Is it a race?
Promoting Green Jobs through Wind Energy
A Comparison of U.S. and China's Policies

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INTRODUCTION

The U.S. and China are the world's largest emitters of greenhouse gasses. Together, they consume more than 36% of the world's energy.[1] The U.S. Department of Energy's Energy Information Administration (EIA) announced a 44% expected increase of world energy consumption over the next two decades.[2] They caution that this could result in a 40% increase in carbon dioxide emissions by 2030 if no action is taken to find suitable energy alternatives.[3] Moreover, the International Energy Agency has projected that global electricity demand will double by 2030, growing at 2.6% per year.[4]

Climate change continues to threaten the environment, the economy, and social development across the world. As two of the primary players, the U.S. and China need to embrace an adaptation strategy. Both countries need strong government action to tackle these mounting energy challenges. Fortunately, addressing these problems can create economic opportunity. Transitioning to a low-carbon economy can create numerous green jobs that can promote economic development.

Much of the world's infrastructure is currently inefficient and overly reliant on fossil fuels. Approximately $200–250 billion is invested in energy-related infrastructure each year to replace existing supplies and to meet demand[5]. In addition, $1.5 trillion is spent on energy

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[1] World Resources Institute, http://cait.wri.org; visited on December 1, 2010
[2] Ayee, G., Lowe, M., Gereffi, G.; *Manufacturing Climate Solutions Carbon-Reducing Technologies and U.S. Jobs; Wind Power: Generating Electricity and Employment*; Chapter 11; 2009; pg. 4; http://www.cggc.duke.edu/environment/climatesolutions/
[3] Energy Information Administration. (2009). International Energy Outlook 2009. http://www.eia.doe.gov/oiaf/ieo/pdf/0484(2009).pdf.
[4] World Energy Council. (2009). Survey of Energy Resources 2007. Pg. 5, http://www.worldenergy.org/other/Print.asp?ContentID=686&URL=/publications/survey_of_energy_resources_2007/nuclear/686.asp.
[5] Sawin, J., *Mainstreaming Renewable Energy in the 21st Century*, Worldwatch Paper 169 (Washington, DC: Worldwatch Institute, May 2004), p. 45

consumption.[6] Hence, there are unique investment and employment opportunities to reorient the economy. However, current policy and investment decisions will impact whether the opportunity was missed or embraced.[7]

China and the U.S. have recognized that they need to promote renewable energy and energy efficiency. There has been and needs to be more of a shift towards investment in renewable energy generation and energy efficiency projects. Awareness of the environmental crisis and the consequent challenges stemming from rising oil prices and risks of energy supply security has forced governments to take this predicament seriously. There is an opportunity to address these concerns through the creation of "green jobs." As both China and the U.S. respond to the opportunity, they are competing for leadership in the renewable energy field and vying for the resulting jobs. Acknowledging the relationship between China and the U.S. is critical to adapting to climate change while sustaining strong economies. Framing this opportunity as a "race," sparking competition between two world powers, can provide the necessary motivation to further invest in green technology and supportive renewable energy policies to promote both the economy and environmental sustainability. This competition and a comparison of what aspects of the U.S. and China's policies and legal structures influence the development of renewable energy and the promotion of green jobs can further stimulate sustainable development and greater global adaptation to climate change.

This paper will first focus on the differences between the policies and investments in China and the U.S. and how framing and acknowledging these differences can strengthen national economies and facilitate effective adaptation to climate change. The study will examine

[6] Greenpeace and Global Wind Energy Council (GWEC), Global Wind Energy Outlook 2006 (Amsterdam and Brussels: September 2006), p. 17.
[7] Greenpeace International and European Renewable Energy Council (EREC), Futu[r]e Investment: A Sustainable Investment Plan for the Power Sector to Save the Climate Amsterdam and Brussels: June 2007), p. 8.

how China's regulations and government efforts have both promoted and deterred renewable energy and green jobs. It will also consider how the U.S. has promoted green (wind) energy and jobs. It will then compare China's approach with the United States' and consider how each country's political, economic and social structure reflect their strategies and consequent results. It will briefly examine the role of free trade and how competition plays a role in promoting renewable energy and green jobs while addressing climate change, acknowledging the recent conflict between the U.S. Steelworkers Union and China's policies. We conclude with specific recommendations and explore opportunities for cooperation between the U.S. and China in further developing both the industry and the appropriate regulations and incentives.

CHINA AS A GLOBAL LEADER IN RENEWABLE ENERGY

As its economy advances, China needs secure, affordable and sustainable energy. As its energy use increases and its economy rises, China is considering various energy options. It has become a leader in renewable energy and is poised to direct a continued growth in renewable energy over the next decade.[8] In just a few years, renewable energy has become a strategic priority, an opportunity, and an asset in China. Its investments and forward-thinking policies demonstrate China's dedication to renewable energy as a national priority. China has invested in its clean energy infrastructure also to create a local manufacturing base to provide domestic economic benefits.[9] China is well positioned to lead this field at an unprecedented scale and speed.

[8] Renewable Energy Policy Network for the 21st Century (REN21), *Renewables 2007 Global Status Report*
[9] Here Comes the Sun (and the Wind, Water, and Biogas): Opportunities and Challenges for the U.S.-China Renewable Energy Collaboration; Woodrow Wilson International Center for Scholars; December 2, 2010, 9-11 AM

In just the fourth quarter of 2010, China invested half the total global investment in renewable energy, focusing specifically on wind power and small hydroelectric power.[10] China's comprehensive policies have made wind power more price competitive with coal power, and have included mandates for Chinese power utilities to use a minimum amount of wind power. China has also set ambitious targets for the country's overall energy matrix and for individual renewable energy technologies, such as wind. Through China's Five-Year Plans, the government has worked to set out ways to achieve such goals.

Collaboration between various governmental powers, including China's State Council and the National People's Congress, made it possible for China to pass a comprehensive "Renewable Energy Law" in 2005. This law encourages domestic energy exploration, sets a target of 15% of China's energy from renewable energy by 2020, and establishes a government commitment to invest $180 billion. The Renewable Energy Law establishes the responsibility of promoting renewable energy under the national government. It provides a framework of regulations to establish the importance of renewable energy, remove market barriers, and create a stable financial system to promote renewable energy. The Law applies a "feed-in tariff" mechanism to promote wind energy, establishing a fixed amount of power to be bid on each year and requires power utilities to pay for the cost of transmission. It establishes a "concession policy," whereby the government awards competitive blocks of capacity to be installed by both private and state-owned project developments annually. The Law also establishes a "mandated market share" of renewable energy required for generating companies; and, it reduces value-added taxes and income taxes for renewable power technologies. China's goal is to develop a

[10] U.S. businesses not buying President Obama's rhetoric on energy 'race' with China; March 15, 2011; http://dailycaller.com/2011/03/15/u-s-businesses-not-buying-president-obama%E2%80%99s-rhetoric-on-energy-race-with-china/

world-class renewable energy industry that is at the cutting-edge of technology development. [11] It has already made its commitment and leadership in renewable energy visible, placing second only to Germany for its financial investment in renewables.

China's other key policy to promote renewable energy development, making it a global leader, is the 2007 "Medium and Long-Term Development Plan for Renewable Energy."[12] This Plan provides guiding principles to accelerate the development of renewable energy, linking it with climate change and economic development. It sets 2020 as the target year to achieve goals, using stipulations such as national targets, feed-in tariffs, price balancing, and mandatory grid access.

