Wood Bioenergy & Carbon Emissions

Presentation to
Avista Climate Policy Council
Spokane, Washington
September 18, 2012

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Director of Policy Analysis Group
College of Natural Resources

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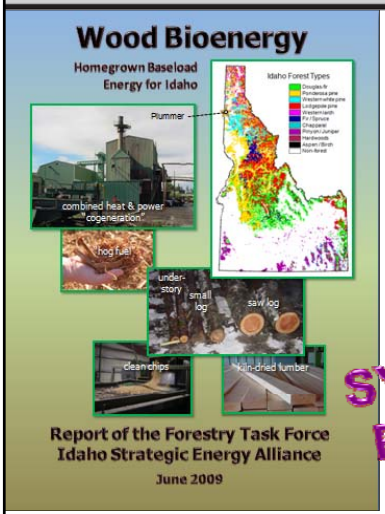
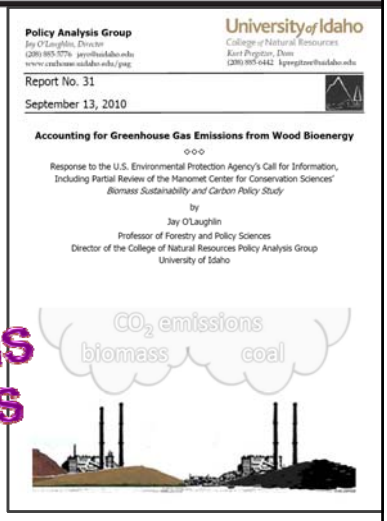


- Current Situation
- Potential Opportunities
- Barriers and Challenges to Development
- Options for Development

SYNTHESIS REPORTS



IDAHO Strategic Energy Alliance

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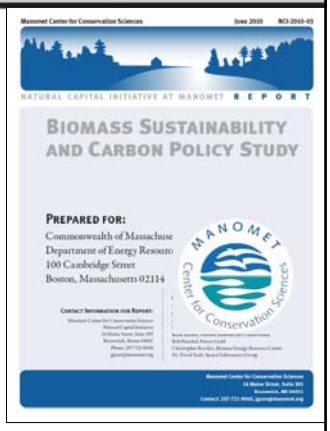
Manomet Center study report

Mass. Study: Wood Power Worse Polluter than Coal

by Steve LeBlanc – June 10, 2010 Associated Press

BOSTON - A new study has found that wood-burning power plants using trees and other "biomass" from New England forests releases more greenhouse gases into the atmosphere than coal over time.

The six-month study, commissioned by Mass. state environmental officials, found biomass-fired electricity would result in a 3 percent increase in carbon emissions compared to coal-fired electricity by 2050. …. Coal is considered one of the chief culprits of greenhouse gas emissions.



http://www.manomet.org/

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Conclusion on Manomet study

Carbon "debt-then-dividend" model is problematic:

1) the choice of today as the beginning time frame for carbon cycling instead of in the past when the existing forest began to uptake atmospheric CO_2;
2) stand-level instead of landscape-level modeling— "management actions should be examined for large areas and long time periods" (Ryan et al. 2010, p. 4);
3) failing to use a life-cycle approach that includes emissions from transporting energy feedstocks; and
4) failing to include carbon sequestered in wood products that result from the timber harvest "business as usual" scenario, and the avoided fossil fuel emissions from substitution for concrete and steel products.

Policy Analysis Group Report No. 31 (2010)

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OUTLINE

- Global warming's six Americas
- Why carbon?
- Carbon stocks & flows
- Forests: Carbon source or sink?
- Is bioenergy "carbon neutral"?
- Conclusions

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What is the analyst's standpoint?

http://www.azteachscience.co.uk/ext/cpd/dips/concept-cartoons.htm

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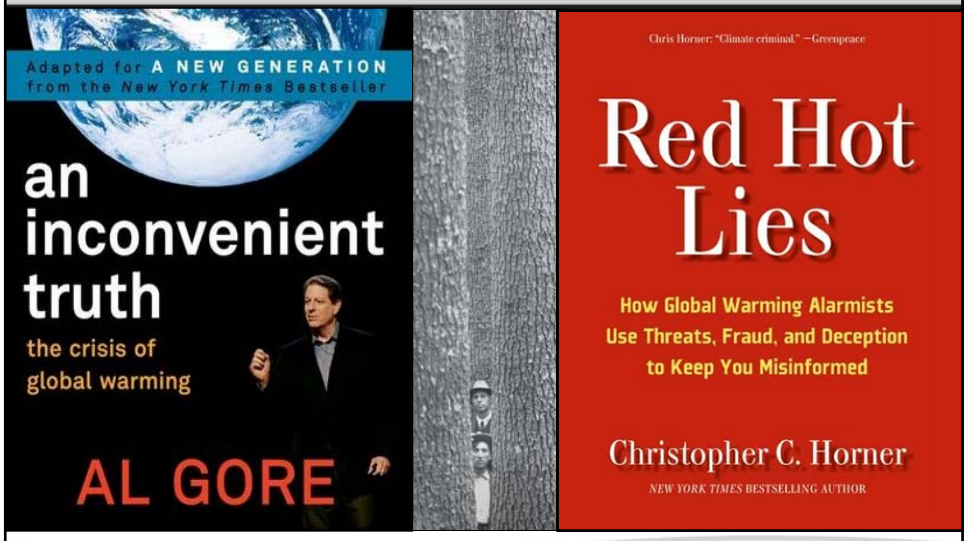
Global crisis . . . . . or . . . . . globaloney?



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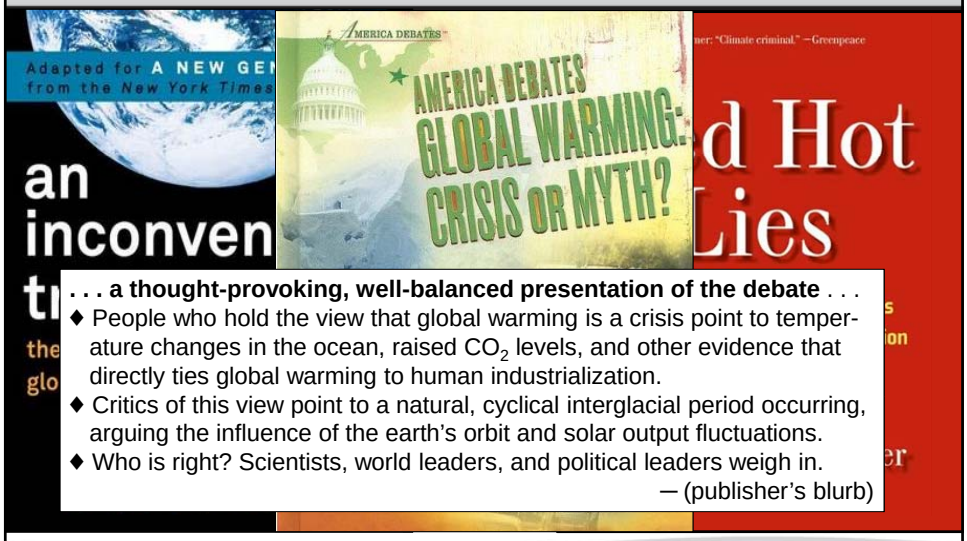
Global crisis . . . . . or . . . . . globaloney?



. . . a thought-provoking, well-balanced presentation of the debate . . .

- People who hold the view that global warming is a crisis point to temperature changes in the ocean, raised CO_2 levels, and other evidence that directly ties global warming to human industrialization.
- Critics of this view point to a natural, cyclical interglacial period occurring, arguing the influence of the earth's orbit and solar output fluctuations.
- Who is right? Scientists, world leaders, and political leaders weigh in.

— (publisher's blurb)

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Alarmists . . .

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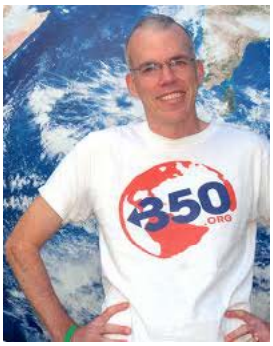
Global Warming's Terrifying New Math

Three simple numbers that add up to global catastrophe - and that make clear who the real enemy is

By BILL MCKIBBEN
JULY 19, 2012 9:35 AM ET



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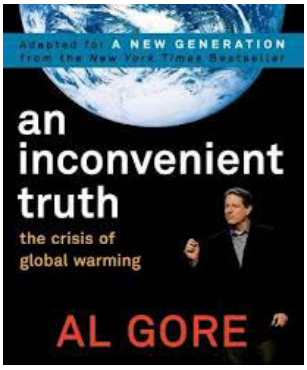
Al Gore: Climate of Denial

Can science and the truth withstand the merchants of poison?

By AL GORE
JUNE 22, 2011 7:45 AM ET



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Denialists . . .

Warren Meyer, None
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2/09/2012 @ 9:56AM | 65,936 views

Understanding the Global Warming Debate

Denialist interpreting IPCC reports . . .

Catastrophic Man-Made Global Warming Theory

Theory

Doubling CO_2 directly increases temperatures about 1C → Feedbacks multiply this 3x-5x or more

Observation

The world has warmed about 0.7C in last century → All of this (and more) due to man-made CO_2

Warming will / is causing many negative effects

- Hurricanes
- Tornadoes
- Glaciers melting
- Seas rising
- More snow / less snow
- More rain / more drought
- Tropical diseases
- Species extinction
- Etc. etc. etc.

Warren Meyer, I
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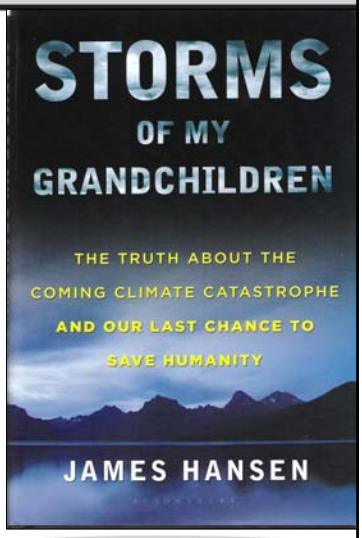
Understanding the Global Warming Debate

On scientific reticence and skepticism . . .

"Scientific reticence, in some cases, may hinder communication with the public. Reticence may be a consequence of the scientific method—success in science depends on continual objective skepticism. Caution has its merits, but we may live to rue our reticence if it serves to help lock in future disasters." (p. 87)



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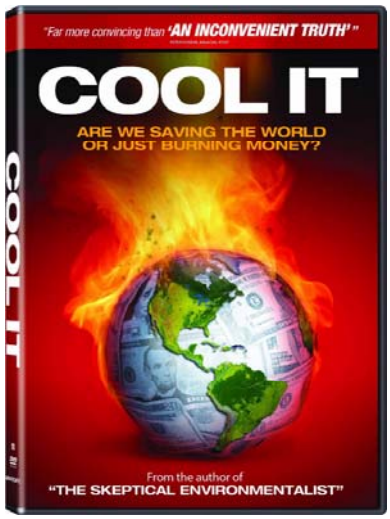
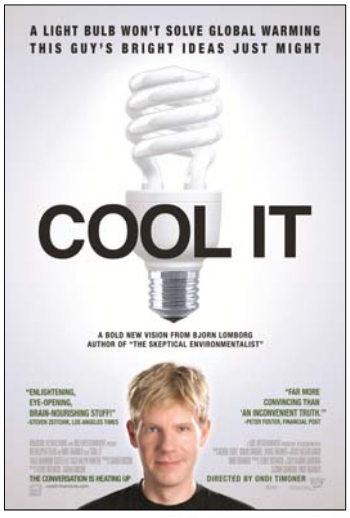
The skeptical environmentalist





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Skeptic on the PBS Newshour

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Recent Programs

MONDAY, SEPT. 17, 2012

CLIMATE CHANGE | ONLINE-ONLY

Climate Change Skeptic Says Global Warming Crowd Oversells Its Message

"I think that some of the issues have been oversold, may have been oversold, because they allow for more regulation to take place. And so the people that like more regulation use global warming as a tool, as a means to an end. And so as a result, we might be getting more regulation and more taxes that really aren't rooted in science, but more in politics."

http://www.pbs.org/newshour/rundown/2012/09/why-the-global-warming-crowd-oversells-its-message.html

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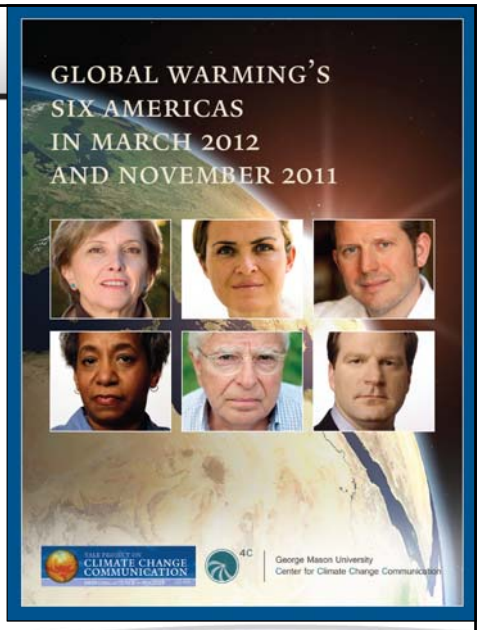
Middle ground . . .

Global Warming's Six Americas

- Alarmed
- Concerned
- Cautious
- Disengaged
- Doubtful
- Dismissive



http://environment.yale.edu/climate/publications/Six-Americas-March-2012/

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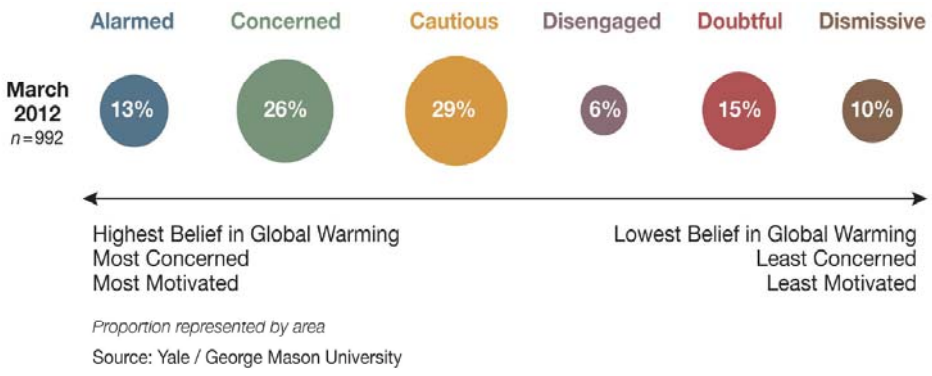
U.S. adults in the 6 Americas, March 2012



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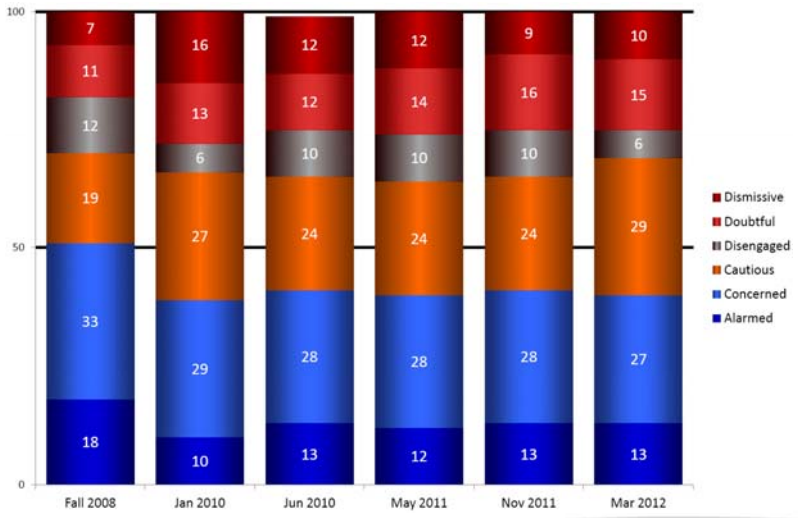
U.S. adults in the 6 Americas, 2008-2012



http://environment.yale.edu/climate/publications/Six-Americas-March-2012/

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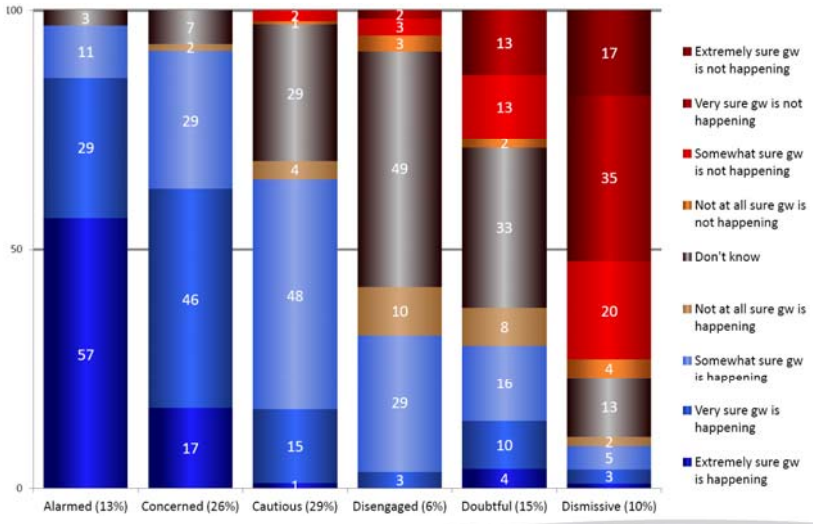
Certainty of belief about GW, March 2012



