

Is it Getting Warm in Here?

Clarifying the Climate Change Debate

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“It is beyond global warming at this point. It’s cooking... and you see people in shorts and you say ‘please don’t wear those.’”

– Robin Williams

This year, you’ll hear nearly every candidate running for any kind of national office – president, senate or representative – talk about dealing with climate change. They’ll comment on how important the issue is and how we have to control greenhouse gases and find new sources of energy.

What they say will probably sound pretty good – they are politicians after all – but here’s a little backgrounder that can help you think through just how much to trust what they have to say and to help you evaluate which one is most likely to tackle this problem in ways you think will work.

Here’s what we have for you:

The Fix We’re in Now

The basic facts – the very least you need to know to get a grip on this issue

So What’s the Plan?

Three different directions the country could go in, complete with important pros and cons for you to think about (and argue with someone else about if you like)

Quotes to Consider

Americans don’t agree on much these days – certainly not how to cope with climate change. Here are what some influential Americans have to say on the topic – quick and to the point

Starting Statistics (and Ones You Need to Know)

You can let the numbers do the talking with our quick set of charts and graphs that will help you understand a lot more about what’s at stake, what’s possible and what’s pie in the sky

THE FIX WE'RE IN

The big argument over climate change used to be whether we really needed to worry about it – whether the climate was heating up, whether global warming was real. There are a few doubters left (and they are a pretty cranky lot), but nearly everyone else – scientists, elected officials, even the companies that produce oil, coal and gas – now accepts the reality of global warming. Most governments and leaders around the world have accepted this as well, including the United Nations, the European Union and, after some initial doubts, President Bush.

So what's the debate now? Well, what to do about it. How can we make sure that climate change is as moderate and gradual as possible, and how do we adapt to the changes that are already taking place. Here's what you need to know:

■ “Greenhouse gases” like carbon dioxide come from the kinds of fuel we use most – namely, oil (which is mostly used for gasoline, diesel and jet fuel) and coal (almost all of which is used to produce electricity). Since people in the U.S. and around the world are burning more of these so-called fossil fuels, greenhouse emissions have also increased – they’re already 35 percent above what they were before the Industrial Revolution.

■ The Earth is getting warmer – global temperatures have risen a full degree Fahrenheit in the last century. And the warming trend is speeding up, with seven of the eight hottest years recorded occurring since 2001. An overwhelming majority of scientists have come to believe these two facts are connected, that human activities, especially the use of fossil fuels that give off carbon dioxide, are the major cause of this warming trend.

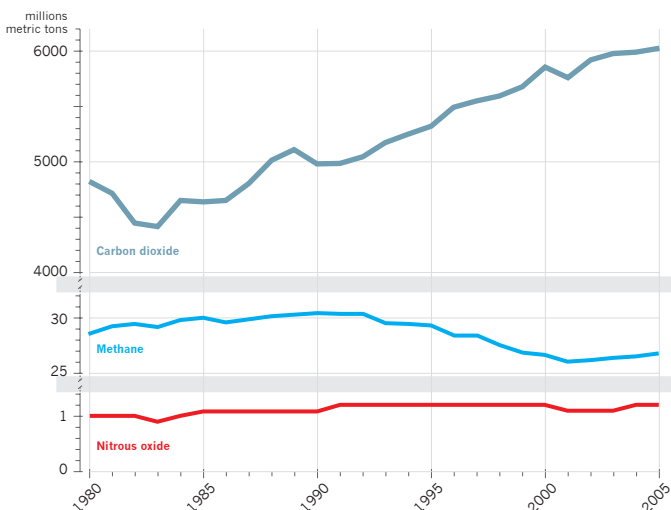
■ The potential impact of global warming is nothing to sneeze at. A degree or two of global warming might seem minor, but it's definitely not. Melting polar ice and glaciers cause coastal flooding in places thousands of miles away. This can devastate communities, especially in poorer countries. Crops that once thrived can fail causing economic upheaval. Miserable insects and diseases flourish in places that didn't have them before. Many scientists also predict an increase in extreme weather – fiercer hurricanes, tornados, and flooding – not to mention many more really bad summer heat waves.

