ESSAY

ENERGY INDEPENDENCE AND GLOBAL WARMING

BY

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In this essay, Professor Pierce explains why we should stop talking about the unattainable and nonsensical idea of energy independence and instead have a serious discussion of potential methods to mitigate anthropogenic global warming. He explains why only a globally coordinated cap and trade system or a globally coordinated carbon tax has any realistic chance of mitigating the effects of global warming and why there is little reason to be optimistic that either approach will be adopted. To be effective, either would increase significantly the cost of oil, gas, and electricity to everyone everywhere, including in many countries and parts of the U.S. that are likely to experience greater prosperity as a result of global warming.

Policy making is often bedeviled by disconnects between public perceptions and reality. This problem is particularly acute today in the context of two public policy issues of central interest to readers of this journal: energy independence and global warming.

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I. ENERGY INDEPENDENCE

Every President from Richard Nixon through George W. Bush has urged the nation to achieve energy independence.[1] The United States has spent scores of billions of dollars pursuing various versions of "project independence," with no reduction in U.S. dependence on imported oil.[2] U.S. dependence on imported oil has increased steadily through each of the last eight administrations.[3] The pursuit of energy independence is one of the few national goals that attracts near unanimous support from politicians of both parties, as well as from virtually all journalists and members of the public.[4] Yet, I know of no expert on energy policy who thinks that pursuit of energy independence makes any more sense than pursuit of automobile independence, tomato independence, or underwear independence.

Last summer, a Wall Street Journal reporter asked half a dozen energy experts of widely varying political stripes to give their views on energy independence.[5] The views expressed ranged from "crazy" to "rhetorical nonsense" to "bumper sticker" politics.[6] I want to add my voice to that chorus. If we actually were to attain energy independence, it would come at a cost of several trillion dollars per year in reduced Gross Domestic Product (GDP), and we would obtain little or no benefit from such a suicidal effort.

Many people believe energy independence would have favorable effects on our ability to implement a sound foreign policy and on the likelihood that we will have to use military force. That belief is based on a serious misunderstanding of the relationship between energy and foreign policy. To illustrate the point, consider that we are extremely concerned about Iran today even though we have not imported one drop of oil from Iran in over fifteen years.[7] There are links between energy and foreign policy, but they are largely unrelated to U.S. dependence on imported oil. All fuels are traded on global markets. If the global supply of oil declines, the price of oil and other fuels will increase, and the U.S. economy will be adversely affected. That is true, however, whether the reduction in supply has any effect on sources of U.S. oil imports or has effects instead on sources of oil imports to Japan or Europe. It is also true whether the reduction in global oil supply occurs as a result of the latest upheaval in the middle east, civil disturbances

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[1] *See* Tom Kenworthy, *Energy Independence May be a Pipe Dream*, USA TODAY, Oct. 24, 2004, http://www.usatoday.com/news/politicselections/nation/issues/2004-10-24-energy-independence_x.htm (last visited July 15, 2007).

[2] *See* Donald Barlett & James B. Steele, *Why U.S. is Running Out of Gas*, TIME, July 13, 2003, *available at* http://www.time.com/time/magazine/article/0,9171,1101030721-464406,00.html.

[3] Timothy Wirth, C. Boyden Grey & John Podesta, *The Future of Energy Policy*, FOREIGN AFFAIRS, July-Aug. 2003, at 132, 134; ENERGY INFORMATION ADMINISTRATION, ANNUAL ENERGY REVIEW: ENERGY OVERVIEW 10–14 (2005), *available at* http://www.eia.doe.gov/emeu/aer/pdf/pages/sec1.pdf.

[4] Thomas Friedman, *The Energy Mandate*, N.Y. TIMES, Oct. 13, 2006, at A27.

[5] John J. Fialka, *Energy Independence: A Dry Hole?*, WALL ST. J., July 5, 2006, at A4.

[6] *Id.*

[7] Energy Information Administration, Total U.S. Crude Oil and Petroleum Products Imports from Iran, http://tonto.eia.doe.gov/dnav/pet/hist/mttim_nus-nir_2a.htm (last visited July 15, 2007).

in Nigeria, incompetence in Venezuela, pipeline corrosion in Alaska, or a hurricane in the Gulf of Mexico.

