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The New Energy Geopolitics?: China, Renewable Energy, and the "Greentech Race"

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INTRODUCTION

> [W]e can't stand by as we let China race ahead to create the clean energy jobs and industries of the future. We should be developing those renewable energy sources, and creating those high-wage, high-skill jobs right here in the United States of America.—President Barack Obama, July 27, 2010[1]

In a recent article, I discussed whether China could meet its ambitious targets for renewable energy deployment.[2] Since the Renewable Energy Law went into effect in 2006, the Chinese government has implemented numerous laws and programs designed to encourage renewables. While China has made strong progress, many factors will influence the nation's future success in renewable energy deployment, including the need for consistent pricing policies to stimulate private sector development and the need to upgrade the country's transmission grid.[3]

The issue of China's support for renewables has taken center stage in the United States, thanks to an investigation by the United States Trade Representative (USTR) that commenced in October 2010.[4] That investigation began with a complaint alleging that China unfairly subsidizes its greentech industries, in violation of its obligations as a member of the

* Professor of Law, University of Richmond School of Law. The author thanks Clayton LaForge for invaluable research efforts and Chris Brown, Jim Gibson, and Alexander U. Conrad for helpful information and comments on drafts; the University of Richmond School of Law for research grant assistance; and the Chicago-Kent Law Review for the kind invitation to take part in this symposium issue devoted to energy law issues.

1. Jesse Lee, *Another Bipartisan Meeting: Help for Small Business & Energy Reform*, THE WHITE HOUSE BLOG (Jul. 27, 2010, 2:34 PM), http://www.whitehouse.gov/blog/2010/07/27/another-bipartisan-meeting-help-small-business-energy-reform.

2. *See generally* Joel B. Eisen, *China's Renewable Energy Law: A Platform for Green Leadership?*, 35 WM. & MARY ENVTL. L. & POL'Y REV. (forthcoming 2010).

3. *Id.*

4. *United States Launches Section 301 Investigation into China's Policies Affecting Trade and Investment in Green Technologies*, OFF. U.S. TRADE REPRESENTATIVE (Oct. 15, 2010), http://www.ustr.gov/node/6223. A full discussion of this investigation under prevailing trade law is beyond the scope of this article.

World Trade Organization (WTO). Well before that investigation began, numerous Americans believed the United States was less engaged in green-tech promotion than China.[5] China has come very far in a short amount of time to promote renewables, and many feel the United States is falling behind. *New York Times* columnist Thomas L. Friedman has been perhaps the most active proponent of this view,[6] but he has plenty of company (including President Obama, as shown by the quote above). In this article, I will use "greentech" to refer to renewable energy technologies such as solar and wind power (the subject of many articles), even though some commentators discuss other technologies such as hybrid and electric vehicles.[7]

China has audacious long-term national targets for renewables that are orders of magnitude higher than current output. In the past few years, China has surpassed short-term milestones, which suggests that it can meet the high long-term targets. And even these ambitious targets are in the process of being ratcheted up, if recent reports are to be believed. China could be generating more electricity from renewables in 2020 than any other nation on earth. It has also advanced rapidly in private sector spending on renewable energy technology and research and development spending.

Many observers state that we are doing less than the Chinese to promote renewables and that we are in a competition with China. After ex-

5. *See, e.g.*, Thomas L. Friedman, *Failure Is Not an Option*, N.Y. TIMES, Apr. 27, 2010, http://www.nytimes.com/2010/04/28/opinion/28friedman.html?ref=thomaslfriedman (opening the column with "China is having a good week in America. Yes it is. I'd even suggest that there is some high-fiving going on in Beijing. I mean, wouldn't you if you saw America's Democratic and Republican leaders conspiring to ensure that America cedes the next great global industry—E.T., energy technology—to China?").

6. Friedman has written often in his column about the need for American energy policy to move forward expeditiously, frequently contrasting America's lack of progress unfavorably with China's policies. *See* Christina Larson, *America's Unfounded Fears of a Green-Tech Race with China*, YALE ENV'T 360 (Feb. 8, 2010), http://e360.yale.edu/content/feature.msp?id=2238 (stating that "Friedman has used the bully pulpit of his influential *New York Times* column to warn that the United States is engaged in a global green-tech competition with China, whose potential dominance represents a 'new Sputnik'").

Friedman has written numerous columns in the first half of 2010 alone that mention China's energy ascendancy. *See, e.g.*, Thomas L. Friedman, *We're Gonna Be Sorry*, N.Y. TIMES, Jul. 24, 2010, http://www.nytimes.com/2010/07/25/opinion/25friedman.html?ref=thomaslfriedman; Thomas L. Friedman, *What 7 Republicans Could Do*, N.Y. TIMES, Jul. 20, 2010, http://www.nytimes.com/2010/07/21/opinion/21friedman.html?ref=thomaslfriedman (noting that "by 2012, China should pretty much own the clean-tech industry"); Thomas L. Friedman, *No Fooling Mother Nature*, N.Y. TIMES, May 4, 2010, http://www.nytimes.com/2010/05/05/opinion/05friedman.html?ref=thomaslfriedman; Friedman, *supra* note 5; Thomas L. Friedman, *Global Weirding Is Here*, N.Y. TIMES, Feb. 17, 2010, http://www.nytimes.com/2010/02/17/opinion/17friedman.html?ref=thomaslfriedman ("China . . . is investing heavily in clean-tech, efficiency and high-speed rail. It sees the future trends and is betting on them. Indeed, I suspect China is quietly laughing at us right now.").

7. *See, e.g.*, John Gartner, *China to Best U.S. in EVs, but Not Hybrids*, HYBRID CARS (Aug. 17, 2010), http://www.hybridcars.com/news/china-best-us-evs-not-hybrids-28457.html.

amining our own energy policy, they claim that the Chinese are embarking on a path that will have disastrous long-term consequences for our nation if we do not act now. A metaphor in much of this writing is that the two nations are engaged in a new "green energy race."[8] This term deliberately invokes the "space race" competition between the U.S.S.R. and the United States to achieve milestones in space after the 1957 launch of the Sputnik satellite. Some writers have even made an explicit comparison between the two eras.

The "green energy race" means different things to different people, but to simplify matters a bit, there are two related but different arguments being made. The first is that the United States is missing out on the economic opportunity available in moving toward a "green economy." In this view, China is creating more green economic activity and jobs than we are. Some fear that China will dominate the global market for greentech, exporting it to us and diminishing American companies' ability to compete with Chinese firms. This, of course, is the bedrock principle of the USTR investigation, and must be considered in the context of the complex relationship between the two nations. The United States has departed from its "courtship" of China, criticizing it for its currency stance and other economic policies,[9] and the greentech investigation represents only one area in which the United States and China have recently tussled with each other.[10]

To some, "losing" the race and falling behind the Chinese would have serious consequences for national supremacy. Some writers also suggest that achieving progress in greentech is a pressing matter of climate security, which they compare to concerns in the 1950s about national security. While this comparison is a bit strained, even senior military leaders recognize that the impacts of climate change could be as drastic as those of losing military supremacy. Commentators concerned about climate security believe that the very survival of each nation is at stake if it does not act expeditiously and that the United States is jeopardizing its future by not taking appropriate steps to address the dire situation presented by climate change. In this view, failing to transition to a clean energy economy would

8. *See infra* notes 15–24 and accompanying text.

9. Mark Landler & Sewell Chan, *Taking Harder Stance Toward China, Obama Lines Up Allies*, N.Y. TIMES, Oct. 2, 2010, http://www.nytimes.com/2010/10/26/world/asia/26china.html?_r=1&partner=rss&emc=rss&src=igw.

10. Sewell Chan & Keith Bradsher, *U.S. to Investigate China's Clean Energy Aid*, N.Y. TIMES, Oct. 15, 2010, http://www.nytimes.com/2010/10/16/business/16wind.html. Note this comment from Rep. Charles Schumer, however: "An investigation into China's illegal subsidies for its clean energy industry is overdue, but it's no substitute for dealing with China's currency manipulation." *Id.*

have a deleterious effect on national wealth and welfare and would leave the United States vulnerable to ceding its position as a major world power.

In this Article, I will evaluate these two different, but related claims that we are in a "green energy race" with China. As I describe in Part I, the space race rhetoric and the affirmative step of starting a trade dispute with China over greentech, are counterproductive. Playing into fears about China has provided a convenient means of political theater in the 2010 election season,[11] but portraying China's ascendancy in greentech as a national threat will have high and unacceptable costs. Given our nations' pressing needs to address climate change, it would be much more productive to forego the rhetoric of the greentech war and support both nations' greentech initiatives. Moreover, the reasons given for why China is "winning" the "race" are not yet completely convincing.

Looking past the symbolic rhetoric of the race metaphor yields further interesting insights about our own approach to energy policy. The central impact of the Sputnik surprise is that it galvanized the United States into action. It called immediate attention to how we appeared to lag behind the U.S.S.R. in our attention to space research and development with federal space programs that were poorly coordinated and duplicative. In the post-Sputnik era, we rushed with fervor to develop a stronger space program. The analogous situation is what the proponents of the "space race" metaphor intend for the United States—a crash program of greentech development and deployment.

The most useful purpose of comparing 2010 and 1957, then, is to prompt the United States to reorient its energy policy to include a more focused effort in greentech, as I propose in Part II. Comparing our current situation to the pre-Sputnik landscape in the United States allows us to learn from history and improve our greentech policy. However, invoking a race metaphor may be less productive than capturing national attention in the United States with concrete, clear domestic goals. I believe that the United States should articulate a single, clear national goal in greentech, just as it did with space research in the Cold War era. A central event in our national space program development was the 1961 announcement by President John F. Kennedy of our intention to put a man on the Moon by the end of the 1960s.[12] This speech catalyzed a decade-long push in science and technology that ranks as one of the most focused in the history of the United States.

11. CAGWmedia, *Chinese Professor*, YOUTUBE (Oct. 20, 2010), http://www.youtube.com/watch?v=OTSQozWP-rM.

12. *See infra* notes 249–251 and accompanying text.

A similar national goal for greentech would unite proponents of renewable energy in a targeted way. Elsewhere, I have argued for the creation of "solar utilities"[13] that would deliver greentech in the residential setting by consolidating all of the functions of financing, installing, and servicing in single entities that would ramp up to utility-size scale in individual areas. In Part II, I discuss why this is the sort of idea that could capture the popular imagination and lead to more greentech development in the United States than casting China as a competitor will accomplish.

I. GEOPOLITICAL COMPETITION IN GREENTECH?: SUITABILITY OF THE "SPACE RACE" METAPHOR

The idea that the United States and China are locked in a competition for greentech supremacy has many adherents. A recent Internet search for "China" and "green energy race" by the author yielded over 300,000 results, with most of the top 100 having directly relevant titles, such as "Who's Winning the Clean Energy Race?,"[14] "Is China Beating the U.S. in Green Technology Development?,"[15] and so forth. As journalist and China expert Christina Larson observes, "[f]ew business stories have ever been imbued with so much gravitas, so many fears, so many metaphors, so much geopolitical speculation, as the recent articles and coverage of China's growing green-tech manufacturing sector."[16] The "China as green competitor" narrative has captivated journalists,[17] bloggers,[18] politicians,[19] envi-

13. Joel B. Eisen, *Can Urban Solar Become a "Disruptive" Technology?: The Case for Solar Utilities*, 24 NOTRE DAME J.L., ETHICS & PUB. POL'Y 53 (2010).

14. THE PEW CHARITABLE TRUSTS, WHO'S WINNING THE CLEAN ENERGY RACE?: GROWTH, COMPETITION AND OPPORTUNITY IN THE WORLD'S LARGEST ECONOMIES 7 (2010), www.pewtrusts.org/uploadedFiles/wwwpewtrustsorg/Reports/Global_warming/G-20%20Report.pdf (containing a section titled "China Takes the Lead, While the U.S. Slips").

15. *Is China Beating the U.S. in Green Technology Development?*, BUILDAROO.COM (Mar. 7, 2010), http://buildaroo.com/news/article/china-green-technology-development.

16. Larson, *supra* note 6.

17. *See e.g.*, Keith Bradsher, *On Clean Energy, China Skirts Rules*, N.Y. TIMES, Sept. 8, 2010, http://www.nytimes.com/2010/09/09/business/global/09trade.html?pagewanted=1&_r=1&ref=keith_bradsher; Keith Bradsher, *China Leading Global Race to Make Clean Energy*, N.Y. TIMES, Jan. 30, 2010, http://www.nytimes.com/2010/01/31/business/energy-environment/31renew.html; Kent Garber, *U.S. Lacks a Coherent Clean Energy Strategy: China Is the Main Competitor in the Global Energy Race*, U.S. NEWS & WORLD REP., May 7, 2010, http://politics.usnews.com/news/energy/articles/2010/05/07/us-lacks-a-coherent-clean-energy-strategy.html; Evan Osnos, *Letter from China: Green-Tech Space Race*, NEW YORKER, Apr. 21, 2009, http://www.newyorker.com/online/blogs/evanosnos/2009/04/greentech-space-race.html; Bruce Usher, *Red China, Green China*, N.Y. TIMES, May 6, 2010, http://www.nytimes.com/2010/05/07/opinion/07Usher.html (observing that "[b]y giving China more time to develop its capacity while neglecting our own, America is not just losing the clean-tech race, it's forfeiting it"); Gerard Wynn, *Is Clean Tech China's Moon Shot?*, REUTERS, Jan. 28, 2010, http://www.reuters.com/article/idUSTRE60R02520100128; *supra* note 6 and accompanying text (Thomas Friedman's *New York Times* columns).

ronmentalists,[20] think tanks,[21] executives of venture capital and energy companies,[22] financial market analysts and commentators,[23] and many others. Most of this commentary simply takes the fact of the race for granted, and few are so bold as to state otherwise.[24] The enthusiastic reception in many quarters to the USTR investigation is yet another measure of the strength of the race idea.

Taking other nations to task for negative impacts on our energy policy is nothing new, of course. Since the 1970s, no fewer than eight Presidents from Richard Nixon to Barack Obama have articulated a goal of achieving

18. Richard Brubaker, *Will China Surpass the US as a Superpower?*, ALL ROADS LEAD TO CHINA (Jul. 16, 2010, 6:22), http://www.allroadsleadtochina.com/2010/07/16/will-china-surpass-the-us-as-a-superpower; Derek Thompson, *Is China Winning the Energy Race?*, THE ATLANTIC (Jun. 17, 2010, 2:25 PM), http://www.theatlantic.com/business/archive/2010/06/is-china-winning-the-energy-race/58321, *republished by* Julian L. Wong, *Interview with The Atlantic on China and the Clean Energy Race*, GREEN LEAP FORWARD (Jul. 8, 2010), http://greenleapforward.com/2010/07/08/interview-with-the-atlantic-on-china-and-the-clean-energy-race.

19. Rep. Ed Markey, *Landing a Clean Energy Victory*, HUFFINGTON POST (Jul. 20, 2009, 9:57 AM), http://www.huffingtonpost.com/rep-ed-markey/landing-a-clean-energy-vi_b_240938.html.

20. Frances Beinecke, *In the Clean Energy Race, Jobs Can Stay in America*, SWITCHBOARD: NAT. RESOURCES DEF. COUNCIL STAFF BLOG (Feb. 23, 2010), http://switchboard.nrdc.org/blogs/fbeinecke/in_the_clean_energy_race_with.html (commentary by Frances Beinecke, President of the Natural Resources Defense Council); Robert F. Kennedy, Jr., *The New Arms Race*, HUFFINGTON POST (Nov. 19, 2009, 3:11 PM), http://www.huffingtonpost.com/robert-f-kennedy-jr/the-new-arms-race_b_364211.html.

21. Daniel J. Weiss & Susan Lyon, *Running for First in the Clean-Energy Race*, CENTER FOR AM. PROGRESS (Jan. 28, 2010), http://www.americanprogress.org/issues/2010/01/sotu_energy.html (the Center's "Out of the Running" report, as discussed below, analyzes the race in detail); ROB ATKINSON ET AL., BREAKTHROUGH INST. & THE INFO. TECH. & INNOVATION FOUND., RISING TIGERS SLEEPING GIANT: ASIAN NATIONS SET TO DOMINATE THE CLEAN ENERGY RACE BY OUT-INVESTING THE UNITED STATES (2009), *available at* http://thebreakthrough.org/blog/Rising_Tigers.pdf; Van Jones & Pan Jiahua, Inst. for Pub. Policy Research, *Climate Change, Innovation and the Clean Energy Race*, GOV MONITOR (May 23, 2010), http://www.thegovmonitor.com/world_news/britain/climate-change-innovation-and-the-clean-energy-race-31528.html.

22. John Doerr & Jeff Immelt, *Falling Behind On Green Tech*, WASH. POST, Aug. 3, 2009, http://www.washingtonpost.com/wp-dyn/content/article/2009/08/02/AR2009080201563.html (commentary by John Doerr, partner in the venture capital firm Kleiner Perkins Caufield & Byers, and by Jeff Immelt, chairman and chief executive of General Electric, a major manufacturer of wind turbine equipment).

23. Eric Pooley, *Senate Inaction Cedes U.S. Energy Race to China*, BLOOMBERG, Jul. 29, 2010, http://www.bloomberg.com/news/2010-07-30/senate-inaction-cedes-u-s-energy-race-to-china-commentary-by-eric-pooley.html; Kerri Shannon, *China, Europe Lapping the United States in the Clean Energy Race*, MONEY MORNING, Apr. 2, 2010, http://moneymorning.com/2010/04/02/clean-energy/; Jeff Siegel, *Have We Even Entered The Clean Energy Race Yet?*, SOLAR FEEDS (Aug. 12, 2010), http://www.solarfeeds.com/green-chip-stocks/13829-have-we-even-entered-the-clean-energy-race-yet; Nick Hodge, *China's Clean Energy Progress: Who's Winning the Cleantech Arms Race?*, GREEN CHIP STOCKS (Feb. 16, 2010), http://www.greenchipstocks.com/articles/cleantech-2010-enter-the-dragon/744.

24. Comments criticizing the "race" metaphor include Charlie McElwee, *Greentech Wars*, CHINA ENVTL. L. (Dec. 4, 2009), http://www.chinaenvironmentallaw.com (stating that "greentech war and competition metaphors . . . seem quite stale, unreflective, and insincere to me"), and Larson, *supra* note 6 (stating that "folks in the green-tech and environmental frontlines—as opposed to politicians and commentators—don't see a 'race' at all").

"energy independence" by weaning the United States from foreign oil.[25] The "race" metaphor is new energy geopolitics, as the differences between the "green energy race" and "energy independence" are obvious. The energy resources in this "race"—deployment of solar and wind capacity—are largely not in place today. Unlike the 1970s, we are not dependent on another nation's resources,[26] but instead, purportedly locked in a competition to develop them. Some say the race is already over. One observer notes, "[t]he United States ceded its leadership in the production of clean energy technologies during the past decade of neglect."[27]

A. What Is the "Race," and Is China "Winning"?

What exactly is the "green energy race"? The more one reads about it, the more difficult it becomes to assess just what the "race" is about. In the space race, there were readily identifiable, concrete goals that inhered in physical space: put satellites and humans in orbit, and land a man on the moon. Here, it is not so clear. What is the purpose of a competition with China? Is it to have more solar panels and wind turbines in place? More governmental and private investment in greentech? More greentech-friendly governmental policies? All of the above? Those writing about it often have different agendas. Companies want more investment in greentech and more access to China's markets. Environmentalists want more active federal policies to encourage deployment of renewables. Free traders want barriers to trade removed.