Prioritizing renewable energy and linking it to China's growing economy has come from the top. Its leaders have recognized that strategic energy planning goes hand in hand with promoting its economy. In China's 11th Five-Year Plan, the government set a goal of increasing efficiency, creating measures that represent one of the most comprehensive energy policies in the world.[13] This Plan successfully reduced China's energy intensity by 20% from 2006 to 2010. It accomplished this target by rapidly developing China's wind power and other renewable energy industries, increasing their scale and power. In the most recent 12th Five-Year Plan, renewable energy was given special emphasis as a way to adapt to climate change and to support the economy. Clean technology industries will continue to development quickly and stably with support from these established plans backed by government policies and new energy technologies. For example, the Plan provides guidance for wind power equipment manufacturing

[11] "Medium and Long-Term Development Plan for Renewable Energy in China"; Beijing, September, 2007; National Development and Reform Commission
[12] National Development and Reform Commission, Medium and Long-Term Development Plan for Renewable Energy in China; Beijing, September 2007.
[13] Martinot, Erica, Junfeng, Li; Power China's Development: The Role of Renewable Energy; 2007; Pg. 11

to be improved, for installed capacity to increase, and for there to be a focus on the quality of renewable energy. Instead of solely focusing on increased capacity, China has recognized the need to ensure expanding the renewable energy industry is possible through improving grid integration.

The 12th Five Year Plan set ambitious targets for renewable energy, making the Plan known the "Greenest FYP in China's History."[14] Chinese leaders quickly recognized that by investing in China's own renewable energy sector and producing energy internally made the Chinese manufacturing industries more self-reliant. Huo Jianguo, director of Chinese Academy of International Trade and Economic Cooperation identified high-end clean energy manufacturing industries as the "new drivers of the country's economy."

China has become a global leader in renewable energy because in addition to China's political leaders recognizing the clean technology as a necessary support for China's economy, industry leaders have as well. Dong Shidang of the Provincial Energy Bureau said, "Given the growing energy consumption and huge challenges facing the traditional energy industry, accelerating the development of new energy resources has become a strategic priority to support economic and social sustainability." Industry heads have recognized that renewable energy development is likely to become the most important economic growth engine as well as a powerful driver of job and wealth creation in future. Increased capital continues to be directed towards renewable energy resources like wind, solar and biomass. Not only is the government setting targets, but also energy industry associations are setting goals to make 25% of China's

[14] Wines, Michael, China Unveils Economic Plan with Focuse on Raising Income and Reining in Pollution; March 5, 2011

energy renewable energy by 2025.[15] As demand for renewable energy increases, Chinese companies seek to supply it and at a cheaper price. Chinese bands and local governments have been supportive of building out China's manufacturing capacity.[16]

China's swift rise as a leader in clean energy stems from a unique level of cooperation between government and industry. The focus is on making China an innovator, investing not only in technology but in its people as well. This investment creates a workforce for the long-term, building capacity and establishing opportunities.

CLEAN ENERGY AS OUR "SPUTNIK MOMENT"

While China has become a global leader in renewable energy, the U.S. has been investing in renewable energy innovation for years and continues to invest in this area. Hence, China and the U.S. are now vying to lead the renewable energy field and compete for the resulting jobs. The relationship and interaction between China and the U.S. is critical to the future of climate change and the global economy.

Although China and North America offer the largest potential markets for wind power and other renewable energy expansion, China overtook the U.S. in 2010 as the most attractive market for renewable energy investment. Although the U.S. still has highest total capacity for wind power globally, China leads in new installations.[17] Consequently, U.S. companies are being lured away to China. The labor is cheaper and the government policies are more inviting. China's general strategy of making renewable energy a priority and seriously investing in renewable energy has been effective. The Chinese government has integrated

[15] Joint Assessment of Reaching 25% Renewable Energy by the Year 2025, a memorandum of understanding signed at the Great Wall Renewable Energy Forum, Beijing, October, 2006; www.renewableenergyaccess.com
[16] Joined at the hip: the US-China Clean energy relationship: White Paper; pg. 8; Bloomberg New Energy Finance 2010; May 17, 2010
[17] According to the Pew Charitable Trusts annual ranking

energy and climate change policies through setting targets for renewable energy and through its top-down requirements forcing electricity grid-operators to prioritize renewable energy. Moreover, China has encouraged investment through its incentives of tax relief and government-established prices, and through its subsidies for Chinese-based manufacturing industries, requiring a minimum of 70% of renewable energy components to be made in China.

As a result of China's government's leadership in prioritizing renewables, the U.S. workforce has begun to recognize the potential effects of China as a renewable energy leaders on its industry. In September 2010, the U.S. Steelworkers Union filed a complaint with U.S. trade officials in opposition to China's strategy to advance as a clean energy leader. They charged that China is unfairly subsidizing its clean energy technology. Arguing that China has used "hundreds of billions of dollars in subsidies, performance requirements, preferential practices and other trade-illegal activities to advance its domination of the sector", the Steelworkers Union recognizes that clean energy represents the future of manufacturing and therefore the U.S. needs to act immediately to avoid replacing U.S. dependence on foreign oil for a dependence on Chinese-made clean energy technology.

Leo Gerard, the United Steelworkers' President, stated "Green jobs are key to our future. Right now, China is taking every possible step — many of them illegal under international trade laws — to ensure that it will control that sector. America can't afford to cede more of its manufacturing base to China." Moreover, U.S. Energy Secretary Steven Chu acknowledged that clean energy was "our Sputnik moment." Moreover, U.S. Commerce Secretary Gary Locke questioned: "How is it that Berlin and Shanghai have become the equivalent of Silicon Valley in clean energy with all the jobs?" This recognition suggests that the countries that lead the 21st

century clean energy economy will be the countries that lead the 21st century global economy.[18] U.S. government sectors, private industry and even individuals are starting to fear that other countries are now exporting technology the U.S. pioneered and they're going after the jobs that come with it.

Expanding renewable energy capacity in the U.S. has been considered an effective strategy to support more than 75,000 jobs; however, this security is changing. Renewable energy manufacturing jobs, like building wind turbines, was once seen as a secure way to support the U.S. economy because transporting giant blades and towers was prohibitively expensive due to the high shipping costs over long distances and because of the tax support from the American Reinvestment and Recovery Act (ARRA) and other laws. Recently, the price of turbines manufactured in China has declined so much due to the tremendous support from China's government. This sudden shift suggests that it may soon be more economical to ship turbine parts to the U.S. than to manufacture them in-country. Turbine pricing in China is about two-thirds of what it costs to manufacture in the U.S.

The market price could dictate the global renewable energy leader and this coveted leadership will not only provide global power, but support the local economy as well. Although not a dominant competitor prior, by 2010, China accounted for 48% of the global wind power installation market.[19] Further, some Chinese wind turbine makers, such as the Goldwind company, are establishing facilities in the U.S., capturing more of the jobs and become an economic force. Additionally, much of the ARRA and other U.S. renewable energy funding is being spent on clean technology manufactured in China, supporting the Chinese economy. For

[18] According to a report from the American Wind Energy Assn
[19] according to Navigant Consulting, http://www.huffingtonpost.com/2011/06/03/china-wind-power-manufacturing-jobs_n_870524.html

example, a $1.5 billion wind farm in the U.S. state of Texas plans to use imported turbines manufactured by A-Power Energy Generation Systems Ltd.[20] The project is expected to create 2,000 manufacturing jobs in China.[21] Some estimates suggest that 80% of the nearly $2 billion ARRA funds spent on wind power went to foreign manufacturers of wind turbines.[22] The tension over funding and the economic consequences have created great debate and strong competition.

The U.S. Steelworkers allege that the Chinese government violated World Trade Organization rules by providing billions of dollars in subsidies to Chinese companies and discriminating against U.S. firms operating in China, in part by restricting their access to needed raw materials. Their complaint attacks China's protectionist policies that ensure that China leads the clean energy race and reaps the economic rewards of promoting jobs for its citizens. China passed a law requiring that 70% of wind projects use local sources. Moreover, if foreign countries want to build renewable energy projects in China, then they must have a China-based partner and must sign a technology transfer agreement. It has also enacted licensing rules that have permitted the China's big wind turbine manufacturers- Goldwind, Sinovel, and DongFang Electric- to dominate more than 50% of the wind turbine market in China. In response, the U.S. has begun to impose its own protectionist policies, such as "Buy American" provisions and requiring tariffs on products from China. This "eye for an eye" approach has soured the U.S. – Sino relationship.

