White Paper on Energy and Global Warming

Sierra Club, Northeast Florida Group

Documentation

Our World is Changing

The Intergovernmental Panel on Climate Change (IPCC) is the largest scientific collaboration ever attempted. It was organized to study global warming by the United Nations in 1984. In 2007 it delivered its Fourth Assessment Report. The findings represent the consensus view of over 2000 scientists and policy experts from over a hundred countries. Consensus means that no one in that body was able to find serious fault with the findings. The findings are based on published research available when the body begins deliberations, about two years before the IPCC publishes its reports. The result is that the IPCC findings are somewhat out of date and quite conservative, but we may trust that things are no better than they say. The Summary for Policymakers of the Fourth Assessment Report is a good place to start learning about the general state of global warming studies. http://www.ipcc.ch/

The best semi-technical introduction to global warming is Tim Flannery's The Weather Makers, now out in paperback. Flannery is an Australian biologist who was named Man of the Year in Australia in 2007 for the book. The onion skin metaphor comes from Flannery, Chapter 2.

For a history and a more technical study, try Spencer Weart's The Discovery of Global Warming from Harvard University Press. Weart maintains a web site with as much supplementary detail as you could wish. http://www.aip.org/history/exhibits/climate/

A great deal of ignorant rant and even propaganda appears constantly on the topic of global warming. The best site, run by climate scientists, to track down informed opinion is RealClimate. http://realclimate.org/

The British Royal Society has published a brief guide to climate change controversies which addresses the eight most common misleading arguments. http://royalsociety.org/page.asp?id=6229

With thousands of scientists working on this most important question new material appears almost every day. One place to keep track of new developments is Climate Ark. http://www.climateark.org/

In 2007 Tufts University published a study of the economic impact of climate change on Florida. It uses two scenarios derived from the 2007 IPCC report, one of vigorous worldwide action and one with business as usual. The report could have been stronger. It uses the most conservative projections (for example, on sea level rise) and ignores much that will surely degrade our economy. "If estimates were included for other sectors such as agriculture, fisheries, insurances, transportation, and water systems — to say nothing of ecosystem damages — the totals would be even larger." (Page 3) Even so, the report conveys some of what inaction will bring. http://www.ase.tufts.edu/gdae/Pubs/rp/Florida_hr.pdf

Driven by glacier flow to the sea, the loss of mass in Antarctica increased dramatically from 1996 to 2006, mostly in the West Antarctic, and is accelerating. The following study is the most comprehensive to date on the status of the Antarctic ice sheets. http://www.nature.com/news/2008/080113/full/news.2008.438.html

Three quarters of the world's fishing grounds are threatened by a failure of oceanic circulation systems due to global warming, according to In Dead Water, a comprehensive report by the UN Environmental Program. http://www.earthtimes.org/articles/show/187537,climate-change-threatens-worlds-fish-stocks-un-group-finds.html

An American Academy for the Advancement of Science meeting in Boston in February 2008 was told that by 2100 the PH of the oceans will have fallen by half a unit unless we control emissions. The

rise in acidity will prevent the formation of (especially) corals, with severe implications for many forms of life. http://www.economist.com/science/displaystory.cfm?story_id=10717954

A UN conference was told in February 2008 that global warming threatens the human rights of millions of people. http://www.planetark.org/dailynewsstory.cfm/newsid/47054/story.htm

Our leading climate scientist, James Hansen, has furnished a set of slides for a ten-minute talk he gave to the Royal College of Physicians in London in February, 2008. They summarize the current problem and his solution. He is at work on a paper setting forth his argument for reducing the point of dangerous anthropogenic interference to 350 ppm of CO2 (with an eye to lowering the levels yet further, as you will see from the slides). http://www.columbia.edu/~jeh1/RoyalCollPhyscns_Jan08.pdf

A study in Science confirms that the persistent and worsening drought in the Western US is due to global warming. http://www.washingtonpost.com/wp-dyn/content/article/2008/01/31/AR2008013101868.html?hpid=moreheadlines Another Science article calls for a fundamental shift in water planning, to adapt to the new patterns brought on by climate change. http://www.eurekalert.org/pub_releases/2008-01/uow-wpc012808.php California must prepare to deal with too much water, and too little. http://www.sfgate.com/cgi-bin/article.cgi?f=/c/a/2008/01/31/MNC9UOA3M.DTL Florida will certainly have too much of the salty kind.

