Announcements

Upcoming Talks (all listed on web page)

Friday March 13, 2009, 5-7pm, Ethnic Cultural Center, 3931 Brooklyn Ave NE
"The True Costs of Coal" presented by Beehive Collective
sponsored by UW Sierra Student Coalition

Saturday, Mar 14, 2:00 PM, Henry Art Gallery,Auditorium
Facing Climate Change. Documenting people around the world as they confront and adapt to global warming
Cost: Students $5

TODAY:
International and National Policy Outlook

Outline

Definitions
Kyoto Protocol
Int'l outlook . . . beyond Kyoto
US aspirations and realities
- Obama administration proposals
- Lieberman-Warner 2008
- "Cap and Trade" vs "Tax and Dividend"
- declining satellite capabilities
- Alternate approach? Regulate CO_2 as pollutant

Clarifying some definitions . . .

"mitigation" (prevention):

prevent an unsafe rise in GHG concentrations

"geoengineering":

allow GHG concentrations to rise, but do something else to counteract their effect on Earth's climate

"adaptation":

adjust to the climatic consequences of the rise in GHG concentrations

International policies to date (starting with UNFCCC, 1992) are focused on mitigation (i.e. prevention)

"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**."**

Principles for action on global environmental issues

Synergy between science and society

- science well supported and well organized
- healthy debate within science
- effective communication of consensus

Policies for global warming

- must be international and intergenerational
- must accommodate human aspirations, BUT
- channel aspirations in sustainable directions
- recognize limits: population and consumption
- recognize and learn from mistakes

>> Kyoto protocol wrap-up

Kyoto Protocol, 1997

UNFCCC: lofty principles

Kyoto Protocol: the gory details of implementation
(summarized in Rough Guide, p.290-295)

Annex 1 Countries: Developed nations that agreed to take the lead in reducing GHG emissions.

Emission Targets: Specific emission levels for each nation (% reduction from 1990 emissions) to be achieved by 2012.

Global Warming Potential (GWP):

Relates emissions of any GHG (methane, nitrous oxide, etc) to the equivalent emission of the main GHG, carbon dioxide.

Kyoto Protocol - history

Summer 1997: U.S. Senate goes on record opposing any treaty that does not specify "meaningful" emission cuts for developing as well as developed nations. Passes 95-0 !

Fall 1997: Treaty is finalized and signed by the U.S. President Clinton.

1998-2001: Clinton never submits to the Senate for ratification (therefore, never became U.S. law)

2005: U.S. President Bush officially withdraws the U.S.

2005: Treaty comes into effect when Russia adds its signature. (This achieves the requirement that developed countries representing at least 55% of Annex I emissions must sign on.)

Kyoto Protocol - Mechanisms

Complicated! See Rough Guide p. 290-295

Goal:

Specific emission reductions by Annex 1 countries by 2012.

Joint Implementation:

Allows developed countries to collaborate in projects that reduce emissions or increase "sinks". (A way of sharing the credit.)

Clean Development Mechanism:

Allows developed countries to get credit for projects that reduce emissions in undeveloped countries. (This aids the goal of technology transfer, essential to long-term reductions by the entire world.)

Emissions Trading:

Allows developed countries to purchase 'assigned amount units' from other developed countries. Creates a market in "carbon credits".

Moral Basis of Mitigation

Kofi Annan, Former Secretary General of the United Nations, August, 2003 [quoted in Houghton (2003), Global Warming, p. 329]:

Two Futures

"Imagine a future of relentless storms and floods; islands and heavily inhabited coastal regions inundated by rising sea levels; fertile soils rendered barren by drought and the desert's advance; mass migrations of environmental refugees; and armed conflicts over water and precious natural resources.

"Then, think again - for one might just as easily conjure a more hopeful picture: of green technologies; liveable cities; energy-efficient homes, transport and industry; and rising standards of living for all the people not just a fortunate minority."

Managing Planet Earth . . .

A new phase in human history
An enormous challenge...

Are we up to it?

>> Int'l outlook . . . beyond Kyoto

Beyond Kyoto

Rough Guide, p. 296-305

Kyoto goal: Annex 1 (developed) countries to cut emissions 5.2% below 1990 levels by the year 2012.