http://environment.yale.edu/climate/publications/Six-Americas-March-2012/

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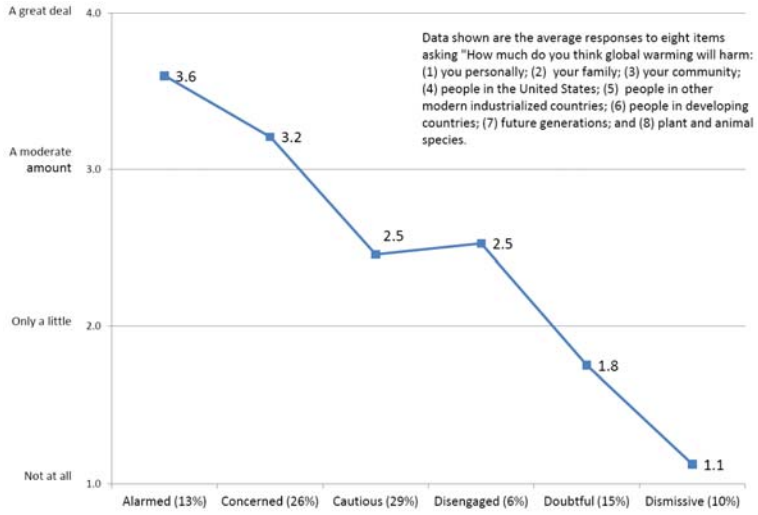
Perceived harm of GW, March 2012



http://environment.yale.edu/climate/publications/Six-Americas-March-2012/

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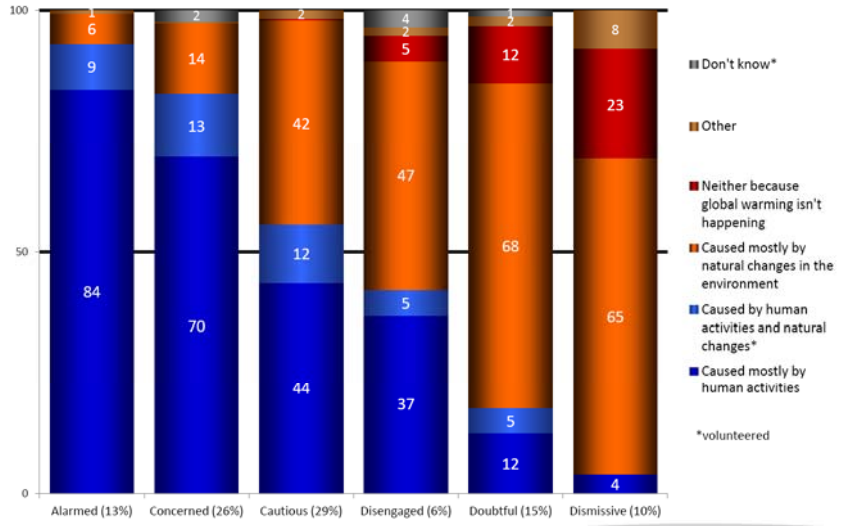
Perceived cause of GW, March 2012



http://environment.yale.edu/climate/publications/Six-Americas-March-2012/

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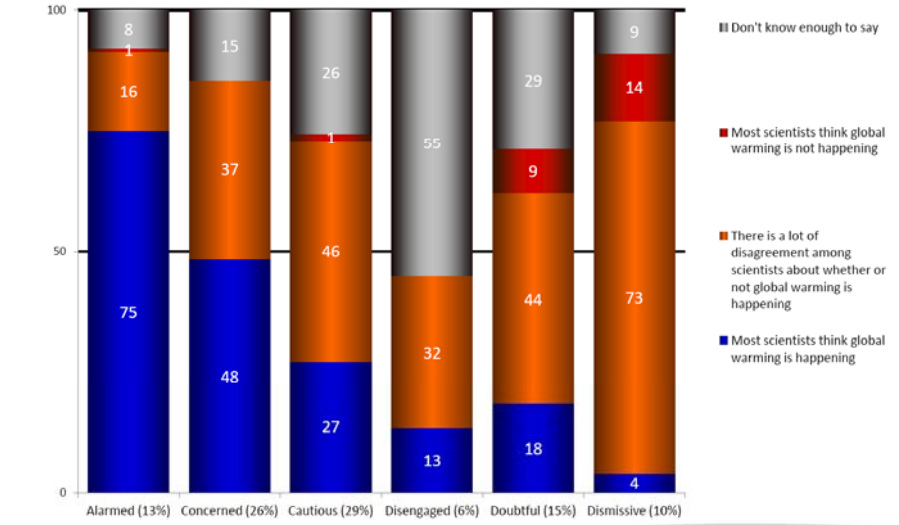
Perceptions of scientific agreement on GW



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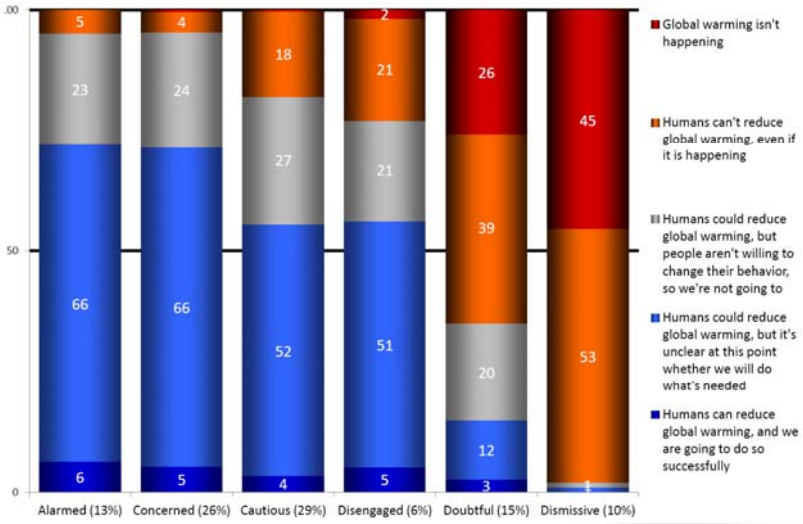
Perceived solvability of GW, March 2012



http://environment.yale.edu/climate/publications/Six-Americas-March-2012/

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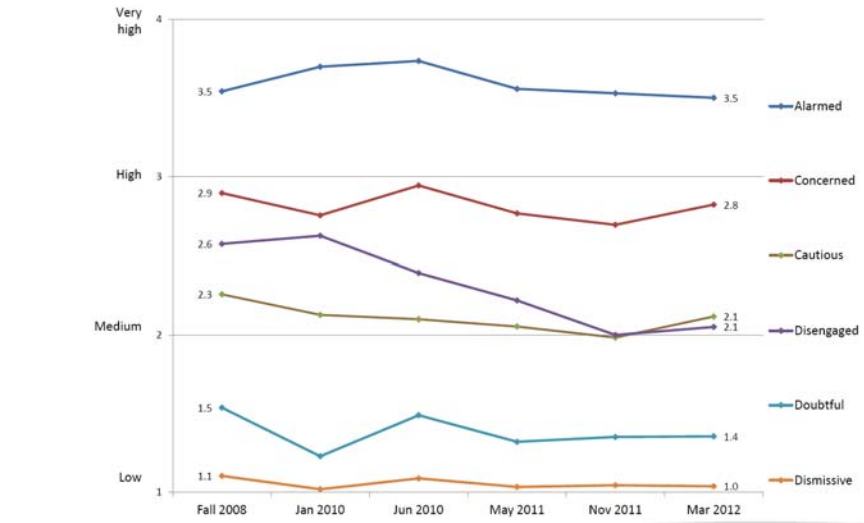
GW issue priority for politicians, 2008-2012



http://environment.yale.edu/climate/publications/Six-Americas-March-2012/

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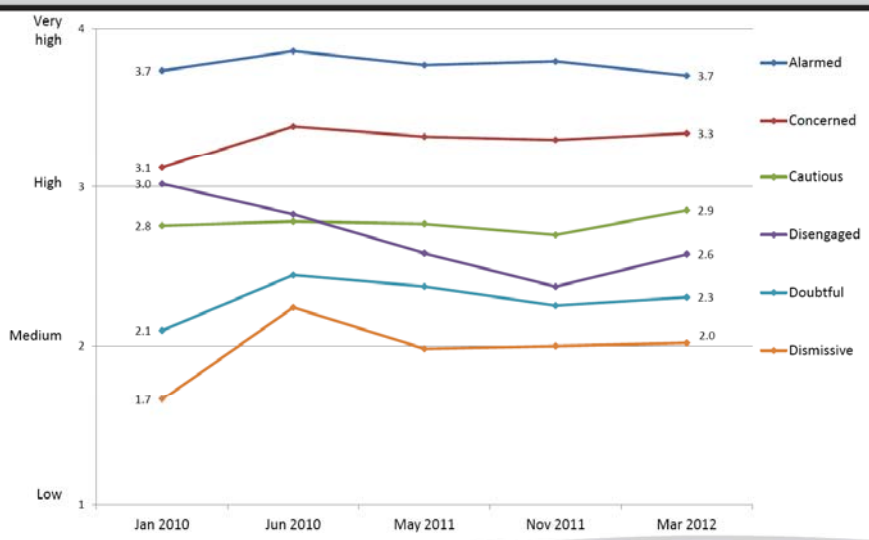
Clean energy issue priority, 2010-2012



http://environment.yale.edu/climate/publications/Six-Americas-March-2012/

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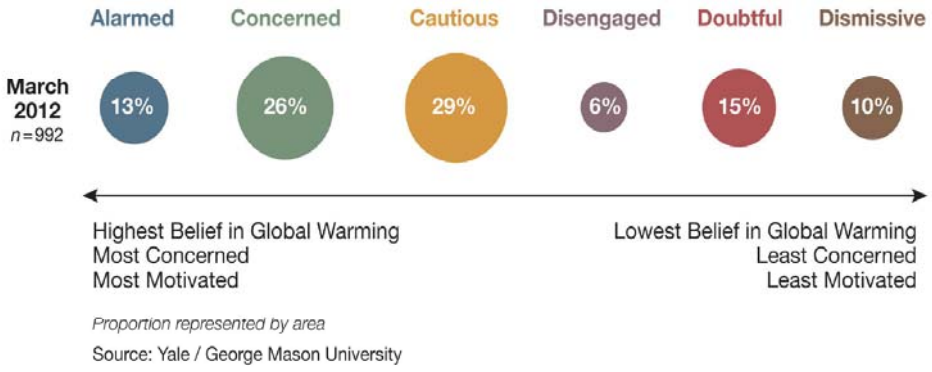
Where do you fit?



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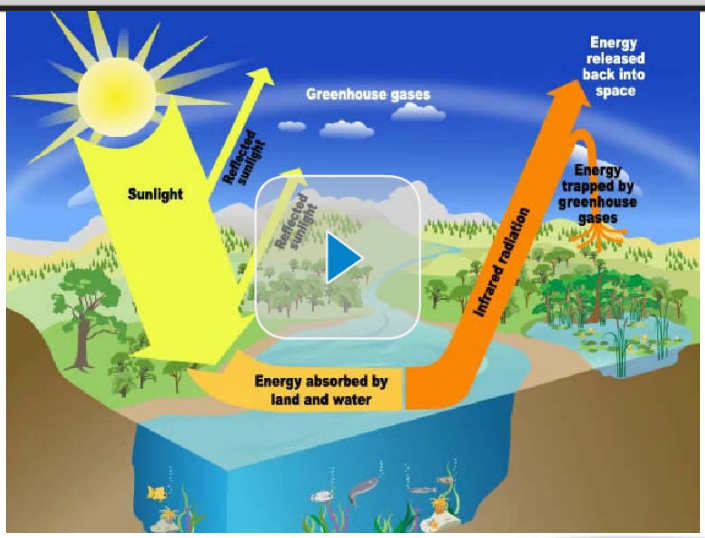
Carbon dioxide (CO_2) is a "greenhouse gas"



http://epa.gov/climatechange/kids/basics/today/greenhouse-effect.html

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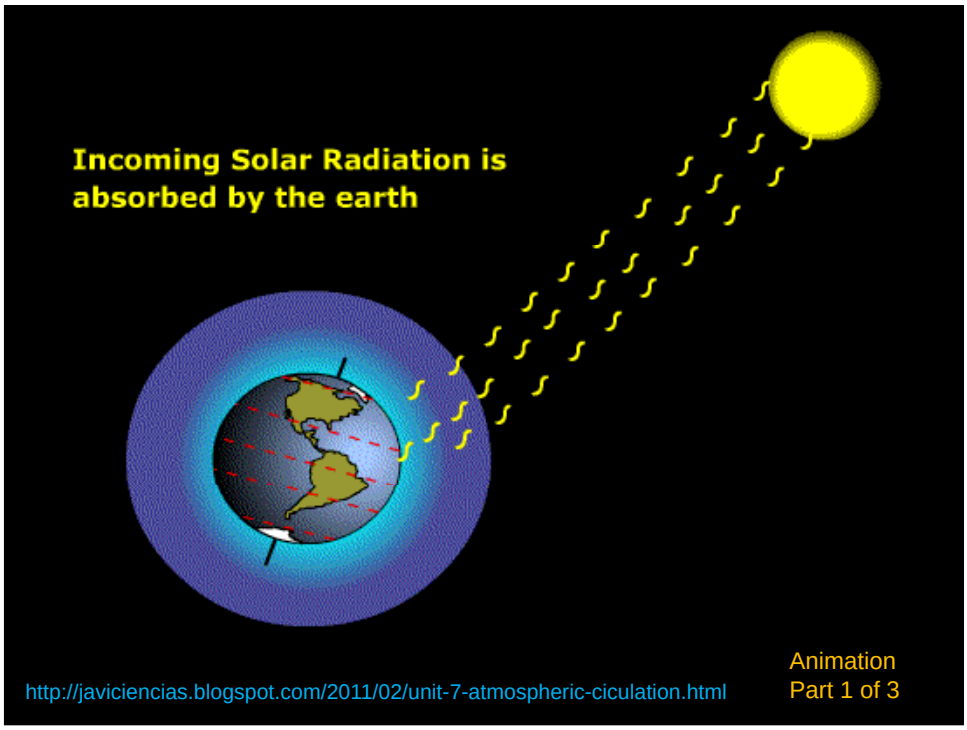
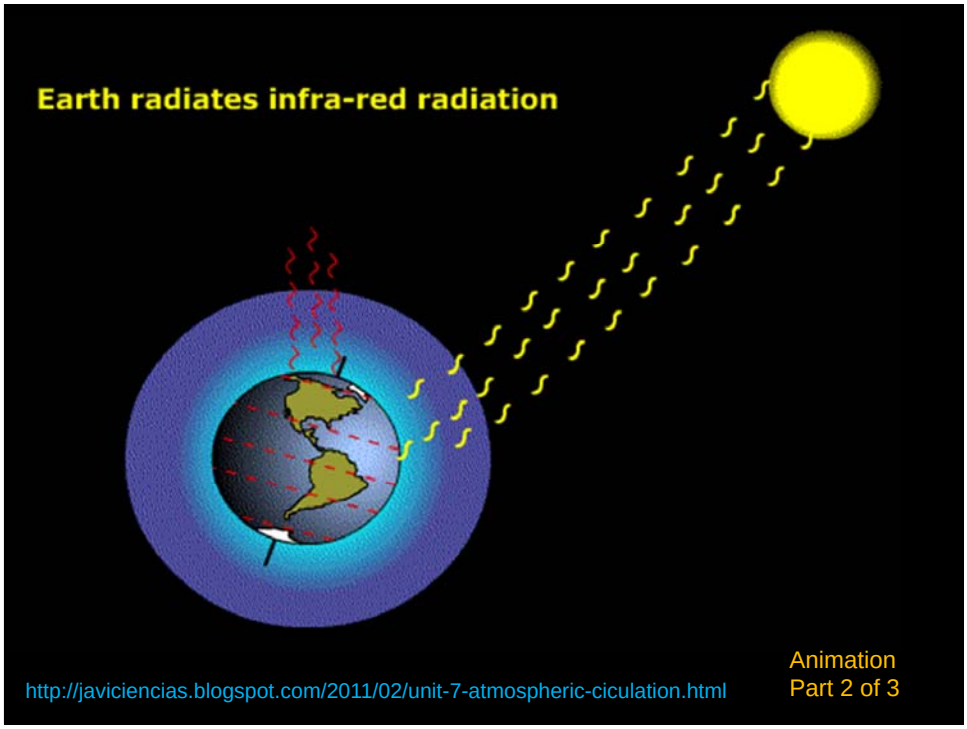
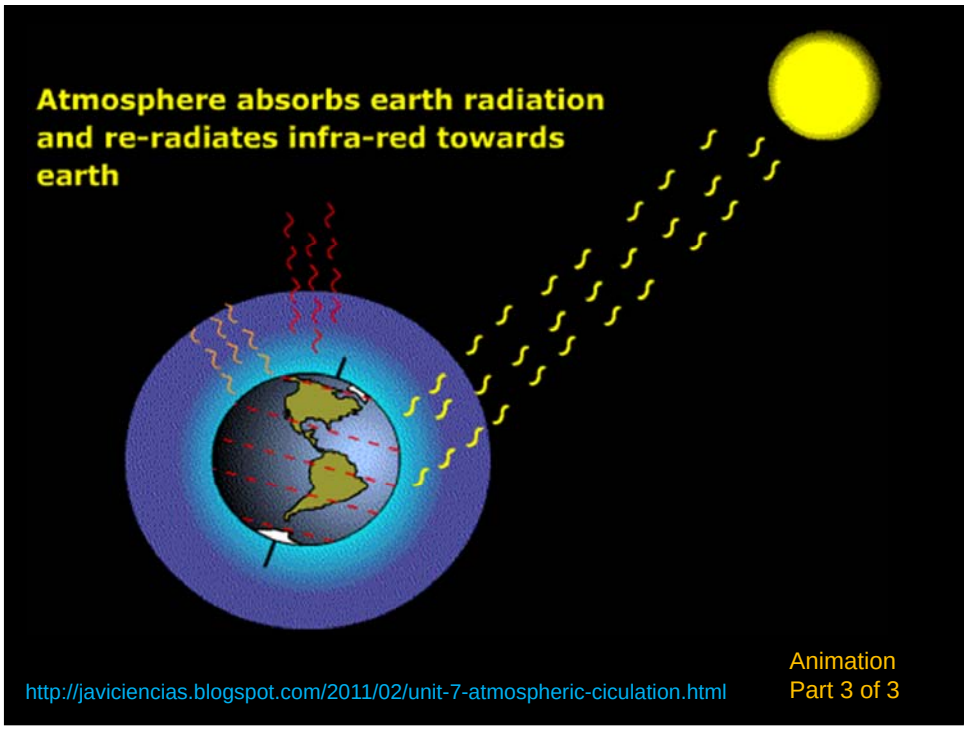


http://javiciencias.blogspot.com/2011/02/unit-7-atmospheric-ciculation.html

Animation
Part 1 of 3


Earth radiates infra-red radiation
http://javiciencias.blogspot.com/2011/02/unit-7-atmospheric-ciculation.html
Animation
Part 2 of 3


