

# So Many Climate Change Bills! Is There Science Behind the Numbers?

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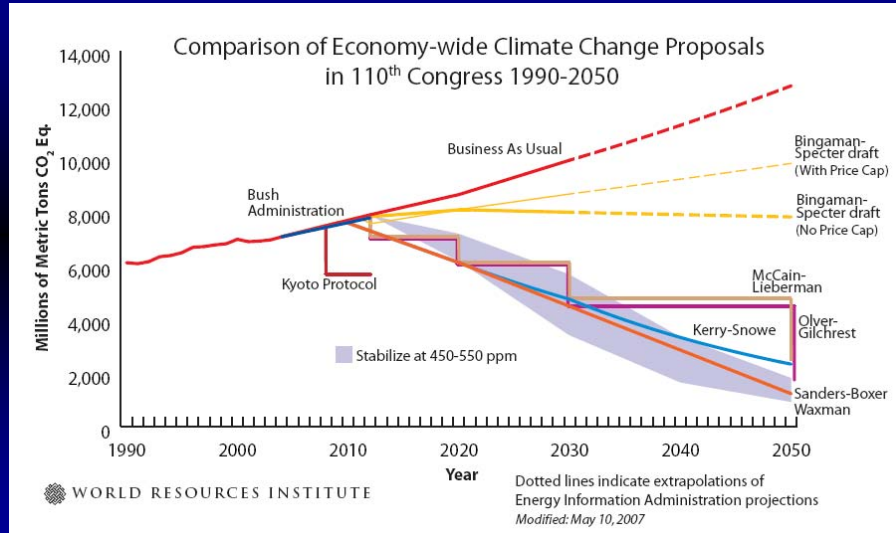
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## Recent Major Climate Change Legislation Introduced

- Kyoto Protocol
- Bush Administration
- Kerry-Snowe
- Olyer-Gilchrest
- McCain-Lieberman
- Bingaman-Specter
- Sanders-Boxer
- Lieberman-Warner

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# Climate Change Legislation



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## IPCC Synthesis Report

*If there's no action before 2012, that's too late. What we do in the next two to three years will determine our future. This is the defining moment.*

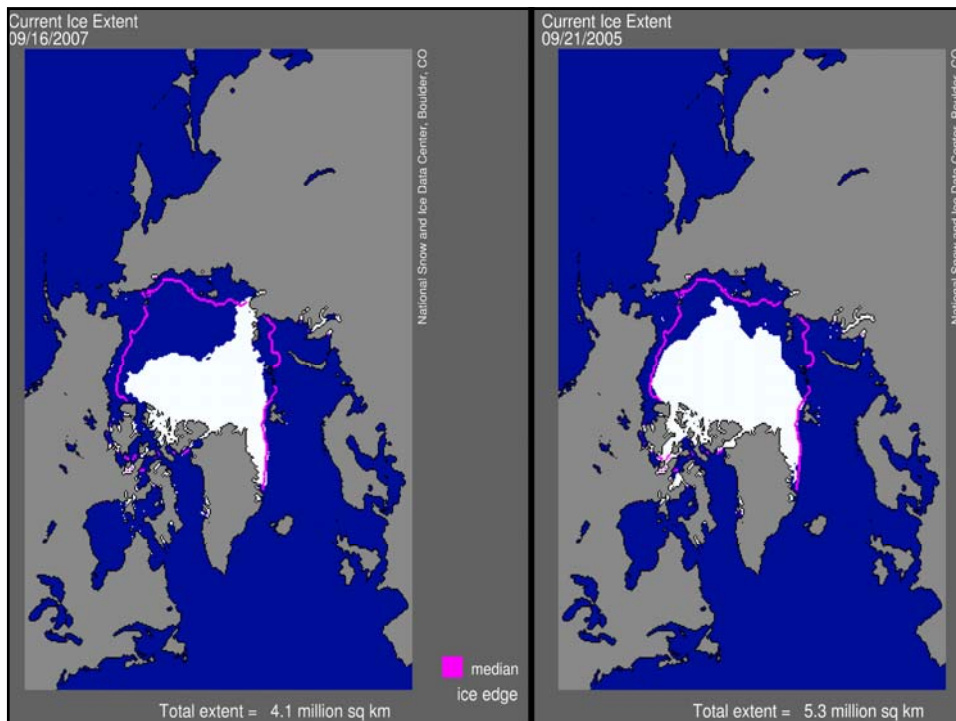
*- RK Pachauri, IPCC Chairman*

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## What Led to this Unprecedented Remark?