25. Richard L. Pierce, Jr., *Energy Independence and Global Warming*, 37 ENVTL. L. 595, 596 (2007). For a more humorous (or sobering, depending on one's perspective) take on the persistence of "energy independence" throughout numerous presidencies, see *The Daily Show with Jon Stewart*, (Comedy Central television broadcast Jun. 16, 2010), *available at* http://www.thedailyshow.com/watch/wed-june-16-2010/an-energy-independent-future. Today, we depend even more on fossil fuels for transportation than we did in the 1970s. Pierce, *supra*. Some believe it is even counterproductive to stress "energy independence" while attempting to address climate change. *Id.* at 596–97; *see also* Paul Roberts, *The Seven Myths of Energy Independence: Why Forging a Sustainable Energy Future is Dependent on Foreign Oil*, MOTHER JONES (May–June 2008), http://motherjones.com/politics/2008/05/seven-myths-energy-independence.

26. Some say China is attempting to corner the market for rare earth elements that are components of renewable energy products. *See, e.g.*, Geoffrey Styles, *China's Leverage on Renewable Energy Increases*, ENERGY COLLECTIVE (Aug. 17, 2010), http://theenergycollective.com/geoffrey-styles/41784/chinas-leverage-renewable-energy-increases; Bradsher, *On Clean Energy, China Skirts Rules*, *supra* note 17. However, no one is claiming that we are dependent on China today for these metals or any other greentech. This did not stop a prominent writer from speculating in the *New York Times* that some day this might be the case. Bradsher, *China Leading Global Race to Make Clean Energy*, *supra* note 17.

27. Daniel J. Weiss, Susan Lyon & Tina Ramos, *The Stone Soup Clean Energy and Climate Bill*, CLIMATE PROGRESS (Jul. 16, 2010), http://climateprogress.org/2010/07/16/the-stone-soup-clean-energy-and-climate-bill.

Consider a threshold question: Why are we competing with *China*? Other nations have a longer head start. European nations like Denmark and Germany[28] have had greentech policies in place for many years, have seen strong growth in their greentech industries, and have generated much of their electricity from renewables.[29] A European Union directive sets binding targets for member nations to generate 20% of their electricity from renewables by 2020.[30] Many European companies already sell greentech equipment in the United States,[31] so it would make just as much sense to say Danish and German companies threaten the growth of the American renewable energy industry as to say that Chinese firms do. Some observers note that the race is not with one nation but many,[32] yet the prevailing comparison is to China.

There is something much more to the "race" metaphor, then, than growth in greentech. As in the space race, there is the pervasive sense that

28. *See* Preben Maegaard, *Danish Renewable Energy Policy*, WORLD COUNCIL FOR RENEWABLE ENERGY, www.wcre.de/en/images/stories/pdf/WCRE_Maegaard_Danish%20RE%20Policy.pdf (last visited Oct. 6, 2010) (Denmark); *Renewable Energy Policy in Germany: An Overview and Assessment*, JOINT GLOBAL CHANGE RES. INST., http://www.globalchange.umd.edu/energytrends/germany/6/ (last visited Oct. 6, 2010) (Germany).

29. By some measures (for example, amount of solar power generated), Spain is winning the greentech race, just as it won the soccer World Cup. Talk about dominance! Jasmine Green, *Spain: Leading the Renewable Energy Race*, CARE2, http://www.care2.com/causes/environment/blog/spain-number-one-in-solar-power-and-more/ (last visited Oct. 6, 2010). One could also point to Portugal, which will get an astounding 45% of its electricity from renewables in 2010. Elisabeth Rosenthal, *Portugal Gives Itself a Clean-Energy Makeover*, N.Y. TIMES, Aug. 9, 2010, http://www.nytimes.com/2010/08/10/science/earth/10portugal.html.

30. Council Directive 2001/77, of the European Parliament and of the Council of 27 September 2001 on the Promotion of Electricity Produced from Renewable Energy Sources in the Internal Electricity Market, art. 3, 2001 O.J. (L 283) 35 (EC); *see* Council Directive 2009/28, of the European Parliament and of the Council of 23 April 2009 on the Promotion of the Use of Energy from Renewable Sources and Amending and Subsequently Repealing Directives 2001/77/EC and 2003/30/EC, 2009 O.J. (L 140) 17 (EC) (implementing the targets); *Legal Framework for Wind Energy: Key Aspects of the Renewable Energy Directive*, EUR. WIND ENERGY ASS'N, http://www.ewea.org/index.php?id=197 (last visited Oct. 6, 2010) (explaining both documents); *Renewable Energy: What Do We Want to Achieve?*, EUR. COMMISSION ENERGY, http://ec.europa.eu/energy/renewables/index_en.htm (last updated Feb. 7, 2010) (discussing the targets and other policies).

31. *See* AWEA MID-YEAR 2010 MARKET REPORT: JULY 2010, AM. WIND ENERGY ASS'N (2010), http://www.awea.org/publications/reports/2Q10.pdf (listing current and proposed installations in the United States, with names of turbine manufacturers, including European manufacturers such as Vestas); *Global Market Outlook for Photovoltaics Until 2014: May 2010 Update*, EUR. PHOTOVOLTAIC INDUSTRY ASS'N (May 15, 2010), http://www.epia.org/fileadmin/EPIA_docs/public/Global_Market_Outlook_for_Photovoltaics_until_2014.pdf (listing activities of European solar manufacturers).

32. A recent report by the Center for American Progress compares United States' renewable energy policies unfavorably to both European nations and China. KATE GORDON, JULIAN L. WONG & JT MCLAIN, CTR. FOR AM. PROGRESS, OUT OF THE RUNNING? HOW GERMANY, SPAIN, AND CHINA ARE SEIZING THE ENERGY OPPORTUNITY AND WHY THE UNITED STATES RISKS GETTING LEFT BEHIND (2010), *available at* http://www.americanprogress.org/issues/2010/03/pdf/out_of_running.pdf. *See also* Markey, *supra* note 19 (Rep. Markey's comment that "Russia was our singular competitor in the celestial contest. In this terrestrial endeavor, we have many.").

if China has more extensive greentech investments and deployment than we do, there will be drastic consequences for national power and wealth. Denmark and Germany attract less attention than China because they pose less of a threat to the United States' overall position in the world. This suggests that the race metaphor is a convenient device for those anxious to feed on Americans' doubts about the loss of superpower status.[33]

Looking behind the rhetoric and evaluating the "race" claims on their merits, it is hardly even clear that the United States is "losing" to China. The differences between the two nations in greentech are much more subtle than they appear in the prevailing narrative.[34] This section will focus on three ways in which commentators claim we are falling behind. One is the growth of China's greentech industry at the possible expense of American firms. Another is the level of national government support for renewables, which some see as more robust and committed in China than in the United States. Finally, some point to rapid growth in installed capacity to suggest that the Chinese are surging ahead. I find each of these claims to be overstated at present or to require some telling context that is often left out of the narrative.

1. Growth of China's Greentech Industry

One fear animating many is that multinational companies will find it difficult to sell their greentech in China, and Chinese companies will flood the United States with their products. It is not difficult to see how this fear has gained traction, as it reflects broader American unease about China's potential for global economic dominance.

In 1979, China began to experiment with the free market, and since then, it has experienced robust growth.[35] Although China's economy is

33. Christina Larson puts it as follows:

> It is telling what is left out of the increasingly dominant "U.S. versus China" green-tech "race" narrative. For starters, there are a lot of other countries at work developing green-tech and becoming significant green-tech markets—the low-carbon future, after all, isn't solely a G-2 aspiration. Yet because the politics are different (there's not the anxiety of the reigning superpower nervously eyeing the new kid on the block), the green aspirations of any country not named China are viewed through an entirely different prism by U.S. commentators. Germany, for instance, is home to the world's top two solar manufacturing companies. Yet we don't read headlines about Old Europe "cleaning our clock" to the 21st century.

Larson, *supra* note 6.

34. *Id.* (statement of Elizabeth Economy, director of Asia Studies at the Council on Foreign Relations, that "[e]ven when you are looking at these big numbers that are coming out of China today, I think it really pays to give a close look at what is actually happening on the ground [and t]hen you begin to get a different, more nuanced picture than what is blasted on the business section of the *New York Times*").

35. CONSTANTIN CRACHILOV, RANDALL S. HANCOCK & GARY SHARKEY, CHINA GREENTECH INITIATIVE, THE CHINA GREENTECH REPORT 2009 21 (2009), *available at* http://www.china-

developing more slowly in 2010 than in recent years, it is still growing at an annual rate of 8%,[36] considerably stronger than the United States' economy.[37] In 2010, some reports noted that China's economy had become the world's second largest, surpassing Japan's.[38] China's "pace of industrialization is significantly faster than that experienced by other countries throughout history."[39] So much of China's manufacturing output is already sold in the United States that observers believe we are "joined at the hip economically."[40] Commentators marvel at China's burgeoning infrastructure and other indicia of modernization,[41] although some acknowledge that environmental and other costs may jeopardize continued strong growth.[42]

greentech.com/sites/default/files/CGTR2009-FullReport.pdf (citing similar data from the United States Department of Agriculture's International Macroeconomics Data Set for 1978-2008 and noting that China's economy has doubled roughly every seven to eight years); WAYNE M. MORRISON, FOREIGN AFFAIRS, DEFENSE & TRADE DIV., CONG. RESEARCH SERV., IB98014, CHINA'S ECONOMIC CONDITIONS (2006), *available at* www.fas.org/sgp/crs/row/IB98014.pdf (detailing the government's shift in policy and stating that "[f]rom 1979 to 2005 China's real GDP grew at an average annual rate of 9.6%"); *Data: GDP Growth (Annual Percentage)*, WORLD BANK, http://data.worldbank.org/indicator/NY.GDP.MKTP.KD.ZG (last visited Oct. 6, 2010) (data for 2005-2008).

36. *China Sets 8% Target for 2010 Economic Growth*, XINHUA NEWS AGENCY, http://www.chinadaily.com.cn/china/2010-03/05/content_9541616.htm (last updated Mar. 5, 2010).

37. Hibah Yousuf, *U.S. Recovery Sputters*, CNNMONEY.COM, July 30, 2010, http://money.cnn.com/2010/07/30/news/economy/gdp/index.htm (stating that the United States experienced a 2.4% annual rate of growth in 3Q 2010); Motoko Rich, *U.S. Economy Slowed to 1.6% Pace in 2nd Quarter*, N.Y. TIMES, Aug. 27, 2010, http://www.nytimes.com/2010/08/28/business/economy/28econ.html (figure revised in August 2010 downward to 1.6%).

38. CHINA GREENTECH INITIATIVE, *supra* note 35, at 21 (citing data from the International Monetary Fund and stating that most analysts predict that China will overtake Japan); David Barboza, *China Passes Japan as Second-Largest Economy*, N.Y. TIMES, Aug. 15, 2010, http://www.nytimes.com/2010/08/16/business/global/16yuan.html. By some predictions, China may overtake the United States by 2030. *See, e.g.*, CHINA GREENTECH INITIATIVE, *supra* note 35, at 32 fig.15.

39. CHINA GREENTECH INITIATIVE, *supra* note 35, at 21.

40. *U.S. and China Vie for Clean Energy Leadership*, ENERGY CHINA FORUM (Aug. 17, 2010), http://www.energychinaforum.com/news/39260.shtml.

41. *See, e.g.*, Carlo Rotella, *The Growth of a Thoughtful City: After a Visit to the Fast-Paced Construction in China, Boston Feels Like Heaven*, BOSTON GLOBE, Aug. 16, 2010, http://www.boston.com/bostonglobe/editorial_opinion/oped/articles/2010/08/16/the_growth_of_a_thoughtful_city/ ("Even second- and third-tier provincial cities like Huangshi and Luan — the Worcesters and Springfields of China — boast brand-new airports that put dowdy, dingy Logan to shame; massively transformative highway projects that make the Big Dig look like overpriced cosmetic surgery; bullet train service that makes Amtrak's Acela look like a musket ball fired underwater; and forests of new high-rises, going up 20 and 30 at a time . . . .").

A thoughtful essay on the rapid growth of one Chinese city is Christina Larson, *Chicago on the Yangtze: Welcome to Chongqing, the Biggest City You've Never Heard Of*, FOREIGN POL'Y, Sept.–Oct. 2010, http://www.foreignpolicy.com/articles/2010/08/16/chicago_on_the_yangtze.

42. *See, e.g.*, CHINA GREENTECH INITIATIVE, *supra* note 35, at 25–30 (discussing environmental degradation in depth); Elizabeth C. Economy, *Congressional Testimony: China's Environmental Challenges*, COUNCIL ON FOREIGN REL., Sept. 22 2004, http://www.cfr.org/publication/7391/congressional_testimony.html; *Impact of Growth on China: What have Been Some of the Negative Consequences of China's Rapid Growth?*, UCLA ASIAN AM. STUDIES

Others note that we do not have full clarity because data on China's growth rely on questionable official sources.[43] Yet even those taking a hard look at the official party line believe that China's economic ascendancy is "world-changing."[44]

Many believe that domestic products cannot compete against those manufactured in China due to China's advantages in less expensive labor, more lax protections of intellectual property, fixed currency rates (until very recently), and weaker environmental protections.[45] Is greentech simply destined to be another area in which the Chinese competitive advantage will overpower American firms? In the depths of a recession in the United States, descriptions of growing Chinese greentech firms invoke strong images of a rising Asian industrial juggernaut.

China's 2007 "Medium and Long-Term Development Plan for Renewable Energy in China" contained an explicit goal to develop a competitive domestic renewables sector,[46] and the nation's greentech sector is growing rapidly. China's domestic wind turbine industry rose from virtual nonexistence to become a major player in the global market in less than five years. In 2009, three of the largest wind turbine manufacturers in the world were Chinese, even though the two largest were Danish (Vestas) and

CTR., http://www.aasc.ucla.edu/uschina/econ_whobenefits.shtml (last visited Oct. 6, 2010); and many other sources discuss the negative impacts of growth in China.

A recent analysis is JONATHAN WATTS, WHEN A BILLION CHINESE PEOPLE JUMP: HOW CHINA WILL SAVE MANKIND - OR DESTROY IT (2010), as noted by Anthony Tao, *Will China Save or Destroy Humanity? Jonathan Watts Launches His New Book on the Environment*, BEIJINGER BLOG (July 14, 2010, 12:00 PM), http://www.thebeijinger.com/blog/2010/07/14/Will-China-Save-or-Destroy-Humanity-Jonathan-Watts-Launches-His-New-Book-on-the-Envi. *See also* Jonathan Watts, *China's Mega-Jams Show the True Cost of Coal: The Number of Coal Trucks Suggest Strains on China's Energy Supply that Are Equal to Those on its Transport System*, GUARDIAN ENV'T BLOG (Aug. 25, 2010, 2:22 PM), http://www.guardian.co.uk/environment/blog/2010/aug/25/china-mega-jams-coal (reporting that major traffic jams result from the large number of coal-bearing trucks on China's roads).

43. Gady Epstein, *This Just In: China Economy Doing Better Than Japan*, FORBES BLOGS (Aug. 16, 2010, 1:47 AM), http://blogs.forbes.com/gadyepstein/2010/08/16/this-just-in-china-economy-doing-better-than-japan/.

44. *Id.*

45. *See, e.g.*, Stan Abrams, *This is Your Brain on Nationalism: US-China Trade Deficit Follies*, CHINA/DIVIDE (Apr. 14, 2010), http://chinadivide.com/2010/your-brain-on-nationalism-us-china-trade-deficit-follies.html (summarizing a number of claims and reports). With respect to greentech specifically, see Bradsher, *China Leading Global Race to Make Clean Energy*, *supra* note 17, citing low labor costs as a Chinese advantage.

46. Nat'l Dev. & Reform Comm'n, *Medium and Long-Term Development Plan for Renewable Energy in China*, CHINA DEV. GATEWAY (Sept. 4, 2007), http://en.chinagate.cn/reports/2007-09/13/content_8872839.htm ("By 2020, a relatively complete renewable energy technology and industry system will have been established, so that a domestic manufacturing capability based mainly on China's own IPRs will have been established, satisfying the needs for deploying renewable energy on a large scale in China.").

American (GE Wind).[47] China leads the world market for solar PV cells and modules, producing more than 40%.[48] Chinese firms' share of the domestic greentech market has increased rapidly,[49] and Chinese companies have become major players around the globe.[50] Evidence of Chinese companies' global ambition is not hard to find. At the 2010 soccer World Cup, advertising for the Chinese firm Yingli Solar was prominently featured on the sideline dasher boards,[51] and Yingli's CEO attributed an upswing in the firm's orders after the tournament to its successful sponsorship.[52]

Still, many Chinese products are sold in China. The USTR investigation's petition details a growing imbalance in "environmental goods" between the United States and China,[53] but in some categories of renewable energy equipment, Chinese firms have been less successful in the United States. Chinese firms sold only 28 MW worth of wind turbines outside of China in 2009.[54] In 2009, Goldwind provided wind turbines to a project in

47. RENEWABLE ENERGY POLICY NETWORK FOR THE 21ST CENTURY, RENEWABLES 2010: GLOBAL STATUS REPORT 30 (2010) [hereinafter RENEWABLES], *available at* http://www.unep.org/sefiren21/.

48. *Compare Global Market Outlook for Photovoltaics Until 2014: May 2010 Update*, *supra* note 31, at 22, *with* U.S. DEP'T OF ENERGY, OFFICE OF ENERGY EFFICIENCY AND RENEWABLE ENERGY, 2008 SOLAR TECHNOLOGIES MARKET REPORT 15 (2010), *available at* http://www1.eere.energy.gov/solar/pdfs/46025.pdf (stating that the 2008 market share of Chinese firms was 27%).

49. Global Intelligence Alliance, *China to Lead Global Wind Energy Development?*, RENEWABLE ENERGY FOCUS (Feb. 15, 2010), http://www.renewableenergyfocus.com/view/7283/china-to-lead-global-wind-energy-development/?opattr=China_to_lead_global_wind_energy_development%3F.

50. JIM HIGHT, BUILDING BRIDGES FOR CLIMATE CHANGE MITIGATION: A ROADMAP OF GLOBAL TRADE PATTERNS IN WIND POWER GOODS AND SERVICES, OECD GLOBAL FORUM ON TRADE: TRADE AND CLIMATE CHANGE 6 (2009), *available at* www.oecd.org/dataoecd/29/63/42886096.pdf ("[I]n 2004, China had only one domestic WTG manufacturer—Goldwind. By the end of 2008, there were approximately 60, with Goldwind as the leading seller, followed by Sinovel, Dongfang and Windey."); Eric Martinot & Li Junfeng, *Renewable Energy Policy Update for China*, RENEWABLE ENERGY WORLD (July 21, 2010), http://www.renewableenergyworld.com/rea/news/article/2010/07/renewable-energy-policy-update-for-china.

51. Stuart Elliott, *An Underdog Amid the Giants Lining the World Cup's Fields*, N.Y. TIMES, July 6, 2010, http://www.nytimes.com/2010/07/07/business/media/07adco.html; *The Challenge of China's Green Technology Policy*, CLIMATE PROGRESS (July 15, 2010 9:33 AM), http://climateprogress.org/2010/07/15/the-challenge-of-china%E2%80%99s-green-technology-policy/ (statement of Julian Wong, Senior Policy Analyst at the Center for American Progress Action Fund).

