The Center for Climate Strategies

Helping States and the Nation Tackle Climate Change

State Climate Action Planning: Florida Energy Commission

Center For Climate Strategies

March 15, 2007

Center for Climate Strategies

- Nonprofit 501c3 policy development group with 25 experts located across the US
- Impartial and expert
- Partner with states to develop climate action policies and plans
- Multiple areas of technical and policy expertise including: climate, energy, transportation, natural resources, economic development
- Supported by states and a consortium of private foundations
- Tom Peterson, Executive Director
  - tdp1@mac.com
  - www.climatestrategies.us

One Degree at a Time…

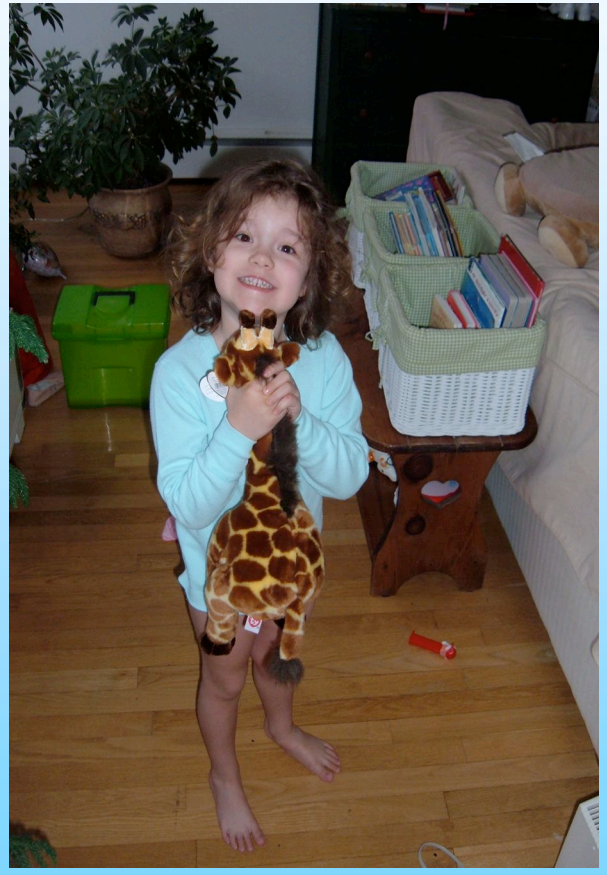
The Challenge

- "The ultimate objective of this Convention .... is to achieve, …. stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system."
  - UNFCCC Article 2 Objective,
  - Rio De Janeiro

Context

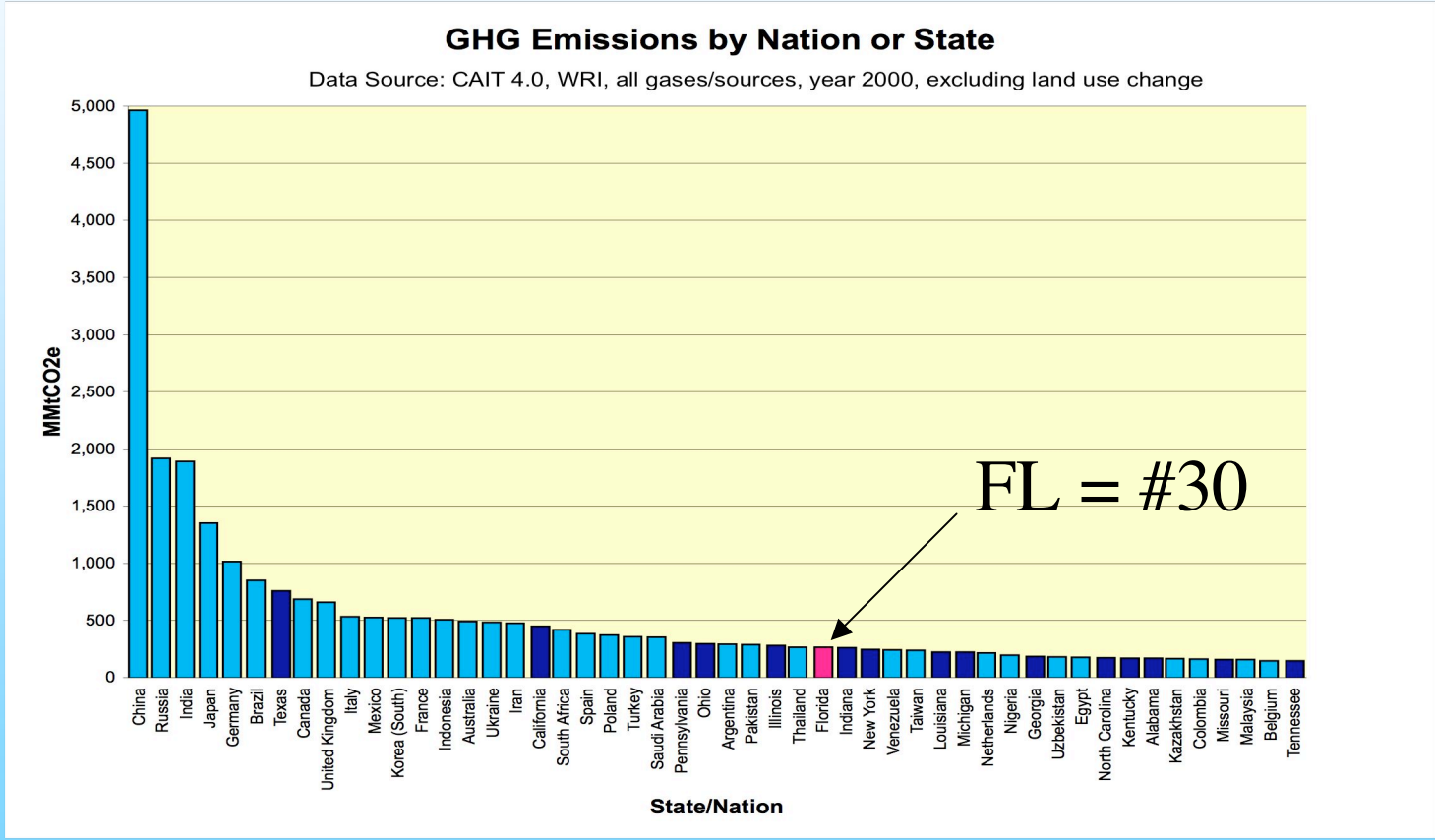
- US GHG emissions continue to increase
  - 50% increase from 1990 - 2020
  - States = 30 of top 75 global emitters
- Near-term decisions will determine long-term fate
  - Buildings, power plans, land clearing, infrastructure
- States are proving GHGs can be reduced effectively
  - Setting strong goals and targets
  - Identifying diverse actions to take now
  - Saving energy, money, and the environment
- Strong federal and state action is needed

Faith and Leadership



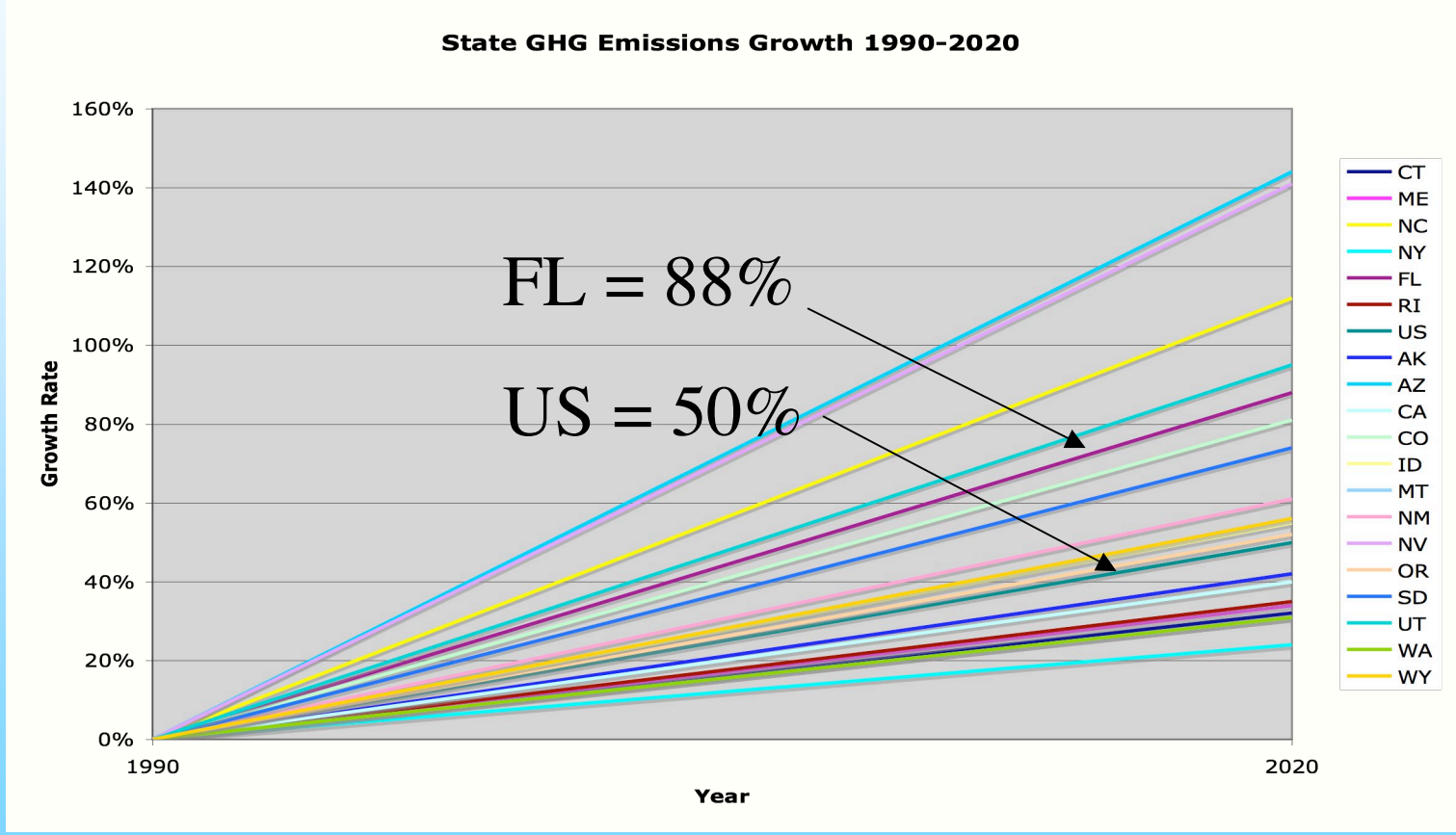
- "…As the children stared at the large stone wall around the orchard and wondered how they would ever scale it, one threw his hat over and said: "Now we must find a way"…"
  - Maine Governor John Baldacci at the launch of the Maine Climate Change Stakeholder Process, 2003