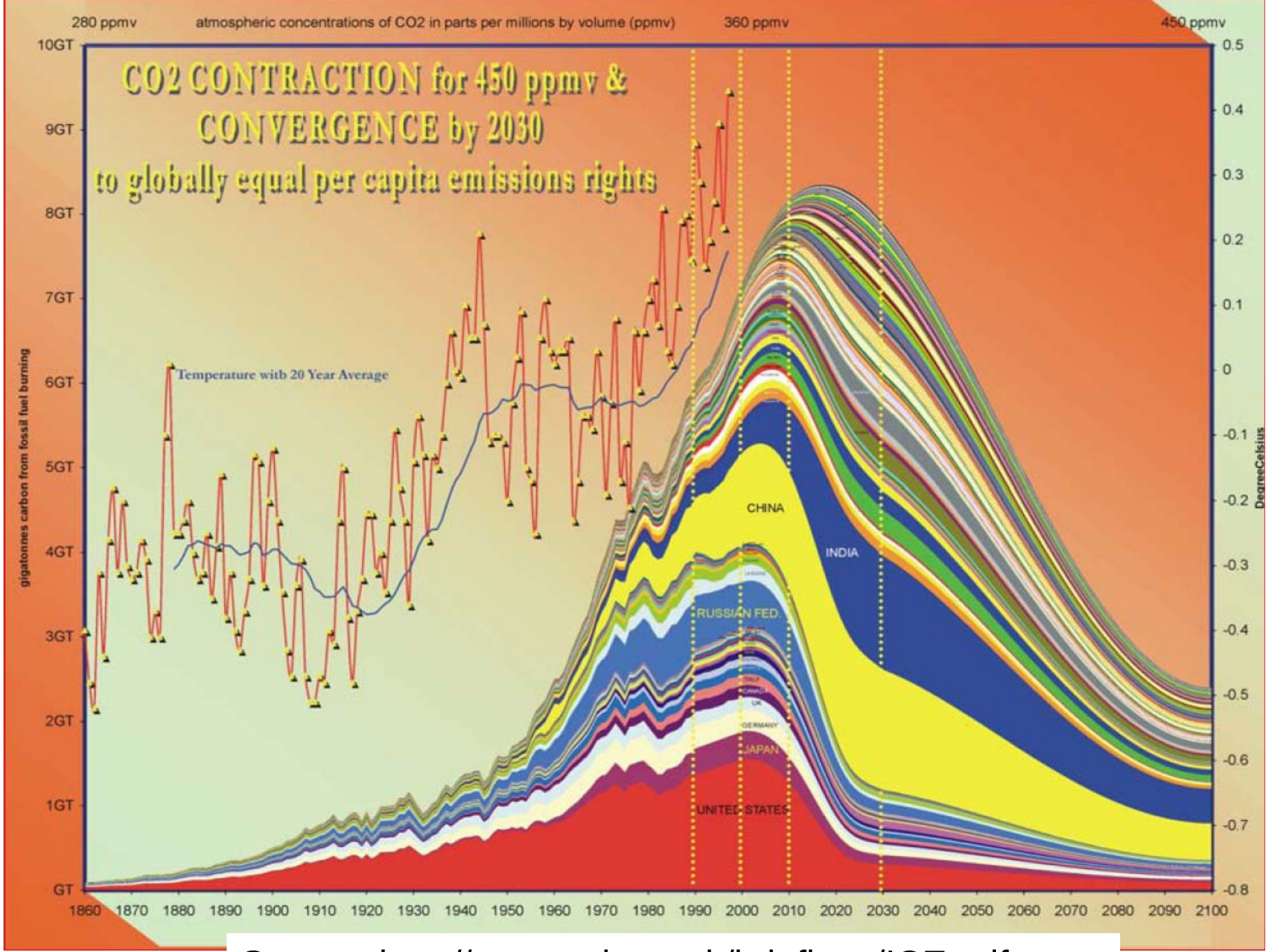
Result? Lots of practical experience along with wrangling and mistakes. Partial success at best.

Now what?

Immediate: Copenhagen, Dec 2009: Meeting of the Parties to the UNFCCC to negotiate the follow-on protocol.

Larger Visions:

