Red Dragon, Green Energy:

Techno-nationalism in China's Approach to Renewable Energy

Andrew B. Kennedy

Crawford School of Economics and Government
The Australian National University

September 2011

Abstract: China's approach to renewable energy technologies has important long-term implications for a range of pressing international issues, from climate change to economic competition to energy security. This paper explores how the Chinese government has approached the development and diffusion of such technologies within China since 2005, focusing on the role of "techno-nationalism" in Chinese policy making in particular. It begins by reviewing the literature on techno-nationalism and developing a typology that differentiates between more or less techno-nationalist views. It then examines the Chinese policy discourse with respect to renewable energy technologies to identify the extent to which the elements of techno-nationalism are present. Lastly, it evaluates the congruence between Chinese techno-nationalism and Chinese policy in the renewable energy sphere.

China's enthusiasm for renewable energy is impressive. In 2005, when China passed its Renewable Energy Law, the country had 117 gigawatts (GW) of hydroelectric capacity, but almost no wind, solar, or biomass power.[1] Five years later, China had nearly 50 GW of capacity in these three energy sources, thanks to the new law as well as a series of follow-on regulations, amendments, and targets. In fact, China has emerged as the world's top producer of wind power, with more than 40 GW of capacity, as well as the world's leading manufacturer of wind turbines and solar panels. All told, China now meets more than 8 percent of its primary energy demand from non-fossil sources, a figure that it plans to raise to 11.4 percent by 2015 and 15 percent by 2020. Some analysts speculate that this last target will be easily exceeded.[2]

In some respects, China's interest in renewable energy has improved the prospects for cooperation with the outside world. Most importantly, it has made it easier for China to support global efforts to combat climate change. Leading up to the Copenhagen Conference in late 2009, Chinese President Hu Jintao stated that China would reduce the carbon intensity of its economy (the amount of carbon dioxide produced per unit of Gross Domestic Product) by 40 to 45 percent between 2005 and 2020. Hu also reiterated China's commitment to raise the share of non-

[1] International Energy Agency, *World Energy Outlook 2007* (Paris: OECD, 2007), 597.

[2] Except as otherwise noted, the data in this paragraph are available in China Greentech Initiative, *The China Greentech Report 2011: China's Emergence as a Global Greentech Market Leader* (April 2011), 73-94, http://www.china-greentech.com/report.; and Xinhua, "China Aims for Greener Economy over Next Five Years," March 4, 2011, accessed through Factiva.

fossil energy in its primary energy consumption to "about 15 percent" by 2020.[3] While these commitments remain non-binding internationally, they are widely seen as credible, precisely because of China's pre-existing interest in reforming its energy system. As such, they have provided a basis for international negotiations on climate change to continue.

In other respects, China's interest in renewable energy promises growing friction with other countries in the years ahead. While promoting new energy supplies, the Chinese government has also sought to reduce its dependence on the outside world for new technologies. Through a range of regulations and subsidies, Beijing has supported the development and diffusion of Chinese-owned energy technologies, while marginalizing those of foreign competitors. In the process, China's government has run afoul of foreign companies and governments that wish to do business with China, and accusations have been made that China is not living up to its commitments under the World Trade Organization (WTO).[4]

In short, China's enthusiasm for green energy reflects not just a desire for a cleaner environment, or a more diverse energy portfolio, but also a keen sense of techno-nationalism. Techno-nationalism is not a new phenomenon in China; it can be traced back to China's humiliation at the hands of industrializing countries in the 19th century. Chinese leaders have thus made it a priority to build up China's own technological capabilities. Under Mao, China invested precious resources in nuclear

[3] Hu also restated commitments with respect to forest cover and forest volume. For the text of Hu's statement, see http://www.gov.cn/ldahd/2009-11/26/content_1474016.htm.

[4] United States Trade Representative, *2010 Report to Congress on China's WTO Compliance* (December 2010), 6, 20-21, 45, accessed at http://www.ustr.gov.

and missile technologies – the "two bombs and one satellite" (*liang dan yi xing*) – while Deng Xiaoping launched programs in the 1980s to promote technological advances in the civilian economy.[5] More recently, Hu Jintao and Wen Jiabao unveiled the National Medium- and Long-Term Program for Science and Technology Development, or MLP, in 2006. The MLP, which touted itself as a "grand blueprint of science and technology development" until 2020, represents the Chinese government's most prominent and comprehensive statement of technological ambition to date.[6] As this essay will show, renewable energy occupies an important place in this vision of China's technological future.

