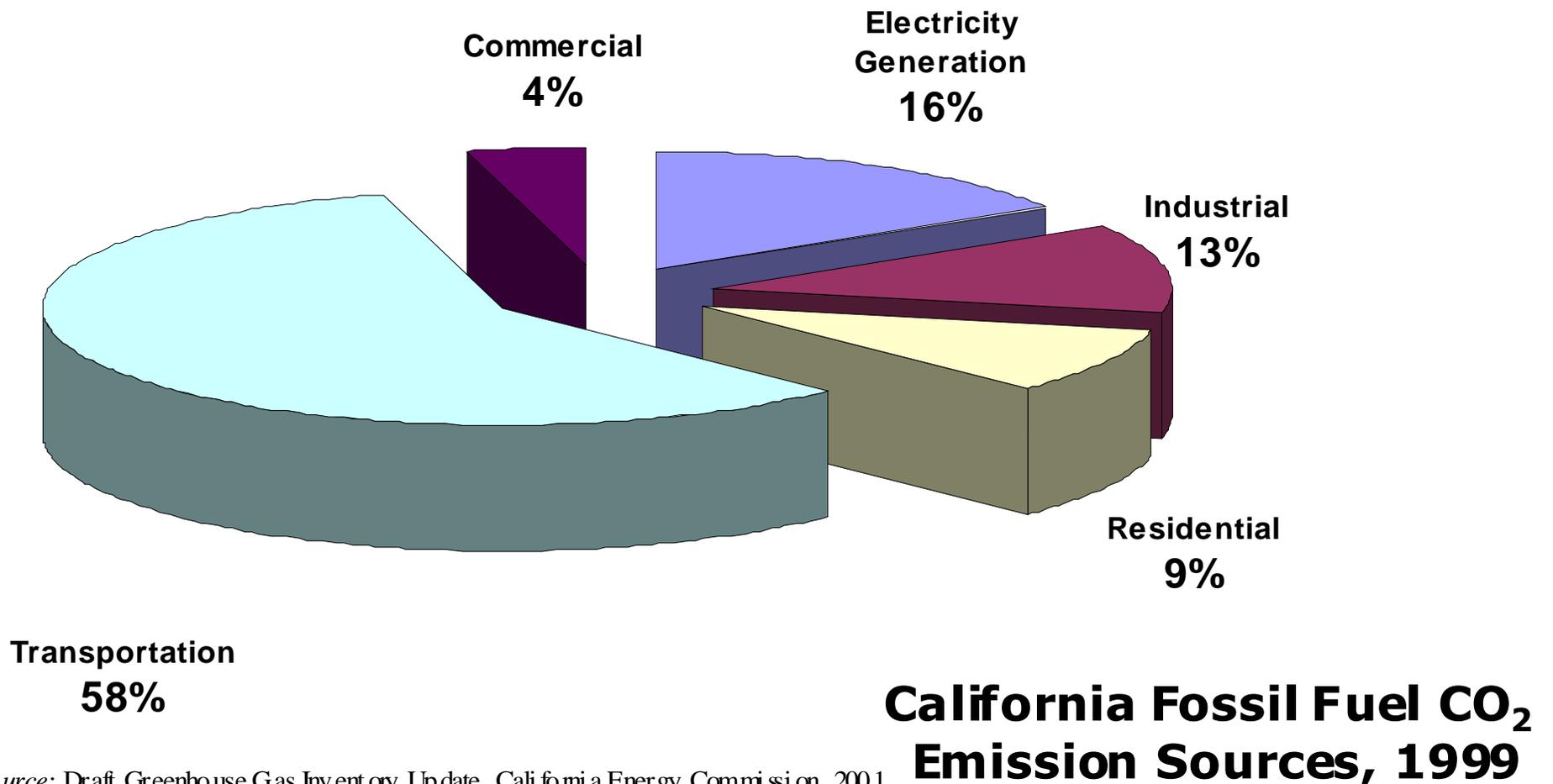


Sources

- **Carbon Dioxide (CO₂)**
 - Fossil fuel combustion
- **Methane**
 - Fossil fuels
 - Landfills, agriculture
- **Nitrous Oxide**
 - Agriculture, cars
- **Hydrofluorocarbons**
 - Refrigerants, solvents

