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**COAL-TO-LIQUID TECHNOLOGY:
A LOOK AT THE GEOPOLITICAL TENSION BEHIND CHINA'S ENERGY
STRATEGY**

by

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ABSTRACT

As interest in renewable energy development continues to rise around the globe, the alignment of China's capabilities and incentive to invest in the green energy sector position the country in a leading role. However, China's recent investment in coal-to-liquid (CTL) technology raises questions as to the direction of China's energy policy and reflects broader geopolitical tensions within the Chinese government. Although CTL technology has been widely criticized as being environmentally unfriendly and economically unsustainable, China continues to invest in it at an astounding pace. Research proposes several possible explanations, such as corruption or local conflicts of interest, however, a critical analysis of China's political and economic systems reveals that China's energy policy is actually split between pursuing oil security and becoming a green hegemon. How the Chinese Communist Party decides to prioritize its energy policy will have widespread economic, environmental and political effects for decades to come.

I. INTRODUCTION

How China's energy sector is governed will affect global geopolitics for decades to come. Despite its widely recognized importance, the subject is often poorly understood. Researchers are constantly being surprised by new achievements, trends and failures in China's energy sector.¹ China is currently debating how it will meet its enormous prospective energy needs, while at the same time maintaining its prospects of becoming a green hegemon. The tension between these two contradictory goals has come to describe China's energy sector. At the very crux of this geopolitical struggle lies the phenomenon of coal-to-liquid (CTL) technology. CTL challenges the popular perception that China's energy policy is organized around sustainability, while at the same time calling attention to the broader economic and political struggles of the Chinese central government.

China has been investing in CTL for over ten years, despite technical difficulties and billions of dollars in losses.² Now, Shenhua Energy Co., a state-owned enterprise and the world's largest power company, is investing 55 billion yuan (7.9 billion U.S. dollars)³ into a CTL project in Ningxia, and another 280 billion yuan (42.3 billion U.S. dollars)⁴ in Xinjiang. With this investment, Shenhua will become the first company to use direct CTL technology on a large scale since World War II. It is widely accepted that CTL technology causes significant harm to the environment, and is not economically

¹ Philip Andrews-Speed, *Governance of Energy in China: Transition to a Low-Carbon economy* (S.I.

² Lucy Hornby, "China's Coal-Conversion Plants Surge Back to Life," *Financial Times*, April 12, 2017, accessed October 29, 2017, <https://www.ft.com/content/02931290-1d94-11e7-a454-ab04428977f9>.

³ Yin Chuan, "Significant Coal-to-Liquid Project In Production In Ningxia," *Xinhua*, December 28, 2016, accessed October 29, 2017, http://news.xinhuanet.com/english/2016-12/28/c_135939342.htm.

⁴ "Shenhua Coal-Chemical base takes shape in Ningxia," *China.org*, July 7, 2008, accessed November 03, 2017, http://www.china.org.cn/china/Ningxia/2008-07/07/content_15967894.htm.

profitable.⁵ Indeed, it takes over ten tons of fresh water to produce one ton of coal-derived fuel.⁶ In a country plagued with water scarcity, China's CTL program raises substantial questions about its environmental sustainability. Additionally, the price of crude oil must be over 55 dollars per barrel for CTL plants to break even, significantly limiting potential profit.⁷

As interest in renewable energy development continues to rise around the globe,⁸ the alignment of China's capabilities and incentive to invest in the green energy sector position the country in a leading role. However, the fact that China is investing so heavily in a non-profitable and environmentally harmful technology raises real questions as to the direction of China's energy policy and the Chinese state's capacity to implement a sustainable and economically viable policy to address its energy security concerns. This paper seeks to explore why Chinese leadership continues to invest so heavily in CTL technology when there are more profitable and environmentally friendly technologies available. This is a case that illustrates wider governmental struggles, such as corruption, weak state capacity, and bifurcated policy. How the Chinese Communist Party (CCP) decides to prioritize its energy goals could very well determine China's energy security, its global reputation, and the political legitimacy of the CCP.

⁵ Lucy Hornby, "China's Coal-Conversion Plants Surge Back to Life," *Financial Times*, April 12, 2017, accessed October 29, 2017, <https://www.ft.com/content/02931290-1d94-11e7-a454-ab04428977f9>.

⁶ Coco Liu, "Chinese companies plunge into coal-to-liquids business, despite water and CO2 problems," *E&E News*, February 23, 2015, accessed November 20, 2017, <https://www.eenews.net/stories/1060013819>.

⁷ James T. Bartis, Frank Camm and David S. Ortiz. *Producing Liquid Fuels from Coal: Prospects and Policy Issues*. Santa Monica, CA: RAND Corporation, 2008. <https://www.rand.org/pubs/monographs/MG754.html>.

⁸ "Renewable energy use rises with China, EU, India giving world hope," *Xinhua*, June 10, 2017, http://news.xinhuanet.com/english/2017-06/10/c_136354044.htm.