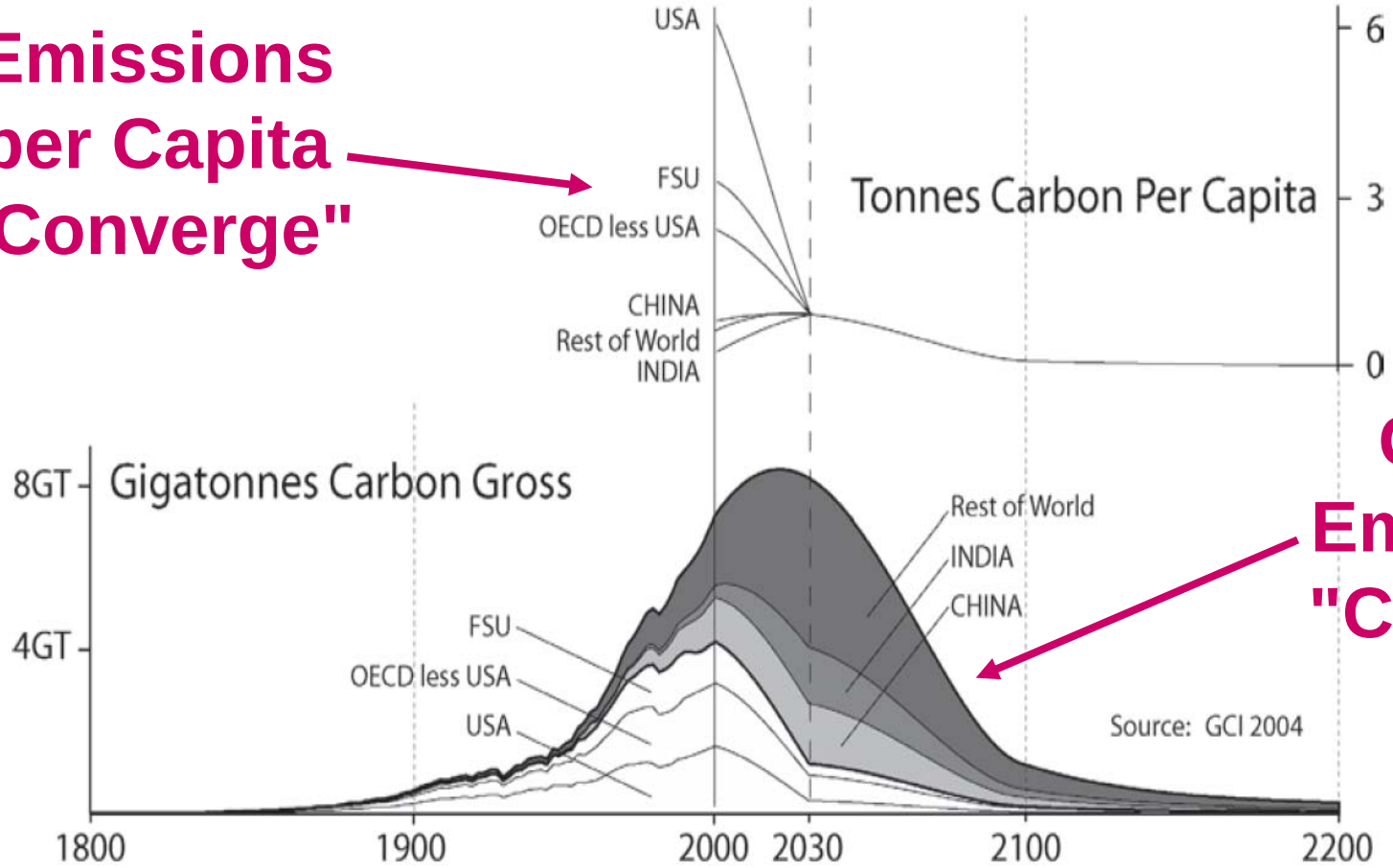
"Contraction and Convergence"
"Global Framework"



Source: http://www.gci.org.uk/briefings/ICE.pdf

Contraction and Convergence: 450ppm target

Emissions per Capita "Converge"



Global Emissions "Contract"

This example shows regionally negotiated rates of C&C.
This example is for a 450ppmv Contraction Budget, Converging by 2030.

Source: http://www.gci.org.uk/briefings/ICE.pdf

[Rough Guide, p. 298]

"Global Framework"

(proposal from consortium of environmental groups)

<u>Three track approach</u>

> **developed countries:** emission reduction targets

> **developing countries:** carbon intensity targets

> **poorest and most climate-vulnerable countries:** direct aid to assist with adaptation

Rough Guide, p. 299

Notable aspects of any global mitigation plan . . .

"There's no disguising the fact that the above plans, and many others, would require a massive explicit and/or implicit transfer of wealth from rich to poor countries . . ."

Rough Guide, p. 300

also, in U.S. and other developed countries

> dramatic rise in energy costs
> dramatic reduction in energy usage
> enormous changes in lifestyle

In-class activity

Uncertainty in a 40-year climate forecast comes mainly from:

1. Human GHG emissions
2. Climate sensitivity
3. The above two are about equally important

Explanation:

Comparing these sources of uncertainty was the quiz section exercise for Week 6 (solutions are provided on webpage under "Homeworks" button).

