The School for Ethics *and* Global Leadership

U.S - China Trade Armistice: Recommendations for U.S Policy

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Introduction

This document, compiled in Fall 2014, is the work of 24 students from the School for Ethics and Global Leadership (SEGL). SEGL is a semester-long program that provides intellectually motivated high school juniors and seniors, who represent the diversity of the United States, with the best possible opportunity to shape themselves into ethical leaders who create positive change in the global community. Each SEGL semester selects a current international issue and works to create a policy document that proposes realistic resolutions to said issue. This document reflects the opinions of SEGL students and does not represent the views of the school or its faculty.

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Executive Summary

China and the United States, as a result of possessing the two largest economies in the world, have been engaged in a trade war. As part of this trade war, the Chinese have stolen intellectual property (IP) from the United States, including IP relating to renewable energy. The Chinese government multiplies the damage caused by IP theft by subsidizing renewables, so that its companies can overtake competing entities in the United States. In the past, the U.S. has retaliated by placing tariffs on Chinese imports to protect domestic businesses, but these tariffs were recently reduced. Despite this gesture of goodwill, this trade war still creates hostilities between the two nations and prevents beneficial cooperation.

Chinese violations of international law have not helped mitigate the tensions created by this destructive trade war. While Chinese entities have violated the World Trade Organization's (WTO) international trade laws on several occasions, the WTO does not have the authority to force China to abide by international law. Therefore, the United States Trade Representative (USTR) should work collaboratively with China to establish mutual respect for WTO laws. Additionally, the USTR should advise China to enforce its own IP protection laws by giving the Chinese incentives to cooperate. These incentives should include a further reduction of tariffs placed on Chinese goods. The Department of State has been working to improve relations and cooperation with China. However, trade disputes have made diplomatic progress difficult. Therefore, the State Department should advise both countries to seek reliable, legal arbitration for unresolved disputes through credible institutions such as the World Intellectual Property Organization (WIPO). Additionally, the State Department should advise Congress to ratify the U.S. China Bilateral Investment Treaty (BIT) so that Chinese companies know their role in protecting intellectual property rights (IPR).

The Department of Energy (DOE) strives to create a cooperative work environment between China and the United States and to improve domestic innovation. To achieve these ends, the DOE has tried to advance progress on renewable energy by supporting synergic research programs such as the U.S.-China Clean Energy Research Center (CERC). However, both countries have different interpretations of IPR. Because of this misunderstanding, many U.S. scientists are worried that the Chinese will steal their ideas, and are reluctant to share their technology through CERC. Therefore, the DOE should focus its funding on protecting American projects and research. This money should also improve cyber security and therefore give incentive to innovative scientists by protecting their IPR.

However, in order to defend American IP and promote healthy cooperation with China, Congress must proactively utilize its power. First, Congress should allow the Department of State to engage in positive negotiations by ratifying the BIT. Second, Congress should allow the Department of Commerce (Commerce) to extend and enhance current tax incentives which will promote American renewable energy systems. Third, Congress should allow the United States International Trade Commission (ITC) to independently investigate IP violations without a formal complaint from a business. Last, Congress should clarify the rules regarding counter-espionage by American businesses. These measures would allow the United States to utilize its resources to scale down the trade war and promote fair trade with China.

History and Current Status

As the world slowly begins to shift its focus from dwindling fossil fuel resources, renewable energy is becoming a booming industry.[1] The United States and China are the two largest global economic forces today, and both are heavily invested in manufacturing renewable energy products.[2]

U.S.-China Trade War

The United States and China repeatedly clash in their race for economic development and dominance in the global market. China's economy, as of 2006, has grown more than that of the U.S. and China is surpassing the U.S. in economic growth, especially in exports.[3] The disparity between U.S.'s and China's exports and growth has resulted in a trade gap of $251.8 billion in 2014 between the two economies, with China challenging American dominance in the global economy.[1]

Increasing Chinese dominance in trade has given the Chinese currency greater power in the international market. The value of the Chinese Yuan (RMB) has increased by 20% compared to the United States Dollar (USD) since 2005; increase in currency value is a sign of China's expanding into foreign investments and spending power.[4] In 2013, China reported a $260 billion (USD) global trade surplus, an increase of $30 billion (USD) from 2012 and one of the largest surpluses ever reported, another example of China's huge economic growth rate.[5] China's anti-monopoly laws have aided the growth of Chinese industry and exports. These laws have been implemented over the past decade to protect industrial policy goals.

China's anti-monopoly policies have resulted in accusations from American companies alleging that the laws have been used to stifle foreign competition to state-owned businesses. The misuse of said laws would be a violation of commitments made by China in its accessionto the World Trade Organization in 2001. However, laws protecting state-owned enterprise, which make up a large portion of the Chinese economy in terms of GDP and employment, would be difficult to remove.[6] The possible establishment of the Chinese-proposed Free Trade Agreement of the Asia-Pacific (FTAAP) is another manifestation of the growing role of China as a center of international commerce, elevating U.S.-China competition over global leadership roles.[7]

Intellectual Property

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[1] Richard Baron, Renewable Energy: a Route to Decarbonisation in Peril? (Paris, France: Organization for Economic Co-operation and Development, 2013), 5.

[2] "U.S.-China Clean Energy Announcements," *The White House*, accessed November 12, 2014, http://www.whitehouse.gov/the-press-office/us-china-clean-energy-announcements.

[3] Tim Callen, "PPP Versus the Market: Which Weight Matters?" (Washington, D.C.: Finance & Development, 2007).

[4] Michael Pizzi, "Russia, China sign deal to bypass U.S. dollar" (New York: Al Jazeera America, 2014).

[5] Ibid.

[6] Hayoun Massoud, "China's anti-monopoly agency targets foreign enterprise, U.S. Chamber says" (New York: Al Jazeera America, 2014).

[7] Xiaoyi Shao and Michael Martina, "China presses case at APEC summit for own free trade deal" (Beijing: Reuters, 2014).

With the competition for economic dominance, intellectual property (IP) violation issues have risen as a central point of tension. In 2014, the State Intellectual Property Office (SIPO) published the Promotion Plan for the Implementation of National Intellectual Property Strategy which outlined plans to enhance its IP enforcement and patent dispute mediation capabilities.[8] This statement was followed by the establishment of the first specialized Intellectual Property Court in Beijing in November of 2014, with two more courts to be established in Shanghai and Guangzhou.[9] In the Promotion Plan, China also expressed interest in establishing mutual trust with foreign governments and businesses. This would be accomplished namely through the implementation of the SINO-US Intellectual Property Rights Cooperation Framework Agreements and arrangements with the EU, Japan, and Korea, as well as the establishment of a WIPO China Office to provide the organization more significant involvement in the development of the Chinese IP system.[10]

The Promotion Plan further outlined China's "Indigenous Innovation" efforts, a program intended to increase the number of patents filed by Chinese businesses and individuals. China has set a goal of 2 million patents per year by 2015 and wants to double the number of patents filed by Chinese applicants by 2015. These goals are reinforced by the Promotion Plan, which states SIPO's intention to "strengthen the aggregated IP administration of strategic emerging industries."[11] To reach their patent goals, China offers 15-25% tax cuts and large government contracts to corporations that produce large numbers of patents.[12] These policies resulted in a 31% increase in patents filed between 2011 and 2012[13] and a 23% annual increase in Chinese patents filed internationally since 2005.[14]

"Indigenous Innovation" efforts are intended to transform China from a manufacturer to a designer. By 2012, Chinese invention patents outnumbered American invention patents.[15] Along with growth in invention patents, China has experienced enormous growth in the number of "utility-model" patents filed, which, by 2010, equaled the number of invention patents filed. "Utility-model" patents are defined as "any new design of the shape, partum, color or their combination, of a product, which creates an aesthetic feeling and is fit for industrial application, and can be granted as quickly as one year after the filing date."[16] These patents accomplish little in terms of innovation, and mostly serve as a means of boosting the number of patents filed, thereby increasing Chinese IP holdings in a variety of markets. This growth, coupled with the development of Chinese IP law, seem to present

[8] "The Promotion Plan for the Implementation of the National Intellectual Property Strategy in 2014," *State Intellectual Property Office of the P.R.C*, accessed November 12, 2014, http://english.sipo.gov.cn/laws/developing/201405/t20140505_944778.html.

[9] Bloomberg News, "China Opens Intellectual Property Courts to Improve Image" (Beijing: Bloomberg, 2014).

[10] "The Promotion Plan for the Implementation of the National Intellectual Property Strategy in 2014," *State Intellectual Property Office of the P.R.C.*

[11] Ibid.

[12] "Innovation in China: Patents, yes; ideas, maybe," (Hong Kong: The Economist, 2010).