Coal-to-Liquid Technology

Direct CTL technology is the chemical process of converting coal directly into synthetic transportation fuel.⁹ Unlike original CTL technology used by Nazi Germany and South Africa's Sansol, direct CTL skips gasifying the coal in to synthesis gas, making it considerably more efficient. The conversion ratio for direct CTL is approximately between one and two-barrels/ton coal. However, for CTL fuels to be competitive it is estimated that the price of crude oil must be priced between 55 to 65 dollars per barrel.¹⁰ With the current market price for crude oil hovering around 53 dollars per barrel, CTL is no longer economically viable.¹¹ During 2008-2009, when China first started exploring CTL technology, crude oil prices were at an all-time high, approximately 90-100 dollars per barrel. During that time, CTL technology was seen as a way to decrease China's dependence on the international oil market.¹² Now, however, oil prices are decreasing and the price of domestic coal is increasing. Despite China's large coal reserves, increasing environmental awareness and the importation of coal have pushed up its price, further decreasing CTL's efficiency.¹³ While CTL projects may currently generate a financial profit, studies show that the quantity of net energy delivered to society is extremely low,¹⁴ due to high initial investment cost and low

⁹ Yang Kong et al., "EROI Analysis for Direct Coal Liquefaction without and with CCS: The Case of the Shenhua DCL Project in China," *Energies* 8, no. 2 (2015): doi:10.3390/en8020786.

¹⁰ James T. Bartis, Frank Camm and David S. Ortiz. "Producing Liquid Fuels from Coal: Prospects and Policy Issues. Santa Monica, CA: RAND Corporation, 2008.
<https://www.rand.org/pubs/monographs/MG754.html>.

¹¹ "Oil Price Charts." *Oilprice.com*. Last modified October 29, 2017. <https://oilprice.com/oil-price-charts/45>

¹² Yang Kong et al., "EROI Analysis for Direct Coal Liquefaction without and with CCS: The Case of the Shenhua DCL Project in China," *Energies* 8, no. 2 (2015): doi:10.3390/en8020786.

¹³ Sarah O. Ladislav, Jane Nakano. "China-Leader or Laggard on the Path to a Secure, Low-Carbon Energy Future?" *Center for Strategic and International Studies*, September 2011.

¹⁴ Yang Kong et al., "EROI Analysis for Direct Coal Liquefaction without and with CCS: The Case of the Shenhua DCL Project in China," *Energies* 8, no. 2 (2015): doi:10.3390/en8020786.

conversion efficiency.¹⁵ Considering these factors, CTL technology remains a controversial form of energy production.

In addition to economic concerns, the CTL process emits large amounts of greenhouse gases into the atmosphere. CTL discharges approximately 0.8 tons of carbon dioxide per barrel produced.¹⁶ Studies estimate that without carbon management the total-fuel-cycle of CTL is 2.0 to 2.2 times that of emissions created by the refining of conventional light crude oils.¹⁷ While carbon capture and storage technology can be used to control emissions, it also increases production cost by approximately five dollars per barrel.¹⁸ For example, 6.2 billion yuan (93 million U.S. dollars) was spent on environmental protections at the Ningxia plant, equal to 11 percent of the initial investment. Furthermore, even the most vigilant carbon management would not significantly reduce the negative environmental impacts. Another environmental concern associated with CTL plants is water use and pollution. China faces serious water shortages, particularly in the northwest desert regions where CTL is being developed. The eight million tons of water required each year for Shenhua's CTL plants, for example, further highlights sinking groundwater levels.¹⁹ Additionally, Shenhua has plans to divert water from the Yellow River, a primary resource for drinking and

¹⁵ Y.H. Henry Chen, John M. Reilly, and Sergey Paltsev, "The prospects for coal-to-liquid conversion: A general equilibrium analysis," *Energy Policy* 39, no. 9 (2011): , doi:10.1016/j.enpol.2011.06.056.

¹⁶ James T. Bartis, Frank Camm and David S. Ortiz. Producing Liquid Fuels from Coal: Prospects and Policy Issues. Santa Monica, CA: RAND Corporation, 2008.
<https://www.rand.org/pubs/monographs/MG754.html>.

¹⁷ Ibid.

¹⁸ Ibid.

¹⁹ Nao Nakanishi and Niu Shuping, "China Builds Plant to Turn Coal into barrels of oil," Reuters, June 04, 2008, accessed October 29, 2017, <http://www.reuters.com/article/us-china-ctl/china-builds-plant-to-turn-coal-into-barrels-of-oil-idUSSP13361320080604>.

agriculture water, to use for their newest plant.²⁰ These instances show how CTL technology will further stretch the already scarce water resources used by over one billion people. On its current track, China's energy production model is unsustainable. There are however, alternative options.