Although some argue that given China's rapid dominance as a leader and supplier in the renewable energy industry, it raises questions about whether there are conflicts between

[20] Kim Chimpan, Chinese Turbines Spun by Texas Winds Spur "Buy American Push," Bloomberg News, April 13, 2010.
[21] Stimulating Green Jobs for China; Investor's Business Daily; February 11, 2010
[22] Ibid.

environmental goals and having domestic production, U.S. President Barak Obama made a call to action during his Presidential campaign and continues to mention energy independence and clean technology as an integral element of rebuilding the U.S. economy. He has proposed an economic job creation plan that would create five million jobs in environmental industries that would present "the next frontier" for U.S. manufacturing. "I ask this Congress to send me legislation that places a market-based cap on carbon pollution and drives the production of more renewable energy in America."[23] He has admonished that "I do not accept a future where the jobs and industries of tomorrow take root beyond our borders."[24] Both China and the U.S. recognize the opportunity of investing in and leading the way in renewable energy as a means to promote each country's national economy.

Furthermore, the U.S. and China are still dependent on each other and must collaborate- perhaps through competition- to power both countries' development and a low-carbon economy. Competition between the two countries should spark greater investment, more innovative policies, and lower cost, higher quality clean energy technology in the U.S., China and around the world. Cooperation between the U.S. and China in the clean energy sector could drive economic growth in both countries and enhance fair trade. There is great potential in clean energy markets for collaboration and some competition. Thus, competition gone wrong with a "full-fledged clean energy trade war be declared"[25]would be a missed opportunity vital to a sustainable global future.

GREEN JOBS DEFINED

[23] President Barak Obama's address to Congress; February 24, 2009.
[24] President Barak Obama's State of the Union Address
[25] Joined at the hip: the US-China energy relationship: White Paper; Pg. 1; Bloomberg New Energy Finance 2010; May 17, 2010

According to the United Nations Environment Program (UNEP), green jobs are "work in agricultural, manufacturing, research and development, administrative, and service activities that contribute(s) substantially to preserving or restoring environmental quality…"[26] However, there are a number of ways to characterize green jobs. Some define "green jobs" as the catch-all term for people doing any mental or manual kind of work that in some way relates to improving environmental quality.[27] Others specify a particular sector, such as renewable energy. For example, The Workforce Information Council, a U.S. advisory group comprised of state and federal employment officials, defines a green job as work that "is essential to products or services that improve energy efficiency, expand the use of renewable energy, or support environmental sustainability."[28] And, the U.S. Bureau of Labor statistics has not issued a standard definition of a "green job" yet.

Although it is difficult to define a global standard, UNEP's 2008 Green Jobs Report qualifies its general, all-encompassing definition of a green job by insisting that they must also be "decent jobs," with good working conditions that include the right to organize.[29] Michael Renner, co-author of the Report said, "A job that is exploitative, harmful or fails to pay a living wage (or worse, condemns workers to a life of poverty) can hardly be called green." Thus "green" is really a statement about the human environment, as well as the natural environment.

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[26] Renner, M. Sweeney, S., Kubit, J. *Green Jobs: Towards decent work in a sustainable, low-carbon world*; Pg. 36; September 2008; http://www.unep.org/PDF/UNEPGreenJobs_report08.pdf

[27] According to Raquel Pinderhughes, a professor of urban studies at San Francisco State University, who has coined the term "Green Collar Jobs" to define specific manual labor opportunities that spark a "green economy" and thus offer living wages and good working conditions.

[28] Hallett, Joe and Gearino, Dan, *Defining 'green' jobs is hard, but important***,** *May 16, 2010, THE COLUMBUS DISPATCH;* http://www.dispatch.com/live/content/business/stories/2010/05/16/defining-green-jobs-is-hard-but-important.html

[29] Therefore, UNEP might not characterize the recycling industry in China as green jobs because of the poor and dangerous working conditions.

Here, green jobs are characterized as clean energy jobs; and, specifically jobs derived from wind power development. Although these green jobs are more defined, they still encompass a great number and diversity of jobs and workers. "Green jobs" in wind power encompass a variety of skills, education levels, and occupations. For example, there are engineering and architecture green jobs. In addition, green jobs encompass project planning and management, administration, marketing, manufacturing, electrical wiring, and so forth. Many of these skilled positions receive good pay.[30] The American Solar Energy Society (ASES) has found that most of the clean energy jobs are standard jobs for accountants, engineers, computer analysts, clerks, factory workers, truck drivers, and mechanics who do not even recognize their jobs are characterized as "green."

Moreover, the average annual earnings for an employee in an Ohio-based wind-turbine manufacturing company was above the U.S. national average.[31] Further, some green jobs are obvious and easy to account for, while others are more indirect. Green jobs such as operating a wind turbine are easily identifiable; others such as manufacturing and supplying materials such as steel used specially for a wind turbine tower are not. Regardless of the definition, China and the U.S. have now recognized that linking the economy with strategies to improve the environment are both necessary and can be rewarding.

BENFITS OF GREEN JOBS

"Our energy problems and their solution are all interconnected."

[30] Renner, M., *"Going to Work for Wind Power,"* World Watch, January/February 2001, p. 26; Pollin, R., and Wicks-Lim, J., *Job Opportunities for the Green Economy: A State-by State Picture of Occupations that Gain from Green Investments* (Amherst, MA: Political Economy Research Institute, University of Massachusetts, June 2008), p. 10; Bezdek,

[31] R., *Renewable Energy and Energy Efficiency: Economic Drivers for the 21st Century,* (Boulder, CO: American Solar Energy Society, 2007) (Ohio wind earnings); (U.S. earnings from U.S. Bureau of Labor Statistics), "Total coverage (UI and UCFE) by Ownership: Establishments, Employment, and Wages, 1997–2006 Annual Averages," at www.bls.gov/cew/ew06table1.pdf

~ Joe Romm, Senior Fellow at American Progress

Green jobs offer an effective strategy for achieving a more resource efficient economy that helps to meet emission reduction targets and to actively manage climate change. By investing in renewable energy, not only will jobs be created, but also unemployment will drop. Investing in clean energy technology and industry creates sustained economic growth and stability by encouraging innovation and creating market forces that reduce fear of future energy security.[32] Relating economic development and emerging alternative energies through green jobs offer the opportunity to achieve great economic, social and environmental success.

The renewable energy sector generates more jobs than the fossil fuel energy sector per unit of installed capacity, per unit of power generated and per dollar invested.[33] According to a 2009 study by the Political Economy Research Institute at the University of Massachusetts-Amherst in partnership with the Washington think tank, the Center for American Progress, investing $150 billion in renewable energy produces 1.7 million new jobs while reducing the unemployment rate by one percent to 8.4%.[34] Other U.S. studies confirm this finding. A 2004 study found investing $300 billion in a clean energy would create more than 3.3 million new jobs.[35] Notably, these jobs could be spread across every state in the U.S. Lots of facts. Be sure to also develop the conceptual implications of the various facts that you cite in your paper.