Atmosphere absorbs earth radiation and re-radiates infra-red towards earth
http://javiciencias.blogspot.com/2011/02/unit-7-atmospheric-ciculation.html
Animation
Part 3 of 3

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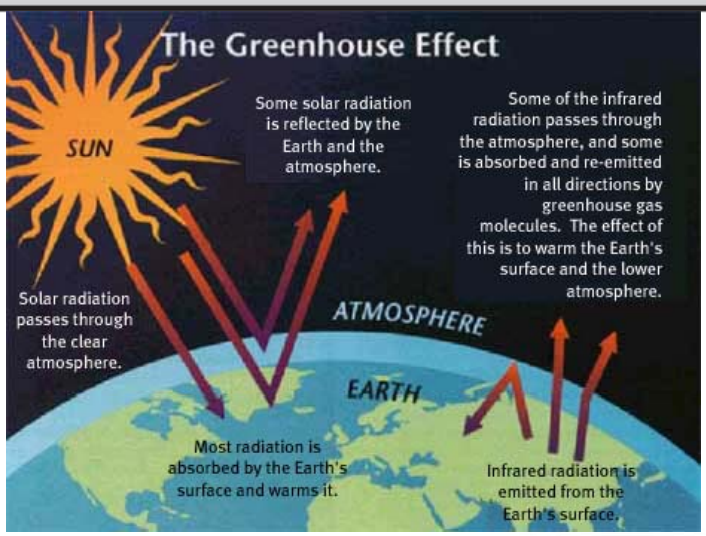

http://www.bigskyco2.org/whatisit/faqs/answers

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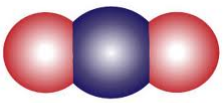
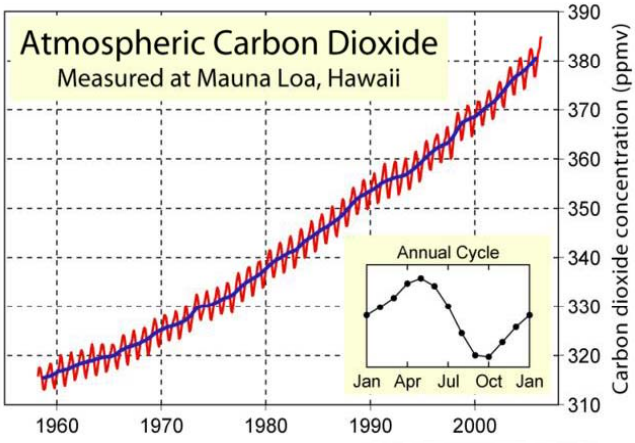
Carbon dioxide (CO_2) is a "greenhouse gas"

What effect does increased CO_2 have?



O=C=O



http://ircamera.as.arizona.edu/NatSci102/NatSci102/lectures/venus.htm

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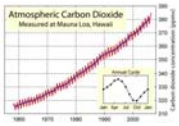
Carbon dioxide (CO_2) is a "greenhouse gas"

What effect does increased CO_2 have?

Three possibilities

1. Have little effect on our temperature because of effects that compensate by rejecting more heat – like an increase in reflective clouds?
2. Cause our climate to get substantially warmer? Most experts lean toward #2, but it is a very complex problem and there is considerable disagreement.
3. Result in a runaway greenhouse effect like that on Venus?



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Our Ocean Planet

Robert Stewart

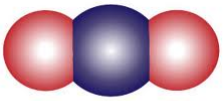
Oceanography in the 21st Century - An Online Textbook

The Carbon Dioxide (CO_2) Problem

The Problem

The carbon dioxide problem can be stated relatively simply:

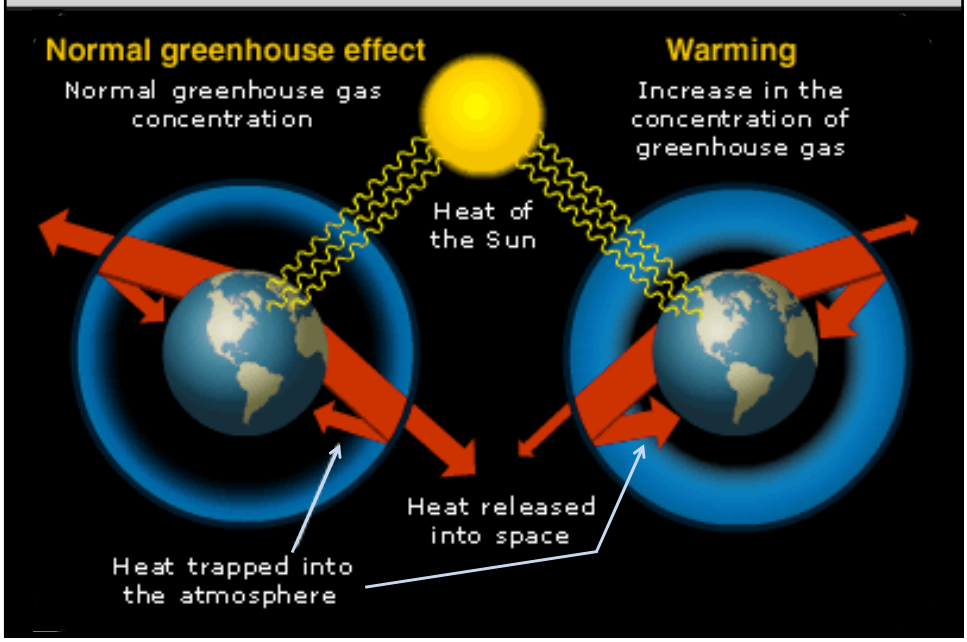
1. More than six and a half billion people burn fuel to keep warm, to provide electricity to light their homes and to run industry, and to move about using cars, buses, boats, trains, and airplanes.
2. The burning of fuel produces carbon dioxide, which is released to the atmosphere.
3. The burning of fuels adds about 6 gigatons of carbon to the atmosphere each year.
4. Carbon dioxide concentrations in the atmosphere have risen from about 270 parts per million (0.026%) before the industrial age to about 380 parts per million (0.038%) by 2006, a 41% increase over pre-industrial values, and a 31% increase since 1870.
5. Carbon dioxide is a greenhouse gas, and the increased concentration of carbon dioxide in the atmosphere must influence earth's radiation balance.



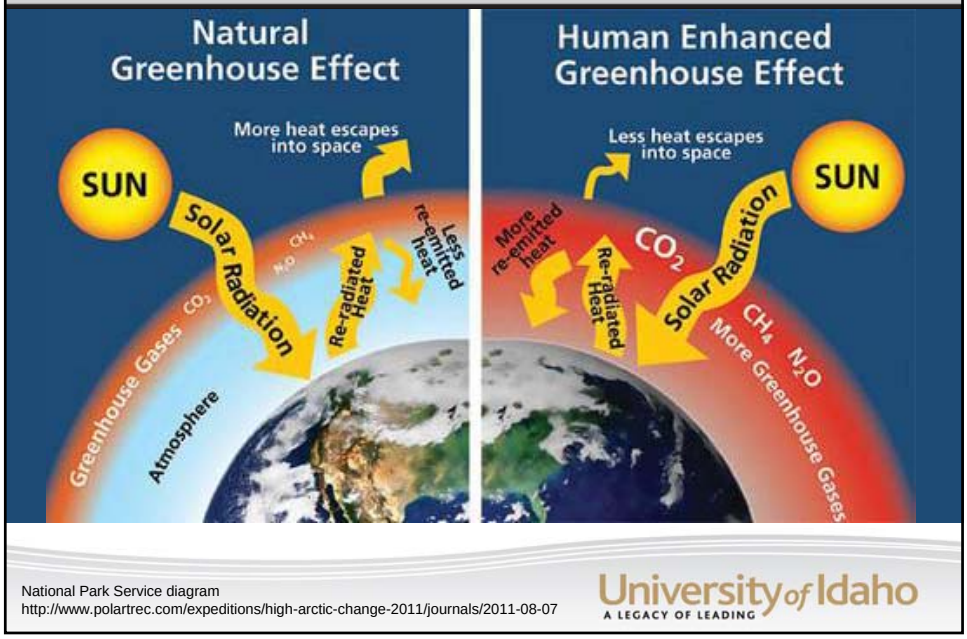
O=C=O

CONTACT:
stewart@ocean.tamu.edu

Prop. #2. ↑CO_2 ⇒ ↑Global Warming



Prop. #2. ↑CO_2 ⇒ ↑Global Warming



National Park Service diagram
http://www.polartrec.com/expeditions/high-arctic-change-2011/journals/2011-08-07

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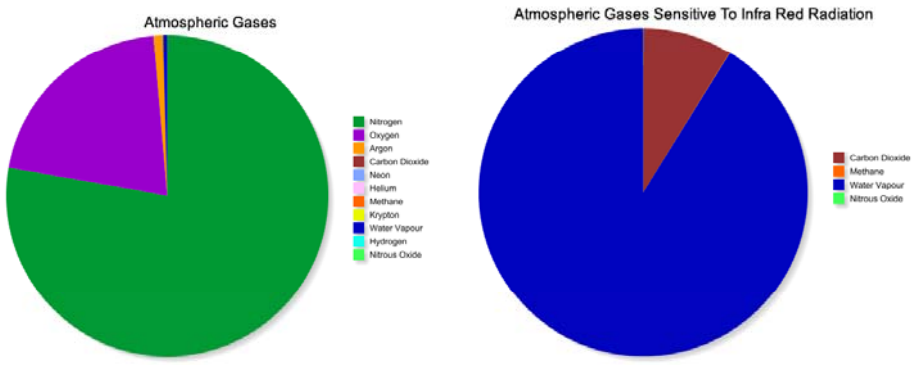
CO_2 is not the only "greenhouse gas"



http://lovelywaterlooville.blogspot.com/2010/02/carbon-dioxide-is-atmospheric-trace-gas.html

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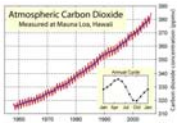
Carbon dioxide (CO_2) is a "greenhouse gas"

What effect does increased CO_2 have?

1. Have little effect on our temperature because of effects that compensate by rejecting more heat – like an increase in reflective clouds?
2. Cause our climate to get substantially warmer? Most experts lean toward #2, but it is a very complex problem and there is considerable disagreement.*
3. Result in a runaway greenhouse effect like that on Venus?



* For example, increased temperatures will increase the evaporation of ocean water and hence may increase cloud cover, and clouds can have a large influence on greenhouse trends.

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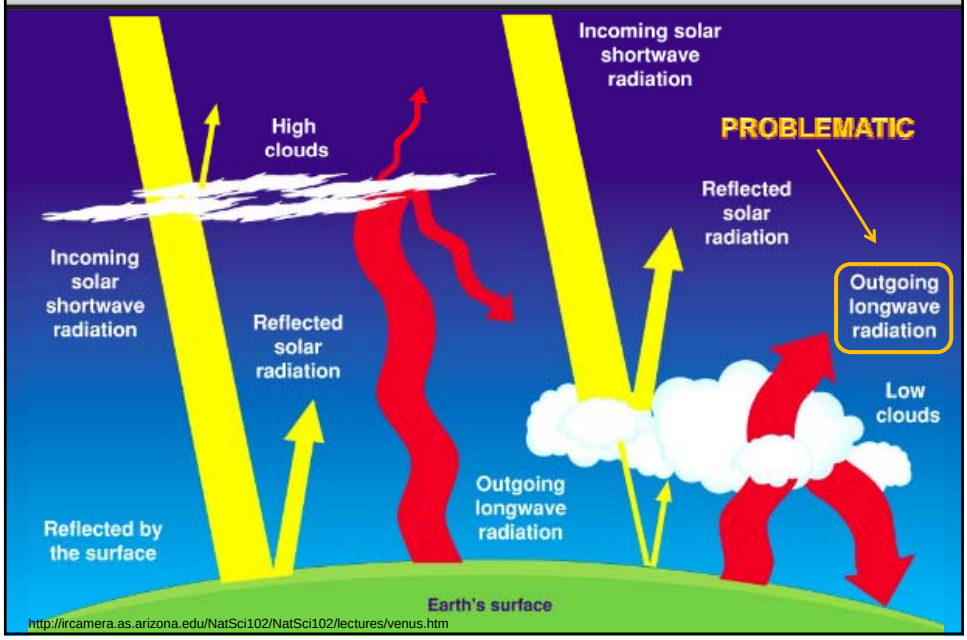
Cloud effects on Earth's radiation



http://ircamera.as.arizona.edu/NatSci102/NatSci102/lectures/venus.htm

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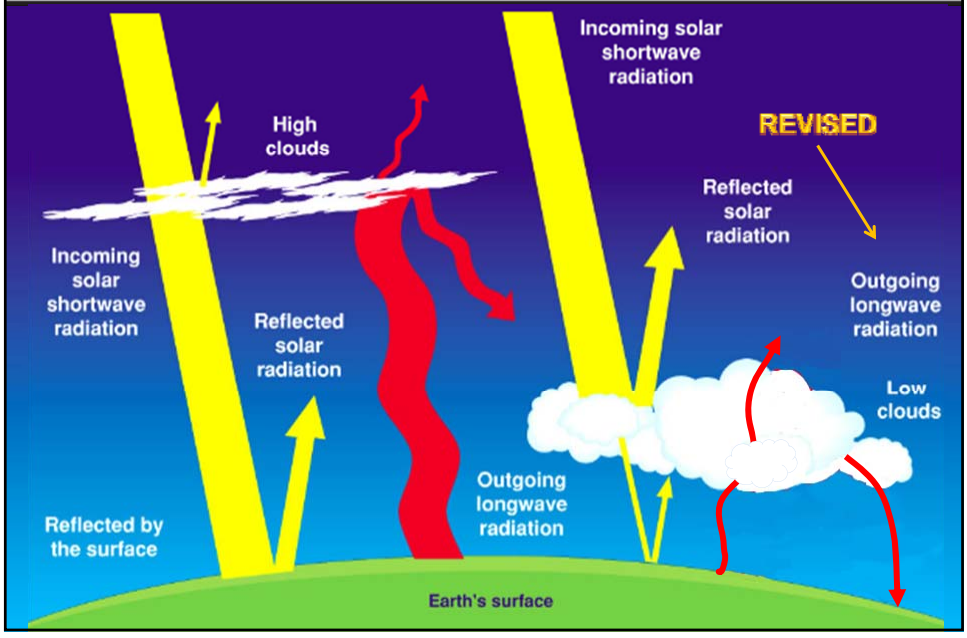
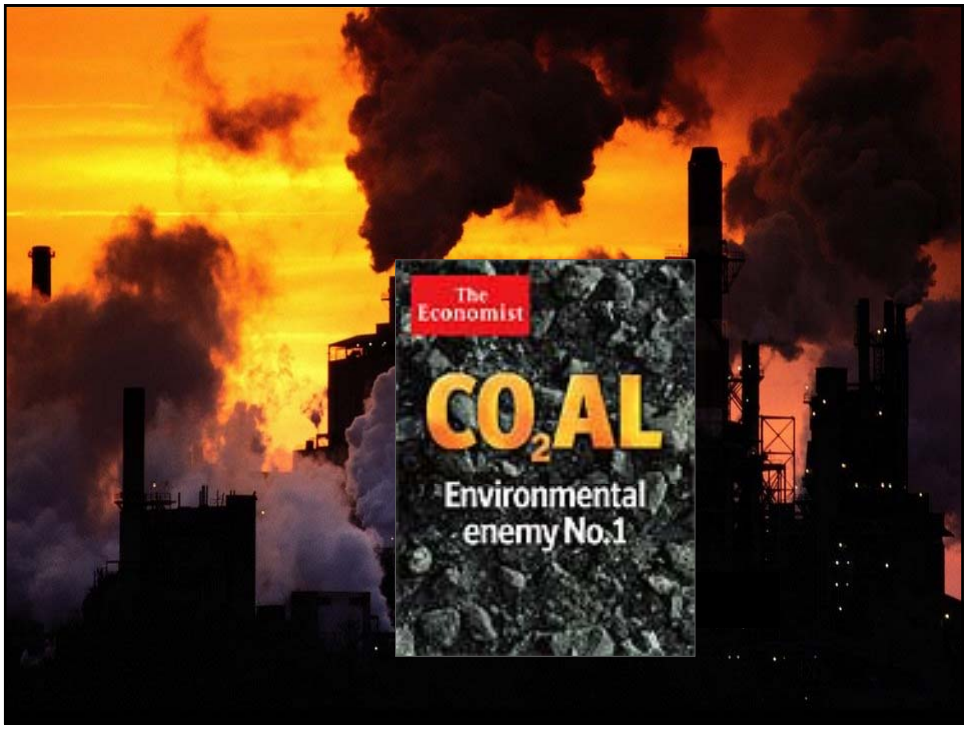
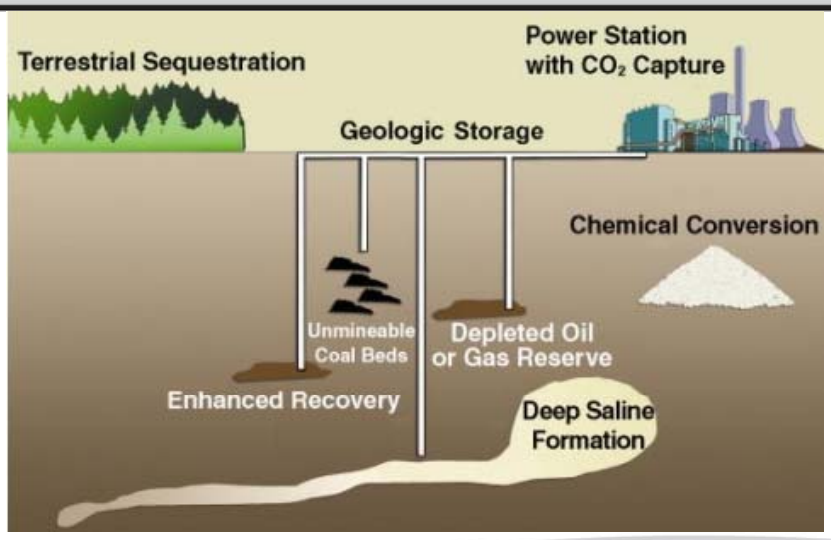




