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TO: Interested Parties

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RE: Another Inconvenient Truth: Solving Global Warming and Energy Security Requires Nuclear Power

Introduction and Summary

It's on the cover of news magazines and has become a daily staple in newspapers. It's brought pictures of swimming polar bears, melting glaciers, and grassy Alpine ski slopes. It's helped garner an Academy Award and a Nobel Prize nomination for *Al Gore*.

Climate change is, well, hot. It is widely discussed, and not just at the policy level—it's become water-cooler talk and Oprah fodder. It has even made its way into a Bush State of the Union address, albeit for less than a sentence and for the first time ever in 2007. And a *Drudge Report* headline screams "Tomorrow's Forecast: Chaos" in response to a major new scientific report on climate change.

We count ourselves among the convinced. Climate change could be among the greatest existential threats that humanity has ever known.

To address this pressing problem, there are a range of options available to policymakers and the public, including reliance on alternative fuels and conserving energy use to mandating controls on carbon emissions. Many of these ideas are worthy of strong support or at least serious consideration. This is a huge, many-sided problem, and it requires a broad, multifaceted set of solutions.

However, few in the environmental community or their allies in policymaking have championed—indeed, most have actively opposed—the one climate change solution that can make a substantial difference in the near term: nuclear power. This raises a serious problem—there does not seem to be a realistic path to resolving climate change that does not significantly expand nuclear energy, but most of those at the frontlines of fighting climate change have not yet embraced it. We must resolve this contradiction if we are to confront global warming effectively.

In this paper, we argue that nuclear energy in America is one important key to solving the global warming crisis—not just in terms of reducing dangerous emissions, but in breaking the logjam in the public domain over climate change.

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Of course we are aware that there are outstanding issues or questions regarding nuclear energy, particularly with regard to waste storage and plant safety. But the flipside of that equation is that some of the other technologies and ideas being offered as solutions to climate change are too small, costly or far off. We cannot allow any large-scale potential fixes to be taken off the table. If, indeed, the existence of the earth as we know it hangs in the balance, we are confident that nuclear safety and waste issues can be resolved to most people's satisfaction.

This memo makes the case for why progressive policymakers and activists should support nuclear power expansion in the United States. We offer three reasons:

1. Expanding nuclear power will make a difference in addressing the problem of global warming.
2. Embracing nuclear power by progressive leaders would have a galvanizing impact on the public, demonstrating the severity of the climate change problem and the need for everyone to make hard choices.
3. Moving forward efficiently on nuclear power could help provide momentum to take additional steps to curb carbon emissions.

1. Expanding Nuclear Power Can Help Fight Global Warming

The facts are quite simple, and they speak for themselves: nuclear power is the only mature, major source of electric power in the United States that is essentially carbon-free.[†] In 2005, nuclear power made up 19 percent of our energy mix and prevented 3.32 million tons of sulfur dioxide, 1.05 million tons of nitrogen oxide and *681.9 million tons of carbon dioxide* emissions in the United States alone.¹

But that is today. US electricity demand is predicted to rise by 45% by 2030. That means 350,000 megawatts of new generation capacity must be built to meet that demand. Unless this country changes course, coal will constitute a larger share of new power generation than it would otherwise.²

One reason is that growth of domestic nuclear power production had, until very recently, totally stalled. There are currently 103 licensed reactors[‡] in the US, at 65 plant sites in 31 states. Most have gotten or will get 20-year license extensions from the Nuclear Regulatory Commission (NRC). But no new nuclear power plants have been brought online since 1996, and since 1973, every new plant order—totaling more than 100—has been cancelled. Moreover, industry consolidation has meant that fewer firms are operating nuclear plants.³

[†]A full—or even an abbreviated—discussion of American or global power usage and its current and potential future impact on climate change is well beyond the scope of this memo. Moreover, we do not discuss in detail the growth of nuclear power in other parts of the world. Rather, we offer a few basic facts about domestic nuclear power and global warming that advocates and policymakers should have at their fingertips.

[‡] TVA is seeking to restart another reactor (Browns Ferry I) sometime this year.