In the remainder of this essay, I explore how techno-nationalist ideology has shaped China's approach to renewable energy technologies since 2005. The first section briefly reviews the literature on techno-nationalism and then develops a typology that differentiates between more or less techno-nationalist views. The second section assesses the type of techno-nationalism that has been expressed in the Chinese discourse on renewable energy. The third section evaluates the congruence between Chinese techno-nationalism in this sphere and Chinese policy

[5] For a comparison of the programs under Mao and Deng, see Evan Feigenbaum, *China's Techno-Warriors: National Security and Strategic Competition from the Nuclear to the Information Age* (Stanford: Stanford University Press, 2003). On the evolution of China's techno-nationalism in the reform era more generally, see Barry Naughton and Adam Segal, "China in Search of a Workable Model: Technology Development in the New Millennium," in William W. Keller and Richard J. Samuels, eds., *Crisis and Innovation in Asian Technology* (Cambridge: Cambridge University Press, 2003), 160-86; and Adam Segal, *Digital Dragon: High-Technology Enterprises in China* (Ithaca: Cornell University Press, 2003), 165-68.

[6] State Council, *Guojia Zhongchangqi Kexue he Jishu Fazhan Guihua Gangyao (2006-2020 Nian)* [National Medium- and Long-Term Program for Science and Technology Development (2006-2020)], February 9, 2006, www.gov.cn/jrzg/2006-02/09/content_183787.htm.

toward international cooperation on renewable energy technologies. The essay concludes by summing up the findings and considering future avenues for research.

The Evolving Concept of Techno-nationalism

The term "techno-nationalism" was first used by Robert Reich in a 1987 essay in the *Atlantic*.[7] Reich was focused on U.S. technology policy in particular, and he saw techno-nationalism as a misguided attempt to prevent other countries from taking advantage of American technological advances. As he put it, "the overriding goal of these initiatives is to protect future American technological breakthroughs from exploitation at the hands of foreigners, especially the Japanese." Reich contrasted techno-nationalism with "techno-globalism," which in his view accurately recognized technology development as a fundamentally transnational phenomenon. Again in Reich's words, "technological development is a joint product of multinational institutions—universities, research laboratories, corporations, even defense programs—that link talented people from all corners of the globe through computers, satellite communications, and jet airplanes." Reich saw American policy as traditionally techno-globalist and critiqued calls for less cooperation with foreign companies and governments.

Since the late 1980s, some scholars have echoed Reich's view of techno-nationalism. Syliva Ostry and Richard Nelson, for example, portray it as a "naïve" attempt by governments "to impose national technology policies on a world in

[7] Robert Reich, "The Rise of Technonationalism," *The Atlantic* (May 1987), 63-69.

which business and technology are increasingly transnational."[8] Yet there are also different views of techno-nationalism, particularly among scholars working on the rapidly growing economies of Asia. Unlike Reich, the Asia-oriented literature has been less concerned with policies to protect domestic advances and more concerned with efforts to promote domestic innovation and reduce dependence on technology imports. In addition, Asia-oriented scholars have sometimes taken a less critical view of techno-nationalism. Writing about Japan, for example, Richard Samuels made a point of distinguishing techno-nationalism from "retrograde mercantilism." Instead, Samuels saw techno-nationalism as "the belief that technology is a fundamental element in national security, that it must be indigenized, diffused, and nurtured in order to make a nation rich and strong."[9] Samuels lauded Japan's efforts in this regard and suggested that the United States could learn from its experience.[10] Writing about Asian economies more generally, Adam Segal and David Kang take an equivocal view of techno-nationalism. They suggest that it derives from an understandable desire to move beyond low-cost manufacturing to more innovative – and rewarding – economic activities.[11] In their view, this desire can produce policies that embrace globalization, particularly if multinationals are seen as willing to move research and development activities to emerging economies. Yet it can also

[8] Sylvia Ostry and Richard Nelson, *Techno-Nationalism and Techno-Globalism: Conflict and Cooperation* (Washington: Brookings, 1995), 28, 60 (check).

[9] Richard J. Samuels, *Rich Nation Strong Army: National Security and the Technological Transformation of Japan* (Ithaca, NY: Cornell University Press, 1994), x.

[10] Ibid.,324.

[11] Adam Segal and David Kang, "The Siren Song of Techno-nationalism," *The Far Eastern Economic Review* (March 2006), www.feer.com/articles1/2006/0603/free/p005.html.

produce policies that exclude multinationals if they are seen as obstacles to national development.

In short, there is no one view of what techno-nationalism is or whether it is a "good" or a "bad" thing. For that reason, I wish to devote some space to explaining how the term will be used in this essay. In essence, I see techno-nationalism as informed by three convictions – each of which builds on those that come before it. The first, and most fundamental, conviction is that technological capabilities can be understood in national terms. This builds on Reich's original point that techno-nationalists see technology as belonging not merely to companies, but to the countries in which these companies are based. Or as Richard Nelson has put it, there is the sense that "[corporate] capabilities are in a sense national, and can be built by national action."[12] In this view, governments have considerable power to impede or empower technology flows from one country to another. As noted above, this view has been strongly criticized by some scholars, including both Reich and Nelson, who argue that major corporate actors are typically multinational in character and that it is unrealistic to expect new knowledge to remain confined within national borders.