Carbon sequestration options



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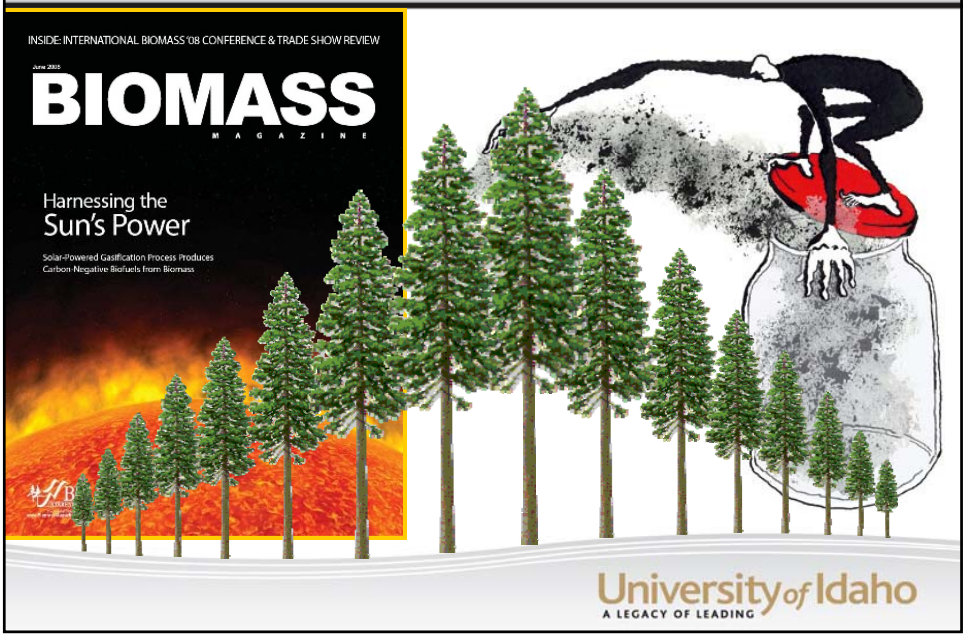
Carbon capture



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OUTLINE

- Global warming's six Americas
- Why carbon?
- Carbon stocks & flows
- Forests: Carbon source or sink?
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- Conclusions

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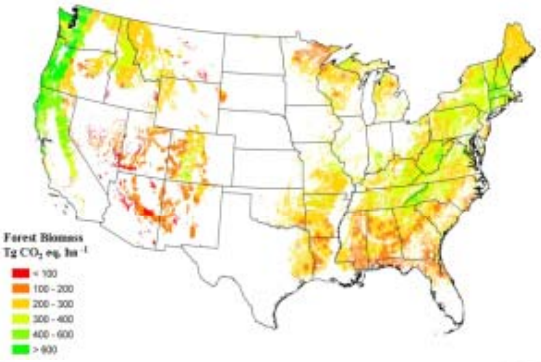
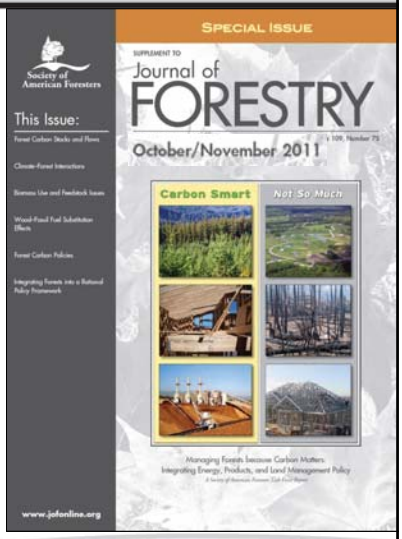
Managing forest carbon: SAF report

The objective of reducing global greenhouse gases (GHG) requires increasing carbon storage in pools other than the atmosphere.





http://www.safnet.org/documents/JOFSupplement.pdf

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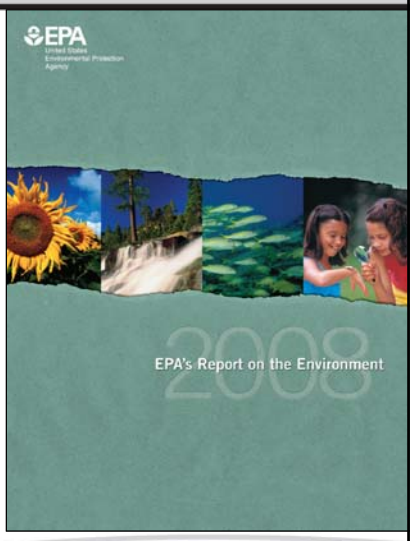
Forests' role in carbon management

Forests contain three-fourths of the earth's plant biomass, about half of which is carbon.

Consequently, forests play a key role in the global carbon cycle by capturing, storing, and cycling carbon.



http://cfpub.epa.gov/ncea/cfm/recordisplay.cfm?deid=190806

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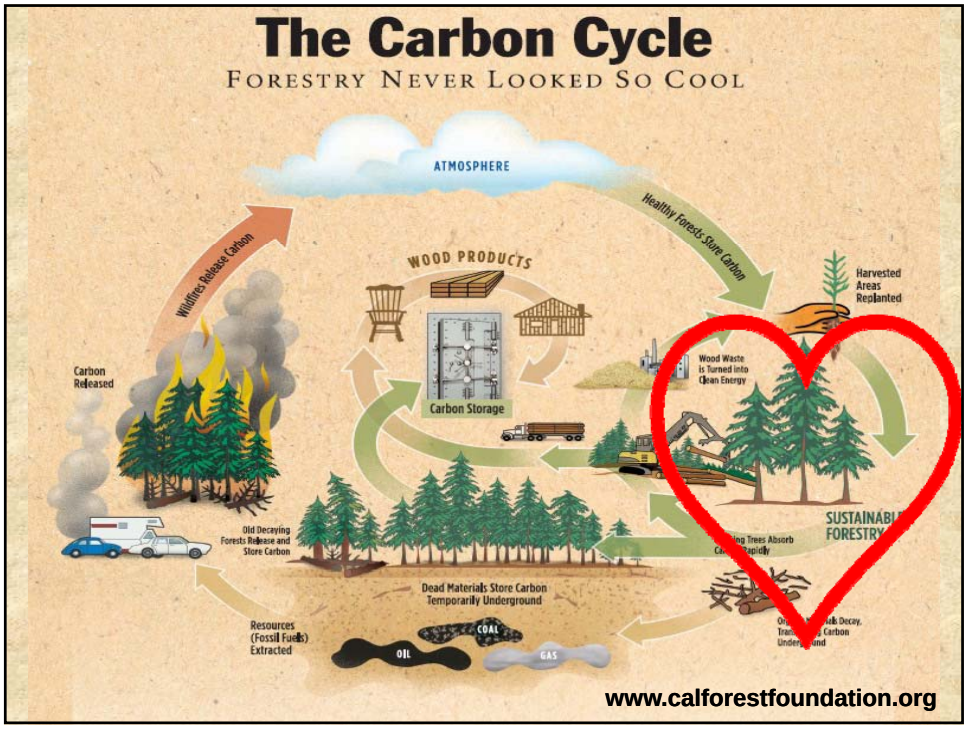
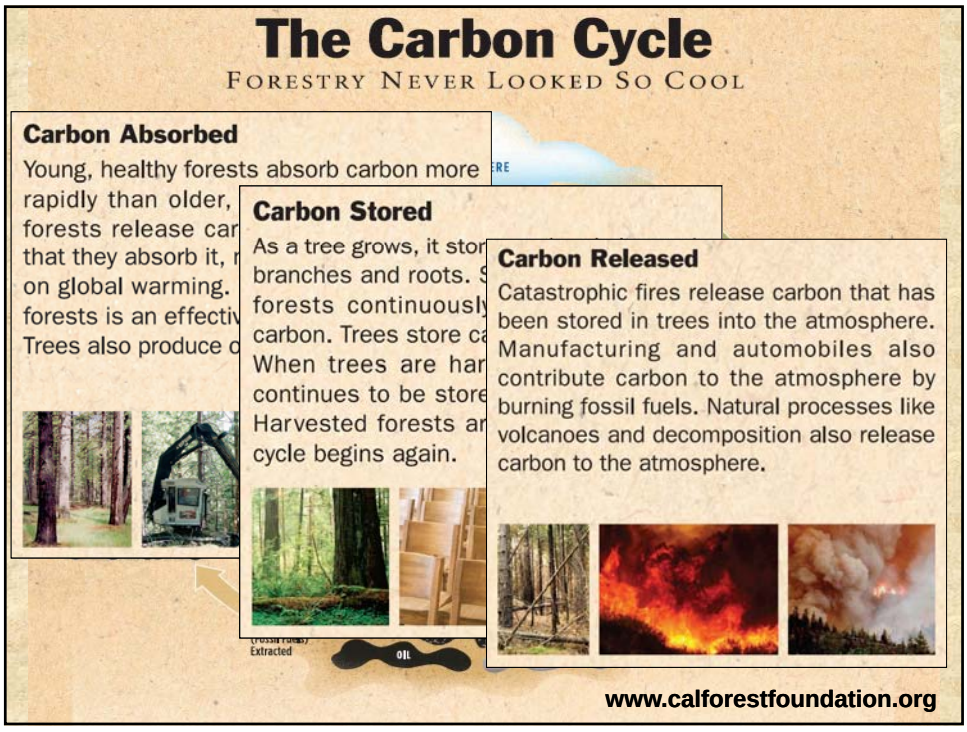
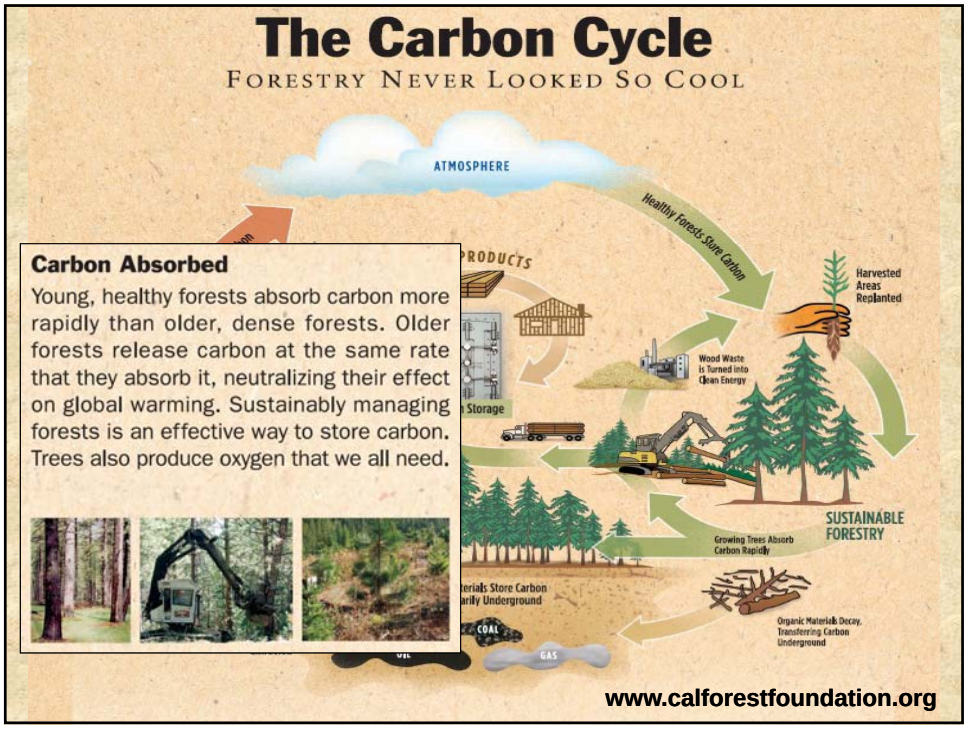
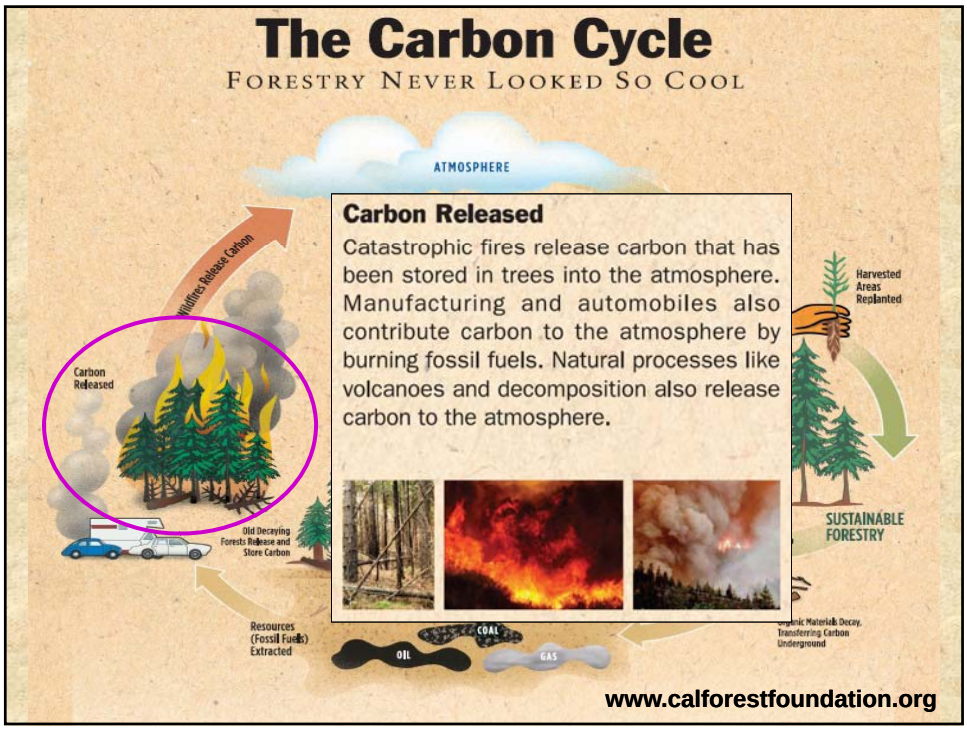

The Carbon Cycle
FORESTRY NEVER LOOKED SO COOL
ATMOSPHERE
Wildfires Release Carbon
Healthy Forests Store Carbon
WOOD PRODUCTS
Harvested Areas Replanted
Carbon Released
Carbon Storage
Wood Waste is Turned into Clean Energy
SUSTAINABLE FORESTRY
Old Decaying Forests Release and Store Carbon
Dead Materials Store Carbon Temporarily Underground
Resources (Fossil Fuels) Extracted
COAL
OIL
GAS
www.calforestfoundation.org


The Carbon Cycle
FORESTRY NEVER LOOKED SO COOL
Carbon Absorbed
Young, healthy forests absorb carbon more
rapidly than older,
forests release car
that they absorb it,
on global warming.
forests is an effecti
Trees also produce
Carbon Stored
As a tree grows, it stor
branches and roots.
forests continuously
carbon. Trees store c
When trees are har
continues to be store
Harvested forests ar
cycle begins again.
Carbon Released
Catastrophic fires release carbon that has been stored in trees into the atmosphere. Manufacturing and automobiles also contribute carbon to the atmosphere by burning fossil fuels. Natural processes like volcanoes and decomposition also release carbon to the atmosphere.
OIL
www.calforestfoundation.org