See also Lecture slides for Week 7, Thurs Feb 19

Uncertainty in a 100-year climate forecast comes mainly from:

1. Human GHG emissions
2. Climate sensitivity
3. The above two are about equally important

Explanation:

See IPCC Fig. SPM.5 (in course pack). Colored lines show range of forecasts for different emission scenarios. Gray error bars (on right) show uncertainty for any one emission scenario, which is driven mostly by uncertainty in climate sensitivity. The two sources of uncertainty are roughly the same.

What is wrong with this argument?

Given that water vapor is the dominant GHG, changing CO2 cannot cause substantial climate change.

1. The premise is wrong
2. The logic is wrong

Explanation:

Premise (that water vapor is the dominant GHG) is perfectly correct.

But the conclusion does not follow from the premise. The increase in atmospheric CO2 from human activities causes a climate forcing that is accurately known (see IPCC forcing bar-graph, Fig. SPM.2 in course pack) and sufficiently large to drive substantial climate change. The fact that H2O is a more important GHG is basically irrelevant.

See also Lecture slides from Week 2, Wed Jan 14.

Choose the smallest number that makes this statement true:

Natural climate changes of the past _____ years are as big as the changes forecast by the IPCC for the 21st century under BAU scenarios.

1. 1000
2. 10,000
3. 100,000
4. 1 million
5. 10 million
6. 100 million

Explanation:

Changes forecast by IPCC: 1 - 6 K

Changes associated with ice-ages: ~5 K

So ice-age changes are as big.

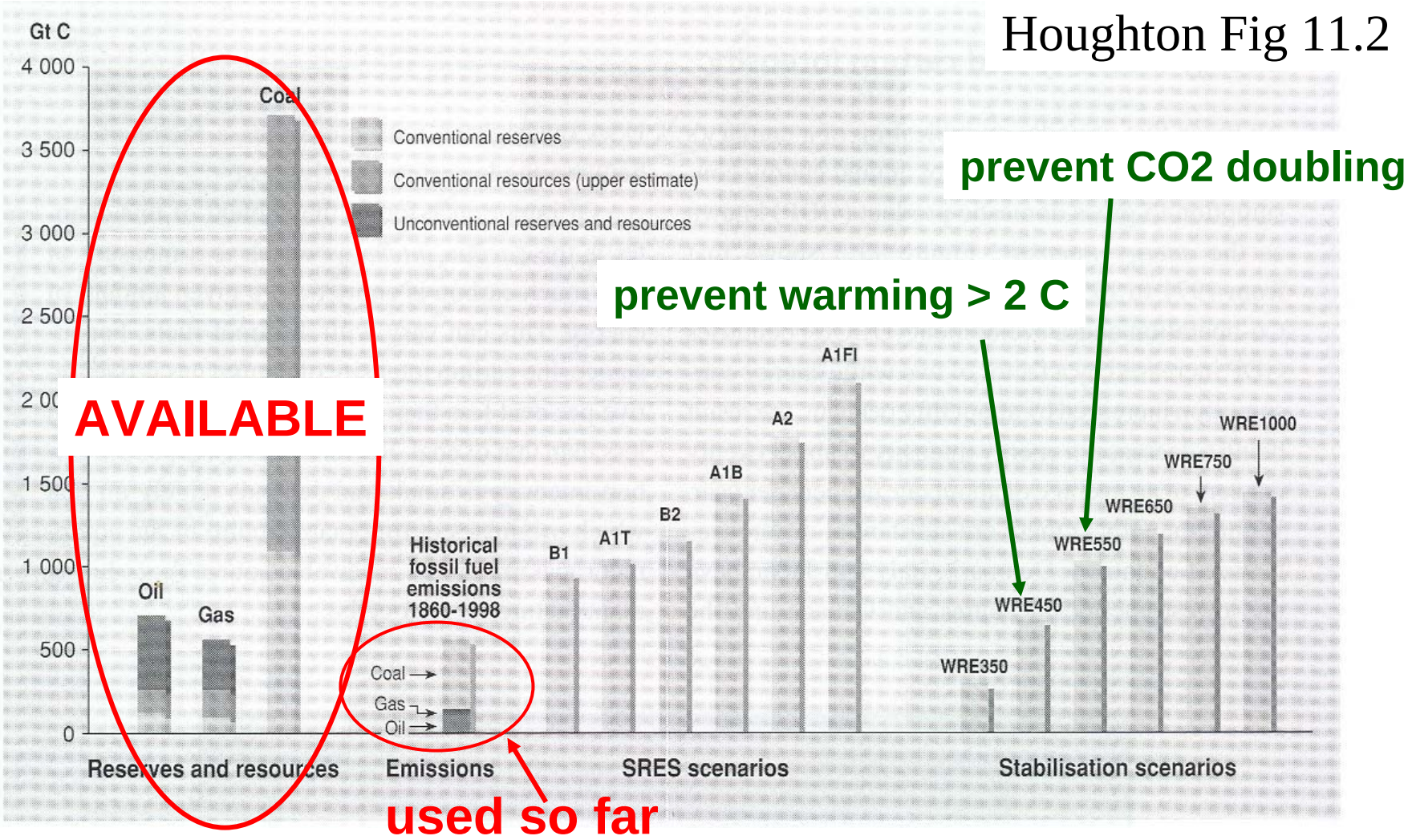
We have been in a warm, interglacial period for the past 10,000 years. (No ice-age during this time.)