US States:
30 of Top 75 World Emitters

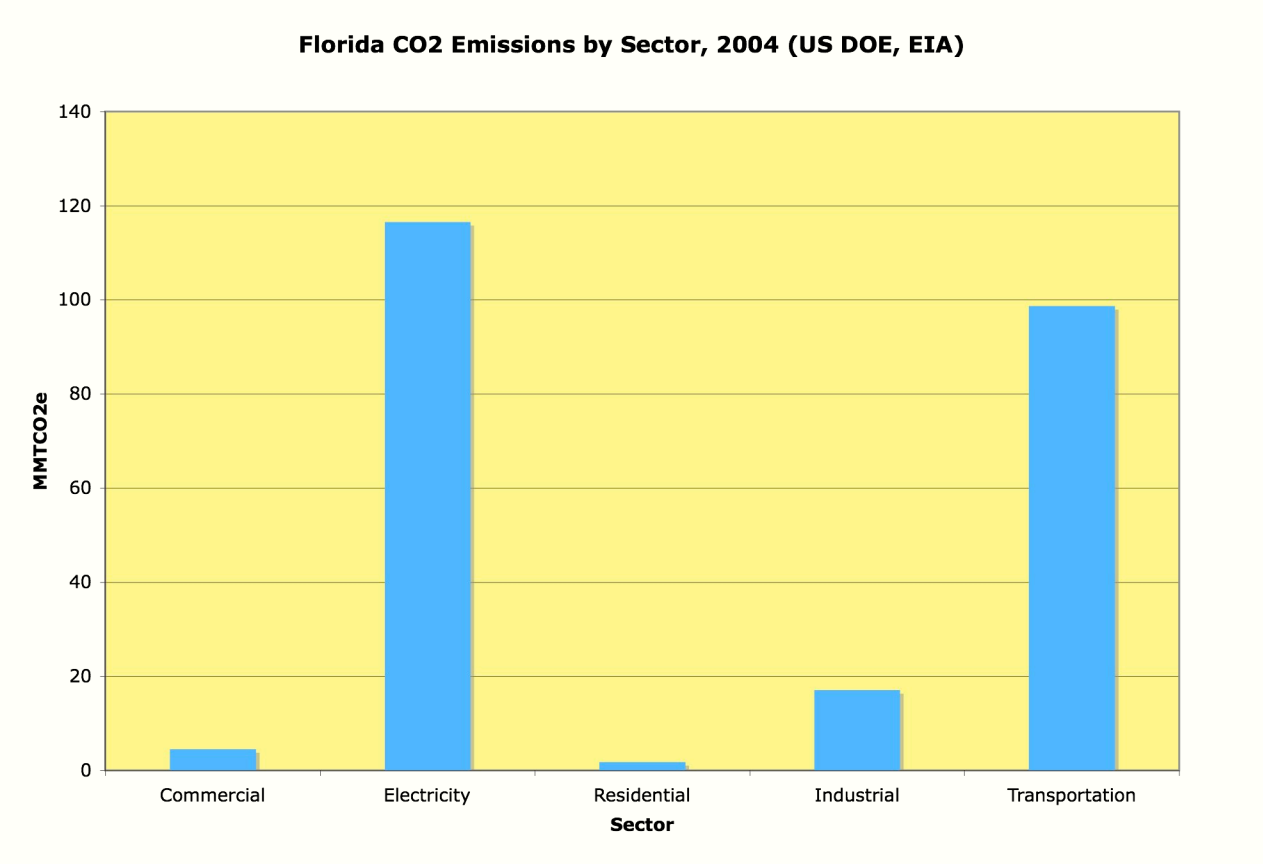


State GHG Growth Rates

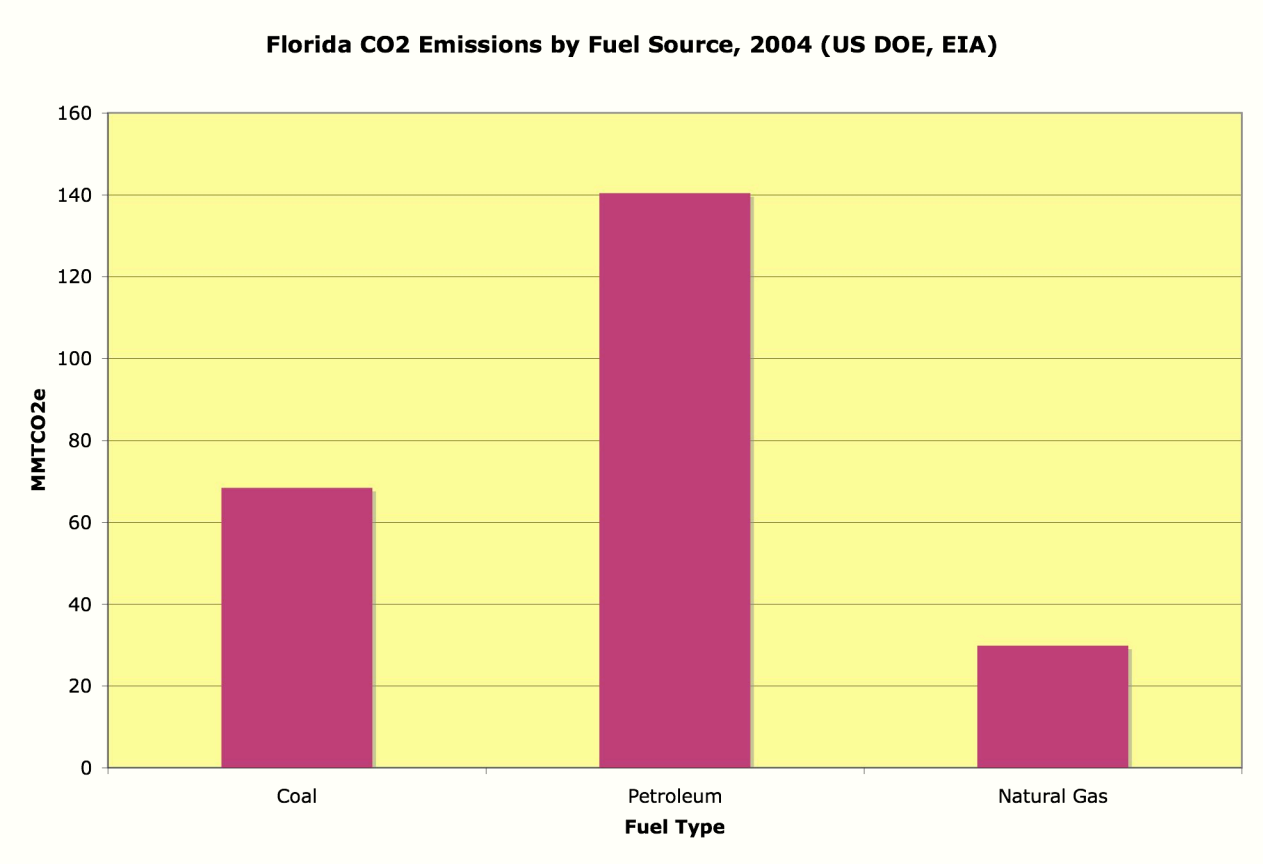
Data from the Center for Climate Strategies, 2006-2007, and US DOE, 2005



Florida CO2 by Major Sectors



Florida CO2 by Fuel Source



Reasons for Action

- Coincidence
- Co-benefits
- Avoided damages
- Shape policy
- Form markets
- Political leadership

States Set the Bar For…

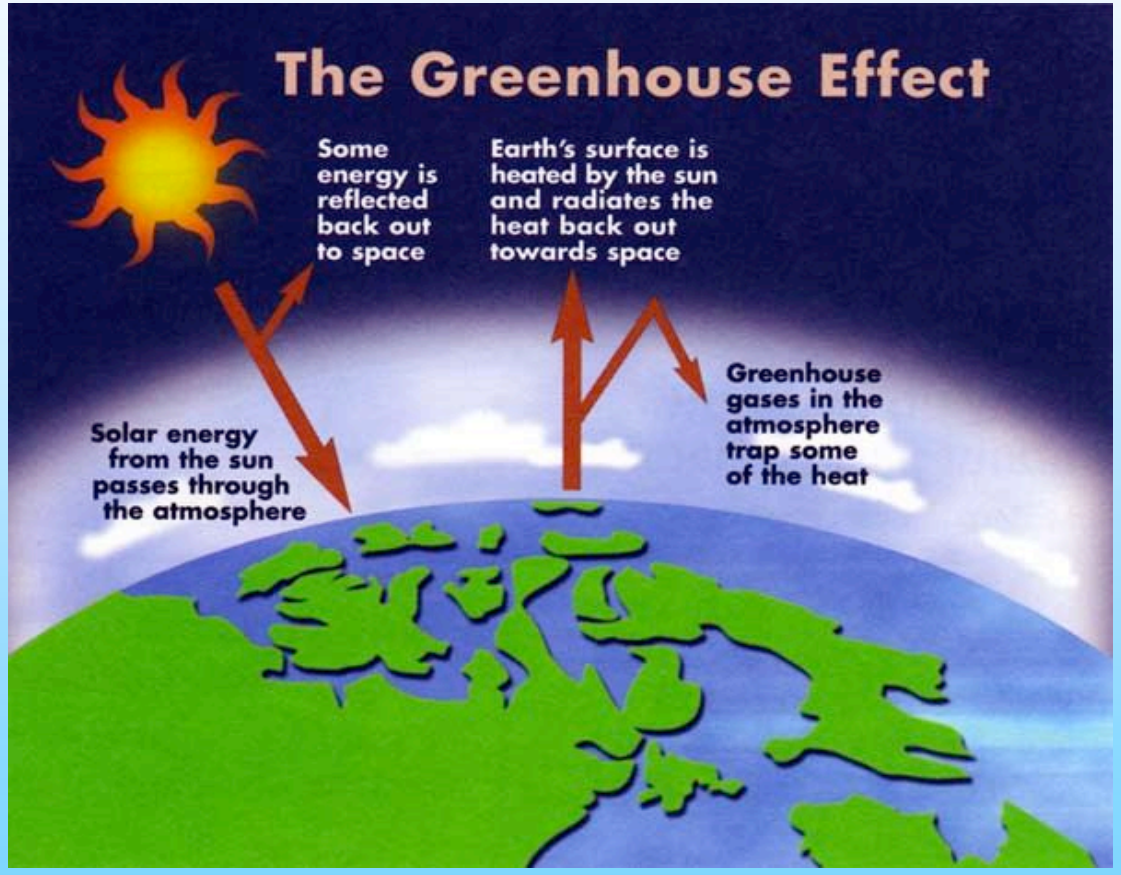
- Goals
- Policies
- Innovation
- Implementation
- Consensus
- Conflict resolution

Overview of Climate Science

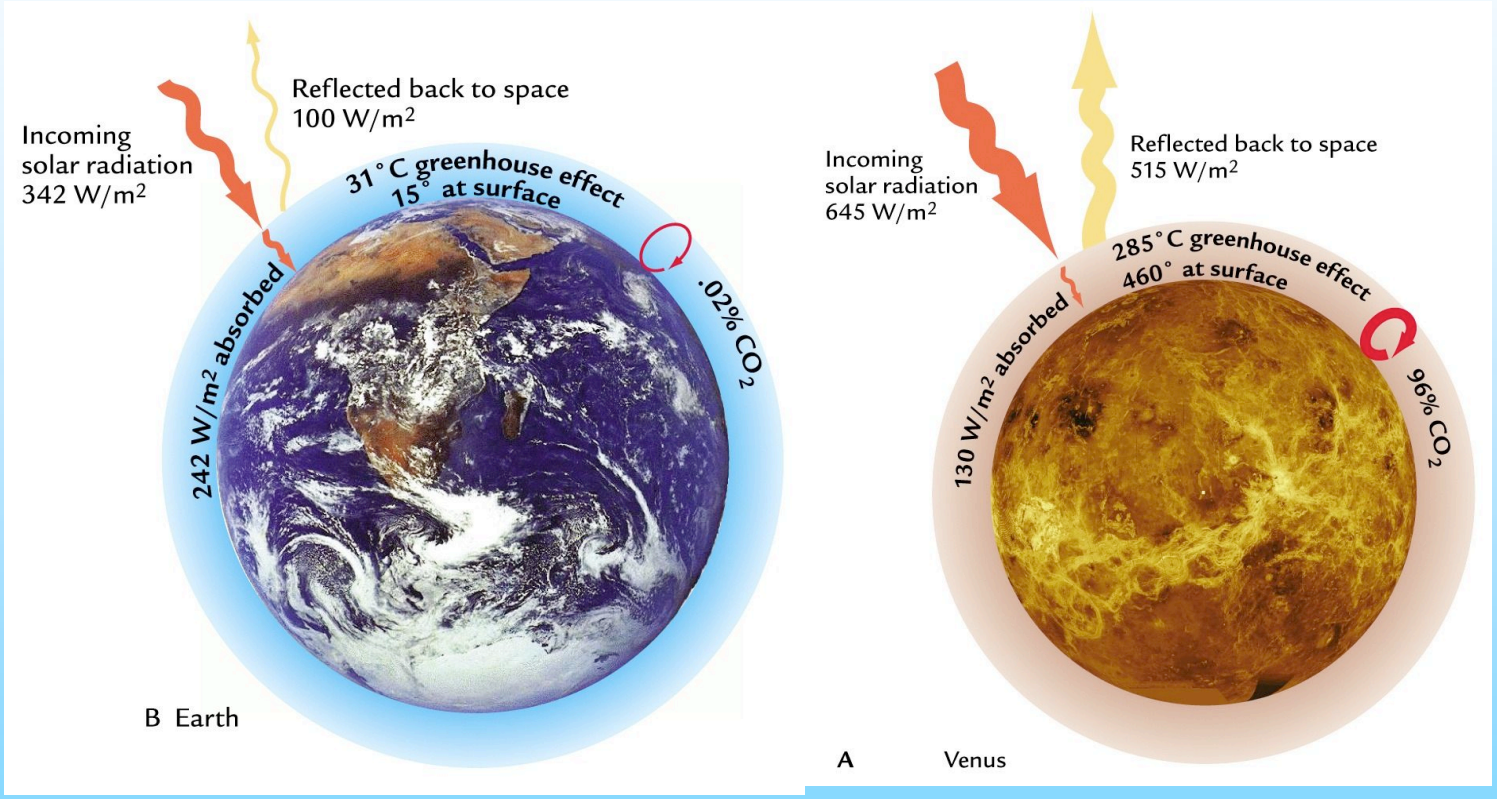
Greenhouse Gases

- Include CO_2 (80% of total), CH_4, N_2O, HFC's, PFC's, and Black Carbon
  - One gallon of gasoline = 20 pounds CO_2
  - One ton of coal = 3500-4400 pounds CO_2
  - One cord of hardwood = 500 pounds CO_2
- Mix quickly in the atmosphere and last long time
- Caused by many activities
- Accumulating at unnaturally high concentrations
- Cause global warming and other effects