U.S. emissions of greenhouse gases

Emissions of greenhouse gases, 1980 — 2005

Note: Emissions of hydrofluorocarbons, perfluorocarbons and sulfur hexafluoride also considered “greenhouse gases,” were less than .05 million metric tons of gas per year from 1980 to 2005

Source: ‘Emissions of Greenhouse Gases, 1980-2005,’ Annual Energy Review 2006, Energy Information Association



“When I heated my home with oil, I used an average of 800 gallons a year. I have found that I can keep comfortably warm for an entire winter with slightly over half that quantity of beer.”

— Dave Barry

THE FIX WE'RE IN

■ We can slow down this warming trend by cutting back on greenhouse gas emissions, but the impact probably can't be stopped or reversed. In other words, it's a question of how much temperatures rise, not whether they rise. But the less they rise the easier it'll be to cope.

■ To reduce greenhouse gas emissions, we'll need to look for alternative fuels and ways to use fossil fuels as efficiently as possible. If you get 50 miles per gallon when you drive, you'll do less environmental damage than if you only get 20 miles per gallon. Less fuel used, fewer emissions.

■ It helps to focus on which fuels produce greenhouse gases and which don't. Oil and coal, yes. Nuclear, solar and wind power, no. Natural gas, which is also a fossil fuel, does produce some greenhouse gas emissions, but it's not nearly as damaging as the big two.

■ As a country, we're also going to have to adapt to the likely impacts of climate change, including extreme weather, crop changes and new diseases. We're also going to have to adapt to reduce greenhouse gases and get our energy from cleaner sources. The question is how, exactly, that happens.

Sources: Intergovernmental Panel on Climate Change, Climate Change 2007 Synthesis Report, Summary for Policymakers [http://www.ipcc.ch/pdf/assessment-report/ar4/syr/ar4_syr_spm.pdf]; U.S. Climate Change Science Program, [<http://www.climatechange.gov>]; Climate Change Site, U.S. Environmental Protection Agency, [<http://www.epa.gov/climatechange/index.html>]

“The college idealists who fill the ranks of the environmental movement seem willing to do absolutely anything to save the biosphere, except take science courses and learn something about it.”

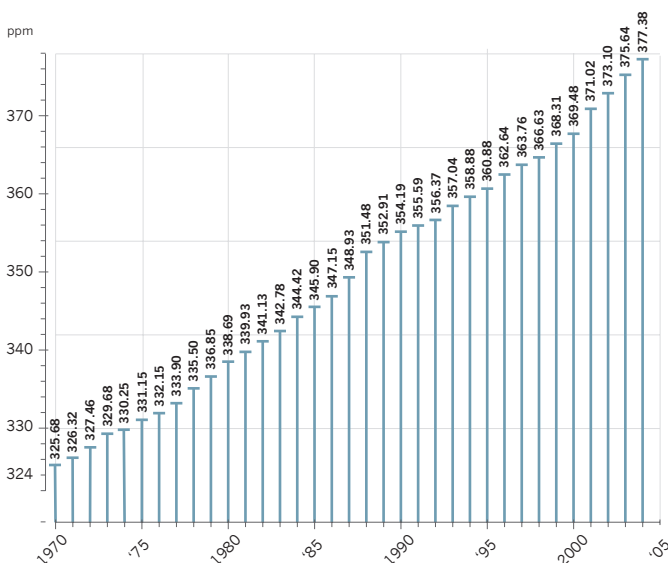
— P.J. O'Rourke

Atmospheric concentration of carbon dioxide

Atmospheric CO2 concentrations in parts per million, 1970 — 2004

Note: Carbon dioxide is considered a greenhouse gas.