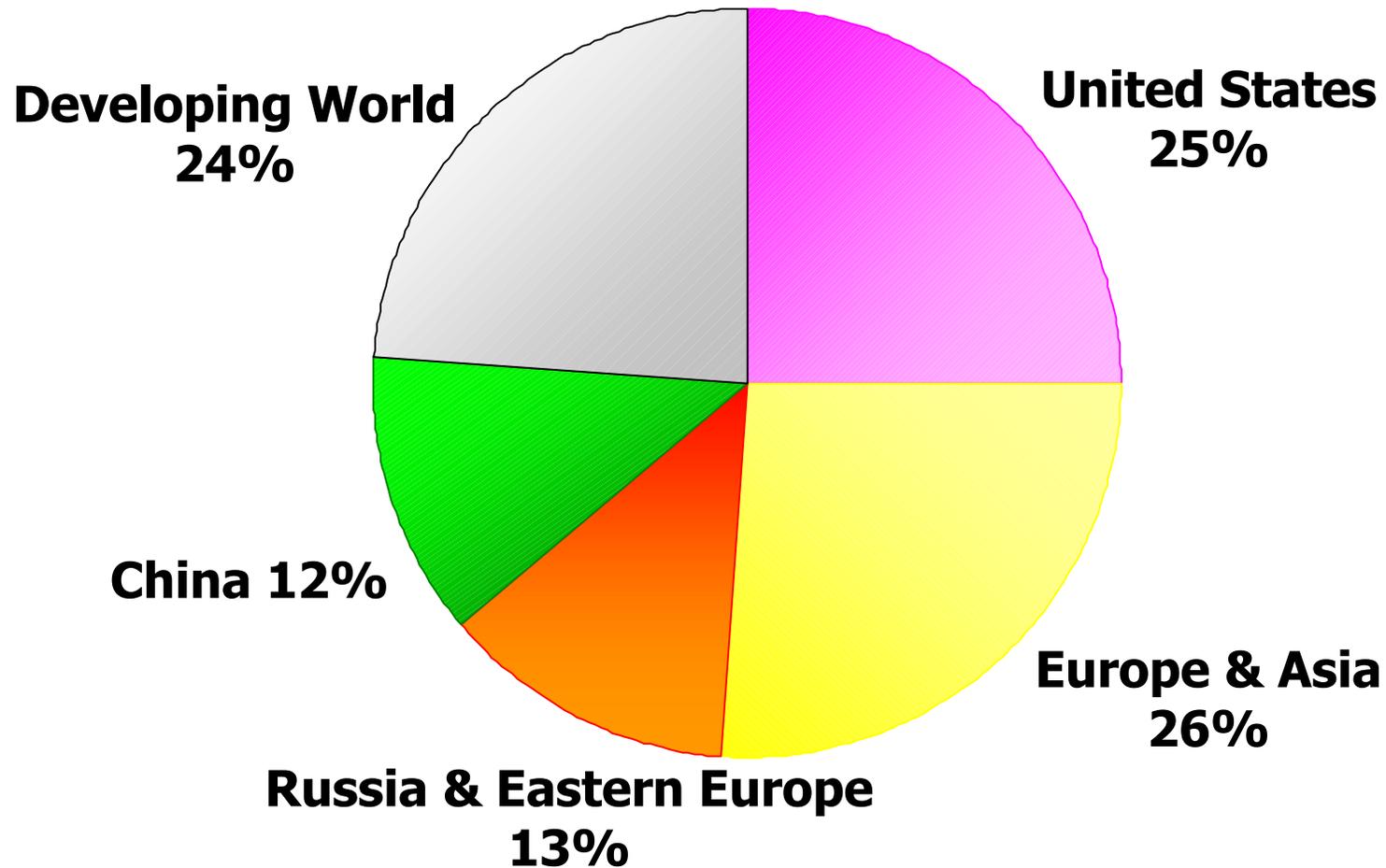
Source: Draft Greenhouse Gas Inventory Update, California Energy Commission, 2001
In CO₂ equivalents

Transportation Is California's Largest Source of CO₂



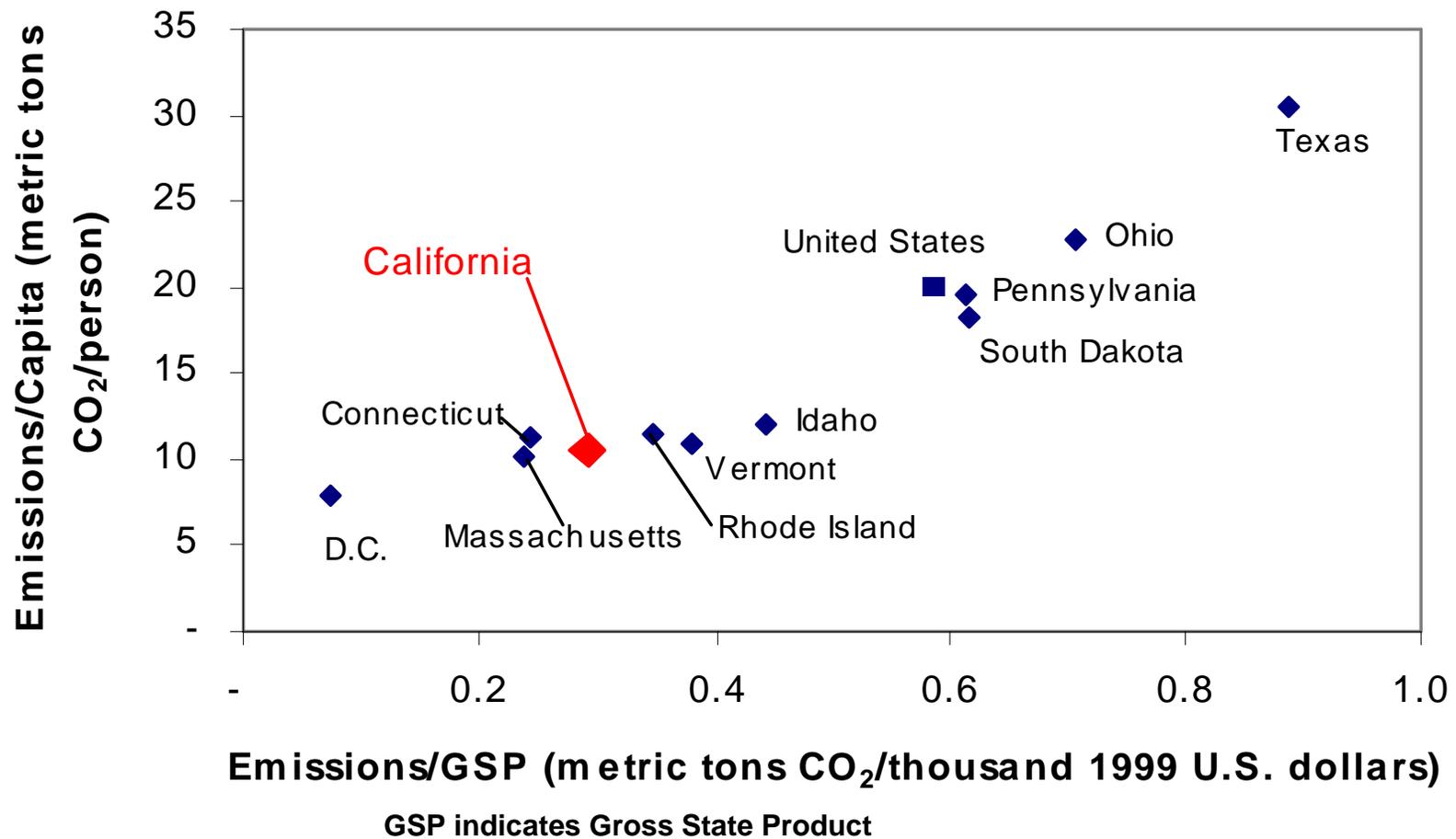
Source: Draft Greenhouse Gas Inventory Update, California Energy Commission, 2001