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[32] Romm, J., *Straight Up: America's Fiercest Climate Blogger Takes on the Status Quo Media, Politicians, and Clean Energy Solutions*; 2010

[33] Renner, M. Sweeney, S., Kubit, J. *Green Jobs: Towards decent work in a sustainable, low-carbon world*; Pg. 6; September 2008; http://www.unep.org/PDF/UNEPGreenJobs_report08.pdf; *Putting Renewables to Work: How Many Jobs Can the Clean Energy Industry Generate?*, pg. 4; Renewable and Appropriate Energy Laboratory (RAEL), UC Berkeley, April 13, 2004 http://rael.berkeley.edu/sites/default/files/old-site-files/2004Kammen-Renewable-Jobs-2004.pdf; pg. 4

[34] http://www.americanprogressaction.org/issues/2010/04/tax_green_economy.html

[35] This study was done by the nonpartisan Perryman Group in Waco, Texas in conjunction with the Apollo Alliance. http://www.americanprogressaction.org/issues/2010/04/tax_green_economy.html

In the U.S., where some regions have experienced great manufacturing job loss, renewable energy such as wind and solar technology development can provide a much-needed alternative. In addition to creating new jobs, the wind industry is positioned to help revive manufacturing jobs that have been lost in other sectors. Sander M. Levin, the Chairman of the Ways and Means Committee, stated "Consider all that is at stake: Cutting edge technologies of the future; manufacturing capacity to build these advanced technology products; lower energy costs for families and businesses; reducing our dependence on foreign oil; and preserving the environment for future generations."[36] For China, renewable energy offers an opportunity to continue to develop economically. Although China does not speak specifically of "green jobs," it recognizes the need to build a workforce that specializes and supports China's growing clean technology sector. It is developing workers and institutions with local technical skills to support research and technology development, as opposed to relying on foreign support. The National Development and Reform Commission (NDRC) has estimated that more than 100,00 skilled scientists and engineers will be needed by 2020[37] to advance renewable energy in China using a Chinese workforce. It has looked to the U.S.

During a time when the middle class in both the U.S. and China are struggling, investing in renewable energy can stabilize the economy and provide jobs to rebuild opportunities. Investing in clean energy can create high-quality, local jobs.[38] Various studies have proven that there are direct links between low-carbon technologies and jobs.[39] In taking action to limit climate change, countries such as the U.S. and China can be creating a variety jobs. Jobs in

[36] Levin, S.; Opening statement at Committee hearing on Energy Tax Incentives and the Green Job Economy, April 14, 2010; http://waysandmeans.house.gov/press/PRArticle.aspx?NewsID=11131
[37] Li Junfeng, *Wind-12*, Beijing: Chemical Press, 2005
[38] http://www.americanprogressaction.org/issues/2010/04/tax_green_economy.html
[39] "Manufacturing Climate Solutions," http://www.edf.org/page.cfm?tagID=31961 (MORE)

renewable energy require a wide range of skills and education levels. Many exist in the manufacturing and construction sectors, which are "traditionally" available to middle class workers.[40] Therefore, government and business leaders tout green jobs as a cornerstone of the new economy. Moreover, promoting clean energy to support the economy, the environment or national security "will create substantial new demand for labor across the economy, and especially in construction and construction-related manufacturing jobs."[41]

Wind Energy & Green Job Benefits

The wind power industry offers particular opportunities for employment and economic growth in the U.S. and in China. It is a cost-effective, renewable energy solution that can reduce greenhouse gas emissions while also providing a reliable source of energy that does not produce any hazardous wastes, emits no carbon dioxide or other air emissions, and does not require mining, drilling or transporting fuel.[42] According to the Global Wind Energy Council's Chairman, Arthouros Zervos, "The wind industry also creates many new jobs: over 400,000 people are now employed in this industry, and that number will be in the millions in the near future."[43] Moreover, there has been a surge in wind energy projects sparked by an increased demand as governments look for cleaner sources of energy to reduce greenhouse gas emissions

[40] Joe Romm's testimony before the House Ways and Means Committee, April 2010; http://www.americanprogressaction.org/issues/2010/04/tax_green_economy.html
[41] Hendricks, B., Campbell, B., and Goodale, P., *Efficiency Works: Creating Good Jobs and New Markets through Energy Efficiency*; Pg. 2; Center for American Progress;Energy Resource Management; September 2010 http://www.americanprogress.org/issues/2010/08/pdf/good_jobs_new_markets_exec_summary.pdf
[42] American Wind Energy Association, Annual Wind Industry Report: Year Ending 2008. http://www.awea.org/publications/reports/AWEA-Annual-Wind-Report-2009.pdf
[43] U.S. and China in Race to the Top of Global Wind Industry; December 9, 2010; http://solarcellpower.net/tag/gwec/

and meet growing energy needs. China and North America offer the largest potential markets for wind power expansion.[44]

There are numerous opportunities to create and transfer jobs in the wind energy industry. According to a recent Duke University study, there are over 8,000 precision parts in one wind turbine.[45] Currently, the U.S. and Europe dominate the global installed capacity of wind energy. However, in 2008, the leading markets of new installed capacity were the U.S. and China.[46] The U.S. generates approximates 29,440 MW of electricity from wind, which is enough to power approximately eight million U.S. homes. Although most of these installed turbines in the U.S. are imported from Europe or Asia, these parts can be manufactured domestically. A report from the American Wind Energy Association (AWEA) found that as annual installations of wind power quadrupled between 2005 and 2009, the domestic content in turbines reached 50%.[47] The reports points out that during the same time period, manufacturing jobs increased from 2,500 to 18,500 and there are 14,000 more in the pipeline "but these and further jobs will only come online with policies dedicated to re-growing our manufacturing sector.".

China has wind energy resources totaling approximately 1,200 GW[48], which have yet to be fully exploited. However, when they do, wind energy could provide 40-70% of China's 2005 total power generation[49] and greatly contribute to the manufacturing sector. As China's wind energy industry is moving towards large-scale development,[50] it promises to increase

[44] http://www.thetradingreport.com/2010/12/17/rare-earth-element-shortages-threaten-global-wind-power-development/
[45] Pg. 4 http://www.cggc.duke.edu/environment/climatesolutions/
[46] http://solarcellpower.net/u-s-and-china-in-race-to-the-top-of-global-wind-industry/
[47] Winds of Change, A Manufacturing Blueprint for the Wind Industry
[48] Mastny, Lisa, Renewable Energy and Energy Efficiency in China: Current Status and Prospects for 2020; Worldwatch Institute Report 182, October 2010, Citing China Renewable Energy Development Strategy Research, Renewable Energy Project team, Chinese Academy of Engineering, December 2007
[49] Ibid.
[50] Li Junfeng, China Wind Power Report 2008; Beijing; Chinese Environmental Science Press; October 2008

manufacturing jobs in China. The government set a target of 30 GW of wind power by 2020, which many believe will be exceeded by 50%.[51] Over the past decade, strong national and provincial policies have resulted in doubling China's wind power capacity, making it second only to the U.S. in total installed wind capacity.[52]

The wind energy industry involves different stages and industry sectors, providing opportunities for employing a wide variety of workers with various skill sets and education levels. There are various stages to building and maintaining and wind turbines that creates employment opportunities from materials production and component manufacturing to project development and construction. Increased promotion and adoption of wind energy could enhance economic impacts.[53] Hence, U.S. President Obama campaigned around the idea of promoting a green economy through renewable energy manufacturing and deployment; and China has begun to target clean energy policies in response to its transition to a low carbon economy.

REGULATIONS AND GOVERNMENT EFFORTS TO PROMOTE/DETER GREEN ENERGY/GREEN JOBS

China and the U.S. have taken different approaches as they vie to lead the clean energy race. The U.S. places more responsibility in the hands of individual states, whereas China provides a more directive, centralized mandate. Both countries are providing financial incentives, however in China the focus is on subsidies, whereas the U.S. has relied more on tax breaks. In China, the government has set ambitious targets, without clear strategies to achieve them; whereas in the U.S. the focus is on framing the issue as one of national security and a strategy to stimulate the economy.