Source: Atmospheric carbon dioxide record from Mauna Loa, May 2005, Carbon Dioxide Information Analysis Center (CDIAC)



HOW WE GOT HERE

You know the old joke: “everybody talks about the weather, but nobody does anything about it.” That’s just fine if we’re talking about your typical rainy day, but with global climate change, not doing anything about it could mean big trouble. The Earth’s atmosphere is heating up because of an accumulation of greenhouse gases in the atmosphere. These gases (mainly carbon dioxide, CO₂ and methane, CH₄, if you want to pull out your periodic table from high school chemistry) are released when we burn fossil fuels like oil, coal and natural gas for transportation, heating and cooling, manufacturing and so on. Another major producer of greenhouse gases is the burning of rain forests in Latin America, Indonesia and elsewhere. Cows also produce methane when they eat and digest their food, but it might be wise to leave the details of that aside. We’ll confine ourselves to the human causes here.

So what do greenhouse gases actually do? They trap heat closer to the Earth, the same way having a thick blanket on your bed at night traps heat close to your body. Since the Industrial Revolution began, humanity has been piling on the blankets. We’ve built our civilization on the power generated by fossil fuels like coal and oil. Those fuels have given us a dramatically better standard of living, but they also add to the greenhouse gases in the atmosphere. For the past 150 years, the average temperature of the Earth’s atmosphere and oceans has been rising, and lately this seems to be speeding up. For example, the eleven hottest years on record have all occurred since 1995.

Carbon dioxide levels are now approximately 40 percent higher than they were at the start of the Industrial Revolution, and they have reached levels not seen in the atmosphere in 20 million years. Scientists say that unless we curb global warming emissions, average U.S. temperatures could be 3.2 to 7.2 degrees higher by the end of the century.

GREENHOUSE EFFECT: Changing the World’s Climate

3. Atmospheric Concentrations of Carbon Dioxide Are Increasing

Roughly half of the CO₂ produced from chemical reactions is retained in the atmosphere.

4. The Rays of the Sun Pass to Earth

Shortwave radiation from the sun, which is not affected by the CO₂ buildup passes through the atmosphere to Earth’s surface.

5. Carbon Dioxide and Other Greenhouse Gases Trap Earth’s Heat

Longer wave infrared heat radiated from Earth is partially absorbed by greenhouse gasses. As the concentration increases, more heat is trapped.

2. Burning Fuel Produces CO₂

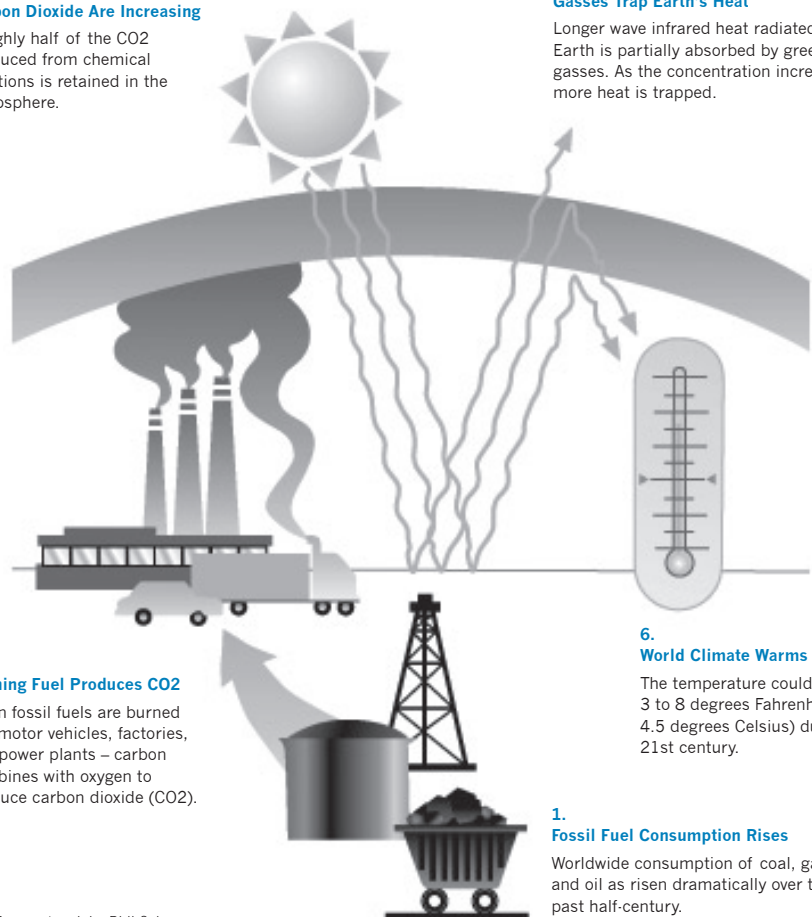
When fossil fuels are burned – in motor vehicles, factories, and power plants – carbon combines with oxygen to produce carbon dioxide (CO₂).

