



Climate Change: The Urgency, Impacts, and Solutions

The debate is over on whether global climate change is occurring and on the role that humans play in the warming of the planet. Global scientific consensus has concluded that global warming due to human activities is having impacts worldwide well beyond warmer temperatures, and is occurring at a faster rate than predicted. Building new fossil fuel and nuclear power plants will not effectively address this urgent problem. Renewable technologies can reduce emissions more quickly, at equal or lesser cost, and without the burdens of these conventional energy sources.

THE EVIDENCE

It is a fact that our planet is warming and human activity is the primary cause. A recent report by the U.S. National Academy of Sciences - commissioned by the Republican chair of the House Science Committee for the sole purpose of settling the global warming debate - found that the past 25 years have been warmer on average than any period in the past 400 years and possibly in the past 1000 years.¹ According to the report, greenhouse gas concentrations in the upper atmosphere are also the highest they have been in at least 400,000 years and continue to rise.² The National Academy report concluded that, "Earth's warming in recent decades has been caused primarily by human activities that have increased the amount of greenhouse gases in the atmosphere."³ The Intergovernmental Panel on Climate Change (IPCC) - a group of respected global scientists organized by the UN to study the issue in depth - has independently come to these same conclusions, along with The American Meteorological Society, the American Geophysical Union, and the American Association for the Advancement of Science (AAAS). In a study of 928 articles published in peer-reviewed scientific journals between 1993 and 2003, not a single one disagreed with the consensus view that climate change is occurring.⁴

The sense of urgency that global climate change must be addressed is similarly widespread. In February 2006, researchers from NASA and the University of Kansas announced that the melting of the Greenland ice sheet has doubled in the past ten years.⁵ The chairman of the IPCC stated at the January 2005 UN Conference on Small Island States in Mauritius, "We are risking the ability of the human race to survive."⁶ British Prime Minister Tony Blair called climate change "the single biggest long-term problem" facing his country and his top governmental scientist upped the ante calling climate change, "the biggest danger humanity has faced in 5,000 years of civilization."⁷

Failure to take immediate steps to reduce greenhouse gas emissions will make stabilizing atmospheric concentrations extremely difficult in the future and will greatly exacerbate the impacts of global warming.⁸ Because of the longevity of greenhouse gases, impacts of the current levels will be felt well into the next century. Feedback loops are also a problem. For instance, 90% of the sunlight hitting snow and ice is presently reflected away from the earth, keeping the surface temperature lower than it otherwise would be. As this snow and ice melts with higher temperatures, sunlight will hit dark ocean water and land instead, which absorbs 90% of its energy, further increasing the Earth's temperature. Similarly, as permafrost melts in the Arctic, carbon dioxide and methane from decaying plant matter will be released in to the atmosphere in enormous amounts, spiking carbon dioxide levels.⁹ Scientists are just beginning to understand these feedback mechanisms, and some have posited that there is a rapidly approaching tipping point, beyond which certain catastrophic affects will be unavoidable and irreversible.¹⁰ That tipping point is expected to be soon - perhaps in the next ten to fifteen years.

THE IMPACTS

Unprecedented changes are already occurring worldwide. Scientists have recorded the melting of the Greenland and Antarctic ice sheets, shrinking of the mountain ice caps in the Andes and equatorial Africa, retreating glaciers, the bleaching of coral reefs, and an increasing number of intense hurricanes.¹¹ According to the National Climatic Data Center, the first half of 2006 was the warmest in the continental U.S. since record-keeping began in 1895, and the sixth-warmest for the world as a whole.¹²

Global warming is expected to impact every part of the globe in a variety of ways. The Earth is expected to warm by approximately 2-6 C° or 3.6-10.8 F° in the next century, melting land ice and expanding warm water.¹³ As a result, sea levels are predicted to rise approximately 0.1 to 0.9 meters, or 4 inches to 3 feet. Changes in the medium to high end of this range would inundate more than

10,000 square miles of currently dry land in the United States,¹⁴ destroy one-half of our wetlands, submerge 1/6 of Bangladesh and all of many Pacific islands,¹⁵ and result in seawater intrusion into groundwater.¹⁶ 13 of the world's 15 largest cities lie on coastal plains.¹⁷ Even worse, if the Greenland ice sheet were to completely melt, sea levels would rise 21 feet, flooding the homes of 1 billion people.¹⁸