- Arctic sea ice melting faster than projected
- Greenland melting
- Profound effects of climate change already noticeable on many ecosystems
- Potential for abrupt climate change seemingly more likely

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## Surface Melt on Greenland

Melt descending into a moulin, a vertical shaft carrying water to ice sheet base.



Source: Roger Braithwaite,  
University of Manchester (UK)

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## What Can We Expect? Paleo-Geological Data

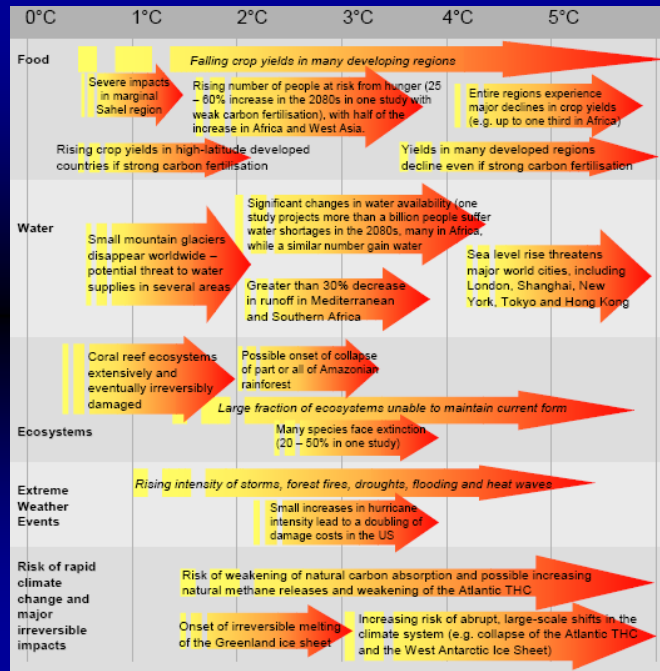
- Sea level was 25–35m higher the last time that the Earth was 2–3°C warmer than today
- Sea level rise lagged tropical temperature by a few thousand years in some cases but *was nearly synchronous in others*
- Even with scenarios that achieve 80% reductions, sea level rise still 1m/century
- Business As Usual scenarios—several meters/century

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# What Can We Expect?

## Climate Modeling Projections

Source: Stern Review, 2005



## Where Do We Draw the Line? “Dangerous Climate Change”

- What or who defines “Dangerous Climate Change”
- Depends on who—and where—you are
  - Pacific Islander losing your ancestral homeland
  - One of 45,000 victims of West European Heat Wave
  - One of the 150,000 annual victims of climate change
  - American with resources
- Scientists have chosen 2°C

## Where Do We Draw the Line?

- United Nations Framework Convention on Climate Change — “to achieve... stabilization of greenhouse gas concentrations in the atmosphere at a level which would prevent dangerous anthropogenic interference with the climate system”
- Criteria of concern in IPCC
  - Warming involving risk to unique and threatened systems
  - Warming engendering a risk of “largescale discontinuities” in the climate system

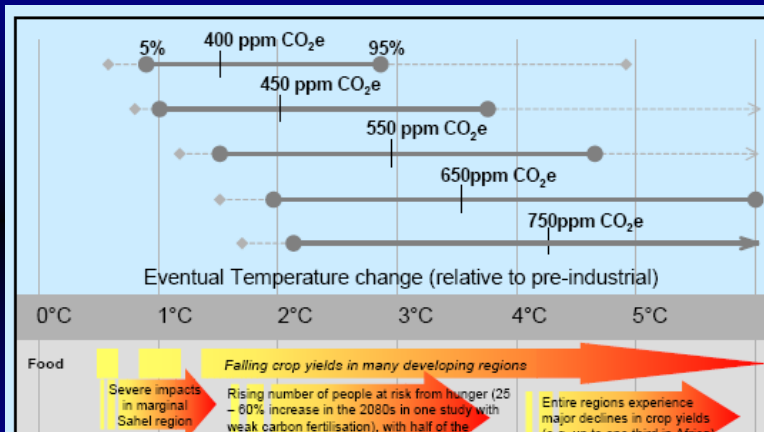
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## What Defines *Dangerous*?