[13] Mao Wang, "Rapidly Evolving Chinese Patent Law System," doctoral thesis, 2014.

[14] "Chinese Patent Filings Abroad on Big Rise," *State Intellectual Property Office of the P.R.C*, accessed November 12, 2014, http://english.sipo.gov.cn/news/internationalip/201408/t20140826_1000882.html.

[15] "Intellectual Property Trends and Developments with China," *The United States Patent and Trademark Office*, accessed November 12, 2014, http://www.uspto.gov/news/speeches/2013/rea_fordham_china.jsp.

[16] Ibid.

some contradictions by both encouraging greater patent filing and attempting to strengthen SIPO's IP enforcement.

The development of China's IP law has so far had limited effects on widespread violation of IP rights in China. Of the total $300 billion in annual losses to IP theft, Chinese theft makes up between 50-80%, depending on the industry.[17] In 2011, SIPO launched a campaign against IP violations. It uncovered 700 violations worth a total of $125 million--only a small proportion of all estimated IP violations that year. U.S. IP holders have complained that the Chinese civil judicial enforcement system makes the process of addressing IP theft in Chinese courts very difficult, especially in the legalization requirements for evidence from outside of the country.[18]

Sinovel v. AMSC

On June 27, 2013 two employees from Sinovel, a China-based wind turbine manufacturer and exporter, and a former employee of a subsidiary of AMSC, a U.S.-based company, were charged with one count each of conspiracy to commit trade secret theft, theft of trade secrets, and wire fraud. The theft allegedly cost AMSC up to $800 million. AMSC developed and sold software and equipment to regulate the flow of electricity from wind turbines to electrical grids,. The software that runs the PM3000, a part of AMSC's wind turbine electrical control system, was developed in the U.S. and stored on a computer in AMSC's office in Middleton, Wisconsin. The PM3000 worked with other products, including AMSC's Low Voltage Ride Through (LVRT) software. The LVRT system is designed to keep a wind turbine operational when there is a temporary sag or dip in flow of electricity in the electrical grid.

Sinovel purchased software and equipment from AMSC for the wind turbines that Sinovel manufactured, sold and serviced. In March 2011, Sinovel owed AMSC more than $100 million for products and services previously delivered and had entered into contracts to purchase more than $700 million in products and services from AMSC in the future.

SolarWorld v. China

A grand jury in the Western District of Pennsylvania (WDPA) indicted five members of the Chinese People's Liberation Army for computer hacking, economic espionage and other offenses directed at seven victims in the U.S. nuclear power, metals, and solar products industries: Westinghouse Electric Co. (Westinghouse), U.S. subsidiaries of SolarWorld AG (SolarWorld), United States Steel Corp. (U.S. Steel), Allegheny Technologies Inc. (ATI), the United Steel, Paper and Forestry, Rubber, Manufacturing, Energy, Allied Industrial and Service Workers International Union (USW) and Alcoa Inc. The indictment alleges that the defendants conspired to hack into American business entities and steal information that would be useful to Chinese competitors, including state-owned enterprises (SOEs). The indictment claims that the conspirators stole trade secrets beneficial to

[17] Blair, Dennis C., Jon M. Huntsman, Jr., Craig R. Barrett, Slade Gorton, William J. Lynn, III, Deborah Wince-Smith, Michael K. Young, and The Commission on the Theft of American Intellectual Property, *The IP Commission Report*. N.p.: the National Bureau of Asian Research, 201, http://www.ipcommission.org/report/ip_commission_report_052213.pdf.
[18] "Intellectual Property Trends and Developments with China," *The United States Patent and Trademark Office*, accessed November 12, 2014, http://www.uspto.gov/news/speeches/2013/rea_fordham_china.jsp.

Chinese competitors, as well as internal communications that provided an insight into the American business' strategies and vulnerabilities.

After the indictment, one of the five soldiers and at least one other unidentified co-conspirator allegedly stole thousands of files including information about SolarWorld's cash flow, manufacturing metrics, production line information, costs, and privileged attorney-client communications relating to ongoing trade litigation, among other things. Such information would enable a Chinese competitor to target aggressively SolarWorld's business operations. This case is still ongoing, and the indictments are still only allegations.[19]

Steel Workers

In 2010, the United Steelworkers' (USW) union accused China of violating the WTO free-trade rules by subsidizing renewable energy resources, such as solar panels and wind turbines, that had been exported from the United States.[20] Claiming that the subsidies gave China an unfair economic advantage, the USW filed a petition under Section 301 of the Trade Act of 1974,[21] stating that "it is the principal statutory authority under which the United States may impose trade sanctions on foreign countries that either violate trade agreements or engage in other unfair trade practices."[22]

After the United States Trade Representative (USTR) for the Obama Administration took on this trade complaint, it was advanced to the WTO for the final ruling where Beijing declared its agreement to eliminate several subsidies on wind power products. Though the USW is satisfied with the outcome of their case, in the future they intend to extend the elimination of Chinese subsidies to solar powered equipment as well.[23]

Tariffs and Dumping

Dumping is an unofficial term for the practice of selling a product in a foreign country for less than either the price in the domestic country, or the cost of making the product. It is illegal in some countries to dump certain products into them because they want to protect their own industries from such competition. This technique has been used by Chinese companies in the solar panel sector, despite a prohibition on the practice established by Chapter 2, Article 11 of the Law Against Unfair Competition of the People's Republic of China, which states that "an operator may not sell goods at a price below cost for the purpose of excluding his competitors."[24] Through the subsidization of the manufacturing process, Chinese companies are able to make solar panels for a lower cost than companies in the United States. Thus, the manufacturers are able to sell the

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[19] "The United States Department of Justice," last modified May 19, 2014, accessed November 12, 2014, http://www.justice.gov/opa/pr/us-charges-five-chinese-military-hackers-cyber-espionage-against-us-corporations-and-labor.

[20] Keith Bradsher, "Union Accuses China of Illegal Clean Energy Subsidies" (New York: The New York Times, 2010).

[21] "Articles," *Chadbourne*, accessed November 6, 2014, http://www.chadbourne.com/US_Investigates_Chinese_Energy_Subsidies_projectfinance/.

[22] "Section 301," *International Trade Administration*, accessed November 6, 2014, http://www.trade.gov/mas/ian/tradedisputes-enforcement/tg_ian_002100.asp.

[23] Cassandra Sweet, "United Steelworkers back solar complaint on China" (Market Watch, 2011).

[24] "Law Against Unfair Competition of the People's Republic of China," *State Intellectual Property Office of the P.R.C*, http://english.sipo.gov.cn/laws/relatedlaws/200804/t20080416_380359.html.

products at a lower selling price, while still making a profit. This has greatly weakened the solar industry inside the United States. However, the influx of cheap solar panels has made the technology more accessible, and more feasible as an alternative to conventional energy sources.

Another instigating factors in this conflict is the use of tariffs. Tariffs, or the taxation of imported and/or exported goods, have been used to counter the market flooding, and prices of the subsidized solar panels sold by Chinese companies in the United States.[25] However, China responded by applying tariffs of their own on polysilicone, they imported from Korea and the U.S., to make solar panels.[26] These tariffs have only increased tensions, and are directly breaking the two countries' agreement to cut the use of tariffs. An agreement that was mutually agreed upon, with the joining of the WTO.[27] Additionally, many would argue that tariffs are weakening the U.S. market, because domestic corporations are given an unfair advantage over foreign companies, research for the amelioration of the product is discouraged, and instead companies are relying on a duty during importation to stay competitive. Thus, tariffs are a seemingly perfect solution to a problem which my only grow from their use.

Conclusion

The ongoing trade conflict between China and the United States, the two largest economies in the world, poses several complex challenges to the growth and success of both nations. IP violation charges against Chinese entities continue to exacerbate tension, and if the current pattern of IP violations remain, Chinese corporations will be at risk of international retaliation. The immense losses by U.S. companies to IP violations put thousands of American jobs and renewable energy manufacturing industries at risk of collapse. However, this conflict provides an opportunity for an international effort to develop strong IP protection in developing economies, including the development of SIPOs enforcement capabilities. With further negotiation, the two nations may not only establish a strong international standard for IP protection, but strengthen economic ties and assist in the growth of the renewables market, which within the century will become essential to the global economy.

[25] Keith Bradsher and Diane Cardwell, "U.S. Slaps Tariffs on Chinese Solar Panels" (New York: The New York Times, 2012).
[26] Karl-Erik Stromsta, "China confirms US, Korea poly-tariffs" (London: Recharge, 2014).
[27] "Tariffs" *World Trade Organization*, accessed November 12, 2014, http://wto.org/english/tratop_e/tariffs_e/tariffs_e.htm.