52. Tom Cheyney, *Yingli Green Posts Strong Q2 Results, Guides 16W of Solar PV Module Shipments for 2010*, PV-TECH, Aug. 19, 2010, http://www.pv-tech.org/news/_a/yingli_green_posts_strong_q2_results_guides_1gw_of_solar_pv_module_shipment/.

53. Pet. for Relief Under Section 301 of the Trade Act of 1974, as Amended: China's Policies Affecting Trade and Investment in Green Technology, 13, Sept. 9, 2010.

54. *Chinese Wind Turbine Manufacturers' Global Expansion: The Dream and The Reality*, GERSON LEHRMAN GROUP (May 9, 2010), http://www.glgroup.com/News/Chinese-Wind-Turbine-Manufacturers-Global-Expansion--The-Dream-and-The-Reality-48260.html; *see also* E-mail from Alexander U. Conrad to author (Sept. 7, 2010) (on file with author) (noting that Chinese firms have not penetrated the Brazilian wind market, despite that government's promotion of wind energy and a favorable climate between the two nations).

Minnesota,[55] and a year later, Yingli Solar supplied solar panels to Rutgers University.[56] Some predict an upswing in Chinese greentech exports to the United States,[57] and at least one high-profile proposed project in the United States involving Chinese technology has attracted specific negative attention. In 2009, a proposed U.S.-China joint wind farm venture in Texas generated a firestorm of protest from members of Congress who claimed the Chinese companies supplying technology to the project were being supported with American stimulus funds.[58]

Another factor fostering apprehension in the United States (and cited in the USTR investigation) is that some feel the Chinese government appears to be shutting foreign manufacturers out of its large domestic market.[59] Official China government policy promotes "indigenous innovation," calling for the nation's reliance on foreign technology to decrease to 30% or less.[60] Foreign observers have reported that as this strategy has been implemented in greentech, it has become more difficult for foreign compa-

55. RENEWABLES, *supra* note 47, at 30; Xinjiang Goldwind Sci. and Tech. Co. Ltd., *Goldwind Debut at Wind Power 2010 to Herald Global Expansion*, PR NEWSWIRE, May 23, 2010, http://www.prnewswire.com/news-releases/goldwind-debut-at-wind-power-2010-to-herald-global-expansion-94711839.html.

56. *Rutgers' Chinese Solar Panels Show Clean-Energy Shift*, NJ.COM, July 24, 2010, http://www.nj.com/business/index.ssf/2010/07/rutgers_chinese_solar_panels_s.html; Brian Rezny, *Chinese Energy Cleans Up Its Act*, SEEKING ALPHA (July 27, 2010), http://seekingalpha.com/article/216784-chinese-energy-cleans-up-its-act.

57. *Solar Market Experiences Shakeout, China Is Well Positioned to Dominate World Market*, TOMMY TOY'S BLOG (Mar. 10, 2010, 7:36 AM), http://tommytoy.vox.com/library/post/solar-market-experiences-shakeout-china-is-well-positioned-to-dominate-world-market.html.

58. *See, e.g.*, Press Release, Senator Charles E. Schumer, Schumer, Casey, Brown & Tester Urge Obama Administration to Suspend Stimulus Program Funneling Billions Overseas (Mar. 3, 2010), http://schumer.senate.gov/record.cfm?id=322732& (detailing efforts by four Senators to block federal funding for the project); *see also* Yael Borofsky & Jesse Jenkins, *The Real Policy Lesson From the Chinese Wind Turbine "Scare,"* BREAKTHROUGH INST. BLOG (Nov. 9, 2009, 1:47 PM), http://thebreakthrough.org/blog/2009/11/the_real_policy_lesson_from_th.shtml (claiming that "Senator Schumer and others who seek to bar Chinese manufacturers from stimulus funds are missing the point" and should focus instead in promoting American greentech firms).

59. *See, e.g.*, Wynn, *supra* note 17 (stating that "Western businesses are worried China is freezing them out of this lucrative market, preferring to nurture its own nascent industries without subjecting them to competition"); Keith Johnson, *Protectionist Breezes: Wind-Power Companies Cry Foul on China*, WALL ST. J. Blogs (May 28, 2009, 12:02 PM), http://blogs.wsj.com/environmentalcapital/2009/05/28/protectionist-breezes-wind-power-companies-cry-foul-on-china/.

60. *See* JAMES MCGREGOR, CHINA'S DRIVE FOR "INDIGENOUS INNOVATION": A WEB OF INDUSTRIAL POLICIES 1, 15 (2009), *available at* www.apcoworldwide.com/content/PDFs/Chinas_Drive_for_Indigenous_Innovation.pdf (providing a comprehensive discussion of these policies); Julian L. Wong, *How to Deal with Chinese Green Protectionism: A U.S. Perspective*, GREEN LEAP FORWARD (July 30, 2010), http://greenleapforward.com/2010/07/30/how-to-deal-with-chinese-green-protectionism-a-us-perspective/ (discussing the Medium-to-Long Term National Plan for Science and Technology Development and the National Indigenous Innovation Accreditation Program in the greentech context).

nies to get their technology accepted in domestic Chinese projects.[61] A recent report on innovation states that as many as thirty-six separate government regulations promote domestic greentech and hamper foreign firms' ability to compete in China.[62] Even before the USTR investigation, one observer stated that protectionist claims against China were reaching a "fever pitch."[63] The USTR investigation petition cites regulations promoting domestic companies as unfair trade subsidies,[64] and claims (for example) that the indigenous innovation policy gives Chinese firms a 5–10% advantage in wind turbine procurement processes.[65] Encouraging announcements of joint ventures and other developments seem to contradict this emerging protectionist trend.[66] China has dropped a requirement that 70% of the components in wind turbines come from domestic sources.[67] Agreements between American companies such as First Solar[68] and Chinese local governments to develop renewable energy projects point to a potentially large market for American greentech in China.[69] Perhaps ironically, however, the USTR investigation complaint cites the First Solar memorandum of understanding to develop a 2 GW solar project as an impermissible practice under the WTO because First Solar agreed to work to support China's domestic industries.[70] In August 2010, there were reports that the First Solar agreement might devolve from an exclusive arrangement into a competition with domestic firms for the right to supply

61. *See, e.g.*, Andrew Peaple, *For Foreigners, China's Solar Market Is Cloudy*, WALL ST. J., Aug. 18, 2010, http://online.wsj.com/article/SB10001424052748704554104575434991356731852.html; Joe McDonald, *U.S., Europe Look to China for Clean Energy Sales*, CHINA MINING (May 16, 2010), http://www.chinamining.org/News/2010-05-17/1274063691d36211.html.

62. MCGREGOR, *supra* note 60, at 33.

63. Wong, *supra* note 60. Another recent article claims that the Chinese government's support for greentech may violate World Trade Organization rules on government support of firms manufacturing for the export market. *See* Bradsher, *On Clean Energy, China Skirts Rules*, *supra* note 17.

64. Pet. for Relief Under Section 301 of the Trade Act of 1974, as Amended, 89–99.

65. *Id.* at 96.

66. *See, e.g.*, Michael Kanellos, *Innovalight Signs with Yingli for Second Chinese Solar Deal*, GREENTECH SOLAR (July 26, 2010), http://www.greentechmedia.com/articles/read/innovalight-signs-with-yingli-for-second-chinese-solar-deal/ (detailing cooperation between Sunnyvale, California-based Innovalight, and Yingli Solar).

67. Chen Limin & Wan Zhihong, *China's Wind Energy Industry Sees Challenges*, CHINA DAILY, Feb. 22, 2010, http://www.chinadaily.com.cn/china/2010-02/22/content_9481836.htm.

68. *First Solar and Ordos Take Key Step Forward in 2GW China Project: Cooperation Framework Agreement Signed During China-US Presidential Summit*, FIRST SOLAR (Nov. 17, 2009), http://investor.firstsolar.com/phoenix.zhtml?c=201491&p=irol-newsArticle&ID=1356152&highlight=.

69. Julian L. Wong, Center for Am. Progress Action Fund, *The Challenge of China's Green Technology Policy and Ohio's Response: Written Testimony Before the U.S.-China Economic and Security Review Commission* 9 (July 14, 2010), http://www.uscc.gov/hearings/2010hearings/written_testimonies/10_07_14_wrt/10_07_14_wong_statement.pdf (discussing "success stories of American companies such as First Solar, eSolar, and American Superconductor making headway into the Chinese market").

70. Pet. for Relief Under Section 301 of the Trade Act of 1974, as Amended, 94–95.

equipment to the mammoth project.[71] As of fall 2010, First Solar's status in the Ordos endeavor, and the competitive landscape for American firms as a whole, was uncertain.

The prevailing concern seems to be that Chinese firms will dominate the global greentech market if current growth rates continue. However, it is by no means clear that they will. Some signs in the past year point to overbuilding and overcapacity in the wind industry, and a possible retrenchment and consolidation of existing firms. In mid-2010, concern about the failure of nations to agree on a climate change agreement and projections of slowing demand in China for wind energy made for an uncertain business climate for wind energy companies.[72] One China-based research analyst wrote, "[i]t's a tough situation to be a wind turbine manufacturer anywhere in the world right now, including in China."[73] On the other hand, there were reports that the top three IPOs in 2010 in global greentech were by Chinese companies.[74] Other firms moved forward with their offerings,[75] but a planned initial public offering for one firm had to be scrapped in mid-2010 due to unfavorable market conditions.[76]

There is also evidence that Chinese firms are not yet competitive in certain market segments. Some provincial utilities in China have chosen Western wind turbines over products from domestic firms due to superior control systems and longer experience with manufacturing larger turbine sizes.[77] The quality of some Chinese greentech is often not yet as strong as that of foreign products.[78] As recently as 2009, Chinese wind turbines were

71. Keith B. Richburg, *Solar Plan in China's Inner Mongolia Highlights Pitfalls for U.S. Firms*, WASH. POST, Aug. 13, 2010, http://www.washingtonpost.com/wp-dyn/content/article/2010/08/12/AR2010081203201.html.

72. Stuart Biggs, *Turbine Makers Face 'Tough' Market as Goldwind Slumps (Update2)*, BLOOMBERG BUSINESSWEEK, June 21, 2010, http://www.businessweek.com/news/2010-06-21/turbine-makers-face-tough-market-as-goldwind-slumps-update2-.html; Zhang Qi, *Sun is Setting on China's Solar Industry*, CHINA DAILY, Jan. 19, 2009, http://www.chinadaily.com.cn/bizchina/2009-01/19/content_7408525.htm (predicting a shakeout in the Chinese solar PV sector).

73. Biggs, *supra* note 72. *See also* Limin & Zhihong, supra note 67 (noting that "[r]adical expansion has brought another problem: makers of both turbines and parts have seen their profits slump in recent years").

74. Dallas Kachan, *China Has Already Surpassed the U.S. in Cleantech*, SEEKING ALPHA (Aug. 15, 2010), http://seekingalpha.com/article/220547-china-has-already-surpassed-the-u-s-in-cleantech.

75. *China's Renewable Energy Giants Look to IPO*, NEW NET (Aug. 18, 2010), http://www.newenergyworldnetwork.com/renewable-energy-news/by_technology/solar-by_technology-new-news/china%E2%80%99s-renewable-energy-giants-look-to-ipo.html.

76. Biggs, *supra* note 72.

77. Thomas Hout, *China's Renewable-Energy Clout*, FORBES (July 30, 2010), http://www.forbes.com/2010/07/30/china-solar-wind-industry-markets-equities-clean-technology-companies_3.html.

78. *See generally* Javier Campello & Stephen Foster, Global Photovoltaic Industry Analysis with Focus on the Chinese Market (May 14, 2008) (unpublished M.A. thesis, Mälardålen University,

less capable than their foreign counterparts,[79] as measured by lower capacity factors (the percentage of time that the turbines operate to generate electricity).[80]

One article on the wind industry observes, "Western producers lead in the high performance segments, while the Chinese lead in lower-performance, price-driven segments."[81] Chinese firms have grown quickly in manufacturing high-volume products but often do not hold key technology patents that would enable them to develop more sophisticated equipment.[82] Chinese firms have grown rapidly through acquiring manufacturing equipment and capitalizing on advantages such as their lower cost of labor.[83] As a result, they have quickly ascended into a leadership position in "downstream" areas of the PV production chain, including cell production and module assembling, but lag behind in "upstream" areas requiring more technological skill, such as silicon purification, ingot, and wafer manufacturing.[84] Chinese companies have a rapidly increasing number of patents, but to date, the companies are "relatively weak" in terms of the patents they hold on more sophisticated technology.[85] A Chinese observer notes that "[i]n quantity, China has become a great solar energy patent country[, b]ut

Västerås, Sweden), *available at* www.diva-portal.org/smash/get/diva2:127961/FULLTEXT01 (discussing challenges facing the Chinese PV manufacturing industry).

79. David Cyranoski, *Renewable Energy: Beijing's Windy Bet*, 457 NATURE 372, 372 (2009), *available at* http://www.nature.com/news/2009/090121/pdf/457372a.pdf ("Wind-turbine manufacturers and wind-farm developers everywhere have faced teething problems, but China has perhaps faced more difficulties than most. Its wind farms are much less efficient than those in other leading countries [and] manufacturing defects have plagued Chinese equipment . . . .").

80. Hout, *supra* note 77 (calling the quality of Chinese turbines "questionable"); Richard Lim, Julisa Mandeville, Ryan Petersen, Jon Saxon, Benjamin Vannier & Tom Wuellner, *Winds of Change: How China's Government Supports Domestic Wind Energy Providers*, KELLOGG SCH. OF MGMT, NORTHWESTERN U. (Oct. 1, 2009), http://www.kellogg.northwestern.edu/departments/international/internationalfocus/article/winds_of_change.aspx ("Chinese-made turbines cost up to 20% less than those of multinational manufacturers. However, field data suggests that Chinese turbines significantly lag foreign products in quality, to the extent that the long-term revenue sacrificed from lower quality (as measured by turbine capacity factor) outweighs the upfront cost savings.").

81. Hout, *supra* note 77.

82. *Id.*

83. Bradsher, *On Clean Energy, China Skirts Rules*, *supra* note 17; *see generally* Arnaud de la Tour, Matthieu Glachant & Yann Ménière, *Innovation and International Technology Transfer: The Case of the Chinese Photovoltaic Industry* (MINES ParisTech, Cerna Working Paper Series, Working Paper 2010-12), *available at* http://hal-ensmp.archives-ouvertes.fr/docs/00/49/85/78/PDF/CERNA_WP_2010-12.pdf.

84. de la Tour, Glachant & Ménière, *supra* note 83; *Global Market Outlook for Photovoltaics Until 2014: May 2010 Update*, *supra* note 31, at 22 & fig.23 (demonstrating that China leads in production of cells and modules but trails in other areas).

85. Liu Songbai, *China's Solar PV Industry Accelerating Quality Transformation*, CHINA ECON. NET (Aug. 20, 2010), http://en.ce.cn/Insight/201008/20/t20100820_21741172.shtml.

. . . patent power does not mean technical power."[86] In 2009, American companies held the top ten cited patents worldwide in solar technology.[87]

Government research and development support is aimed at closing this technology gap.[88] However, funding from the central government may be inefficient because it focuses too little on basic research.[89] Still, many who are familiar with China believe that it is only a matter of time before Chinese greentech improves through the well-known Chinese propensity to grow domestic companies by innovating, based at first on importing foreign technology and assimilating it. As energy policy analyst Julian Wong observes:

> One of the historical features of China's technology innovation is the role of foreign technology in the innovation chain. To achieve its goals of indigenous innovation, China's government has adopted a model of "import-absorb-digest-re-innovate." Thus, the early stages of all technology development include heavy reliance on foreign technologies.[90]

Over time, much as Japanese and Korean automakers have evolved over the past few decades, Chinese greentech firms may eventually close the gap and sell more sophisticated products. Even if Chinese solar and wind technology improves, however, the greentech industry in the United States is hardly standing still. Unlike a moribund Rust Belt industry ripe for trampling by foreign companies, it is growing and providing more products to the domestic and global markets.[91] The cost advantages of Chinese firms may eventually fade,[92] or the gap may close. Chinese workers increasingly are demanding higher wages and better working conditions.[93] Foreign firms are increasingly taking another strategy to cut costs: building their own manufacturing plants in China.[94] Some greentech, like the larger com-

86. *Id.*

87. *Id.*

88. *See, e.g.*, de la Tour, Glachant & Ménière, *supra* note 83, at 16.

89. Wong, *supra* note 69, at 7.

90. *Id.*

91. As but one example of this growth, see Herman K. Trabish, *The Birth of a U.S. Wind Power Manufacturing Industry*, WIRED (Aug. 15, 2010), http://www.wired.com/epicenter/2010/08/wind-power-industry/#ixzz0x5attOL6 (noting that "five U.S. turbine manufacturers in operation in 2005 grew to 15 in 2009").

92. Bradsher, *On Clean Energy, China Skirts Rules*, *supra* note 17 ("Because China's clean energy industry has relied so heavily on land deals and cheap state-supported loans, the industry could be vulnerable if China's real estate bubble bursts, or if the banks' loose lending creates financial problems of the sort that have plagued Western financial markets in recent years.").

93. *See, e.g.*, Richard Brubaker, *Chinese Employees are Going for More Frequent Walks*, ALL ROADS LEAD TO CHINA (July 19, 2010), http://www.allroadsleadtochina.com/2010/07/19/employees-are-going-for-a-walk-more-frequently/; Shaun Rein, *Three Big Trends Changing China for Multinationals*, FORBES (Aug. 24, 2010), http://www.forbes.com/2010/08/24/china-multinationals-branding-leadership-careers-rein.html.

94. Hout, *supra* note 77.

ponents of wind turbines, is heavy and expensive to transport.[95] In the American market, the costs of shipping large turbines from China might outweigh higher domestic labor costs. And American greentech firms enjoy other cost advantages, such as preferential tax policies.[96]

On the whole, then, Chinese firms are not yet invincible juggernauts displacing their foreign counterparts. To assert that as a fact is simply erroneous. Further, while predictions of dominance may or may not be accurate, the real question may be whether it matters. Americans may perceive, rightly or wrongly, that Chinese firms are about to dominate this sector. There is obvious concern at the highest levels of the United States government, as the USTR investigation and high-level discussions and trade missions involving the American and Chinese governments suggest.[97] Some retort that fear of Chinese firms is as overblown as rhetoric in the 1980s claiming that mighty Japan was about to dominate the world economic scene.[98] Who is correct? The picture is muddled and leaves room for arguments based on fear of what the Chinese firms *might* do.

Setting up China as an economic bogeyman has a potential drawback: it could imperil the bumpy economic relationship between the two nations. If American companies' biggest fear is being shut out of the Chinese greentech market, portraying Chinese companies as participants in a competition can easily lead to an arms race where each nation erects protectionist barriers to the other's firms. In this zero sum game, there may be one winner,

95. *Id.* (noting a "bias in favor of local sourcing" because "shipping wind power apparatus is heavy and awkward"); Trabish, *supra* note 91; *Chinese Wind Turbine Manufacturers' Global Expansion: The Dream and The Reality*, supra note 54.