U.S. Is The Largest Single Contributor To Greenhouse Gas Emissions



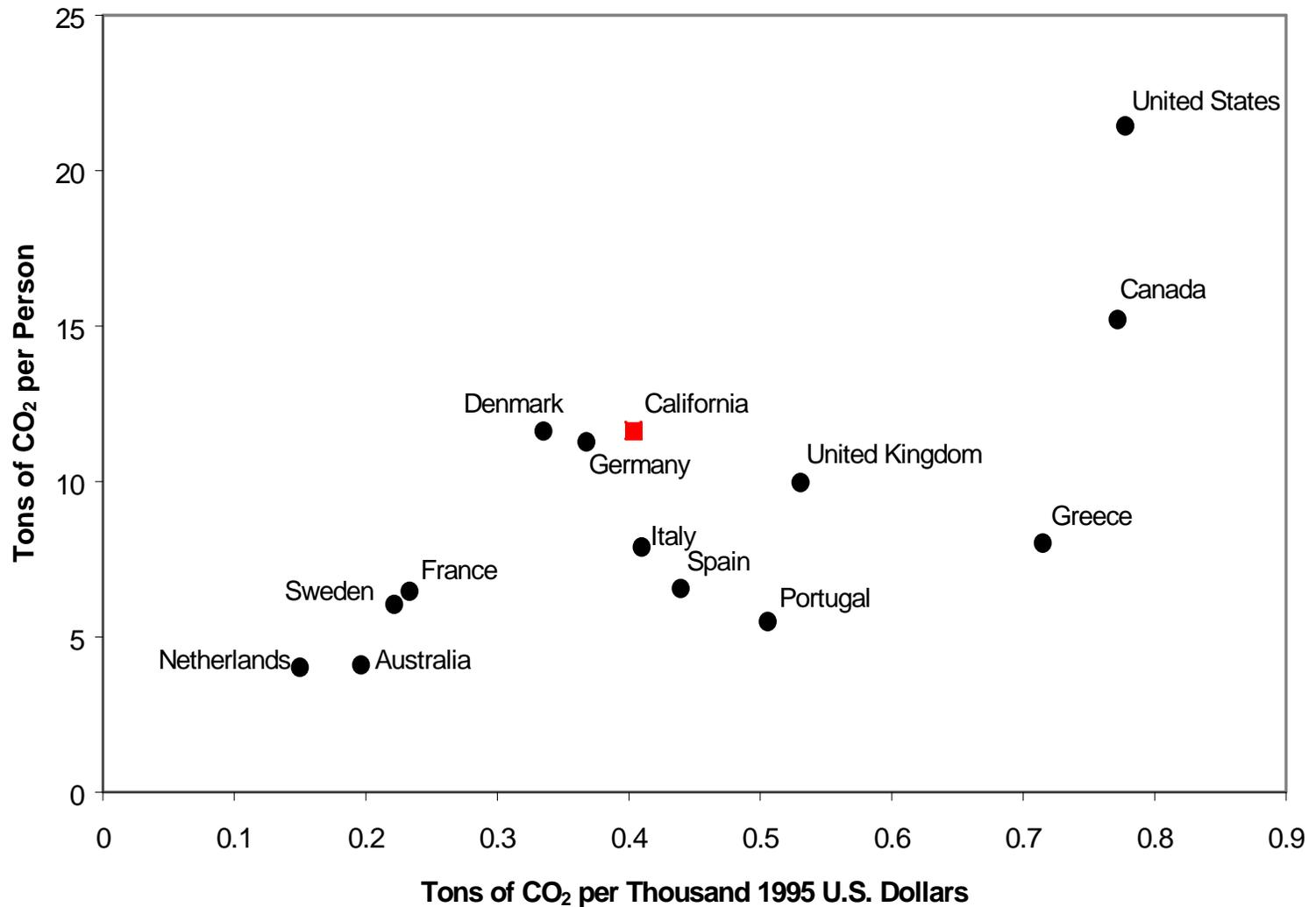
Source: U.S. EPA Global Warming Website
In 1998 CO₂ Equivalent