The second conviction is that relations between nation-states – with respect to technology at least – are fundamentally competitive. In this view, technology is not only something that national governments can control; it is also a key element of national wealth and power and, as such, a contentious realm of interstate rivalry.[13]

[12] Richard Nelson, *National Innovation Systems: A Comparative Analysis* (Oxford: Oxford University Press, 1993), 3.

This emphasis on international competition, in turn, implies that technology transfer between countries is problematic. While such transfers are certainly possible and do occur, they tend to be costly as technology providers seek to maximize their revenues. Technology transfers can also create a state of dependence for the recipient country, undermining its political autonomy. Lastly, a high degree of interstate competition means that the transfer of key technologies is likely to be tightly controlled or prohibited. In this view, therefore, dependence on the outside world for technology should be minimized insofar as possible – both because of the costs involved and because the potential benefits are likely to be limited.

The third conviction is that one's own country can boost its technological capabilities through its own resources. This type of belief has not received much attention in the techno-nationalism literature to date, but confidence in national capabilities is a key variable that needs to be considered. Technological innovation is no simple task; it requires both "hardware" such as scientists and engineers, laboratories, and financial investment, as well as "software" assets that are harder to quantify.[14] The latter include collaborative relationships among government, businesses, and universities, legal protections that reward innovation, and a culture that supports risk-taking. Based on their assessment of their own country's

[13] This point resonates with Samuels' depiction of techno-nationalism as a belief in the link between technological prowess and national security. More pointedly, other scholars suggest that techno-nationalism is "the idea that technological strength is an effective determinant of national power in a harshly competitive world." See Joan Johnson-Freese and Andrew Erickson, "The Emerging China–EU Space Partnership: A geotechnological balancer," *Space Policy* 22 (2006), 12.

[14] The literature on "national innovation systems" is extensive. On the "hardware" and "software" of innovation, see Adam Segal, *Advantage: How American Innovation Can Overcome the Asian Challenge* (New York: W.W. Norton, 2011), 22-26.

"hardware" and "software," policymakers may adopt a range of beliefs about their country's ability to develop new technologies. The most pessimistic possible view is that there is no alternative to cooperating with the outside world, regardless of the problems associated with them, because of the weaknesses of one's own country's innovation system. A somewhat more confident view is that cooperation with the outside world is essential, but that the nation is not helpless and has means of facilitating, coercing, or otherwise effecting technology transfer. The most confident possible view is that the nation's own capacity for innovation means that it can essentially do without the outside world.

One can imagine several different perspectives on technology policy based on the extent to which on subscribes to the various convictions outlined above. First, one may reject the notion that technology can be understood in national terms. Taking this view renders the subsequent questions about the nature of technology in international affairs largely irrelevant. If technology cannot be contained within national borders, it is less important whether relations between states in this regard are competitive and whether one's state needs the outside world or not. I call this a "post-national techno-globalist" view. Second, one may agree that governments play a key role in technology transfer, but be relatively optimistic about interstate relations in this regard. We might call this a "cooperative techno-globalist" view. Third, one may maintain that technology can be nationally controlled and see it as an arena of international competition, but have serious doubts about national innovative capabilities. In this case, there will be a desire to reduce external dependence but also a recognition that it is indispensable at the same time. We

might call this rather conflicted perspective a "pragmatic techno-nationalist" view. Fourth, and lastly, one may believe that technology can be seen as a national attribute, that interstate relations are competitive with respect to technology, and that one's own nation can be largely self-reliant in technology development. I call this most extreme view "autarkic techno-nationalism."

Before proceeding, I should emphasize that the point of this discussion is not to distinguish between "correct" and "incorrect" views. Instead, I have simply sought to develop a more nuanced means of categorizing views on technology policy. Rather than taking a binary view that contrasts techno-nationalism with techno-globalism, I have suggested that multiple beliefs inform techno-nationalism and that we should think in terms of a spectrum of views, ranging from the least nationalistic (post-national techno-globalist) to the most nationalistic (autarkic techno-nationalist).[15] With this discussion as foreground, in the next section I ask where China's views on renewable energy technology fit within this spectrum.