Alternative Energy Sources

Economic and environmental concerns with CTL have caused global skepticism towards China's CTL investment, particularly when there are other more environmentally friendly and cost-effective options available.²¹ Sustainable energy solutions provide an economically viable option to meet China's rising energy needs while avoiding further damage to the environment. Renewable energy represents a small but rapidly growing share of China's energy mix. China invested over 100 billion dollars in renewable energies in 2015, making it the world's largest investor in green energy.²² Indeed, China has an abundance of green energy resources to draw from. Previous research proposes wind energy as an economically competitive alternative to coal for China. According to a study done by researchers at Harvard and Tsinghua University, "Assuming a guaranteed price of 0.516 RMB/kWh (7.6 U.S. cents) for delivery of electricity to the grid," wind energy could be delivered profitably and accommodate the majority of China's projected electricity demands for 2030.²³ As renewable energy technologies advance, wind and

²⁰ Lucy Hornby, "China's Coal-Conversion Plants Surge Back to Life," Financial Times, April 12, 2017, accessed October 29, 2017, <https://www.ft.com/content/02931290-1d94-11e7-a454-ab04428977f9>.

²¹ Jonathan Woetzel and Jiang Kejun, "China's Renewable Energy Revolution," McKinsey Global Institute, August 2017, accessed April 14, 2018.

²² Joel Jaeger, Paul Joffe, and Ranping Song, "China is Leaving the U.S. Behind on Clean Energy Investment," World Resources Institute, January 6, 2017, accessed October 31, 2017, <http://www.wri.org/blog/2017/01/china-leaving-us-behind-clean-energy-investment>.

²³ Michael B McElroy, Xi Lu, Chris P. Nielsen, and Yuxuan Wang. 2009. Potential for wind-generated electricity in China. *Science* 325(5946): 1378-1380.

solar become more advantageous. Not only because they reduce pollution, but also because they have long-term economic benefits. While Chinese policy makers' have shown considerable interest in renewable energy, recent investment in CTL technology, which is neither environmentally friendly nor economically sustainable, represents a significant divergence from China's sustainability efforts. A careful analysis provides three possible explanations for this divergence. The first is the vested interests and corruption of elites, second is the conflicting goals of local and national governments, and lastly is the tension between China's need for oil security and desire to be a green hegemony.

II. CORRUPTION VS NATIONAL INTERESTS

The structure of China's post-reform economic system and history of corruption in state-owned enterprises (SOE) provides one possible explanation for its recent investment in CTL technology. Economic decentralization without clarification of ownership rights in the post-Tiananmen era led to ruling elites and their friends in the private sector taking advantage of opportunities to acquire SOE's with little supervision.²⁴ Additionally, incomplete market reforms give SOE's privileges and access to cheap capital, allowing them to embark on unprofitable projects that benefit executive's personal interests. This combined with greater executive autonomy has created a structural gap in which corruption thrives.²⁵ Indeed, one could say that corruption is the price China has paid for the transition from a command to a market-

²⁴ Minxin Pei, *China's Crony Capitalism: the Dynamics of Regime Decay* (Cambridge, MA: Harvard University Press, 2016), 24.

²⁵ Ibid.

based economy.²⁶ Despite Xi Jinping's impressive anti-corruption campaign, corruption in large SOE's such as Shenhua, the largest power SOE in China and company responsible for CTL production, remains rampant. The structure of SOE's creates tension for high-ranking executives between personal monetary incentives and wider national values. Despite Xi's recent efforts, evidence suggests that "bribe-taking, embezzlement, and unauthorized use of public funds" have risen to astronomical levels since the late 2000s.²⁷ Researcher Andrew Wedeman proposes that this is because the CCP has adopted an informal policy of "selective toleration," allowing economically beneficial corruption while targeting political deviants.²⁸ The unstable relationship between the Chinese government and SOE's means that executives and political leaders are continually confronted with opportunities for collusion and corruption.

The bribery scandal at Shaanxi Electric Power Group provides an example of typical corruption activities that take place within large SOE's. After receiving money from the government to upgrade their electric power grid, the executives of the company accepted bribes to buy shoddy equipment from suppliers at inflated prices.²⁹ Over 53 individuals were involved in the scandal and the "president, Wang Wenxue, was convicted of taking bribes totaling 7.1 million yuan (one million U.S. dollars)."³⁰ Another example, showing the ease with which elites can steal hundreds of thousands of yuan can be seen at China National Petroleum Corp. (CNPC). Jiang Jiemin, the former chairman of

²⁶ Andrew Wedeman, *Double Paradox: Rapid Growth and Rising Corruption in China* (Ithaca and London: Cornell University Press, 2012) 31.

²⁷ Minxin Pei, *China's Crony Capitalism: the Dynamics of Regime Decay* (Cambridge, MA: Harvard University Press, 2016), 153.

²⁸ Andrew Wedeman, *Double Paradox: Rapid Growth and Rising Corruption in China* (Ithaca and London: Cornell University Press, 2012) 120.

²⁹ Minxin Pei, *China's Crony Capitalism: the Dynamics of Regime Decay* (Cambridge, MA: Harvard University Press, 2016), 159.

³⁰ *Ibid.*

CNPC, was accused of taking over 14 million yuan in bribes (2.1 million U.S. dollars).³¹ In addition, the energy giant sold the oil field property rights below market price to Zhou Yongkang's (former Politburo Standing Committee member, party chief of Sichuan province, and head of CNPC) eldest son, who flipped the fields for a profit of over 550 million yuan (83 million U.S. dollars).³² These examples of coercion and bribery have become the new normal in China's reformed capitalist economy and result in significant economic and social damage to the state.