6. World Climate Warms

The temperature could increase 3 to 8 degrees Fahrenheit (2 to 4.5 degrees Celsius) during the 21st century.

1. Fossil Fuel Consumption Rises

Worldwide consumption of coal, gas, and oil has risen dramatically over the past half-century.



Adapted from artwork by Phil Scheuer.

WHAT COULD HAPPEN?

A 3.2 to 7.2 degree rise in temperature may not sound like much, at least to those who aren't scientists. But this could have devastating consequences.

Here's what worries scientists:

Coastal Flooding.

A growing concern is that the large ice sheets of Greenland and West Antarctica will likely melt more quickly in the future, accelerating the rise in sea levels and threatening many coastal communities. The Dutch, much of whose land is already below sea level, are so concerned they have begun experimenting with floating houses.

Extreme Weather.

Many scientists believe that the increase in heat waves, episodes of extreme rainfall and the intensity of hurricanes may be related to global warming – and that we can expect harsher weather if the warming trend is allowed to continue.

Droughts.

Rising temperatures may increase the number of droughts, which will in turn affect food crops across the globe. Many scientists are warning that we may already be seeing agricultural problems as a result of global warming.

Economic and Social Instability.

Problems like coastal flooding, extreme weather and crop failures all impact the economy and social stability. People who live in coastal areas may be displaced or have to deal with repeated flooding. Extreme weather like hurricanes and tornadoes destroys homes and businesses, sometimes entire communities. Droughts and crop failures lead to food shortages and rising prices.

Problems like these are devastating anywhere. Keep in mind that when it comes to coping with these catastrophic events, the United States is better off than many countries. We've got money and technical savvy to adapt. The consequences in other poorer parts of the world, like Africa, could be much worse.

Naturally with consequences like these, the better part of valor is to do whatever can be done to slow the process of climate change and try to hold it to levels that we can adapt to. The overwhelming majority of scientists warn that we cannot afford to wait and see what happens. We can't take that doubt about specifics as a reason to sit on our hands and hope that the problem resolves itself.

Since it's called global warming, the U.S. obviously isn't the only player here. So far, the U.S. has been reluctant to join international agreements on climate change such as the Kyoto Protocol which sets binding targets for reducing greenhouse gas emissions. President Bush proposed a plan for voluntary reductions instead and the Senate objected to the fact that the Kyoto treaty does not set targets for emerging economies like China and India. One hundred and eighty one countries have signed and ratified the treaty, and although the U.S. has not, many states and cities in the U.S. have passed resolutions endorsing its terms.

(Continues on next page)

"Oooh, so Mother Nature needs a favor?! Well maybe she should have thought of that when she was besetting us with droughts and floods and poison monkeys! Nature started the fight for survival, and now she wants to quit because she's losing. Well I say, hard cheese."

**– Montgomery Burns,
"The Simpsons"**

WHAT COULD HAPPEN?

So how is the U.S. doing compared to other countries?