II. GLOBAL WARMING

While I would like to hear a lot less talk about energy independence, I would like to hear a lot more talk about global warming. Specifically, I would like to hear more meaningful discussion about what, if anything, we can, and should, do about global warming. There continues to be lively debate among politicians and in the general press about whether the anthropogenic global warming hypothesis is true, but little serious discussion of what the United States should do if it is true. I now rate the probability that the anthropogenic global warming hypothesis is true at around 90%—much higher than the probability I would have assigned it at the time of Kyoto. It is time to shift most of the public debate from whether anthropogenic global warming is real to what we should do about it.

Let me begin this discussion with a few estimates of the economic effects of global warming by two Yale economists. Robert Mendelsohn estimates that global warming will reduce annual output in North America by only 0.3%, an amount so small that it would justify only modest efforts to address the problem.[8] His colleague, William Nordhaus, estimates global warming will reduce annual global output by 3%—a staggering economic effect that would justify an aggressive and costly response.[9]

When you disaggregate the estimates of Nordhaus and Mendelsohn geographically, you begin to recognize the difficulty of choosing an appropriate response even if you accept Nordhaus's estimate of the devastating effects of global warming on the global economy. Both Mendelsohn and Nordhaus predict that some regions and countries will lose and others will gain as a result of global warming.[10] For instance, both predict that India and Africa will be major losers, while Russia will gain as a result of global warming.[11]

The details of the determinants of the economic effects of global warming are complicated, but some of the most important determinants are easy to understand. For example, India is a very hot, heavily agriculture-dependent country in which the level of agricultural production depends largely on the strength of the annual monsoon.[12] India's economy would be devastated by reductions in agricultural output attributable to temperature

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8 *Dismal Calculations*, ECONOMIST, Sept. 9, 2006, at 14–17; ROBERT MENDELSOHN ET AL., COUNTRY-SPECIFIC MARKET IMPACTS OF CLIMATE CHANGE 5 (1997), *available at* http://crgd.atmos.uiuc.edu/publications/market_impact/MarktImp.PDF.

9 *Dismal Calculations*, *supra* note 8, at 14; WILLIAM D. NORDHAUS & JOSEPH BOYER, WARMING THE WORLD: ECONOMIC MODELS OF GLOBAL WARMING 96 (2000).

10 *See* MENDELSOHN, *supra* note 8; *see* NORDHAUS & BOYER, *supra* note 9.

11 MENDELSOHN, *supra* note 8, at 6; WILLIAM D. NORDHAUS & JOSEPH BOYER, REQUIEM FOR KYOTO: AN ECONOMIC ANALYSIS OF THE KYOTO PROTOCOL 8–9 (1999), *available at* http://www.econ.yale.edu/~nordhaus/homepage/Kyoto.pdf.

12 *Indian Fears Over Monsoon Delay*, BBC NEWS, July 17, 2002, http://news.bbc.co.uk/1/hi/world/south_asia/2133629.stm (last visited July 15, 2007).

increases and changes in the pattern and strength of the annual monsoon.[13] By contrast, Russia is very cold. Its agricultural output would increase significantly as a result of increases in its average temperature. In addition, Russia would save many billions of dollars per year in reduced heating costs, and increased temperatures would provide improved access to the enormous natural gas reserves of Siberia.

Both Mendelsohn and Nordhaus predict only modest increases in U.S. GDP as a result of global warming—Nordhaus predicts a 0.5% increase in U.S. GDP, while Mendelsohn predicts a 0.1% increase in U.S. GDP.[14] Both also predict large variations in effects within the United States, with some regions and states losing a lot and others actually gaining.[15] Ironically, support for action to address global warming is much stronger in New England than in Oklahoma, even though global warming is likely to have net beneficial effects in New England and terrible effects in Oklahoma.

Estimates of the costs of taking the kinds of actions that would avoid global warming span a range as large as the range of estimates of the cost of global warming. For instance, Britain's House of Lords estimates that the cost of avoiding global warming would be a reduction of 0.2% to 3.2% of global output.[16] If you accept the high end of the British estimate of the cost of avoiding global warming and the Mendelsohn estimate of the cost of global warming, it would be economically rational to do nothing and allow global warming to take place. Even if you accept the relatively low Mendelsohn estimate of the economic cost of global warming and the high end of the British estimate of the cost of avoiding global warming, however, you might still support an aggressive and expensive effort to avoid global warming because of some of the non-economic costs of global warming. For example, a recent study by a respected scientist predicts that global warming will eliminate 15–37% of the species now on the planet,[17] and many studies predict that global warming will displace scores of millions of impoverished residents of the coastal areas of Bangladesh and Indonesia.[18]

Turning from the economics of global warming to the politics of global warming, the picture becomes even more complicated and even more gloomy. Many people in the United States who favor taking some action to address global warming believe "the answer" is for the United States to

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13 David Black, *The Rains May Be A-Comin*, 297 SCIENCE 528–29 (July 2002).