A study in Nature finds an approximately 40% sensitivity of hurricane intensity and frequency to a half degree C change in sea surface temperature. Previous studies had found such an effect in the past hundred years; this one shows how that can be. The study focuses on the Atlantic in the northern hemisphere. http://www.sciencedaily.com/releases/2008/01/080130130647.htm

A study in Nature Geoscience finds that the last time temperatures were as high as they are becoming the sea level rose 1.6 meters a century, twice the IPCC Fourth Assessment Report maximum estimate. http://ec.europa.eu/research/headlines/news/article_08_01_28_en.html

We, Too, Must Change

In February 2008 The New Yorker ran a comprehensive story on the project of reducing carbon emissions. http://www.newyorker.com/reporting/2008/02/25/080225fa_fact_specter

A couple of Science articles from February 2008 confirm what we knew, that current biofuels from corn and other crops are worse than what they are meant to replace in terms of global warming. The articles are getting a lot of attention and are a base for appealing to the government to stop the lavish funding of what has been called a solution worse than the problem. The Science articles do a more thorough job of analyzing land use issues than has been the case before.
http://www1.umn.edu/umnnews/Feature_Stories/Converting_pristine_lands.html
http://www.iht.com/articles/2008/02/07/healthscience/biofuel.php

This overview of biofuels from Environment leads to the conclusion that the project of maintaining our motorized world with even the most ambitious biofuel program is doomed. We would do far better to rethink transportation and subsidize forestation.
http://environment.yale.edu/pubs/Bioenergy-The-Cure-for-Our-Oil-Addiction/

Our Viable Options for Energy Sources

Fred Krupp and Miriam Horn's Earth: The Sequel, The Race to Reinvent Energy and Stop Global Warming (Norton, 2008) is an up-to-date insider's view of the research and development of alternative energy in the US. Krupp is President of the Environmental Defense Fund.

A life cycle analysis of silicon-based forms of solar energy finds that even when the production process depends on coal-based energy, solar cuts greenhouse gas emissions by around 90%. When we

base the production on already developed renewable energy, the emissions can fall to zero. http://www.sciam.com/article.cfm?id=solar-cells-prove-cleaner-way-to-produce-power

Coolearth Solar is marketing balloons which concentrate the sun on one hard-working silicon chip. The balloons can be strung above farmland or other sites which need largely uninterrupted sun. http://coolearthsolar.com/ Coolearth and Nanosolar are producing systems scaled for industrial use. http://nanosolar.com/ Infinia Corporation is preparing to market a 3 kilowatt Stirling power system for homes. http://www.infiniacorp.com/applications/clean_energy.php

Citigroup, Morgan Chase, and Morgan Stanley are drafting Carbon Principles which will guide their lending to utilities wishing to build coal plants. Other banks are expected to follow suit. The guidelines will include the cost of storing carbon and other risk factors. The banks will consider competing costs of energy efficiency and renewable sources when evaluating loans for coal plants. "The days of conventional coal are over," said an Environmental Defense spokesperson. http://www.truthout.org/issues_06/020408EA.shtml

The LA Times sketches the history of coal politics in the Bush administration. http://www.latimes.com/news/nationworld/nation/la-na-coalside18jan18,1,4689013.story?coll=la-headlines-nation

A report on the recent successes in stopping coal plants and the current court battles: http://uk.reuters.com/article/oilRpt/idUKN1530481720080115?pageNumber=1&virtualBrandChannel=0

The cost estimates of nuclear energy typically do not include disposing of the waste or the full cost of decommissioning the plants. As this British report shows, those are major considerations. The estimated decommissioning costs for Britain's 19 nuclear reactors have reached 74 billion pounds exclusive of storage facilities, which are still not sited. They are thinking of burying the hot debris in the ocean. http://www.independent.co.uk/news/uk/politics/nuclear-cleanup-bill-16312bn-higher-than-predicted-775603.html

The US Department of Energy has not supplied congress with information on the long-term costs and the radioactive wastes of nuclear power. In Oct. 2007 Moody investor service warned that nuclear construction costs are likely to be double the stated estimates. Last year congress halted funding for reprocessing and fast reactor facilities. We have treated and disposed of less than 1% of past reprocessing wastes; it has cost 100 billion dollars so far. http://www.nirs.org/neconomics/alvarez2009doebudget.pdf From the Nuclear Info and Research Source, http://www.nirs.org/neconomics/neconomicshome.htm

117 reactors have been permanently shut down as of 2007, with a mean age of 22 years. Moody's estimates the cost of nuclear at $6-7,000/kW (Oct 07). That would mean about 13-15 cents/kWh. Governments have provided financing because banks will not. The industry hopes to pass the liability on to customers through regulatory change. But state commissions in the future may balk at passing along imprudent construction and operating costs to ratepayers. Former Nuclear Regulatory Commission member Peter Bradford, who was involved in the licensing of some 25 nuclear reactors, comes to a severe judgment on the prospects of nuclear power: "Those who tell you things like 'It could save the earth' (1) or 'Clean, green atomic energy can stop global warming' (2) or 'Nuclear energy just may be the energy source that can save our planet from catastrophic climate change' (3) are inviting you into a dangerous lala land in which nuclear power will be over subsidized and under scrutinized while other more promising and more rapid responses to climate change are neglected and the greenhouse gases that they could have averted continue to pollute the skies at dangerous rates." (4)