96. Wong, *supra* note 69, at 8; Bradsher, *On Clean Energy, China Skirts Rules*, supra note 17 ("Many state and local governments in the United States have also built roads, installed power lines and made other infrastructure improvements that have increased the value of private land as part of programs to attract clean energy. Tax holidays for such businesses are common in the United States, as in China.").

97. *US Cleantech Trade Mission Heads to China to Boost US Exports*, ENERGY CHINA FORUM (May 18, 2010), http://www.energychinaforum.com/news/35466.shtml.

98. Dan Harris, *Why China Won't Rule Tech.*, CHINA LAW BLOG (July 15, 2010), http://www.chinalawblog.com/2010/07/why_china_wont_rule_tech.html (stating that "[the] arguments are no different than the arguments that were being made about Russia in the 1960s and about Japan in the 1980s and neither country is really anywhere these days on the technology map"). *See also* Epstein, *supra* note 43 (observing that "we should remember Japan's seeming invincibility in the 1980's and the stunning two decades of stagnation that followed when we look at China now").

It would hardly be surprising if objections to Chinese involvement in the United States looked remarkably similar to those of the 1980s regarding Japanese investment. One recent report claims

> nothing in the review of U.S. reactions to the boom in Japanese FDI suggests that the experience will not be repeated in the case of another formidable East Asian nation, particularly one that does not share many of the strategic, political and military common interests with the U.S. that muted and cabined the investment friction vis-à-vis Japan.

Curtis J. Milhaupt, *Is the U.S. Ready for FDI from China? Lessons from Japan's Experience in the 1980s*, *in* INVESTING IN THE UNITED STATES: IS THE US READY FOR FDI FROM CHINA? (Karl P. Sauvant ed., 2008), *available at* www.vcc.columbia.edu/pubs/documents/MilhauptFinalEnglish.pdf.

or none at all. Some have argued that for this reason alone, it would be best to drop the rhetoric about a green energy race.[99]

2. Central Government Support

> Despite early hiccups, it is now clear that the important reforms included in China's 2005 Renewable Energy Law have been implemented with a speed and effectiveness that most countries can only envy.[100]

Observers believe China's national government offers consistent and committed support to the greentech sector. They contrast this commitment with our woeful levels of research and development on renewables, our inability to agree on national standards for deployment of renewables, and other signs of relative inactivity, and find our efforts wanting.

In this view, China's authoritarian government is not a barrier to progress, but a major facilitator of it. A Communist nation with a central government planning process need not concern itself with pesky hindrances like the agendas of 538 Senators and Representatives, so it can develop renewables far more quickly.[101] This is hardly the first time that some have claimed that Communism creates more favorable conditions for a sustained technological undertaking. In 1957, after the launch of Sputnik, the famed rocket scientist Wernher von Braun is reputed to have said from his base in Huntsville, Alabama, that "because of some idiotic bureaucratic imperatives, someone else had beaten him to it [a satellite launch]."[102] We know how the rest of that story turned out in the 1960s.

99. McElwee, *supra* note 24.

100. RENEWABLES, *supra* note 47, at 52.

101. Kachan, *supra* note 74 ("China is making decisions quickly, and isn't encumbered by democratic process."); Todd Woody, *The Next Great Leap Forward: China Powers the Global Green Tech Revolution*, GRIST (Jan. 11, 2010), http://www.grist.org/article/2010-01-11-china-powers-global-green-tech-revolution/ ("In a one-party state, a government official saying, 'Make it so,' can remove obstacles to any given project and allocate resources for its development."); *10 Reasons Why China is the Greentech Leader,* SOLAR FEEDS (Aug. 27, 2010), http://www.solarfeeds.com/green-chip-stocks/14040-10-reasons-why-china-is-the-cleantech-leader ("And unlike a western democracy, when China's central leaders make up their minds, action follows quickly."). As an example, the article *China Has Already Surpassed the U.S. in Cleantech* notes that "in less time than it took the U.S. DOE to do stage 1 of an application review for a 92 MW project in New Mexico, China approved, signed and is ready to begin construction this year on a 20 times bigger project." Kachan, *supra* note 74. *See also* Bradsher, *On Clean Energy, China Skirts Rules*, *supra* note 17 (noting that the Sunzone firm obtained permits for and constructed a solar panel manufacturing plant in less than a year, far shorter than the process would taken in the United States).

102. MATTHEW BRZEZINSKI, RED MOON RISING: SPUTNIK AND THE HIDDEN RIVALRIES THAT IGNITED THE SPACE AGE 166 (2007). *See also* John Noble Wilford, *With Fear and Wonder in its Wake, Sputnik Lifted Us into the Future*, N.Y. TIMES, Sept. 25, 2007, http://www.nytimes.com/2007/09/25/science/space/25sput.html?pagewanted=all (Sputnik's launch "plunged Americans into a crisis of self-confidence" and caused them to wonder: "Were the institutions of liberal democracy any match in competition with an authoritarian communist society?").

Those claiming China's government is more efficient at greentech policy have a blind spot for history, as one usually does not associate "nimble" with a society that operates by five-year development plans:[103] think of the Soviet Five-Year Plans and *Animal Farm*.[104] Any view of the Chinese energy policy process that paints government support for greentech as strong, unwavering, and consistent is overly simplistic and has little to recommend it. China's National Energy Administration is about to release a ten-year plan for greentech development, which some find a persuasive blueprint for comprehensive support (although its details have not yet been released).[105] However, the reality is that China occasionally struggles to find consistency in its greentech policies. There are numerous policy options available,[106] and China has experimented with a wide variety of them.[107] Some have led to considerable progress,[108] such as the Renewable Energy Law and the 2009 stimulus package,[109] but others, including frequent reorganizations of the governmental energy bureaucracy, have been less successful.[110]

The most frequently cited instance of government support is direct financial aid, in the form of low-interest loans, export promotion, and other aid such as subsidized land made available to renewable energy developers.[111] The USTR investigation petition cites five areas in which it believes the Chinese are acting unfairly, one of which is "prohibited subsidies to

103. *See, e.g.*, Cindy Fan, *China's Eleventh Five-Year Plan (2006–2010): From "Getting Rich First" to "Common Prosperity,"* 47 EURASIAN GEOGRAPHY & ECON. 708 (2006), *available at* www.sscnet.ucla.edu/geog/downloads/597/300.pdf (discussing the Eleventh Five-Year Plan for 2006–2010 and its language attempting to correct problems such as income inequality).

104. GEORGE ORWELL, ANIMAL FARM (1946).

105. Julian L. Wong, *Green Hops: It's Been a While! (And the Next May Be for a While)*, GREEN LEAP FORWARD (July 31, 2010), http://greenleapforward.com/2010/07/31/green-hops-its-been-a-while-and-the-next-may-be-for-a-while/.

106. *See* CTR. FOR AM. PROGRESS, *supra* note 32, at 3 (listing numerous governmental policies under the headings of Markets, Financing, and Infrastructure); RENEWABLES, *supra* note 47, at 35–46 (describing policies adopted in nations around the world).

107. Eisen, *supra* note 2; CHINA GREENTECH INITIATIVE, *supra* note 35, at 48–55 (listing and discussing governmental laws, policies, and programs).

108. Martinot & Junfeng, *supra* note 50 (discussing impacts of recent policy changes).

109. The $4 trillion RMB ($586 billion) package contained billions of dollars worth of incentives for green projects. CHINA GREENTECH INITIATIVE, *supra* note 35, at 50, states that $31 billion of the stimulus package was for green investments. Caution about that figure is warranted. An analysis by Julian Wong shows that "All that Glitters is Not Green," in that "bullish" estimates of which specific parts of the package would have green impact are overstated. Julian L. Wong, *How Green is China's Stimulus Package*, GREEN LEAP FORWARD (March 3, 2010), http://greenleapforward.com/2010/03/03/how-green-is-chinas-stimulus-package/.

110. Eisen, *supra* note 2; Wong, *supra* note 69, at 7 (noting that with respect to China's greentech R&D programs, "while some of these programs have been in place for nearly two decades, it is not clear that they are yielding the hoped-for results").

111. Bradsher, *On Clean Energy, China Skirts Rules*, *supra* note 17.

green technology."[112] These financial incentives include the Ministry of Finance's "Special Fund for Wind Manufacturing," the Ministry of Finance and Ministry of Commerce's "Export Product Research and Development Fund," and the provision of financing through export credits by China's Export-Import Bank.[113] The state-owned China Development Bank made $42 billion in loans in 2010 to solar and wind energy companies,[114] a sum that well exceeds comparable financing levels in the United States.[115]

Yet some of China's other policies, such as pricing benchmarks for electricity generated from renewables added to the national electricity grid, have been anything but consistently encouraging to the greentech sector. Over the past two years, prices in China's feed-in tariff for solar have been inconsistent across the country.[116] The National Development and Reform Commission (NDRC) sets solar on-grid prices, and announced in 2009 that it intended to set benchmark levels for solar pricing. As of late 2010 it had not done this, relying instead on ad hoc bidding.[117] The most recent project priced in late summer 2010 involved a consortium of Chinese firms proposing a feed-in tariff of 0.73 renminbi (RMB, $0.108 at 6.8 RMB to the dollar) per kilowatt-hour for a new solar project in the Ningxia region.[118] This was more than one-third less than the price accepted in a previous project's winning bid, which suggests that these firms were willing to accept lower rates in return for their optimism that eventually there will be further development of solar power.[119] While the winning bidder was not announced, the low price suggests it may have been a state-owned enterprise (SOE) that need not show a profit and could undercut a private company's bid. This hybrid system of state-owned and private companies competing for the same projects is cited in the USTR investigation petition as disfavoring competition.[120] It is an ongoing challenge to progress in China's energy

112. Pet. for Relief Under Section 301 of the Trade Act of 1974, as Amended, 63.

113. *Id.* at 66–83.

114. Natalie Obiko Pearson, *Chinese Government 'Confused' by U.S. Probe of Green Aid, Trade Group Says*, BLOOMBERG, Oct. 27, 2010, http://www.bloomberg.com/news/2010-10-27/chinese-government-confused-by-u-s-probe-of-green-aid-trade-group-says.html.

115. Joel Kirkland, *Tax Cuts, Renewable Energy Grants Attract Unlikely Allies*, N.Y. TIMES, Apr. 16, 2010, http://www.nytimes.com/cwire/2010/04/16/16climatewire-tax-cuts-renewable-energy-grants-attract-unl-12659.html (largest program totals $5 billion).

116. CHINA GREENTECH INITIATIVE, *supra* note 35, at 104 (noting that "substantial policy divergence has occurred" in this area "at local levels across China").

117. Eisen, *supra* note 2.

118. Jim Bai & Aizhu Chen, *China Firms Offer $0.108/kWh Feed-In Rate in Solar Tender:Source*, REUTERS, Aug. 16, 2010, http://www.reuters.com/article/idUSTRE67F2BJ20100816?type=GCA-GreenBusiness.

119. *Id.*

120. Pet. for Relief Under Section 301 of the Trade Act of 1974, as Amended, 95–96.

system,[121] and as one report observes, "lack of competition reduces efficiencies and innovation that come from open and competitive markets."[122]

Until 2009, a bidding tender system was also in place for electricity generated from wind turbines above 50 MW. That system was criticized for failing to promote wind power development.[123] For smaller wind installations, provincial governments set pricing policies on an ad hoc, project specific basis, which provided little long-run guidance on pricing. The USTR investigation petition also claims that these local procurement processes disfavored foreign firms by being essentially closed to non-Chinese bidding.[124] A new system of "zonal tariffs" largely replaced the previous pricing scheme, but it is too early to tell whether it will encourage more wind power development over the long term.

Observers of the Chinese government's energy and environmental policies have learned that the Chinese government is not infallible, nor does it always act as rapidly as some believe.[125] No fewer than nineteen governmental bodies have responsibility for some aspect of greentech policy.[126] There are inevitable delays in coordination. Ambitious announcements, as in the case of the solar feed-in tariff, are not always translated quickly into concrete policies.[127] The gap between announcement and im-

121. Wang Mingyuan, *Issues Related to the Implementation of China's Energy Law: Analysis of the Energy Conservation Law and the Renewable Energy Law as Examples*, 8 VT. J. ENVTL. L. 225, 248 (2007) (observing that "[t]he lack of open, fair, regulated, and orderly market competition mechanisms in the energy sector is a fundamental hindrance to renewable energy development and to the Renewable Energy Law's implementation"). SOEs continue to be an important part of China's economic landscape. *See* Michael Wines, *China Fortifies State Businesses to Fuel Growth*, N.Y. TIMES, Aug. 29, 2010, http://www.nytimes.com/2010/08/30/world/asia/30china.html. For an intriguing analysis that China's reliance on SOEs will eventually undercut its economic growth, see Paul Denlinger, *China's Outdated Practice of Capitalism*, FORBES BLOGS (Aug. 24, 2010, 12:00 AM), http://blogs.forbes.com/china/2010/08/24/chinas-outdated-practice-of-capitalism/?boxes=Homepagechannels.

122. CHINA GREENTECH INITIATIVE, *supra* note 35, at 87.

123. *See* LI JUNFENG, SHI JINGLI, XIE HONGWEN, SONG YANQIN & SHI PENGFEI, A STUDY ON THE PRICING POLICY OF WIND POWER IN CHINA 1–2 (2006), *available at* http://www.gwec.net/fileadmin/documents/Publications/Report%20wind-power-price-policy%20china.pdf. Commenting on the report, Li Junfeng, Director of the China Renewable Energy Industry Association, observed that in China, "wind power is a new industry and it still needs support. The current pricing policy does not match the goal of supporting wind development, and it has to be changed." *A Study on the Pricing Policy of Wind Power in China*, GLOBAL WIND ENERGY COUNCIL, http://www.gwec.net/index.php?id=156 (last visited Oct. 6, 2010).

124. Pet. for Relief Under Section 301 of the Trade Act of 1974, as Amended, 96–97.

125. *See, e.g.*, Mingyuan, *supra* note 121, at 249 (comment of Tsinghua University professor Wang Mingyuan that in the central government, "the lack of assessment and feedback mechanisms results in legislation and policy that cannot be modified or improved in a timely fashion during the implementation").

126. CHINA GREENTECH INITIATIVE, *supra* note 35, at 44 (listing the agencies and their areas of responsibility).

127. Eric Savitz, *Solar: China Feed-In-Tariff Could Be 2 Years Away*, BARRON'S Blogs (Sept. 17, 2009, 2:43 PM), http://blogs.barrons.com/techtraderdaily/2009/09/17/solar-china-feed-in-tariff-could-

plementation is important, because national proclamations tend to be broad frameworks requiring implementation by administrative organs of the national government. Unlike the American system, where public involvement can help steer the actions of administrative agencies, the Chinese government has little accountability to accomplish its advertised objectives.[128] Key personnel changes in the inner circle of the Chinese Communist Party can make for policy reversals or alterations.

The Chinese government's top-down nature creates enormous reliance on provincial and local governments to implement national policies. Robust policy announcements by Beijing do not easily translate to reality on the ground in the provinces,[129] and coordination between national and local officials is always difficult.[130] Implementation at the local level is not always uniform across the nation.[131] The structure for local enforcement of national environmental and energy policies is just beginning to develop, and it lags badly in localities outside of major cities.[132] Local officials often have incentives built into their job goals to prefer projects that can deliver short-term profits,[133] not renewable energy projects that might not pan out for years.[134] Some local governments have direct conflicts of interest between their responsibilities to promote growth of SOEs and their mandates to implement national policies.[135]

The perception that China's government is unwaveringly committed to supporting greentech is often accepted uncritically, without these or any other caveats. Observers may not always grasp the nuances of Chinese governmental action on greentech and often jump to conclusions that might

be-2-years-away/. This projection was confirmed by the prevalence of ad hoc bidding over the next two years. *See* Jim Bai & Aizhu Chen, *China Firms Offer $0.108/kWh Feed-in Rate in Solar Tender: Source*, REUTERS, Aug. 16, 2010, http://www.reuters.com/article/idUSTRE67F2BJ20100816. *See* Wong, *supra* note 105 (noting that the mid-2010 bidding was the "latest indication that authorities are not quite ready with the idea of a national feed-in tariff for solar").

128. *See, e.g.*, *Development Trend of China's Administrative Accountability Study*, FREE PAPER DOWNLOAD CENTER (July 3, 2010), http://www.hi138.com/e/?i72718 (noting that "China has just begun the implementation of administrative accountability").

129. Mingyuan, *supra* note 121, at 249 (noting that "as China is a large country with unbalanced regional development, uniform national legislation often fails to consider local characteristics and is not specific or adaptable to local needs").

130. This marvelous bit of understatement is found in CHINA GREENTECH INITIATIVE, *supra* note 35, at 91.

131. *Id.*

132. *Id.* at 92–93.

133. Mingyuan, *supra* note 121, at 237 (noting that "[s]ome localities and departments still compare expected growth rate goals, and only talk idly of energy conservation and environmental protection").

134. *Id.* at 245 (observing that "most thermal power projects are larger in scale, attract greater investment, bring about faster results, and are more profitable than renewable energy projects").

135. CHINA GREENTECH INITIATIVE, *supra* note 35, at 92.

be erroneous or oversimplified. It is easy to contrast China's supposed progress with the United States' apparent lack of follow-through. One example—implementation of emissions trading schemes—demonstrates how that rhetoric can miss the mark. In summer 2010, climate bills failed in the Senate, and it became clear that the United States was not going to adopt a cap-and-trade scheme regulating greenhouse gas emissions. At the same time, China announced that it planned to adopt a trading scheme in its new Five-Year Plan for national economic development.[136] Some pounced on this contrast, suggesting that China was about to succeed where the United States was not.[137]

A closer look at this announcement suggests otherwise. Even if the Chinese government follows through on its announced plan, it will take considerable time to craft an actual scheme and to get it up and running. Cap-and-trade schemes in Europe and the United States took several years from the beginning of their design to commencement of operations.[138] The apparent scope of China's planned effort is laudable, but hardly the sort of initiative that shows that the United States is lagging. There apparently was debate about whether "pilot carbon trade projects should start from a selected industry, or a certain area."[139] Thus, it appears that the initial project as implemented will probably be closer in scope to the utility-only scheme of the ongoing Regional Greenhouse Gas Initiative in American northeastern states.[140] The United States, it would seem, is not behind, but actually ahead.[141]

This tendency of misperception is reminiscent of the space race era. Throughout much of the 1950s, we had little hard information on the

136. Li Jing, *Carbon Trading in Pipeline*, CHINA DAILY, July 22, 2010, http://chinadaily.com.cn/china/2010-07/22/content_11033249.htm.

137. Friedman, *We're Gonna Be Sorry*, *supra* note 6 (noting that "[j]ust as the U.S. Senate was abandoning plans for a U.S. cap-and-trade system, this article [about the Chinese plan] ran in The China Daily").

138. *See* A. Denny Ellerman, *The EU Emission Trading Scheme: A Prototype Global System?*, HARV. PROJECT ON INT'L CLIMATE AGREEMENTS, August 2008, at 3, *available at* http://belfercenter.ksg.harvard.edu/files/Ellerman11.pdf (describing the progress of the EU-ETS).