Carbon Intensities For California And Selected States - 1995



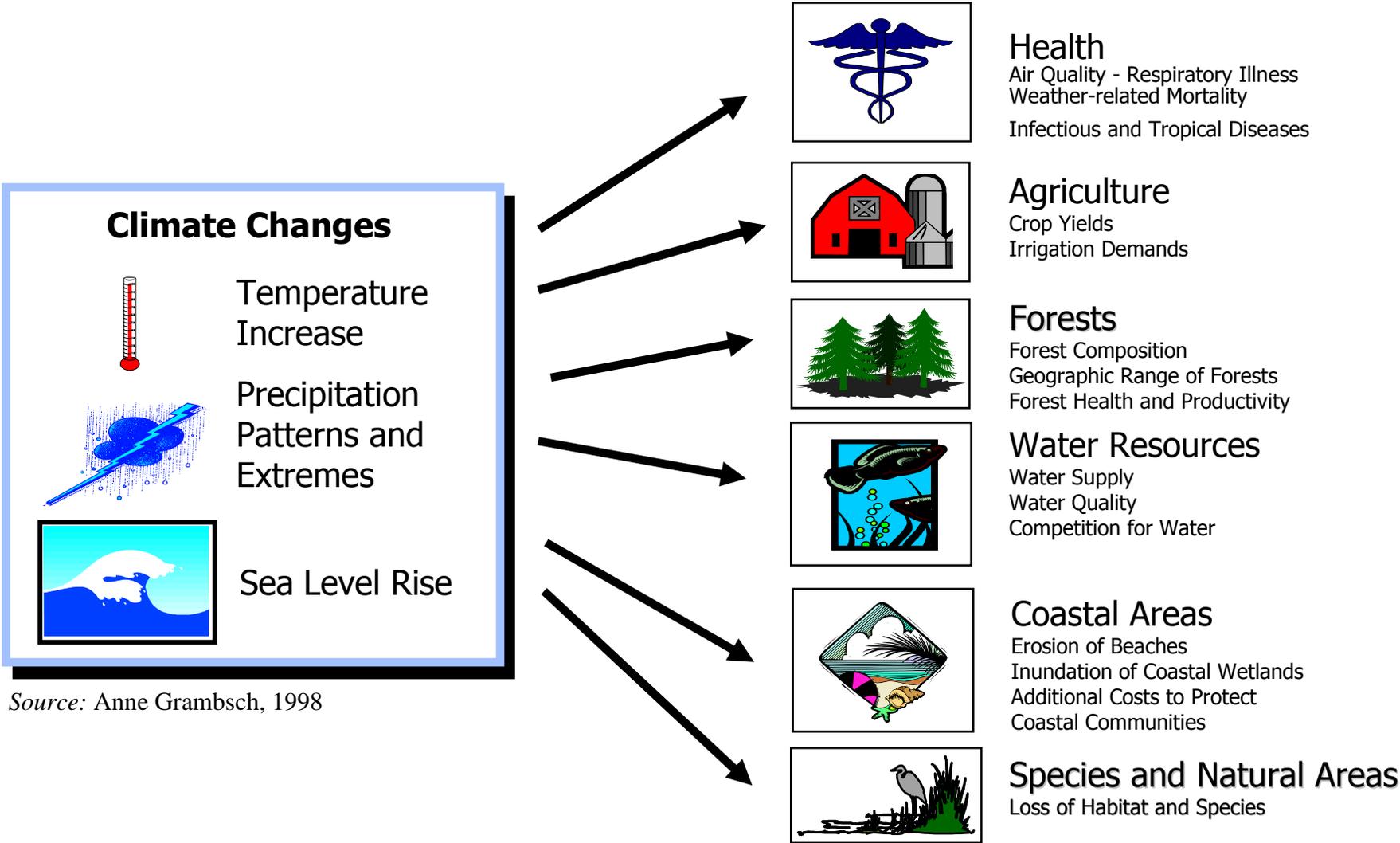
Source: Draft Greenhouse Gas Inventory Update, California Energy Commission, 2001

