



To: Ken Lay

From: Rob Bradley

Department: Policy Analysis

Subject: Global Climate Change Debate &
Meeting with Clinton

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My advice for the Clinton meeting is what you already know: stay as far away from the politics as possible and just portray Enron as part of the solution in the trading function, the energy substitution function, and the conservation (ESCO) function.

This said, I would like to share what I have learned in recent weeks when I finally had a chance to formally study the debate. I naturally went in as a skeptic but expected to find some real uncertainty and weak links in the skeptics' position and thus a hard decision based on the economic costs involved with activism. I now believe the science is a mess, it has been a mess since the start but has been strategically politicized, and that a turn is being made away from any sort of consensus that a real warming problem exists among the real experts. The skeptics are coming out and being more popularized, and even the Bert Bolins of the world are getting concerned about the politicization of the science.

The reason this is important is that a lot of Americans are going to hear both sides of the debate in the coming months, and it is going to be easy to be a skeptic, particularly once the energy cost estimates come into play. Robert Samuelson (see attached) went through the same exercise I did for his recent Washington Post article, a crash course talking to scientists on both sides, and he reached a similar conclusion.

A Notable, Growing Lack of Scientific Consensus

The opponents of global warming policy activism are "leading with the science" for good reason. The science is far from settled and appears to be becoming more openly unsettled. The attached article in Science magazine by senior editor Richard Kerr is considered a vindication of the skeptics' view, and The New Scientist is rumored to be running a similar-type article concluding that the skeptics have won the debate in the climatology world.

What is misleading about the claim of "consensus" by warming activists is the large number of environmental scientists who are quick to accept the premise of a warming problem and deduce the negative effects in their areas of specialty. But of the thousands of scientists who are voicing their opinion on climate change, far fewer are really climate specialists. America only has 100 or so Ph.D climatologists, I am told. Once you get to the real experts, there are plenty of vocal skeptics such as leading climatologists at Harvard, MIT, Virginia, Arizona, and NASA, and the "silent doubters" (as Kerr refers to them) number many more. Houston's own Dr. Neil Frank is also a skeptic (his degree is in meteorology, which has a similar training as climatology).

The "consensus" of the IPCC report about "discernible influence" is drawn more from the Policymakers Summary (which was the one section of the three-volume report that was not peer

reviewed for the final draft, a controversy that has been chronicled in the press) than the whole report, which shows lots of caveats and uncertainty. Chairman Bolin and others are now complaining that the report has been too politicized from the Policymakers section (see attached report from Fred Singer's Science & Environmental Policy Project group).

Regarding the "consensus" among economists in the statement circulated by Redefining Progress, 90% of the membership of the American Economics Association did *not* sign the statement, and there are regrets of some signers given that it turned out to be a political document. The premise of the Economist's Statement on Climate Change begs the science of climate change and really just says if there is a problem, use the least-cost method of solving it (trading permits for command-and-control).

Key Science Issues

At a recent conference sponsored by the Competitive Enterprise Institute, I heard a debate between Pat Michaels of Virginia (skeptic) and Alan Robock of Maryland (believer), both climate Ph.D's and fresh from a hearing before the Senate Subcommittee on Foreign Relations. This debate cut through a lot of the hype given that both participants' statements reflected refereed facts and theories and little spin. Unlike economists that can draw upon social science theories that are all over the map, natural scientists must be more constrained with their facts and theories.

The opposing viewpoints hinge between

- **taking the observed data that shows no warming at face value and working back to the theory or**
- **believing General Circulation Models that assume not only a slight warming from increases in CO2 emissions but *positive feedback* from cloud cover and water vapors to produce a potentially cataclysmic warming.**

Both debaters agreed that actual data was not showing warming and thus the weather events of recent years, even if abnormal, cannot be a vindication of the (apocalypse) global warming hypothesis. Surface temperature readings from thermometers do not show warming in the last decade, only a jump in the decade before. Satellite data, which accurately measures temperatures in the atmosphere over land and surface temperatures over water (accounting for 70% of the earth's surface) shows no warming in the 18.5 years of its existence but a slight cooling. However, without the Mt. Pinatubo volcano, both speakers agreed, the temperature record would be flat.