- Tipping points or thresholds in the climate system that would cause
  - Significant Coral bleaching.....1.6°C ↑
  - Greenland to melt.....2°C ↑
  - Significant biodiversity loss.... 2-3°C ↑
  - West Antarctic Ice Sheet to melt.....2°C ↑
  - Land carbon sinks to reverse..... 3°C ↑
  - Thermohaline circulation to stop....5°C? ↑

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## What CO<sub>2</sub> Level Will Keep Temperature < 2°C?



Source: Stern Review 2005

## What's the *Probability* of that Level Avoiding *Dangerous* Climate Change<sup>12</sup>?

### Levels: CO<sub>2</sub> vs. CO<sub>2</sub>e

- CO<sub>2</sub> **current = 383 ppm**
- CO<sub>2</sub>e(Kyoto) vs. CO<sub>2</sub>e(Total)
- CO<sub>2</sub>e(Kyoto) **current = 460 ppm**
  - Includes CH<sub>4</sub>, N<sub>2</sub>O, CFCs
- CO<sub>2</sub>e(Total) **current = 375 ppm**
  - Includes Kyoto plus O<sub>3</sub>, sulfate aerosols, black carbon
    - Many are *negative* forcings
    - Many have short lifespans (10 days)
    - Measures to ↓ fossil fuel use and air pollution will reduce
- Emissions: C vs. CO<sub>2</sub>
  - 1 ton C = 3.62 tons CO<sub>2</sub>

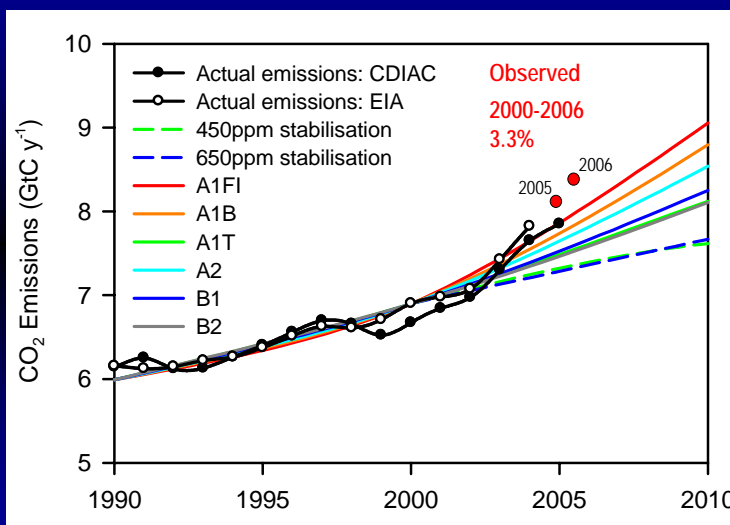
# The Climate Pipeline

	Lifetime in the atmosphere (years)	100-year Global Warming Potential (GWP)	Percentage of 2000 emissions in CO <sub>2</sub> e
Carbon dioxide	5-200	1	77%
Methane	10	23	14%
Nitrous Oxide	115	296	8%
Hydrofluorocarbons (HFCs)	1 – 250	10 – 12,000	0.5%
Perfluorocarbons (PFCs)	>2500	>5,500	0.2%
Sulphur Hexafluoride (SF <sub>6</sub> )	3,200	22,200	1%

The Stern Review, 2005

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## Trajectory of Global Fossil Fuel Emissions



SRES (2000) growth rates in % y<sup>-1</sup> for 2000-2010:

A1F1: 2.71  
 A1B: 2.42  
 A2: 2.13  
 B1: 1.79  
 A1T: 1.63  
 B2: 1.61

Raupach et al. 2007, PNAS, courtesy of Global Carbon Project

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## Stabilization

- Carbon emissions must = sinks
- Current carbon emissions = 34 GtCO<sub>2</sub>e/yr
  - Expected to ↑ 60 – 70% by 2030 BAU
- Current carbon sink = ~17 GtCO<sub>2</sub>/yr
  - Sinks are decreasing
  - Sinks may be 1 to 3 GtCO<sub>2</sub> by 2100
- Models show *global* emissions budget is 1700 GtCO<sub>2</sub>e for 2000-2050
- *Global* emissions must ↓ by 50% below 2000 levels by 2050

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## How to Divvy Up the Global Carbon Budget?

- Developing vs. developed countries?
- Population?
- Total emissions vs. per capita?
- GDP?
- Historical contributions to greenhouse gases?
- Current contributions to greenhouse gases?