Considering rampant patterns of corruption, it is not difficult to deduce that investment in CTL was not the actions of a misguided national government, but rather of self-interested elites within Shenhua Energy Co. itself. Shenhua is China's largest energy SOE with a market capital of approximately 400 billion yuan (60 billion U.S. dollars).³³ Based on a report done in 2014, corruption is most common in large SOE's because they conduct high-value transactions, and therefore create easy targets for potential corruption.³⁴ The larger the SOE the easier it is to find partners in collusion, reduce risk, and steal large sums of money without notice. Shenhua's CTL project can be analyzed using similar tactics. The project has attracted enormous amounts of investment and has a large profit margin providing many opportunities for personal gain. While it is impossible to make definitive conclusions, Shenhua's CTL project fits all of the dimensions required for corruption to thrive. CTL provides ample opportunities for individual gain through

³¹ Ibid.

³² Ibid.

³³ "China Shenhua Energy Co Ltd (601088.SS)," Reuters, accessed November 02, 2017, <https://www.reuters.com/finance/stocks/overview/601088.SS>.

³⁴ 中国企业家犯罪研究报告 2014 [Report on crimes of Chinese corporate executives in 2014].

contract bidding, embezzlement and personnel management.³⁵ Therefore, vested individuals face a coincidence of interest, do they stay loyal to China's publically stated sustainable energy goals or do they utilize CTL's large profit margin for their own benefit?

Shenhua's leadership has a track record of pursuing personal gain over broader regime goals. Zhang Xiwu, Shenhua's chairman before being appointed the director of the State-Owned Assets Supervision and Administration Commission (SASAC), the government committee responsible for overseeing SOE's, was recently arrested for corruption.³⁶ While the exact reasons for his arrest have not been reported he was accused of abusing his position for personal and family benefit and being involved in various forms of illegal profiteering. His arrest in July 2017 is thought to be linked with earlier corruption investigations in the Shenhua group. In 2014 anti-corruption investigators announced the arrest of several top Shenhua executives, including assistant general manager Zhang Wenjiang³⁷ and vice president Hua Ziqiao.³⁸ Shortly after, the anti-corruption agency proclaimed that the senior leaders of Shenhua where suspected of corruption, and sporadic arrests continued for several years. These arrests further solidify the hypothesis that corruption may also play a role in Shenhua's latest investment strategy. While CTL may not benefit China as a whole, or even be in line with national environmental policies, it does benefit a few powerful individuals. Considering

³⁵ Minxin Pei, *China's Crony Capitalism: the Dynamics of Regime Decay* (Cambridge, MA: Harvard University Press, 2016), 153.

³⁶ Lary Ong, "Former Chinese State Asset Regulator Deputy Head Purged," Epoch Times, July 03, 2017, accessed November 02, 2017, https://www.theepochtimes.com/former-chinese-state-asset-regulator-deputy-head-purged_2264226.html.

³⁷ Ibid.

³⁸ "Former executives of China's Shenhua energy under investigation," Reuters, December 23, 2014, accessed November 02, 2017, <http://www.reuters.com/article/china-corruption-shenhua/former-executives-of-chinas-shenhua-energy-under-investigation-idUSL3N0U72B720141223>.

Shenhua's corrupt history and weak bureaucratic structure, it is easy to conclude that CTL production is merely the doing of a few high-level executives looking to expedite their own financial gain.

While corruption is one explanation for China's recent investment in CTL technology, this argument is inconclusive due to insufficient evidence linking Shenhua Energy Co.'s current projects to exploitation. It is possible for the interests of elites to sustain an inefficient enterprise, however, it is much more difficult to start an entire industry for the purposes of corruption. This would require corrupt elites taking on much more risk than is necessary. Although the potential personal income from CTL is huge, there are other industries in which corruption would be easier and less risky. The lack of proof and the large logistical risk means that even if corruption has played a small role, there are more compelling political motivations that better explain investment in CTL.

III. LOCAL VS NATIONAL INTERESTS

Another possible explanation for investing in CTL technology is the conflict of interests between local and state governments. Generalized, non-province specific policies from Beijing have caused a misalignment of interests between local and state governments making it difficult for the CCP to enforce policies in distant regions. The saying '山高皇帝远', 'The mountains are high and the emperor is far away' has come to describe the common phenomenon of local officials acting independently despite policy direction from Beijing.³⁹ While very few officials question the fundamental structure of

³⁹ Richard McGregor, *The Party: the Secret World of China's Communist Rulers* (Harper Collins Publishers, 2010).

one-party rule, the everyday economic administration of China requires an altogether different calculus. Richard McGregor describes that instead of, “surging out like a single river out of the capital, the transmission of economic management is more akin to a series of locks, in which each locality takes what they want out of the policy waterway.”⁴⁰

While sustained economic growth and environmental issues are important to China as a whole, local governments are more likely to act in their own best interest. Prioritizing short-term local problems such as enterprise cash flow difficulties, attracting investment, and social stability concerns.⁴¹ CTL projects attract investment from Beijing and provide employment, two key pieces to a sustainable provincial government. This encourages local officials to sustain an inefficient industry, and ignore national green energy targets.