14 NORDHAUS & BOYER, *supra* note 9, at table 4-11; MENDELSOHN, *supra* note 8, at 15.

15 NORDHAUS &BOYER, *supra* note 11; MENDELSOHN, *supra* note 8.

16 1 HOUSE OF LORDS, SELECT COMMITTEE ON ECONOMIC AFFAIRS, THE ECONOMICS OF CLIMATE CHANGE 44 (2005), *available at* http://www.publications.parliament.uk/pa/ld200506/ldselect/ldeconaf/12/12i.pdf.

17 *Where the Wild Things Are*, ECONOMIST, Sept. 9, 2006, at 13. *See also* INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, CLIMATE CHANGE: IMPACTS, ADAPTATION, AND VULNERABILITY, SUMMARY FOR POLICYMAKERS 6 (2007), *available at* http://www.ipcc-wg2.org/index.html (predicting an increased risk of extinction for 20–30% of assessed species).

18 *E.g.*, S. Huq, S.I. Ali & A. A. Rahman, *Sea Level Rise and Bangladesh: A Preliminary Analysis*, 14 J. COASTAL RESEARCH 44–53 (1995); INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE, IMPACTS ASSESSMENT OF CLIMATE CHANGE: REPORT OF WORKING GROUP 2 (1990).

participate actively in the Kyoto accord.[19] That belief is mistaken. Even if the United States were to participate in the Kyoto accord, and even if every participant were to fulfill its commitment, the results would be trivial.[20] Action far more drastic than Kyoto is required to avoid global warming.

Most people who want to take the actions required to avoid global warming want to rely on some combination of increased energy efficiency and increased use of renewable resources to get us where we need to be.[21] That strategy would not be effective. In 2005, researchers at Oxford concluded that increased energy efficiency and increased use of renewables cannot alone achieve the necessary reductions.[22] They urged Great Britain and the European Union to adopt other strategies that are more promising, specifically including an effort to maximize the construction of nuclear power plants.[23]

A few months later, researchers at Harvard concluded that, while an all-out nuclear plant construction program would be a step in the right direction and might be sufficient in Europe, it too would not be adequate on a global basis.[24] They concluded that the capacity of the nuclear construction industry is too limited to allow countries like India and China to meet their rapidly increasing demand for electricity with new nuclear power plants alone.[25] The Harvard researchers concluded that only "clean coal" plants can simultaneously satisfy the increased demand for electricity in India and China and allow the world to achieve the needed reduction in emissions.[26] They defined "clean coal" plants as those that incorporate sequestration of carbon dioxide.[27] We know little about the cost of sequestration yet, but most estimates are that it will add over 50% to the per unit cost of generating electricity in a coal-fired plant.[28]

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19 United Nations, *Kyoto Protocol to the United Nations Framework Convention on Climate Change*, U.N. Doc FCCC/CP/1997/7/Add.1, 37 I.L.M. 22 (Dec. 11, 1997).

20 NORDHAUS & BOYER, *supra* note 9, at 163–68.

21 *E.g.*, Press Release, Greenpeace, IPCC Report Completes Scientific Jigsaw Puzzle (May 4, 2007), *available at* http://www.greenpeace.org/usa/news/ipcc-report-lays-out-options.

22 Malcolm Keay, *CO_2 Emissions Reduction: Time for a Reality Check?*, OXFORD INST. FOR ENERGY STUD. (2005), *available at* http://www.oxfordenergy.org/comment.php?0502.

23 *See id.* (noting sustainable energy sources will only negligibly reduce carbon emissions while also noting only nuclear power has achieved any material reductions); *see also* Malcolm Keay, *Wind power in the UK: Has the Sustainable Development Commission Got it Right?*, OXFORD INST. FOR ENERGY STUD. (2005), *available at* http://www.oxfordenergy.org/pdfs/comment_0605.pdf (criticizing a Scottish plan to build wind farms while phasing out nuclear power generation); Jeremy Watson, *Experts Show Official Wind Power Claims are Hot Air*, THE SCOTSMAN, Feb. 27, 2005 (reporting on the Oxford report and the Scottish Administrative reaction).