Recommendations to the Department of State

In the past several years, the Department of State and the Chinese Ministry of Foreign Affairs have shown consistent collaborative efforts in tackling the issue of climate change. However, the conflict over intellectual property rights (IPR) has slowly gained the attention of the diplomatic world. Although diplomatic efforts have been made despite the trade war surrounding renewable energy, the U.S. and China have been discounting international trade law by imposing tariffs, faltering the international endeavor against global climate change.

Diplomatic and Economic Relationships

The United States and China have a very close trade relationship; the U.S. is China's largest trading partner and China is the U.S.' second largest.[28] In 2012, China exported a total of $352 billion to the U.S., and the U.S. exported a total of $128 billion to China.[29] The two superpowers agree that climate change and renewable energy must be a main focus in working toward a clean energy future. The U.S. and China have invested more capital than any other country into research and development of renewable energy, and they also hold significant levels of economic interests in the field of renewable energy.

Although both countries hold interest in renewables, these two superpowers are not collaborating to create new renewable energy technology. Over $300 billion are being lost per annum in the U.S. due to IP theft, of which 50-80% is expected to be due to theft by China.[30] When China steals American IP, they can dump the product back in the U.S. by selling it at a price significantly lower than the cost of American manufacturing, this beating out American businesses. China's industrial goal to make any items for export as cheap as possible encourages IP theft.[31]

Currently the U.S. and China are responsible for over 33% of global greenhouse gas emissions,[32] and on November 11, President Obama and Xi Jinping came together to discuss how climate change can be addressed.[33] One of President Obama's announced goals was to cut net greenhouse gas emissions by 26-28% less than 2005 levels, by the year 2025.[34] Some agreements include the expansion of joint clean energy research and development, as well as the advancement of major carbon capture and the use of storage demonstrations.[35] Additionally, they agreed to the enhancement of cooperation on hydrofluorocarbons (HFCs), the launch of a Climate-Smart/Low-Carbon Cities initiative, and the

[28] World Bank. "China." Data. January 1, 2013. http://data.worldbank.org/country/china.
[29] Michael F. Martin, " What's the Difference?—Comparing U.S. and Chinese Trade Data," CRS Report RS22640.
[30] Ibid.
[31] Ibid.
[32] "FACT SHEET: U.S.-China Joint Announcement on Climate Change and Clean Energy Cooperation." The White House. November 11, 2014. Accessed November 12, 2014. http://www.whitehouse.gov/the-press-office/2014/11/11/fact-sheet-us-china-joint-announcement-climate-change-and-clean-energy-c.
[33] Ibid.
[34] Ibid.
[35] Ibid.

promotion of trade in green goods.[36] These new agreements between the U.S. and China are helping keep the relationship strong and they avoid bigger disputes from arising.

Pursuing Arbitration

In order to develop and enhance clean energy technology through international collaboration, China and the United States have bilaterally created the U.S.-China Clean Energy Research Center (CERC).[37] CERC Protocol states that upon mutual agreement of the parties, "a dispute shall be submitted to an arbitral tribunal for binding arbitration in accordance with the applicable rules of international law."[38]

The World Intellectual Property Organization (WIPO) provides one of the most credible arbitration services, in line with the arbitration rules of United Nations Commission on International Trade Law (UNCITRAL),[39] a required characteristic of the arbitral tribunal according to the CERC protocol. Although China has historically rejected major international arbitrations, these cases have mainly dealt with territorial disputes. In addition, when China or the U.S. has any discrepancies with WIPO's rules of arbitration, WIPO provides them the ability to negotiate the rule of arbitration.[40] The WIPO Arbitration and Mediation Center is capable of providing the most legitimate and accommodating opportunity for arbitration to both the U.S. and China in the world.

Addressing Tariff Implementation

The Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS) came into effect in 1995, as a comprehensive agreement by members of the World Trade Organization to respect other nations' intellectual property.[41] In April of 2007, the United States sued China in international court through the WTO over alleged violations of the TRIPS Agreement on Intellectual Property Rights. [42] According to the U.S. government, enforcement of U.S. copyright protection in China was insufficient, and the scope of IP theft was unprecedented.[43] That being said, the U.S. was also criticized by the WTO for it's inconsistencies with acting upon the SCM Agreement, an international trade agreement on the regulations of subsidies and countervailing measures. The U.S. had placed

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[36] "FACT SHEET: U.S.-China Joint Announcement on Climate Change and Clean Energy Cooperation." The White House. November 11, 2014. Accessed November 12, 2014, http://www.whitehouse.gov/the-press-office/2014/11/11/fact-sheet-us-china-joint-announcement-climate-change-and-clean-energy-c.

[37] "Protocol between The Department of Energy of the United States of America and The Ministry of Science and Technology and the National Energy Administration of the People's Republic of China for Cooperation on a Clean Energy Research Center." U.S. China Clean Energy Research Center. November 17, 2009. Accessed November 7, 2014, http://www.us-china-cerc.org/pdfs/protocol.pdf.

[38] Ibid.

[39] "World Intellectual Property Organization." Alternative Dispute Resolution. Accessed November 12, 2014. http://www.wipo.int/amc/en/.
"WIPO Arbitration Center." WIPO. January 1, 1995. Accessed November 12, 2014, http://http://www.wipo.int/edocs/pubdocs/en/arbitration/447/wipo_pub_447.pdf.

[40] *Guide to WIPO Arbitration*. Geneva: World Intellectual Property Organization, 2009.

[41] "World Trade Organization." *WTO*. World Trade Organization 2014, 1 Jan. 2014. Web. 6 Nov. 2014, http://www.wto.org/english/tratop_e/trips_e/intel2_e.htm.

[42] Ibid.

[43] Ibid.

countervailing duties on Chinese products entering the U.S., but were ruled inconsistent and therefore illegal under the WTO.[44] The dispute was finally settled on July 14, 2014.

With complications stemming from the implementation of illegal tariffs came the necessity for change. On November 11, 2014, President Obama and President Xi Jinping came to a large agreement regarding climate change during the Asia Pacific Economic Cooperation summit. At that meeting the two leaders agreed to eliminate tariffs on technology between the two countries; the elimination of tariffs is a huge step in the direction of international trade cooperation.[45]

In the past five years, the State Department has not publicly attempted to format a treaty to combat the trade complications and economic inequalities. A treaty proposed to repeal restricting tariffs on both sides, as well as the acceptance to follow the TRIPS agreements would be valuable. The removal of tariffs would allow both nations to pursue more diplomatic trading efforts and look towards mutual economic development Furthermore, the removal of restrictive tariffs could also open up the possibility of expanding the renewable energy industry as a whole. The fact that the two leaders agreed to eliminate tariffs is evidence of of the improving trade relationship, and hopefully these measures will be put into action.

Improving Accountability Between China and the U.S.

Because the United States and China have both infringed upon international trade laws, the creation and ratification of a treaty to set mutual trade regulations would be valuable.[46] A Bilateral Investment Treaty (BIT) would regulate trade uniformly for both countries rather than separate domestic law.[47] Furthermore, foreign investors and their covered investments would be treated "as favorably as the host party treats its own investors."[48] The ratification of a BIT would also garner support for the development of international law standards and the creation of more transparent investment processes.

Bilateral Investment Treaties have also been identified as a potential way to aid compromise between China and the United States. In the fifth round of the U.S.-China Strategic and Economic Dialogue in July of 2013, both governments reached an agreement to reconvene negotiations on a BIT.[49] In a BIT meeting in July of 2014, China agreed to cover all types of investments permitted under the treaty. This would mean that all sectors of its economy would be held accountable for the prevention of IP theft through increased government oversight. Furthermore, all exceptions to BIT standards would be made transparent to the United States government.[50]

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[44] "DS437: United States — Countervailing Duty Measures on Certain Products from China." July 14, 2014. Accessed November 12, 2014. http://www.wto.org/english/tratop_e/dispu_e/437r_conc_e.pdf.
[45] Stout, David. "China and U.S. Strike IT Deal at APEC." Time. November 11, 2014. Accessed November 12, 2014. http://time.com/3577450/us-china-apec-trade-deal-tariffs/.
[46] "WORLD TRADE ORGANIZATION." WTO. March 19, 2010. Accessed November 7, 2014. http://www.wto.org/english/tratop_e/dispu_e/cases_e/ds362_e.htm.
[47] Ibid.
[48] Ibid.
[49] U.S. Department of the Treasury, "U.S. Fact Sheet – Economic Track Fifth Meeting of the U.S.-China Strategic and Economic Dialogue," press release, July 12, 2013, http://www.treasury.gov/press-center/press-releases/Pages/jl2011.aspx.
[50] Ibid.

Recommendations

- Submit disputes concerning intellectual property of renewable energy technology between the United States and China to the WIPO Arbitration and Mediation Center upon mutual agreement between the two governments. If a mutual agreement for arbitration is not reached initially, negotiate the modification of the WIPO rules to best accommodate both parties and submit when reciprocal agreement is reached.