There is some good news of late—the 2005 Energy Policy Act provides various incentives which support currently operating plants and encourages future construction. Since the 2005 law was passed, 13 companies have filed licenses with the NRC to build as many as 31 new reactors.⁴

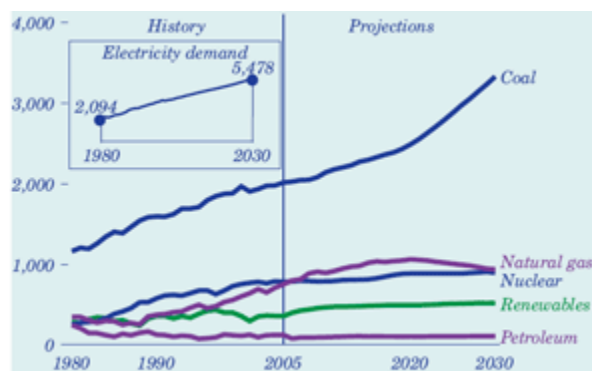
But the growth in nuclear production is not without controversy—serious debates relating to nuclear waste and plant safety continue. Still, we think the risks are worth taking. America has grappled with a nuclear waste dilemma for decades—it is a serious and currently unsolved problem, but we believe it can be managed safely in the short term and handled effectively in the long term.

As for plant safety, there is simply no such thing as completely risk-free power, and nuclear is no exception. That being said, our nuclear sites are some of the most fortified, well-protected industrial spaces in the nation. The industry’s security is regulated and closely watched by on-site federal inspectors and overseers, and the FBI has categorized nuclear plants as “difficult targets.” Furthermore, a new generation of plant design and technologies has made nuclear facilities more efficient, safe and less costly than in the past.⁵

Yet despite good safety records and a recent resurgence in interest in new reactors, on its current trajectory, total nuclear generation is projected to grow from 780 billion kilowatt-hours in 2005 to only 896 billion kilowatt-hours in 2030 (that is, if the new reactors cited above come on-line). Even with this projected increase, the nuclear share of total electricity generation is expected to *fall* from 19 percent in 2005 to 15 percent in 2030. We would need another four plants (for a total of 35 new plants) simply to maintain nuclear power’s current piece of the US energy pie.⁶

So from a global warming perspective, the American energy production outlook is not great now, and, without substantial change, it is projected to get much worse, as this chart demonstrates:

Electricity Generation by Fuel, 1980–2030 (billion kilowatt-hours)



Source: Energy Information Administration, Annual Energy Outlook 2007 with Projections to 2030 <http://www.eia.doe.gov/oiaf/aeo/index.html>

That, in our view, is an unacceptable outcome. We must face the reality that a growing population and evolving technology will place ever-increasing demands on our energy production. We believe that policymakers and advocates should set as a general goal that we expand non- or low-carbon sources, such as nuclear, wind, solar, and “clean coal,” to meet much of the new demand for power that our expanding nation and modern life require. As a specific and measurable target, we should aim to advance nuclear energy to a point where it provides for 25 percent of America’s energy. This is an ambitious but achievable goal; unless we get closer to it, meeting increased energy needs while dealing with the reality of climate change is probably a pipe-dream.

2. Embracing Nuclear Power Can Help Rally the Public on Climate Change

Recent public opinion polling reveals a seeming paradox: Americans believe that global warming is real, but they don’t feel any urgency about dealing with it.

A Pew poll in January found that 77% of Americans believe there is solid evidence of global warming, and the same number believe global warming is a very serious or somewhat serious problem.⁷ But another Pew poll of global attitudes found that only 19% of Americans who had heard of global warming expressed a great deal of personal concern over the issue, the smallest percentage of any country in a survey of 15 nations. And climate change ranks 20th out of 23 in Pew’s annual list of policy priorities (only 38% rank it as a top priority).⁸ Another January poll found that less than half of respondents said global warming worries them “a great deal” or “a good amount.”⁹ In short, awareness of climate change is high, but urgency—and demand for government action—is low.

In part, this is because the solutions that many offer seem incommensurate to the scope of the problem. For example, almost no one disagrees that we should use more solar power, but solar makes up 1/30th of 1 percent of current US power usage. It is a very important but very small part of a near- or even mid-term solution. We simply must have more mature, low-carbon power generation methods if we are to address this issue aggressively over the next several decades.

One glaring problem is the failure on the part of leading climate change advocates—from most environmental groups to leading Members of Congress—to support the only existing, mature energy source that can almost immediately help save our planet from catastrophic climate change. Consider what the three largest US environmental groups are still saying about nuclear power:

[I]t is completely unacceptable that the U.S. government is pushing for more nukes when most of the rest of the world is saying “so long.”¹⁰

– **Greenpeace**

Unfortunately, the nuclear power industry in its present state suffers from too many security, safety, and environmental exposure problems and excessive costs to qualify as a leading means to combat global warming pollution.¹¹

– Natural Resources Defense Council

The Sierra Club opposes the licensing, construction and operation of new nuclear reactors utilizing the fission process ...¹²

– Sierra Club

Clearly, the mainstays of the movement still have not even lost their hostility to nuclear power, much less acknowledged the role that nuclear power can play a major part of the solution to global warming.