139. Jing, *supra* note 136.

140. *Welcome*, REGIONAL GREENHOUSE GAS INITIATIVE, http://rggi.org/home (last visited Oct. 6, 2010). For descriptions of the RGGI program, see William Funk, *Constitutional Implications of Regional CO_2 Cap-and-Trade Programs: The Northeast Regional Greenhouse Gas Initiative as a Case in Point*, 27 UCLA J. ENVTL. L. & POL'Y 353 (2009), *available at http://www.law.ucla.edu/jelp/Articles/27-2%20Article/UCLA%20JELP%2027-2%20Funk.pdf*; Steven Ferrey, *Goblets of Fire: Potential Constitutional Impediments to the Regulation of Global Warming*, 35 ECOLOGY L.Q. 835 (2008), *available at http://www.boalt.org/elq/documents/elq35-4-04-ferrey-2009-0309.pdf*.

141. A carbon trading executive active in the Asian market estimated in 2010 that it would be 2015 before China had a scheme in place. *China Renewables to Power Ahead Without CDM*, ENERGY CHINA FORUM (Aug. 23, 2010), http://www.energychinaforum.com/news/39477.shtml.

U.S.S.R.'s activities, and consistently over- or underestimated the nature of its government's commitment to the space program. Warnings in the popular press that the U.S.S.R. was about to launch a satellite were roundly ignored, as many believed the nation was simply incapable of doing so.[142] At a Congressional hearing, a Senator laughed at the suggestion that the U.S.S.R. could soon be in space.[143] Meanwhile, fears about the U.S.S.R.'s ability to build a bomber capable of striking the United States prompted a massive buildup of air power and spending on missiles to close the so-called "missile gap," in which we built more than twenty times as many planes as the Soviets.[144] Those fears later turned out to be overblown, but by 1957 we had made our commitment, churning out large numbers of planes while our space program languished.

There may be comparable errors in our evaluation of China's commitment to developing greentech. It is difficult to obtain accurate information from China's national government, which is both famously secretive about its intentions and actions, and prone to frequent releases of propaganda (as any reader of Xinhua knows).[145] Information routinely made available in the West is often protected in China as state secrets, and recent efforts to promote a FOIA-like freedom of information regime[146] have shown just how difficult it is to understand governmental actions with anything resembling accuracy.[147] One example from the greentech sector will suffice: according to the USTR investigation petition, "there is a lack of

142. BRZEZINSKI, *supra* note 102, at 136.

143. *Id.* at 135.

144. *Id.* at 58; Jacob Neufeld, *Technology Push, Colloquium on Contemporary History*, NAVAL HIST. & HERITAGE COMMAND (Sept. 23, 2003), http://www.history.navy.mil/colloquia/cch9c.html (noting that "[i]n the wake of Sputnik there emerged the so-called 'missile gap,' a highly-publicized notion that the Soviet Union was poised to surpass the United States in numbers of strategic missiles."); Wilford, *supra* note 102 (observing that "[a]n exaggerated estimate of the 'missile gap' became a rallying cry of the 1960 presidential campaign and may have been crucial in Kennedy's narrow victory").

145. *See generally* David Shambaugh, *China's Propaganda System: Institutions, Processes, and Efficacy*, 57 CHINA J. 25 (2007), *available at* web.rollins.edu/~tlairson/china/chipropaganda.pdf. Shambaugh describes the Chinese propaganda system as a "sprawling bureaucratic establishment, extending into virtually every medium concerned with the dissemination of information." *Id.* at 27. "Xinhua" is the Xinhua News Agency, the official press agency of the People's Republic of China, which, Shambaugh notes, "has always had a dual role: to report news and to disseminate Party and state propaganda." *Id.* at 44. Many in the West cite stories from Xinhua without this important context.

146. Jamie P. Horsley, *China Adopts First Nationwide Open Government Information Regulations*, FREEDOMINFO.ORG (May 9, 2007), *available at* www.law.yale.edu/documents/pdf/Intellectual_Life/Ch_China_Adopts_1st_OGI_Regulations.pdf (discussing the Regulations of the People's Republic of China on Open Government Information).

147. A 2010 workshop on transparency in reporting of environmental information and accompanying report by the Natural Resources Defense Council found that there had been a "good start on open information" but that the system had a long way to go. Alex Wang, *Assessing the State of Environmental Transparency in China*, SWITCHBOARD: NAT. RESOURCES DEF. COUNCIL STAFF BLOG (June 7, 2010), http://switchboard.nrdc.org/blogs/awang/assessing_the_state_of_environ.html.

official, detailed information regarding the terms upon which financing is provided by China ExIm Bank."[148]

Recently, government ministries have made considerable efforts to explain their actions in English. Even when information is available in English, however, it is often written in a dense Communist prose that makes it difficult to decipher. A handful of Western observers have made great strides to parse through the inner workings of the Chinese governmental structure in excellent blogs devoted to China's energy and environmental law and policy.[149] Yet even their detailed and determined efforts rely from time to time on hunches and guesswork when the central government has not seen fit to connect the dots about its intentions. Thus, sweeping pronouncements about the Chinese government's intentions and policies should be avoided when possible.

3. The Results Speak for Themselves . . . Or Do They?

Commentators routinely invoke greentech deployment statistics to show that we are losing the green energy race. By some metrics, Chinese progress is impressive. In 2009, China obtained a much larger share of its electricity from renewable sources than the United States did (17% versus 8.8%),[150] but this figure is skewed by the predominance of hydroelectric generation in China,[151] especially the output from the mammoth Three Gorges Dam project.[152] China is expanding its use of hydropower, but because it has controversial environmental impacts and is a mature technology, it is not often included in discussion of a greentech race.

In solar and wind power, the picture is a bit less clear. China added 13.8 GW of new wind power capacity to 10.0 GW for the United States in 2009,[153] but its installed total capacity still trailed that of the United States (35.1 GW versus 25.8 GW). Those numbers cannot be compared directly,

148. Pet. for Relief Under Section 301 of the Trade Act of 1974, as Amended, 78.

149. Notable English language blogs on China's environmental and energy policies include CHINA ENVTL. L., http://www.chinaenvironmentallaw.com/, GREEN L., http://www.greenlaw.org.cn, and GREEN LEAP FORWARD, http://greenleapforward.com/. In addition, a number of commentators provide information on Twitter, including energy consultants Chris Brown (using the name "@chrisrbrown") and Alexander Conrad (@darnoc).

150. RENEWABLES, *supra* note 47, at 59

151. REN21 RENEWABLE ENERGY POLICY NETWORK FOR THE 21ST CENTURY, RECOMMENDATIONS FOR IMPROVING THE EFFECTIVENESS OF RENEWABLE ENERGY POLICIES IN CHINA 7 (2009), *available at* http://www.ren21.net/pdf/Recommendations_for_RE_Policies_in_China.pdf (noting that of the 586.7 terawatt-hours ("TWh") of electricity generated from renewables in China in 2008, all but 22.0 TWh came from hydropower projects).

152. David Biello, *The Dam Building Boom: Right Path to Clean Energy?*, YALE ENV'T 360 (Feb. 23, 2009), http://e360.yale.edu/content/feature.msp?id=2119.

153. RENEWABLES, *supra* note 47, at 54 tbl.R2.

though, as China's wind projects have been less efficient than those elsewhere.[154] In 2009, China had a mere 0.4 GW of grid-connected solar photovoltaic capacity,[155] though it pledged to meet a much higher target by 2020.[156] The United States had a larger 1.2 GW of installed PV capacity, still far less than world leader Germany's 9.8 GW. China had substantially more solar hot water heater capacity and has outdone the United States almost sixty-fold.[157]

At present, then, China is not outstripping the United States in total installed capacity, but it might if it achieves its ambitious targets for 2020—30 GW for wind (or possibly 100 GW, according to recent reports that the targets would be increased) and 1.8 GW for solar PV (or possibly as much as an astounding 20 GW).[158] The general manager of the State Grid Corporation has stated that total renewable energy capacity in the nation will triple to 600 GW by 2020.[159] However, that projection should contain the qualifier that much of the increase will be in hydropower.[160] And apples should be compared to apples: Europe and the United States also plan to increase installed capacity substantially above current levels by 2020.[161]

Even if all the planned greentech is deployed in China, actual utilization might lag behind installed capacity.[162] Solar and wind installations

154. *See* CHINA GREENTECH INITIATIVE, *supra* note 35, at 87–88 (discussing reasons for lower efficiency in earlier installed wind farms).

155. RENEWABLES, *supra* note 47, at 55 tbl.R4. China did have more installed capacity per unit of gross domestic product, however. Wong, *supra* note 60.

156. CHINA GREENTECH INITIATIVE, *supra* note 35, at 36 fig.21; *see also* LI JUNFENG, WANG SICHENG, ZHANG MINJI & MA LINGJUAN, CHINA SOLAR PV REPORT 11 tbl.6 (2007), *available at* www.wwfchina.org/english/downloads/ClimateChange/china-pv-report-en.pdf (comparing China's goal to estimates of installed PV capacity in other nations).

157. RENEWABLES, *supra* note 47, at 56 tbl.R5.

158. CHINA GREENTECH INITIATIVE, *supra* note 35, at 36 fig.21. The lower targets are contained in the Medium and Long Term Development Plan for Renewable Energy, and the higher figures are based on reports of new targets likely to be contained in the National Energy Administration's ten-year plan. *See, e.g.*, Kevin Mo, *Go with Wind: China to Dramatically Boost its Wind Power Capacity, Again*, SWITCHBOARD: NAT. RESOURCES DEF. COUNCIL STAFF BLOG (July 21, 2009), http://switchboard.nrdc.org/blogs/kmo/go_with_wind_china_to_dramatic.html. *But see* Charles McElwee, *A Mighty Wind*, CHINA ENVTL. L. (May 6, 2009), http://www.chinaenvironmentallaw.com/2009/05/06/a-mighty-wind/#more-1697 (stating, "I'm not believing [new targets] until I see a formally amended copy of China's Medium & Long-Term Renewable Energy Development Plan").

159. Besta Shankar, *China Clean Power Capacity to Reach 600 GW by 2020: Report*, INT'L BUS. TIMES, July 27, 2010, http://www.ibtimes.com/articles/38685/20100727/iea-clean-energy-state-grid-corp-hydropower-smart-grid-renewable-energy-wind-solar-carbon-dioxide-em.htm. Current installed capacity of all renewables in China is 226 GW. RENEWABLES, *supra* note 47, at 10.

160. According to projections about increased 2020 targets, 300 GW of capacity—far more than wind and solar combined—would be in hydropower. CHINA GREENTECH INITIATIVE, *supra* note 35, at 36 fig.21.

161. JUNFENG ET AL., *supra* note 156, at 11 tbl.6 (listing predictions for 2020).

162. Eisen, *supra* note 2.

experience difficulties in connecting to the country's transmission grid, so actual power supplied falls short of capacity.[163] A national effort to upgrade the grid is underway,[164] but there are considerable challenges today involved in dispatching solar and wind power resources. The "mandated market share" requirement applies to the country's major utilities and requires each to obtain 8% of capacity and 3% of actual generation from renewables by 2020.[165] A 2008 report concluded that even the near-term requirement that utilities get 1% of actual generation from renewables in 2010 would be "challenging."[166]

Some point to a different metric: annual investment by Chinese firms in renewable energy technology. Asset financing levels in China have recently outpaced those of American firms.[167] According to a recent report by the Pew Charitable Trusts,[168] "China took the top spot for overall clean energy finance and investment in 2009, pushing the United States into second place."[169] In 2009, Chinese spending (excluding R&D) totaled $34.6 billion to $18.6 billion for the United States,[170] although the same report did note that "overall clean energy finance and investment in the United States more than doubled during the past five years."[171] However, as the spending levels are within the same order of magnitude, it does not

163. Bradbord Plumer, *Nice Wind Farm, But So What?*, NEW REPUBLIC (June 1, 2010), http://www.tnr.com/blog/the-vine/75231/nice-wind-farm-so-what (noting that because of the challenges in upgrading the grid, "a lot of that wind and solar capacity could end up getting wasted, and some of it already does").

164. *See, e.g.*, Martinot & Junfeng, *supra* note 50 (discussing grid-related provisions in the recent update to the Renewable Energy Law).

165. These targets were specified in the Medium and Long Term Plan for Renewable Energy Development. For a discussion of this, see Chunbo Ma & Lining He, *From State Monopoly to Renewable Portfolio: Restructuring China's Electric Utility*, 36 ENERGY POL'Y 1697, 1706 (2008), *available at* http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1290737. *See also* Eric Martinot & Li Junfeng, *Renewable Energy Policy Update For China, China's Latest Leap: An Update on Renewables Policy*, RENEWABLE ENERGY WORLD (July 21, 2010), http://www.renewableenergyworld.com/rea/news/print/article/2010/07/renewable-energy-policy-update-for-china; *GWEC Reports on Wind Power in China*, OFFSHORE WIND (Apr. 26, 2010), http://www.offshorewind.biz/2010/04/26/gwec-reports-on-wind-power-in-china/.

166. Ma & He, *supra* note 165, at 1707; *see also* Christina Larson, *A Climate Dilemma for China: The World Leader in Economic Growth and Carbon Emissions Faces Competing Forces*, CENTER FOR PUB. INTEGRITY (Nov. 12, 2009), http://www.publicintegrity.org/investigations/global_climate_change_lobby/articles/entry/1801/ (stating that utilities were struggling to meet the requirement).

167. RENEWABLES, *supra* note 47, at 28 (stating that Chinese asset financing was $29.2 billion in 2009, up from $22 billion in 2008 and nearly two times the U.S. figure of $10.7 billion). *See also* Jeremy van Loon & Alex Morales, *China Surges Past U.S., Europe in Clean-Energy Asset Financing*, BLOOMBERG BUSINESSWEEK, July 13, 2010, http://www.businessweek.com/news/2010-07-13/china-surges-past-u-s-europe-in-clean-energy-asset-financing.html.

168. THE PEW CHARITABLE TRUSTS, *supra* note 14.

169. *Id.* at 7.

170. *Id.* at 7 fig.4.

171. *Id.* at 10.

seem that this in and of itself is reason for panic. The real fear with respect to financing levels seems to be that if the United States does not adopt progressive climate measures (including a cap-and-trade law), it will fall further behind China.[172] As I discuss below, that argument militates in favor of renewed efforts in the United States to strengthen climate policies, not a policy of greentech warring with China.

The market data has inherent appeal as a set of statistics that seems to neatly capture the spirit of American inaction on renewables. What is its real significance, however? Does it matter, except for international bragging rights, whether the United States or China occupies the top spot in a table of solar and wind investment or installed capacity? Would it even matter if China's installed capacity were an order of magnitude larger than that of the United States?

The total investment figures or gigawatts of renewable energy capacity installed should not be viewed as a complete measure of the success of a national greentech policy. Those figures do not tell us how China is moving toward reducing its usage of fossil fuels and achieving climate goals. The stakes are very high. As I will discuss below, China must have sufficient domestic policies in place (including greentech deployment plans) if the global effort to reduce greenhouse gas emissions is to succeed.

In the overall energy picture, China's record is mixed. China is adding renewable energy capacity rapidly, but it is much more dependent on conventional fossil fuel generation than the United States. Coal accounts for a staggering 70% of the nation's electricity generation capacity.[173] Even large deployment of renewables will not enable China to reduce that number substantially over the next decade.[174] And that only tells part of the story. In recent years, China has become a voracious energy user. Its rapid annual growth and increasing appetite of its citizens for modern conveniences and luxuries has resulted in rapid increases in energy demand.[175] In 2010, China achieved the dubious milestone of surpassing the United States

172. *Id.* (noting that "[d]omestic policy decisions appear to have shifted the competitive positions of G-20 member countries").

173. *China's Power Generation Goes Greener with Total Capacity up 10%*, XINHUA NEWS AGENCY (Jan. 7, 2010), http://news.xinhuanet.com/english/2010-01/07/content_12771880.htm (coal-fired power accounted for 74.6% of the nation's 874 million kW of electricity generation capacity in 2009); U.S. DEP'T OF ENERGY, ENERGY INFO. ADMIN., INDEP. STATISTICS AND ANALYSIS, COUNTRY ANALYSIS BRIEFS: CHINA (2009), http://www.eia.doe.gov/cabs/China/pdf.pdf (2006 data); Ma & He, *supra* note 165, at 1698.

174. CHINA GREENTECH INITIATIVE, *supra* note 35, at 40 (noting that "even if China were to achieve its target of deriving 20% of energy from renewable sources by 2020, most of the non-renewable energy would still be derived from coal"); Ma & He, *supra* note 165, at 1707.

175. CHINA GREENTECH INITIATIVE, *supra* note 35, at 32–33.

as the world's largest primary energy user.[176] On the whole, its industries are far less energy-efficient than those in the United States and Japan.[177] The government's initiatives have helped improve energy efficiency,[178] but China still has a long way to go.

To satisfy its increasing energy demand, China has added much more conventional generation capacity than greentech.[179] An article on China and greentech put this bluntly, stating that "China's investment in renewable energy and other green technologies is miniscule compared to the resources devoted to its continued building of coal-fired power plants and efforts to secure dirty oil shale supplies in Canada and elsewhere."[180] In 2009, China began construction of a mammoth 13.6 GW power base fueled by coal in Gansu province, the same location planned for a much-praised 10 GW wind farm.[181] The amount of new investments in conventional technology made up over one-third of the 134.4 billion RMB (just under $20 billion) spent in the first half of 2010, according to the National Energy Board.[182] Some new plants use technology designed to reduce emissions

176. Shai Oster & Spencer Swartz, *World News: Beijing Disputes IEA Data on Energy*, WALL ST. J., July 21, 2010, http://online.wsj.com/article/NA_WSJ_PUB:SB10001424052748703720504575378243321158992.html (citing statistics from the International Energy Agency that China used 2.252 billion tons of oil equivalent in 2009 as compared to 2.17 billion tons of oil equivalent for the United States); *see also* Ann Carlson, *China's Growth in Energy Usage Truly Alarming*, LEGAL PLANET: ENVT'L L. & POL'Y BLOG (May 7, 2010), http://legalplanet.wordpress.com/2010/05/07/chinas-growth-in-energy-usage-truly-alarming/; Rezny, *supra* note 56 (citing the report and Chinese criticism that the "second largest consumer" story does not give enough weight to China's greentech investments and carbon intensity targets).

177. CHINA GREENTECH INITIATIVE, *supra* note 35, at 40; *U.S. and China Vie for Clean Energy Leadership*, *supra* note 40.

178. CHINA GREENTECH INITIATIVE, *supra* note 35, at 38–39.

179. *Two Energy Giants: A Contrast in Approach*, INST. FOR ENERGY RES. (Apr. 22, 2010), http://www.instituteforenergyresearch.org/2010/04/22/two-energy-giants-a-contrast-in-approach/ (tables showing Conventional Thermal Generating Capacity Additions in China outstripped all renewables additions—and far outpaced non-hydropower renewables—between 2005-2008).

180. Woody, *supra* note 101; *see also Two Energy Giants: A Contrast in Approach*, *supra* note 179 ("The size and scope of [China's] investments in conventional forms of energy dwarf their commitment to 'green energy.'").

181. Charlie McElwee, *China Starts Construction on 13.6GW Coal-Fired Power Base*, CHINA ENVTL. L. (Aug. 10, 2009), http://www.chinaenvironmentallaw.com/2009/08/10/china-starts-construction-on-136gw-coal-fired-power-base/. One Chinese professor claims that provincial governments have stronger incentives to build conventional plants than greentech facilities. Mingyuan, *supra* note 121, at 244–45 ("[E]ven though the State has made clear that renewable energy exploitation and utilization is an area of high priority and that key public and private actors are encouraged to be involved, some local governments are enthusiastic about, and spare no effort in, starting thermal power plants, while renewable energy generation projects are often 'pending discussion.' The objective cause of this phenomenon is that most thermal power projects are larger in scale, attract greater investment, bring about faster results, and are more profitable than renewable energy projects.").