The Carbon Cycle
FORESTRY NEVER LOOKED SO COOL
ATMOSPHERE
Healthy Forests Store Carbon
Carbon Absorbed
Young, healthy forests absorb carbon more rapidly than older, dense forests. Older forests release carbon at the same rate that they absorb it, neutralizing their effect on global warming. Sustainably managing forests is an effective way to store carbon. Trees also produce oxygen that we all need.
Harvested Areas Replanted
Wood Waste is Turned into Clean Energy
SUSTAINABLE FORESTRY
Growing Trees Absorb Carbon Rapidly
Organic Materials Decay, Transferring Carbon Underground
COAL
OIL
GAS
www.calforestfoundation.org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Catastrophic fires release carbon that has been stored in trees into the atmosphere. Manufacturing and automobiles also contribute carbon to the atmosphere by burning fossil fuels. Natural processes like volcanoes and decomposition also release carbon to the atmosphere.
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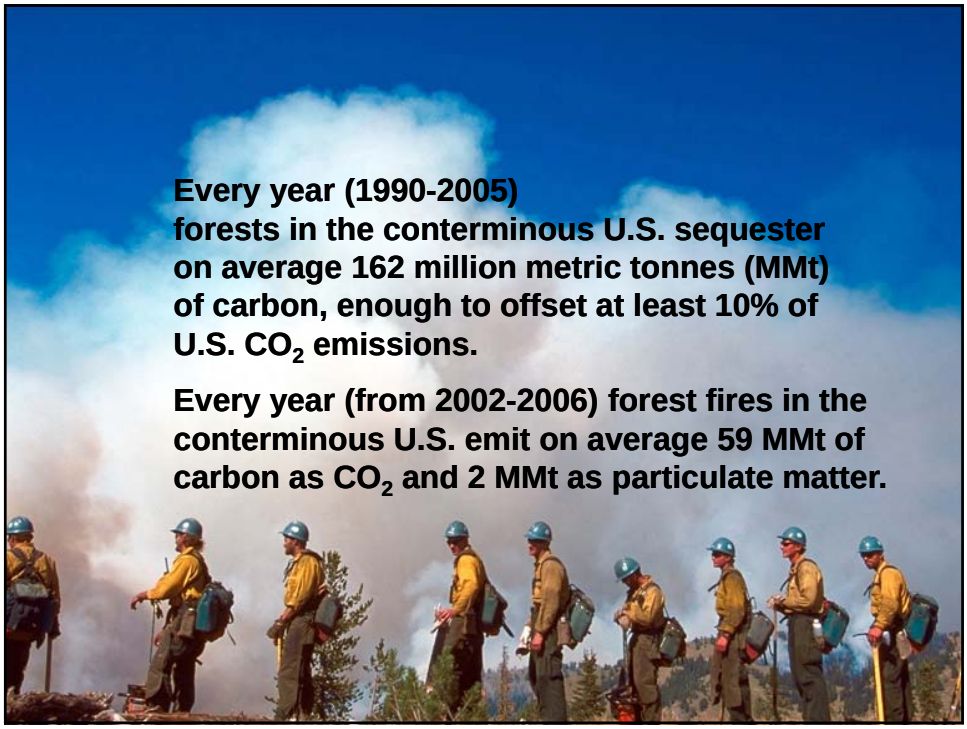
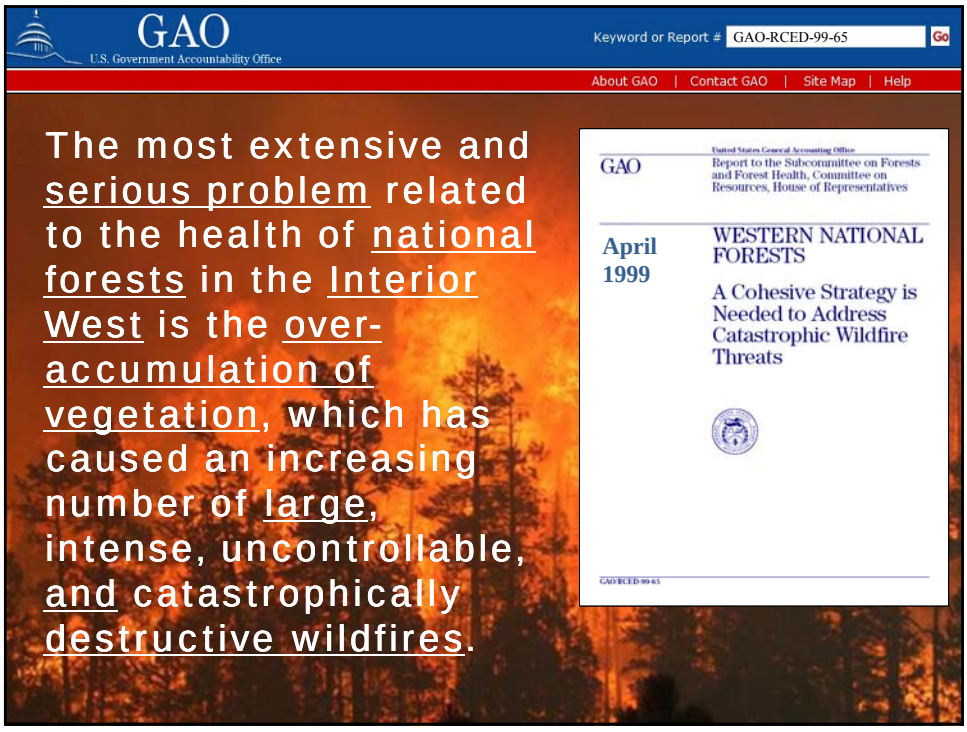
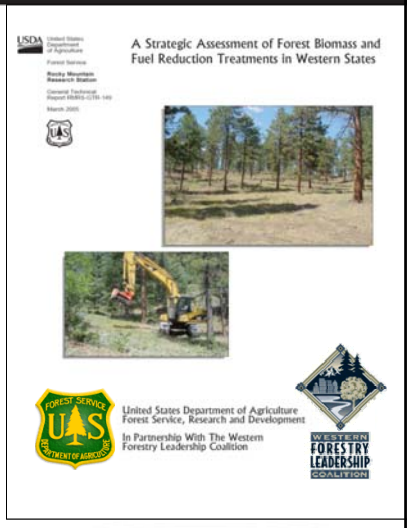

Every year (1990-2005) forests in the conterminous U.S. sequester on average 162 million metric tonnes (MMt) of carbon, enough to offset at least 10% of U.S. CO_2 emissions.
Every year (from 2002-2006) forest fires in the conterminous U.S. emit on average 59 MMt of carbon as CO_2 and 2 MMt as particulate matter.


GAO
U.S. Government Accountability Office
Keyword or Report # GAO-RCED-99-65
Go
About GAO | Contact GAO | Site Map | Help
The most extensive and serious problem related to the health of national forests in the Interior West is the over-accumulation of vegetation, which has caused an increasing number of large, intense, uncontrollable, and catastrophically destructive wildfires.
United States General Accounting Office
GAO
Report to the Subcommittee on Forests and Forest Health, Committee on Resources, House of Representatives
April 1999
WESTERN NATIONAL FORESTS
A Cohesive Strategy is Needed to Address Catastrophic Wildfire Threats
GAO/RCED-99-65

Forest biomass utilization

Implementation of any significant fuel reduction effort will generate large volumes of biomass and require the development of additional workforce and operations capacity in western forests.



http://www.fs.fed.us/rm/pubs/rmrs_gtr149.pdf

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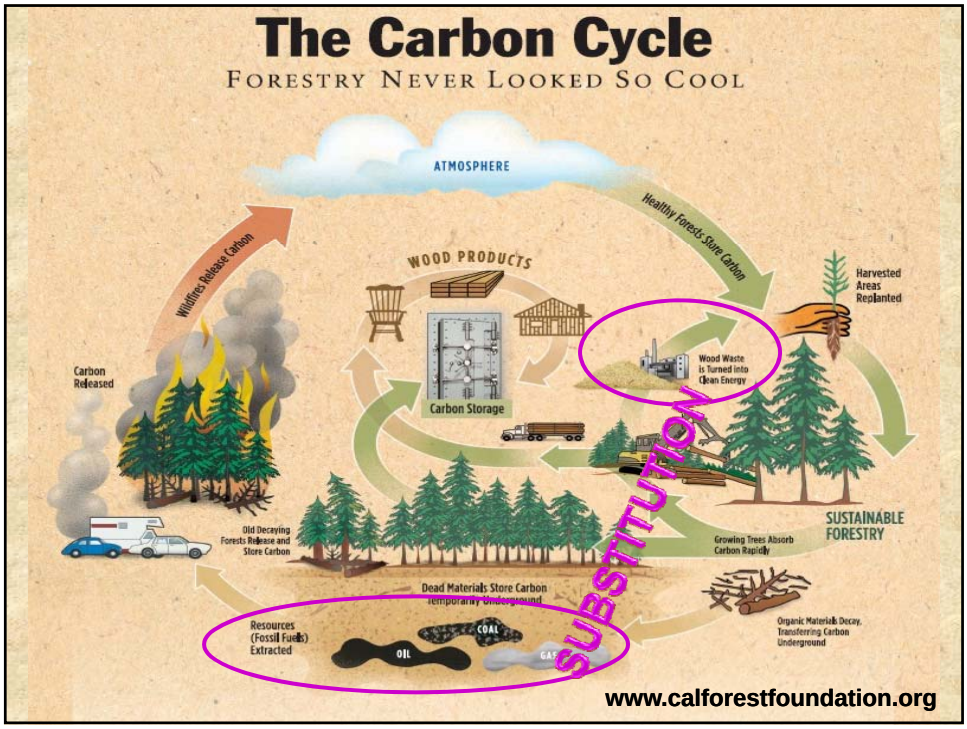

Burning biomass mill residues

Burning biomass mill residues

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Wood bioenergy substitution

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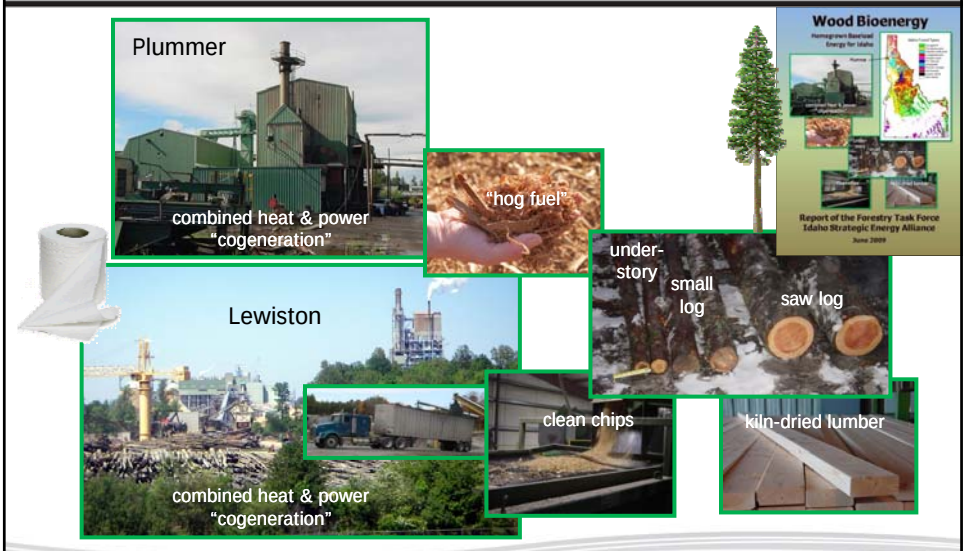
AVISTA biopower, Kettle Falls, WA (46 MW)

photo courtesy of Ron Gray, Avista Corp..

Wood bioenergy is a byproduct . . .



http://www.energy.idaho.gov/energyalliance/d/forest_packet.pdf

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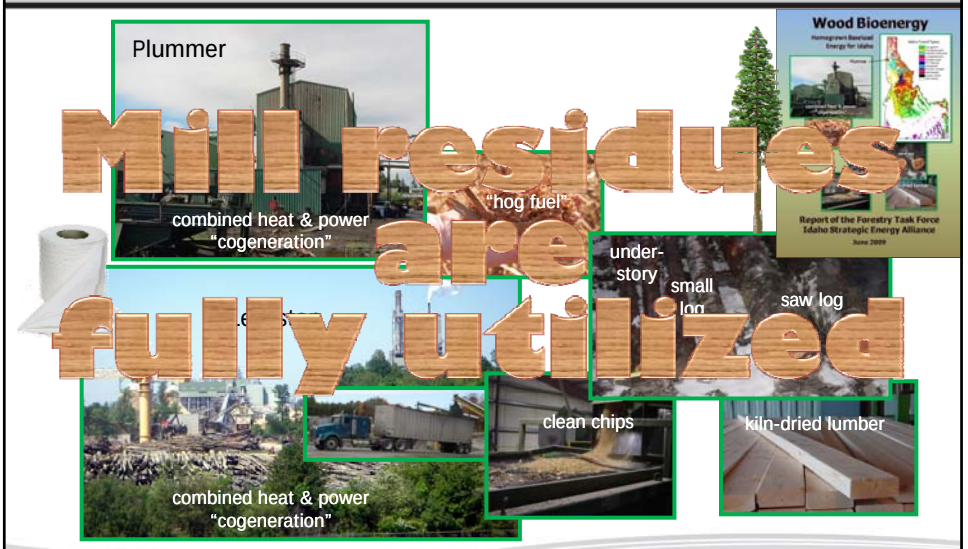
Wood bioenergy is a byproduct . . .



http://www.energy.idaho.gov/energyalliance/d/forest_packet.pdf

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Biomass as an alternative energy source

Western Governors' Association

University of Idaho
College of Natural Resources

Forest Biomass Supply Analysis for Western States by County:[*]
Final Report to the Western Governors' Association[†]

Philip S. Cook and Jay O'Laughlin[‡]
January 24, 2011 (revised)[**]

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Biomass as an alternative energy source

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College of Natural Resources

Western Governors' Association

Forest Biomass Supply Analysis for Western States by County:*
Final Report to the Western Governors' Association†

Philip S. Cook and Jay O'Laughlin‡

January 24, 2011 (revised)**

* Estimates for sustainable supplies of forest biomass (i.e., forest health or fire hazard reduction thinning and logging residues) for individual states are available separately.

† This report provides details on methods and assumptions that were used by U.S. Forest Service and University of Idaho researchers to develop county-level estimates woody biomass supply estimates for the western states.

‡ Philip S. Cook is Research Associate, Policy Analysis Group, College of Natural Resources, University of Idaho, Moscow; Jay O'Laughlin is Professor of Forestry and Policy Sciences, and Director, Policy Analysis Group, College of Natural Resources, University of Idaho, Moscow. Dr. O'Laughlin is co-chair of the Woody Biomass Utilization and Energy Production Subcommittee for the Western Governors' Forest Health Advisory Committee. He also chairs the Forestry Task Force for the Idaho Strategic Energy Alliance and is a member of its Carbon Issues Task Force.

** First prepared in December 2009 by the University of Idaho's College of Natural Resources for the Western Governors' Association in fulfillment of Contract #20108-0840 and revised in January 2011 to accompany publication of individual reports for each state.

Contact authors by phone (208) 885-5776 or e-mail at pag@uidaho.edu

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Biomass as an alternative energy source

CLEARWATER PAPER

"For many reasons, both Clearwater Paper and Avista's 62 megawatt boilers in the inland region have not run at full production for the past three years. [2009-2011]

"Current price of incremental hog fuel exceeds the natural gas equivalent. Any additional demand on woody biomass for hog fuel will further reduce woody biomass utilization for energy at Clearwater Paper in Lewiston."

http://legislature.idaho.gov/sessioninfo/2011/interim/energy_public_vleet.pdf

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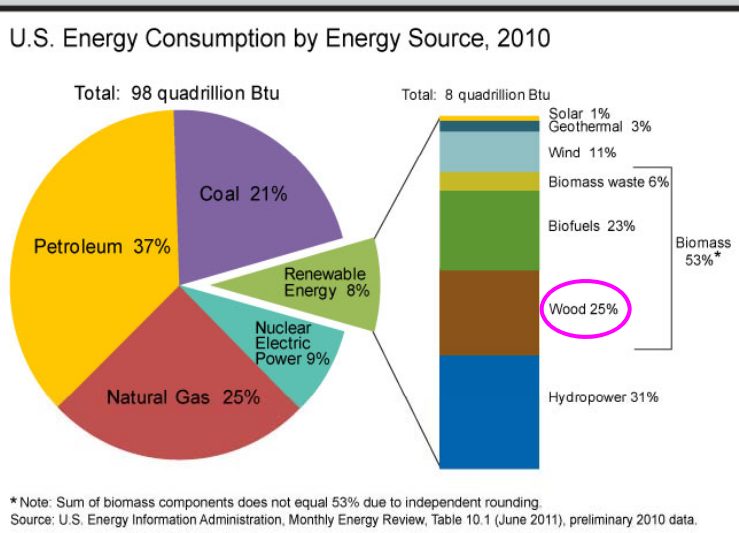
Biomass: largest renewable energy source



Independent Statistics & Analysis
U.S. Energy Information Administration

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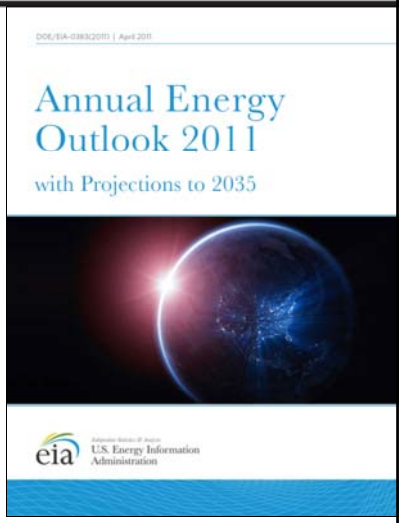
Future outlook

The U.S. Dept. of Energy's Energy Information Administration (EIA) projects a **large increase in biopower production** from wind and biomass.