And despite what some are calling a “nuclear renaissance” that is pegged to the climate issue and rising power needs, anti-nuclear forces have worked hard to muddy the waters. For example, the following polling question was asked on a survey by the Civil Society Institute:

Experts have proposed a range of long-term and short-term solutions to the energy crisis and the threat posed by global warming. Some solutions—including solar energy and wind power—are already in place and would be expanded in the near-term. Others—such as increased conservation—could start immediately. Still others—including nuclear power and hydrogen fuel cells—would take a decade to put in place, or longer. What is your view of the best way for America to proceed? Would you say... the energy and global warming problem is happening now. We need most of the emphasis placed on immediate and near-term solutions that will deliver fast results or we need most of the emphasis placed on solutions that will deliver results a decade from now or later?

Not surprisingly, 62% of respondents to this sharply slanted and misleading question said we need to take action now. Never mind that solar and wind are not mature power generation techniques and simply *cannot* provide “near term solutions” to our CO₂ problems.

Many advocates have taken this approach, attempting to keep the debate fixed solely on conservation and renewable sources. And no one denies that both are crucial to addressing the problem of global warming—a solution is impossible without real shifts in public behavior and a huge increase in our investment in renewable energy.

But we believe that by talking only about conservation and renewable energy, advocates have undercut the seriousness of their own argument on climate change. The American public may not know much about base-load capacity, but they understand that we are not going to get out of our CO₂ problem by relying solely on wind farms or geothermal power at this point in time. And they may be reluctant to make hard changes in their own lives—or demand policy fixes to climate change—until environmentalists start making some tough choices too.

Indeed, if advocates were to embrace nuclear power, which many have spent their careers fighting, it would help prove to the public that a dramatic shift in our thinking as a nation is required when our way of life or very existence may be at risk.

Some individuals in the movement have begun doing precisely that. The most prominent is Greenpeace Founder Patrick Moore, who told Congress:

If nothing is done to revitalize the American nuclear industry, the industry's contribution to meeting US energy demands could drop from 20 percent to 9 percent. What sources of energy would make up the shortfall? Very likely, the US would turn to an even greater reliance on fossil fuels.¹³

And in an editorial last year, Dr. Moore put the fundamental point quite plainly: "Nuclear energy is the only large-scale, cost-effective energy source that can reduce these emissions while continuing to satisfy a growing demand for power. And these days, it can do so safely."¹⁴

Patrick Moore is not alone—a few other movement leaders, and some environmental advocates in Congress—have begun to come to this conclusion. They include Stewart Brand, founder of *The Whole Earth Catalog*, and Hugh Montefiore, former Chairman of Friends of the Earth. Senator Barbara Boxer, one of the staunchest environmentalists in Congress and Chair of the Environment and Public Works Committee, recently noted the trend toward nuclear on her committee and has signaled a possible shift in her own thinking about nuclear power as it relates to climate change.¹⁵

Some of the groups are starting to come around as well. Environmental Defense calls nuclear power one of many "wedges" to be used in attacking global warming, and they note that if "the unresolved concerns can be answered satisfactorily, however, nuclear power may one day have the potential to be a factor in slowing the emissions that contribute to global warming. For that reason, it is worth pursuing continued research."¹⁶

The public appears ready for this change. A January 2007 poll by UPI of nearly 7,000 Americans found that 62 percent agree that new nuclear plants should be built.¹⁷ This is precisely the same percentage of Americans that an *LA Times* survey last summer found would support "the increased use of nuclear power as a source of energy in order to prevent global warming."¹⁸

The data are clear: Americans understand that climate change is real, and they are ready to embrace nuclear power as one piece of the long-term solution. But the public will need to hear from environmental advocates to seal the deal.

3. Moving Forward Efficiently on Nuclear Power Can Help Provide Momentum to Fight Carbon Emissions

One important reason that nuclear power production stalled in the 1990s involved the extraordinary inefficiencies built into the system. Every new plant was required to

have its own unique design, leaving this nation with a patchwork of different reactors, using different parts and procedures. This massively drove up costs of construction and made operation and maintenance much more expensive and difficult, because parts were not interchangeable and personnel had to learn a new plant every time they went there. By contrast, countries like France, which draws 78 percent of its power from nuclear energy, built essentially the same two plants throughout the country.

Thankfully, the United States seems to have learned a lesson from that experience, and it now seems standardized reactor design will be the way of the future for domestic production of nuclear power plants. This will not only reduce the costs of construction, operation and maintenance, it will improve training, efficiency and, ultimately, safety.¹⁹ Furthermore, many new reactors will be built where plants already exist, further increasing efficiencies and reducing start-up and construction costs.