- Propose and negotiate a treaty that would eliminate the current tariffs that China and the United States have imposed on each other, with respects to the TRIPS agreements.

- After a heightened focus on the process of refining a Bilateral Investment Treaty, propose a BIT to the United States Senate that can ensure the security of American investors in both American and Chinese corporations for implementation in China and the United States.

United States Trade Representative

With the authority to develop and recommend trade policies and negotiations, the USTR is responsible for coordinating the United States's trade relations, and that job involves protecting IPR for the purpose of innovation, especially in green technology. Protection of IPR is vital for development of such innovations, however violations by China of American and international property law have occurred. These transgressions could have major implications for creative solutions to climate change, because if there are no enforced regulations about green technology IPR, there are no motives to invent anything new. Furthermore, businesses become reluctant to invest in green technology. A bilateral approach to this problem is crucial, meaning the United States needs to work with China instead of against them. So far, current laws and organizations have failed to force China to abide by the current international WTO laws. The situation is not being adequately addressed by either party involved, however there are many potential approaches that could set up and maintain this ideal bilateral approach.

WTO Enforcement Procedures and How Disputes are Settled

The World Trade Organization is an organization dedicated to negotiating agreements that facilitate international trade and to providing a legal and institutional framework to ensure the implementation of these agreements.[51] The Dispute Settlement Body (DSB) is rule-based system of the WTO that provides framework to establish stability within the international community. The DSB confers direct benefits to both the complainant and the respondent. [52] This remedy system provides a win-win situation that allows countries to negotiate peacefully and avoid a trade war. That being said, the WTO itself will not implement the verdict declared at the end of a case. Instead, the WTO will leave it to the two countries to resolve diplomatically. The DSB procedure works under the assumption that all nations will fulfill trade related commitments and realize expected benefits.[53] The real problem arises when a country such as China does not act upon the set verdict because it does not benefit their national interests. Lack of incentives to comply with the WTO, limits its legitimacy and efficiency in solving international issues.

China has been involved as a plaintiff in twelve WTO cases, thirty two as a defendant, and one hundred thirteen cases as a third party member since its acceptance to the WTO in 2001.[54] As prerequisites to entering the WTO, China committed to reducing the average tariff for industrial goods, informing WTO of all government subsidies, and granting full trade to foreign countries within three years.[55] Additionally, China had to meet requirements of providing nondiscriminatory treatment to all WTO members and ending discriminatory trade policies against foreign investors. [56] Specifically regarding intellectual property, China must implement the WTO's Trade Related Aspects of Intellectual Property Rights (TRIPS). Additional WTO requirements include opening its

[51] World Trade Organization."Overview" http://www.wto.org/english/thewto_e/whatis_e/wto_dg_stat_e.htm.
[52] Castel-Foder, Kennan J. "Providing a Release Valve: The U.S.-China Experience with the WTO Dispute Settlement System." Case Western Reserve Law Review. Fall 2013, Vol. 64 Issue 1, p201-238. 38p .
[53] Ibid.
[54] World Trade Organization. "Disputes by country /Territory"
http://www.wto.org/english/tratop_e/dispu_e/dispu_by_country_e.htm.
[55] Wayne M. Morrison. "China-U.S. Trade Issues." Congressional Research Service. July 10, 2014.
[56] Ibid.

banking system to foreign financial institutions within five years, and allowing for joint ventures in insurance and telecommunications.[57] China has been charged with violations of these agreements in the the dispute cases.

In 2009 a US-Chinese case was brought against Chinese export duties and export quotas for industrial minerals.[58] In this case, China was found guilty of violating WTO requirements yet again. In response, the U.S. and EU threatened to take action against China in the WTO. These threats were successful and on January 1, 2013, China removed its export duties and export quotas despite the fact that doing so did not benefit Chinese national interests.[59] This case was only successful when other countries became involved, therefore in order for China to comply with intellectual properties terms, the international community must become involved. Additionally another meeting between the United States Trade Representative and the Chinese International Trade Representative to enforce the news laws established in the Law Enforcement Conference would be necessary. A first step towards improving law enforcement would be to apply the stricter IP laws in a small local community and gradually expand to all of China.

On December 22, 2010, another case was brought against China in the WTO. The United States requested that China end government subsidies for wind power equipment manufacturers that use parts and components made in China. The U.S. stated that this was in violation of a multitude of international laws.[60] On June 7, 2011 the United States Representatives announced that China agreed to end these subsidies; but to this day China has failed to report its reduction of the subsidies or any steps it has put in place to end the subsidies.[61] Since China does not have incentives to follow through or have international push, it is unlikely that China will follow through with the verdict. In order to keep China accountable, incentives are necessary. The U.S. currently places tariffs on Chinese goods including renewable energy technology; these tariffs hinder the Chinese consumer reach in the United States. An agreement is needed in which the U.S. will remove tariffs so long as China respects IP laws and the terms decided in the Law Enforcement Conference. Tariffs will be reestablished if China does not agree and comply with the conference's terms and if law enforcement is not improved in China.

The Trade-Related Aspects of Intellectual Property Rights (TRIPS Agreement) was written in 1995 and applies to all WTO members. Each member country has to make sure its laws comply with the obligations of the agreement.[62] In order to enforce TRIPS, all WTO members are a part of the TRIPS Council where they are allowed to monitor each others' laws.

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[57] Wayne M. Morrison. "China-U.S. Trade Issues." Congressional Research Service. July 10, 2014.
Morrison, "China- U.S. Trade Issues."

[58] Steve Dickinson, and Dan Harris. "Another China WTO Loss. Another Nail In The Coffin Of World Trade." China Law Blog. February 12, 2012. Accessed November 3, 2014.
http://www.chinalawblog.com/2012/02/another_china_wto_loss_another_nail_in_the_coffin_of_world_trade.html.

[59] World Trade Organization."China- Measures Related to the Exportation of Various Raw Materials".http://www.wto.org/english/tratop_e/dispu_e/cases_e/ds394_e.htm.

[60] World Trade Organization. "China- Measures concerning wind power equipment."
http://www.wto.org/english/tratop_e/dispu_e/cases_e/ds419_e.htm.

[61] Morrison, "China- U.S. Trade Issues."

[62] World Trade Organization. "Trade-Related Aspects of Intellectual Property Rights Agreement." Section 5 Patents, Article 27, 1996.

In order to maintain transparency, members must give copies of their laws and regulations to the TRIPS Council that reviews members' legislation. Member countries unite and discuss any questions, comments, and answers they may have during the TRIPS Council meeting.

At the time of their entrance into the WTO in 2001, China was aware of the TRIPS agreement and was required to sign and abide by its regulations. The 2001 Protocol on the Accession of the People's Republic of China explicitly calls on China to "administer in a uniform, impartial, and reasonable manner all its laws, regulations and other measures of the central [and local governments]...pertaining to or affecting trade."[63] This is meant to encourage China to establish a system that allows enterprises to bring cases not abiding by these standards to the attention of the national authorities.[64]

A meeting between the USTR and the Chinese International Trade Representative is necessary in order for policies and laws in both countries to see eye-to-eye. The TRIPS agreement and Council are useful, but their collective capacities have limits that only direct contact between the U.S. and China are capable of.

Current Chinese Laws and Law Enforcement

China's current patent laws permit two main types of patents: utility patents and invention patents. Utility patents only grant ten-year patent terms (rather than 20-year terms for invention patents), and require a meager description of the subject or item being patented. Additionally, utility patents do not entail thorough examination by China's State Intellectual Property Office (SIPO) to determine whether or not they are actually innovative.[65] On the other hand invention patents, are much harder to obtain and are relatively rare. These patents are difficult to obtain because, unlike utility patents, invention patents are examined extensively by the SIPO.[66]

China's State Intellectual Property Office grants patents on a first-come, first-serve basis.[67] An example of this policy was when Schneider Electric, a French energy company, was sued by a smaller Chinese energy corporation, because Schneider Electric did not patent its miniature circuit breaker (a type of electric switch).[68] The Chinese company, Chint, won the lawsuit because it filed its patent for the circuit breaker before Schneider Electric. However, Schneider Electric had been distributing its miniature circuit breakers in China for years longer than Chint had distributed them. Therefore, Schneider Electric never thought it needed to patent its circuit breakers. Moreover, Schneider Electric had actually patented its circuit breakers in countries other than China, making their patents valid in China (according to WTO law). But, in the end, even though Schneider Electric invented the product, the Chinese court ruled that Schneider had to pay Chint $45 million because

[63] World Trade Organization. "Protocol on the Accession of the People's Republic of China." Article 61 , 2001.
[64] Ibid.
[65] Michael Vella, Richard Hung, and David Yang, *Beyond the Due Diligence: Patent Protection in China.* Nation Venture Capital Association. January 1, 2005,
http://nvcatoday.nvca.org/index.php/beyond-the-due-diligence-patent-protection-in-china.html.
[66] Dennis C. Blair et al., *The IP Commission Report* (n.p.: National Bureau of Asian Research, 2013).
[67] *Intellectual Property Rights*, Embassy of the United States, January 1, 2005,
http://beijing.usembassy-china.org.cn/protecting_ipr.html.
[68] Miniature Circuit Breakers, ABB, 2014,
http://www.abb.us/product/seitp329/49a79353b0194401c12572ab00257544.aspx.