Going back 100,000 years takes you into the last ice-age.

>> US National aspirations and realities

The Challenge: Resisting Temptation

Houghton Fig 11.2



The hope . . .

U.S. aspirations:

"I am absolutely certain that generations from now, we will be able to look back and tell our children that ... this was the moment when the rise of the oceans began to slow and our planet began to heal."

[Barack Obama, June 3, 2008]

>> Obama administration proposals

Obama administration proposals

http://www.whitehouse.gov/agenda/energy_and_environment/
March 10, 2009

<u>The Obama-Biden comprehensive New Energy for America plan will:</u>

- Help create five million new jobs by strategically investing $150 billion over the next ten years to catalyze private efforts to build a clean energy future.
- Within 10 years save more oil than we currently import from the Middle East and Venezuela combined.
- Put 1 million Plug-In Hybrid cars -- cars that can get up to 150 miles per gallon -- on the road by 2015, cars that we will work to make sure are built here in America.
- Ensure 10 percent of our electricity comes from renewable sources by 2012, and 25 percent by 2025.
- Implement an economy-wide cap-and-trade program to reduce greenhouse gas emissions 80 percent by 2050.

Obama administration proposals

http://www.whitehouse.gov/agenda/energy_and_environment/
March 10, 2009

<u>Energy Plan Overview</u>

Provide Short-term Relief to American Families

- Crack Down on Excessive Energy Speculation.
- Swap Oil from the Strategic Petroleum Reserve to Cut Prices.

Eliminate Our Current Imports from the Middle East and Venezuela within 10 Years

- Increase Fuel Economy Standards.
- Get 1 Million Plug-In Hybrid Cars on the Road by 2015.
- Create a New $7,000 Tax Credit for Purchasing Advanced Vehicles.
- Establish a National Low Carbon Fuel Standard.
- A “Use it or Lose It” Approach to Existing Oil and Gas Leases.
- Promote the Responsible Domestic Production of Oil and Natural Gas.

Obama administration proposals

http://www.whitehouse.gov/agenda/energy_and_environment/
March 10, 2009

<u>Energy Plan Overview (cont)</u>

Create Millions of New Green Jobs

• Ensure 10 percent of Our Electricity Comes from Renewable Sources by 2012, and 25 percent by 2025.
• Deploy the Cheapest, Cleanest, Fastest Energy Source – Energy Efficiency.
• Weatherize One Million Homes Annually.
• Develop and Deploy Clean Coal Technology.
• Prioritize the Construction of the Alaska Natural Gas Pipeline.

Reduce our Greenhouse Gas Emissions 80 Percent by 2050

• Implement an economy-wide cap-and-trade program to reduce greenhouse gas emissions 80 percent by 2050.
• Make the U.S. a Leader on Climate Change.

>> The reality: Leiberman-Warner, 2008

Current Action in the U.S.

Lieberman-Warner Climate Security Act (S-3036)

mandates emission reductions from major emitters in U.S. using a cap-and-trade system:

19% below current levels by 2020
33% by 2030
70% by 2050

generates revenue from sale of emission permits

$3 trillion through 2050
however, about 50% of permits are 'given away'

putting a cost on emissions sends the market signal to develop clean-energy technologies

revenues raised are used to

- **cushion the shock of rising energy prices**
- **provide incentives and direct investment in clean technologies**

Lieberman-Warner Climate Security Act (S. 2191)

Summary from the sponsors

Range of benefits ("win-win strategy"):

The Act invests set-aside emission allowances and money raised by the auction of such allowances in advancing several important public policies, including:

- deploying advanced technologies and practices for reducing emissions;
- protecting low- and middle-income Americans from higher energy costs;
- keeping good jobs in the United States;
- mitigating the negative impacts of any unavoidable global warming on low- and middle-income Americans and wildlife; and
- mitigating or forestalling political instability and international conflict that can threaten US national security, through actions designed to address negative global warming impacts on resource-stressed populations in other countries.