The conflict of interest between Beijing and local governments is not new to China. Indeed, one of the reasons Beijing’s generalized policies have been successful at all is because each locality adjusts it to their own needs. However, this also means that local governments will avoid implementing national environmental and economic policies that are impractical or harmful to their organizational interests.⁴² Local officials, who deal with real problems of livelihood and job creation, will often ignore broad state policies. The widespread misalignment of interests indicates that the continuation of CTL may not be a reflection of national energy policies but rather the interests of local governments.

⁴⁰ Ibid, 173.

⁴¹ Genia Kostka, and William Hobbs. “Local Energy Efficiency Policy Implementation in China: Bridging the Gap between National Priorities and Local Interests.” *The China Quarterly* 211 (2012): 765–85. doi:10.1017/S0305741012000860.

⁴² Minxin Pei, *China's Crony Capitalism: the Dynamics of Regime Decay* (Cambridge, MA: Harvard University Press, 2016), 26.

A study done by Tim Wright on a 1998 policy initiative called, ‘Closing the pits and reducing coal production’ provides an excellent example of this phenomenon.⁴³ The goal of this policy was to close down township and village enterprise (TVE) mines to correct China’s coal safety record and to reduce output, therefore balancing supply and demand.⁴⁴ The environmental and safety effect of the small mines were not only giving China bad face, they also detracted from the economic development of larger, more efficient SOE mines. The target was to close 25,800 TVE mines and reduce output by 250 million tons by the end of 1999.⁴⁵ However, officials soon discovered that people who were dependent on the TVE mines for their livelihood resisted the policy. Many local authorities feared that the policy would wreak havoc on their county’s economy and social order. Officials did not want to be responsible for the economic downfall of their region so they would express support for the policy in public, but do nothing in reality.⁴⁶ Therefore, while on paper many mines were closed, they reopened illegally as soon as the investigator’s backs were turned. Similarly, these kinds of tensions can be applied to the CTL situation. While local governments may agree in theory with China’s environmental energy platform, continuing local CTL production simply brings in more revenue and meets the more urgent needs of local regions.

Although CTL production benefits local economies by creating jobs and attracting investment, it is ultimately a betrayal of China’s national energy goals. China’s Nationally Determined Contribution (NDC’s), decided upon during the Paris Climate

⁴³ Tim Wright, "State Capacity in Contemporary China: ‘closing the pits and reducing coal production’," *Journal of Contemporary China* 16, no. 51 (April 18, 2007): doi:10.1080/10670560701194392.

⁴⁴ Ibid.

⁴⁵ Ibid.

⁴⁶ Ibid.

Agreement, publicly state China's commitment to environmentalism. Pledging that, "China attaches great importance to addressing climate change since long making it a significant national strategy for its social and economic development and promoting green and low-carbon development as an important component of the ecological civilization process."⁴⁷ It is clear that China has committed to using low-carbon technology. Indeed, earlier this year Xi vowed that China will, "stick to the basic state policy of energy conservation and environmental protection."⁴⁸ Considering such rhetoric, the use of CTL technology, a large carbon emitter, represents a considerable irregularity. While the national government is concerned with green energy and fulfilling international environmental contracts, local governments are pursuing CTL as a moneymaking opportunity.

The investment being poured into these localities are enormous; a quoted 280 billion yuan (42.3 billion U.S. dollars) is being invested into the coal chemical base in Ningxia alone.⁴⁹ Additionally, it is estimated that the Ningxia plant will create 30,000 jobs and will increase local incomes by 18 billion RMB per annum by 2020.⁵⁰ Ceasing CTL production would cause these regions to lose jobs and the backbone of their local

⁴⁷ People's Republic of China, Department of Climate Change, National Development & Reform Commission of China, *Enhanced Actions on Climate Change: China's Nationally Determined Contributions*, by Su Wei (2015), 2.

⁴⁸ Meng Jie, "Xi stresses clean energy development," Xi stresses clean energy development - Xinhua | English.news.cn, June 7, 2017, accessed November 03, 2017, http://news.xinhuanet.com/english/2017-06/07/c_136347551.htm.

⁴⁹ "Shenhua Coal-Chemical base takes shape in Ningxia," China.org, July 7, 2008, accessed November 03, 2017, http://www.china.org.cn/china/Ningxia/2008-07/07/content_15967894.htm.