[51] Global Wind energy Outlook 2006, Global Wind Energy Council
[52] REN21, Renewables 2010 Global Status Report
[53] Pg. 10 http://www.cggc.duke.edu/environment/climatesolutions/

The United States

The U.S. green energy program focuses on a strong role for individual states as there is no national energy policy. Nevertheless, the U.S. has passed national laws that have supported renewable energy investment. Framing renewable energy as an issue of energy security and economic stability through awareness building and campaign promises have been of great importance. One of U.S. President Barak Obama's primary pre-election goals was energy independence. He ran for office on the idea of sparking the economy through endorsing renewable energy. He proposed an economic plan creating five million jobs in environmental industries that would present "the next frontier" for U.S. manufacturing. Since his successful election, the U.S. has made important steps in promoting this strategy. For example, President Obama established a Special Advisor on Green Jobs, Enterprise and Innovation for the White House Council on Environmental Quality. Van Jones, the appointed advisor, has said: "You can't take a building you want to weatherize, put it on a ship to China and then have them do it and send it back. So we are going to have to put people to work in this country— weatherizing millions of buildings, putting up solar panels, constructing wind farms. Those green-collar jobs can provide a pathway out of poverty for someone who has not gone to college." However, Jones resigned in 2009 as a result of difficulties in achieving his goals and no one has replaced him. The U.S. government has not implemented some of these efforts as effectively as needed to spark the economy and ensure that the U.S. remains a leader in the renewable energy sector.

Call to Action

In his Address to Congress on February 24, 2009, President Obama made a call to action. He has encouraged Congress to seek solutions to climate change and national unemployment through promoting green jobs. "I ask this Congress to send me legislation that places a market-

based cap on carbon pollution and drives the production of more renewable energy in America." President Obama has pushed to establish a clean energy economy in the U.S. that has already produced jobs in a variety of industries and occupations. For example, more than 750,000 jobs at more than 70,000 individual firms already exist in industries that seek to expand clean energy production, increase energy efficiency, and reduce greenhouse gas emissions.[54]

Importantly, many of these clean energy industries continue to have high growth rates. A 2009 report from Pew Charitable Trusts shows that clean energy jobs grew by 9.1 percent between 1998 and 2007, while total jobs grew by only 3.7 percent.[55] While some of these jobs require a high level of education, such as engineering, legal, and government administration, there are opportunities for a range of skills and education levels that include jobs in construction, systems installation, and manufacturing sectors.

The Need for National Implementation

Renewable energy and energy efficiency industries could create 37 million jobs in the U.S. by 2030; however policymakers need to support their development with a national directive.[56] As powerful as a President's call to action can appear, the policies, legislation and incentives that the government has sponsored need to be enforced. The federal government has passed a number of important regulations, including the American Recovery and Reinvestment Act, The Energy Independence and Security Act, and the Renewable Energy Grant Program, among others. In addition, individual states have taken steps to encourage clean energy adoption

[54] Jospeh Romm, Testimony before the House Ways and Means Committee; April 15, 2010; The Center for American Progress; http://www.americanprogressaction.org/issues/2010/04/tax_green_economy.html
[55] The Clean Energy Economy: Repowering Jobs, Business and Investments Across America; June 2009; Pew Charitable Trust; http://www.pewcenteronthestates.org/uploadedFiles/Clean_Economy_Report_Web.pdf
[56] Bezdek, R., *Green Collar Jobs in the U.S. and Colorado: Economic Drivers for the 21st Century; 2009*; American Solar Energy Society; www.ases.org/greenjobs

and create green jobs. However, a national policy is necessary to maintain the momentum the U.S. needs to sustain its economy while adapting to climate change.

American Recovery and Reinvestment Act (ARRA) of 2009

The American Recovery and Reinvestment Act (ARRA) passed in 2009 includes the Clean Energy Manufacturing Program that allocated $2.3 billion in tax credits for building and expanding manufacturing facilities. It provided a 30% tax credit for investments in 183 manufacturing facilities for clean energy products across 43 states to support 41,000 jobs. (It included specific provisions for green jobs.) These funds reinvigorated factories in the U.S. that were falling apart and helped U.S. citizens return to the assembly lines building renewable energy technologies. It helped get Americans out of unemployment lines and back onto assembly lines building wind turbines and solar panels. However, the program has been oversubscribed by a 10-1 ratio.[57] Demand for this program exceeded expectations -- $7.7 billion worth of applications poured in.

The Energy Independence and Security Act of 2007

Through the "Green Jobs Act" provision (H.R. 2847), the Energy Independence and Security Act of 2007 established an energy and renewable energy worker training program. It provided up to $125 million in funding to establish national and state job training programs. The U.S. Department of Labor would administer these jobs and help address needs in renewable energy industries.

Renewable Energy Grant Program

The Renewable Energy Grant Program created 55,000- jobs and directly led to 4,250 megawatts of renewable energy deployment in 2009. It provided a 30% investment tax credit

[57]http://www.americanprogressaction.org/issues/2010/04/tax_green_economy.html

for manufacturing facilities across the country, supporting an additional 41,000 jobs. Further, there was great demand for this program. Over $7.7 billion in applications were filed.

State Efforts

In addition to legislation from the federal government, state efforts have been essential to supporting renewable energy and green job development. In fact, states have taken the lead in developing energy policies. Twenty nine states[58] have introduced legislation relating to the creation of green jobs. Such legislation provides scholarships, training programs and other incentives that encourage renewable energy manufacturing.

Moreover, the governors of California, Colorado and Ohio have enacted policies that support renewable energy and clean energy jobs. They have done so according to each state's specific needs. For example, in Ohio, by changing the tax policy treatment of wind power, capacity increased from seven megawatts to 1,100 megawatts. In Colorado, the state encouraged wind manufacturers to locate in-state and become one of the major state employers.[59] As a result, some of the largest wind farms in the U.S. have been built there. These wind farms provided construction and project design jobs during construction, in addition to long-term operation and maintenance jobs.

Many states have acknowledged the benefits that encouraging an economy based on renewable energy provides. For example, Michigan recognized the opportunity to rebuild its job base, attract new investment, and diversify its economy. It found that renewable energy firms

[58] The twenty nine states include: Arizona, California, Colorado, Connecticut, District of Columbia, Florida, Hawaii, Idaho, Illinois, Iowa, Louisiana, Maine, Massachusetts, Minnesota, Missouri, New Hampshire, New Jersey, New Mexico, New York, North Carolina, Oklahoma, Pennsylvania, Rhode Island, South Carolina, Tennessee, Virginia, Washington, West Virginia, and Wisconsin.

[59] Pg. 10; http://www.edf.org/documents/10469_EDF_CareersforColorado2009.pdf

grew at a 30% growth rate, adding nearly 1,900 jobs from 2005 to 2008.[60] Michigan has established a Renewable Portfolio Standard (RPS) and a goal of reducing fossil fuels by 45 percent by 2020. These state initiatives have driven investment and created green jobs.

In order to encourage green jobs, some states, such as California have passed legislation to cap carbon emissions by gasoline refiners and other large polluters. This shift towards an economy based more on renewable energy has had little impact on consumers and businesses, while creating up to 623,000 new jobs over the next decade.[61]

However, because of the recent recession, some states have put renewable energy on hold; and, Congress has struggled unsuccessfully to pass an energy bill. Moreover, while state policies are useful in initiating projects, federal support is needed. Although supportive of the idea of using renewable energy to spark the economy and provide green jobs, federal support has waned. Even if President Obama initially pushed for green jobs, his most recent tax package accepted by Senate GOP leaders allow for certain tax measures supporting the renewable energy market to expand to expire. According to Representative Edward J. Markey, Chairman of the Select Committee on Energy Independence and Global Warming and the Energy and Environment Subcommittee of the Energy and Commerce Committee wrote, "In its current form, the deal would allow the only effective federal support mechanism for renewable electricity to

[60] Michigan Green Jobs Report 2009: Occupations & Employment in the New Green Economy; May 2009; prepared by the Bureau of Labor Market Information and Strategic Initiatives; http://www.milmi.org/admin/uploadedPublications/1604_GreenReport_E.pdf

[61] The Clean Energy Economy: Repowering Jobs, Business and Investments Across America; June 2009; Pew Charitable Trust; http://www.pewcenteronthestates.org/uploadedFiles/Clean_Economy_Report_Web.pdf

expire, killing the 20,000 wind energy jobs and 11,200 jobs in geothermal that would be created in 2011 and the 65,000 jobs in solar over the next two years."[62]

National Political Division over Green Jobs

Moreover, the divide in the Senate between the Democrats and Republicans has prevented progress and support for renewable energy. It did not approve of an extension of the Renewable Energy Grant Program, which may result in the wind industry needing to lay off 20,000 people (25%) of its workforce. What's more, Republicans in Congress have fought to keep heavily subsidizing the oil and gas industry. Consequently, private investment is leaving the U.S. and "trillions of dollars…may now be spent on jobs in China, South Korea, Europe, and elsewhere."