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U.S. Energy Information Administration

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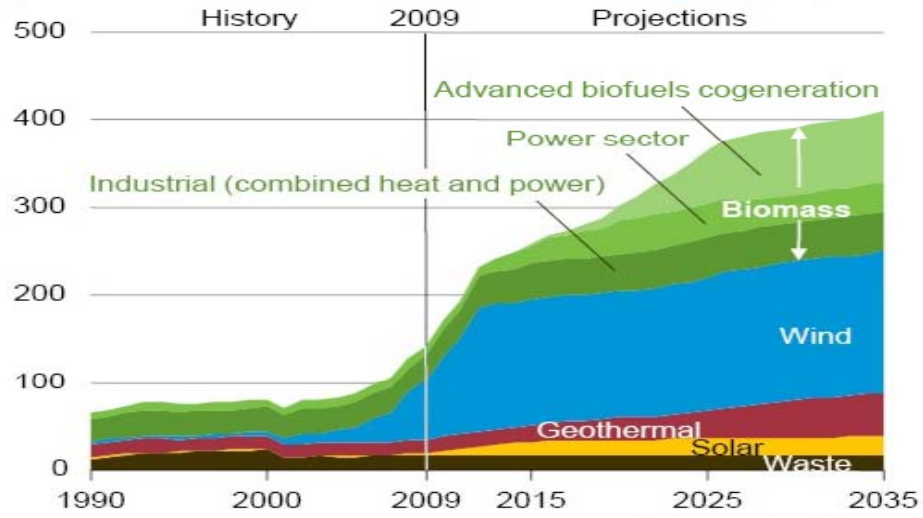
Non-hydro renewable electricity outlook



Independent Statistics & Analysis
U.S. Energy Information Administration

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Forest management . . .

. . . opportunity to address three challenging issues:

- Restoring forest health, fire resiliency, and wildlife habitat
- Finding renewable energy alternatives
- Revitalizing western economies

"Triple Win"

http://www.forestry.org/media/docs/westernforester/2006/dec06.pdf

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OUTLINE

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- Carbon stocks & flows
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- Conclusions

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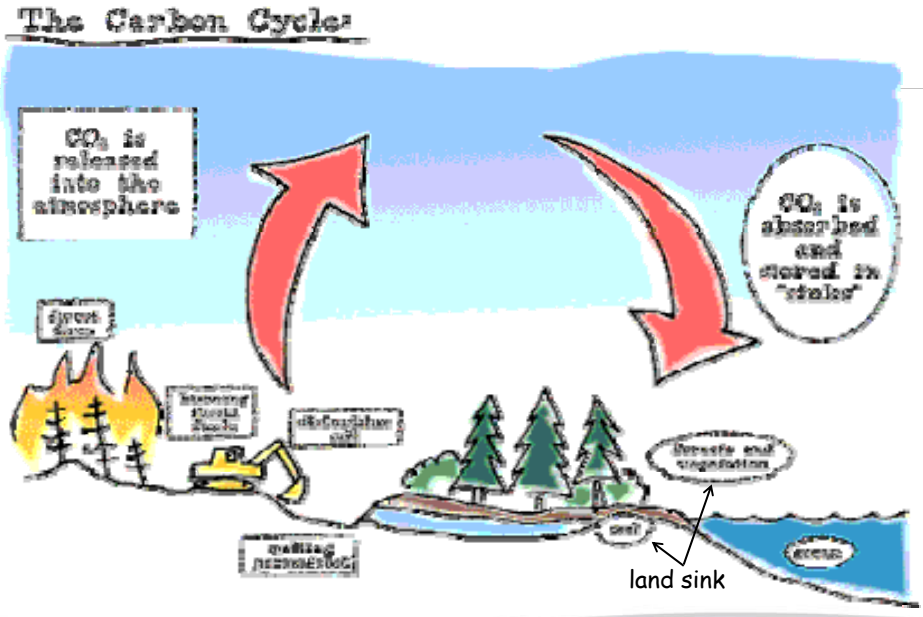

Source: Natural Resources Canada

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Land sink – uncertainty

. . . the future of the land sink is quite uncertain, ranging from uptake surpassing that of the ocean to a significant loss of carbon.

Socolow, R., Hotinski, R., Greenblatt, J.B., Pacala, S. (2004). "Solving the climate problem: Technologies available to curb CO_2 emissions." *Environment* 46(10):8-19.

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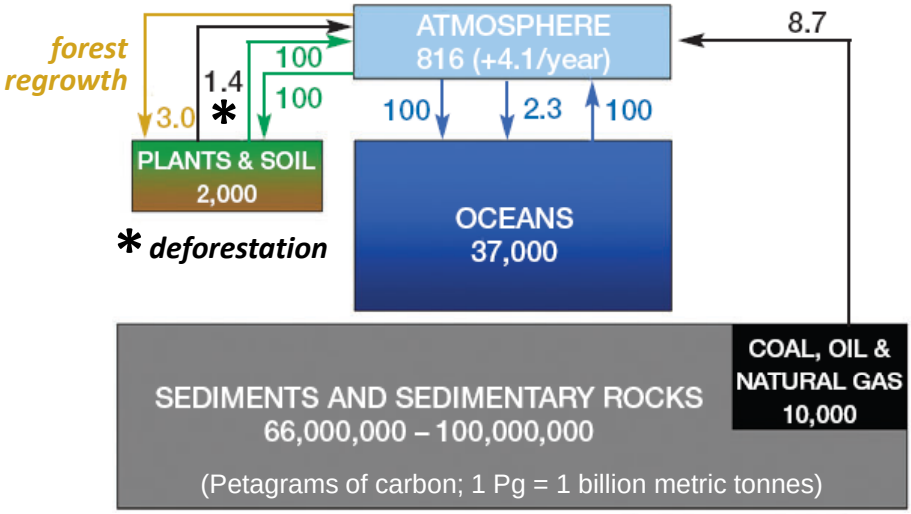
Global carbon stocks (boxes) & flows (arrows)



Houghton, R.A., in, Ryan et al. (2010) *A Synthesis of the Science on Forests and Carbon for U.S. Forests.*

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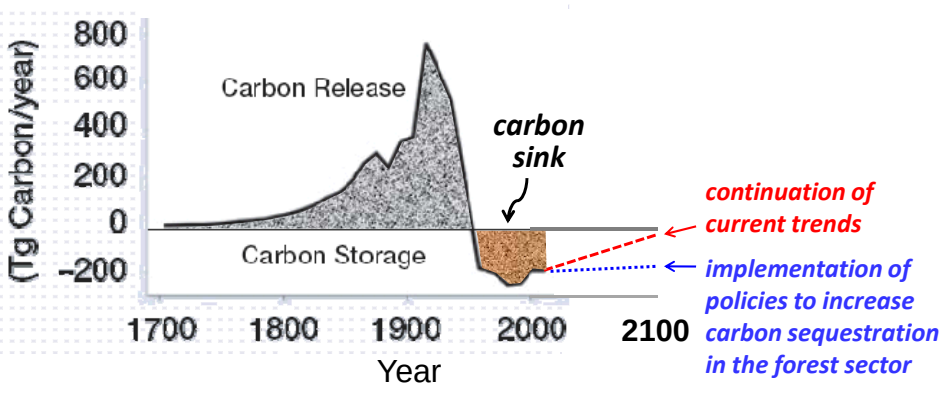
Carbon balance in U.S. forests, 1700-2100



Birdsey, R., Pregitzer, K., & Lucier, A. (2006). Forest carbon management in the United States: 1600-2100. *Journal of Environmental Quality* 35:1461-1469.

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Wildfire, fuels & climate change

The overall importance of climate in wildfire activity underscores the urgency of ecological restoration and fuels management to reduce wildfire hazards to human communities and to mitigate ecological impacts of climate change . . .

A.L. Westerling, et al. (2006). "Warming and earlier spring increase western U.S. forest wildfire activity." *Science* 313: 940-943.

http://www.sciencemag.org/content/313/5789/940.short

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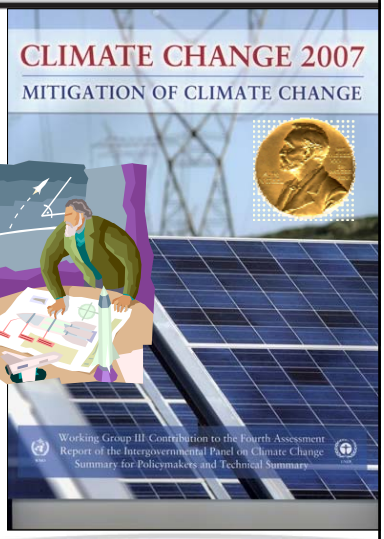
Forests' role in climate change mitigation

". . . a sustainable forest management strategy aimed at maintaining or increasing forest carbon stocks, while producing an annual sustained yield of timber fibre or energy from the forest, will generate the largest sustained mitigation benefit."



http://www.ipcc.ch/publications_and_data/ar4/wg3/en/ch9.html

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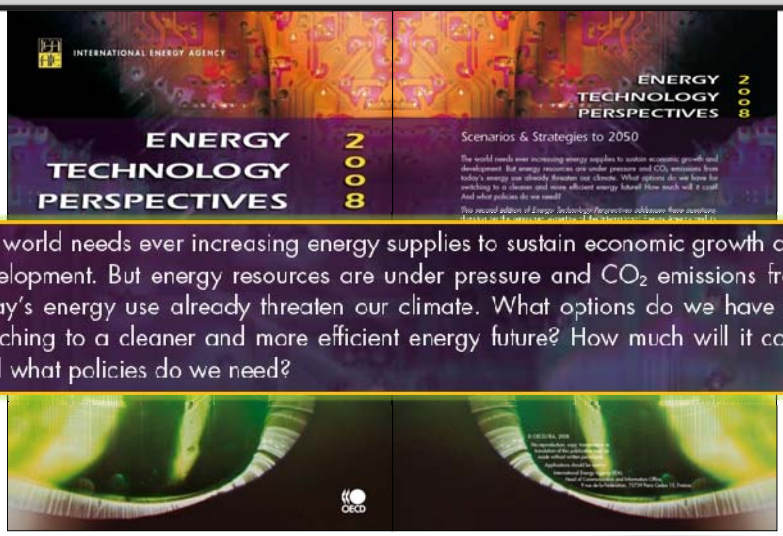
Energy perspectives – Int'l Energy Agency



http://www.iea.org/Textbase/techno/etp/index.asp

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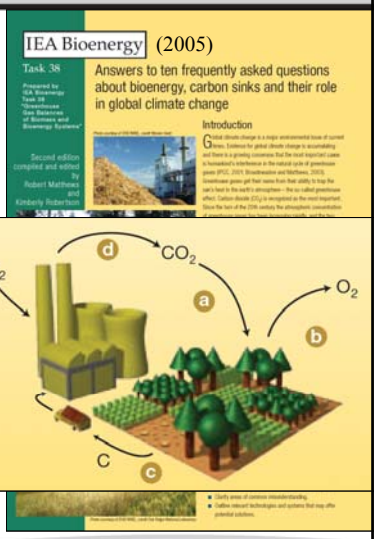
Viewpoints on biomass "carbon neutrality"

. . . recycling of carbon as biomass accumulates in forests and energy crops and consumed in power station. (a) CO_2 is captured by the growing crops and forests; (b) oxygen (O_2) is released and carbon (C) is stored in the biomass of the plants; (c) carbon in harvested biomass is transported to the power station; (d) power station burns biomass, releasing CO_2 captured by plants back to atmosphere. Considering entire process cycle, no net CO_2 emissions from burning the biomass.



http://www.ieabioenergy-task38.org/publications/faq/

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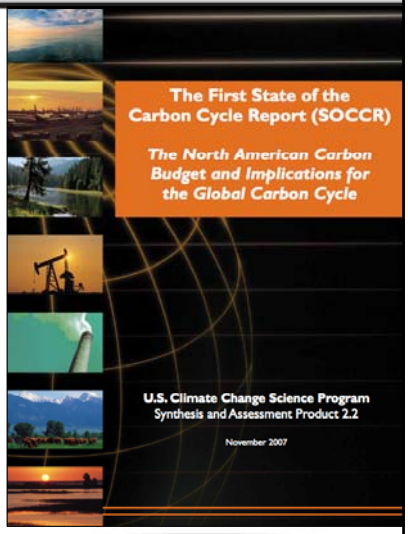
Viewpoints on biomass "carbon neutrality"

". . . biomass fuels are considered carbon neutral because return of the biomass carbon to the atmosphere completes a cycle that began with carbon uptake from the atmosphere by vegetation." (p. 88, boxed pull-quote)



cdiac.ornl.gov/SOCCR/

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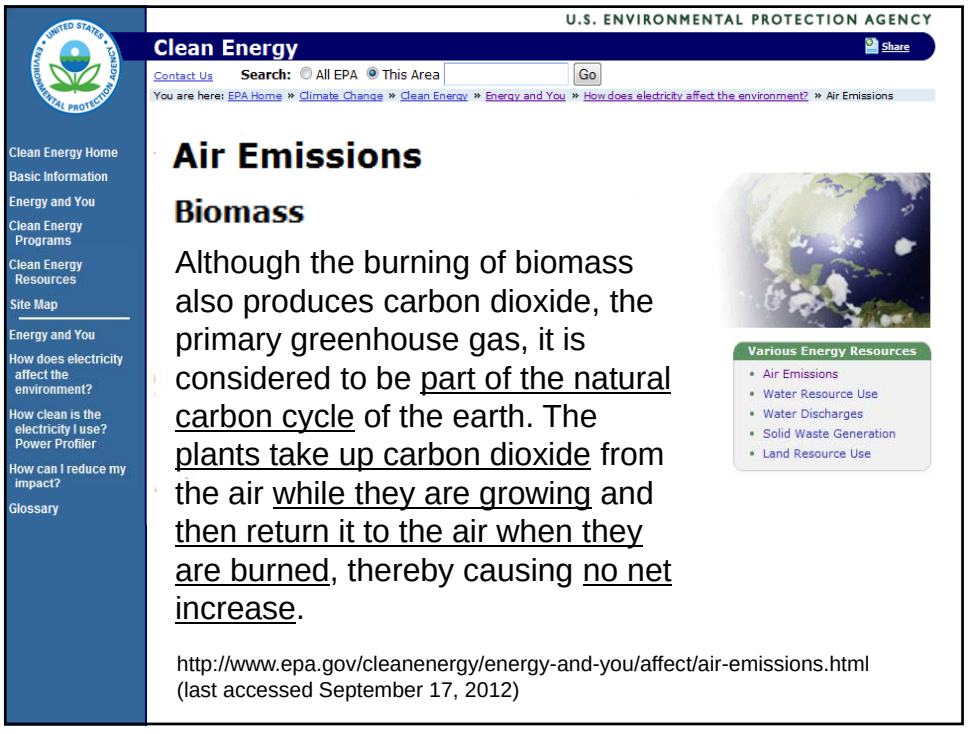

http://www.epa.gov/cleanenergy/energy-and-you/affect/air-emissions.html (last accessed September 17, 2012)

Viewpoints on biomass "carbon neutrality"

Box 2

Frequently Asked Questions About Biomass Greenhouse Gas Emissions

Q: Can we consider CO_2 produced by biomass burning for energy to be "CO_2 neutral" or "carbon neutral"?

A: Biomass burning for energy cannot be automatically considered carbon neutral even if the biomass is harvested sustainably, there still may be significant emissions from processing and transportation etc. of the biomass.

While CO_2 emissions from biomass burnt for energy are reported as zero in the Energy Sector, the net CO_2 emissions are covered in the Land Use Sector.

Source: IPCC website (undated)

Policy Analysis Group Report No. 31 (2010)

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Biomass emissions – EPA "tailoring rule"

6560-50-P

ENVIRONMENTAL PROTECTION AGENCY

40 CFR Parts 51, 52, 70, and 71

[EPA-HQ-OAR-2009-0517; FRL-_____]

RIN 2060-AP86

Prevention of Significant Deterioration and Title V Greenhouse Gas Tailoring Rule

May 13, 2010

We proposed to apply PSD and title V [CAA] to GHG sources that emit or have the potential to emit at least 25,000 tpy CO2e, and we proposed a PSD significance level in a range between 10,000 and 25,000 tpy CO2e . . . biomass combustion/ biogenic emissions are not exempted

http://www.epa.gov/nsr/documents/20100413final.pdf

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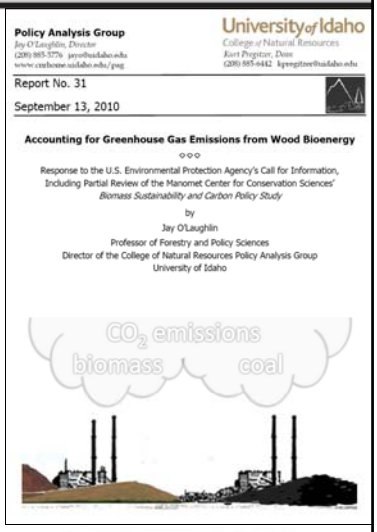
Problem Analysis

The primary issue addressed herein is whether burning biomass for energy should be regulated the same way as fossil fuels.

Whether biomass combustion is "carbon neutral" is high on the list of related concerns.