Chint had a domestic utility patent and Schneider did not.[69] This case shows the great value of a utility patent in China, which is why the amount of annually granted utility patents boomed from 180,000 in 2007, to 580,000 in 2011.[70] However, the legitimacy of these patents is often questionable. According to the IP Commission Report, "Utility model patents based on questionable research, copied ideas (sometimes even including photocopies of old patents in the applications), and even old, invalidated technology are being pursued and granted in record numbers."[71] Furthermore, according to a Beijing-based attorney at the international law firm Orrick, Herrington & Sutcliffe, one can "literally copy patents from any country and have them filed and granted in China as a utility model patent."[72]

The WTO has put in place minimum requirements regarding the protection of intellectual property that "require that patents be available and patent rights enjoyable without discrimination as to the place of invention and whether products are imported or locally produced."[73] China has laws in place that satisfy these WTO requirements, but they are not enforced. This poor enforcement of intellectual property laws was proven in a study conducted by the U.S. International Trade Commission, which states that U.S. firms estimated losses greater than $1.3 billion to Chinese patent infringers in 2009.[74] Therefore, the root of this entire problem is not a lack of Chinese legislation; rather, it is a lack of law enforcement and respect for the WTO requirements.

The solution to this patent problem, as it relates to China and the U.S., is the creation of an International Patent Committee (IPC). This committee would be the sole granter of patents for every country in the WTO. Thus, all domestic organizations currently in charge of granting patents would be made ineffective. The creation of the IPC would be beneficial because it would stop offices, like China's SIPO, from granting copied and unlawful patents to its citizens. Current WTO law states that a patent in one member country is equally valid in any other member country. However, the Schneider Electric Case proved that this law is not obeyed in China because Schneider Electric lost, even though it had a valid patent outside of China. Therefore, the creation of the IPC would help the WTO enforce its patent laws because the WTO would actually be in charge of granting all patents.

Recommendations:

- Create the International Patent Committee with at least at least one representative from every WTO country. This committee will have the responsibility of patenting new ideas and checking their validity.
- Set up a Law Enforcement Conference with all WTO countries to improve law enforcement, punishment, and consequences for violating WTO laws.

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[69] Robert Burns, December 1, 2007, *Will China become the World Leader in Patent Litigation?* http://www.finnegan.com/resources/articles/articlesdetail.aspx?news=5baf9931-12cd-4d65-8f27-4644b9010b98.

[70] Dennis C. Blair et al., *The IP Commission Report* (n.p.: National Bureau of Asian Research, 2013).

[71] Ibid.

[72] Ibid.

[73] *Overview: The TRIPS Agreement,* World Trade Organization. Accessed November 7, 2014, http://www.wto.org/english/tratop_e/trips_e/intel2_e.htm#patents.

[74] Dennis C. Blair et al., *The IP Commission Report* (n.p.: National Bureau of Asian Research, 2013).

- In return for China's cooperation in the Law Enforcement Conference and the International Patent Committee, eliminate U.S. tariffs on Chinese solar panels.
- Set up a meeting between the USTR and the Chinese International Trade Representative to implement the new laws and strategies agreed upon in the agreements proposed above.

Recommendations to the Department of Energy

The Department of Energy (DOE) plays a crucial role in developing renewable energy technology, encouraging continued domestic technological advancement and working to foster international collaboration and research in renewables. In order to do its job, the DOE must work to address the intellectual property (IP) theft by creating a more mutual understanding of intellectual property rights (IPR) between research organizations in the United States and China. Although it has taken steps to address IPR education through the U.S.- China Clean Energy Research Center, the DOE must invest even more time in fostering a relationship based on trust which will ultimately work to support the economies of both countries while advancing the global development of sustainable energy systems. Finally, the DOE has a responsibility to ensure that every company it funds has taken adequate measures to protect their information.

Innovation and Intellectual Property in China and the U.S.

One of the most pressing issues the international community currently faces is the need for renewable energy. If the global community continues to use nonrenewable fossil fuels at the current rate, more than 11 billion tons annually, the world's known crude oil deposits will be depleted by 2052.[75] In response to this threat, both the United States and China have attempted to make the transition to a clean energy based economy. These attempts, however, have been minimal; the U.S. invested only $36.7 billion in renewable energy in 2013,[76] amounting to 1.05% of the government's annual budget.[77] That same year, China spent roughly 2.47%[78] of its annual budget by investing $54.2 billion in renewable energy innovation.[79] This funding was a step in the right direction for both countries but ultimately is far too low. In the U.S., increased funding for renewable energy technology has allowed companies to decrease the cost of manufacturing clean energy and develop more efficient production methods. Funding has also allowed for faster rates of product development and innovation.[80] For example, an increase in solar panel production led to a 50% decrease in average price in 2011.[81]

However, ideological differences between the United States and China with regard to the nature of intellectual property give rise to certain challenges in striving for collaboration, including the theft of intellectual property. In order to understand these differences, it is crucial to be aware of the transitions the Chinese economy and patent industry are currently experiencing. China has started to

[75] "The End of Fossil Fuels," Ecotricity, https://www.ecotricity.co.uk/our-green-energy/energy-independence/the-end-of-fossil-fuels (accessed November 6, 2014).

[76] The Pew Charitable Trusts, "Who's Winning the Clean Energy Race?," *Chinese American Forum* 29, no. 4: 25. *Academic Search Complete*, EBSCO*host* (accessed October 29 2014).

[77] Congressional Budget Office, *The Federal Budget in 2013: An Infographic* (CBO, 2014).

[78] CIA World Factbook. *East and Southeast Asia: China, 2014*.

[79] The Pew Charitable Trusts, "Who's Winning the Clean Energy Race?", 25.

[80] Department of Energy: The Budget for Fiscal Year 2013, Association of American Universities, https://www.aau.edu/WorkArea/DownloadAsset.aspx?id=13042 (accessed November 11 2014).

[81] Diane Cardwell, "Renewable Sources of Power Survive, but in a Patchwork," *New York Times* (New York, NY), April 10, 2014, accessed November 12, 2014, http://www.nytimes.com/2012/04/11/business/energy-environment/renewable-energy-advances-in-the-us-despite-obstacles.html?_r=0.

make the transition from a traditionally manufacturing based economy to an economy that fosters innovation. This is evident in the fact that China has set incentives for companies to obtain patents and even surpassed the U.S. in number of "invention patents" made. However, the continuation of IP theft shows that there is still work to be done with regard to gaps in understanding of IP between the U.S. and China.

The U.S.-China Clean Energy Research Center

The U.S.-China Clean Energy Research Center (CERC) strives to facilitate collaborative research and development on clean energy technology between the United States and China. CERC aims to allow the two nations to "share a responsibility to contribute to the world's future sustainability and prosperity by taking advantage of the abundant opportunities for cooperation between their two countries on clean energy technologies."[82] CERC also works to solve the difference in understanding of intellectual property between the U.S. and China in order to resolve IPR battle between the two nations. On November 11, 2014, the U.S. and China extended CERC's current mandate for another five years, including funding for three existing tracks on building efficiency, clean vehicles and advanced coal technology and launching a new track on the energy-water nexus.[83]

Since its creation in 2009, CERC has held two center-wide meetings focusing on IP and how it relates to both countries' research. The first joint workshop was held in Haikou, China, in March, 2012. At that meeting, CERC came to the conclusion that in a research consortium having well-defined membership procedures is a key requirement for successful collaboration.[84] The second CERC cooperative meeting was held in Stanford, California in February, 2013. At that meeting, CERC determined that there are many instances of misperceptions between Chinese and U.S. firms due to cultural differences, and a lack of understanding of each other's IP rules and legal systems.[85] CERC must hold more frequent meetings so that the United States and China can better understand the other country's perspective.