Many European nations like Britain and France, and Japan as well, have acted much more aggressively on cutting emissions. They rely more on nuclear power and natural gas than we do and rely much more on mass transit and rail.

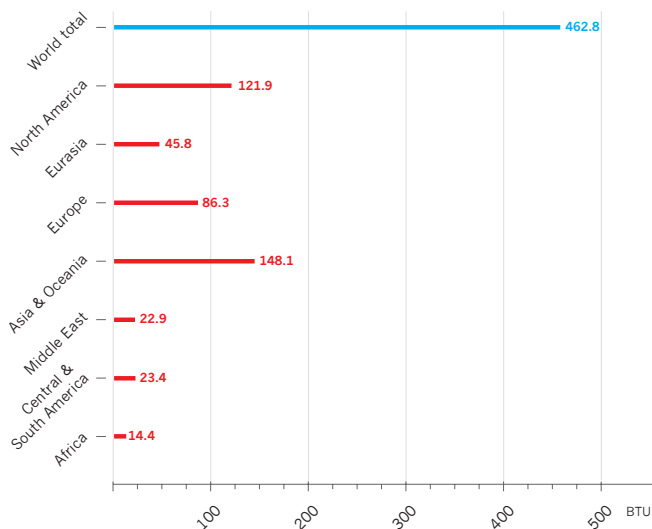
The story is mixed in developing countries, especially the economic powerhouses like China and India. Because their economies are growing so rapidly, they use much more energy and produce more greenhouse gases than they have in the past. At the same time, they have the chance to start fresh with cleaner and more efficient technologies if they can be persuaded to do so.

With China and India producing more greenhouse gases these days, some believe these countries deserve more of the blame for global warming. But it's not really so clear who is guiltiest. Global warming stems from accumulated gases in the atmosphere, so industrialized countries like the U.S. and those in Europe have played a major role in creating the problem since oil and coal have been the centerpieces of their economies for decades now.

International energy consumption

Per capita consumption of energy, in million British thermal units (BTU), 2005

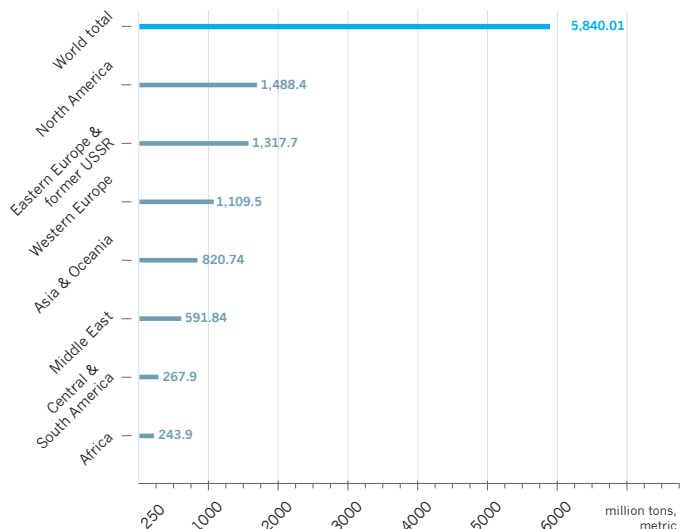
Source: "International Energy Annual: 2005," September 2007, Energy Information Administration



International carbon dioxide emissions

Per capita carbon dioxide emissions, in million metric tons, 2005

Source: "International Energy Annual: 2005," July 2007, Energy Information Administration



SO WHAT'S THE PLAN?

There are different ways to think about this issue, and here we outline three alternative plans concerning the best way to address the problem of global warming.

The Three Approaches in Brief:

Choice One:

The top priority is reducing the amount of greenhouse gases released into the atmosphere. We need decisive national and international action to do this.

Choice Two:

The top priority is adapting to the effects of global warming. It's too late to prevent global warming, so we should prepare our country and others worldwide to deal with the problems it will cause.