Policy Analysis Group
University of Idaho
College of Natural Resources

Report No. 31

September 13, 2010

Accounting for Greenhouse Gas Emissions from Wood Bioenergy

Response to the U.S. Environmental Protection Agency's Call for Information, Including Partial Review of the Manomet Center for Conservation Sciences' *Biomass Sustainability and Carbon Policy Study*

by

Jay O'Laughlin
Professor of Forestry and Policy Sciences
Director of the College of Natural Resources Policy Analysis Group
University of Idaho

Policy Analysis Group Report No. 31 (2010)

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EPA defers biomass permitting | 1/12/2011

EPA United States Environmental Protection Agency

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News Releases By Date **01/12/2011** Share

EPA to Defer GHG Permitting Requirements for Industries that Use Biomass / Three-year deferral allows for further examination of scientific and technical issues associated with counting these [biomass] emissions

The agency intends to use this time to seek further independent scientific analysis of this complex issue and then to develop a rule-making on how these emissions should be treated in determining whether a Clean Air Act permit is required.

http://yosemite.epa.gov/opa/admpress.nsf/0/4369C709163915B485257816005971BB

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EPA defers biomass permitting | 1/12/2011

United States Environmental Protection Agency

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News Releases By Date **01/12/2011** Share

"We are working to find a way forward that is scientifically sound and manageable for both producers and consumers of biomass energy. In the coming years we will develop a commonsense approach that protects our environment and encourages the use of clean energy," said EPA Administrator Lisa P. Jackson.

"Renewable, home-grown power sources are essential to our energy future, and an important step to cutting the pollution responsible for climate change."

http://yosemite.epa.gov/opa/admpress.nsf/0/4369C709163915B485257816005971BB

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EPA defers biomass permitting | 1/12/2011

United States Environmental Protection Agency

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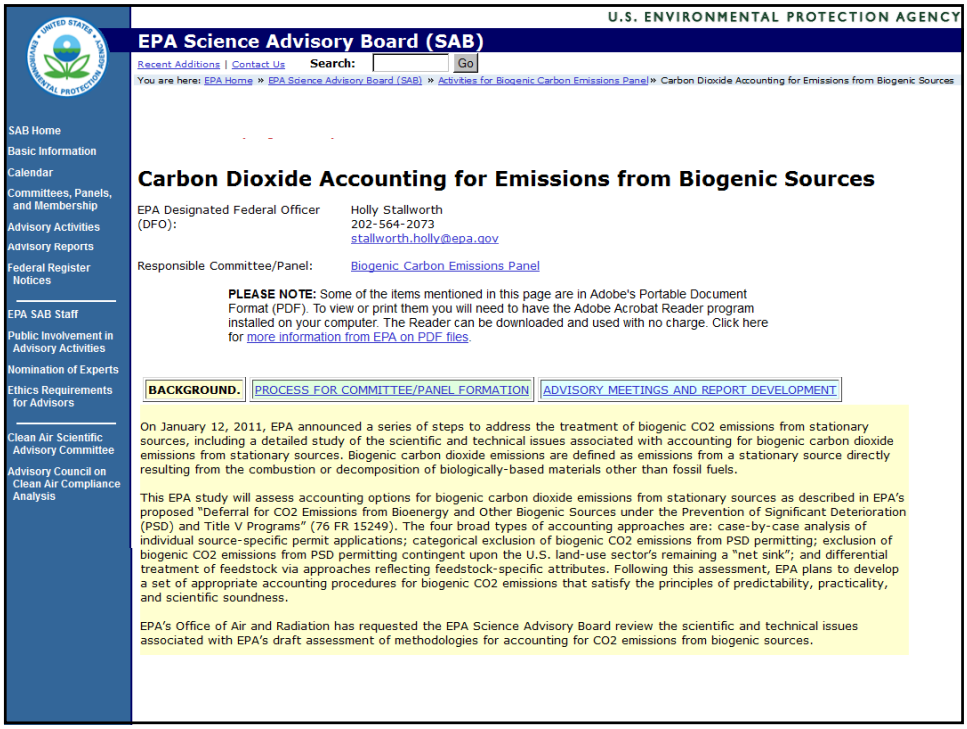

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EPA Science Advisory Board (SAB)

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Carbon Dioxide Accounting for Emissions from Biogenic Sources

EPA Designated Federal Officer (DFO): Holly Stallworth, 202-564-2073, stallworth.holly@epa.gov

Responsible Committee/Panel: Biogenic Carbon Emissions Panel

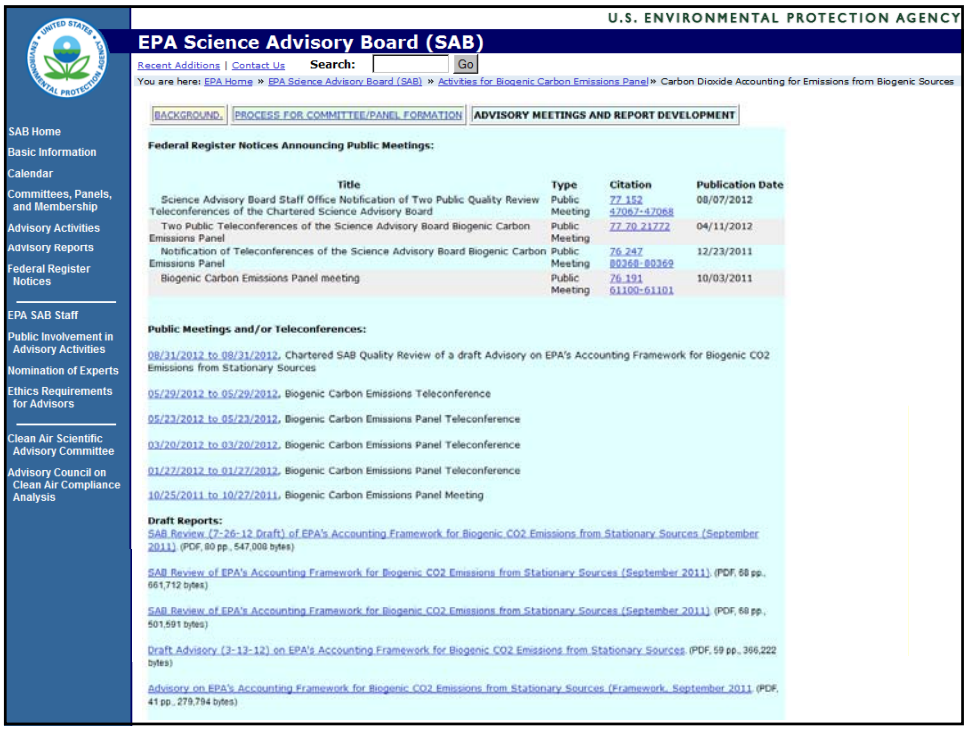
PLEASE NOTE: Some of the items mentioned in this page are in Adobe's Portable Document Format (PDF). To view or print them you will need to have the Adobe Acrobat Reader program installed on your computer. The Reader can be downloaded and used with no charge. Click here for more information from EPA on PDF files.

BACKGROUND. | PROCESS FOR COMMITTEE/PANEL FORMATION | ADVISORY MEETINGS AND REPORT DEVELOPMENT

On January 12, 2011, EPA announced a series of steps to address the treatment of biogenic CO2 emissions from stationary sources, including a detailed study of the scientific and technical issues associated with accounting for biogenic carbon dioxide emissions from stationary sources. Biogenic carbon dioxide emissions are defined as emissions from a stationary source directly resulting from the combustion or decomposition of biologically-based materials other than fossil fuels.

This EPA study will assess accounting options for biogenic carbon dioxide emissions from stationary sources as described in EPA's proposed "Deferral for CO2 Emissions from Bioenergy and Other Biogenic Sources under the Prevention of Significant Deterioration (PSD) and Title V Programs" (76 FR 15249). The four broad types of accounting approaches are: case-by-case analysis of individual source-specific permit applications; categorical exclusion of biogenic CO2 emissions from PSD permitting; exclusion of biogenic CO2 emissions from PSD permitting contingent upon the U.S. land-use sector's remaining a "net sink"; and differential treatment of feedstock via approaches reflecting feedstock-specific attributes. Following this assessment, EPA plans to develop a set of appropriate accounting procedures for biogenic CO2 emissions that satisfy the principles of predictability, practicality, and scientific soundness.

EPA's Office of Air and Radiation has requested the EPA Science Advisory Board review the scientific and technical issues associated with EPA's draft assessment of methodologies for accounting for CO2 emissions from biogenic sources.



U.S. ENVIRONMENTAL PROTECTION AGENCY

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BACKGROUND. | PROCESS FOR COMMITTEE/PANEL FORMATION | **ADVISORY MEETINGS AND REPORT DEVELOPMENT**

Federal Register Notices Announcing Public Meetings:

Title	Type	Citation	Publication Date
Science Advisory Board Staff Office Notification of Two Public Quality Review Teleconferences of the Chartered Science Advisory Board	Public Meeting	77 152 47067-47068	08/07/2012
Two Public Teleconferences of the Science Advisory Board Biogenic Carbon Emissions Panel	Public Meeting	77 70 21772	04/11/2012
Notification of Teleconferences of the Science Advisory Board Biogenic Carbon Emissions Panel	Public Meeting	76 247 80368-80369	12/23/2011
Biogenic Carbon Emissions Panel meeting	Public Meeting	76 191 61100-61101	10/03/2011

Public Meetings and/or Teleconferences:

08/31/2012 to 08/31/2012, Chartered SAB Quality Review of a draft Advisory on EPA's Accounting Framework for Biogenic CO2 Emissions from Stationary Sources

05/29/2012 to 05/29/2012, Biogenic Carbon Emissions Teleconference

05/23/2012 to 05/23/2012, Biogenic Carbon Emissions Panel Teleconference

03/20/2012 to 03/20/2012, Biogenic Carbon Emissions Panel Teleconference

01/27/2012 to 01/27/2012, Biogenic Carbon Emissions Panel Teleconference

10/25/2011 to 10/27/2011, Biogenic Carbon Emissions Panel Meeting

Draft Reports:

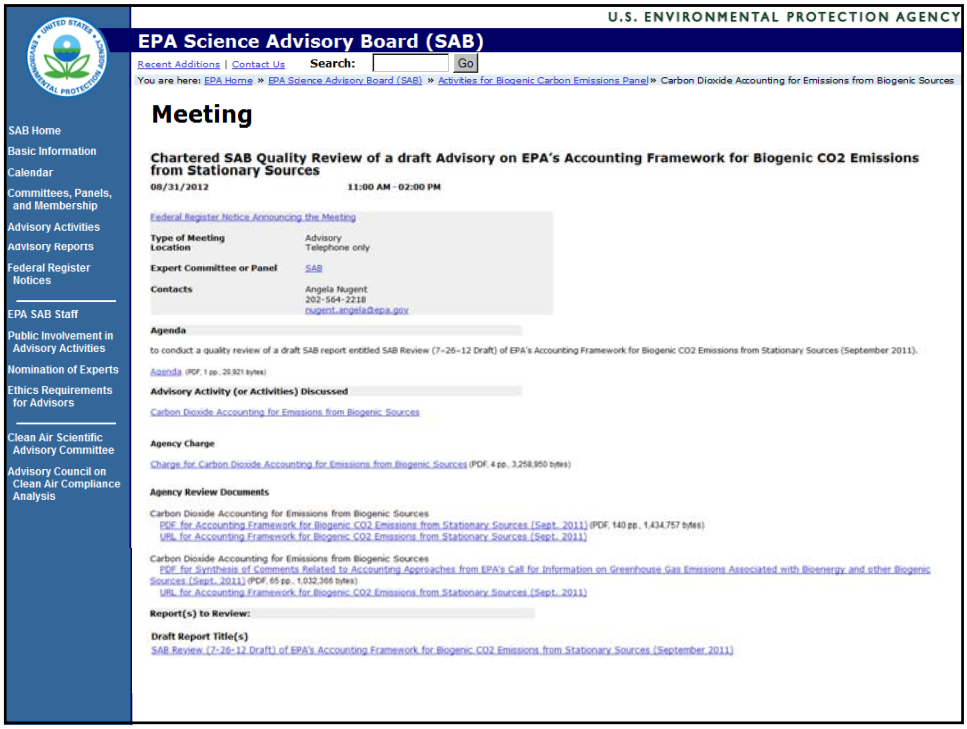
SAB Review (7-26-12 Draft) of EPA's Accounting Framework for Biogenic CO2 Emissions from Stationary Sources (September 2011) (PDF, 80 pp., 547,008 bytes)

SAB Review of EPA's Accounting Framework for Biogenic CO2 Emissions from Stationary Sources (September 2011) (PDF, 68 pp., 661,712 bytes)

SAB Review of EPA's Accounting Framework for Biogenic CO2 Emissions from Stationary Sources (September 2011) (PDF, 68 pp., 501,591 bytes)

Draft Advisory (3-13-12) on EPA's Accounting Framework for Biogenic CO2 Emissions from Stationary Sources (PDF, 59 pp., 366,222 bytes)

Advisory on EPA's Accounting Framework for Biogenic CO2 Emissions from Stationary Sources (Framework, September 2011 (PDF, 41 pp., 279,794 bytes)



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Meeting

Chartered SAB Quality Review of a draft Advisory on EPA's Accounting Framework for Biogenic CO2 Emissions from Stationary Sources

08/31/2012 **11:00 AM - 02:00 PM**

Federal Register Notice Announcing the Meeting

Type of Meeting	Advisory
Location	Telephone only
Expert Committee or Panel	SAB
Contacts	Angela Nugent 202-564-2218 nugent.angela@epa.gov

Agenda

to conduct a quality review of a draft SAB report entitled SAB Review (7-26-12 Draft) of EPA's Accounting Framework for Biogenic CO2 Emissions from Stationary Sources (September 2011).

Agenda (PDF, 1 pp., 20,921 bytes)

Advisory Activity (or Activities) Discussed

Carbon Dioxide Accounting for Emissions from Biogenic Sources

Agency Charge

Charge for Carbon Dioxide Accounting for Emissions from Biogenic Sources (PDF, 4 pp., 3,258,950 bytes)

Agency Review Documents

Carbon Dioxide Accounting for Emissions from Biogenic Sources
PDF for Accounting Framework for Biogenic CO2 Emissions from Stationary Sources (Sept., 2011) (PDF, 140 pp., 1,434,757 bytes)
URL for Accounting Framework for Biogenic CO2 Emissions from Stationary Sources (Sept., 2011)

Carbon Dioxide Accounting for Emissions from Biogenic Sources
PDF for Synthesis of Comments Related to Accounting Approaches from EPA's Call for Information on Greenhouse Gas Emissions Associated with Bioenergy and other Biogenic Sources (Sept., 2011) (PDF, 65 pp., 1,032,366 bytes)
URL for Accounting Framework for Biogenic CO2 Emissions from Stationary Sources (Sept., 2011)

Report(s) to Review:

Draft Report Title(s)

SAB Review (7-26-12 Draft) of EPA's Accounting Framework for Biogenic CO2 Emissions from Stationary Sources (September 2011)

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SAB Review (7-26-12 Draft) of EPA's Accounting Framework for Biogenic CO2 Emissions from Stationary Sources (September 2011)

Meeting Materials

Disclaimer Although not required to do so, EPA generally posts public comments submitted to the SAB, CASAC or Council and their subcommittees on the internet to make them easily available to the public. Posting of public comments is not an Agency endorsement of, or agreement with, any information or viewpoints presented in the public comment, nor is it an Agency endorsement of the quality or correctness of such information and viewpoints. In addition, mention of any trade names or commercial products in posted meeting material does not constitute a recommendation by EPA or the SAB for use.

Category	Meeting Material
Committee Members' Comments	Compilation of Member Comments as of 08/28/12. (PDF, 32 pp., 131,019 bytes)
Committee Members' Comments	Compilation of member comments as of 8/30/2012. (PDF, 38 pp., 155,483 bytes)
List of public speakers	List of Registered Public Speakers. (PDF, 1 pp., 14,714 bytes)
Public comment submitted to the SAB Staff Office	Comments from Ann Ingerson, The Wilderness Society, and Ellen Hawes, ENE . (PDF, 3 pp., 160,234 bytes)
Public comment submitted to the SAB Staff Office	Comments from David P. Tenny, National Alliance of Forest Owners. (PDF, 93 pp., 479,522 bytes)
Public comment submitted to the SAB Staff Office	Comments from Jay O'Laughlin. (PDF, 26 pp., 360,824 bytes)
Public comment submitted to the SAB Staff Office	Comments from Linc Cannon, Oregon Forest Industries Council. (PDF, 1 pp., 72,321 bytes)
Public comment submitted to the SAB Staff Office	Comments from Nathaniel Greene, Natural Resources Defense Council. (PDF, 3 pp., 217,357 bytes)
Public comment submitted to the SAB Staff Office	Comments from Peter Becker, David Carr, Larry Edwards, and Jonathan Lewis. (PDF, 3 pp., 96,728 bytes)
Public comment submitted to the SAB Staff Office	Comments from Reid Miner, NCAS: Uncertainties in Anticipated Future Baselines . (PDF, 7 pp., 161,145 bytes)
Public comment submitted to the SAB Staff Office	Comments from Ronal W. Larsen. (PDF, 7 pp., 113,018 bytes)
Public comment submitted to the SAB Staff Office	Comments from William A. H. Sammons. (PDF, pp., 92,355 bytes)
Public comment submitted to the SAB Staff Office	Comments received from Jonathan Lewis on "leakage" signed by Peter Becker, David Carr, Larry Edwards, Alec Giffen and Jonathan Lewis. (PDF, 2 pp., 108,823 bytes)
Public comment submitted to the SAB Staff Office	David Tenny response to Tim Searchinger. (PDF, 1 pp., 11,548 bytes)
Public comment submitted to the SAB Staff Office	Slides from Jerry Schwartz, American Forest & Paper Association. (PDF, 5 pp., 126,507 bytes)
Public comment submitted to the SAB Staff Office	Statement of Mary S. Booth, Partnership for Policy Integrity . (PDF, 1 pp., 36,571 bytes)
Public comment submitted to the SAB Staff Office	Tim Searchinger Oral Comments. (PDF, 2 pp., 45,809 bytes)
Roster	SAB Roster with Liaisons. (PDF, 4 pp., 84,169 bytes)

Panel responses to EPA charge questions

Question 3.1. Does the SAB support EPA's assessment and characterization of the underlying science and the implications for biogenic CO_2 accounting?