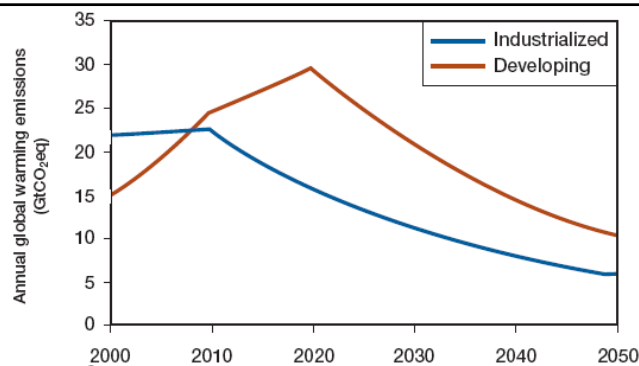
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## Divvying Recommendations per Union of Concerned Scientists

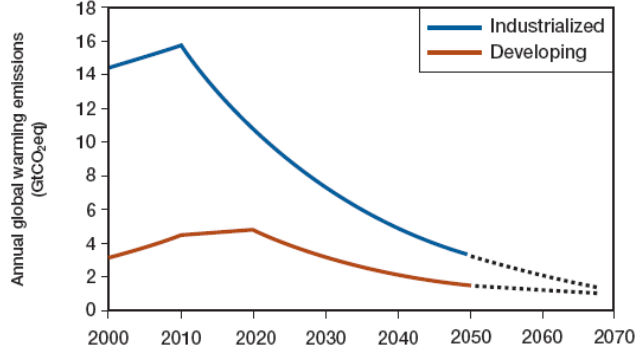
- Developing countries peak in 20 to 25 years vs. developed in 10 to 15 years
- Developing nations required to ↓ 25% by 2050 (China higher)
- Industrialized nations required to ↓ 70-80% by 2050

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### Total Emissions

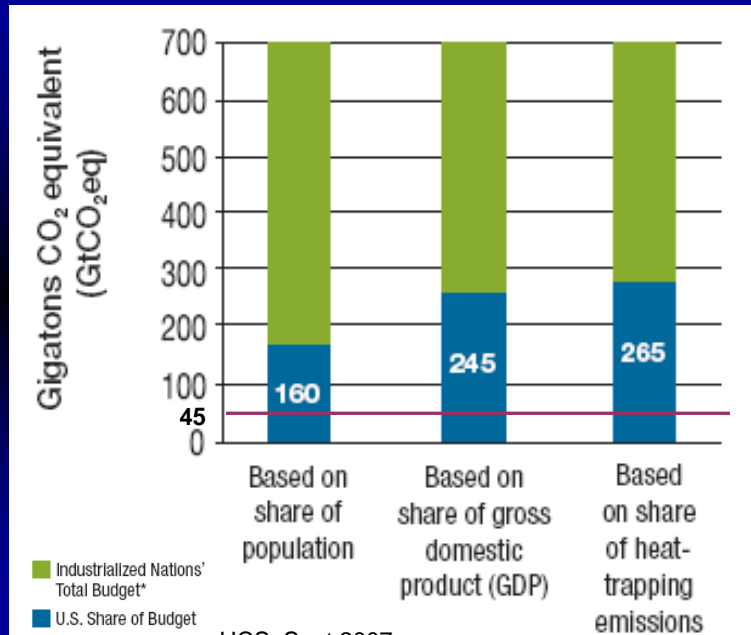


### Per Capita Emissions



UCS, Sept. 2007

## U.S. Share of Industrialized Budget 2000-2050



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## Why Do We Need to Act Immediately?

1.

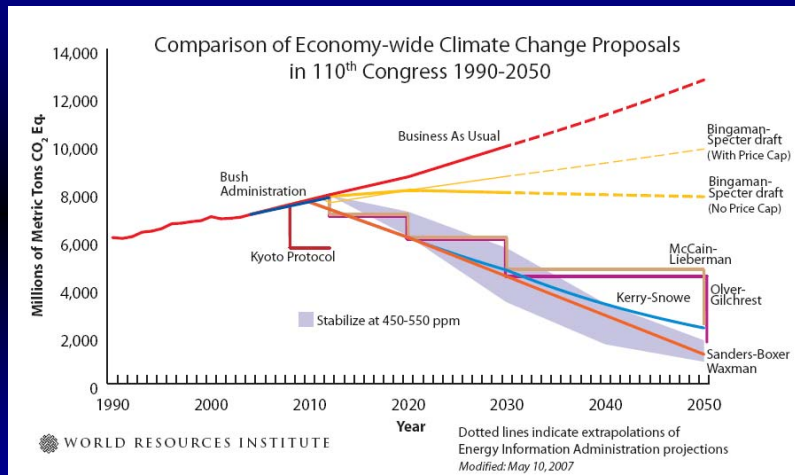
Infrastructure	Expected lifetime (years)
Hydro station	75++
Building	45+++
Coal station	45+
Nuclear station	30 - 60
Gas turbine	25
Aircraft	25-35
Motor vehicle	12 - 20