Lieberman-Warner Climate Security Act (S. 2191)

National Wildlife Federation assessment (Oct 29, 2007)

phases out current subsidies to polluters (e.g. oil and gas industries)

explicitly grants states the right to enact more stringent programs; provides financial incentives to do so

promotes projects to store carbon in forests and soils, "which can enhance habitat for fish and wildlife." In these projects, the bill "favors the use of native species and prevents the use of destructive invasive species."

promotes efforts to protect forests globally

provides "some funding" for international efforts to help vulnerable human populations and natural resources. [should be strengthened]

Lieberman-Warner Climate Security Act (S. 2191)

CNN, 30 May 2008
http://money.cnn.com/2008/05/30/news/economy/gunther_legislation.fortune/?postversion=2008053018
By Marc Gunther, senior editor
NEW YORK (Fortune) -- **An influential coalition of Fortune 500 companies and environmental groups that was formed to support climate-change legislation has splintered over the Lieberman-Warner bill** ...

other members ... , most visibly Duke Energy (DUK, Fortune 500), a coal-burning utility, are strongly opposed.

floor debate began Monday, June 2, 2008

Opposed by Democratic Senator Robert Byrd and many others

Died in Senate within a few days; never even came to a vote

>> cap-and-trade vs tax-and-dividend

"Cap and Trade" or "Tax and Dividend" ?

Cap-and-Trade (selling the right to emit) raises BIG money

"Sen. Joe Lieberman estimates that the market value of all permits under his bill would be about $7 trillion by 2050." Robert Reich, WSJ, 6/4/08

"Tax and 100% Dividend" (Jim Hansen, Robert Reich, others?)

"The worst thing about the present inadequate political approach is that it will generate public backlash. Taxes will increase, with no apparent benefit." [Hansen]

"public backlash" example...

"So-called "green" taxes are a con... Governments around the world have realized that environmentalism gives them an easy way of squeezing yet more tax out of hard-working people.

Bill Carmichael, Yorkshire Post, 31 May 2008

"Cap and Trade" or "Tax and Dividend" ?

"Tax and 100% Dividend" (Jim Hansen, Robert Reich, others?)

"For this reason I strongly favor a "tax and dividend" approach. The entire carbon tax should be given back to the public, an equal amount to each person. No bureaucracy is needed to figure this out. If an early carbon tax averages, say, $1200 per person... a monthly $100 deposit can be made automatically in everyone's bank account."

"Although energy prices will rise, you can bet your bottom dollar that lower and middle income people will figure out how to reduce energy use enough that, overall, they come out ahead. And in so doing, moving to more energy-efficient products, they will spur economic activity and create jobs.

for more info, see webpage, Readings, Jim Hansen

>> The Reality: declining satellite capabilities

Developments at NASA

NASA's Mission Statement (pre-2004):

"To understand and protect our home planet
"To explore the universe and search for life
"To inspire the next generation of explorers"

NASA's Mission Statement (now):