No. "There is no scientifically correct answer when choosing a time horizon, …"

Panel responses to EPA charge questions

Question 4(b). Is the [accounting] framework scientifically rigorous?

No. "The SAB did not find the Framework to be scientifically rigorous. Specifically, the SAB identified a number of deficiencies that need to be addressed." These issues include time scale, spatial scale, additionality, assessing uncertainty, leakage, and some other issues and inconsistencies, some of which are identified in reply to Question 4(g).

Panel responses to EPA charge questions

Question 4(g). Are there additional limitations of the accounting framework itself that should be considered?

Yes. "A number of important limitations of the Framework are discussed below: framework ambiguity, feedstock groups, potential for unintended consequences, and assessment of monitoring and estimation approaches."

Panel responses to EPA charge questions

Question 4(e). Is [the accounting framework] simple to implement and understand?

No. "It is neither."

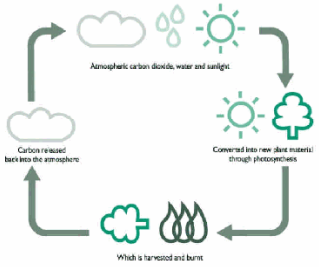
Question 6(a). Does the report – in total – contribute usefully to advancement of understanding of accounting for biogenic CO_2 emissions from stationary sources?

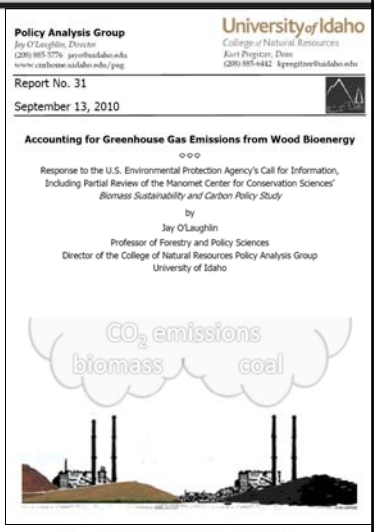
"Yes, the Framework … addresses many issues that arise in such an accounting system. … However, the solutions offered in many cases, particularly those related to the use of harvested wood for bioenergy, lack transparency or a scientific justification."

Conclusion on biomass "carbon neutrality"

Rather than "carbon neutral" it is more accurate to say that biomass can be a low-carbon source of renewable energy.

The GHG emissions from transportation would be reported in that sector in order to avoid double counting.




Policy Analysis Group
University of Idaho
College of Natural Resources
Report No. 31
September 13, 2010

Accounting for Greenhouse Gas Emissions from Wood Bioenergy

Response to the U.S. Environmental Protection Agency's Call for Information, Including Partial Review of the Manomet Center for Conservation Sciences' *Biomass Sustainability and Carbon Policy Study*

by

Jay O'Laughlin
Professor of Forestry and Policy Sciences
Director of the College of Natural Resources Policy Analysis Group
University of Idaho

Policy Analysis Group Report No. 31 (2010)

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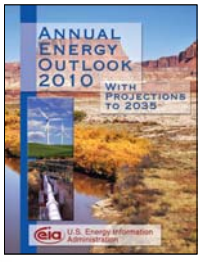
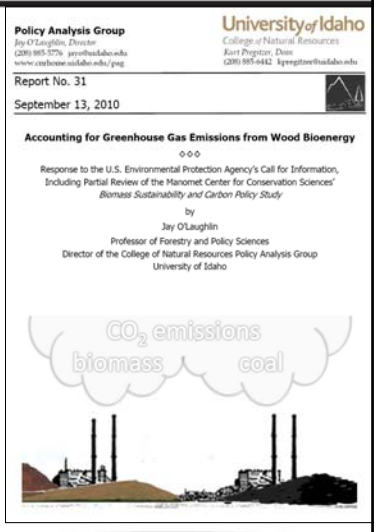


The U.S. Dept. of Energy has the issue clearly in focus and is already reporting the data at the national scale.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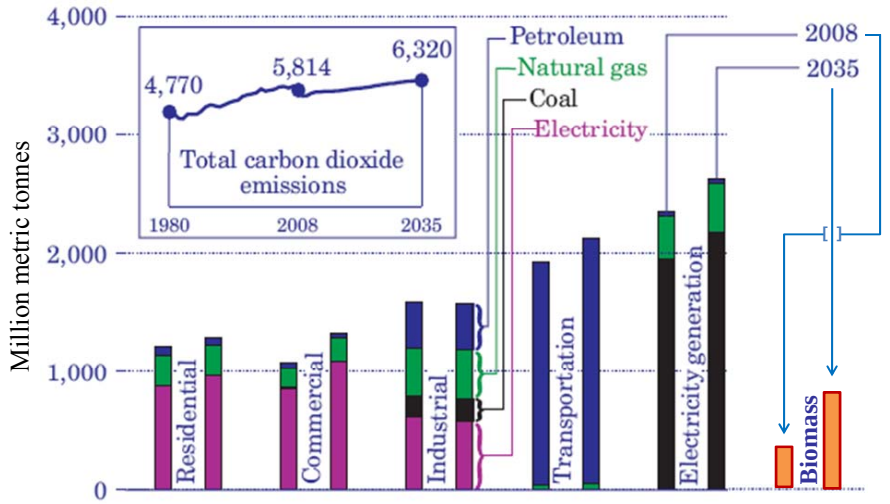
CO_2 emissions by sector & fuel (2008 & 2035)



U.S. Energy Information Administration
Independent Statistics and Analysis (Annual Energy Outlook 2010)

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OUTLINE

- Global warming's six Americas
- Why carbon?
- Carbon stocks & flows
- Forests: Carbon source or sink?
- Is bioenergy "carbon neutral"?
- Conclusions

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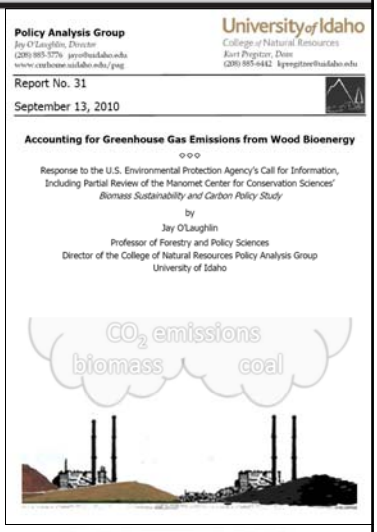
Conclusion on biomass/fossil comparison

The idea that the combustion of coal is somehow better for the atmosphere than the combustion of wood for bioenergy as currently practiced in the U.S. does not make sense.

The current debate is likely to conclude that burning wood to produce electricity is an improvement over burning coal, now, but only if the feedstock comes from sustainably managed forests.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CO_2 emissions
biomass
coal

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Carbon Accounting

Federal Register / Vol. 75, No. 135 / Thursday, July 15, 2010 / Notices 41173

WRONG QUESTIONS!

ENVIRONMENTAL PROTECTION AGENCY
[EPA–HQ–OAR–2010–0560; FRL–9175–9]
Call for Information: Information on Greenhouse Gas Emissions Associated With Bioenergy and Other Biogenic Sources
AGENCY: Environmental Protection Agency (EPA).
ACTION: Call for information.

EPA is soliciting information and views on:

- National-scale Carbon Neutrality
- Alternative Accounting Approaches
- Comparison with Fossil Energy

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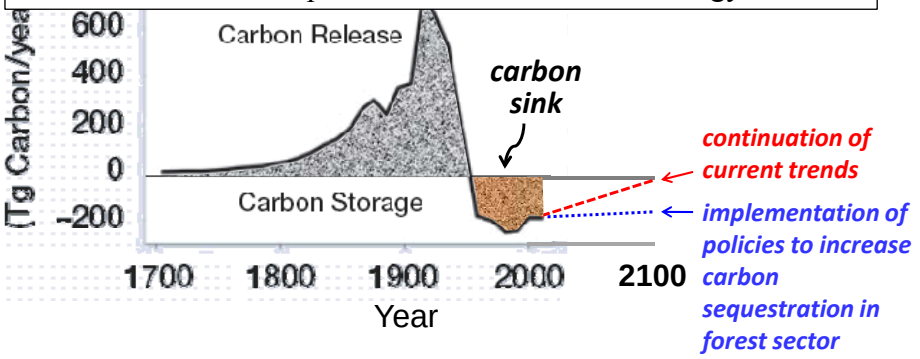
Carbon balance in U.S. forests, 1700-2100

Renewable energy policies need to address two key questions:
1) how to maintain forests as carbon sinks over the long term, and
2) how to optimize the production of forest biofuels and biomaterials that help reduce demand for fossil energy.



Birdsey, R., Pregitzer, K., & Lucier, A. (2006).

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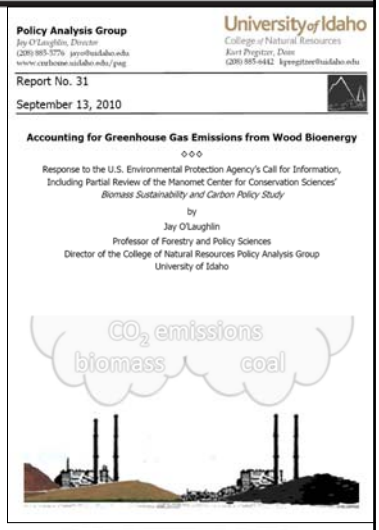
Executive Summary – Conclusion

The EPA is reconsidering how GHG emissions from biomass combustion should be treated under its regulatory responsibilities for GHG emissions.

The policy choice is facilitating use of biomass produced continuously by the carbon cycle to substitute for fossil fuels, or encumber such use and continue to mine fossil fuels while forests are allowed to decay and burn.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CO_2 emissions
biomass
coal

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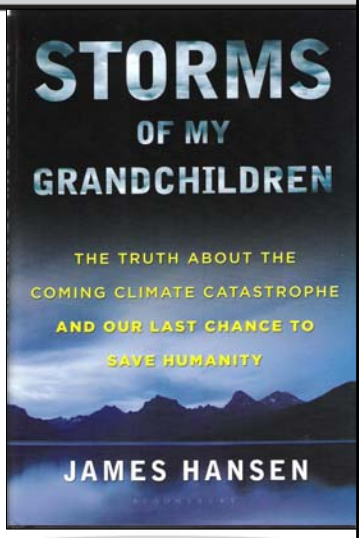
The expert witness approach . . .

Policy decisions on climate change are being deliberated every day by those without full knowledge of the science, and often with intentional misinformation spawned by special interests.

This book was written to help rectify this situation. Citizens with a special interest—in their loved ones—need to become familiar with the science, exercise their democratic rights, and pay attention to politicians' decisions.

Otherwise, it seems, short-term special interests will hold sway in capitals around the world—and we are running out of time.



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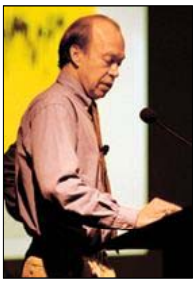
Wood bioenergy: back to the future

THE INDEPENDENT ON SUNDAY | CLIMATE CHANGE

Phase out coal and burn trees instead, urges leading scientist



14 September 2008 – Dr. James Hansen was the first leading scientist to announce that global warming was taking place. Now he has issued a warning that a back-to-the-future return to one of the oldest fuels is imperative because the world has exceeded the danger level for carbon dioxide in the atmosphere.

NASA Goddard Institute for Space Studies
New York, N.Y.

Columbia University

http://www.columbia.edu/~jeh1/

http://www.independent.co.uk/environment/climate-change/phase-out-coal-and-burn-trees-instead-urges-leading-scientist-929889.html

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Wood bioenergy: back to the future

THE INDEPENDENT ON SUNDAY | CLIMATE CHANGE

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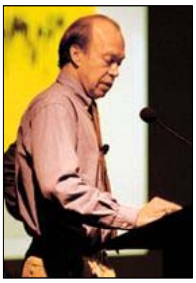

14 September 2008 – Growing trees, which absorb the gas from the air as they grow, burning them instead of fossil fuels to generate electricity, and capturing and storing the carbon produced in the process is needed to get the greenhouse effect down to safe levels, says Dr. Hansen (below 350 ppm).

Goddard Institute for Space Studies
New York, N.Y.

Columbia University

http://www.columbia.edu/~jeh1/

http://www.independent.co.uk/environment/climate-change/phase-out-coal-and-burn-trees-instead-urges-leading-scientist-929889.html

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Who is James Hansen?

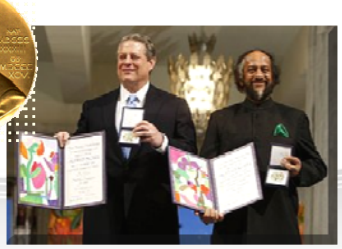
news

November 26, 2008

Discover Magazine

The 10 Most Influential People in Science
The world-changing minds who move science from theory to action
by Susan Kruglinski and Marion Long

Al Gore won a Nobel Peace Prize [and an "Oscar"] for explaining global warming to the world; James Hansen explained global warming to Al Gore.



Towards a cohesive federal wood bioenergy policy

www

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Towards a cohesive federal wood bioenergy policy

- What is a “cohesive policy”
- Towards a cohesive policy: wildfire & carbon
- Wood bioenergy policy objectives or goals
- **Elements of a cohesive wood bioenergy policy**
  - Establish a single definition of biomass
  - Achieve parity among renewable technologies
  - Improve federal land management policies

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Using forest biomass for energy production

Policy Resolution 11-2

WESTERN GOVERNORS' ASSOCIATION

Background (9 points)

1. Western **forests provide** raw materials for **wood products** and, as a **by-product**, **wood bioenergy**.
4. There is an **absence of a clear and cohesive federal policy** on the use of biomass for energy production. Without such a policy, definitions and decisions made by an array of competing federal authorities have negative impacts on efforts to improve forest health.

www.westgov.org/component/joomdoc/doc_download/1517-11-2

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Using forest biomass for energy production

Policy Resolution 11-2

WESTERN GOVERNORS' ASSOCIATION

Governors' Policy Statement (7 points)

2. The Western Governors think that a **federal biomass policy need**s to be developed, which **reflects** a fuller understanding of the **benefits of utilizing forest residues for bioenergy** at both the national and regional levels, and

   includes a definition of biomass based on the actual material, not the location of feedstock, such as from federal lands.

www.westgov.org/component/joomdoc/doc_download/1517-11-2

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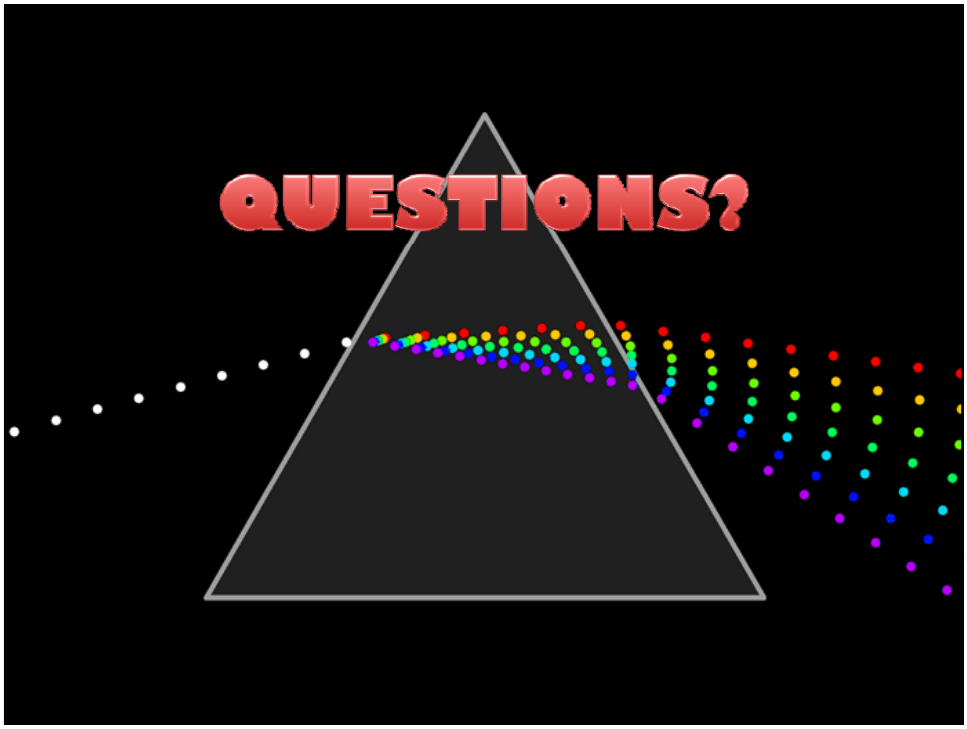
QUESTIONS?