Intellectual Property Theft and Security

IP security is a concern for many U.S. economic and government sectors, with over $300 billion in losses due to IP theft on average per year.[86] Energy is one of the largest targets for intellectual property theft. That theft can occur in several ways, including new forms of cyber espionage as well as more "traditional" methods such as bribery, theft of files, and patent violation.[87] In 2009, the U.S. wind turbine company AMSC accused Chinese manufacturer Sinovel of bribing a former employee for software codes.[88] In 2014, SolarWorld Americas charged members of the People's

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[82] U.S. China Clean Energy Research Center, "Protocol," news release, November 17, 2009, 2.
[83] Office of the Press Secretary of the United States, "U.S.-China Joint Announcement on Climate Change," news release, November 11, 2014, 1.
[84] Joanna Lewis, "Workshop Summary" (paper presented at Annual Meeting of the U.S. China Clean Energy Research Center, Haikou, China, March 5, 2012), 2.
[85] Lewis, "Workshop Summary," 3.
[86] Dennis C. Blair et al., *The IP Commission Report* (n.p.: National Bureau of Asian Research, 2013), 2.
[87] *2012 Cost of Cyber Crime Study: United States* (n.p.: Ponemon Institute, 2012) quoted in *The IP Commission Report*.
[88] Patrick Smith, "AMSC case against Sinovel progresses in US," Wind Power Monthly, last modified July 7, 2014, http://www.windpowermonthly.com/article/1302306/amsc-case-against-sinovel-progresses-us.

Liberation Army with hacking into classified files.[89] Cybersecurity measures have been proven to increase an organization's ability to detect and mitigate cyber attacks. A 2012 study done by the Ponemon Institute found that costs due to cybercrime in companies with the lowest level of security infrastructure were nearly four times the costs faced by those with high security levels.[90] The study also found that the overall greatest injury due to cyber attacks were related to information loss.[91] This shows that increasing security measures in organizations that research and develop intellectual property would decrease the risk of that intellectual property being stolen. However, currently the Department of Energy does not have any clear overarching policies in place that require all organizations or companies it funds to implement IP security programs. According to the Ponemon study, the most effective cost-saving cybersecurity measure is simply access to sufficiently funded resources, including security intelligence systems, access governance tools and specifically designated trained security personnel. Without a legitimate policy regarding security, the DOE can not expect the research and development they sponsor to be safe from IP conflicts.

Renewable Energy Research and Innovation in the U.S.

The Department of Energy funds many organizations and agencies that facilitate innovation in renewable energy technologies. The Loan Programs Office (LPO) of the DOE is responsible for funding various energy-related projects, awarding a total of $32.4 billion in loan grants to companies and organizations nationwide.[92] The Advanced Research Projects Agency - Energy (ARPA-E) is an example of an agency funded by the DOE that plays a large role in the advancement of renewable energy in the United States. Despite the role ARPA-E plays in the advancement of technologies that "are capable of significantly changing the energy sector to address our critical economic and energy security challenges", the Fiscal Year 2012 House Energy and Water Development Appropriations Bill recommended a 44.3% decrease in ARPA-E's budget.[93] The House Appropriations Subcommittee on Energy and Water also proposed an 80% budget cut for the 2014 fiscal year.[94] Although these budget cuts did not become a reality, they present an issue because of the questions posed surrounding the future of renewable energy investments.

ARPA-E received a budget of $280 million for the 2014 fiscal year, but the DOE has requested a budget of $325 million for the 2015 fiscal year.[95] This would amount to a 16.1% increase in funding from 2013. In order for the DOE to maintain its desired role as the leading proponent of renewable energy innovation in the United States, funding for these organizations must be increased despite ongoing intellectual property disputes between the U.S. and foreign powers such as China and past proposed budget cuts.[96] If this funding is not increased, innovation will lose its standing as a top

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[89] Diane Cardwell, "Solar Company Seeks Stiff U.S. Tariffs to Deter Chinese Spying," *New York Times*, September 1, 2014.
[90] *2012 Cost of Cyber*, 16.
[91] Ibid.
[92] Loan Programs Office, Department of Energy, accessed November 5, 2014, http://energy.gov/lpo/projects.
[93] Committee on Appropriations, Energy and Water Development Appropriations Bill, 2012, H.R. Rep. No. 112-112, 1st Sess., at 114 (2011).
[94] *America's Energy Revolution: A New Path to Jobs and Economic Growth: Hearings Before the H. Comm. on the Budget*, 113th Cong. 20 (2013) (statement of Daniel J. Weiss, Senior Fellow and Director of Climate Strategy, Center for American Progress).
[95] Funding by Appropriation, Department of Energy, accessed November 1, 2014, http://www.energy.gov/sites/prod/files/2014/04/f14/FY%202015%20DOE%20Budget%20by%20Appropriation.pdf.
[96] Mission, Departme`nt of Energy, accessed November 1, 2014, http://energy.gov/mission.

priority of the DOE and environmental issues will continue growing. Furthermore, cutting off funding from research-based organizations is an ineffective way to handle intellectual property disputes; cut funding does nothing to solve the legal issues at hand, and would merely repress U.S. and Chinese abilities alike to combat current environmental problems.

Recommendations

- The U.S.-China Clean Energy Research Center should hold biannual center-wide conferences to address ongoing differences in interpretations of intellectual property rights as they arise over time.

- The DOE should establish clear and consistent security requirements for financial grants and loans, and should expect that all organizations or companies that they provide significant funding to have full plans for cybersecurity infrastructure (including firewalls, access governance, and security intelligence). The DOE should be prepared to direct funding to the growth of security infrastructure in organizations it funds.

- The DOE should advocate for the fulfillment of budget requests for DOE Loan Program Office projects and other research agencies such as ARPA-E in the interest of prioritizing innovation in renewable technology despite intellectual property disputes.

Recommendations to the Department of Commerce

The interests of the Department of Commerce (Commerce) are focused on the advancement of American businesses, both domestically and abroad.[97] These interests become increasingly important when dealing with the issue of U.S.-China economic relations.[98] Currently, there is a threat to American business in the form of dumping. Dumping occurs when a foreign company sells a product in the U.S. at a price that is lower than the cost of manufacturing. In response to this Chinese dumping, Congress increased the tariff on solar panels to about 31% in order to enforce anti-dumping efforts and expand American business.[99] Tariffs hurt both American and Chinese business by preventing the industries from expanding, ending collaboration, and promoting the coddling and isolation of American Industry. In order to work towards a more equitable industry for both America and China, the adoption of a multifaceted policy would be useful. Since the Chinese perspective views the use of cyber intelligence programs as acceptable in respect to both public and private sector advancement, it is unlikely that both the U.S. and China will be able to come to an agreement as to what is acceptable surveillance.[100]

Cyber Security in the Private Sector

The charges brought by the U.S. Department of Justice against members of the People's Liberation Army lend only a glimpse into the cyber crimes that have been committed against the American private sector. In 2012, the Ponemon Institute conducted a survey of 56 companies in various sectors of American industry. The report found that the average annualized cost of cyber crimes for the surveyed companies was $8.9 million per year. However, the cost per employee of these crimes was significantly higher for small organizations ($1,324 per capita) as opposed to large organizations ($305 per capita).[101] In addition, Verizon Enterprise Solutions found that, although large organizations experience more security incidents than small organizations (47,425 incidents and 5,819 incidents, respectively, out of a total sample size of 53,244 incidents, excluding 10,193 incidents associated with unknown organization sizes), small organizations are almost 13.8 times more likely to experience a data breach during one of those incidents.[102] This is partially because small businesses generally have less liquid capital available to them and therefore, they have less ability to make internal improvements such as implementing new cyber security measures. In 2005, an analyst for American technological firm, Gartner, Inc., found that for every $5.62 that businesses spend after a security breach, $1.00 could have been spent in preventative measures to reduce

[97] "About the Department of Commerce," Commerce.gov, accessed November 6, 2014, http://www.commerce.gov/about-department-commerce.
[98] Diane Cardwell, "Solar Company Seeks Stiff U.S. Tariffs to Deter Chinese Spying," *New York Times* (New York, NY), September 1, 2014, Energy & Environment, accessed November 2, 2014.
[99] United States Department of Commerce, *Commerce Preliminarily Finds Dumping of Crystalline Silicon Photovoltaic Cells, Whether or Not Assembled into Modules from the People's Republic of China*, pdf.
[100] Schmidt and Sanger, "5 in China Army," U.S.
[101] *2012 Cost of Cyber Crime Study: United States* (n.p.: Ponemon Institute, 2012), accessed November 6, 2014, http://www.ponemon.org/local/upload/file/2012_US_Cost_of_Cyber_Crime_Study_FINAL6%20.pdf.
[102] *2014 Data Breach Investigations Report* (Verizon Enterprise Solutions, 2014), 6, pdf.

breaches and minimize damages. In 2013, this data was re-evaluated by the same analyst, who concluded that this ratio has not changed much in the past eight years.[103]

In order to make cyber security more available to vulnerable small businesses, a pilot grant program could be set up by Commerce in conjunction with the Department of Homeland Security's National Cyber Security Division. The program would allow for American small businesses that meet requirements for both size (set forth by the U.S. Small Business Administration) and level-of-risk to apply for grants through Commerce for the purpose of subsidizing internal cyber security programs. The size of this pilot program could vary depending on the size of the yearly budget. According to our initial calculations, one possible budget for a small-size program could be $35.4 million, but this could also be scaled up to $354 million or more. These numbers are derived from taking the per capita damages incurred by small businesses, applying the ratio set forth by Gartner, multiplying by one of the more common employee cut-off requirements for small businesses (500), multiplying by 3,000 for the number of businesses that claim to have been targeted by Chinese attacks, and taking 10% and 100% of this value, respectively. With new funding available to at-risk small businesses across the U.S., one step is taken towards mitigation of the problem of cyber attacks.