Enhanced Greenhouse Effect



Earth v. Venus

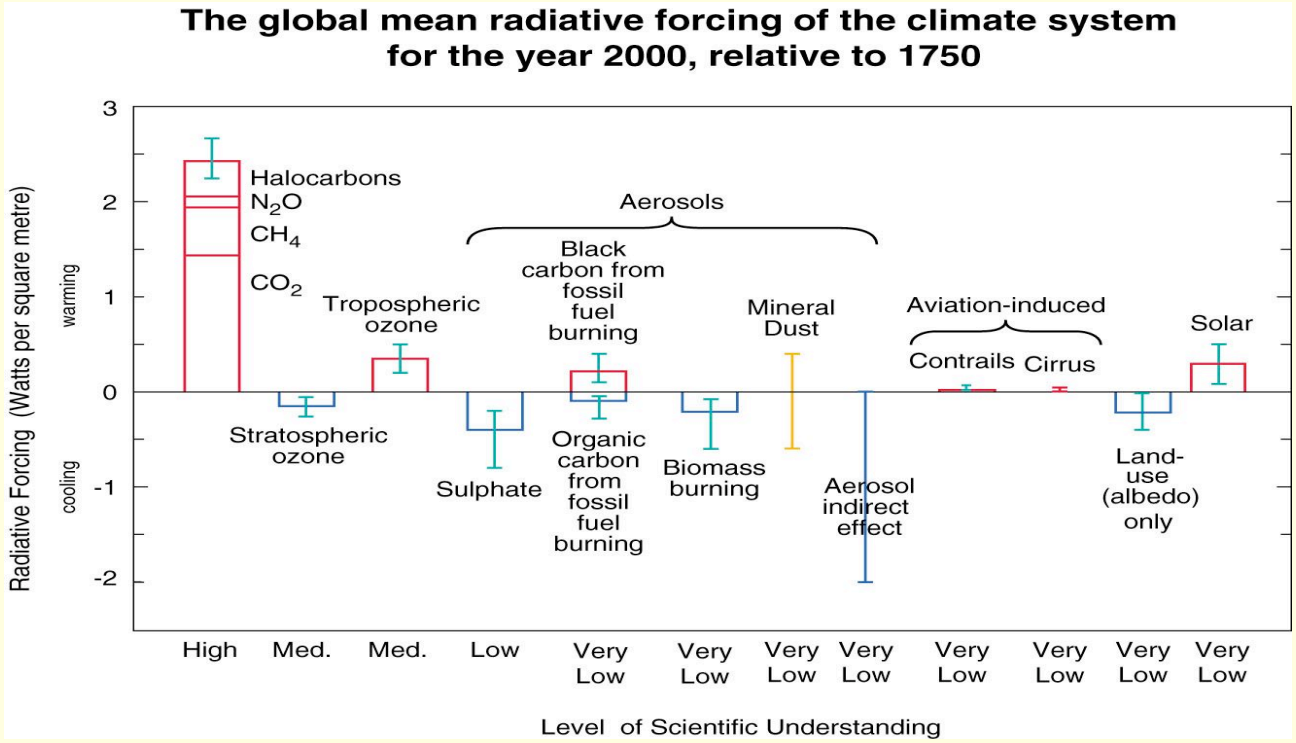


The Earth is 15°C on average
(would be frozen solid w/o CO_2)