182. 国家能源局举行2010年上半年能源经济形势发布会 [National Energy Board Held the First Half of 2010, the Economic Situation of the Energy Conference],

from coal burning, and the government is moving to retire small, higher polluting coal plants,[183] but as of 2010, China "uses more coal than the United States, Europe, and Japan combined."[184]

In short, China is adding to its greentech portfolio, but has a long way to go to address rapidly increasing demand for energy and to lessen the impacts of its growing economy on climate change. That context should be a central part of any discussion about the "clean energy race" that touts China's achievements in deploying solar panels and wind turbines or in greentech financing levels.

B. Invoking the Space Race Metaphor is Counter-Productive for Addressing Climate Change

While many believe the United States is losing the green energy race, the reality does not yet match the rhetoric.[185] However, there is supposedly much more at stake than the success of each nation's greentech sector. Without a greentech surge, the United States cannot achieve reductions in greenhouse gas emissions. A push to develop more renewable energy is an important component of virtually any credible strategy for reducing carbon emissions in the United States, from the legislation that passed the House of Representatives in 2009, to state and regional efforts and strategies proposed by independent interest groups.[186]

Failure to make progress on greentech could hamper the entire effort to address climate change, which, to some, makes this a matter of national survival. The emerging literature on "threat multiplication" is an attempt to address the relationship between climate change and national security. While a comprehensive discussion of this intriguing literature is beyond the

中华人民共和国国家发展和改革委员会 [National Development and Reform Commission], http://nyj.ndrc.gov.cn/ggtz/t20100721_362050.htm (last visited Oct. 6, 2010).

183. CHINA GREENTECH INITIATIVE, *supra* note 35, at 39.

184. Keith Bradsher, *China Outpaces U.S. in Cleaner Coal-Fired Plants*, N.Y. TIMES, May 10, 2009, http://www.nytimes.com/2009/05/11/world/asia/11coal.html.

185. *See, e.g.*, Press Release, Bloomberg New Energy Finance, Joined At The Hip: The US-China Clean Energy Relationship: Bloomberg New Energy Finance Study Debunks Myths About US-China Clean Energy Relationship (May 19, 2010), bnef.com/Download/pressreleases/116/pdffile/ (comment of Michael Liebreich, CEO of Bloomberg New Energy Finance, that "[i]t is easy to paint clean energy trade between the US and China in terms of winners and losers, but the relationship defies simplistic assumptions").

186. For a description of state and federal programs, see generally PEW CENTER ON GLOBAL CLIMATE CHANGE, http://pewclimate.org; Joseph Romm, *One Brief Shining Moment for Clean Energy: Passage of the First Climate Bill in the House Is a Big First Step to Cut Global Warming. But It's Not Enough*, SALON (June 27, 2009), http://www.salon.com/news/environment/feature/2009/06/27/waxman_markey (discussing the passage of ACES).

scope of this article, a basic understanding of it is useful to evaluating any claims that "losing" to the Chinese imperils our survival. To begin with, the "threat multiplication" idea assumes there is considerable uncertainty about how the international community will respond politically and economically to climate change. Generally speaking, uncertainty is present in two different but related situations. The first is that failure to address climate change impacts, like military conflict, has the potential to destabilize a society.[187] Recognizing this potential, experts in our military are paying increased attention to climate concerns.[188] Within China, there are also signs that policymakers view climate insecurity as a potential threat to the nation.[189] The second usage of "threat multiplication" is that where tension already exists, climate impacts can exacerbate it.[190] Stress on the environment can increase existing conflicts in a region, or between individual nations.[191] As one observer notes, "climate change could drive a more collaborative approach in inter-state relations or it could exacerbate tensions between and within countries, leading to a 'politics of insecurity' as countries focus on protecting themselves against the impact."[192]

187. *See, e.g.*, Brian Merchant, *U.S. Navy Vice Admiral: Climate Change is a Threat Multiplier (Video)*, TREEHUGGER (JUNE 24, 2010), http://www.treehugger.com/files/2010/06/us-navy-vice-admiral-climate-change-threat-multiplier.php.

188. *See U.S. National Security Requires Cleantech Leadership – Report*, SUSTAINABLE BUSINESS (July 30, 2010), http://www.sustainablebusiness.com/index.cfm/go/news.display/id/20764 (discussing report by fifteen top-ranking admirals and generals calling for American greentech leadership); *Tackling a National Security Challenge*, NAT'L SECURITY NETWORK (July 21, 2010), http://www.nsnetwork.org/node/1672 (climate change is a "threat multiplier" for conflict).

The Central Intelligence Agency has opened a Center on Climate Change and National Security to analyze the threat to national security posed by climate issues. Press Releases & Statements, Cent. Intelligence Agency, CIA Opens Center on Climate Change and National Security (Sept. 25, 2009), https://www.cia.gov/news-information/press-releases-statements/center-on-climate-change-and-national-security.html.

189. *China and Climate Security, Event Summary*, WOODROW WILSON INT'L CENTER FOR SCHOLARS (Oct. 6, 2009), http://www.wilsoncenter.org/index.cfm?fuseaction=events.event_summary&event_id=553283.

190. *See generally* CLEO PASKAL, GLOBAL WARRING: HOW ENVIRONMENTAL, ECONOMIC, AND POLITICAL CRISES WILL REDRAW THE WORLD MAP (2010); Nick Mabey, *A Transatlantic Agenda on Climate Security?*, E3G (Feb. 19, 2009), http://www.e3g.org/programmes/foreign-articles/a-transatlantic-agenda-on-climate-security/; Paul Rogers, *A Global Threat Multiplier*, OPEN DEMOCRACY (Mar. 20, 2008), http://www.opendemocracy.net/article/a_global_threat_multiplier; *Climate Security*, EASTWEST INSTITUTE, http://www.ewi.info/climate-security (last visited Oct. 6, 2010) (East-West Initiative program on climate security).

191. *See, e.g.*, BRUCE VAUGHN, NICOLE T. CARTER, PERVAZE A. SHEIKH & RENÉE JOHNSON, CONG. RESEARCH SERV., R41358, SECURITY AND THE ENVIRONMENT IN PAKISTAN 1 (2010) *available at* http://www.fas.org/sgp/crs/row/R41358.pdf (discussing the environment in and around Pakistan, stating that "the potential effects of climate change could act as a *threat multiplier* to national security [and] might exacerbate existing threats to national security such as weak governance, poverty, and armed insurgents").

192. Nick Mabey, *Managing Climate Security (2)*, CHINA DIALOGUE (Jan. 16, 2009), http://www.chinadialogue.net/article/show/single/en/2690.

What does this mean in the context of the green energy race, and which threat do commentators have in mind when they talk about China? Parsing through language to ascertain just what is intended can be tricky. Some simply state that action on greentech is important to our "national security," without elaboration.[193] Some state directly that danger posed by climate impacts poses as much of a threat to our survival as the U.S.S.R. did in the 1950s,[194] but this refers to the magnitude of the threat posed by climate impacts, not by China.

I assume for the moment that this essential concept is correct. With so much uncertainty involved (*What climate change impacts will a given nation have? How will they affect the political and economic system?*) and a body of literature that is just beginning to grapple with this complexity, however, that is far from settled. Another assumption relates to who judges the impacts on national security from climate change: policymakers and climate analysts? Or the general public? This can make quite a difference. The consensus in the United States on the imperative to move forward with strong climate action is hardly universal. Public polls reflect majorities in favor of policies such as climate legislation,[195] but also sentiment skeptical of the underlying climate science.[196] I will assume that those concerned about climate insecurity will eventually convince the American public of the increased need to act, even though Americans today generally do not

193. *See, e.g.*, *U.S. National Security Requires Cleantech Leadership*, *supra* note 188 ("Like the space race, the race to develop and own clean energy technology has enormous and long-range strategic implications for national security."); Brian Wynne, *Winning the Race with Electric Drive*, Comment to *Can the U.S. Keep up in Clean Energy Race?*, NAT'L J. EXPERT BLOGS: ENERGY & ENV'T (Aug. 2, 2010, 5:37 PM), http://energy.nationaljournal.com/2010/08/can-the-us-keep-up-in-clean-en.php (comment of Brian Wynne, President, Electric Drive Transportation Association, that "[t]he clean energy race has important national security, economic and environmental implications for the U.S.").

194. *See, e.g.*, Thomas Homer-Dixon, *Terror in the Weather Forecast*, N.Y. TIMES, Apr. 24, 2007, http://www.nytimes.com/2007/04/24/opinion/24homer-dixon.html (describing climate change as "just as dangerous — and more intractable — than the arms race between the United States and the Soviet Union during the cold war").

195. Alex Kaplun, *If Polls Say 'Yes' to a Climate Bill, Why Do Lawmakers Say 'Maybe'?*, N.Y. TIMES, Jan. 26, 2010, http://www.nytimes.com/cwire/2010/01/26/26climatewire-if-polls-say-yes-to-a-climate-bill-why-do-la-41121.html.

196. *See, e.g.*, Spencer Magloff, *Poll: Americans More Skeptical About Global Warming*, CBS NEWS, Mar. 11, 2010, http://www.cbsnews.com/8301-503544_162-20000326-503544.html (stating that in a March 2010 poll, "[f]ifty percent of respondents believe human activities are causing a rise in the earth's temperature, while [forty-six] percent say the rise is due to natural causes"). The increase in skeptical sentiment can be traced in large part to "Climategate," the attempt to discredit climate science researchers based on e-mail messages from the Climate Research Unit in England. *Id.* For a typical anti-science article on Climategate, see John Lott, *Why You Should Be Hot and Bothered About 'Climategate,'* FOX NEWS, Nov. 24, 2009, http://www.foxnews.com/opinion/2009/11/24/john-lott-climate-change-emails-copenhagen/. The researchers were eventually vindicated in an independent inquiry, see *"Climategate" Leak Report Vindicates Scientists*, CBS NEWS, July 7, 2010, http://www.cbsnews.com/stories/2010/07/07/world/main6653464.shtml.

believe that their survival as a nation depends on addressing the threat posed by climate change.

With these assumptions in place, we can represent the threat multiplication concept with these two simplified equations:

EQUATION 1:
Existing military threat (military tension, terrorism, secession movements, weak governance, etc.)
(x) threat of climate change impacts (multiplier)
= intensified military threat

EQUATION 2:
No current military threat
(x) threat of climate change impacts (multiplier)
= intensified threat to national status

Commentators on the green energy race speak about both the threat in the greentech sector and the resulting consequences for climate change, often in the same article. The result is a conflation of the two different rationales for responding to China's greentech ascendancy. For that reason, claims that greentech competition with China poses a threat to the United States invoke a different equation that should be represented as follows:

EQUATION 3:
Existing economic threat (threat to dominate the greentech sector)
(x) threat of climate change impacts (multiplier)
= intensified threat to national status

The first variable in Equation 3 is different from that of Equation 1, because China is not perceived as a military threat to the United States. China's position in the world concerns many Americans, and the "race" rhetoric capitalizes on that fact. However, public polling reflects a populace worried predominantly about China's potential for economic dominance.[197] A recent article puts it succinctly: "For China, Will Money Bring Pow-

197. *See, e.g.*, John Pomfret & Jon Cohen, *Poll Shows Concern About American Influence Waning as China's Grows*, WASH. POST, Feb. 25, 2010, http://www.washingtonpost.com/wp-dyn/content/article/2010/02/24/AR2010022405168.html (summarizing results of public polling).

er?"[198] Much ink has been spilled on that issue, and there are many "doom-merchants predicting that China will topple America from its pre-eminence."[199] At present, however, there is little risk from China's military. The Defense Department's 2010 report to Congress suggests that China is spending some of its economic wealth on its military,[200] but falls far short of casting China as a present threat. Americans are afraid they will lose their jobs to the Chinese, not their lives. Fear is a great motivator, it is often said, but there are no calls for construction of fallout shelters or duck-and-cover drills in American classrooms.

The situation in the Cold War era was far different. For over a decade before 1957, Americans were gripped by public fear that the U.S.S.R. was about to attack the United States. This in turn made them willing to believe virtually anything about Sputnik, whether or not it was true. Even though Sputnik was a 184-pound satellite with only the capability to broadcast a radio signal back to Earth,[201] widespread press reports had it brandishing missiles aimed at American cities.[202] The resulting clamor to ramp up the American space program was animated by fear that we would be attacked if we did not have the ability to do so ourselves. Sputnik dominated the national defense discussion for many years after its launch, in a manner well out of proportion to its actual capabilities.[203]

This contrast is so striking that it makes no sense to cast the threat from China in military terms. Therefore, Equation 3 "computes" in the same way as Equation 1 only if climate change impacts are a multiplier to an *economic* threat. There is one further complication, as the second variable in Equations 1 and 3 (climate change impacts) is not identical. The impacts in Equation 3 would result from failures of American greentech policies in conjunction with other failures to address climate change. Equation 1 assumes that the United States fails to address climate change as a

198. Piers Brendon, *For China, Will Money Bring Power?*, N.Y. TIMES, Aug. 21, 2010, http://www.nytimes.com/2010/08/22/opinion/22brendon.html.

199. *Id.*

200. U.S. OFFICE OF SEC'Y OF DEF., ANNUAL REPORT TO CONGRESS: MILITARY AND SECURITY DEVELOPMENTS INVOLVING THE PEOPLE'S REPUBLIC OF CHINA (2010), *available at* www.defense.gov/pubs/pdfs/2010_CMPR_Final.pdf; *see* David Isenberg, *China Threat: Now You See It, Now You Don't*, ASIA TIMES, Aug. 19, 2010, http://www.atimes.com/atimes/China/LH19Ad01.html for a discussion of the report.

201. Wilford, *supra* note 102.

202. *Id.*

203. HERBERT F. YORK, RACE TO OBLIVION: A PARTICIPANT'S VIEW OF THE ARMS RACE 106 (1970), *available at* http://www.learnworld.com/ZNW/LWText.York.RaceToOblivion.html (observing that "[t]he successful launching of the Soviet satellite was inflated by design and circumstance far out of proportion to its real technological and strategic significance into a specter of menace which haunted America for years").

society, but does not specify how that will happen. By contrast, Equation 3 assumes a specific failure of governmental policy. For the purposes of analysis, however, we will assume identical impacts. The central question then presents itself squarely: Do climate change impacts multiply the existing *economic* threat in the same fashion as Equation 1?

The economic impact of losing the greentech race might be significant (although, as noted above, I believe the United States is not "losing"). However, combining fear of China's economic growth with the fear of climate change impacts is not at all the same math as in Equation 1, which premises the multiplying effect on pre-existing conflict between nations. As the Quadrennial Defense Review puts it, "[w]hile climate change alone does not cause conflict, it may act as an accelerant of instability or conflict."[204] More flashpoints and more unpredictability of a military response can be expected. So, for example, one might expect the negative impacts of climate change to contribute to a higher incidence of terrorism.[205] Climate impacts can also increase the costs of waging war by, for example, increasing the price of necessary fuels.[206]

In greentech race commentary, language like "race" and "new Sputnik" makes no distinction between economic and military conflict. The entire linguistic framework of the greentech "race" invokes the tension of the Cold War era in the hope that the nation will perceive a threat from China. The language is far too loaded to pretend otherwise. The argument is that if China deploys greentech more aggressively than we do, it has a better chance of resisting climate insecurity. This leaves the reader to assume that this threat is tantamount to the threat of China "attacking" us with policies designed to ensure its survival at the expense of ours. Yet the situation is much more like the math of Equation 2: climate insecurity, while real, is separate from and partly related to the threat of losing the greentech race. The failure to address climate change stems from a whole host of poor governmental and private sector decisions, including but hardly limited to failing to promote greentech adequately. The call to action is not to portray China as a threat, but to do something about the real threat, that is, to address climate security by taking comprehensive actions.

204. U.S. DEP'T OF DEFENSE, QUADRENNIAL DEFENSE REVIEW REPORT 85 (2010), *available at* http://www.defense.gov/qdr/images/QDR_as_of_12Feb10_1000.pdf.

205. CTR. FOR NAVAL ANALYSES CORP., NATIONAL SECURITY AND THE THREAT OF CLIMATE CHANGE 44 (2007), *available at* http://securityandclimate.cna.org/report/National%20Security%20and%20the%20Threat%20of%20Climate%20Change.pdf.

206. MICHAEL DAVIDSON, CTR. FOR STRATEGIC & INT'L STUDIES, CLIMATE SECURITY IN EAST ASIA: NEW OPPORTUNITIES FOR NON-TRADITIONAL COOPERATION 1 (2010), *available at* http://csis.org/files/publication/pac1025.pdf.

To do this, we need to confront a powerful reality: the United States and China are interdependent, not independent competitors.[207] We *need* China to take the very actions some would posit as competition. This, as some have noted, makes the USTR investigation especially unwelcome.[208] Moreover, this is very different from the space race era. In the 1950s, if the U.S.S.R. took the action that many feared, it could have destroyed the United States. The situation today could not be more different. Without its greentech efforts and other measures[209] such as its announced goal to reduce the "carbon intensity" of its economy (CO_2 emissions per unit of GDP),[210] China's rapidly increasing energy demand and huge spending on conventional technology would add considerably to greenhouse gas emissions.[211] There will be no effective global reduction of emissions that does not include the United States and China,[212] because they are by far the

207. *See, e.g.*, Wong, *supra* note 69, at 11 (noting that "the 'clean energy race' is not a zero-sum game").

208. Bradford Plumer, *Should We Start a Solar Panel Trade War with China?*, NEW REPUBLIC BLOG (Sept. 9, 2010, 4:10 PM), http://www.tnr.com/blog/77566/should-we-start-solar-panel-trade-war-china ("a far more effective way to strengthen the U.S. clean-energy industry would be to boost domestic demand . . . than through a solar-panel trade war").

209. *See China and Climate Change*, PEW CENTER ON GLOBAL CLIMATE CHANGE, http://www.pewclimate.org/policy_center/international_policy/china.cfm (last visited Oct. 6, 2010) (fact sheets on specific issues and strategies).

210. China's President, Hu Jintao, stated in September that China's next five-year plan would include a new goal to reduce carbon intensity—CO_2 emissions per unit of GDP—from 2005 levels by 2020 by a "notable margin." Julian L. Wong, *China's Carbon Intensity Plans and its Impact on Climate Progress*, GREEN LEAP FORWARD, http://greenleapforward.com/2009/09/25/chinas-carbon-intensity-plans-and-its-impact-on-climate-progress/ (last updated Sept. 30, 2009). In November 2009, it announced that number was a reduction of 40% from 2005 levels by 2020. Edward Wong & Keith Bradsher, *China Joins U.S. in Pledge of Hard Targets on Emissions*, N.Y. TIMES, Nov. 26, 2009, http://www.nytimes.com/2009/11/27/science/earth/27climate.html.

There are already signs that this goal will be difficult to meet. In early fall 2010, China was poised to miss a target set by the 11th Five-Year Guidelines, CHINA GREENTECH INITIATIVE, *supra* note 35, at 39, for reducing the energy intensity of its industries between 2005 and 2010 by 20%. *China Closes Factories as Green Deadline Looms*, ENERGY CHINA FORUM (Aug. 24, 2010), http://www.energychinaforum.com/news/39598.shtml. According to one consultant quoted in this article, "[i]f Beijing fails to hit the 2010 target by a wide margin, its credibility on climate change commitments will be subject to a great deal of international scepticism." *Id.* (quoting Damien Ma of the Eurasia Group consulting firm).