China's Thinking about Renewable Energy: Pragmatic Techno-nationalism

To what degree has techno-nationalist ideology influenced Chinese thinking about renewable energy in recent years? To begin, it is helpful to consider in more detail the MLP. This 38,000-character document was commissioned by the 16th Party Congress in 2002 and publicly released by the State Council in early 2006. As

[15] Note that other scholars have suggested a different spectrum in this regard. In particular, Kennedy, Suttmeier and Su distinguish between ideological techno-globalists, instrumental techno-globalists, instrumental techno-nationalists, and ideological techno-nationalists. See Scott Kennedy, Richard P. Suttmeier, and Jun Su, "Standards, Stakeholders, and Innovation: China's Evolving Role in the Global Knowledge Economy," National Bureau of Asian Research Special Report #15 (September 2008), 9.

the product of several years of deliberation, it offers a window on mainstream thinking within the Chinese government on technology policy. The MLP listed eleven "main areas and priority topics" that were seen as "critical to economic and social development and national security and in dire need of S&T support." Energy was listed first, and the report stated that it was a priority to increase China's energy supply by "diversifying the country's energy structure." Most important for our purposes here, it exhorted China to "strive for breakthroughs in renewable energy, including wind energy, solar energy, and biomass energy, and associated scale applications."[16]

The prominence that was accorded to energy, and renewable energy in particular, in the MLP should not come as a surprise. The energy intensity of China's economy (the amount of energy consumed per unit of GDP) had begun to rise early in the decade, and by 2004 the country was suffering from widespread power shortages.[17] While China has abundant reserves of coal with which to meet its growing demand for energy, pollution from coal-fired power plants had begun to take a severe toll on China's environment and its people.[18] As the MLP stated:

> Our country is currently suffering from sharp discrepancies between energy supply and demand, an irrational energy structure, and low energy efficiency, with a predominantly coal-based primary energy consumption, resulting in severe environmental pollution. Over the next 15 years, meeting the fast growing demand for energy and for its

[16] State Council, *Guojia Zhongchangqi Kexue he Jishu Fazhan Guihua Gangyao.*

[17] Dan Rosen and Trevor Houser, *China Energy: A Guide for the Perplexed* (Washington, DC: Peterson Institute for International Economics, 2007), 6; Tschang Chi-chu, "China's Power Crisis," *The Straits Times,* July 26, 2004. Accessed at: http://www.geni.org/globalenergy/library/media_coverage/the-straits-times/chinas-power-crisis/index.shtml.

[18] Joseph Kahn and Jim Yardley, "As China Roars, Pollution Reaches Deadly Extremes," *The New York Times*, August 26, 2007, A1.

> clean and efficient utilization constitutes a major challenge for the development of energy-related science and technology.[19]

In addition, the MLP's emphasis on so-called "new renewables" – wind, solar, and biomass energy – and the lack of attention to hydropower also makes sense from a technology development perspective. The former are emerging industries in China with great potential for growth. In contrast, while China's hydropower sector is set for considerable expansion over the next decade, after 2020 growth will slow as China will have exploited most of its hydropower resources.[20] Large hydropower projects have also become politically vexing for the Chinese government, and since the 1990s it has encountered substantial resistance to them.[21]

If we look more closely at the MLP, clear techno-nationalist themes are apparent. First, technology is clearly portrayed as a national attribute. In fact, this assumption underlies much of the prose, which is concerned with the gap between China's "S&T development" and that of developed countries. As the MLP stated, "China's overall S&T level still has a fairly big gap to close, compared with that of developed nations." Second, technology is depicted as a key national resource in a competitive world. The MLP noted that technological development had greatly enhanced China's "comprehensive strength" to date, with the development of nuclear weapons, satellites, manned space flights, and hybrid rice. But it also noted that China was still engaged in a tough competition with other countries for

---

[19] State Council, *Guojia Zhongchangqi Kexue he Jishu Fazhan Guihua Gangyao.*

[20] International Energy Agency, *World Energy Outlook 2010* (Paris: International Energy Agency, 2010), 290.

[21] On the politics of resistance to large hydropower projects, see Andrew C. Mertha, *China's Water Warriors: Citizen Action and Policy Change* (Ithaca: Cornell University Press, 2008).

technological strength. As the MLP noted, "the nation will be for a long period of time under enormous pressures from developed nations who possess economic and S&T superiority." In keeping with this view, the report noted that it was difficult to acquire valuable technologies from other countries. As the MLP stated, "facts have proved that, in areas critical to the national economy and security, core technologies cannot be purchased." The report concluded that China had to "enhance its indigenous innovation capability" in order to "take the initiative in the fierce international competition."[22]

On the question of how much China could boost its technological prowess through national resources, however, the MLP was much more nuanced. On the one hand, the report seemed broadly confident in many respects. It noted that China's rapid economic development created a strong foundation for technological development. It touted the country's human capital in science and technology. It argued that China's combination of socialist political structure with market mechanisms enabled the country to mobilize efforts "to do great things" and to do so efficiently. It praised Chinese civilization as capable of "incorporating things of diverse nature, which favors the creation of a uniquely innovative culture." On the other hand, it enumerated a range of shortcomings in China's own science and technology system. It criticized the innovative capability of Chinese enterprises as "weak." It noted that the S&T sector was too compartmentalized and that management of the S&T system was "terribly uncoordinated." It also worried that the system did a poor job of rewarding high achievers and encouraging innovation