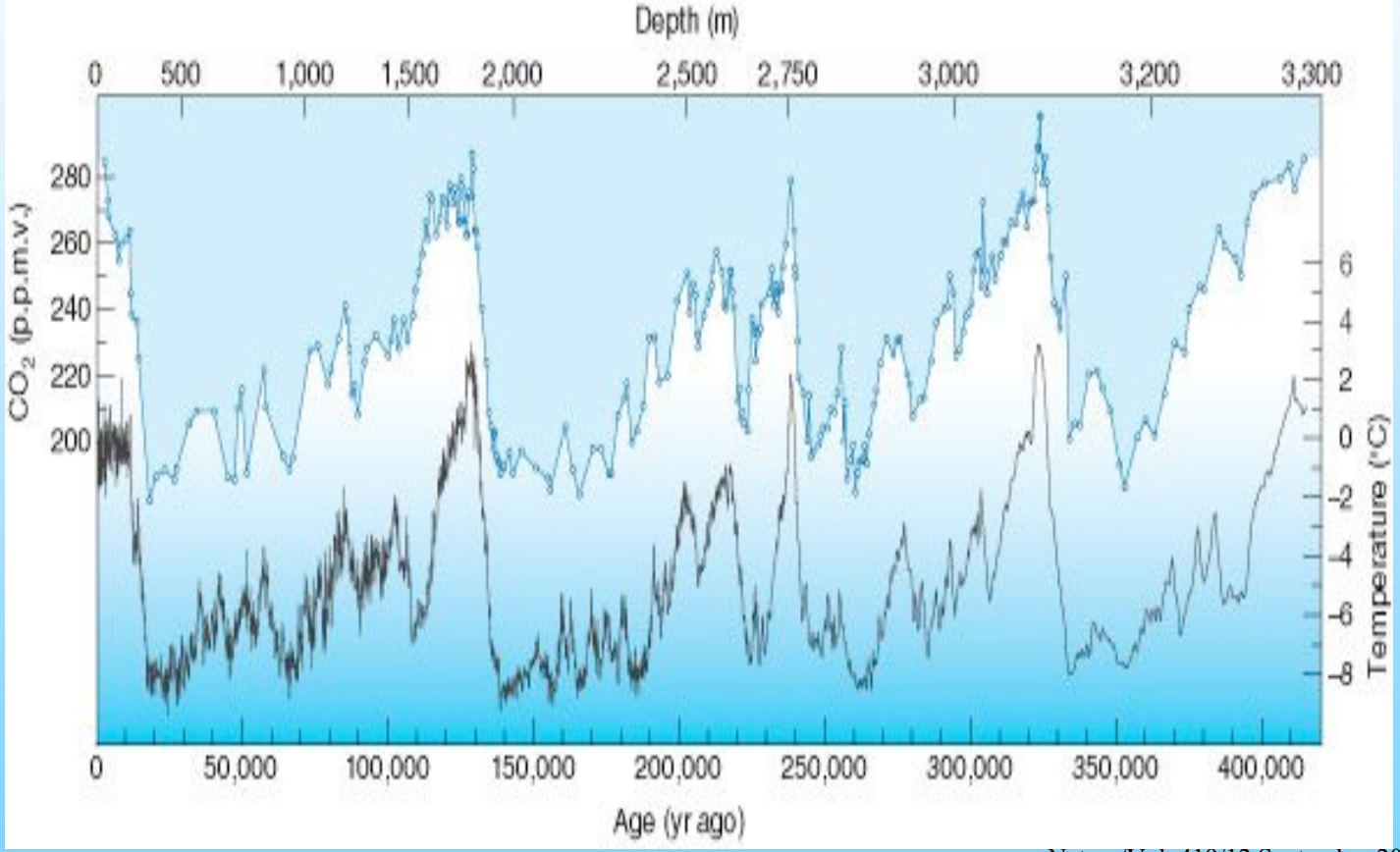
Venus = 460°C on average

From: Ruddiman, 2001

GHGs Effects Can be Isolated

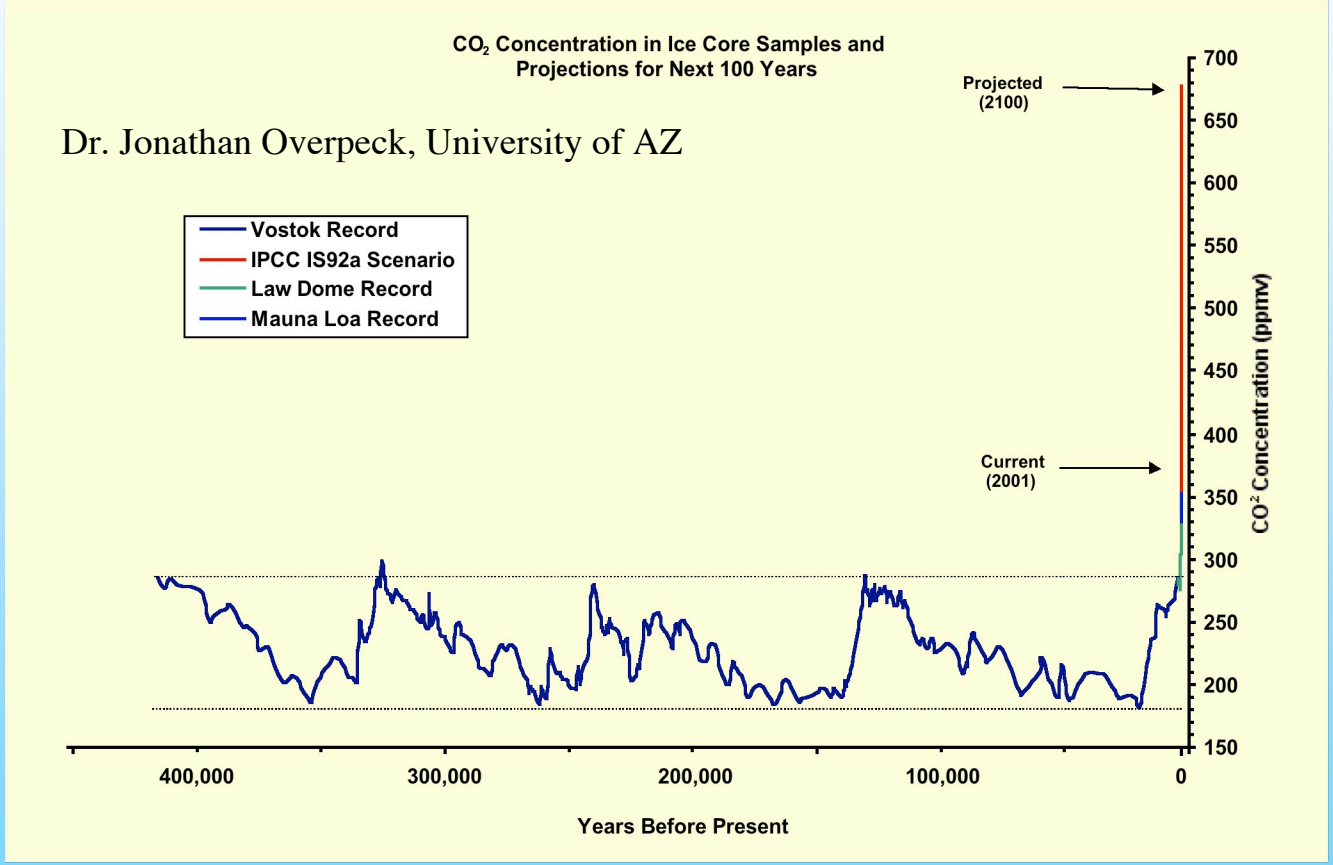


CO2 and Temperature Co-vary

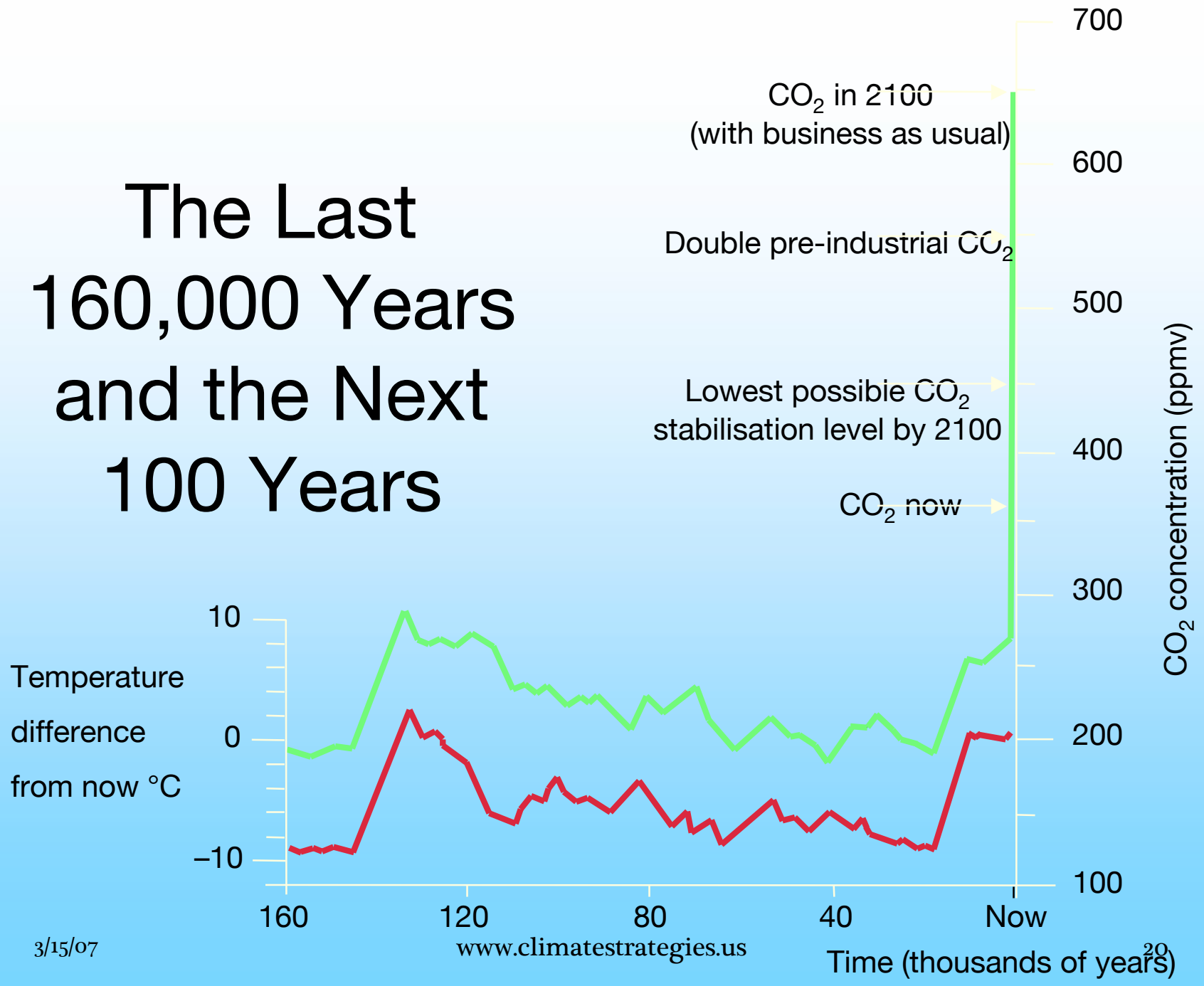


Nature/Vol. 419/12 September 2002, pg. 189

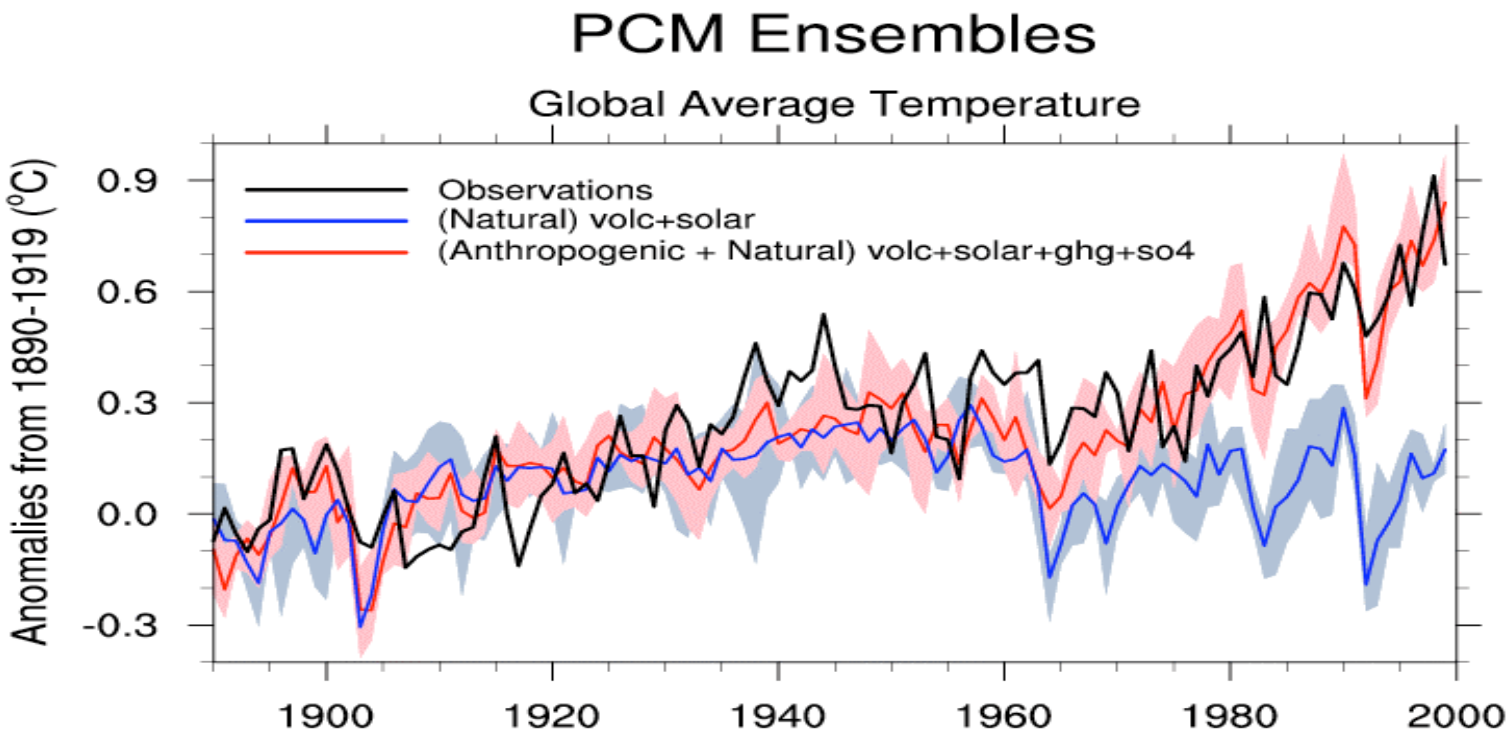
GHG's and Temperature



The Last 160,000 Years and the Next 100 Years



Natural v. Human Forcing



Meehl et al. (2004)

Temperature Projections

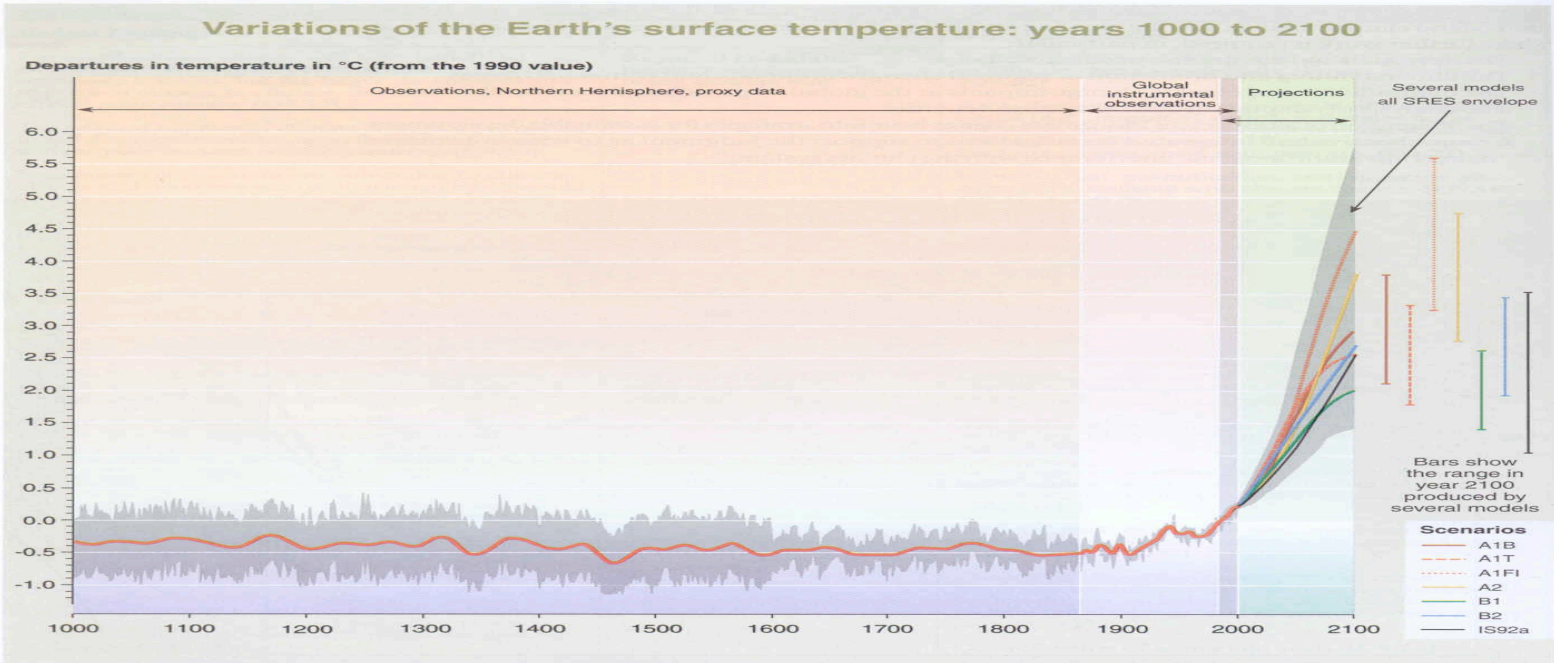


Figure SPM-10b: Variations of the Earth's surface temperature: years 1000 to 2100. From year 1000 to year 1860 variations in average surface temperature of the Northern Hemisphere are shown (corresponding data from the Southern Hemisphere not available) reconstructed from proxy data (tree rings, corals, ice cores, and historical records). The line shows the 50-year average, the grey region the 95% confidence limit in the annual data. From years 1860 to 2000 are shown variations in observations of globally and annually averaged surface temperature from the instrumental record; the line shows the decadal average. From years 2000 to 2100 projections of globally averaged surface temperature are shown for the six illustrative SRES scenarios and IS92a using a model with average climate sensitivity. The grey region marked "several models all SRES envelope" shows the range of results from the full range of 35 SRES scenarios in addition to those from a range of models with different climate sensitivities. The temperature scale is departure from the 1990 value; the scale is different from that used in Figure SPM-2.

Q9 Figure 9-1b

Loss of major ice sheets: potentially,a very big issue.

-- Begins with only 1-2^{0}C further warming?

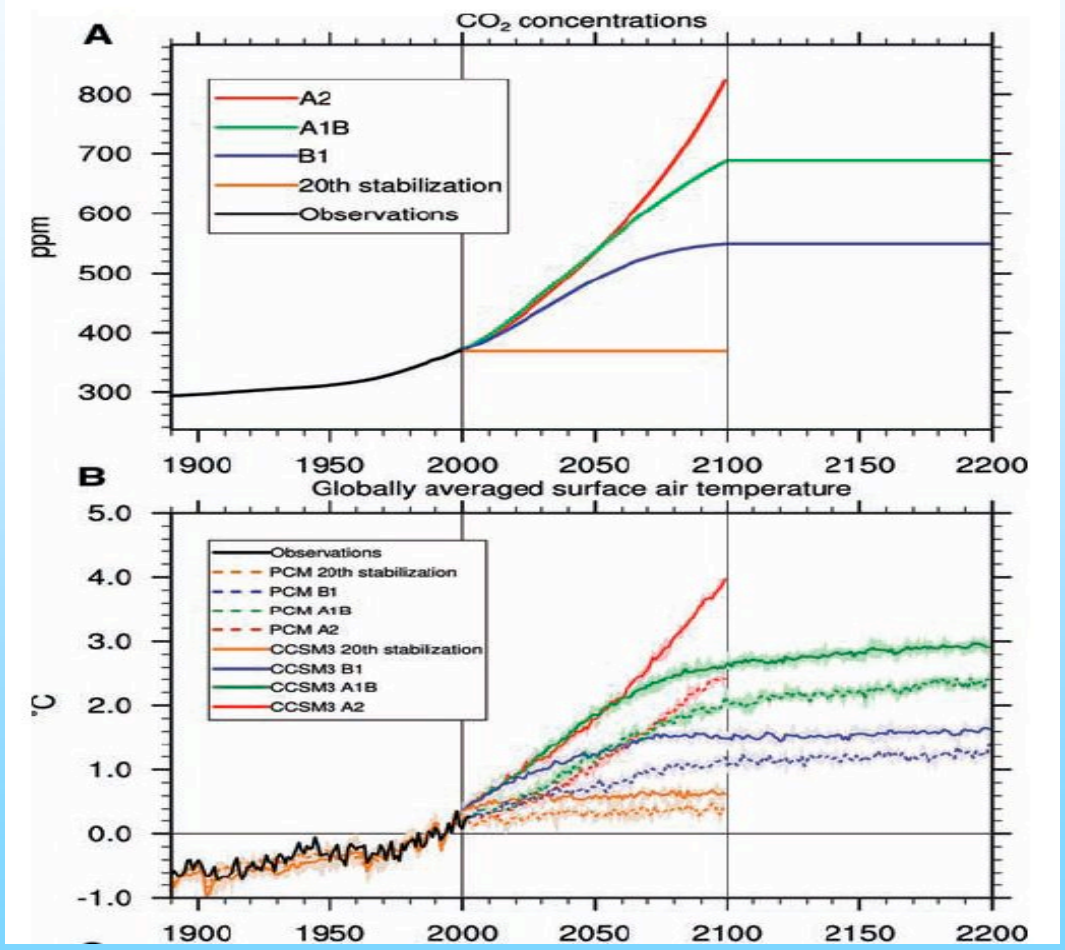
-- Spread over a few hundred or a few thousand years?