Although the U.S. has passed a variety of legislative mechanisms to encourage renewable energy and individual states have made great headway in promoting renewable energy, these efforts have not been aggressive enough, unified or fully implemented to the extent that they could have. Sander M. Levin, Chairman of the Ways and Means Committee notes that "If we are not aggressive about expanding our green manufacturing capacity, these manufacturing jobs will be created overseas and the United States will become more reliant on products that are produced outside of our borders." There is more that the U.S. government can do. Importantly, the U.S. does not have a national energy policy with an established standard. Gary Locke, the U.S. Commerce Secretary, warned that the U.S. risks losing jobs because Congress has yet to enact a clean energy policy. "In a few years, we're going to wake up and say, 'How is it that

[62] Seth Leitman; Rep. Markey says We Need to Wake Up and Save Clean Energy; December 8, 2010; Grist; http://www.greenopia.com/DA/news/16229/12-8-2010/Rep.-Markey-Says-We-Need-To-Wake-Up-and-Save-Clean-Energy

Berlin and Shanghai have become the equivalent of Silicon Valley in clean energy with all the jobs?'"[63]

Some argue that the government should not be the only driver of renewable energy and that the private sector should be the one to lead the way. Nevertheless, in other countries where there are national energy policies and established renewable energy targets such as China, they have reached progress in reducing carbon emissions, encouraging renewable energy and creating jobs. The 2009 Pew Charitable Trust report found that if the U.S. adopted aggressive clean energy policies such as a national Renewable Energy Standard, which would require electricity providers to supply a minimum amount of power from renewable energy sources, the U.S. would gain $342 billion![64] Additionally, some of the money set aside as tax credits, such as the manufacturing tax credits in ARRA ended up going to larger manufacturers that could afford to expand without these incentives.

There is great need for a strong incentive program as opposed to tax subsidies for polluting fossil fuels. Especially as a result of the recession, financing for renewable energy and tax credits are not as available. However, the currently proposed Reid-McConnell Tax Relief bill would be a step backwards in promoting clean energy and green jobs. Even though it provides an essential extension of the Convertible Renewable Tax Incentive, it also extends tax credits for liquid coal and corn ethanol, which cause substantial environmental harm. This bill would not ensure the promotion of domestic jobs.

Moreover, without strong subsidies and support, renewable energy options are not as competitive as other sources. Growth in renewable energy has dwindled in the U.S. while it has

[63] http://apolloalliance.org/digest/u-s-launches-clean-energy-exports-drive/; http://www.reuters.com/article/idUSTRE6B67E620101207

[64] The Clean Energy Economy: Repowering Jobs, Business and Investments Across America; June 2009; Pew Charitable Trust; http://www.pewcenteronthestates.org/uploadedFiles/Clean_Economy_Report_Web.pdf

surged in China because of competition from cheaper sources like natural gas that undermines investor interest in alternatives. In addition, the credit crunch has discouraged investment in both large-scale renewable energy projects and the needed transmission to distribute it.[65] Peter Kelly, vice president of the American Wind Energy Association said "clean energy economic activity and reduced global greenhouse gas emissions are at risk because today neither the President nor Congress has insisted that tax policies continue to support development of wind and solar energy."

Consequently, renewable energy manufacturing jobs in the U.S. has decreased dramatically. Although the U.S. government has announced its recognition of the benefits of promoting renewable energy and green jobs, not enough has been done to prioritize this opportunity. The cost of clean energy and the regulatory barriers and the infrastructure issues prevent the private sector from investing in renewable energy. Since the start of the 21st century, seven million jobs were lost in the manufacturing industry.[66] Further, despite all of the talk of green jobs, most stimulus money spent on renewable energy has gone to foreign investment.

In the mean time, China has caught up with the U.S. Although the potential for millions of manufacturing jobs exist in clean energy technologies in the U.S., China has the competitive edge. They have been outspending the U.S. in clean energy by $34.6 billion to $18.6 billion[67] and they have "closed the quality gap." China has passed more efficient policies making it easier for manufacturers to access the necessary capital to build to build and maintain a business.[68]

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[65] Keith Johnson; Ill Winds Blow for Clean Energy: Cheap, and Abundant, Natural Gas Diminishes Alternative Projects' Appeal; July 9, 2009; Wall Street Journal; http://online.wsj.com/article_email/SB124710043333415571-lMyQjAxMDI5NDA3OTEwMDkwWj.html

[66] http://www.renewableenergyworld.com/rea/news/article/2010/11/will-clean-energy-manufacturing-create-us-jobs

[67] http://www.americanprogressaction.org/issues/2010/04/tax_green_economy.html

[68] Ibid.

Although President Obama emphasized that his green jobs plan would create "good jobs that cannot be outsourced,"[69] some fear that this has not been the case. Some U.S. industries are starting to notice that some of its investments in clean energy are supporting China's workforce as opposed to its own. Moreover, wind farm developers are concerned that Western governments may be disillusioned about encouraging renewable energy requirements if it created jobs in China as opposed to in the U.S.[70] If investing in clean energy means increasing trade deficits with China, it will be difficult to get the U.S. behind renewable energy.

China

The U.S has been the world's largest energy consumer since the early 20th Century. The International Energy Agency reported that China has surpassed the U.S. as the world's largest energy consumer and biggest greenhouse gas emitter.[71] China has also passed the U.S. as the world's largest greenhouse gas emitter in 2006.[72] However, it has also become a "superpower" in promoting and developing clean energy technologies such as wind power. It has the world's highest new installed capacity of wind turbines.[73] According to the World Wind Energy Association President, Dr. Anil Kane, "The world market for wind turbines saw a slight slow-down in the first half of 2010. However, there is still a robust development in many countries. The Asian markets and especially China with its impressive growth continue to be the main drivers of the world wind energy markets. Companies in the Asian countries are now about to start exporting wind turbines and equipment on a larger scale. Such new manufacturing

[69] Energy Speech: Barak Obama and Joe Biden: New Energy for America; August 3, 2008; http://www.barackobama.com/pdf/factsheet_energy_speech_080308.pdf
[70] http://www.nytimes.com/2010/12/15/business/global/15chinawind.html?pagewanted=3&_r=1&hp
[71] China overtakes the United States to become world's largest energy consumer; July 20, 2010; http://www.iea.org/index_info.asp?id=1479
[72] China now no. 1 in CO2 emissions; USA in second position; http://www.pbl.nl/en/dossiers/Climatechange/moreinfo/Chinanowno1inCO2emissionsUSAinsecondposition.html
[73] Shai Oster, *Climate Talks in Tianjin Put Spotlight on China*; Wall Street Journal; October 4, 2010

capacities will further speed up the wind energy deployment worldwide, mainly for new markets in the developing world."[74] Although the U.S. and Europe originally dominated, China is taking over.

China has demonstrated strong market power. Its wind energy developments have expanded rapidly. "The Chinese wind energy market is going from strength to strength, and has once again doubled in size compared to 2007, reaching over 12 GW of total installed capacity," said Shi Pengfei, Vice President of the Chinese Wind Energy Association (CWEA).[75] Then, in 2009, generating 25.9 GW, China made up one third of the world's new wind farm development,.[76] Further, China has announced that in the next decade it will construct an additional 133 GW of wind turbine generated electricity, which may require it to limit exports of its rare earth materials needed to construct the wind turbines.[77] According to Steve Sawyer, Secretary General of the Global Wind Energy Council, "Even in the face of a global recession and financial crisis, wind energy continues to be the technology of choice in many countries around the world. Wind power is clean, reliable and quick to install, so it is the most attractive solution for improving supply security, reducing CO2 emissions, and creating thousands of jobs in the process."