Choice Three:

The top priority is unleashing the power and ingenuity of the free market to search for solutions. Putting too much reliance on government will make the problems worse, not better.

Origins of greenhouse gases

Note: Engineered chemicals do not occur in nature

Source: Energy Information Center, U.S. Department of Energy

GREENHOUSE GAS	ORIGIN(S)
Carbon Dioxide	• Combustion of fossil fuels, such as petroleum and coal
Methane	• Byproduct of natural gas and coal production • Waste management • Agriculture (livestock)
Nitrous Oxide	• Agriculture (nitrogen-based fertilizer) • Energy consumption (mainly automobile use) • Chemical manufacturing and waste water treatment
Hydrofluorocarbons*	• Automobile air conditioners
Perfluorocarbons*	• Aluminum production
Sulfur Hexafluoride	• Insulators for circuit breakers and other electrical equipment

* engineered chemicals, not naturally occurring

CHOICE ONE: CUT GREENHOUSE EMISSIONS AS QUICKLY AS POSSIBLE

We need to cut greenhouse emissions and change our energy use as quickly as possible to prevent the worst consequences of global warming.

What's most needed now is strong government action both here and abroad to dramatically cut the production of greenhouse gases, shift to new energy sources and prevent as much of the damage global warming would otherwise cause as possible. Therefore, we should:

Increase conservation and fuel efficiency by:

- Substantially raising fuel-economy standards for new cars and giving tax incentives to drivers who choose fuel-efficient hybrids and smaller cars.

- Raising the gas tax to encourage people to move to more fuel-efficient cars and reduce their driving to essential travel. Use the revenues to fund research and development of alternative energy.

- Enacting a "carbon tax" on industrial emissions to encourage businesses to reduce their greenhouse gases.

- Passing construction codes in places that require new buildings to be more energy-efficient.

- Investing in energy-saving public transportation and rebuilding the country's rail system for commercial shipping.

Change our energy sources by:

- Stop building coal-fired power plants, which put out a lot of greenhouse gases, and aggressively shift to cleaner energy sources that are already available, like natural gas and nuclear power.

- Investing in research on solar, wind and other technologies that "capture" greenhouse gases from smokestacks and "store" them so that they are relatively harmless to the environment.

Take a leading role in international efforts by:

- Signing the Kyoto treaty and joining other international efforts to reduce greenhouse gases through policies that put limits on what any country can produce in the way of carbon emissions.

- Providing aid to developing countries in the form of know-how and resources that help them industrialize with clean energy.

Arguments for this approach:

- There is no time to lose. The longer we wait, the harder it will be to change. We need to start moving away from our dependence on fossil fuels as quickly as feasible.

- Alternative forms of energy are the wave of the future. The U.S. will lose out environmentally and economically by clinging to the technologies of the past. Other countries have done more to reduce their greenhouse gas emissions, and their economies have not suffered dramatically.

Arguments against this approach:

- The U.S. has a huge investment in its highways, trucking systems, private auto travel and coal-powered electricity. It will take decades to rebuild and retool our systems.

- Putting taxes on larger cars like SUVs and on gasoline will penalize people who need bigger vehicles and have to drive long distances.

- Businesses will pass their higher energy costs onto customers, leading to higher costs for nearly everything.

CHOICE TWO: ADAPT TO THE INEVITABLE CHANGES

Given how far global warming has already advanced, and given the cost and disruption involved in shifting away from fossil fuels, the wisest course is to figure out how the United States can adapt to the tough problems climate change will inevitably cause. Therefore, we should:

Adapt society to harsher weather conditions by:

- Enacting new building codes to make our cities more weather- and flood-proof.
- Providing subsidies and tax breaks to farmers to help them switch to different crops and methods that can better survive climate disruptions.
- Developing new dams, seawalls and flood control systems to minimize the impact of higher water levels on cities likely to be affected.