Dr. Michael Oppenheimer, Princeton, data from National Snow and Ice Data Center 2004

Stabilization Scenarios

Carbon Dioxide Concentration

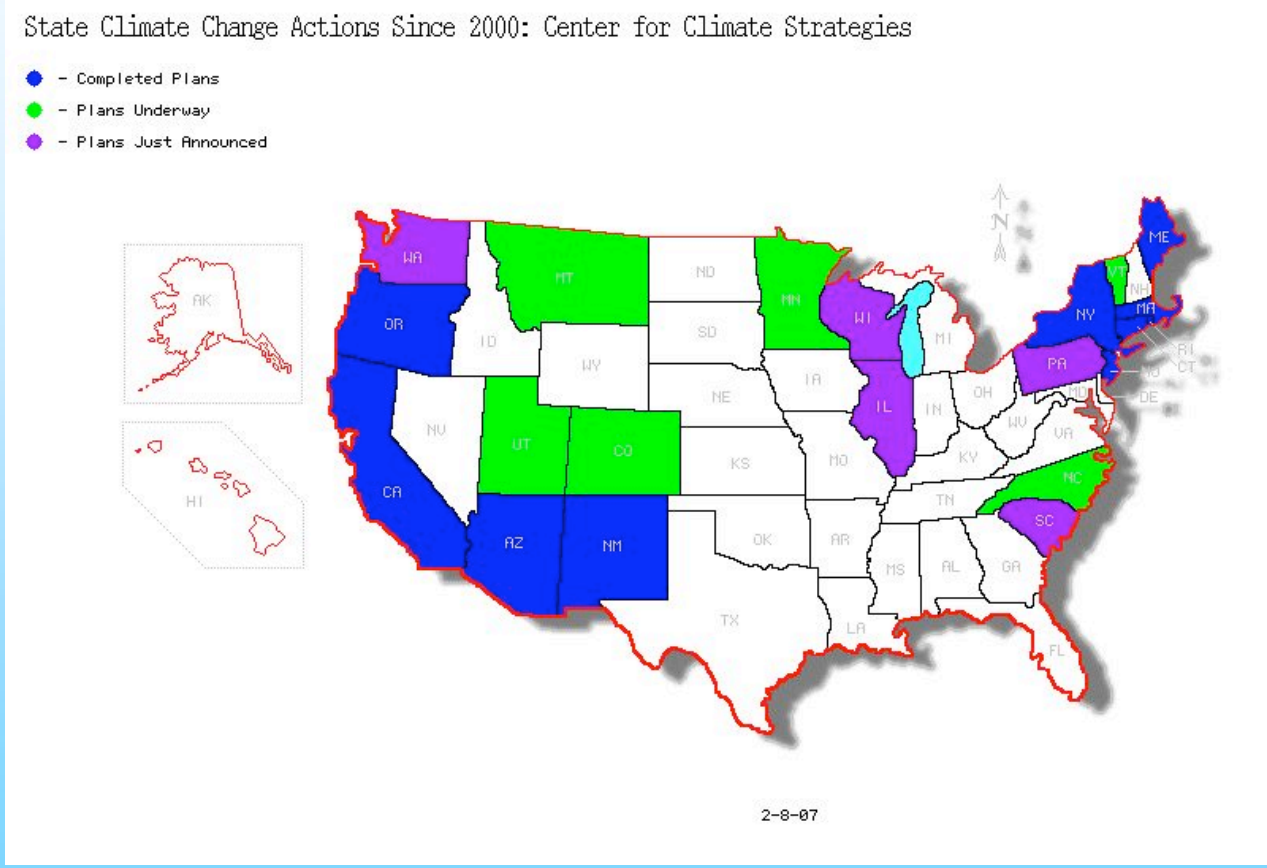
Warming (°C)



Progress Through Action!

State Climate Planning

State Climate Plans



State Actions Since 2000

- GHG State Emissions Inventories and Forecasts
  - 25 recent
- Energy and Climate Policies and Mechanisms
  - 300+ types undertaken, more underway
- State Climate Action Plans
  - 20 complete or underway, more likely
- Statewide GHG targets and timetables
  - 13 current, 9 underway
- Reporting systems and or registries
  - 30 underway
- Regional actions
  - NEG/ECP, WCCI, RGGI, 5 State Agreement

States Provide Diverse Solutions

- Over 300 actions undertaken by states
  - Energy efficiency and conservation
  - Clean and renewable energy
  - Transportation and land use efficiency
  - Forest and agriculture conservation
  - Waste management
  - Industrial process improvement

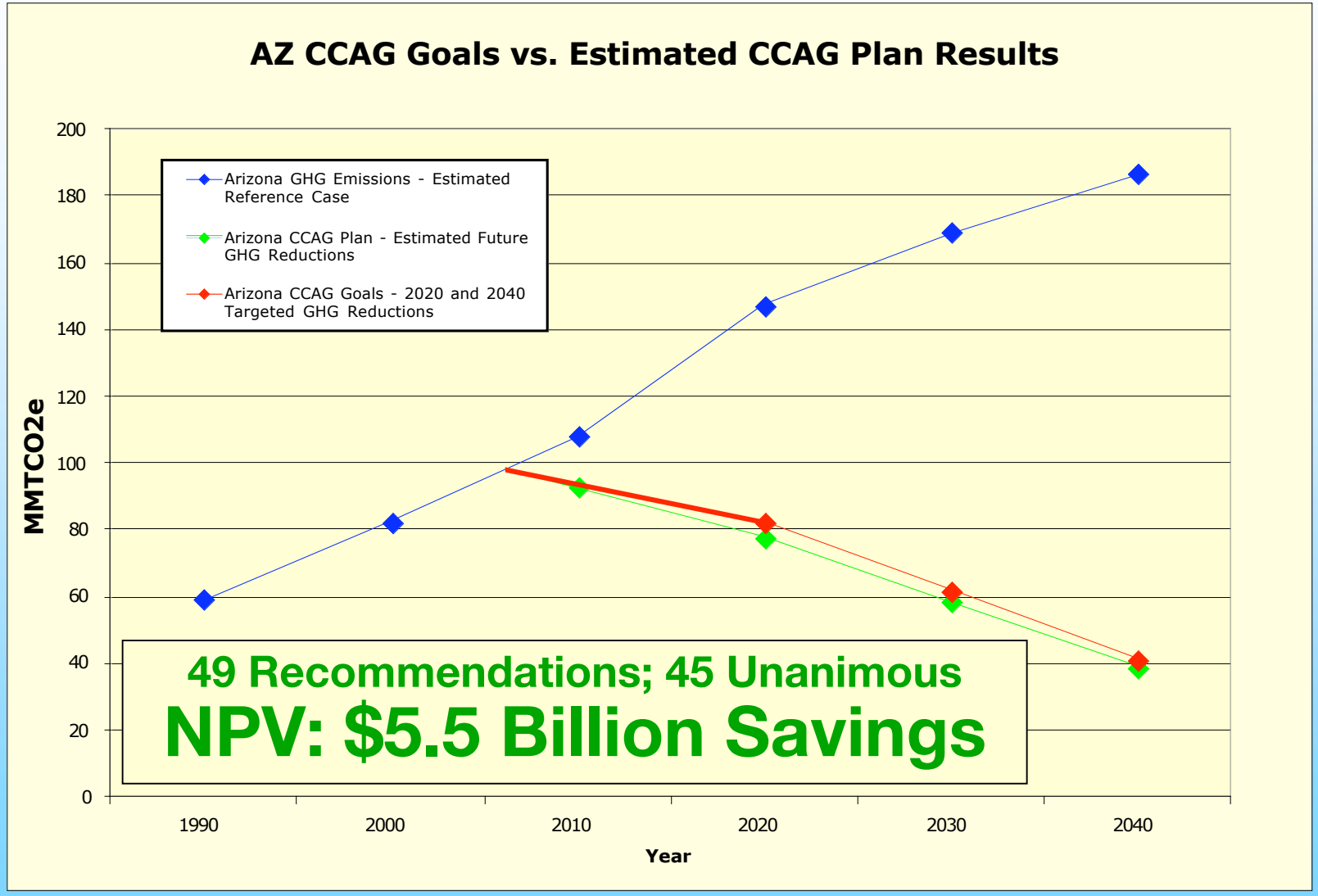
Implementation Methods: One Size Doesn't Fit All

- Voluntary Agreements
- Technical Assistance
- Financial Incentives
- Targeted Spending
- Codes and Standards
- Market Based Approaches
- Pilots and Demos
- Information and Education
- Research and Development
- Reporting and Disclosure

A “Portfolio” of Policy Options…

CCS CENTER FOR CLIMATE STRATEGIES	Codes & Standards	Market Mechanisms	Funding Mechanisms	Voluntary Agreements	Technical & Financial Assistance	Information & Education	Pilots & Demo Projects	Reporting & Disclosure
Agriculture & Forestry								
Energy Supply								
Residential, Commercial, & Industrial								
Transportation & Land Use								
Waste Management								
Cross-Cutting Issues (Education, Registries, etc.)								