Working Together with China: CERC and the Trade War

The U.S.-China Clean Energy Research Center (CERC) is supported with at least $150 million over five years split evenly between the two countries.[104] On November 11, 2014, the U.S. and China agreed to "a renewed and expanded commitment to CERC".[105] One way in which they are renewing the commitment is by extending the CERC monetary support for another five years from 2016-2020. Collaboration between the U.S. and China on research will expand the solar industry in both countries which employs about 600,000 Americans. Expanding support for CERC is in the interest of American business because a larger clean energy industry creates more jobs. Thus, it would advantageous for the Department of Commerce to continue funding and supporting CERC to ensure the expansion of the renewable energy industry.

Tariff Reform

Tariffs have played a key role in the trade war between the U.S. and China. Tariffs can be useful to kickstart domestic industry temporarily, but in the long term, they do more harm than good. In tackling an issue so global as renewable energy, the U.S. and China need to work together to develop technology and put an end to growing pollution. Tariffs only prevent that collaboration and are detrimental to future of renewable energy. American tariffs were originally created in response to claims of Chinese dumping in the photovoltaic module market. As a response to the American tariffs, the Chinese government imposed both anti-subsidy and anti-dumping tariffs on polysilicon

[103] Danny Yadron, "Companies Wrestle With the Cost of Cybersecurity," *Wall Street Journal* (New York, NY), February 25, 2014, accessed November 6, 2014.
[104] "About," U.S.-China Clean Energy Research Center.
[105] The White House Office of the Press Secretary, *Fact Sheet: U.S.-China Joint Announcement on Climate Change and Clean Energy Cooperation* (11.: 11., 2014), 2.

imports from the U.S. in July and August of 2013, amounting to 63.5% in some cases.[106] These tariffs must be eliminated because they prevent the growth of global collaboration to fix the energy crisis.

Domestic Industry

The American solar industry is in a period of tremendous growth. As of the 2nd Quarter of 2014, the cumulative installed solar capacity in the U.S. was 15,900 Megawatts (MW), enough to power more than 3.2 million average-sized homes.[107] Furthermore, total installations of solar panels in 2013 were valued at $13.7 billion: a major increase from the $11.5 billion in sales in 2012 and $8.6 billion in 2011.[108] As of 2013, there have been 445,000 operational solar systems in the U.S.[109] and 142,698 jobs directly employed by the solar industry in 2013: a 19.9% increase over 2012. Beyond that, approximately 435,000 jobs have been indirectly employed by the industry, meaning that nearly 600,000 employees are connected to the American solar industry.[110]

There are three main sub-industries within the solar industry: polysilicon manufacturing, module manufacturing, and installing. The polysilicon manufacturing industry stayed stagnant from 2010 to 2011 at approximately 40,700 metric tons.[111] From 2009 to 2010, the industry grew by 84%, from 22,120 metric tons to 40,715.[112] This industry is the United States' largest advantage over China, as we export $873 million in polysilicon while importing only $4 million from the Chinese.[113] The module manufacturing industry exhibited similar trends as polysilicon, with stagnation from 2010 to 2011 after huge growth. It stayed at about 1,200 MW for 2010 and 2011, after growing by 72% from 2009 to 2010.[114] This is China's greatest asset, as we import $1.154 billion in modules while exporting only $17 million.[115] The entire manufacturing sector directly employed 29,851 people in 2013, and is expected to increase by 8.6% for 2014.[116] The solar installation industry is also growing, as seen by statistics mentioned above. In addition, 140,000 individual installations were completed in 2013,[117] a 130% increase from 2011's 61,000.[118]

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[106] Chris Meehan, "China Escalates Trade War With US Over Polysilicon, Upping Tariffs to 63.5%," *SolarReviews News*, September 18, 2013, accessed November 6, 2014, http://www.solarreviews.com/news/china-polysilicon-tariffs-upped-to-64.

[107] SEIA, "Solar Energy Facts: Q2 2014," news release, September 22, 2014,1, PDF.

[108] Ibid.

[109] GTM Research and SEIA, *2013 Year-In-Review*, U.S. Solar Market Insight (n.p.: n.p., 2013), Executive Summary, accessed November 6, 2014, http://www.seia.org/sites/default/files/resources/5jBprenCY92013ye.pdf.

[110] The Solar Foundation, *National Solar Jobs Census 2013* (n.p.: n.p., 2014), 16, accessed November 6, 2014, http://www.thesolarfoundation.org/sites/thesolarfoundation.org/files/TSF%20Solar%20Jobs%20Census%202013.pdf.

[111] GTM Research and SEIA, *2011 Year-In-Review*, Executive Summary.

[112] Ibid.

[113] NREL Department of Energy, *Solar PV Manufacturing Cost Analysis: U.S. Competitiveness in a Global Industry*, by Alan Goodrich, Ted James, and Michael Woodhouse, 4, October 11, 2011, accessed November 6, 2014, http://www.nrel.gov/docs/fy12osti/53938.pdf.

[114] GTM Research and SEIA, *2011 Year-In-Review*, Executive Summary.

[115] NREL Department of Energy, *Solar PV Manufacturing Cost*, 4.

[116] The Solar Foundation, *National Solar Jobs Census*, 14.

[117] GTM Research and SEIA, *2011 Year-In-Review*, Executive Summary.

[118] GTM Research and SEIA, *2013 Year-In-Review*, Executive Summary.

Current Incentives

The current tax credits for residential and commercial renewable energy systems can be found in 26 U.S. Code §25D[119] and §48.[120] According to those sections of 26 U.S. Code, the current tax credit law is as follows: 30% of the cost of either a residential or commercial system can be received back in the form of tax credits as long as that system is solar electric, solar water heating, geothermal, wind beneath a certain size, or fuel cell. If the system does not meet these qualifications and is a commercial system, it can still receive 10% of the cost as tax credits. For any type of system except fuel cell, there is no maximum amount that can be received as tax credit.

These tax incentives have been extremely successful. Solar installation has grown by 1600% since January 1, 2006 when the current tax credits took effect.[121] 4,751 MW of photovoltaic installations were installed in 2013, a 41% increase over 2012.[122]

In terms of the three solar sub-industries, polysilicon manufacturing is thriving, module manufacturing is insignificant, and installing will continue to grow as long as the trend of rapid growth continues. Thus, the module industry is in far more need of assistance than the other two. Following the immense success tax incentives have had on the American solar industry in general, that same success could be applied to the manufacturing industry specifically. Commerce must pressure Congress to extend the current tax credits another eight years and add a stipulation that solar systems using modules manufactured by American companies will receive a 35% credit. This number is admittedly unsupported, as there is too great a discrepancy between systems to accurately determine what percentage tax credit would be most beneficial to American manufacturers. As a result, we determined 35% because it was larger than the tax credits given to any other system without being unrealistically big. This value that should be amended if information becomes available that suggests a different percentage. This will assist American manufacturers by incentivizing their product without straying from the ultimate goal of making solar power cheaper for everyone, no matter where the panels come from.

Recommendations

- Commerce should pilot a grant program with the Department of Homeland Security's National Cyber Security Division that allows for American small enterprises to receive funding to set in place new cyber security measures. This would be accomplished through the application for program grants out of a Congressionally-mandated budget.
- China and the U.S. should come to an agreement through negotiation to mutually lower and eventually eliminate tariffs.

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[119] Residential Energy Efficient Property, 26 U.S.C. § 25D. Accessed November 2, 2014, http://www.law.cornell.edu/uscode/text/26/25D.

[120] Energy Credit, 26 U.S.C. § 48. Accessed November 2, 2014. http://www.law.cornell.edu/uscode/text/26/48.

[121] "Solar Investment Tax Credit," SEIA, accessed November 2, 2014, http://www.seia.org/policy/finance-tax/solar-investment-tax-credit.