[22] State Council, *Guojia Zhongchangqi Kexue he Jishu Fazhan Guihua Gangyao.*

more generally. Not surprisingly, therefore, it concluded that international cooperation would be very important for China going forward. In fact, the MLP argued that China should try to expand its technology collaboration with the rest of the world. Universities and research institutes were exhorted to set up joint laboratories with foreign ones. Chinese enterprises were encouraged to establish R&D centers overseas, and multinational corporations were invited to set up more R&D centers within China. Clearly, the MLP was not sufficiently confident in China's domestic capabilities to endorse a "go it alone" approach.[23]

In sum, the MLP revealed a clear strain of pragmatic techno-nationalism in Chinese official thinking about technology policy. While China's leaders viewed the development of new energy technologies, as well as other technologies, as a competitive endeavor, they stopped well short of endorsing an autarkic approach. If we examine more specific statements that China's leaders have made about clean energy technologies, does this pragmatic techno-nationalist orientation remain evident? Certainly, China's leaders have devoted no little attention to renewable energy in the past few years. This may be in part because the election of Barack Obama in the United States suggested that the American government would support renewable energy development more vigorously in the future. Indeed, analysts at state-run think tanks in Beijing began to worry after Obama's election that China would become increasingly dependent on energy technology imports from the United States in the future.[24] In addition, the Copenhagen conference in December

[23] State Council, *Guojia Zhongchangqi Kexue he Jishu Fazhan Guihua Gangyao.*

[24] Author's interview at a state-run think tank, Beijing, March 13, 2009.

2009 concentrated the world's attention on the challenge of climate change and the development clean energy technologies. It is not surprising, therefore, that Chinese leaders have spoken about renewable energy technology with some frequency in recent years.

If we look at the statements that Chinese leaders have made about renewable energy, there is a clear tendency to see it in national terms and also in terms of international competition. Premier Wen Jiabao heads China's National Energy Commission (NEC) as well as the State Council Leading Group on Science, Technology, and Education. In September 2009, Wen told the World Economic Forum that China would "accelerate the development of a low carbon economy and green economy so as to gain an advantageous position in the international industrial competition."[25] Wen's heir apparent, Executive Vice Premier Li Keqiang, also plays an important role in renewable energy policy as Deputy Chairman of the NEC with special responsibility for climate change. In January 2010, Li exhorted his country to "step up innovation and grab the commanding heights in energy development and international competition."[26] Later that month, Xie Zhenhua, Vice Chairman of the National Development and Reform Commission (NDRC) and China's lead negotiator on climate change issues, elaborated on the theme of international competition. Xie told his audience that "while protracted negotiations on development space were taking place, in reality every country has quietly started

[25] For the text of Wen's speech, see http://au.china-embassy.org/eng/xwfw/t583435.htm.

[26] "Vice premier Stresses Development of Energy-saving Industry," Xinhua, January 8, 2010.

competing in low-carbon economic development."[27] Xie likened this competition to the space race in the Cold War, and then he noted that China faced "huge pressure from the developed countries" since they "occupy a favorable position in the international low-carbon economic competition thanks to their financial and technological superiority as well as domestic conditions that promote the growth of low-carbon markets." In October 2010, a more detailed view of international competition was articulated by Zhang Qiang, Deputy Director of the Institute of International Technology and Economics at the State Council's Development Research Center, in an essay for *Global Times*.[28] Zhang argued that "the U.S. government has recognized that only through leading in the field of clean-energy technology can the United States achieve its strategic goal of renovating its economy and maintaining hegemony." He cited various measures that the U.S. government has taken to support clean energy development and cautioned his compatriots not to expect too much of Sino-American cooperation in this field. As Zhang wrote, "we have to understand that although China and the U.S. regard clean-energy technology as a focus of mutual exchange and cooperation, the U.S. government will not let China share in its key technologies." China should therefore "make its own strategies for clean-energy technological development."

Yet if Chinese officials see energy technology development in terms of international competition, they have also been modest about what China can

[27] The text of Xie's remarks is available at: http://finance.sina.com.cn/hy/20100109/11137218805.shtml.

[28] Zhang Qiang, "U.S. Won't Share Its Clean-energy Initiatives with China," *Global Times*, October 11, 2010. Accessed at http://opinion.globaltimes.cn/commentary/2010-10/580907.html.

accomplish on its own in the renewable energy sector. In January 2011, Li Keqiang visited several European countries and emphasized China's need for European investment and expertise in the clean energy sector.[29] Lower-level officials have also emphasized the need for continued cooperation with the outside world. The aforementioned essay by Zhang Qiang, for example, maintained that it was important to work with foreign enterprises whenever possible. "Regarding small-scale high-tech companies abroad," he wrote, "China can include them into its own research and development plans through merging, buying shares, employing their technological talents and cooperation."[30] Zhou Fengqi , former head of the NDRC Energy Research Institute, frankly stated in 2009 that "the level of our core technologies and our capacity for indigenous innovation still needs to be improved," while discussing China's prospects for development in wind power.[31] Zhou explained that China was still in a phase in which it needed foreign technical expertise, without which Chinese enterprises would not become internationally competitive. Or as Liu Xielin, a noted Chinese expert on innovation policy, has put it more broadly, "without (international cooperation), catching-up is almost impossible" for countries like China.[32]

---

[29] "Chinese vice premier urges high-tech cooperation with Germany," Xinhua, January 9, 2011. Accessed at http://english.gov.cn/2011-01/09/content_1780926.htm.