The Stern Review, 2005

2. When and where we peak is important!

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## Is There a Bill that Will Get Us There?



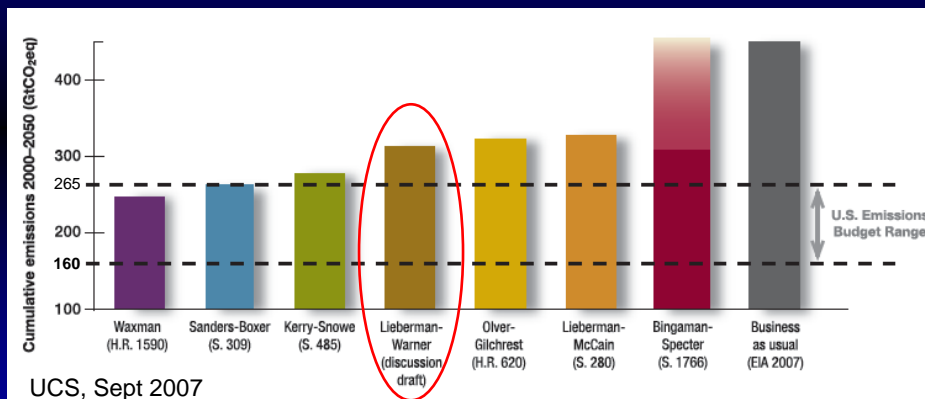
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## Lieberman-Warner Bill Summary

- Uses a cap-and-trade mechanism to get to 1990 levels by 2020 and 63% below 1990 levels by 2050
- Only covers 75% of U.S. emission sources
  - Electric power, transportation, manufacturing

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## Cumulative U.S. Emissions in 2050 with Federal Proposals



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## Lieberman-Warner Bill (S.2191)

- Voted out of Environment & Public Works Committee Dec 5<sup>th</sup>
  - Vote 11:8 along party lines
- Pushed by Senator Boxer
- The only climate change bill that will be actively considered in early 2008
- Had a difficult time getting voted out of committee—will likely be weakened on Senate floor

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## Lieberman-Warner Bill (S. 2191) Good Points

- 20% of auction proceeds distributed to low and moderate-income energy consumers
- Strengthens energy efficiency standards for residential boilers and for commercial & residential buildings
- Requires mandatory EPA review every 5 years
- 55% of the auction proceeds would be used for Energy Technology Deployment Program, 20% to Energy Assistance Fund, 20% to Adaptation Fund, 5% to Climate Change Worker Training Fund
- Bill rewards states with stricter standards than the federal cap
- There is some funding for green jobs

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## Lieberman-Warner Bill (S.2191) Not So Good Points

- It doesn't get to 80% below 1990 levels by 2050
- Only covers 75% of emission sources
- Only 18% of credits will be auctioned off initially. The rest will be given away—gives polluters a free ride
- That gradually increases to 73% of the credits auctioned off by 2036
- Allows polluters to submit “offset” allowances totaling as much as 15% of emission permits
- Annual caps may be temporarily increased by 20% if later caps are tightened and companies pay interest on “borrowed” allowances
- There's not as much funding for green jobs as there could be

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## What's the Best Strategy?

- Is it better to vote for a bad bill that doesn't accomplish what is necessary to avert catastrophic climate change so that we have *something*?
- Or withhold support and hope for a better bill later (When? How long can we wait?)

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## Should We Vote for a Bad Bill?

- Examples of weak environmental bills that were strengthened later
  - Clean Air Act 1955, 1963, 1970, 1990
  - Clean Water Act 1972, 1977, 1987
  - General Mining Act 1872, 2007
- Often a lengthy lag between initial passage and improvement
- If a bill is passed, will the legislators and the public think we've taken care of the problem?