Discourage people from living in areas that are likely to be hard-hit by floods and wildfires by:

- Ending federal flood insurance, which encourages building in coastal areas.
- Providing tax incentives that encourage people who live in coastal and other flood-prone areas to move to less vulnerable regions.
- Giving government the power to bar development on extremely vulnerable coastland and riverbanks. These areas could be better used for parkland.

Increase federal funding for:

- Scientific research into such areas as: how to develop local food crops that can adapt to harsh weather conditions, controlling tropical diseases and pests, and high-level monitoring systems including satellites to help track weather patterns, crop failures, pest contagions, etc.
- Financial and technical aid for developing nations to adapt to these extreme conditions which are likely to be more devastating in their regions.

Arguments in favor of this approach:

- This approach applies the country's resources toward the most important issue – how to handle emergencies that will likely result from global warming.
- This focuses on what we can do in our own country rather than trying to get other countries to reduce their greenhouse gas emissions.
- This approach uses government to protect health and safety, not to legislate what drivers and businesses do.

Arguments against this approach:

- This approach does almost nothing to curb the release of greenhouse gases, which means that climate change could get even worse. We could damage the Earth irretrievably.
- The government would be telling people where they can and can't live, not to mention what kinds of buildings they can live in. It would lead to a lot more regulation and red tape.

CHOICE THREE: USE THE FREE MARKET TO SEARCH FOR SOLUTIONS

The best thing we can do to address the challenges of global warming is to make sure the private sector has the information, freedom and incentives that will best allow businesses to respond to it. We can't let bureaucracy and politics get in the way of innovation. There's money to be made in "going green," and with the right help creative entrepreneurs will seize the opportunity. Therefore, we should:

Cut back on regulation and red tape that might inhibit businesses from responding to new opportunities in alternative energy by:

- Easing government regulations so that businesses can bring new, green technologies to market more quickly. Simplifying and expediting procedures for building nuclear power plants so environmental advocacy groups can't hold up development for years.

- Granting tax incentives to power companies to upgrade their plants to use new, cleaner technology.

- Creating incentives or tax breaks for businesses that "go green."

- Offering competitive "innovation" prizes for needed technology, such as ways to capture greenhouse emissions, store nuclear waste and develop better battery technology.

Encourage private sector research by:

- Providing tax breaks for businesses that explore new forms of clean energy.

- Supporting business-university partnerships that develop practical technologies for businesses to implement.

- Improving science and math education in U.S. schools to develop the next generation of engineers.

- Granting more visas for foreign scientists, engineers and other technical personnel to enter the U.S. so businesses have the highly skilled staff they need.

- Eliminating state-specific mandates that force businesses to develop different products and procedures for different localities.

Work toward international agreements that:

- Expedite the sale and distribution of green technologies that solve key problems such as capturing greenhouse emissions or the disposal of nuclear waste.

- Encourage international banks and multinational corporations to invest in green technologies for the developing world.

Arguments for this approach:

- Surveys of business leaders show that most recognize that there's money to be made in green technology. China and India will be in the market for energy-efficient technology, so the free enterprise system will be poised to respond.

- Relying on business solutions will avoid highly expensive government programs and the intrusive regulations and policies that restrict the freedom of businesses and consumers.

- Science comes up with solutions, but business is really the engine that brings technological change out of the laboratory and into daily life.

Arguments against this approach:

- The free market can't solve all our problems. After all, it was big businesses, in the form of energy and automobile companies (among others), that delayed action on the global warming issue for decades.

- By the time business has a strong enough profit motive to change the way it consumes energy, it will be too late to reverse global warming and avoid its most disastrous impacts.

- More and more business leaders themselves are calling for government action to require greater conservation and cleaner energy. Government action creates a level playing field so businesses that want to invest in cleaner energy won't be at a disadvantage.

QUOTES TO CONSIDER

Think everyone agrees on the problem and what to do about it? Here's a sampling of what some very different Americans have to say about the issue:



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'Today I challenge our nation to commit to producing 100 percent of our electricity from renewable energy and truly clean carbon-free sources within 10 years.'