In addition to flooding due to rising sea levels, coastal areas will experience more severe storms and surges due to warmer ocean temperatures.¹⁹ Hurricane Katrina in August 2005 was a preview of the type of storm which will become much more frequent, as hurricanes near the end of the 21st century are expected to be stronger with significantly greater precipitation than those under current climate conditions.²⁰

General climate patterns are also expected to change, with increases and decreases in precipitation ranging from 5-20%.²¹ In addition to the above-mentioned flooding impacts, droughts are expected to increase worldwide along with heat waves, stressing agricultural production and increasing wildfires. In terms of human health, air pollution will increase with higher temperatures because smog forms when pollutants mix with sunlight and heat, and the spread of infectious diseases, such as malaria, will accelerate due to increased habitat for mosquitoes and other vectors.²²

Carbon dioxide (CO₂) – the principal greenhouse gas released by human activity – is also dissolving into the oceans, increasing the water's acidity, and particularly damaging coral and other shelled plankton. The list of expected impacts goes on and on.

SOLUTIONS

The effects of global warming depend largely upon the energy path we take. Solutions will include changes both in electricity production and transportation. For electricity, the current plan to build new coal and nuclear power plants in the U.S. will not be effective at halting global warming and will only make other problems worse. Of the 153 newly proposed coal plants, most are in addition to existing coal plants – not replacing older plants – and almost all will continue to emit large amount amounts of CO₂, as well as sulfur, nitrogen oxides and mercury. Even if plants are built with carbon sequestration technology, there are likely to be problems with CO₂ leakage and contamination, and coal mining will continue to pollute soil and ground water.

Likewise, the proposal for more than twenty new nuclear reactors in the U.S. – while releasing fewer greenhouse gas emissions than coal – would come with its own set of problems. Building new reactors requires polluting uranium mining, the generation of radioactive waste, and increased proliferation, accident, and terrorist risks. No country in the world has found a solution for these problems. Proposals for new reactors, licensing, and construction together also require long lead times, at best 10 years, and would be expensive. Already wind power at good sites in the U.S. is significantly cheaper than power would be from new nuclear power plants.²³

Moreover, conventional technologies such as coal and nuclear power have costs that are unaccounted for in our present economic models, such as carbon emissions, air pollution, degradation from

mining, the safety and security risks posed by commercial reactors, risks from nuclear weapons proliferation, and the dangerous legacy of radioactive waste. When these costs are accounted for in the price of conventional technologies, there are better and faster solutions to climate change.

Renewable energy sources – such as wind, solar, advanced hydroelectric power, and geothermal heat pumps – can better meet U.S. electricity needs in the coming decades. This can be done without carbon emissions, destructive mining, or the production of radioactive waste. While non-hydro renewables presently provide just 2.3% of electricity in the U.S., according to studies from Stanford University, the National Renewable Energy Laboratory (NREL), and the Energy Foundation, *it is technically feasible for a diverse mix of existing renewable technologies to completely meet our electricity needs by 2020.*²⁴ In fact, as much as 20% of U.S. electricity could immediately come from non-hydro renewable energy sources without any negative effects to the stability or reliability of the electrical grid. Over the longer term, improvements to the grid can be made, and renewable technologies could supply increasingly higher percentages.

A recent analysis by the International Energy Agency (IEA) - an intergovernmental body of twenty-six countries committed to advancing security of energy supply, economic growth, and environmental sustainability- concluded that *intermittency is not a technical barrier to renewable energy.*²⁵ To deal with variability and intermittency,²⁶ IEA recommends distributed generation, links across geographic areas, a diverse mix of technologies harnessing different resources, and the continued development of storage technologies. Significant progress is being made in these areas.

For transportation, fundamental technology changes are slightly further off, but improvements in fuel economy standards could be made now and would have a significant impact in reducing oil use. Using design improvements and existing hybrid technology, average fuel economy standards for passenger cars could easily exceed 100 miles/gallon and be commercialized within the next decade.²⁷ In combination with the use of some local sustainable biofuels, this would serve as a transition to a completely hydrogen and electricity based transportation system.

For more details on how renewable energy can meet U.S. needs in the coming decades see:

<http://www.citizen.org/documents/RenewableEnergy.pdf>.

To find out what you can do locally and at the state level, please see:

<http://www.citizen.org/documents/WhatCanYouDoRenewable.pdf>

For the documents referenced in this fact sheet, please see

http://www.citizen.org/cmep/energy_enviro_nuclear/renewables/articles.cfm?ID=15779

Updated September 2006
Public Citizen's Energy Program
Phone: (202) 588-1000
cmep@citizen.org
www.energyactivist.org