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## Other Options

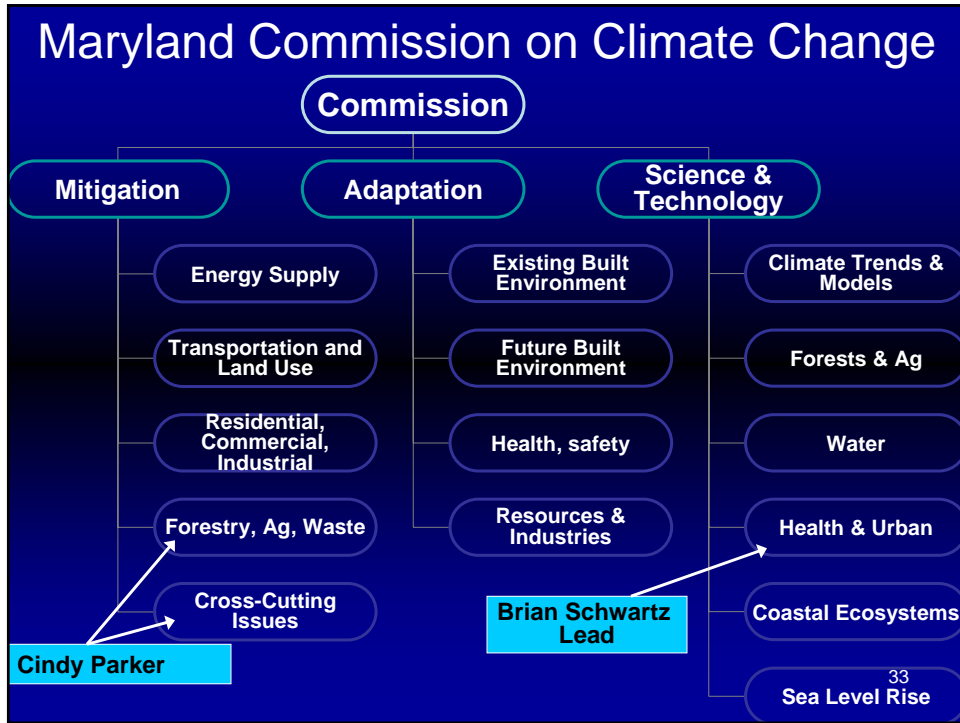
- While the Feds are doing very little, the states have taken the initiative and have been quite busy
- In 2006, California was 1<sup>st</sup>
  - greenhouse gas emissions reduced to 1990 by 2020
- Following California's lead several other states are pursuing legislation
- Maryland also

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## Maryland Commission on Climate Change

- Executive order by Governor O'Malley (4/07)
- Develop an action plan to address the causes of climate change
  - **1990 levels by 2020**
  - **80% reduction from 2006 by 2050**
- Prepare for the likely consequences and impacts to Maryland
- Establish firm benchmarks and timetables for implementing Commission's recommendations

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- ## Mitigation Working Group
- Representatives from industry, power plants, environmentalists, citizens, and 1 health person
  - Reviewed > 300 policy recommendations from other states and new ones we created
  - Whittled down to ~60 through consensus process to develop into full policy recommendations
    - Relevance for MD
    - Cost:Benefit ratio (not just \$\$, but also health, environmental, societal costs and benefits)
    - Feasibility
  - Chose ~12 as Early Action Items
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## MCCC Interim Report

- **Goals**
  - Use consumption as base approach
  - Use 2006 as baseline levels (not 1990)
  - Mid-Course Review every 4 years
- **Advance policy options**
  - Low hanging fruit
  - Minimal contention
  - Legislation likely this session
- **Broadly mentions ~60 policy recs that will be fully developed for final report**

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## Maryland Climate Change Goals

- **2012 - 10% below 2006 levels**
- **2015 – 15% below 2006 levels**
- **2020 – 25% to 50% below 2006 levels**
- **2050 – 90% below 2006 levels**
- ~~**2100 – zero emission or carbon neutral**~~

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## Final Report Due April 2008

It will include ~50 policy recommendations with detailed, specific info regarding:

- Description and goals
- Detailed analysis of cost:benefit
- Implementation mechanisms
- Estimated cost to implement
- Timetable
- Consensus reached?

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## Criteria for Good Climate Change Bill

- Emissions peak by 2010
- Reduce emissions at least 20% by 2020
- Reduce emissions at least 80% by 2050
- Reward good behavior/penalize bad behavior
- Reduce burden on most vulnerable

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