⁵⁰ John Sexton and Pang Li, "Shenhua coal-chemical base takes shape in Ningxia," July 21, 2008, , accessed December 08, 2017, http://www.china.org.cn/china/Ningxia/2008-07/07/content_15967894.htm.

economy. Consequently, localities continue to push for various projects as part of their plans to increase local GDP.⁵¹

At a basic level, the discontinuity between the central government's strategic goals and local government's operational intentions reflects China's weak state capacity. CTL production is allowed to persist because of the interests of various local players, despite its contradiction to national goals. However, this does not provide ample explanation as to why the Chinese government re-initialized CTL production. Indeed, flaws in this argument can be found when looking at the water needs of these specific regions. CTL plants must be placed near large coal reserves, however, the majority of China's coal reserves are located in Northern China, which is facing extreme water shortages.⁵² Indeed, Northern China is home to 43 percent of China's population but only 14 percent of the country's water supply.⁵³ The Yellow River, also the water source for China's five largest CTL plants, has already been depleted 76 percent by human use.⁵⁴ CTL production will only further exacerbate extreme water shortages. The vice general manager of Shenhua, Zhang Yuzhuo, estimated that to meet CTL water demands for his company alone would require one percent of the Yellow River's water.⁵⁵ Although the accuracy of this statement is questionable, it gives an idea of just how large the impact of CTL will be on a region already facing extreme water scarcity.

⁵¹ Andrew J. Minchener, *Coal-to-oil, gas and chemicals in China*, report, February 2011, accessed November 3, 2017, https://www.usea.org/sites/default/files/022011_Coal-tooil,%20gas%20and%20chemicals%20in%20China_ccc181.pdf.

⁵² Renee Cho, "How China Is Dealing With Its Water Crisis," *State of the Planet*, May 19, 2011, accessed December 07, 2017, <http://blogs.ei.columbia.edu/2011/05/05/how-china-is-dealing-with-its-water-crisis/>.

⁵³ Jim Yardley, "China's Path to Modernity, Mirrored in a Troubled River," *The New York Times*, November 18, 2006, accessed December 07, 2017, <http://www.nytimes.com/2006/11/19/world/asia/19yellowriver.html>.

⁵⁴ Joseph John. Narus, *Coal to oil in China: scientific development or crossing the river by feeling the stones?* Master's thesis, Portland State University (2010), 78.

⁵⁵ *Ibid*, 81.

This has already had an effect on local communities. For example, the Ningxia plant redirects water previously used for 2,000-year-old rice patties, putting many farmers out of work.⁵⁶ While these communities may not be large, they hold considerable sway in China's rural population, where many CTL plants are based. It is unlikely that local government officials would risk further worsening an already exacerbated water shortage, threatening the livelihoods of tens of millions throughout the region.⁵⁷

Therefore, while misalignment of interests' certainty provides a partial explanation for sustaining the CTL industry, this argument fails to explain the support coming out of the central government itself. This paper explores the entrenched interests and geopolitical tensions rampant in China's national energy policy and will argue that investing in CTL is a way for China to balance its desire to have oil security and become a green energy hegemon.

IV. GREEN ENERGY HEGEMON VS OIL SECURITY

Although both individual and local interests can be seen as contributing factors in CTL production, they both rely on the assumption that the central government's commitment is to green energy and economic efficiency. In fact, it is not that the Chinese government is unable to pursue its interests, rather the evidence suggests that the overriding political motivations of the central government are split and even conflictual with each other. China's investment in CTL technology reflects a tension within the CCP

⁵⁶ Lucy Hornby, "China's Coal-Conversion Plants Surge Back to Life," *Financial Times*, April 12, 2017, accessed October 29, 2017, <https://www.ft.com/content/02931290-1d94-11e7-a454-ab04428977f9>.

⁵⁷ Joseph John. Narus, *Coal to oil in China: scientific development or crossing the river by feeling the stones?* Master's thesis, Portland State University (2010).

itself between a geopolitical desire to be a green energy leader and increased oil security, which would help support the energy needs of China's high-intensity growth model. Decades of fast economic growth have created a demand for energy that has outstripped domestic supply.⁵⁸ And the production of transportation fuels from coal has become an alternative option to lessen the deficiency in petroleum supply.⁵⁹ China sees CTL production as a possible solution to its energy security crisis, by taking a readily available energy source, coal, and transforming it into crude oil. At the same time, China is taking on a new environmentalist leadership role after the U.S. withdrawal from the Paris Climate Agreement. These two contradicting goals have placed China in a difficult position, and the CCP is desperately avoiding choosing between them. The production of CTL provides a way for China to appease both its oil needs and its desire to become a green leader. Although it may only be for a short time, CTL has allowed the Party to ease the growing geopolitical tension between energy security and green leadership.

Oil Security

Energy supply is critical for China's sustained economic growth and social stability, however, China's current crude oil supply situation is precarious. As energy consumption increases domestic resources will be unable to meet China's rising demand. China's dependence on imported oil is projected to reach 76.9 percent by 2020 and 82 percent by 2030.⁶⁰ This growing dependency on foreign oil is both a theoretical and practical challenge for China. From a theoretical standpoint, reliance on imported oil

⁵⁸ Erica Strecker Downs, *China's Quest for Energy Security* (RAND, 2000).

⁵⁹ Ibid.