Satellite data is considered more accurate than surface land measurements by climatologists since it has been corroborated by balloon data and comprehensively measures water surface temperatures that are not covered by thermometers. Yet there is concern and much research being done to see why the land measurements taken at the surface and deduced from the air are not congruent. The "heat island effect" may or may not be disproven, but mysteries remains. In February 1998, a new satellite is being launched that is supposed to more accurately read land measurements—with luck this part of the debate will be settled with a cycle of readings.

The satellite data is the major thorn in the side of the alarmists. An attempt to discredit the satellite readings as inaccurate due to equipment turnover appears to have been effectively rebutted in Science. Another argument, recently made by Katie McGinty for the White House, is that the satellite data is not measuring for the area where life exists and thus is secondary. However, even surface temperatures have been flat for a decade, the water surface areas only measured by

satellite show no warming for two decades, and the General Circulation Models that form the basis of the IPCC report assume that satellite data is a linear amplification of land surface temperatures.

So what is the alarmists' argument? Robock argues that the General Circulation Models show that real warming should have occurred (in the range of the IPCC report, the high end being where the precautionary principle comes into play), but countervailing weather events such as El Nino and the Mt. Pinatubo volcano have masked the theoretical warming from higher CO2 concentrations and feedback effects.¹ Robock crucially believes that the models are performing sound *ceteris paribus* runs and that other subtle measures of warming can be found. He believes the recent weather showing underwarming could be reversed at any time as countervailing factors reemerge.

Robock also referred to the IPCC "consensus" and turned to the precautionary principle with reference to the recent study by the World Resources Institute on how the transition to lower carbon levels in energy supply would be much less costly than estimates show (more on this later). He also gave examples of how environmental activism turned out to be right for the wrong reasons or more right than expected going in.

The debate boils down to **feedback effects** that the models are debating. Michaels questions the General Circulation Models that crucially assume positive feedbacks with water vapors and clouds since the same models again and again are contradicted by data. The models have three major deficiencies at present: computing power, the lack of reliable data points, and the unknowns of atmospheric physics—all of which need much more money and time to solve. The newer models, however, are showing less warming than older models but still continue to overestimate actual temperatures, Michaels argues. He believes that what we know—beginning with the data—works against the assumption that the feedback mechanisms are reinforcing. He cites evidence that the feedbacks are neutral or even negative—suggesting more of a self-regulating system that we know.

The IPCC 2001 report will focus on feedback effects, an issue that gets very complex quick. But the scientific momentum seems to be shifting toward clouds and water vapors as **not** amplifying the warming. If the science becomes more certain toward the skeptics in this area, then we would be able to better explain the data record, and the "crisis" scenario would recede. (Note: the water vapor effect in the IPCC models alone *doubles* the CO2 effect.)

The Precautionary Principle and Cost Issues

Enter the precautionary principle. If either the data showed unambiguous warming, or the models showing hypothetical warming were reliable (today's models cannot accurately predict weather several days out, Dr. Frank complained to me), the precautionary principle would have a much stronger case for proactive mitigation measures. However, the precautionary principle is being stretched with both *the data* and *the model uncertainty* leaning the other way. This is what the Republicans and economy-sensitive Democrats are going to stress again and again and again against Clinton-Gore and the environmentalists.

A Commerce Department study released by the White House on July 16th that showed that a \$100/ton carbon tax by the year 2010 would increase natural gas prices 66% and reduce consumption 20% and increase electricity prices 29% and reduce usage by 12% (the press reports state 1990 for the output base; the price increases may or may not be keyed off of 1990). With 1996 data, electricity generation falls 25% and gas production drops nearly 40%. Coal is the

¹ The sulfate aerosol theory of why warming was not showing up, where sunlight was being reflected back to the sky, advanced by James Hansen and others, has reportedly been abandoned.

hardest hit with its current \$13/ton price quadrupling to \$52/ton and output falling 35%. (I don't understand the elasticity of demand assumptions in the model, but this is what the report says.)