Carbon Intensities For California And Selected Countries - 1995



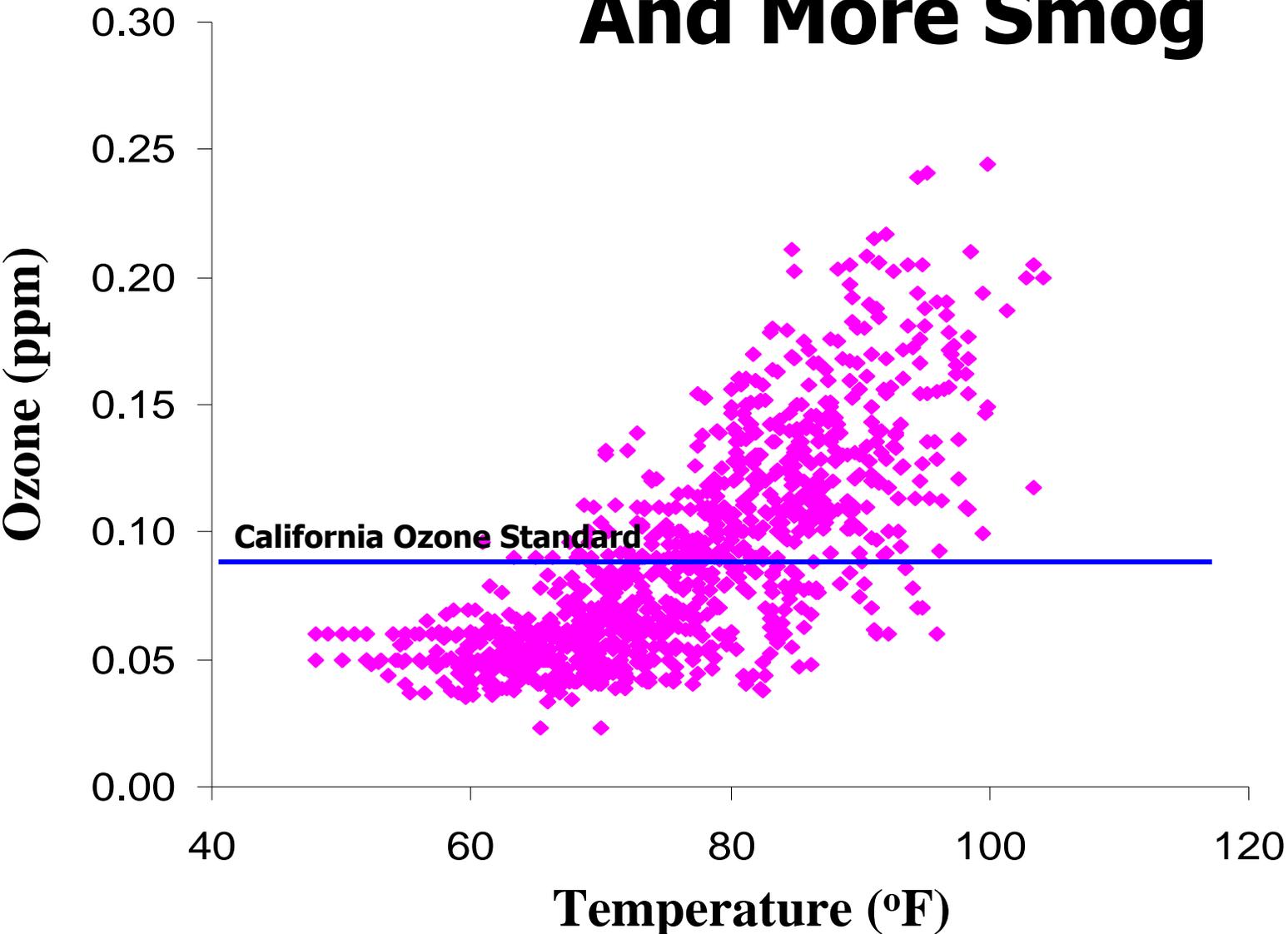
Source: Draft Greenhouse Gas Inventory Update, California Energy Commission, 2001