⁶⁰ Joseph Y.S. Cheng, "A Chinese View of China's Energy Security," *Journal of Contemporary China* 17, no. 55 (May 2008).

violates Mao's doctrine of self-reliance (自力更生), a guiding economic principle of socialist China.⁶¹ This does not require complete self-reliance, however, it implies that the government should hold significant control over domestic energy systems.⁶² China's oil consumption has skyrocketed in the past decade⁶³ and requires sufficient oil to fuel its high-intensity economic growth model without the risks involved with being reliant on the global market. Indeed, researcher Zhang Wenmu goes so far as to say that international oil dependence is "the Achilles heel to contemporary China, as it has forced China to trust its fate (stable markets and access to resources) to others."⁶⁴ Whatever the analogy, it is clear that energy security and oil independence are precursors to China's global rise, and must be addressed.

China's geopolitical desire for oil independence is threefold. First, China has a deep-seated historically based fear of foreign oil dependence. Secondly, it distrusts the international oil market. Lastly, the CCP sees oil sustainability is a precursor to China's sustained economic growth and therefore Party legitimacy.

The first reason behind China's desire to be oil independent requires a deeper understanding of historical context. The Chinese government's unease with its status as a net importer of oil originates with Soviet participation in China's energy sector during the 1950s.⁶⁵ Soviet advisors had a major impact in developing China's oil industry after the CCP took power, and their departure following the Sino-Soviet split in the 1960s left

⁶¹ Erica Strecker Downs, *China's Quest for Energy Security* (RAND, 2000).

⁶² Kim Woodwad, *The International Energy Relations of China*, Stanford, CA: Stanford University Press, 1980, 33.

⁶³ People's Republic of China: Oil for 2015," IEA - Report, 2015, accessed November 04, 2017, <https://www.iea.org/statistics/statisticssearch/report/?year=2015&country=CHINA&product=Oil>.

⁶⁴ Zhang Wenmu, 'Sea power and China's strategic choices', *China Security*, (2006), 7-9.

⁶⁵ Erica Strecker Downs, *China's Quest for Energy Security* (RAND, 2000).

China floundering.⁶⁶ The abrupt departure seriously damaged some of the large-scale energy projects they had been collaborating on. As a result, China became reliant on the Soviets for over 50 percent of its refined oil products.⁶⁷ This, combined with the Great Leap Forward movement resulted in massive economic collapse. China blamed the catastrophe entirely on the Soviet Union for abandoning them in their hour of need and made accelerated efforts to become oil self-sufficient.⁶⁸ These experiences made Chinese leadership acutely aware of the importance of oil security on economic and geopolitical power. Even now, the Chinese government sees economic independence as an essential part of sustainable development. In his speech to the 19th Communist Party Congress, Xi Jinping said that to further economic development China must, “reform and open up, be self-reliant, hardworking and enterprising.”⁶⁹ Although China has come a long way in opening up its economy, there remains an inherent distrust in the global market. Now that China is once again a net-importer of oil, these fears have come to the forefront of China’s energy policy.

The second reason for China’s pursuit of oil independence is the Chinese government’s wariness of international actors’ huge influence in the oil market. The Chinese government is troubled that the U.S., Japan, and Western Europe allies have dominance over Middle Eastern oil and could potentially use this influence to keep China in “check”.⁷⁰ China fears that U.S. dominance over the world oil market could work to

⁶⁶ Ibid.

⁶⁷ Ibid.

⁶⁸ Ibid.

⁶⁹ Xi Jinping, "Secure a Decisive Victory in Building a Moderately Prosperous Society in All Respects and Strive for the Great Success of Socialism with Chinese Characteristics for a New Era" (speech), October 18, 2017, accessed November 20, 2017.

⁷⁰ Wu Lei, “中东石油与我国未来石油供求平衡” (“Middle East Oil and Our Equilibrium of Oil Supply and Demand in the Future”), *世界经济与政治 (World Economics and Politics)*, No. 3, 1997, pp. 30-33

weaken China by controlling energy resources and limiting China's access to oil.⁷¹ One example of this is the U.S.' close ties with oil supplying states, such as Saudi Arabia. Additionally, the U.S. Navy dominates the sea-lanes stretching from the Persian Gulf to the South China Sea, where the majority of China's oil imports must pass through.⁷² This means that the U.S. could disrupt or even block the majority of China's oil supply with relative ease, crippling its economy. Furthermore, while not specifically identified by Chinese leadership, it is possible that the U.S. could apply oil sanctions against China to punish behavior they dislike.⁷³ Differences in the two countries political values concerning human rights, arms sales, or cross-strait relations provide ample possibilities for this kind of rebuke.

To minimize such dangers, China has been pursuing its own oil diplomacy in the Middle East. This diplomacy strengthens and diversifies China's ties with oil producing nations and complicates those with oil importing nations.⁷⁴ However, these actions have been met with mixed results. In some instances, it provided an opportunity for increased cooperation. In others, it quickly escalated into a neo-mercantilist approach of locking up energy supplies, thus sparking further instability of energy resources.⁷⁵ This has encouraged increased domestic efforts for oil self-sufficiency. This distrust of the global market and fear of international intervention has caused China to look to alternative oil production methods, such as CTL, for a more permanent solution.