1 National Geographic, April, 2006
2 Wired Magazine, February, 2005
3 Patrick Moore, Washington Post, April 16, 2006

[4] Peter A. Bradford, "Nuclear Power and Climate Change", Society of Environmental Journalists Panel Debate, Burlington, Vermont, October 27, 2006
http://www.nirs.org/neconomics/206749.the_world_nuclear_industry_status_report.pdf

MidAmerican Nuclear Energy, owned by Warren Buffet, cancelled an Idaho nuclear plant in January 2008, citing the poor economics of nuclear energy.
http://www.nirs.org/neconomics/2008128idahoreactorcancelled.pdf

US nuclear subsidies under the US Energy Policy Act of 2005 are said to be about $2-20/megawatt hour. Without them nuclear would probably not be an option. Future governments may not be willing to continue the subsidies. (Subsidies are listed on page 5 of the following source.)
http://www.greenpeace.org/raw/content/usa/press-center/reports4/the-economics-of-nuclear-power.pdf

The US government assumes responsibility for spent fuel at $1/megawatt hour, but the actual disposal costs, if we ever learn how to dispose of the wastes, are likely to be considerably higher; the storage costs amount to considerably more than a dollar. (Page 21) The actual costs of a nuclear disaster are not in the accounting—liability of the company is limited by law in the US and elsewhere. (Pages 23-24) http://www.nirs.org/c20/atommythen_thomas.pdf

Philip Lusk has provided a systematic recent analysis of the cost of nuclear power which puts it as 19.75 cents/kWh. That places it outside the range of both fossil fuels and their practical alternates, both conservation and renewable energy technologies. The choice of nuclear becomes hard to understand. http://www.nirs.org/neconomics/nuclearpowerplantelectricitycostslusk.pdf

Since 1974 the Sierra Club has had the following policy: The Sierra Club opposes the licensing, construction and operation of new nuclear reactors utilizing the fission process, pending:

1. Development of adequate national and global policies to curb energy over-use and unnecessary economic growth.
2. Resolution of the significant safety problems inherent in reactor operation, disposal of spent fuels, and possible diversion of nuclear materials capable of use in weapons manufacture.
3. Establishment of adequate regulatory machinery to guarantee adherence to the foregoing conditions. The above resolution does not apply to research reactors.

Adopted by the Board of Directors, December 12-13, 1974

Florida Power and Light has entered into an agreement with Ausra Corp. and several other American utilities to construct several solar power stations over the next five to seven years.
http://www.reuters.com/article/scienceNews/idUSN2720694420070928

The Stern Report is the most extensive analysis of the economics of energy conversion.
http://www.hm-treasury.gov.uk/independent_reviews/stern_review_economics_climate_change/sternreview_index.cfm

Where We Must Go

http://en.wikipedia.org/wiki/Main_Page is a good place to begin learning about the renewable technologies.

A leaked UN report estimates that shipping is responsible for 4.5% of CO2 emissions to date, about double what has been believed, and about double the emissions from aviation.
http://www.guardian.co.uk/environment/2008/feb/13/climatechange.pollution

Scientific American published "A Solar Grand Plan" in January, 2008. It uses only conservative technology to achieve a level of production which, in concert with other renewable sources, could take the country completely off fossil fuels. The price would be around half the costs so far of our invasion of Iraq, and would be a more worthwhile use of our resources. http://www.sciam.com/article.cfm?id=a-solar-grand-plan

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The first peer-reviewed study of the level of carbon emissions necessary to stabilize global temperatures finds a near zero emissions level is required.
http://www.eurekalert.org/pub_releases/2008-02/ci-scr021408.php
http://www.agu.org/pubs/crossref/2008/2007GL032388.shtml

An article in a January 2008 issue of Nature comes to a similar conclusion by looking at the effects of increased CO2 on the ability of the environment to store it.
http://www.nature.com/nature/journal/v451/n7176/full/nature06593.html

George Monbiot's Heat: How to Stop the Plant from Burning (South End Press, 2007) describes a program to reduce England's carbon emissions by 90% by 2030. It is full of researched ideas on alternatives.

Cornell has been a leader in studying the potential of terra preta.
http://www.css.cornell.edu/faculty/lehmann/biochar/Biochar_home.htm