Potential Climate Change Impacts



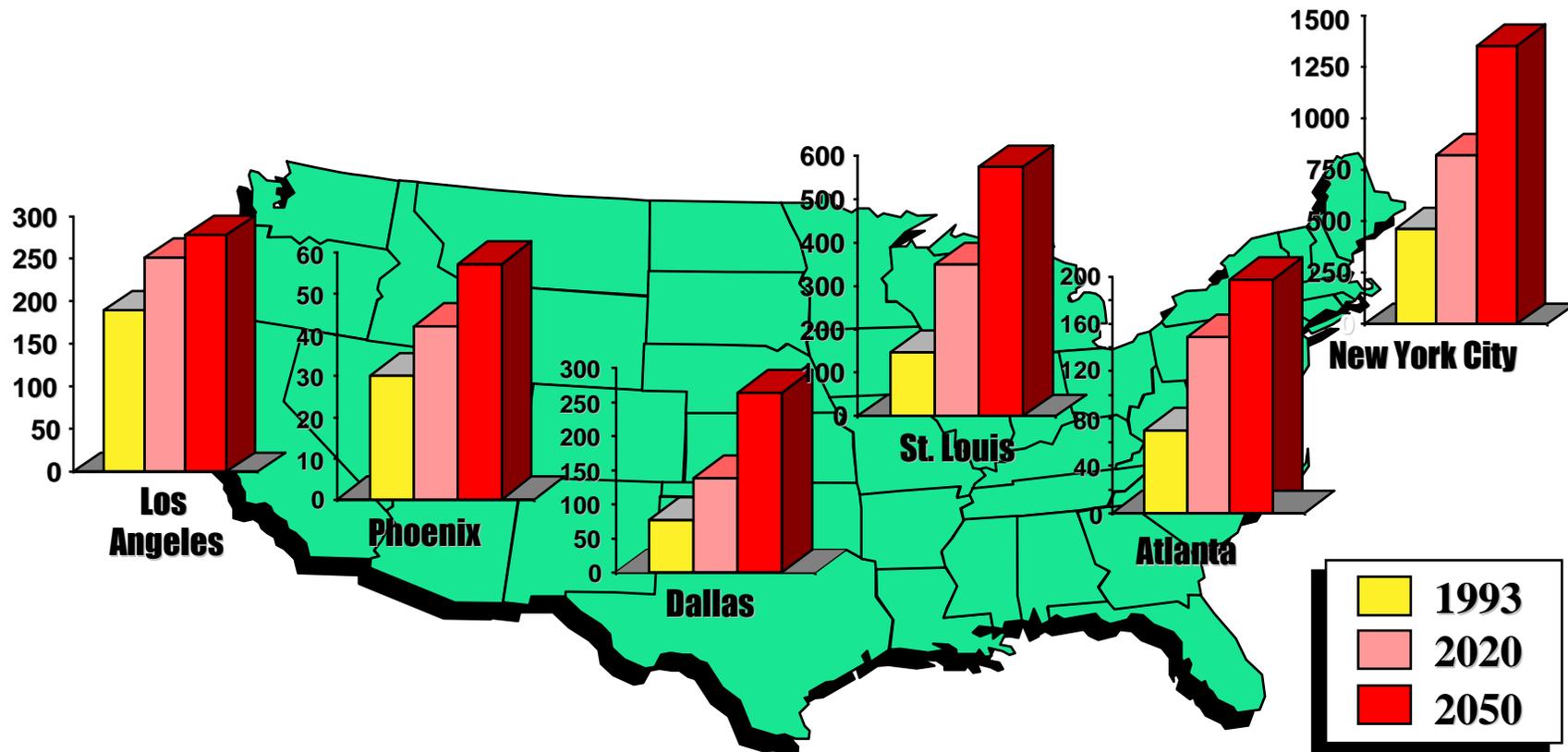
Source: Anne Grambsch, 1998

Hotter Days Lead To Higher Emissions And More Smog



**Los Angeles
Ozone Levels
(1995-1998)**

Average Annual Excess Weather-Related Mortality For 1993, 2020, and 2050 Climate



Sources: Kalkstein and Green (1997); Chestnut et al. (1995) Note: Includes both summer and winter mortality. Assumes full acclimation to changed climate. Includes population growth.

GFDL Climate Change Scenario.

Worldwide Likelihood Of Insect-borne Diseases Will Increase

<i>Disease</i>	<i>Insect</i>	<i>Population at risk (millions)</i>	<i>Present distribution</i>	<i>Likelihood of altered distribution with warming</i>
Malaria	mosquito	2,100	(sub)tropics	✓✓
Schistosomiasis	water snail	600	(sub)tropics	✓✓
Filariasis	mosquito	900	(sub)tropics	✓
Onchocerciasis (river blindness)	black fly	90	Africa/Latin America	✓
African trypanosomiasis (sleeping sickness)	tsetse fly	50	tropical Africa	✓
Dengue	mosquito	unavailable	tropics	✓✓
Yellow fever	mosquito	unavailable	tropical South America & Africa	✓

Likely ✓
 Very likely ✓✓

Source: Modified World Health Organization (WHO), as cited in Stone (1995).