24 *See generally* Jonathan Shaw, *Fueling Our Future*, 108 HARV. MAGAZINE, May-June 2006, *available at* http://www.harvardmagazine.com/on-line/050692.html; *see also* MASS. INST. OF TECH., THE FUTURE OF COAL: AN INTERDISCIPLINARY MIT STUDY (2007), *available at* http://web.mit.edu/coal/The_Future_of_Coal.pdf [hereinafter MIT STUDY].

25 *See generally* Shaw, *supra* note 24.

26 *Id.*

27 *Id.*

28 MIT STUDY, *supra* note 24, at 130, table A-3.C.7.

Are the leaders of India and China willing and able to persuade their citizens to pay 50% more than the present market price for electricity? I am skeptical. Both countries are now engaged in a concerted effort to try to satisfy their citizens' demands for below-market price electricity by locking up fuel supplies at below-market prices all over the world.[29] I am confident those misguided efforts will fail, but it is hard to imagine either country making the transition from pursuit of a national strategy of locking in below-market energy prices to a national strategy of paying 50% more than the present market price of energy any time in the near future.

So what can, and should, we do about global warming? There is a broad consensus on three issues.[30] First, an effective global warming effort must be global in scope. We may not have to persuade Malawi and Mauritious to participate actively, but no effort can be successful unless it involves the active participation of all major nations, including the United States, China, India, and Russia. Any effort that excludes major nations would be an expensive exercise in futility. It would yield more geographic redistribution of emissions than reduction of emissions.[31]

Second, command and control regulation would not be effective for this purpose. An effective command and control system would be prohibitively expensive to implement.[32] We must choose instead between a globally-coordinated carbon tax and a global cap and trade system of the type pioneered at present by the Kyoto participants. Unlike a rigid and archaic command and control system, either a cap and trade system or a globally-coordinated carbon tax has the potential to induce billions of individual contributors of global warming gas emissions all over the world to adopt voluntarily the most cost-effective combinations of increased energy efficiency, use of renewables, and other technologies that do not generate global warming gases, such as nuclear power plants and clean coal power plants that include carbon sequestration.

Nordhaus has argued persuasively that a globally-coordinated carbon tax is far more promising than a global cap and trade system.[33] Nordhaus anticipates several serious problems with any global cap and trade program. Such a program would require nations to make coordinated decisions about emissions baselines that would be difficult or impossible to make.[34] It would create so much uncertainty about the future prices of emissions permits that trade in permits would be severely impaired.[35] A global cap and trade system would also produce highly volatile energy prices and be characterized by transactions costs

29 *See, e.g.*, Peter Goodman, *Surging Coal Prices Sour Energy Investment in China*, WASH. POST, May 3, 2005, at E01; Hubert Reineberg, *India's Electricity Sector in Transition: Can Its Giant Goals Be Met?* 19 THE ELEC. J. 77 (Jan./Feb. 2006).

30 *Where to Start*, ECONOMIST, Sept. 9, 2006, at 23–24.

31 If major nations decline to participate, many carbon-dioxide emitting activities will relocate to those nations over time.

32 *See generally* William D. Nordhaus, *After Kyoto: Alternative Measures to Control Global Warming*, 96 AM. ECON. REV. 31, 31–34 (2006).

33 *See id.*

34 *See id.* at 32–33.

35 *See id.* at 33.

so high they would impair its efficacy.[36] Finally, Nordhaus fears a global cap and trade system would be plagued by pervasive corruption.[37]

All of those problems can be avoided by implementing instead a globally-coordinated carbon tax. Nordhaus also points out a globally-coordinated carbon tax has the additional advantage of responding to each nation's fiscal needs.[38] This is a particularly important advantage to the United States. The Federal Reserve Board has identified our present large structural budget deficit as our most serious long-term economic problem.[39] No one knows how much longer we can sustain our present level of deficit spending, but everyone agrees we must reduce the deficit soon. That can be accomplished only through some combination of increased taxes and reduced spending. A large carbon tax would allow us to get our fiscal house in order without having to make the politically and economically painful decisions to increase income taxes or reduce spending.