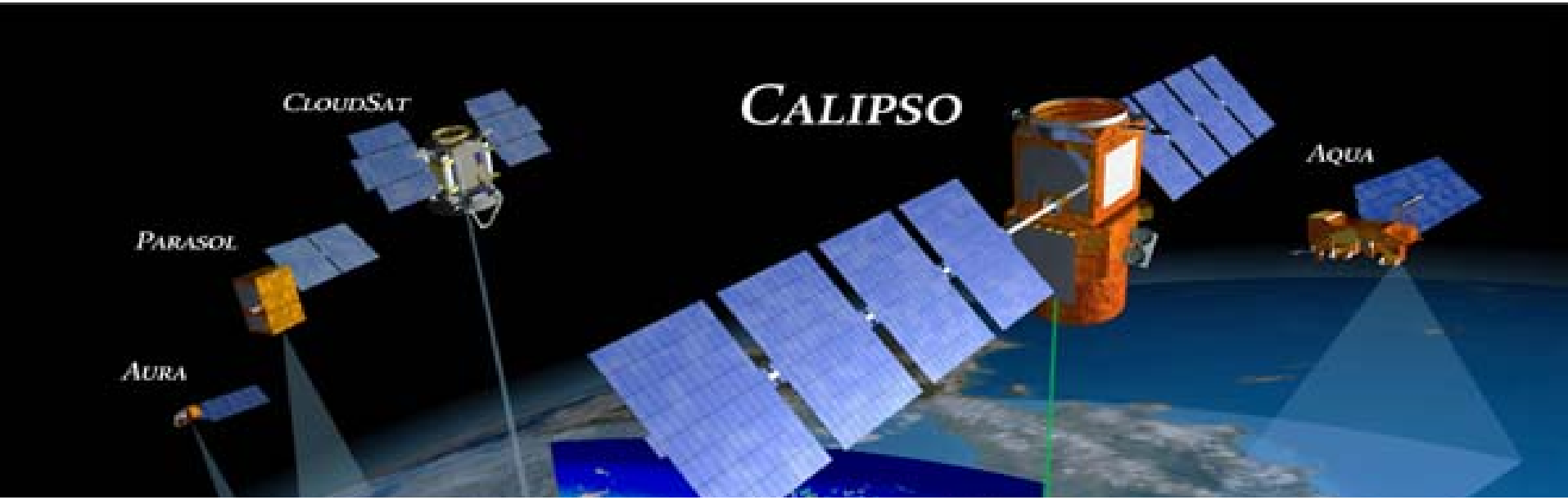
"To explore the universe and search for life
"To inspire the next generation of explorers"

Jan, 2004: President Bush announces the "Moon-Mars Plan" - a bold new vision for NASA.

Since then, funding for Earth Science (especially climate science) has been slashed.

Earth monitoring is set to decline dramatically in the coming decade.

Declining Satellite Capabilities



<u>National Academy of Sciences report, Jan 2007:</u>

From 2000-2005, NASA budget for Earth Science <u>declined</u> by 30% when adjusted for inflation.

By 2010 there is likely to be a 40% decrease in the number of NASA's Earth observing instruments. Other agencies (like NOAA) are not taking up the slack.

In particular, key instruments for monitoring climate change (e.g. for monitoring Earth's albedo and energy balance) are not being replaced.

We are about to create gaps in the data record which will essentially eliminate the possibility of detecting long-term trends in key climate parameters - including the cloud feedback.

NASA News, April, 2006:
Selected Mission for Space Shuttle Deployment

Lunar Crater Observation and Sensing Satellite
LCROSS

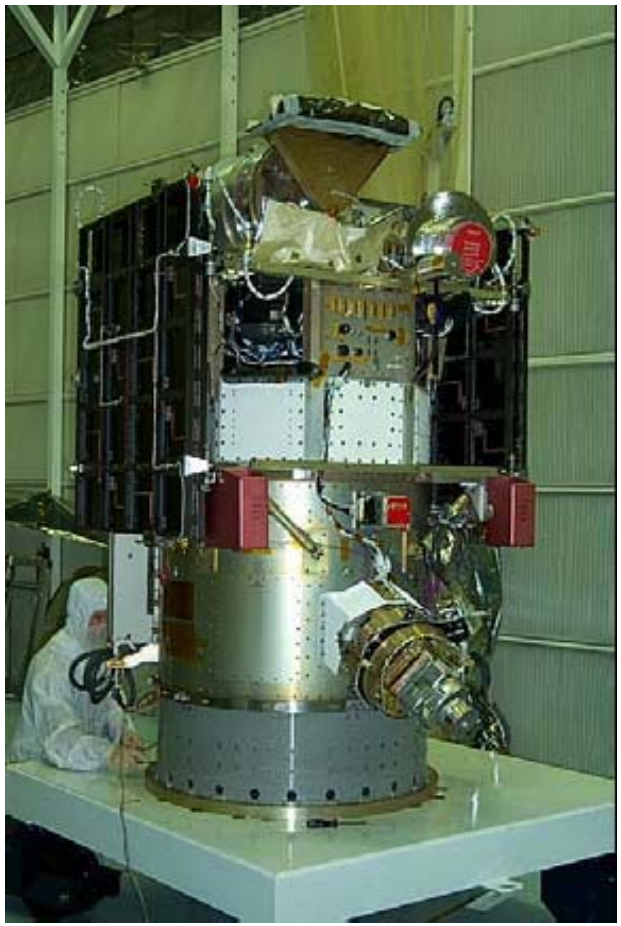
release SUV-sized projectile

examine blast plume for evidence of buried water

NOT selected

Deep Space Climate Observatory: DSCOVR

View entire sunlit earth, 24 hours a day
Moon calibration for extreme sensitivity and accuracy
Provides a critical test of global warming theory