211. Studies by the McKinsey consulting firm and the United Kingdom's Tyndall Centre find that under alternative scenarios of projected growth, China must take drastic measures to reduce greenhouse gas emissions or suffer considerable increases by 2030. TAO WANG & JIM WATSON, SUSSEX ENERGY GROUP & TYNDALL CTR. FOR CLIMATE RESEARCH, CHINA'S ENERGY TRANSITION: PATHWAYS FOR LOW CARBON DEVELOPMENT (2009), *available at* http://www.sussex.ac.uk/sussexenergygroup/documents/china_report_forweb.pdf; MCKINSEY & CO., CHINA'S GREEN REVOLUTION: PRIORITIZING TECHNOLOGIES TO ACHIEVE ENERGY AND ENVIRONMENTAL SUSTAINABILITY 11 (2009), *available at* http://www.mckinsey.com/locations/greaterchina/mckonchina/reports/china_green_revolution_report.pdf.

212. *See, e.g.*, CTR. FOR AM. PROGRESS, A ROADMAP FOR U.S.-CHINA COLLABORATION ON CARBON CAPTURE AND SEQUESTRATION 12 (2009), *available at* www.americanprogress.org/issues/2009/11/pdf/china_ccs.pdf (observing that "[i]f these two countries

world's two largest emitters of carbon dioxide and other greenhouse gases.[213] Failure by either nation to reduce its emissions would imperil the entire global effort.[214] We should encourage and support China's efforts, not consider them a threat to our national wellbeing.[215]

Rather than creating the scorched earth of a "greentech war,"[216] both nations can benefit from collaboration that takes advantages of the respective strengths of each.[217] The urgency to do this is compelling. No nation has ever grown so rapidly as China is growing now, and no nation has had to address such daunting environmental challenges at the same time as it has pursued such rapid growth.[218] This poses major hurdles to tackling climate change that must be surmounted by nations working together. And there are not just two nations involved, but the whole world.[219] The planet is in peril if we do not all act together with concerted, targeted efforts. Rather than creating a two-nation race, we should encourage China's domestic policies and the climate change collaborations of the "BRIC" developing economies (Brazil, Russia, and India, in addition to China).[220]

cannot find a way to come together to jointly address the problems caused by these emissions, it is highly unlikely that the world will be able to agree on a strategy for effective mitigation any time soon").

213. ENERGY INFO. ADMIN., U.S. DEP'T OF ENERGY, ANNUAL ENERGY REVIEW 343 tbl.11.19 (2008), *available at* http://www.eia.gov/FTPROOT/multifuel/038408.pdf (in 2006, China emitted 6,018 MMT of CO_2 compared to the United States' 5,903 MMT).

214. "China is on track to overwhelm the global effort to address climate change." *Challenges and Opportunities for U.S.-China Cooperation on Climate Change Before the Sen. Committee on Foreign Relations*, 111th Cong. 16 (2009), *available at* http://www.hsdl.org/?view&doc=113654&coll=0 (statement of Elizabeth Economy, C.V. Starr Senior Fellow and Director, Asia Studies, Council on Foreign Relations).

215. Bradsher, *On Clean Energy, China Skirts Rules*, *supra* note 17 (citing comments of Zhao Feng, Sunzone's general manager, that "the world should appreciate the generous assistance of Chinese government agencies to the country's clean energy industries. That support has made possible a sharp drop in the price of renewable energy and has helped humanity address global warming").

216. McElwee, *supra* note 24.

217. *See, e.g.*, Press Release, Bloomberg New Energy Finance, *supra* note 185 ("The two nations may be in competition, but the big win for both of them would be to drive the cost of a clean power generation below the cost of fossil fuels."); Christina Larson, *America's Unfounded Fears of a Green-Tech Race with China*, YALE ENV'T 360 (Feb. 8, 2010), http://e360.yale.edu/content/feature.msp?id=2238 (quoting Shanghai-based American entrepreneur Richard Brubaker's statement that "[t]he clean-tech war is overblown from the start" and discussing how "the green-tech 'race' is not one that one side wins and the other loses, but a scenario where partnerships are sought out and the final equation doesn't have to be a zero-sum game"); Wong, *supra* note 69, at 11.

218. CHINA GREENTECH INITIATIVE, *supra* note 35, at 35.

219. The website of the United Nations Framework Convention on Climate Change contains a wealth of information on global responses to climate change, including the Kyoto Protocol, Copenhagen Accord, and many more documents. *See* UNITED NATIONS FRAMEWORK CONVENTION ON CLIMATE CHANGE, http://unfccc.int (last visited Oct. 6, 2010).

220. *See, e.g.*, *BRIC Countries' Think-Tanks Discuss Climate Change*, CHINA.ORG.CN (Apr. 15, 2010), http://www.china.org.cn/world/nuclear_bric_summits/2010-04/15/content_19823233.htm.

Nationalistic rhetoric on climate change (as best embodied in the USTR investigation) will have high costs. Creating near-term tension would be especially unfortunate for the U.S.-China relationship on climate matters, which is complex, but not marked by the same animosity as America's relationship with the U.S.S.R. in the 1950s. The two nations have occasionally criticized each other's progress toward reducing greenhouse gas emissions, and China is not reticent about highlighting its stronger programs (greentech promotion) and downplaying weaker ones (lack of binding nationwide emissions limits).[221] The two nations have ongoing tensions on a whole host of sensitive topics,[222] but have worked productively with each other to address climate change.[223] Some note that collaboration on climate issues could have a positive impact on the entire U.S.-China dialogue,[224] although the USTR investigation threatens that optimistic outlook.[225]

In the two-year period of international negotiations between the promulgation of the Bali Action Plan and the December 2009 Copenhagen summit, there were numerous cooperative activities between the two nations. The highest level of talks took place under the auspices of the U.S.-

221. *See China and the US: This House Believes that China is Showing More Leadership than America in the Fight Against Climate Change*, ECONOMIST DEBATES (Nov. 25, 2010), http://www.economist.com/debate/days/view/421 ("China has succeeded in deflecting attention from how much carbon it has emitted and will continue to emit to how much carbon it has prevented from being emitted. There is no question that China has run a slick public relations campaign, but it's not all smoke and mirrors. China's efforts to improve energy security and industrial efficiency do have the effect of reducing the rate of growth of its carbon emissions." (comment of Charles R. McElwee)).

222. There are many books, articles, and studies that analyze the U.S.-China relationship, and it would take an entire bookshelf to list them all. *See, e.g.*, Dan Edwards, *New China Books Roundup*, BEIJINGER BLOG (Aug. 26, 2010, 12:00 PM), http://www.thebeijinger.com/blog/2010/08/26/New-China-Books-Roundup. A useful starting point for a list and brief discussion of the issues between the two nations is KERRY DUMBAUGH, CONG. RESEARCH SERV., RL33877, CHINA-U.S. RELATIONS: CURRENT ISSUES AND IMPLICATIONS FOR U.S. POLICY (2007), *available at* assets.opencrs.com/rpts/RL33877_20071221.pdf. One recent flashpoint has involved censorship and the Internet. *See, e.g.*, Jessica Guynn, *Google Takes a Side Step in Censorship Dance with China*, CHI. TRIB., Mar. 22, 2010, http://articles.chicagotribune.com/2010-03-22/business/sc-biz-0323-google--20100322_1_google-china-hong-kong-china-s-internet.

223. For general discussions of these meetings, *see* Michael Wines, *In China, Pelosi Calls for Cooperation On Climate*, N.Y. TIMES, May 28, 2009, http://www.nytimes.com/2009/05/28/world/asia/28pelosi.html; *U.S. Experts Welcome China's Pledge on Carbon Emission Cuts*, XINHUA NEWS AGENCY (Nov. 27, 2009), http://news.xinhuanet.com/english/2009-11/27/content_12549647.htm.

224. Michael Davidson, *US, China: A Green Security Blanket?*, Asia Times, May 14, 2010, (noting that climate cooperation could "dwarf existing military cooperation and help stabilize the bilateral relationship").

225. The Chinese official response to the USTR investigation was not especially heart-warming, as one might expect. *See* Michael Forsythe & Feifei Shen, *China's Zhang Says Obama Seeking 'Votes' with Clean Energy Race*, BLOOMBERG, Oct. 18, 2010, http://www.bloomberg.com/news/2010-10-18/china-s-zhang-says-obama-seeking-votes-with-clean-energy-subsidy-probe.html.

China Strategic and Economic Dialogue.[226] Discussions also took place during 2009 with other world leaders at the Pittsburgh G-20 summit[227] and the Major Economies Forum on Energy and Climate.[228] There was even talk during 2009 of the two nations forming a sort of "G-2" to cooperate on financial and climate matters, though that never materialized.[229] The two nations have pledged several times to take mutual action to address climate change,[230] and while the promises are often hortatory, the ongoing discussion does have important value in strengthening the bilateral relationship.[231] Advocating a strategy of competition with the Chinese undercuts these activities.

Continued antagonistic rhetoric about a clean energy race will make it difficult to conduct cooperative efforts in energy and environmental matters. Unlike the near-complete scientific secrecy that marked the Cold War era,[232] China and the United States are working to develop technology together. Under the China-U.S. Science and Technology Agreement, the Department of Energy has twelve ongoing initiatives with China,[233] including electric vehicle[234] and carbon capture and storage development initia-

226. *U.S.-China Strategic and Economic Dialogue*, U.S. DEP'T OF TREASURY, http://www.ustreas.gov/initiatives/us-china/ (last updated June 10, 2010). See CHINA GREENTECH INITIATIVE, *supra* note 35, at 58, for a discussion of S&ED activities.

227. *See Leaders' Statement: The Pittsburgh Summit*, PITTSBURGH SUMMIT, http://www.pittsburghsummit.gov/mediacenter/129639.htm (last visited Sept. 6, 2010).

228. *See Major Economies Forum on Energy and Climate*, U.S. DEP'T. OF STATE, http://www.state.gov/g/oes/climate/mem/ (last visited Sept. 6, 2010).

229. *See* Elizabeth Economy & Adam Segal, *Time to Defriend China*, FOREIGN POL'Y (May 24, 2010), http://www.foreignpolicy.com/articles/2010/05/24/time_to_defriend_china (discussing the origin of the G-2 idea and its demise).

230. *See, e.g.*, Andrew C. Revkin, *China and U.S. Pledge Climate Teamwork*, N.Y. TIMES DOT EARTH BLOG (July 28, 2009, 6:19 PM), http://dotearth.blogs.nytimes.com/2009/07/28/china-and-us-pledge-climate-teamwork/ (describing the July 2009 memorandum of understanding); Press Release, White House, Office of Press Sec'y, U.S.-China Joint Statement (Nov. 17, 2009), http://www.whitehouse.gov/the-press-office/us-china-joint-statement (section "V. Climate Change, Energy and Environment" of "U.S.-China Joint Statement" following President Obama's trip to China in November 2009).

231. CHINA GREENTECH INITIATIVE, *supra* note 35, at 58 (discussing the importance of the S&ED in this regard).

232. Hugh Gusterson, *Secrecy, Authorship and Nuclear Weapons Scientists*, *in* SECRECY AND KNOWLEDGE PRODUCTION 57, 69 (Judith Reppy ed., 1999), www.einaudi.cornell.edu/peaceprogram/publications/occasional_papers/occasional-paper23.pdf (discussing the "intense secretiveness of the Soviet state").

233. CHINA GREENTECH INITIATIVE, *supra* note 35, at 58.

234. Press Release, White House, Office of Press Sec'y, Fact Sheet: U.S.-China Electric Vehicles Initiative (Nov. 17, 2009), http://www.energy.gov/news2009/documents2009/US-China_Fact_Sheet_Electric_Vehicles.pdf. For a skeptical view of this initiative, see Charlie McElwee, *Thin Gruel*, CHINA ENVTL. L. (Nov. 19, 2009), http://www.chinaenvironmentallaw.com/2009/11/19/thin-gruel.

tives.[235] The Clean Energy Ministerial Forum in July 2010, hosted by U.S. Secretary of Energy Steven Chu and attended by his Chinese counterpart and ministers from twenty-two other nations, outlined a multi-part agenda in specific areas of cooperation.[236] Similar to Norway, which saw cooperation in fishing matters cut off by an aggrieved China after the award of a Nobel Prize to a Chinese dissident,[237] the United States could find itself shunned by China in these highly symbolic areas instead of cooperating with it.

Some even argue (in obvious counterpoint to the USTR investigation) that China's subsidies and other programs to promote renewables can be good for the United States' economy.[238] The Council on Foreign Relations' Michael Levi, examining the study cited earlier in this Article that the United States retains leadership at the high value end of the solar development and manufacturing chain,[239] argues that "it's quite possible for the United States and China both to win, with China lowering the cost of relatively low-tech parts of the value chain, in turn growing the market for the higher-tech parts that are still handled by the United States."[240] Levi compares this to other situations in which China manufactures products developed in the United States. Some might find that overstated, and others cite feedback loops like the one described earlier in this Article (in which Chinese firms eventually find their way up the value chain).[241] On the other hand, warring with China can only hurt the prospects for American firms to do business in China.[242]

At the international level, greentech warring makes it even more difficult to reach a global climate agreement. Many have chastised China for taking insufficient steps toward an agreement limiting greenhouse gas

235. *See, e.g.*, *Carbon Sequestration Leadership Forum: A Global Response to the Challenge of Climate Change*, U.S. DEP'T OF ENERGY, http://fossil.energy.gov/programs/sequestration/cslf/ (last updated June 23, 2010) (activities of the international Carbon Sequestration Leadership Forum); *see generally* CTR. FOR AM. PROGRESS, *supra* note 212 (calling for more bilateral cooperation on CCS development).

236. *Summary Fact Sheet*, CLEAN ENERGY MINISTERIAL, http://www.cleanenergyministerial.org/pdfs/CEM_SummaryFactSheet.pdf (last updated July 23, 2010).

237. *China Cancels More Visits After Nobel Award*, EARTH TIMES (Oct. 13, 2010), http://www.earthtimes.org/articles/news/348499,cancels-visits-nobel-award.html.

238. Plumer, *supra* note 208.

239. de la Tour, Glachant & Ménière, *supra* note 83.

240. Michael Levi, *The Downside to Made in the USA*, COUNCIL ON FOREIGN REL., Sept. 9, 2010, http://blogs.cfr.org/levi/2010/09/09/the-downside-to-made-in-the-usa/.

241. Alan S. Brown, *Manufacturing at the Crossroads*, MECHANICAL ENGINEERING, June 2010, *available at* http://memagazine.asme.org/Articles/2010/June/Manufacturing_Crossroads.cfm.

242. Forsythe & Shen, *supra* note 225 (noting ominously that the United States "cannot win this trade fight").

emissions. According to some accounts, China's foot-dragging[243] and refusal to adopt binding reduction targets was at least in part responsible for the failure of the Copenhagen Accord to incorporate global binding limits,[244] although the United States shares some blame for putting forth a weak negotiating position. As China's economy continues its rapid growth, there will be even greater demand for it to agree to limit emissions.[245] Castigating it for its greentech policies could foster a climate of distrust and delay further progress on a post-Kyoto agreement. For example, it would not take much for Senators who oppose international climate agreements to blame the Chinese as a reason for refusing to agree to any such agreement (a prerequisite for it to go into effect in the United States),[246] as they already have done once before with a resolution opposing ratification of the Kyoto Protocol.[247] The rhetoric of a green energy race could give cover for this regrettable posturing.

For all of these reasons, the symbolism of the space race and "climate security" is simply not helpful in a discussion of global climate change. Should we abandon any effort to invoke that bygone era? In the next Part, I will argue that we should learn important lessons as a nation from the actual trajectory of the program of technology development and deployment that responded to Sputnik and eventually put a man on the moon at the end of the 1960s.

II. LESSONS FOR ENERGY POLICY FROM THE "SPACE RACE"

> Huntsville, which had dubbed itself "Rocket City USA," was learning the harsh reality of the military industrial complex: with the stroke of a

243. China has "associated with" (agreed in principle to) the Copenhagen Accord. On the other hand, it believes "it is neither viable nor acceptable to start a new negotiating process," a stance which would reverse years of international work. Arthur Max, *China, India Join Copenhagen Accord, Last Major Emitters To Sign On*, HUFFINGTON POST (Mar. 9, 2010, 2:24 PM), http://www.huffingtonpost.com/2010/03/09/china-india-join-copenhag_n_491640.html (comments of Premier Wen Jiaboa).

244. *See, e.g.*, Mark Lynas, *How Do I Know China Wrecked the Copenhagen Deal? I Was in the Room*, GUARDIAN (Dec. 22, 2009), http://www.guardian.co.uk/environment/2009/dec/22/copenhagen-climate-change-mark-lynas. Lynas' argument was criticized by many who believed it unwise to ascribe sole blame to the Chinese.

245. CHINA GREENTECH INITIATIVE, *supra* note 35, at 34 (noting that if China develops at its current pace, "international concerns over global warming would increasingly be directed toward China").

246. "If China isn't willing to translate domestic policy and goals into international commitments, [Senators] won't support US participation in a Copenhagen treaty." Charlie McElwee, *The Climate Group Preaches Revolution*, CHINA ENVTL. L. (Aug. 21, 2009), http://www.chinaenvironmentallaw.com/2009/08/21/the-climate-group-preaches-revolution.

247. *See* S. Res. 98, 105th Cong. (1997) (adopted by a unanimous vote of 95-0, which was justified in part on the rationale that the United States would be required to reduce emissions while India and China would not).

> pen in Washington, entire communities could be wiped out as quickly as they were created.[248]

Avoiding missteps similar to those made in the pre-Sputnik climate for space programs in the United States may be more rewarding than pointing the rhetorical finger at China. Blaming China merely deflects attention from our own inabilities to develop progressive policies on renewables and climate change. Instead of looking outward to China and chastising it for its energy development and deployment policies, we should look inward at ourselves, as we did in our own response to the space race. The reasons for this are complex but well worth examining.

Support for our space programs was much more forthcoming after the launch of Sputnik than before it. We cannot rewrite that story, but we can avoid another one like it in greentech. In many respects, the federal government's support of greentech is no stronger than its support for the space program at the time of the Sputnik launch. Bold action is needed to transcend that gap. The 1961 announcement that the United States intended to put a man on the moon was not the beginning of the space program but a continuation and refocusing of its purpose. Similarly, I argue that the effort to develop greentech in the United States requires a national goal as ambitious as the moon shot, and as calculated to draw maximum popular attention.

A. Technology Development in the Space Race

The story of rocket technology development in the United States during the pre-Sputnik era has been well documented,[249] and I will describe it only briefly. During the post-World War II era, the Air Force and Army (and, to a lesser extent, the Navy) worked to develop rockets capable of carrying missiles into space that could threaten the U.S.S.R. or retaliate after an attack. At one point there were six different missile programs under development, each with different purposes. The unnecessary duplication stemmed in part from overreaction to fear of the Soviets.[250] The missile programs faced numerous hurdles, including institutional resistance. Key Air Force personnel believed that missiles were not the technology of the future, for "although the ICBM had ushered in a new age of warfare, the

248. BRZEZINSKI, *supra* note 102, at 162.

249. *See, e.g.*, BRZEZINSKI, *supra* note 102, at 45–59; ROBERT A. DIVINE, THE SPUTNIK CHALLENGE: EISENHOWER'S RESPONSE TO THE SOVIET SATELLITE (1993); WALTER A. MCDOUGALL, THE HEAVENS AND THE EARTH: A POLITICAL HISTORY OF THE SPACE AGE (1985); YORK, *supra* note 203.