Rising Seas, Vanishing Shores

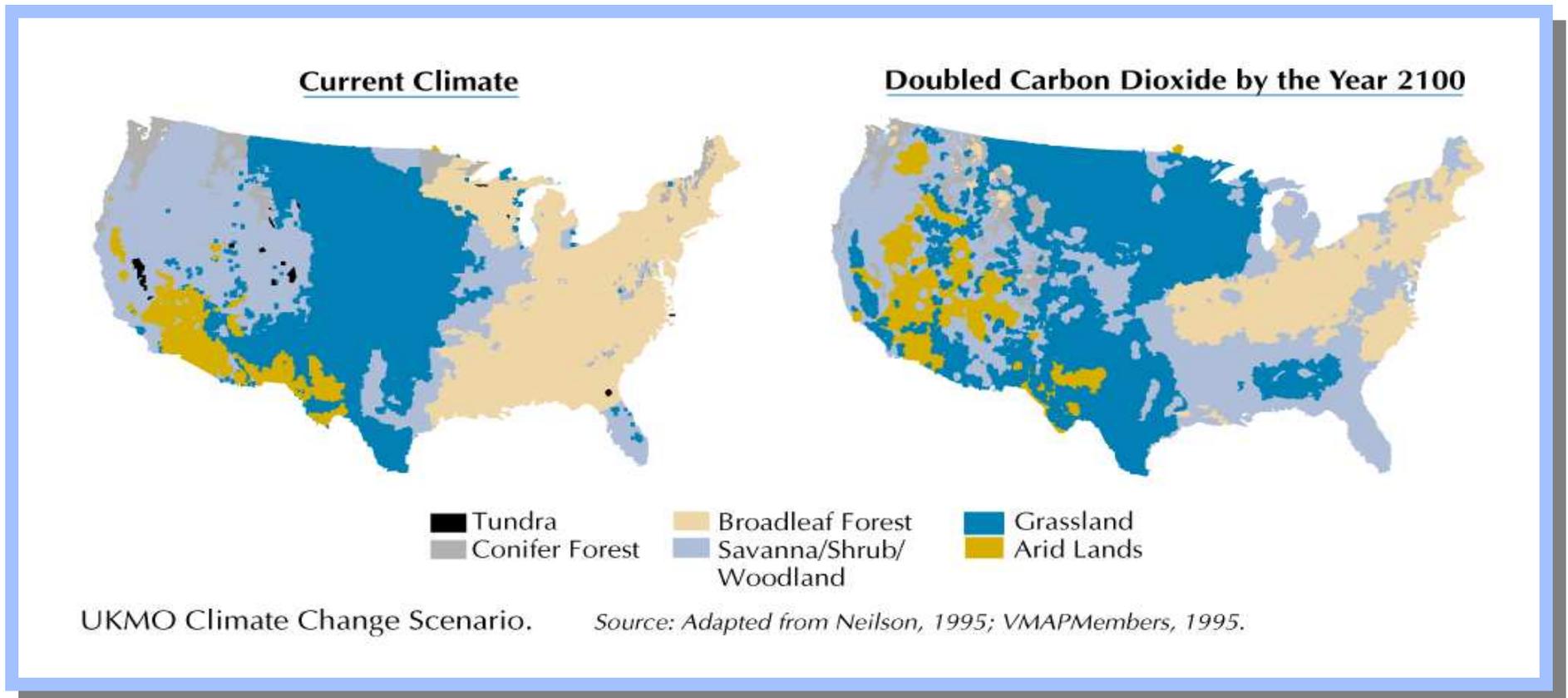


**Sea level rose 4-8"
worldwide during
the 20th century**

**North Beach,
Maryland**

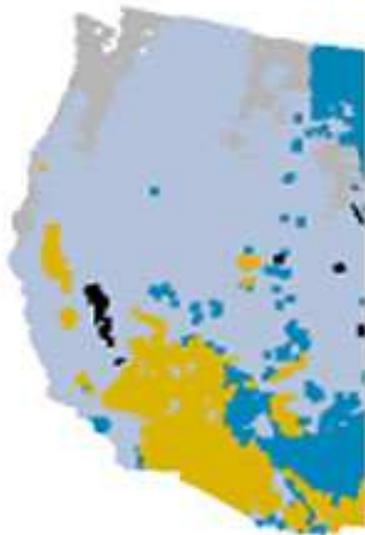


Projected Changes In Vegetation

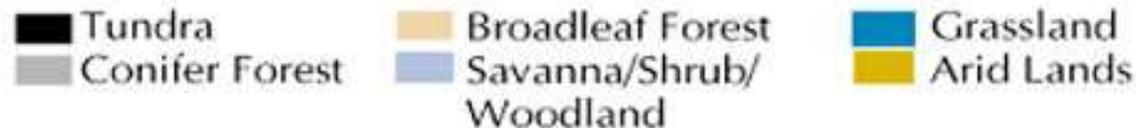
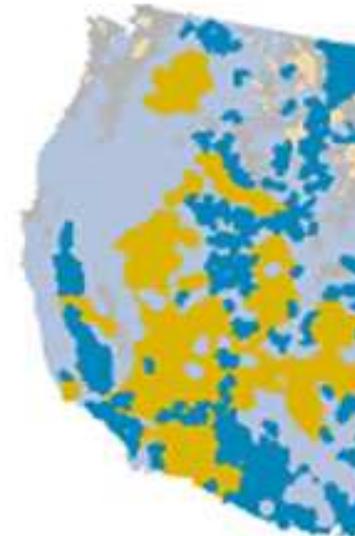


Projected Changes In Vegetation

Current Western Climate



Doubled Carbon Dioxide
by the year 2100



UKMO Climate Change Scenario.