Long-Term Policy

China has formulated a long-term policy that has promoted the rapid success of China's renewable energy and green job goals. This policy is driven from the top down, ensuring a

[74] 16 Gigawatts of Wind Power added in First Half of 2010; October 19, 2010; http://www.wwindea.org/home/index.php?option=com_content&task=view&id=281&Itemid=43
[75] http://solarcellpower.net/u-s-and-china-in-race-to-the-top-of-global-wind-industry/
[76] http://www.thetradingreport.com/2010/12/17/rare-earth-element-shortages-threaten-global-wind-power-development/
[77] http://www.thetradingreport.com/2010/12/17/rare-earth-element-shortages-threaten-global-wind-power-development/

stable demand for clean energy and thus facilitating investments in renewable energy sector by arranging low-cost finance. China's government has analyzed the financial crisis and responded by identifying wind energy development as key to economic growth. It has focused on balancing its growing economy with environmental impacts. To do so, it is changing its policy and legal framework. In 2005, the Chinese government launched the "All China Environment Federation" that receives loans from the World Bank to support project addressing environmental problems. It has used much of these funds to encourage investment and innovation in renewable energy technology. [78]

Technical Assistance

In addition to a long-term policy that recognizes the importance of considering the environment, the Chinese government is supporting its own manufacturers providing technical assistance and coordinating export strategies. These Chinese companies learn the technology and take advantage of the government polices. As such, they are able to become dominant, low-cost suppliers. The Chinese government is intent on building its wind energy industry into the global leader.[79]

Targets- Renewable Energy Law- 2006

China's Renewable Energy Law set a target of 15% of China's energy coming from renewable energy by 2020 by providing an investment commitment of US$180 billion by 2020.[80] In particular, China plans on generating 30 GW of wind power by 2020. Although these renewable energy targets that are particularly ambitious, the government's efforts have

[78] China's Attempt to Balance the Environment and a Rapidly Growing Economy Drives Regulation, Innovation and Investment in Renewable Energy; December 6, 2010; http://solarcellpower.net/chinas-attempt-to-balance-the-environment-and-a-rapidly-growing-economy-drives-regulation-innovation-and-investment-in-renewable-energy-water-indus/

[79] http://www.nytimes.com/2010/12/15/business/global/15chinawind.html?pagewanted=3&_r=1&hp

[80] Table I.2-5 from Martinot and Junfeng, op. cit. note 63, p. 14.

encouraged a surge in renewable energy development. The law provides that the Chinese government provided subsidies for renewable energy projects for the first 15 years. Thereafter, the support will remain in existence but will be reduced by 2% after 15 years.[81] In doing so, it required the national grid to purchase power from renewable energy producers. It also set out to diversify China's energy supplies and enhance energy security. The Renewable Energy Law created two forms of renewable energy pricing, one that is set by the government and the other that is government-guided. This regulation also encourages domestic energy exploration and international energy cooperation while developing renewable energy.

Moreover, although China's oil consumption is increasing, it is also developing compulsory emission standards, which give manufacturers a few years to improve their technology. These aggressive targets set the stage for encouraging renewable energy companies to participate in a market where wind energy and other renewable technologies will be supported.

Incentives

China is also providing valuable incentives to encourage low-carbon generation. China's incentives are almost triple those in the U.S. These incentives are tied in to its targets. They support China's overall goal of cutting carbon dioxide emissions per unit of gross domestic product by 40 to 45 percent from 2005 through 2020. As such, China has received the highest rank for green stimulus according to HSBC's Building a green recovery.

National Investments- China's Energy Conservation Law- 1997, 2007

[81] Law as a Tool to Promote Green Economy: UNEP 9th Global Training Programme on Environmental Law and Policy; 2-13 November 2009; Slide 25; http://www.unep.org/dec/PDF/events/gtp9/Law_Tool_Promote_Green_Economy.pdf

China's Energy Conservation Law created a plan for investment in clean energy and created an energy efficiency standard. It eliminated outdated and high energy consumption products; in addition, it created certification and labeling for energy efficiency products.[82] It has been effective in requiring key energy users to take necessary measures to increase their energy efficiency. Finally, it made funding available for research and development.

Moreover, in China's effort to accelerate renewable energy development, the government plans to invest two trillion Yuan ($265 billion) in the renewables sector.[83] The Chinese are putting in almost $12 billion a month in the clean energy sector[84] to dominate as the world's supplier of clean energy. China recognizes that this investment will support millions of jobs. Moreover, establishing financial incentives such as low-interest, long-term loans are necessary to overcome high upfront capital costs. To sustain this goal, however, China must both phase out subsidies to polluting and inefficient industries in addition to shifting the funds to renewable energy. These financial investments are necessary considering that OECD countries account for the majority of global renewable energy investments, and China makes up 7.5 percent.[85]

The Chinese government invests in Chinese companies, making them strong competitors on the global market. The Chinese companies that were upstarts a few years ago, now hold more than 85 percent of the wind turbine market. They now control almost half of the $45 billion global market for wind turbines. They owe much of their success to the Chinese government, which provides low-interest loans and cheap land. In addition, state-owned power companies

[82] Law as a Tool to Promote Green Economy: UNEP 9th Global Training Programme on Environmental Law and Policy; 2-13 November 2009; Slide 26; http://www.unep.org/dec/PDF/events/gtp9/Law_Tool_Promote_Green_Economy.pdf
[83] Emma Graham-Harrison, "China Plans $265 Billion Renewables Spending," Reuters, 4 September 2007.
[84] http://www.reuters.com/article/idUSTRE6B67E620101207
[85] Green Jobs: Towards a Low-carbon world, pg. 94, citing UNEP and New Energy Finance Ltd., op. cit. note 134, p. 16

who are the major equipment buyers provide them with preferential contracts. Additionally, Sinovel, China's biggest wind turbine maker, are backed by Chinese government-owned banks who have provided them low-interest loans of more than $13 billion.

International Support

Although the majority of international renewable energy and efficiency investment are directed to developed countries, China has received increased funding flows. For example, between 2005 and 2006, clean tech venture capital investment increased 147 percent, representing 19 percent of the total investment.[86] Moreover, China will get more than half of the available Clean Development Mechanism projects.[87]

The International Labor Organization (ILO), a multilateral agency that "promotes workers' rights, encourages decent employment opportunities, enhances social protection and strengthens dialogue in handling work-related issues,"[88] has established a partnership with the United Nations Environment Programme and International Trade Union Federation to promote "opportunity, equity and a just transition process…" in China. The ILO has characterized China's green job activities as: 1) supporting policy formulation for promoting green employment; 2) building capacity of government, employers organizations, workers organizations and other partners; 3) assessing the impact of climate change on employment.[89]

Top-Down Requirements

[86] James Stack et al., Cleantech Venture Capital: How Public Policy Has Stimulated Private Investment (Brighton, MI and San Francisco, CA: CleanTech Venture Network and Environmental Entrepreneurs, May 2007), pp. 8, 10; Cleantech Group, LLC, China Cleantech Venture Capital Investment Report (Brighton, MI and San Francisco, CA: Cleantech Venture Network, 2007), p. v.

[87]

[88] http://www.ilo.org/global/About_the_ILO/Mission_and_objectives/lang--en/index.htm

[89] Green Jobs in China Fact Sheet; http://www.ilo.org/china

In December 2009, the National People's Congress, China's legislature, announced an amendment to its 2006 Renewable Energy Law. These new regulations forced electricity-grid operators to prioritize the use of renewable energy in order to reduce its reliance on coal. Even if the renewable energy sources are more expensive and more complicated to use, the amendment forces the state-owned electric grid companies to distribute renewable energy rather than energy from coal-fired power plants. This amendment demonstrates China's effort to reduce greenhouse gases and to increase its use of renewable energy sources to 15% of its total by 2020, up from 9% in 2008.[90] Moreover, it is related to the goal China announced at the Copenhagen climate summit of reducing its carbon emissions relative to economic output from 205 levels by 40% to 45% in 2020.