Arizona Climate Plan Results

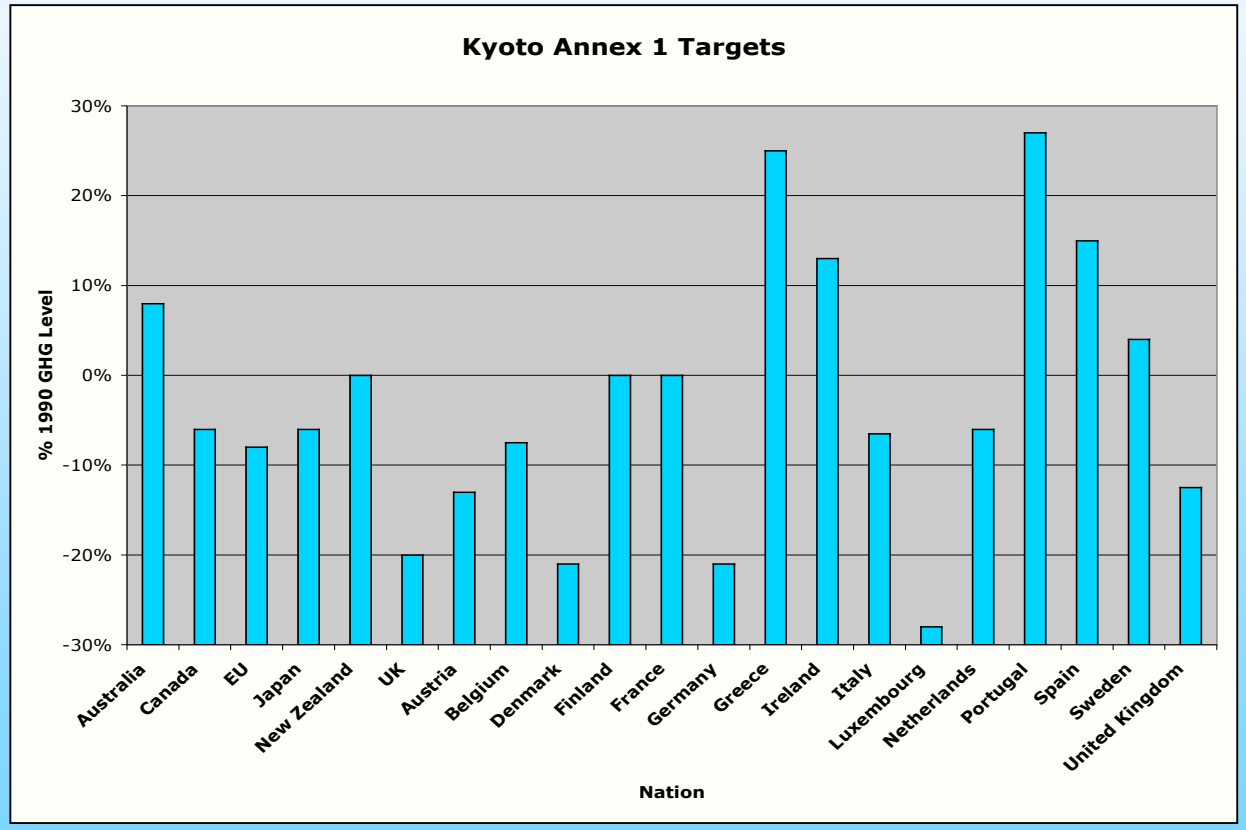


State Climate Goals

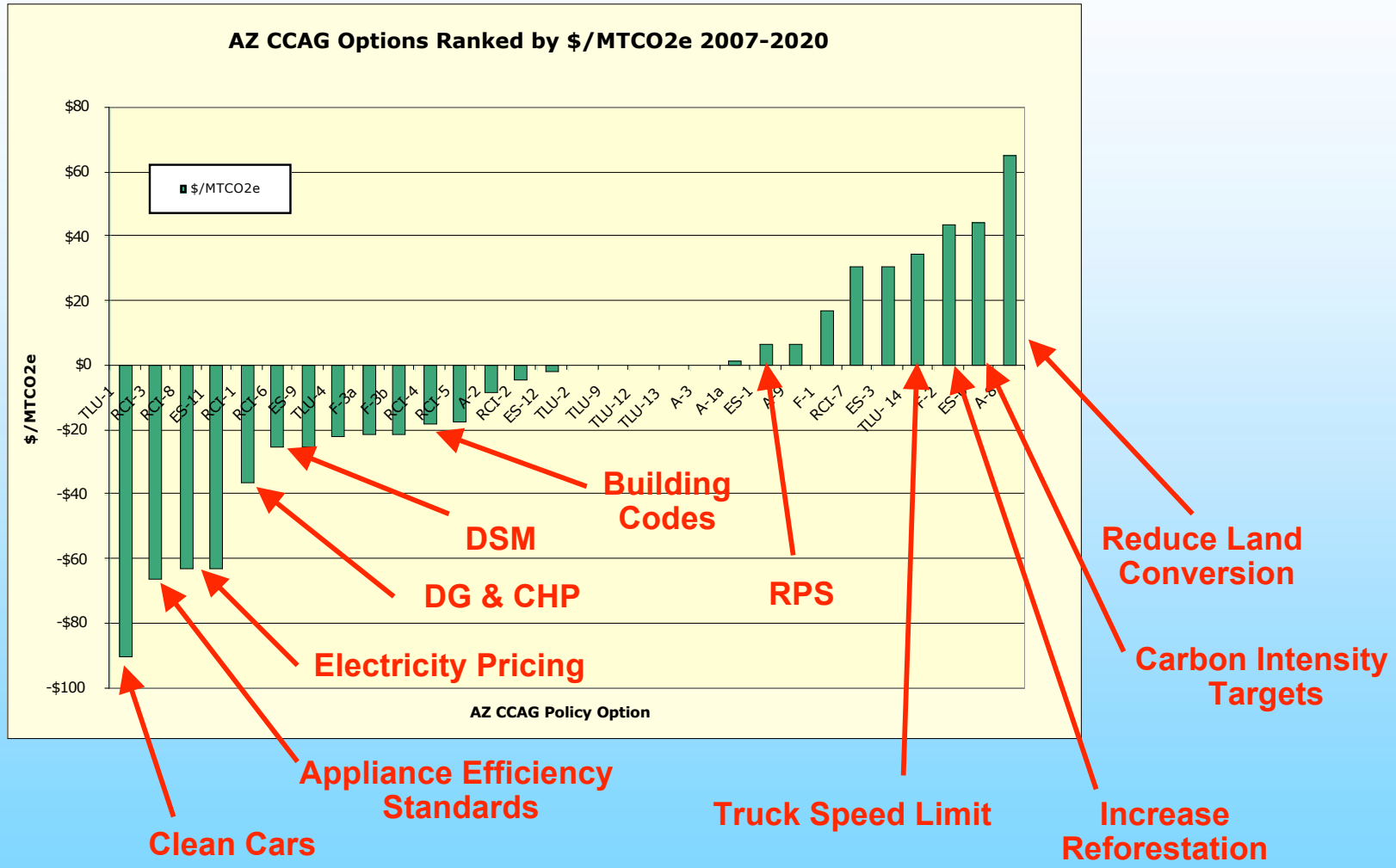
State	1990-2020 GHG Forecast	State Goals	Climate Plan Coverage
Arizona	149%	2000 levels by 2020; 50% below by 2040	106%
California	41%	- E.O.: 2000 level by 2010; 10% below by 2020; 80% by 2050 - AB-32: 1990 levels by 2020	100%
Connecticut	32%	1990 level by 2010; 10% below by 2020; 75% by 2050	100%
Maine	34%	1990 level by 2010; 10% below by 2020; 75% by 2050	100%
New Jersey	In progress	30% below 2000 levels by 2020; 75% by 2050	TBD
New Mexico	48-64%	2000 level by 2012; 10% below by 2020; 75% by 2050	137%
Oregon	38%	1990 level by 2010; 10% below by 2020; 75% by 2100	85%
Puget Sound	37%	1990 level by 2010; 10% below by 2020; 75% by 2100	100%
Rhode Island	35%	1990 level by 2010; 10% below by 2020; 75% by 2050	100%
Vermont	In progress	25% below 1990 levels by 2012; 50% below 1990 by 2028; 75% by 2050	TBD

“Common but Differentiated Targets”

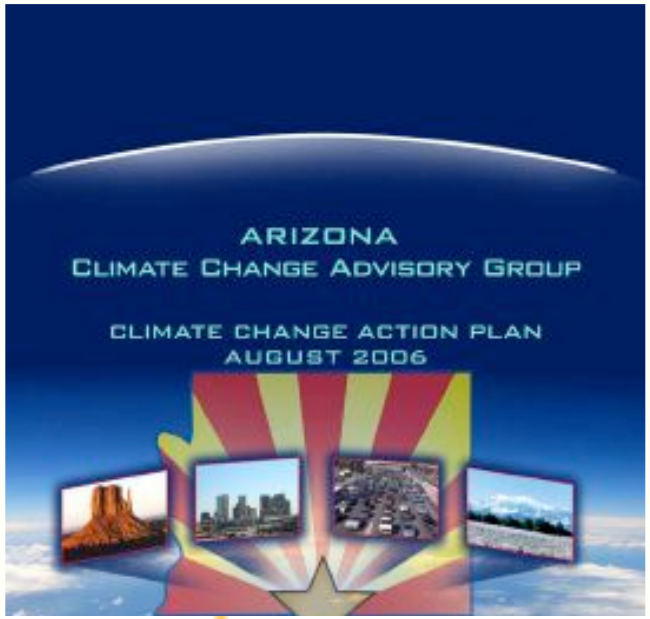
International GHG Targets



GHG Reduction Strategies



www.azclimatechange.us



CCAG Recommended Policy Options, by Quantified Cost Per Ton GHG Removed

Cost savings are shown below the axis. Net costs are shown above the axis.

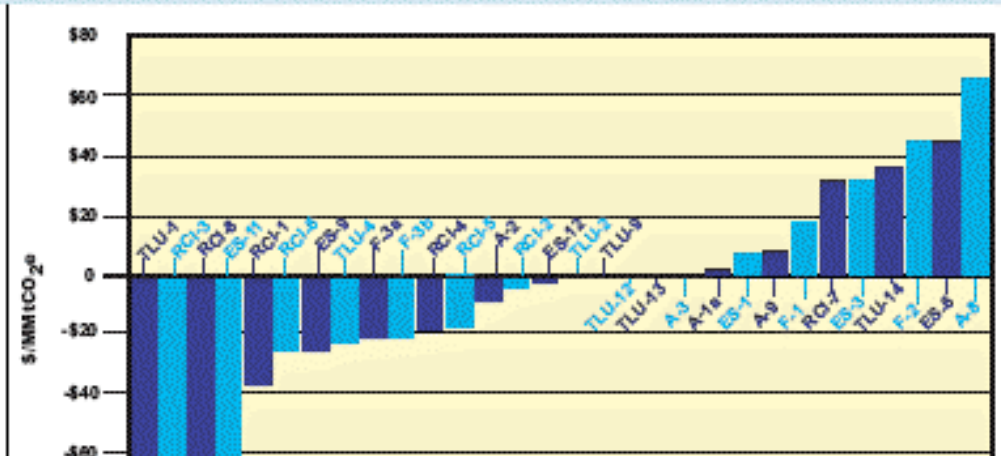


Table 1-3 Totals

Total of all CCAG Options with Adjustments for Overlap (Detailed data may be found in the Tables presented in Chapters 4-8 and the Appendi	2010 Annual GHG Reduction ($MMtCO_2e$)	2020 Annual GHG Reduction ($MMtCO_2e$)	2007-2020 Cumulative Reduction ($MMtCO_2e$)
	15.4	69.4	485.4[14]

+285,000 jobs

The Center for Climate Strategies (CCS) has calculated overall net economic cost savings from the CCAG's policy option recommendations of more than $5.5 billion from 2007-2020. The CCS also has calculated that the average cost for each ton of GHGs removed would be -$12.74, meaning that there would be a net econmic cost savings of $12.74 for each ton of GHGs removed.[15]

California's Climate Plan Results

AB-32 & E.O. S-3-05: Reducing to 1990 GHG levels by 2020 will add $4 billion and 83,000 jobs to California's economy.

(UC-Berkeley)

NO REASON TO WAIT

EFITS OF GREENHOUSE GAS REDUCTION IN SÃO PAULO AND CALIFORNIA

andards yielded net economic
between 1975 and 1995, and
through 2003.

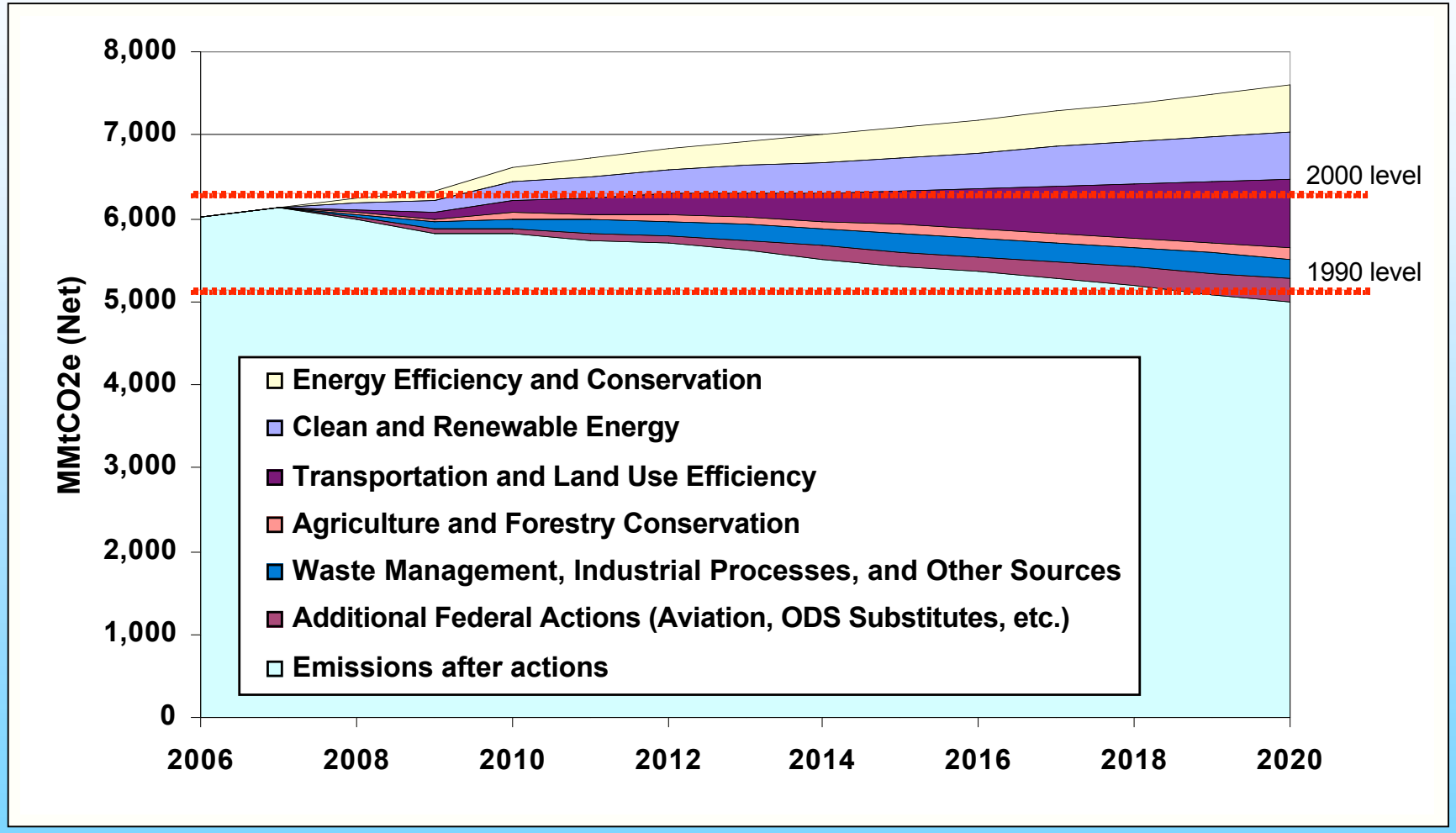
cent smaller ($31 billion)
ency in the industrial and
ears had not been achieved.

of economic activity) in the
state had remained at 1975 levels, air pollution emissions from stationary
sources in the state would have been about 50 percent greater in 1995.