[30] Zhang Qiang, "U.S. Won't Share Its Clean-energy Initiatives with China."

[31] Zhongguo Fengneng Chanye Gongguoyuqiu Lou Miaotou [Signs of Supply Exceeding Demand in China's Wind Power Industry]," June 11, 2009, Zhongguo Chanjing Xinwenbao [China Industry and Economic Gazette]. Accessed through China Infobank.

[32] Lie Xielin, "Path-following or Leapfrogging in Catching-up: the Case of the Chinese Telecommunication Equipment Industry," Paper no. 2007/01, Centre for Innovation, Research and Competence in the Learning Economy, Lund University, December 5, 2006, 23, accessed at http://www.circle.lu.se/publications.

These different strands of thought came together in a more extended analysis published by Li Junfeng and Chang Yu in 2010, "The New Global Game in New Energy."[33] The article is worth noting because Li is Deputy Director of the NDRC's Energy Research Institute and reportedly a key player in renewable energy policy. Li and Chang's analysis initially seemed to take a dark view of international competition in renewable energy. Europe was a "hypocrite" that scolded China for not doing enough to combat climate change while withholding advanced technology that would help it to do more.[34] The United States, in turn, was an "out and out villainous character" who was "guarding against" or even "containing" China out of fear that it would "occupy the commanding heights of the clean energy economy."[35] For these and other reasons, competition was "hard to avoid," and the United States and China in particular were "competing opponents."[36] Li and Chang also sounded rather confident in Chinese new energy firms. Whereas Chinese companies and foreign companies once had a "student-teacher relationship," they now had a "competing opponents relationship" and "the student has surpassed the teacher."[37] In other respects, however – policymaking and technology development, for example – China was still a "student" and had much to learn.[38] They noted that

---

[33] Li Junfeng and Chang Yu, "Quanqiu Xin Nengyuan de Xin Boyi [The New Global Game in New Energy]," Shishi Baogao [*Report on Current Events*] (2010), No. 11, 50-55.

[34] Ibid., 51.

[35] Ibid.

[36] Ibid, 54.

[37] Ibid., 53.

[38] Ibid.

United States in particular "possessed advanced technology and R&D capability."[39] The two held out hope that Washington and Beijing would settle their inevitable disputes amicably and even suggested that the "prospects for U.S.-China cooperation are infinitely broad."[40]

To sum up, China's thinking about renewable energy technology appears to be torn between two competing perceptions, whether one examines the MLP or the statements and writings of prominent officials in the energy arena. There is a strong sense that China faces a competitive and unforgiving international environment, and that the country must make greater efforts to acquire new energy technologies of its own or else remain intolerably dependent on the outside world. Yet there is also a clear belief that China must continue to engage with the outside world in order to improve its technical expertise in this arena. It is against this backdrop of pragmatic techno-nationalism that China has approached international cooperation with respect to renewable energy technologies in recent years.

China and International Cooperation on Renewable Energy: Testing the Limits

China's approach to international cooperation in the renewable energy sphere has been remarkably congruent with its pragmatic techno-nationalism. China has not merely offered robust support for the development of the renewable energy industry through the Renewable Energy Law and other measures. The Chinese government has also sought to advance domestic firms in this sphere at the

[39] Ibid., 54.
[40] Ibid.

expense of foreign firms by tilting the playing field in favor of the former. Yet China has also been careful not to go too far in this direction, and it has generally retreated when its policies have been challenged. In short, China has been less cooperative with the outside world than one would expect a techno-globalist state to be, but it has been more cooperative than one would expect an autarkic techno-nationalist state to be.