[122] Mike Munsell, "U.S. Solar Market Grew 41%, Had Record Year in 2013," Green Tech Solar, last modified March 7, 2014, accessed November 6, 2014, http://www.greentechmedia.com/articles/read/u.s.-solar-market-grows-41-has-record-year-in-2013.

- Commerce should continue to fund CERC to allow the U.S. and China to continue to collaborate to create innovative renewable energy.
- Commerce should encourage Congress to extend the current tax credits for eight years, while adding the following clause: For solar systems, the 30% tax credit will be available for any system, while systems that use entirely American manufactured modules can receive a 35% credit.

Recommendations to the Congress of the United States

The Congress of the United States (Congress) has not taken comprehensive measures in order to counteract intellectual property theft by Chinese corporations and the circulation of products created from stolen IP. Congress has held one hearing on IP theft, released a single commission report on the issue, and passed token legislation, such as the Cyber Intelligence Sharing and Protection Act (CISPA).[123] Despite these efforts, China is still responsible for 70% of the intellectual property theft directed at American corporations,[124] and these measures do little to combat the key issues at play.

Furthermore, the current national systems in place are ineffective at preventing the circulation of stolen IP. The United States International Trade Commission (USITC) lacks the ability to monitor which products are circulated within the United States and has limited means to prevent the sale of products based on stolen IP.[125] Additionally, anti-espionage and cyber defence programs within large companies have proven ineffective, as evidenced by the 3,000 American corporations reporting cyber attacks last year, and require standardization in order to prevent IP theft.[126] Finally, current tax incentives, meant to support the purchase of green technologies, still apply when products are based off of stolen intellectual property.[127] The following suggestions will help Congress better combat the theft of renewable energy intellectual property by Chinese entities.

We intend to help further involve the United States legislature in this growing conflict without the need to pass robust legislation during this atmosphere of political gridlock. Furthermore, with the lack of success from tariffs and embargos, we hope the following, in not directly targeting China, will confront these issues without exacerbating current trade tensions.

Empowering the International Trade Commission

As presented in section 337 of the 1930 Tariff Act, the USITC is only allowed to investigate patent fraud in the instance that the inventor or patent holder presents a case of possible IP theft.[128] This process not only keeps power from the USITC by not allowing the commission to utilize government assets such as Border and Customs office to investigate IP theft, but is also not fast enough to prevent goods based on stolen IP from circulating into the United States economy. While over 3,000 businesses have complained about cyber attacks, the ITC has only managed to see as few as 70 IP theft cases as of 2010.[129] To make matters worse, cases often go unreported because some companies simply do not report cases of IP theft. For instance, when 35 *Fortune 500* companies were attacked in 2010, only Google and one other company came forward, the latter not reporting any

[123] Committee on Energy and Commerce, Hearing on Cyber Espionage and the Theft of U.S. Intellectual Property and Technology, Doc. No. 113, 1st Sess., at 7 (2013).
[124] Dennis C. Blair et al., *The IP Commission Report* (n.p.: the National Bureau of Asian Research, 2013), 3.
[125] Tariff Act of 1930, 19 U.S.C. § 4 (1930).
[126] David E. Sanger, "As Chinese Leader's Visit Nears, U.S. Is Urged to Allow Counterattacks on Hackers," *The New York Times* (New York City, U.S.), May 21, 2013, 19.
[127] Energy Credit Act, 26 U.S.C. § 48 (2008).
[128] Tariff Act of 1930, 19 U.S.C. § 4 (1930).
[129] United States International Trade Commission, Facts and Trends regarding USITC Section 337 Investigations, Doc. No. 113, 1st Sess., at 4 (2013).

details.[130] In such cases, the ITC is not allowed to use its government resources to investigate the other 33 attacks. Clearly, this is evidence of the current bureaucratic processes in place preventing action.

An application of the elastic clause would permit Congress to allow the ITC to independently investigate violations of IP code within the United States, as outlined in the TRIPS agreement.[131] This action would allow the ITC to take more proactive measures in investigating IP theft and not be dependant on inventors, patent holders, or federal courts. Furthermore, it would permit the USITC to uphold independent investigations of IP theft by having access to trade locations that businesses cannot monitor amongst other benefits. Moreover, by creating a partnership with other government organizations, no further funds would need to be allocated to the ITC to maintain vigilance. These actions are justified by Article I, Section 8, Clause 8[132] of the Constitution, the commerce clause,[133] and implied powers of the United States.[134]

Protecting Businesses from Cyber Attacks

A great deal of U.S. intellectual property stolen by China is taken via cyber attacks. In order to empower businesses to protect themselves against these cyber attacks, Congress should clarify and condense anti-espionage rules and regulations within the United States. IP intensive industries, such as computer development, account for 18.8% of the economy and are valued at a total of $5.06 trillion.[135] It is estimated that 3,000 of these businesses have reported cyber attacks in the last year.[136] The fact that these large companies have been targeted show a need for legal clarity to defend themselves against China's exploitation of stolen IP: a market that is valued at over $300 billion.[137] However, according to *Forbes Magazine*, the danger of corporate retaliation to hacking is: "that some of the proposed activities are illegal and may result in significant criminal penalties and civil liabilities for the companies and personnel who engage in them. They could also result in reputational damage, loss of stock value to shareholders, retaliatory actions, and diplomatic crises."[138]
In holding public hearings of top policymakers on counterintelligence and IP, as well as members of corporations that already include robust counter-espionage techniques, we hope to establish stronger and more transparent rules and regulations for cyber protection within the United States.

It would be advantageous for hearings to be held by the Congress of the United States with the following government officials who are deeply involved in areas relating to IP theft:

Dianne Feinstein (D-California), Chairwoman of the Senate Committee on Intelligence; Tom Carper (D-Delaware), Chairman of the Senate Committee on Homeland Security and Governmental

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[130] McAfee, *Net Losses: Estimating the Global Cost of Cybercrime* (n.p.: Intel Security, 2014).
[131] "Agreement on Trade-Related Aspects of Intellectual Property Rights," World Trade Orgonization, accessed November 7, 2014, http://www.wto.org/english/tratop_e/trips_e/t_agm0_e.htm.
[132] U.S. Const. art. I, § 8, cl. 8.
[133] U.S. Const. art. I, § 8, cl. 3.
[134].U.S. Const. art. I, § 8, cl. 18.
[135] Dennis C. Blair et al., *The IP Commission Report* (n.p.: the National Bureau of Asian Research, 2013), 26.
[136] Michael S. Schmidt and David E. Sanger, "5 in China Army Face U.S. Charges of Cyberattacks," *New York Times* (New York City, U.S.), May 19, 2014, 1.
[137] Dennis C. Blair et al., *The IP Commission Report* (n.p.: the National Bureau of Asian Research, 2013), 2.
[138] Jody Westby, "Caution: Active Response to Cyber Attacks Has High Risk,"*Forbes*, November 29, 2012.

Affairs; Tom Coburn (R-Oklahoma), Ranking member, Committee on Homeland Security and Governmental Affairs; Admiral Michael S. Rogers, Director of the National Security Agency.

We also propose hearing representatives of American corporations recently targeted by Chinese hackers in order to ascertain how regulations can be put in place to allow these corporations to better defend themselves. These include the following industries who either have been affected by cyber attacks or have resources to fight against them:

Apple, Inc. Microsoft, Inc., SolarWorld, JPMorgan Chase and Co., Target Corporation, American Superconductor.

Effective Tax Incentives

Presently, there are tax incentives in place to provide commercial and residential renewable energy systems using solar, geothermal, wind, or fuel cells with tax credits of 30% of the cost of the system, with no ceiling on the tax credits that can be attained.[139] Furthermore, there is a 10% tax credit incentive for commercial systems for all other renewable energy systems that do not fit the aforementioned requirements as found in U.S. Code 26 Section 48 and U.S. Code 26 Section 25 D. These benefits are set to expire on January 1, 2017.[140]

A 35% tax credit for systems using solar modules made in the U.S. and the current 30% incentive on all other systems would encourage businesses to invest in American products and systems without targeting or inciting specific Chinese corporations to retaliate.

Recommendations

- Empower the USITC by employing the elastic clause in order to grant them the right of independent investigation with the ability to look into IP theft without the discretion of patent holders. This would require a basic majority in both the House and the Senate for approval.
- Encourage the protection of IP amongst businesses and corporations by holding hearings with top policy makers and heads of technology corporations in order to ultimately pass legislation on the handling of cyber attacks and IP theft within companies.
- Enhance and expand current tax incentives by specifying a 35% tax credit incentive for solar systems composed entirely of modules manufactured in the U.S. while assigning a 30% tax credit incentive for all other systems; the current tax incentive legislation should be extended 8 years from 2017.

[139] Energy Credit Act, 26 U.S.C. § 48 (2008).
[140] Energy Improvement and Extension Act, 1424 U.S.C. (2008).

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