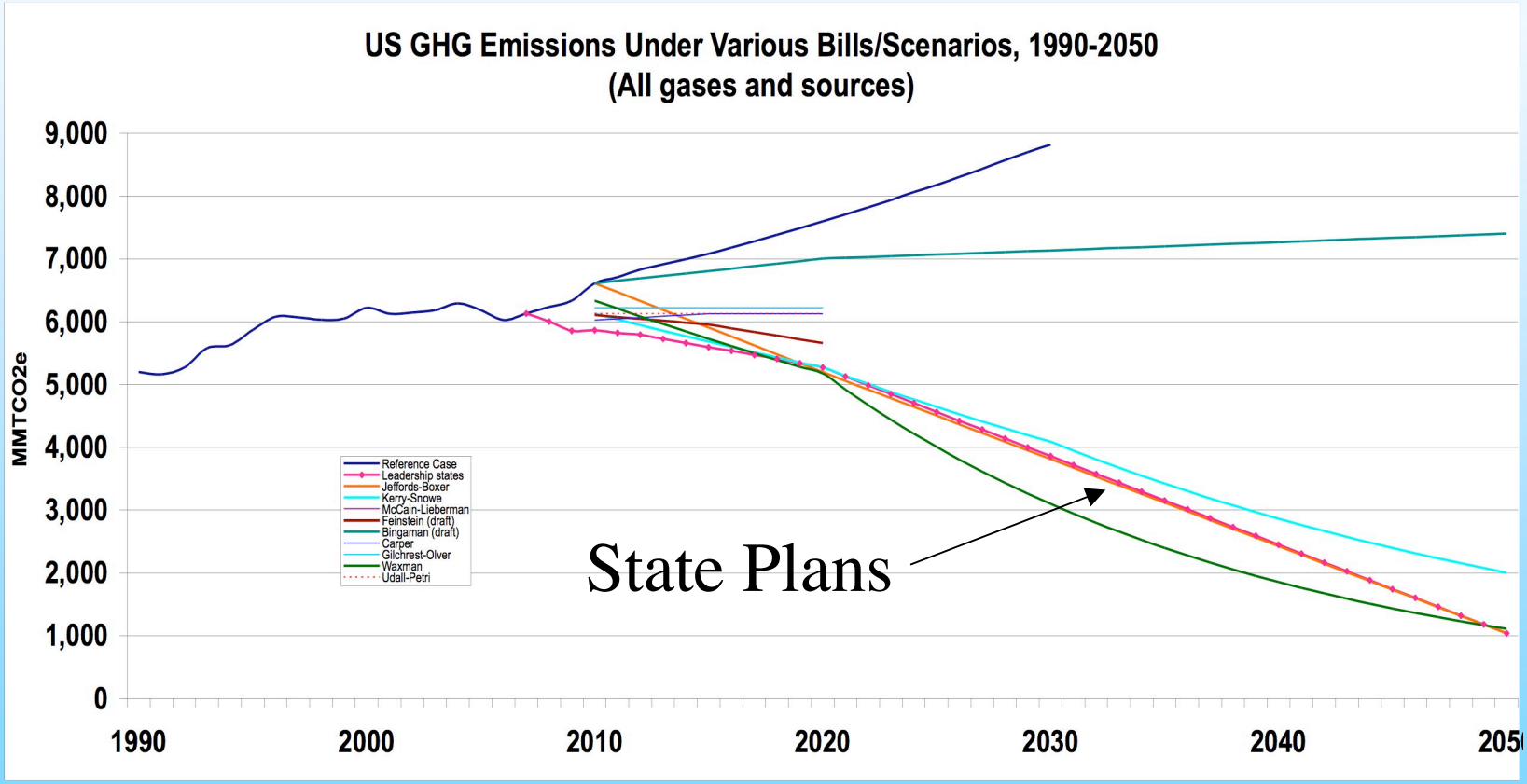
December 2005

How Leadership States Are Doing It

(States' "wedges" scaled to national GHG emissions)



Comparison to National Bills



Stepwise Planning Process

1. Develop inventory and forecast of emissions
2. Identify a full range of possible actions
3. Identify initial priorities for analysis
4. Develop straw proposals
5. Quantify GHG reductions and costs/savings
6. Evaluate co-benefits, feasibility issues
7. Develop alternatives to address barriers
8. Aggregate results
9. Establish goals or targets
10. Implement recommendations

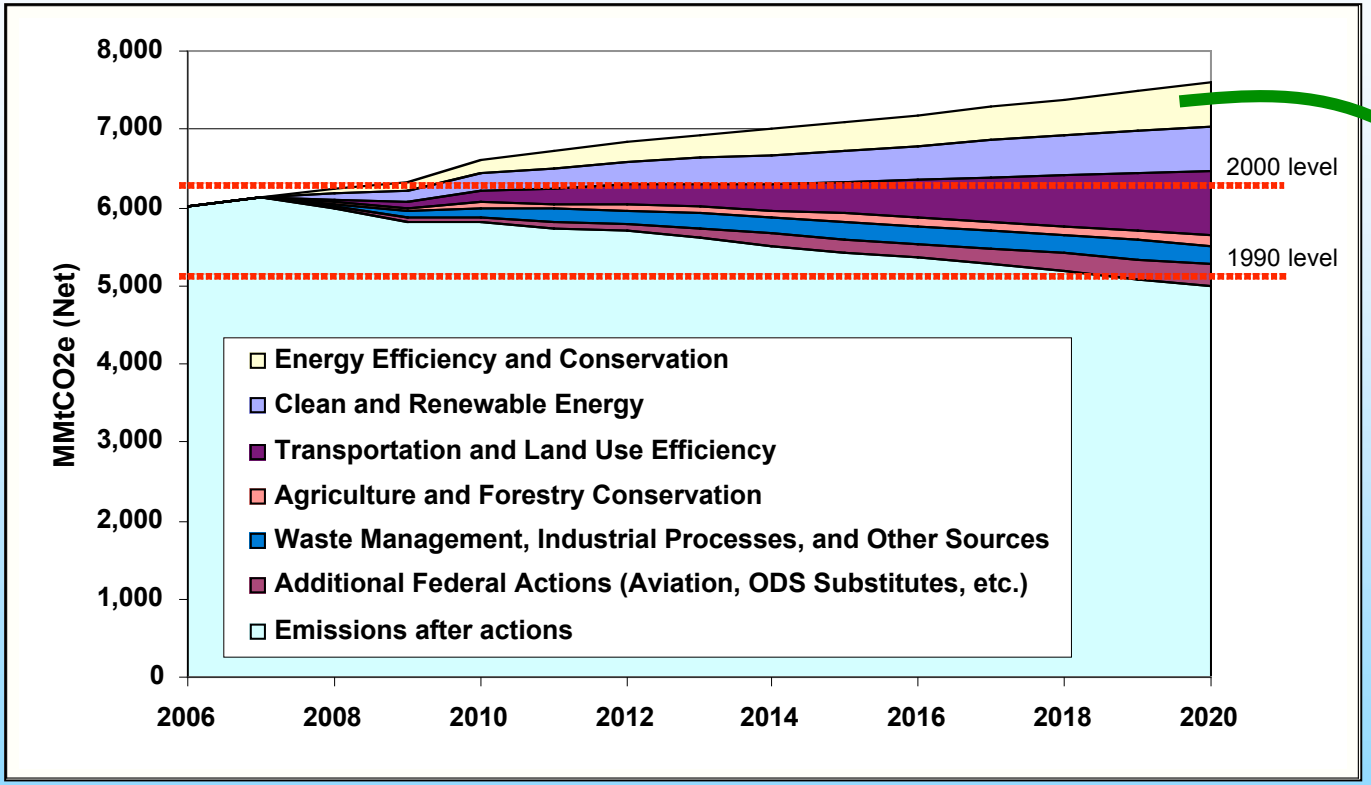
Ingredients to Successful State Climate Plans

- Self determined and open ended
- Comprehensive on all dimensions
- Participatory and collaborative
- Allow extended discussion
- Sufficient time for learning and iteration (six full advisory group meetings over 12 months, with interim work group meetings)
- Stepwise and progressive process
- Advanced fact finding and analysis
- Joint policy development and modeling
- Transparent and open
- Inclusive and diverse
- Seek but don't mandate consensus

Advantages of Youth…

Background: Details of Action

Energy Efficiency and Conservation



~24% of closing the "jaws"

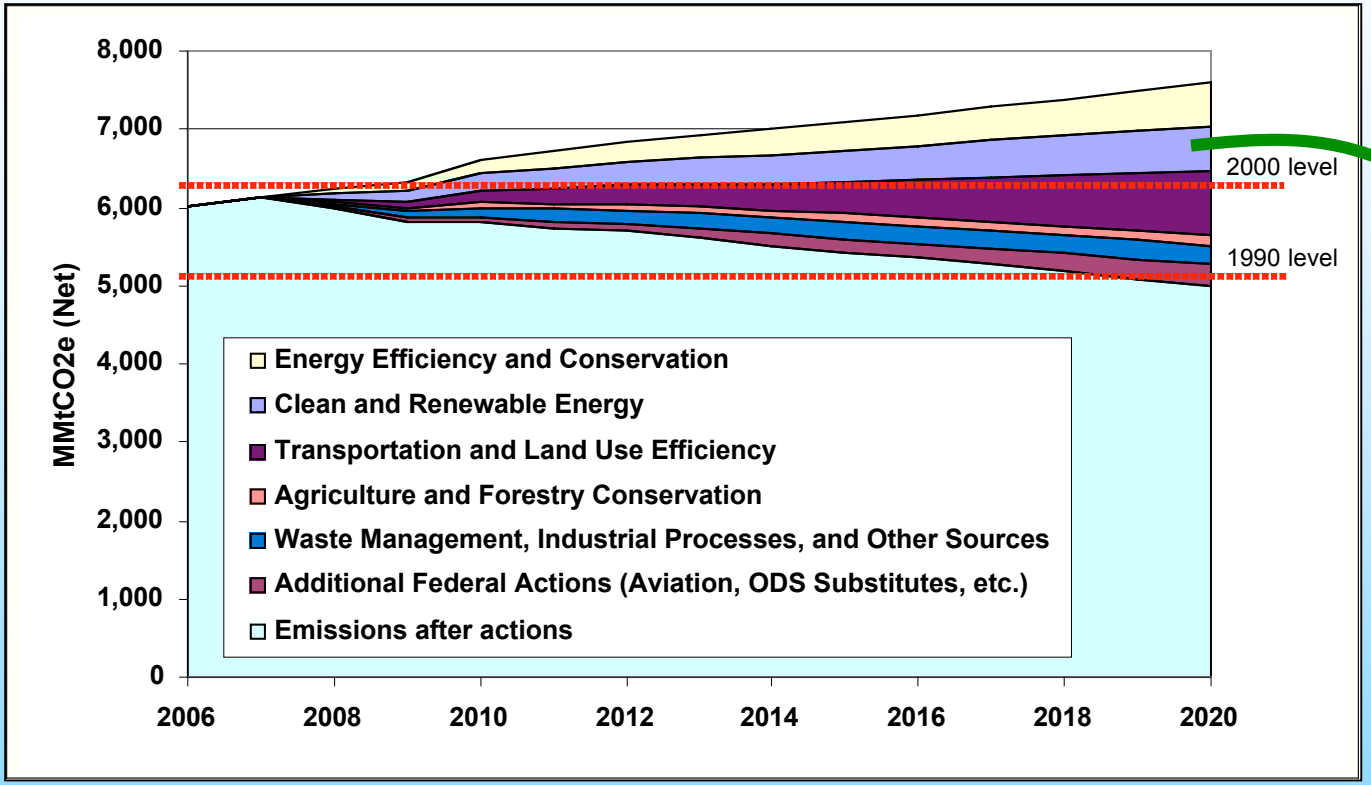
Energy Efficiency and Conservation

- ***Key areas of state action:***
  - Energy efficiency programs, funds, & requirements
  - Building codes and “beyond-code” incentives
  - Appliance standards
  - Green building programs and lead-by example activities
  - Pricing strategies
  - Market transformation programs
- ***Approximate costs (examples):***
  - AZ: -$30 / MTCO2e
  - NM: -$10 / MTCO2e

Energy Efficiency and Conservation

- ***Key outcomes & co-benefits:***
  - GHG reductions on the order of 10-15% of total state emissions by 2020
  - Lower energy bills and overall cost savings to consumers and businesses ($billion+ NPV)
  - Reduced dependence on imported fuels (and reduction in cost of natural gas)
  - Lower vulnerability to energy price volatility
  - Job creation and support for local economic development
  - Technology/market development
  - Reduced criteria pollutants; improved public health

Clean and Renewable Energy



~24-30% of closing the "jaws"