— **Al Gore**, July 17, 2008



'There is no way the United States can hope to persuade China and India to adopt more environmentally friendly growth strategies without first acknowledging its own responsibility – and then doing something about it. At the same time, a carbon tax might finally convince the rest of the world that the United States does not aim to invade countries to preserve cheap oil.'

— **Kenneth Rogoth**, Foreign Affairs



Photograph by Remy Steinegger

'Unless the United States radically reduces its greenhouse gas emissions, along with other major emitters, the damage to the climate will be irreversible.'

— **Tony Blair**, Washington Post op-ed, May 29, 2008



'My message is that the evidence is sufficient that we should move towards the most effective possible steps to reduce carbon loading of the atmosphere. I think there has to be, if you will, a green conservatism.'

— **Newt Gingrich**



'Although debates continue over global warming, its causes and its impact, the consensus in the scientific community is that Earth is getting warmer and the emission of greenhouse gases, namely carbon dioxide, or CO₂, is largely to blame. American leaders have a responsibility to future generations to address this problem... Instituting a responsible cap and trade system will provide American businesses with the certainty they require to make sound investments for the future. ... By encouraging new technologies and alternative sources of energy, it will help reduce our dependence on oil from unstable parts of the world.'

— **Sen. Elizabeth Dole, R-N.C.**

The Voter's Survival Kit was written by Scott Bittle and Jean Johnson of Public Agenda, co-authors of "Where Does the Money Go: Your Guided Tour to the Federal Budget Crisis" HarperCollins, 2008. We had invaluable help from Andrew Yarrow, Jenny Choi, Francie Grace, Aviva Gutnick, Peiting Chen and David White.

Public Agenda is a nonprofit, nonpartisan organization working to strengthen our democracy's capacity to tackle tough issues. We want to ensure the public's views are represented in decision-making and that citizens have the tools and information they need to grapple with the critical challenges of the day. We conduct public opinion research, we run public engagement programs around the country, and we run this Web site to give both citizens and leaders the information they need to know.

Our voter guides are designed to help you make sense of what politicians are saying, at least when it comes to the critical issues facing our country. We lay out some key facts along with different points of view about how to address the issue. Each comes with some potential costs and tradeoffs – because every plan has both pros and cons, and a voter should face both honestly. Public Agenda isn't pushing a particular solution, so whatever you decide is okay with us. But it'll be easier to judge the candidates once you've considered where you want the country to go in the next four years – and what you're willing to do to get there.

Funding for the Voter's Survival Kit was provided by the Carnegie Corporation of New York.

You can find out more about Public Agenda at www.publicagenda.org.



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Some of the key sources for Is It Getting Warm in Here Are:

Climate Change 2007 Synthesis Report, Summary for Policymakers, from the Intergovernmental Panel on Climate Change

This is the result of the United Nations' effort to bring together scientists from around the world to make the best possible assessment of the problem. Very detailed, very precise and carefully phased.

http://www.ipcc.ch/pdf/assessment-report/ar4/syr/ar4_syr_spm.pdf

Analyses of the Effects of Global Change on Human Health and Welfare and The Effects of Climate Change on Agriculture, Land Resources, Water Resources, and Biodiversity in the United States, from the U.S. Climate Change Science Program

Compiles the U.S. government's research on this issue, from many different federal agencies

<http://www.climate-science.gov/Library/sap/sap4-6/final-report/>

<http://www.climate-science.gov/Library/sap/sap4-3/default.php>

Climate Change Site, from the U.S. Environmental Protection Agency

Excellent resources for a general audience

<http://www.epa.gov/climatechange/index.html>

Annual Energy Outlook and other resources from the U.S. Energy Information Administration

The statistics section of the Energy Department, with all the data you'd ever want on energy use in the United States.

<http://www.eia.doe.gov/>



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