The wind sector is worth examining in particular, as it has been the main focus of non-hydropower renewable energy growth in China since 2005. Wind energy became a hot industry in China relatively quickly because it was the most cost-effective way for Chinese power companies to meet their renewable energy targets assigned to them by the government. It is not surprising, therefore, that the Chinese government has focused its efforts on promoting Chinese wind turbine manufacturers. In 2004, the NDRC established the Wind Power Concession Project, which promoted the development of large-scale wind farms and which required developers to employ wind power technology with 70 percent local content. In 2005, the NDRC broadened this local content requirement to include all wind power projects in China.[41]

Over the next several years, Chinese companies rapidly increased their share of the country's wind power market. Whereas in 2004 three-quarters of all wind turbines installed in China were foreign-made, by 2010 Chinese companies

[41] For a summary of these measures, see Dewey & LeBoeuf, LLP, "China's Promotion of the Renewable Electric Power Equipment Industry – Hydro, Wind, Solar, Biomass," report prepared for the National Foreign Trade Council (March 2010), 51-53, accessed at www.nftc.org/default/.../2010/China%20Renewable%20Energy.pdf.

controlled 85 percent of the market.[42] In fact, by late 2010 Chinese firms were supplying about half of the US$45 billion global market for wind turbines.[43] The extent to which this extraordinary change reflected the local content requirement, as opposed to other factors, remains unclear. Foreign firms responded to the requirement by building their own factories in China in order to comply with it. Some observers claim that these investments met with limited success because Chinese companies proceeded to best their foreign competitors on price, which was a major consideration for state-owned developers.[44] Other analysts point out that the foreign firms were forced to develop networks of domestic parts suppliers in order to begin production in China and that these newly-trained suppliers were of considerable benefit to Chinese firms as they sought to approximate the quality of multinational manufacturers.[45] In any case, China began to face external pressure to eliminate the requirement in second half of 2009, when the newly installed Obama administration in the United States began to press the issue in bilateral discussions. Shortly after it was raised, China announced that it would revoke the requirement.[46] China's decision to abolish the measure was presumably made easier by the stunning success of Chinese wind energy firms over the past several years.

---

[42] China Greentech Initiative, *The China Greentech Report 2011*, 79.

[43] Keith Bradsher, "To Conquer Wind Power, China Writes the Rules," *The New York Times*, December 14, 2010.

[44] Ibid.

[45] Bradsher, "To Conquer Wind Power, China Writes the Rules."

[46] Ibid.

Nonetheless, the timing of China's announcement suggests that foreign pressure played an important role as well.

This pattern of tilting the playing field toward domestic firms and then retreating under pressure has been repeated in the wind sector. Starting in 2008, for example, China's "Special Fund for Wind Power Equipment Manufacturing" provided grants ranging from $6.7 million to $22.5 million to Chinese wind turbine manufacturers to incentivize the use domestic equipment, and this practice continued into 2010. In late 2010, however, the Obama administration lodged a complaint with the WTO charging that the subsidies were prohibited under the organization's rules. The two sides then took up the issue in bilateral discussions in early 2011. In June 2011, China agreed to terminate the program before the case was heard by the WTO.[47]

The pattern of favoring domestic firms and then retreating under pressure has also been evident in policy toward renewable energy more broadly, as well as other types of technologies. In 2006, the MLP had stated that government procurement policy could be an important means of promoting domestic technology products. Over the next few years, a number of provincial and local governments developed catalogues of technology products to receive preferential treatment in procurement. In 2009, the NDRC, the Ministry of Science and Technology, and the Ministry of Finance jointly issued Circular 618, which formally announced the creation of a national-level catalogue of domestic technology products. Circular 618 identified six broad categories of products were to be targeted, one of which was

[47] "China Agrees to Halt Wind Power Subsidies Rather than Fight U.S. in WTO," *Inside U.S.-China Trade*, Vol. 11, No. 23 (June 8, 2011), accessed through Factiva.

"new energy and equipment" technologies. Sub-categories included wind, solar, and biomass technologies.[48]

Circular 618 quickly elicited international criticism, especially since the market for government procurement in China had been estimated at tens of billions of dollars.[49] While China was not a member of the WTO Government Procurement Agreement prohibiting discrimination, Beijing appeared stung by the criticism, and it quickly began to backtrack. In April 2010 the central government published draft revisions to Circular 618 that softened some of its requirements. The draft indicated, for example, that products could be accredited as "indigenous" if they were based on intellectual property that was licensed from overseas (as opposed to owned by a Chinese entity).[50] Foreign companies remained unsatisfied, however, and continued to press for a reversal of the policy. In January 2011, President Hu Jintao told U.S. President Barack Obama while visiting Washington that China would sever the link between its procurement policies and its innovation policies. Chinese representatives subsequently elaborated on this commitment at the May 2011 Strategic and Economic Dialogue.[51] While it remains to be seen how the

---

[48] U.S.-China Business Council, "Issues Brief: China's Domestic Innovation and Government Procurement Policies," Updated March 2011, www.uschina.org/public/documents/.../innovation_procurement_brief.pdf.

[49] Andrew Browne and Jason Dean, "Business Sours on China; Foreign Executives Say Beijing Creates Fresh Barriers; Broadsides, Patent Rules," *The Wall Street Journal Online*, March 17, 2010, accessed through Factiva.