250. YORK, *supra* note 203, at 116.

Air Force did not convert entirely to missiles, persisting in the belief that a manned aircraft was the 'proper' vehicle for the service."[251]

Herbert York (the Defense Department's Director of Defense Research and Engineering in the space race era) and Matthew Brzezinski, among others, describe inter-service rivalries[252] that contributed to "competition for scientists, facilities, and funding."[253] York writes that Wernher von Braun and General John Bruce Medaris maneuvered in a practically "subversive" way to keep the Army's Jupiter program alive.[254] At one point, they disregarded a higher-level decision to transfer missile program responsibility to the Air Force and continued work on their Jupiter C.[255] This bravado was "hailed and rewarded after the fact,"[256] when the Army's rocket was the first to successfully launch an American satellite into space.

Throughout the pre-Sputnik era, there was a lack of central coordination of scientific research and of missile development. York states that the "Office of the Secretary of Defense, too new, too small, and too weak, could not keep things under control."[257] In the early 1950s, high-level scientific advice to the President was also lacking and thought to be unimportant.[258] As late as 1957, President Eisenhower could state that he "hadn't given thought to any proposal to establish a scientist in a policy position in the White House or Cabinet."[259]

In the early to mid-1950s, the federal government preached austerity in defense funding, led by Secretary of Defense Wilson and President Eisenhower, who was skeptical of the "military-industrial complex." Warnings about missile preparedness sparked governmental action, including the report of the 1954 Strategic Missiles Evaluation Group, known colloquially as the "Teapot Committee."[260] However, funding was constrained by the

251. Neufeld, *supra* note 144.

252. The Air Force's Western Development Division focused on the Atlas and other missiles, but competed with the Jupiter program underway at the Army's Huntsville, Alabama arsenal under the leadership of the expatriate rocket scientist Wernher von Braun. YORK, *supra* note 203, at 126–135; *see also* BRZEZINSKI, *supra* note 102, at 52.

253. Neufeld, *supra* note 144.

254. *See* YORK, *supra* note 203, at 135 ("Whether the achievement of launching thirty-one pounds in January, 1958, with Juno I justified the almost subversive actions necessary to do so is something which, in retrospect, I am not at all sure about. This kind of clever maneuvering in which ambitious men work out ways of getting around the restraints imposed by a higher authority, including authority at the constitutional level, goes on all the time in all the services . . . .").

255. BRZEZINSKI, *supra* note 102, at 52.

256. YORK, *supra* note 203, at 135.

257. *Id.* at 125.

258. ROGER PIELKE, JR. & ROBERTA KLEIN, THE RISE AND FALL OF THE SCIENCE ADVISOR TO THE PRESIDENT OF THE UNITED STATES (2009).

259. *Id.*

260. Neufeld, *supra* note 144.

Eisenhower administration's 1956 reductions in research and development that had the effect of reducing the number of missiles to be developed and stretching out the deployment schedule.

Sputnik's launch changed everything.[261] As York notes, "[a]fter the first shock, strong reactions set in at all levels and in most segments of American society." Numerous House and Senate Committees held hearings intended to discover where we had gone wrong.[262] The executive branch focused on creating or realigning agencies and organizations to better serve the objectives of getting America into space. Ironically, a Senate committee had discussed all of these ideas one year earlier, "but Sputnik had not yet happened and so they evoked very little response at that time."[263]

All three military services, the National Advisory Committee for Aeronautics (NACA, a precursor to today's NASA), and even the Atomic Energy Commission vied for a leadership role. Two major actions were the 1957 elevation of science to a near-Cabinet level position, and the 1958 creation of the National Aeronautics and Space Administration. The Science Advisory Committee of the Office of Defense Mobilization, a creature of the Korean War, became the President's Science Advisory Committee (PSAC).[264] The PSAC's mandate was to "see to it that those projects which experts judge have the highest potential shall advance with the utmost speed."[265] York writes that "without PSAC the United States in the first frantic responses to the shock of the Russian successes [we] would have undertaken a larger number of ill-advised programs in a more disorganized fashion than we actually did."[266]

Despite this advance, funding for space projects was still clouded in uncertainty. Overall spending increased significantly after Sputnik's launch, but "the increase in the number of independent claimants for funds only served to confuse things."[267] York states that:

261. *See, e.g.*, Wilford, *supra* note 102 (quoting historian Walter McDougall who stated that "[n]o event since Pearl Harbor set off such repercussions in public life").

262. YORK, *supra* note 203, at 112 ("The Senate and the House of Representatives created new special committees for similar purposes. The Senate Armed Services Committee, its Preparedness Subcommittee, the Government Operations Committees, the powerful Joint Committee on Atomic Energy, and others all held extensive hearings for the purpose of examining the situation in detail.").

263. YORK, *supra* note 203, at 121. One interesting recommendation is analogous to proposals today regarding climate: boosting the resources allocated to scientific education. "PTA's and school boards and university trustees all came to the conclusion that inadequacies in the quality and quantity of science education were the root causes of the whole mess. And as a result the status and salary of nearly all science teachers and professors markedly improved." *Id.* at 113.

264. PIELKE & KLEIN, *supra* note 258.

265. *Id.* (quoting President Dwight D. Eisenhower)

266. YORK, *supra* note 203, at 116.

267. *Id.* at 125.

> Each of the services, inspired both by genuine patriotic concern and by self-interest, hoped to take advantage of the public confusion and consternation over Sputnik. Supported by its coterie of contractors and special supporting organizations, each intensified its campaign against the other two and against the higher authorities that were trying to restrain the outburst. The battles were fought on the speaking podium, in the kept technological press, and before the committees of Congress.[268]

When Soviet cosmonaut Yuri Gagarin became the first person to fly in space in 1961, Vice President Johnson (acting on advice from many, including Dr. von Braun) advised Kennedy that the United States had largely failed to marshal its resources adequately to compete with the U.S.S.R. in space flight.[269] He concluded that "[w]e are neither making maximum effort nor achieving results necessary if this country is to reach a position of [space] leadership."[270] Months later, Kennedy announced his support for the Apollo program.[271]

The announcement that the United States aimed to put a man on the moon by the end of the 1960s is often viewed as the start of a process that led to a great national success.[272] What that account leaves out, however, is that the events leading up to Kennedy's announcement show that we were still continuing to work our way out of the hole we had dug in the 1950s. After Sputnik, we discovered that we had devoted woeful amounts to satellite research and development, that governmental agencies had competed with each other (which delayed positive developments), and that there was inadequate coordination of space programs throughout the government. The process of reversing those shortcomings took many years.

B. Parallels to the Present Day

Our snapshot of America's science and technology efforts in 1957 highlights poor levels of support for space research and development, combined with a resistance in the military to shift resources from core missions (flying manned bombers, fighting enemies on the ground). Only in retrospect did we see that governmental support, early, often, and consistent, was crucial to the development of the space program. That insight translates to greentech in two ways. First is that we need governmental involvement of the same sort to catalyze development of our greentech sector. Second, and

268. *Id.* at 126.

269. Memorandum from Lyndon B. Johnson, Memorandum for the President, Evaluation of Space Program (Apr. 28, 1961), *available at* http://history.nasa.gov/Apollomon/apollo2.pdf.

270. *Id.*

271. Wilford, *supra* note 102.

272. *See, e.g., id.*

more crucially important, is that if we do not devote the resources now, we will regret it later.

In greentech, we have spent decades repeating the mistake of the 1950s space program. National energy policy may not feature the Sputnik-era drama of levels of bureaucracy fighting with one another, with separate branches of the military furtively pursuing duplicative programs. On the other hand, numerous observers have noted that we lack a stable set of policies to encourage greentech research, development, and deployment.[273] While we have done well to invent new technologies,[274] our efforts to advance them to the commercial stage and promote their deployment are "fragmented," spread among numerous agencies, and lacking coordination.[275] A number of plans and reports produced since late 2008 to influence the incoming Obama administration detailed the need for a transformation of our energy policy with, among other policies, an increased attention to renewables.[276]

As many have noted, "[g]overnment policies can provide a strong impetus for constructing renewable generation facilities," and there is a wide variety of potential incentives, including support for research and development, tax incentives, government procurement policies, renewable portfolio standards (RPSs), carbon cap-and-trade programs, and feed-in tariffs.[277] Federal spending on renewable energy is both anemic in its overall levels (having declined in real terms since 1980)[278] and, even after the added

273. Wong, *supra* note 60 (noting that "[t]he United States risks falling behind China, as well as other Asian and EU countries, because of its failure to create a long-term vision for clean energy development and a stable policy framework to realize that vision").

274. *Id.* (noting that "the United States has been tremendously successful in inventing many important clean energy technologies, but has faired [sic] less well in mass production and commercialization relative to the size of its economy").

275. *See, e.g.*, David L. Levy, *The Political Economy of Renewable Energy in the US and Europe*, ALL ACAD. RES., http://www.allacademic.com//meta/p_mla_apa_research_citation/0/7/2/5/7/pages72573/p72573-1.php (last visited Oct. 6, 2010) (observing that "[renewables] policy in the US is characterized by fragmentation, uncertainty, lack of coordination, a lack of substantive taxes or subsidies, and the absence of a meaningful overall emissions reduction target").

276. *See* JEFFREY LOGAN & TED L. JAMES, A COMPARATIVE REVIEW OF A DOZEN NATIONAL ENERGY PLANS: FOCUS ON RENEWABLE AND EFFICIENT ENERGY (2009), *available at* http://www.nrel.gov/docs/fy09osti/45046.pdf (analyzing twelve such plans).

277. The National Renewable Energy Laboratory and the Pew Center on Global Climate Change, among many others, have issued numerous publications on the link between governmental policies and promotion of renewables. *See NREL Publications*, Nat'l Renewable Energy Laboratory, http://www.nrel.gov/publications/ (last visited Oct. 6, 2010); PEW CENTER ON GLOBAL CLIMATE CHANGE, *supra* note 186. A recent noteworthy report in the author's home region is Marilyn A. Brown et al., *Renewable Energy in the South: A Policy Brief* (Ga. Inst. of Tech., Sch. of Pub. Pol'y 2010, Working Paper No. 58, 2010), *available at* www.spp.gatech.edu/faculty/workingpapers/wp58.pdf.

278. FRED SISSIN, CONG. RESEARCH SERV., RS22858, RENEWABLE ENERGY R&D FUNDING HISTORY: A COMPARISON WITH FUNDING FOR NUCLEAR ENERGY, FOSSIL ENERGY, AND ENERGY EFFICIENCY R&D (2008), *available at* http://www.nationalaglawcenter.org/assets/crs/RS22858.pdf.

billions of dollars in spending in the 2009 stimulus package,[279] well behind that devoted to fossil fuels.[280] Federal tax policy for renewables is inconsistently supportive,[281] and the result is that in some years, many new projects come to fruition, but the pipeline often dries up.[282] The American Wind Energy Association observed in 2010 that the pace of installations boomed in 2009,[283] but slowed in 2010 when stimulus package funds dried up. The cyclical pace of support "clearly illustrates the consequences of on-again, off-again short-term federal incentives for wind as a market signal."[284]

Some of the Obama administration's actions in response to our lag in promoting renewables are similar to actions taken in response to Sputnik, such as the creation of a Cabinet-level position to address climate change, which echoes governmental reorganizations taken in the late 1950s. One action that is especially comparable and noteworthy is the funding of the Advanced Research Projects Agency-Energy (ARPA-E) with $400 million from the ARRA stimulus package. ARPA-E's name and mission deliberately echo that of the Advanced Research Projects Agency (ARPA)[285] created after Sputnik in the Department of Defense.

The moon landing was the product of an amalgamation of many disparate efforts to develop different types of technologies. So too is energy

279. *See* Amanda Ruggeri, *What the Stimulus Package Does for Renewable Energy*, U.S. NEWS & WORLD REP. (Mar. 6, 2009), http://politics.usnews.com/news/energy/articles/2009/03/06/what-the-stimulus-package-does-for-renewable-energy.html (noting that the package contained "about $50 billion in spending and $20 billion in tax provisions"); Daniel J. Weiss & Alexandra Kougentakis, *Recovery Plan Captures the Energy Opportunity*, CTR. FOR AM. PROGRESS (Feb. 13, 2009), http://www.americanprogress.org/issues/2009/02/recovery_plan_captures.html (linking to a comprehensive spreadsheet detailing individual programs and provisions); *see also* Joe Romm, *The Entire American Economy, Including Renewable Energy, Benefitted from the Stimulus Bill*, CLIMATE PROGRESS (Aug. 25, 2010), http://climateprogress.org/2010/08/25/the-entire-american-economy-including-renewable-energy-benefited-from-the-stimulus-bill (discussing the impact of the stimulus package on the economy, including promotion of greentech).

280. *See* Zachary Shahan, *Fossil Fuels Get Tons More in Subsidies than Renewable Energy*, CLEAN TECHNICA (July 31, 2010), http://cleantechnica.com/2010/07/31/fossil-fuels-get-tons-more-in-subsidies-than-renewable-energy/ (noting that governments devote more than ten times as much to subsidizing fossil fuel industries than to solar and wind).

281. Romm, *supra* note 279 (discussing the potential for tax incentives to expire at the end of 2010).

282. Candace Lombardi, *U.S. Wind Energy Popular, But Lacks Investment*, CNET NEWS (July 28, 2010), http://news.cnet.com/8301-11128_3-20011926-54.html?tag=mncol;mlt_related.

283. *Global Wind Power Boom Continues Despite Economic Woes*, GLOBAL WIND ENERGY COUNCIL (Mar. 2, 2010), http://www.gwec.net/index.php?id=30&tx_ttnews[tt_news]=247 (comments of AWEA's CEO Denise Bode that "[t]he U.S. wind energy industry shattered all installation records in 2009, chalking up the Recovery Act as a historic success in creating jobs, avoiding carbon, and protecting consumers").

284. AWEA MID-YEAR 2010 MARKET REPORT: JULY 2010, *supra* note 31, at 3.

285. Angelique van Engelen, *Obama Addresses Climate Change in Program Styled on 1960s Space Race*, GLOBAL WARMING IS REAL (May 5, 2009), http://www.globalwarmingisreal.com/blog/2009/05/05/obama-addresses-climate-change-in-program-styled-on-1950s-space-race/.

research and development. Like the Apollo program, it is not clear at the outset which technology will prevail, so we need to work on a variety of fronts over a long period of time. ARPA-E's focus on stimulating research and development of risky new technologies may well be excellent for this purpose, but the initial $400 million support is a drop in the bucket compared to the levels needed. Programs established in the stimulus package are a temporary fix and not the comprehensive approach that we need.[286]

At present, it has become apparent that much of the rest of our effort to develop national targets for greentech is mired in a rut. No climate bill with a price on carbon (through an economy-wide or more limited trading scheme), a renewable electricity standard, or a national feed-in tariff is likely to be forthcoming from the Congress.[287] Progress toward even the more limited goal of a stand-alone national renewable electricity standard is doubtful.[288] Many have noted the failure of federal leadership[289] and the actions of a number of progressive states that have stepped into the void with their own programs.[290] These policies are not uniformly available throughout the country. Also, a national program (such as a national renewable portfolio standard) may achieve results that piecemeal state and regional efforts underway cannot.[291]

How can we make more progress? The moon project offers a way of looking at this. Indeed, the idea of a domestic challenge like that of sending a man to the moon may well be more of what those talking about a "clean energy race" actually mean than following China's lead. Addressing climate change requires the kind of committed and strong support from the federal government that the space program received throughout the 1960s.[292] The race is really a race to meet a national goal that we have articulated and that is in our national self-interest, whether or not it has geopolitical significance.

286. Wong, *supra* note 109.

287. David Roberts, *On the Death of the Climate Bill*, GRIST MAGAZINE, July 22, 2010, http://www.grist.org/article/2010-07-22-on-the-death-of-the-climate-bill/.

288. *Id.*

289. *See, e.g.*, Wong, *supra* note 60 (noting that "[w]hat the United States has instead is a patchwork of differing state and local policies paired with federal policy tools that are temporary and unpredictable").

290. For descriptions of the wide variety of state programs, see *U.S. States & Regions*, PEW CTR. ON GLOBAL CLIMATE CHANGE, http://www.pewclimate.org/states-regions (last visited Oct. 6, 2010), and JONATHAN L. RAMSEUR, CONG. RESEARCH SERV., RL33812, CLIMATE CHANGE: ACTION BY STATES TO ADDRESS GREENHOUSE GAS EMISSIONS (2007), *available at* http://ncseonline.org/NLE/CRSreports/07Dec/RL33812.pdf.

291. *See* Lincoln Davies, *Power Forward: The Argument for a National RPS*, 42 CONN. L. REV. 1339, 1397 (2010); Joshua P. Fershee, *Changing Resources, Changing Market: The Impact of a National Renewable Portfolio Standard on the U.S. Energy Industry*, 29 ENERGY L.J. 49, 61 (2008).

292. Engelen, *supra* note 285.

We put a man on the moon in part because we were captivated by the idea of a simple, clear goal. Previously, I have argued for a clear goal in renewables. I believe that a new form of governmental assistance is required beyond feed-in tariffs, tax credits and rebates, solar power purchase agreements, and property tax financing.[293] I have focused on a platform for discussing one idea that could catalyze a push toward rapidly increasing development of renewables: a "solar utility" that would reduce the upfront cost of panels to nearly zero by subsidizing and installing them at houses.[294]

A cautionary tale from the past is in order. In 1978, President Jimmy Carter articulated a goal of generating 20% of the nation's electricity from renewable sources by 2000, which, of course, is comparable to RPS levels being discussed now. Follow-through on that goal was poor, as Congress rejected many of the individual programs designed to achieve the goal and fossil fuel industries marshaled their resources to prevent the advancement of renewables industries.[295]The current era features stronger support for renewable energy and may be more promising for achieving a national goal. If we focus national attention on a concrete goal, like "a solar panel on every house," intermediate technology and policy milestones are easier to achieve because they are in service of the purpose.

CONCLUSION

> Can we please retire this rhetoric? Both countries have their strengths and can make unique contributions to our shared goal. Let's stop fighting a war where both sides believe they are the losers.[296]

China has become a major player in greentech in a short amount of time. If it could keep up its breakneck pace of growth it might look like it has pulled far ahead of us in the new "green energy race," but at present the picture is more muddled. The "space race" metaphor and the USTR investigation are counterproductive in that they pit the two nations against each other, when they should emphasize interdependence and cooperation. In the end, competing with China in greentech is about as useful as "energy independence." It may be much more productive to convince Americans that their nation's future depends on investment in renewables through a specific national goal.

293. Eisen, *supra* note 13, at 2.

294. *Id.* at 3.

295. Richard Rosentreter, *Oil, Profit$, and the Question of Alternative Energy*, HUMANIST, Sept.–Oct. 2000, at 8, *available at* http://findarticles.com/p/articles/mi_m1374/is_5_60/ai_65133031/.

296. McElwee, *supra* note 24.