Other efficiencies were built into the 2005 Energy Policy Act, which is helping to fuel some resurgence of nuclear power development in the US. Still, more needs to be done. Both to deepen the impact that nuclear power itself can have on US emissions and to demonstrate to the public that we can make real progress on climate change, policymakers must ensure that new nuclear power plants can be constructed safely, affordably and efficiently.

There are other reasons as well to push for a resurgence of nuclear power. First is energy security. While the United States has almost unlimited quantities of coal, we are becoming increasingly dependent on others for fuels like natural gas. The public is acutely aware of America's need for great energy security, and reducing our dependence on natural gas for power generation would both boost that security and make gas more affordable for consumer heat and industrial uses. Since 2000–2001, wholesale prices for natural gas have jumped as much as three-fold, largely as a result of the growth in the use of natural gas for electric generation that began in the 1990s. This has cost thousands of Americans their jobs as companies shutdown, lay off employees, or move their production overseas where natural gas is far cheaper. It has also raised the cost of natural gas to a point where many families cannot afford to heat or cool their homes.

Below we offer a number of policy suggestions to better ensure that nuclear energy plays an important role in addressing America's future energy needs:

Set-up a Competent Energy Loan Guarantee Office in DOE

A key provision in the 2005 Energy Policy Act is the establishment of a loan guarantee program for the construction of new electricity power plants that reduce, sequester or altogether avoid carbon emissions. Nuclear, renewable energy such as wind and solar, as well as "clean coal" technologies, all qualify under this program.

Loan guarantees are important in nuclear power, because the cost of building a nuclear plant can cost as high as \$2–\$6 billion,²⁰ an astronomical sum for many of the

companies that will make initial investments. Moreover, these loan guarantees are self-financing, meaning that the private sector underwrites what it costs the federal government to provide the credit of the loan guarantee.²¹

This office was finally appropriated money as part of the 2007 Continuing Resolution that was passed in February of this year. We encourage the Department of Energy to set this office up without delay, and we urge policymakers to continue to provide the necessary funds to run the office in the years to come.

Raise the Loan Guarantee Ceiling

DOE, via regulations, states that no more than \$5 billion in loan guarantees can be provided for the entire program in FY2007. Given the high capital costs of just one nuclear plant, this ceiling should be raised to allow more plants and spur new technology, not just in the nuclear arena, but also for renewable energies and clean coal efforts.

Provide Sufficient Resources to the NRC for New Reactor Applications

As noted above, there are already pending applications to build as many as 31 new reactors. These applications require rigorous review by the NRC. As such, the agency should be provided with the appropriate resources, staff and authority necessary to carry out their duties in a timely and professional manner.

Continue Funding for the Nuclear Power 2010 Program

Congress should continue to fund the Nuclear Power 2010 program, a public/private partnership in which new sites for nuclear plants are being identified, new technology is being tested, a business case for the building of new plants is being mapped out and untested regulatory processes are being sampled.²²

Help Mitigate Regulatory Risk

One major disincentive for companies looking to build new nuclear plants is the threat of unmitigated regulatory risk. In the past, plants were often delayed after approval had been given and even once construction had begun, causing costs to skyrocket and projects to be abandoned. An uncertain regulatory environment dissuades companies looking to build new plants and hampers investment in new plant development. Congress and the Administration should work with the nuclear industry to help mitigate the risk of excessive delays.

Include Nuclear in New Climate Change Proposals

Even though we are just at the beginning of the 110th Congress, various and competing pieces of legislation dealing with climate change have already been introduced. Speaker Pelosi has even appointed a special committee to deal with the issue. While the proposals differ in scope, most of them define methods of electricity generation that should be encouraged, usually by designating renewable and other "clean" sources.

Some of these proposals purposely omit nuclear from the mix, and this is wrong. By leaving nuclear out, lawmakers are dealing a major economic blow to the only carbon free source of energy that is immediately poised to combat climate change and are muddying their arguments about the necessity of tough choices and actions to combat the threat of global warming.

Help Secure a Workforce Talent for the Nuclear Industry

Any expansion of nuclear power requires more people knowledgeable in nuclear sciences. Funding for programs like the University Reactor Fuel Assistance and Support Program, which provides scholarships, research funding and overall support for nuclear education programs at the undergraduate and graduate level, is essential to ensuring that people take up careers in the nuclear industry. The workforce needs, however, are not limited to the college educated. The industry also needs a large number of highly skilled laborers. These workers require specific trade knowledge related to the construction and maintenance of nuclear power plants. Local governments and unions should work with the nuclear industry to develop adequate training programs and partnerships for these jobs that pay well above local prevailing wages.