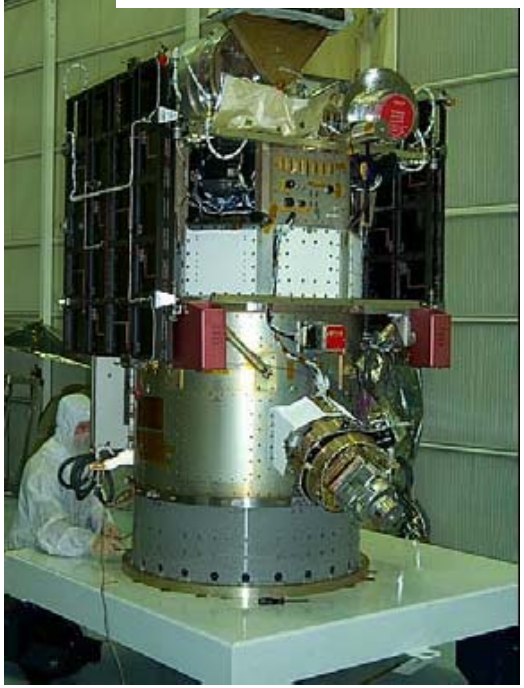


instruments are entirely built and ready to go

DSCOVR update: Mar 10, 2009

The Omnibus Appropriations Bill 1105, passed 3/10/09 by the US Congress contains the following fateful statement:
"The bill provides $9,000,000 for NASA to refurbish and ensure flight and operational readiness of DSCOVR earth science instruments." [p. 141]

http://www.desmogblog.com/dscovr-finally-going-fly



Deep Space Climate Observatory: DSCOVR

>> Alternate path? Regulate CO2 as a pollutant

Obama administration: EPA fast-track?

http://www.nytimes.com/gwire/2009/03/10/10greenwire-epa-document-shows-endangerment-finding-on-fas-10053.html
NY Times, March 10, 2009

Proposed Endangerment Finding for GHGs in Response to Mass. v. EPA

Guidance-Option Selection Briefing

March 6, 2009

from leaked EPA internal briefing (PowerPoint presentation)

Timeline Leading up to Now

- 1999: EPA received a petition to regulate greenhouse gas (GHG) emissions from new motor vehicles and engines under section 202(a) of the Clean Air Act (CAA).
- 2003: EPA denied the petition. In 2005, a split panel of the D.C. Circuit upheld EPA's denial.
- April 2007: In *Mass. v. EPA*, Supreme Court rejected EPA's reasons for denying the petition, stating that CO_2 meets the CAA definition of air pollutant and that EPA must base its decision on the statutory criteria of Section 202 (e.g., whether there is endangerment or not, or whether scientific uncertainty precludes EPA from making a reasoned judgment)

http://www.nytimes.com/gwire/2009/03/10/10greenwire-epa-document-shows-endangerment-finding-on-fas-10053.html
NY Times, March 10, 2009

EPA's Charge to Make an Endangerment Finding

- According to *Mass v. EPA* decision of April 2007, EPA must find that GHGs from new motor vehicles:
  - cause or contribute to air pollution that endangers, or
  - do not cause or contribute to air pollution that endangers, or
  - that the science is too uncertain to make a reasoned judgment
- Language under Sec. 202 of the CAA:
  - The Administrator shall by regulation prescribe…standards applicable to the emission of any air pollutant from any class or classes of new motor vehicles or new motor vehicle engines, which in his judgment cause, or contribute to, air pollution which may reasonably be anticipated to endanger public health or welfare.

http://www.nytimes.com/gwire/2009/03/10/10greenwire-epa-document-shows-endangerment-finding-on-fas-10053.html
NY Times, March 10, 2009

Endangerment Finding Workplan/Timeline

Task	Milestone
Draft science TSD to internal EPA review (and external expert review) Draft Endangerment Finding to internal EPA review	3/9/09 3/10/09
Internal Agency review complete	3/16/09
Final Agency Review (FAR)	**3/18/09**
Submit for Formal Interagency Review	3/20/09
Complete Interagency Review	4/10/09
Proposal signed by Administrator	**4/16/09**
Proposal published in Federal Register: - 60-day comment period, 2 public hearings	4/30/09

http://www.nytimes.com/gwire/2009/03/10/10greenwire-epa-document-shows-endangerment-finding-on-fas-10053.html
NY Times, March 10, 2009