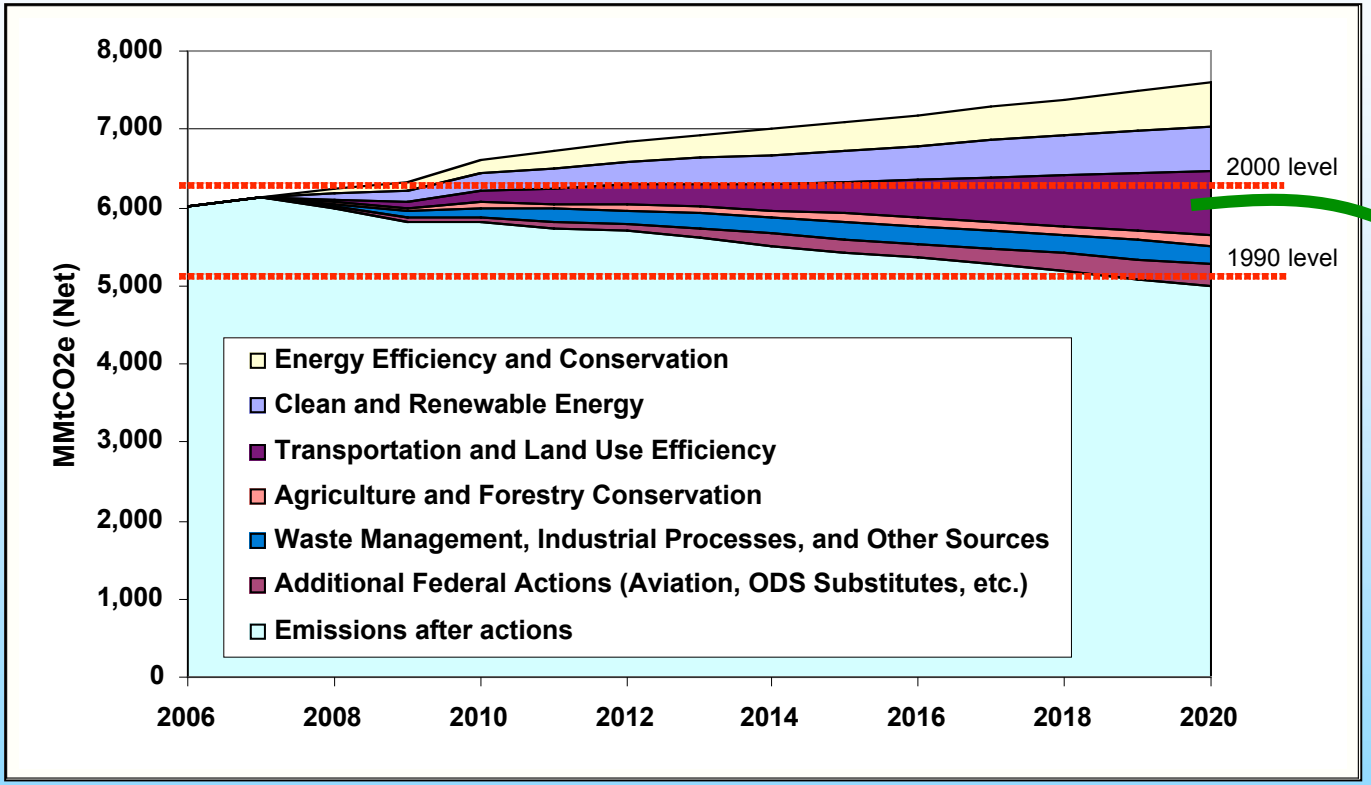
Clean and Renewable Energy

- ***Key areas of state action:***
  - Renewable portfolio standards, incentives, and purchase programs
  - Waste energy capture & use (e.g., combined heat and power) initiatives
  - Electric sector carbon policy (cap and trade, generation performance standards)
  - Cleaner oil and gas production
  - Carbon capture and storage
- ***Approximate costs (examples):***
  - AZ: $21 / MTCO2e
  - NM: $7 / MTCO2e

Clean and Renewable Energy

- ***Key outcomes and co-benefits:***
  - GHG reductions on the order of 10-25% of state emissions by 2020
  - Greater energy reliability; security
  - Lower vulnerability to energy price volatility
  - Reduced dependence on imported fuels (and reduction in cost of natural gas)
  - Job creation and support for local economic development
  - Non-GHG environmental benefits (local air quality, power plant construction)

Transportation and Land Use Efficiency



~20-36% of closing the "jaws"

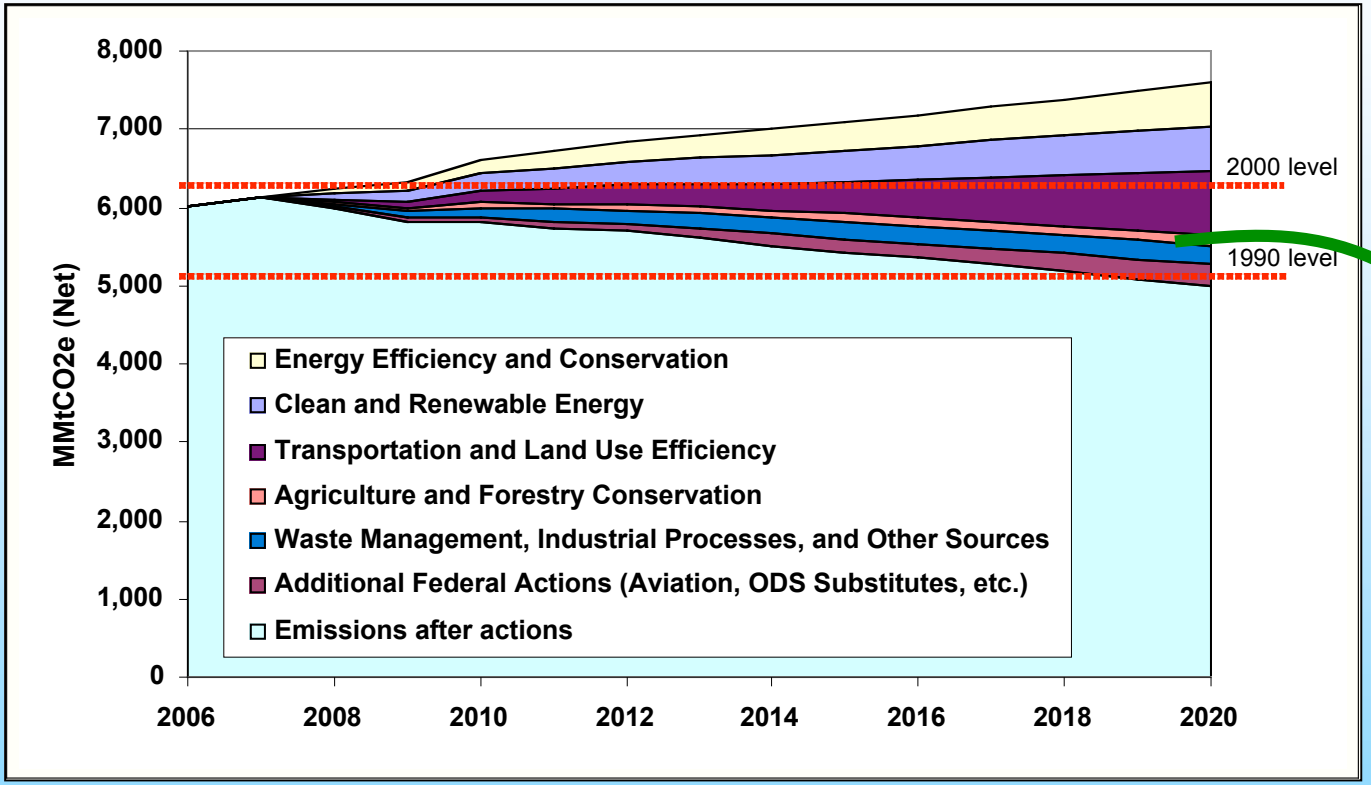
Transportation and Land Use Efficiency

- ***Key areas of state action:*** *(not additive)*
  - Transportation System Efficiencies
    - Efficiencies in Vehicle Miles of Travel (VMT): 1 to 20 %
  - Location Efficiencies
    - Efficiencies in VMT: 3 to 11 %
  - Alternative Fuels
    - Reductions in GHG Emissions: 3 to __ %
  - Efficient Vehicle Designs
    - Reduction in GHG Emissions: 10 to 20 %
  - Heavy Duty Vehicle Operational Efficiencies
    - Reductions in GHG Emissions: 4 to 20 %
- ***Approximate costs (examples):***
  - AZ: -$32 / MTCO2e
  - NM: -$36 / MTCO2e

Transportation and Land Use Efficiency

- ***Key outcomes and co-benefits:***
  - GHG reductions on the order of 18-25% of sector emissions by 2020
  - "Oil Savings" of a similar magnitude and reduced dependence upon imported petroleum products
  - Net societal economic benefits and consumer pocketbook savings
  - Job creation and global capital investment from energy related 'cleantech' sector growth
  - Direct health co-benefits from reduced mortality, morbidity, and hospital visits from respiratory ailments

Agriculture and Forestry



~6-9% of closing the "jaws"

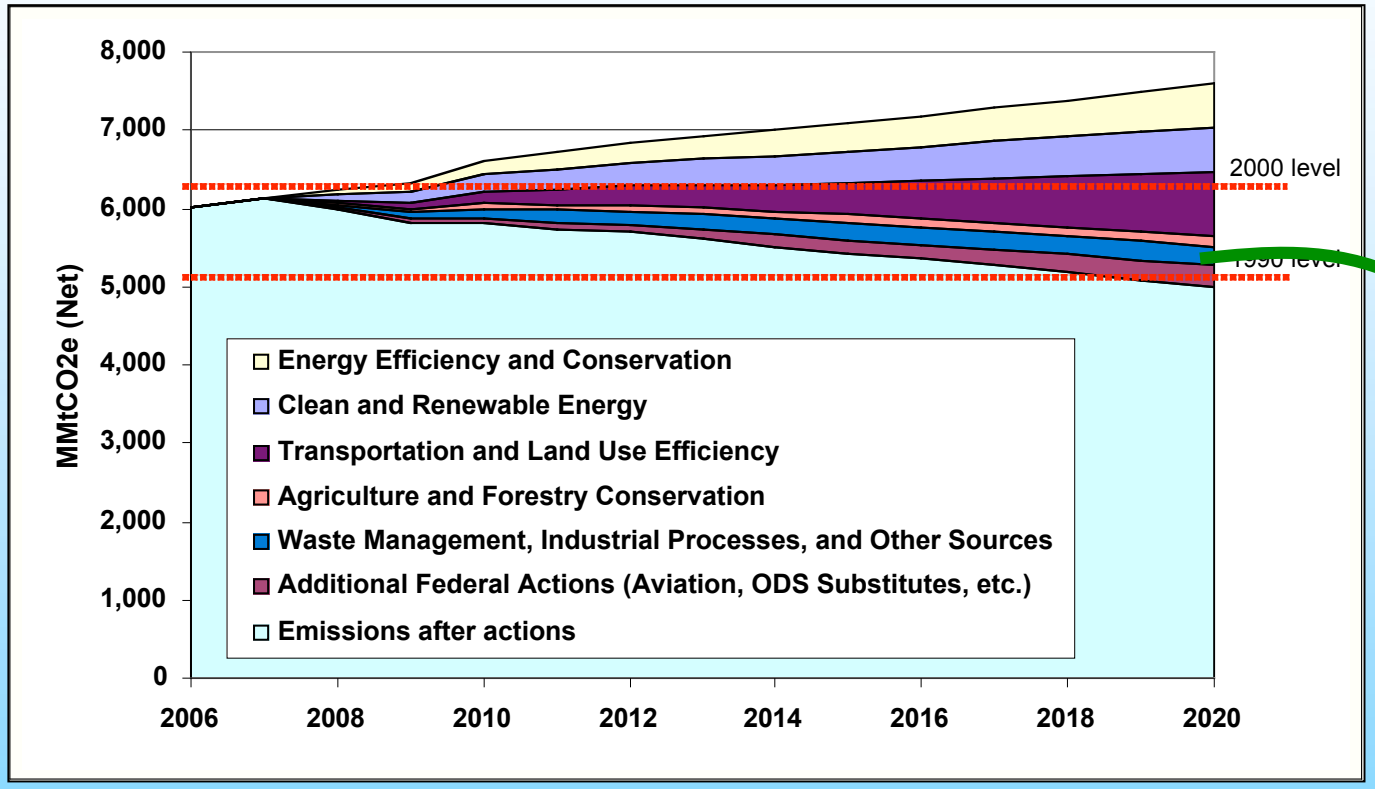
Agriculture and Forestry

- ***Key areas of state action:***
  - Protection, establishment & restoration: Increase sequestration with new forests; prevent loss of existing forests
  - Forest management: Improve management to increase sequestration and reduce CO_2 losses in existing forests
  - Agricultural practices: Reduce GHG from agricultural practices and increase carbon sequestration in soils
  - Agricultural land use management: Prevent CO_2 losses from agricultural land use change (e.g., cultivation of grasslands/grazing lands)
  - Production of bioenergy feedstocks: Increase biomass used in bioenergy sources (e.g., 25 x 25)
- ***Approximate costs (examples):***
  - AZ: -$1 / MTCO2e
  - NM: -$5 / MTCO2e

Agriculture and Forestry

- ***Key outcomes and co-benefits:***
  - GHG reductions on the order of 1-7% of state emissions by 2020
    - Actions & potential reductions vary regionally
  - Proven practices & technologies ready for scale-up
  - Sectors essential for bioenergy development
  - Energy savings from bioenergy & co-benefits of practices (e.g., manure management, no-till agriculture, planting shade-trees)
  - Environmental improvements: wildlife habitat, biodiversity, water quality, soil stabilization, land protection / open space

Waste Management, Industrial Gases, and Other Sources



~11-18% of closing the "jaws"

Waste Management, Industrial Gases, and Other Sources

- ***Key areas of state action:***
  - Recycling, source reduction, and composting
  - Landfill and wastewater gas capture and use
  - Management of, and alternatives to, high global warming potential refrigerants
  - Cement manufacturing and blending
  - High GWP gases in industrial processes (Semi-conductor and aluminum PFCs, N20 nitric acid
- ***Approximate costs (examples):***
  - (Not segregated in AZ & NM)

Waste Management, Industrial Gases, and Other Sources

- ***Key outcomes:***
  - Reduced pressure on landfills; fewer landfill-related air and water emissions
  - Reduce environmental impacts associated with raw material extraction and processing
  - Job creation and local economic development associated with secondary material markets
  - Innovation: industrial process improvements; product substitutes, etc.
  - New markets for clinker substitutes