[50] "Guanyu Kaizhan 2010 Nian Guojia Zizhu Chuangxin Chanpin Rending Gongzuo de Tongzhi (Zhengqiu Yijian Gao) [Notice on the Launch of National Indigenous Innovation Product Accreditation Work for 2010 (Draft for Soliciting Input)]," April 2010, http://www.most.gov.cn/tztg/201004/t20100409_76710.htm.

[51] On Hu's commitment and the subsequent elaboration, see "U.S., China Sign Economic Pact; Deepen Pledges on Innovation," *Inside U.S. Trade*, Vol. 29, No. 19, May 13, 2011, accessed through Factiva.

commitment will be implemented, China has clearly sought to balance its desire to promote domestic technology development with its desire to maintain links with the outside world.

China continues to support its renewable energy industry in other ways. For example, its green technology exports benefit from generous export financing assistance, a subject that the United States has recently begun to raise in its Strategic and Economic Dialogue with China.[52] In addition, new energy technologies have been highlighted as one of the "strategic emerging industries" (SEI) that Beijing announced in 2010 it would target for rapid development. In late May of this year, President Hu Jintao presided over a politburo "study session" on innovation and called for new policies to support the SEI industries.[53] The specific policies that the Chinese government will employ remain to be seen, although there has been speculation that there will be financial support for small- and medium-sized companies.[54] Whatever the policy package contains, it is likely that China will continue to test the limits of what its economic partners will accept.

---

[52] "China Agrees to Halt Wind Power Subsidies Rather than Fight U.S. in WTO," *Inside U.S.-China Trade*.

[53] "Hu Jintao Zai Zhonggong Zhongyang Zhengzhiju Diershijiuci Jiti Xuexishi Qiangdiao Jinjin Zhuazhu Lishi Jiyu Qieshi Jiada Gongzuo Lidu Tuidong Zhanlue Xinxing Chanye Kuaisu Jiankang Fazhan [Hu Jintao Stresses Firmly Grasping the Historic Opportunity to Realistically Intensify Work to Promote Rapid and Healthy Development of Strategic Emerging Industries at the 29th Collective Study Session of the Central Committee Politburo]," May 30, 2011, http://www.gov.cn/ldhd/2011-05/31/content_1874294.htm.

[54] "China to Unveil Support Policies for Emerging Industries in Succession," Xinhua, June 27, 2011, accessed through Factiva.

Conclusion

There is much to praise about China's embrace of renewable energy. As noted at the outset of this essay, it has facilitated international dialogue on climate change, even if a binding global agreement remains out of reach. It is also a means to enhance China's natural environment, which suffers from legendary air pollution problems. Promoting renewable supplies also improves China's energy security, both by diversifying its energy portfolio and by reducing its need to import energy supplies from abroad. Moreover, given that the U.S. has failed thus far to enact comprehensive energy reform, it is a positive development that one of the world's largest economies is providing a substantial market in which new energy technologies can be introduced and improved.

Nonetheless, China's approach to renewable energy also suggests that its policies in this arena will also be a source of international tension in the years ahead. China's overall perspective on technology development tends to be nationalistic and competitive, and this orientation has clearly influenced its approach to renewable energy. As a result, it has sought to favor domestic companies, particularly in the wind sector, and to marginalize their foreign competitors. At the same time, Beijing has little desire to shut itself off from the world, and it has proven quite pragmatic in its approach. When its policies have come under pressure, it has revised or cancelled them, at least on paper.

In the future, it would be worth addressing three questions that arise from the findings of this paper. First, because this paper has documented congruence between the beliefs of Chinese leaders and Chinese policy, it would be worth

conducting more in-depth case studies to ascertain the role played by techno-nationalist beliefs in the policymaking process. Correlation is not causation, after all. Second, closer scrutiny of policymaking in China may also reveal a wider range of views on technology policy, and – assuming there is a connection between beliefs and policy – it is worth asking under what conditions proponents of a more techno-nationalist approach are likely to prevail. Third, and relatedly, it would be worth exploring China's approach to other clean energy technologies when it appears to diverge from the pattern documented in this paper. China has, for example, been an enthusiastic importer of nuclear energy technologies, even though this is a field of high-technology mentioned in the MLP and even though nuclear power is set to play an increasingly substantial role in China's energy portfolio.[55] It is possible that China's more open approach to nuclear technology reflects greater doubts about its ability to compete in this energy sector at present. In addition, it should be noted that the costs of compromising on quality in nuclear energy are considerably higher than they are in the renewable energy sector, another consideration that could promote greater reliance on imported technologies in the near term. In any case, it is worth exploring this divergence between China's approach to new renewable and nuclear energy technologies, both to understand the conditions under which the former might become more cooperative and the latter more confrontational.

[55] On China's more open approach to nuclear energy, see Wang Haibin, "Nuclear Straw Man: Influences on China's Foreign Nuclear Energy Relationship by Its Economic and Security Considerations," unpublished manuscript, June 2010.