Other government regulations include China's requirement that 70 percent of components must be made in China. On July 4, 2005, The National Development and Reform Commission in China passed this requirement (Notice 1204), enforcing that "Wind farms not meeting the requirement of equipment localization rate shall not be allowed to be built."[91] It has also imposed import duties (3 percent for parts, 8 percent for assembled components, and 17 percent for fully assembled turbines).[92] In addition to this specific regulation, China's government makes it easier for Chinese companies to become established than foreign companies. For example, Spanish wind company, Gamesa, controlled more than a third of the Chinese market in 2005. Although Gamesa, like other foreign manufacturers, was attracted to China by the promise of large market, the Chinese government has made it difficult for foreign companies to succeed without supporting the local economy. Thus, most of Gamesa's wind turbine

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[90] Shai Oster; Chinese Law Aims to Increase the Use of Rnewable Energy; December 28, 2009; http://online.wsj.com/article_email/SB126192809041606467-lMyQjAxMDI5NjIxODkyMjg4Wj.html
[91] http://www.nytimes.com/2010/12/15/business/global/15chinawind.html
[92] Green Jobs: Towards a Low-Carbon world, Pg. 106, citing Martinot and Li, op. cit. note 178, pp. 18–19

components are made by local suppliers, whose workers Gamesa trained to meet difficult local content requirements. Even though Chinese suppliers learn Gamesa's designs and consequently can undermine the company by selling parts to its Chinese competitors, Gamesa still benefits from participating in the Chinese market. It still sells more than twice as many turbines in China as it did before the government started supporting renewable energy.

Potential Issues

As China's clean energy industry continues to soar, its success has been "clouded." Although China's investment in clean technology has positive environmental impacts, its policies have also stimulated opposition. Critics argue that Chinese firms have unfair advantages and their policies violate international trade treaties. The United Steelworkers have filed a complaint with trade officials and the World Trade Organization (WTO) claiming that China is unfairly subsidizing its renewable energy sector. The steelworkers' petition cites low-interest loans from state-owned banks, grants of free land, and other benefits only available to Chinese companies. They have urged President Obama and his administration to address China's "unfair trade practices" that have led to global domination of the green technology sector. The WTO is due to return a decision by January 15. It has the authority to order China to repay the government subsidies it gave to its export industries that disadvantaged foreign competitors. However, China's policies are "an open secret."[93]

An additional issue facing China and its push for green jobs and renewable energy is that although China's renewable energy laws have supported the renewable energy industry, there are still problems implementing them. China's network has struggled handling dispatching renewable energy because of fluctuations in weather patterns and supplying China's power

[93] http://www.nytimes.com/2010/12/15/business/global/15chinawind.html

demands. While China's successes are drawing attention, so are its failures. Although targets are in place, China is struggling to meet its energy efficiency goal of increasing 20% by the end of 2010 from 2005 levels. Moreover, despite its efforts to transition to a green economy, carbon emissions are soaring in China.

REFLECTION OF THE POLITICAL, ECONOMIC AND SOCIAL STRUCTURE

China's national mandate for promoting clean energy has enabled the country to become a leader in renewable energy manufacturing in a short period time, providing many jobs to its citizens. Chinese Premier Wen Jiabao pledged to use "an iron fist" in order to achieve the renewable energy targets. [94]

Moreover, China is not only encouraging clean energy investment in China itself, but also because the cost of doing business is more affordable, facilities, revenue and jobs in clean energy from other countries such as the U.S. will be established in China as well. As such, even if the U.S. maintains a steady renewable energy industry and exports renewable energy products, it may still run a trade deficit as it imports equipment and technology from China.

The U.S. has not fully implemented a comprehensive national energy policy. Although President Obama made clean energy and green jobs a cornerstone of his campaign for presidency, the U.S. is longer on rhetoric than substance. It has thus far failed to feed the country with necessary clean energy investments that would allow the industry to become more established as China has in a short period of time.

Further, the U.S. government is divided on its priorities and beliefs. In addition, the government is divided along party lines. In the current Congress, half of the Republicans are

[94] Shai Oster; *Climate Talks in Tianjin Put Spotlight on China*; October 4, 2010; http://online.wsj.com/article/SB10001424052748704380504575529584266140978.html

climate change skeptics. According to an analysis by Think Progress, a website run by the Center for American Progress, 86% oppose any climate change legislation if I would cost the government money.[95] Unlike in China, where the government has made a unified investment in clean energy, in the U.S. the government is divided on how and where to spend its time and resources. While individual U.S. states have made substantial investments and built supported local economies with clean energy technologies and jobs, a unified national effort and directive is needed. "California may end up being a clean-technology island."[96]

Conversely, China has been making the transition to green energy and consequently building its green economy rapidly as a result of national support from the government. The Chinese Renewable Energy Industry Association predicts that China's wind capacity could reach 50,000 MW by 2015.[97] This potential offers great opportunity for green jobs and will substantially impact both China's economy and the overall energy matrix. Some have analogized China's success in clean energy as winning "the race" against the U.S.

CONCLUSION

There is a great opportunity to promote competition between the U.S. and China as the countries vie to be the leader in building a low-carbon economy. This is a "Sputnik moment." It is necessary to recognize the occasion as one to encourage cooperation and to motivate long-term strategies to adapt to climate change. Such a juncture should not be squandered.

Is it a race between the U.S. and China to be the leader in renewable energy? Yes, it is a race, but not between a tortoise and a hare. Although China has been able to rapidly accelerate the development of renewable energy through its "iron fist" approach, it could easily switch

[95] http://www.latimes.com/business/la-fi-green-congress-20101106,0,3761998.story
[96] http://www.latimes.com/business/la-fi-green-congress-20101106,0,3761998.story
[97] Janet L. Sawin, "Wind Power Continues Rapid Rise," Vital Signs Online (Worldwatch Institute), released April 2008, at www.worldwatch.org/node/5448.

priorities with its next Five-Year Plan or beforehand. Moreover, it is focused on a narrower field of renewable energy technologies. Although a centralized policy would be beneficial to the U.S., individual state efforts have effectively accelerated renewable energy growth through increasing demand, decreasing price and supporting the local economy. Also, though slower than China in its renewable energy development, the U.S. has explored more diverse technologies and could more likely discover an alternative solution.

Whereas China has certainly created low-cost clean technology manufacturing that has made renewable energy more cost-competitive with fossil fuels, it still relies predominantly on coal. The U.S. has clearly coined the idea of "green jobs" and has been investing in capacity building for years; nevertheless, it has lost some of these jobs and talent to foreign countries.

Both countries are well positioned to lead the global markets in renewable energy, but cannot do so alone. Individual country targets set can be set and exceeded. However, in the clean energy race, there is not one clear winner and loser, if the race is played fairly. The true target should be globally-focused. Leadership in a renewable energy economy will provide an example for other countries and provide market stability with competition and lower prices. There is no one way for either the U.S. or for China to win the race on its own. Cooperation between the two countries is necessary. Sharing experiences and ideas to build a global energy economy based on renewable energy will be essential. There is room for more than one country at "the top." There is great opportunity and fortunes to be made in targeting a low carbon future as a means of supporting the economy at the country/government-level and at the private-sector industry level. Moreover, individual workers will benefit and make their small fortunes as well, supporting their families and consequently supporting their countries.

The U.S. and China's political and legal structures have supported distinct and detached advancements in various renewable energy technologies and industries in different ways. Now, both countries should embrace the opportunity to learn from each other's experiences and adopt strategies appropriately.