Many politicians and business leaders prefer a cap and trade system to a carbon tax, but those preferences are based on dubious reasoning. Many politicians prefer cap and trade because it allows them to avoid the dreaded "t" word. They either do not realize, or prefer to ignore, the reality that cap and trade imposes a "tax" that is functionally identical to a carbon tax. Either mechanism can be effective only by increasing the price of carbon-dioxide emitting activities by the same large amount. The difference lies in the identity of the entities receiving the increased revenues attributable to that price increase. In the case of a carbon tax, governments receive those revenues. In the case of a cap and trade system, the holders of the emissions permits receive the added revenues.[40] That, of course, is why many business leaders favor cap and trade. They hope to obtain massive additional revenues attributable to the emissions permits the government allocates to them.

By now, the extreme difficulty of the political task of persuading citizens and politicians all over the world to agree to take the actions needed to respond effectively to global warming is clear. When President Clinton attempted to persuade Congress to enact a Btu tax that would have added only a few pennies to the cost of hydrocarbons, his proposal was pronounced dead on arrival in the Senate.[41] It is hard to imagine what it would take to persuade Congress and the public to accept a carbon tax that would have to

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36 *See id.* at 33–34.

37 *See id.* at 34.

38 *See generally id.* at 31, 34.

39 *See, e.g.*, Associated Press, *Benjamin Bernancke warns of 'vicious cycle' in deficits*, MSNBC, Jan. 18, 2007, http://www.msnbc.msn.com/id/16688089/ (last visited July 15, 2007).

40 Industrial consumers emitting large quantities of carbon dioxide have made many millions of dollars as a result of the European Union's adoption of a cap and trade program. *See* David Gow, *Power Tool*, GUARDIAN UNLIMITED, May 17, 2006, *available at* http://environment.guardian.co.uk/climatechange/story/0,,1829568,00.html; OPEN EUROPE, THE HIGH PRICE OF HOT AIR: WHY THE EU EMISSIONS TRADING SCHEME IS AN ENVIRONMENTAL AND ECONOMIC FAILURE (2006), *available at* http://www.openeurope.org.uk/research/ets.pdf.

41 Steven Greenhouse, *Moynihan Predicts a Deal on Bigger Energy Tax*, N.Y. TIMES, July 12, 1993, at A18.

be at least twenty times the magnitude of the Clinton proposal to be effective. And, a carbon tax is the least expensive means of responding effectively to global warming. A cap and trade system would be more expensive, and a command and control system would be much more expensive.

This leads logically to a discussion of the third prerequisite for effective action to address global warming. There is a broad consensus that the actions required to address global warming effectively are possible only if the United States takes a leadership role in persuading the rest of the world to take the painful actions necessary to address the problem. It is obvious President Bush is not willing to assume such a leadership role,[42] but there is reason for optimism that his successor of either party may be willing to take that responsibility.

The conditions could not be worse for U.S. success in leading such an effort at present, however. U.S. credibility and persuasive power in the community of nations is at its lowest ebb at any time since the 1960s, and prospects for obtaining broad international agreement on any major issue are the worst they have been since the 1930s.[43] The next President of the United States will have to devote most of her or his energy to restoring U.S. credibility and to avoiding the "clash of civilizations" that Samuel Huntington warned us about a decade ago.[44]

Is there any chance of convincing every major nation to bear a share of the massive cost of avoiding global warming? I am not confident that anyone has persuasive powers that effective. The political obstacles look even larger when you recognize that some major countries, like Russia, will benefit from global warming. Who is going to undertake the task of persuading Russian citizens they should volunteer to incur large costs to avoid a phenomenon that would benefit most of them?

I do not know what will happen in the global warming debate, but I am confident of two things. First, it is a debate worth having, given the extraordinarily high stakes. Second, most of the readers of this journal will spend a high proportion of the rest of their professional lives participating in disputes that are related in some way to the global warming debate. The Supreme Court's five-to-four decision in *Massachusetts v. EPA*[45] marked the beginning of a legal struggle that will match the U.S. civil rights struggle of the sixties in its importance and intensity.

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42 *See, e.g.*, Mark Hertsgaard, *While Washington Slept*, VANITY FAIR, May 2006, at 200.

43 *See, e.g.*, Nancy Snow, *Anti-Americanism and the Rise of Civic Diplomacy*, FOREIGN POLICY IN FOCUS, Dec. 13, 2006, *available at* http://www.fpif.org/fpiftxt/3795.

44 SAMUEL P. HUNTINGTON, THE CLASH OF CIVILIZATIONS AND THE REMAKING OF THE WORLD ORDER (1997).

45 127 S.Ct. 1438 (2007).