Source: Adapted from Neilson, 1995; VMAPMembers, 1995

The Economic Impact Of Global Warming On U.S. Agriculture



**Economic loss
could amount to
\$13.6 billion
annually in 1990
dollars**

Source: Schlenker, Wolfram, et al., "The Impact of Global Warming on U.S. Agriculture," University of California, Berkeley, June 2002

AB 1493 Economic Aspects

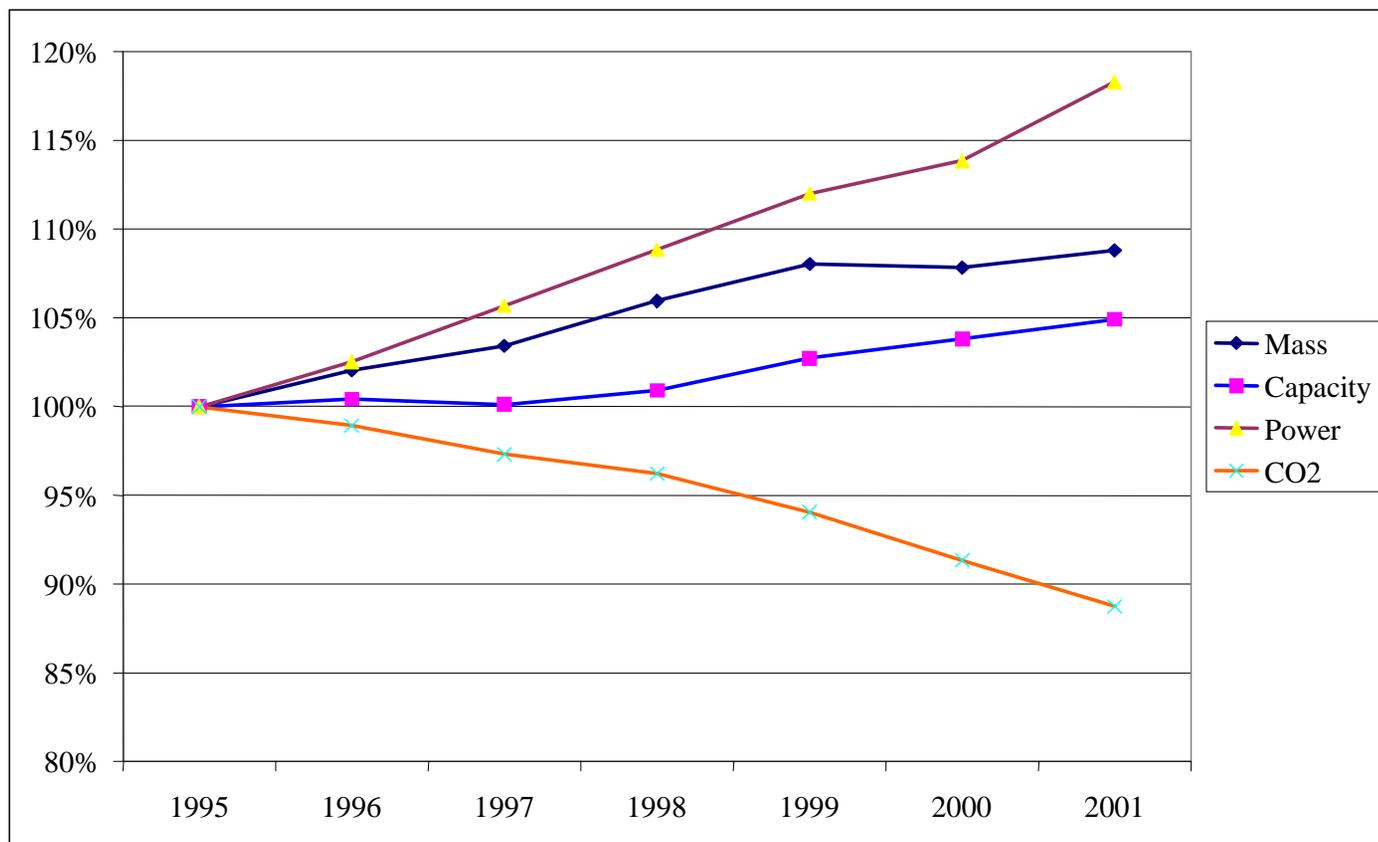
- **Consider economic impacts, including impacts on jobs, businesses, and California business competitiveness with other states**
- **Achieve the maximum cost-effective and technologically feasible method to reduce carbon dioxide emissions**
- **Provide automobile manufacturers maximum flexibility**
- **Offer numerous alternatives**
- **Allow opportunity for legislative oversight**

Technologies That Reduce Greenhouse Gas Emissions

Technology		GHG Reduction, %	Current Models Using This Technology
Off-the-Shelf Engine Technologies			
1	Variable valve timing and lift	3-8	BMW, Honda
2	Cylinder deactivation	3-6	Cadillac
3	Smaller engine with supercharger	5-7	Mercedes
4	Throttleless engine	3-6	BMW
5	Hybrid electric drive	15-30	Toyota Prius
Off-the-Shelf Transmission Technologies			
1	5-speed automatic	2-3	Ford Explorer (SUV)
2	Continuously variable transmission	4-8	Saturn VUE (SUV)
Emerging Engine Technologies			
1	Camless valve actuation	15	
2	Variable compression ratio	2-6	

Source: Data extracted from a 2001 report of the National Academy of Sciences
Greenhouse gas (GHG) emission reductions are based on CO₂

New Automobile Fleet Characteristics and CO₂ Emissions In Europe



Average CO₂ emissions for new vehicles decreased significantly in Europe despite increases in vehicle mass, power, and engine capacity

Source: European Automobile Manufacturers Association and the Commission Services,
"Monitoring of ACEA's Commitment on CO₂ Emission Reduction from Passenger Cars," June 2002