Conclusion

On March 9, 2007, at a meeting of European Union heads of state, leaders made a commitment to reducing greenhouse gas emissions to 20% below 1990 levels, and stated explicitly that nuclear would be a part of the mix as a non-carbon source of energy. It is time for leaders in the United States to speak that plainly, both in making a commitment to reducing emissions overall and in embracing nuclear as a significant part of that effort. With "earth in the balance," as Al Gore once wrote in his visionary book of the same name, strong action and hard choices are required of everyone, and this is one that we believe progressive leaders of all stripes must take.

Endnotes

¹ Nuclear Energy Institute: Quantifying Nuclear Energy's Environmental Benefits Fact Sheets (www.nei.org)

² Energy Information Administration, *Annual Energy Outlook 2007 with Projections to 2030* (<http://www.eia.doe.gov/oiaf/aeo/index.html>)

³ Mark Holt, CRS Issue Brief, *Nuclear Energy Policy*, updated Mar. 15, 2006

⁴ Nuclear Energy Institute. Energy Loan Guarantees: An Important Financing Tool for New Nuclear Power Plants Fact Sheet (www.nei.org). To view a listing of new plants and their status, visit <http://www.nei.org/index.asp?catnum=2&catid=344>

⁵ According to the Energy Information Administration, over the past 10 years nuclear power facilities have increased output by some 25 percent because of the decreased number of plant shut downs and accidents. See Jean Chemnick, "Cap and Trade May Become Energy's Stock in Trade", *The Politico*, Apr. 10, 2007.

⁶ Standard & Poor's, *Why U.S. Utilities Are Seeing Nuclear Power in a New Light*, Jan. 9, 2007 (www.standardandpoors.com/ratingsdirect)

⁷ Survey Pew Research Center, conducted Jan.10-15, 2007; 1,708 respondents. Retrieved from <http://people-press.org/reports/display.php3?ReportID=303>

⁸ Survey by Pew Global Attitudes Project, conducted Apr. 2006; 1,001 respondents (U.S. sample). Retrieved from <http://pewglobal.org/reports/display.php?ReportID=252>

⁹ ABC News/Washington Post Poll, conducted Jan. 16-19, 2007, 1001 respondents.

¹⁰ Greenpeace Website (Issues: Nuclear) (<http://www.greenpeace.org/usa/campaigns/nuclear>)

¹¹ NRDC Issue Paper, *Commercial Nuclear Power* (Oct. 2005), p.2 (<http://www.nrdc.org/nuclear/power/power.pdf>)

¹² Sierra Club Conservation Policies: Nuclear Power (<http://www.sierraclub.org/policy/conservation/nuc-power.asp>)

¹³ Dr. Patrick Moore, PhD, Statement before the US Senate Committee on Energy & Natural Resources, Apr. 28, 2005.

¹⁴ Patrick Moore, "Going Nuclear: A Green Makes the Case", *The Washington Post*, Apr. 16, 2006 (p. B-1).

¹⁵ David Whitney, *Showdown on Nuclear Waste Storage*, *The Sacramento Bee*, Dec. 19, 2006 (p. A3) ("I am a pragmatist," Boxer said. "The vast majority of the members on my committee support nuclear power, and so do the majority in the Senate. So my focus is on safety, security and research, because I don't think there is any question that we are going to be seeing new plants.").

¹⁶ Environmental Defense, Q&A on Nuclear Power (<http://environmentaldefense.org/article.cfm?contentID=4470>)

¹⁷ Survey by UPI/Zogby Interactive, conducted Jan. 16-18, 2007; 6,909 respondents (MOE +/- 1.2%), cited at <http://www.upi.com/ZogbyPoll/view.php?StoryID=20070126-054147-9603r>.

¹⁸ Survey conducted by the *Los Angeles Times*, July 28-August 1, 2006; 1,478 respondents (data provided by The Roper Center for Public Opinion Research, University of Connecticut).

¹⁹ See NRC, *New Reactor Licensing* (<http://www.nrc.gov/reactors/new-reactor-licensing.html>)

²⁰ Mark Holt, CRS Issue Brief, *Nuclear Energy Policy*, updated Mar. 15, 2006

²¹ Nuclear Energy Institute. Energy Loan Guarantees: An Important Financing Tool for New Nuclear Power Plants Fact Sheet (www.nei.org).

²² See U.S. Department of Energy, Office of Nuclear Energy, <http://np2010.ne.doe.gov>