The White House considers these estimates as high since taxation and not trading is assumed in the model, and warming activists are turning to a recent study by Robert Repeto of the World Research Institute for much lower estimates. Repeto's analysis, however, has some debatable assumptions, four of which caught my eye with a quick reading.

- it assumes that CO2 abatement will result in major health and wealth gains since all the bad effects of a major warming are avoided;

Comment: This begs the science, the starting point of the debate that is far from settled. Minor warming over long periods of time beneficially "greens" the planet and would have to be a "cost" of abatement in this analysis. On the other hand, other emissions reductions from CO2 abatement should count as a positive.

- it assumes that the revenue raised by carbon abatement is offset by tax reductions elsewhere and has the "double dividend" of taxing "bads" in place of "goods."

Comment: Public choice analysis suggests that a new revenue source will create expenditure pressure (such as foreign aid for climate change initiatives). Even assuming initial revenue neutrality, carbon taxes can be expected to decline over time as it has its intended effect of reducing carbon emissions, forcing a return to the prior tax structure.

- renewable energies such as wind and solar are almost competitive with fossil fuels and are closing the gap

Comment: The competitive gap of these renewables is very substantial both with surplus power from sunk-cost coal facilities that produce 2¢ per kWh electricity and with new gas-fired plants that produce 3¢ per kWh power. Carbon abatement will not only increase fossil-fuel electricity prices, it will significantly increase renewable energy prices that disproportionately reflect infrastructure electricity costs compared to fossil fuels. Resources for the Future will estimate the price effect on renewable energy under a proposed project but cannot ball park it for me now.

- it does not include the administrative cost of carbon regulation

An international carbon treaty requiring a world carbon police effort has costs that no regulatory effort has ever seen before outside of the illegal drug trade. These "deadweight" costs are wholly separate from the participant costs of carbon taxes or emissions credits. The regulatory costs of the U.S. SO2 trading program, where monitors are on the smokestacks, is very clean and simple compared to what a world program would look like.

Implications for Enron

The upside for Enron from carbon abatement policy includes:

- gas-for-coal substitutions;
- an emerging market for renewables;

- CO2 trading revenue

The downside for Enron has been less focused on. It includes:

- lower netback prices for oil and gas production for EOG;
- higher prices and lower quantity consumed for natural gas, negatively affecting pipeline throughput and trading volumes; and
- higher prices and lower quantity consumed for electricity, negatively affecting trading volumes and creating a potential "political problem" for major retail providers; and
- higher renewable infrastructure costs to continue the competitive problem with fossil-fuel and nuclear capacity.

If we could get decent assumptions, a very interesting financial analysis for the corporation could be done. With big retail assumptions, carbon abatement might be more neutral than we now think.

The Beginning--Not the End--of Global Regulation

I'm really editorializing here, but many in the free market community see carbon activism as the first step toward international environmental planning. Just when central economic planning is dead, here comes global environmental planning. It is feared that a severe *regulatory dynamic* will be created that few are focusing on right now since we are still in the blackboard phase where only the best of intentions and the optimal plans are in play.

The following is not hard to imagine:

- an international regulatory infrastructure created for carbon control ventures into new areas such as population control, biodiversity, etc.
- international trade and capital flows become tightly regulated depending on compliance with international carbon accords;
- international tensions and conflict are created (the "eco-imperialism" problem);
- carbon emissions, not meeting plan (which is a virtual certainty), require a number of corrective measures such as international forestation initiatives and efficiency mandates; and
- a black market in energy is created in the developing countries, where wood and dung are substituted for grid power to work against carbon abatement and cause greater compliance costs and lifestyle regulation.

Policy activism to abate carbon is a huge issue not only for Enron but for every employee as investors and participants in the Houston, state, national, and international economies. If there was ever a situation where a company should look not only at its own competitive situation but the general welfare of "good public policy," beginning with the science and ending with unintended consequences, this one is it.

cc: T. Thorn, J. Palmisano, B. Stram