⁷¹ Erica Strecker Downs, *China's Quest for Energy Security* (RAND, 2000).

⁷² Ibid.

⁷³ Ibid.

⁷⁴ Hongyi Harry Lai, "China's Oil Diplomacy: Is It a Global Security Threat?" *Third World Quarterly* 28, no. 3 (2007): 519-37. <http://www.jstor.org/stable/20454944>.

⁷⁵ Suisheng Zhao, "China's Global Search for Energy Security: Cooperation and Competition in Asia-Pacific," *Journal of Contemporary China* 17, No. 55 (2008): 207-227

Lastly, China needs oil security to continue its pattern of high economic growth and ensure the CCP's political legitimacy. Historically, in the reign of Mao, the Chinese government drew its legitimacy solely from its strong commitment to socialism. However, when Deng Xiaoping took power in 1978 he knew this was no longer sufficient to appease the general populace and introduced China's "opening up and reform" economic campaign.⁷⁶ From then on the CCP has relied on performance-based legitimacy to secure its own political future. Only by constantly improving economic growth and social welfare does the CCP reinforce its own authority. However, China's slowing economic growth since 2012 means that this legitimacy is under attack.⁷⁷ China needs a reliable source of crude oil to continue its rapid economic growth and secure its own political future. Without this, institutional failures, such as the healthcare system, lack of government transparency, and rampant corruption will come to light, sparking widespread social discontent.⁷⁸ China's development of CTL provides the crude oil China desperately needs, particularly for its transportation sector, which is essential to continued economic growth.

The importance of oil security in sustaining China's growth pattern cannot be underestimated. Gross domestic product (GDP) grew at a rate of 9.8 percent per year from 1985-1995 and is expected to average 6.6 percent per year until 2020.⁷⁹ Along with this impressive economic growth, China's energy consumption has also increased. Total

⁷⁶ Patrick E. Tyler, "Deng Xiaoping: A Political Wizard Who Put China on the Capitalist Road," *The New York Times*, February 19, 1997, accessed November 05, 2017, <http://www.nytimes.com/1997/02/20/world/deng-xiaoping-a-political-wizard-who-put-china-on-the-capitalist-road.html>.

⁷⁷ "The World Bank In China: Overview," World Bank, March 28, 2017, accessed November 05, 2017, <http://www.worldbank.org/en/country/china/overview>.

⁷⁸ William C. Hisao, "The Political Economy of Chinese Health Reform," *Health Economics, Policy and Law* 2 No. 3 (2007): 241.

⁷⁹ World Bank, *China 2020: Development Challenges in the New Century*, Washington, DC, 1997, 21.

primary energy consumption increased from less than 18 quadrillion Btu in 1980 to 37 quadrillion Btu in 1996. It is now projected to reach over 98 quadrillion Btu by 2020, equal to energy consumption levels in the United States.⁸⁰ While most this consumption is still in the form of coal, oil is taking up an increasingly large portion. Indeed, oil consumption is projected to reach 8.8 million barrels per day (mb/d) by 2020, a large increase from 3.5 mb/d in 1996.⁸¹ The CCP must find a way to provide this oil or risk a decrease in economic growth. CTL technology provides a way to meet this growing demand. By transforming China's surplus of coal into valuable oil, CTL helps sustain economic growth and improve energy security without relying on more imports. Although CTL is financially inefficient, it is the only feasible way for China to significantly increase its oil production, therefore lessening its dependence on the global oil market. In more ways than one, the future of China's political and economic stability depends on increasing its oil security. This analysis sheds new light on the importance of the role of CTL in relation to the broader positionality of the Chinese government.

The Chinese government has turned to CTL as a way to ease the tension between its geopolitical desire to increase oil security and to become a global green power. Although contradictory both are essential to ensuring China's socioeconomic stability and global progress. At the same time, China must prove its commitment to environmentalism in order to legitimize the CCP's power on a global scale. Although CTL is not necessarily the most economically efficient or environmentally friendly option, it provides a way for China to reduce its coal use, therefore progressing its goal as

⁸⁰ Erica Strecker Downs, *China's Quest for Energy Security* (RAND, 2000).

⁸¹ Ibid.

a clean energy leader, and provides valuable oil needed to continue economic growth and achieve oil sustainability.

Altering Environmental Impact

China has shown consistent desire to become a green energy leader. Pursuing green leadership not only gives China heightened moral authority on the global stage, it also provides a pathway to increased geopolitical power. CTL technology can help China achieve this by lessening its dependence on coal, despite CTL's various other environmental concerns. China has more to gain from green energy development than any other country in the world. Now, analysts believe the Trump administration's decision to pull out of the Paris Climate Agreement has gifted China an opportunity to improve its economy, quality of life and international position. Paul Haenle, who served on the National Security Council under Barack Obama, went so far as to say that the decision gave China a "geopolitical win".⁸² In president Xi's speech to the 19th Communist Party Congress he promised that China would take a "driving seat in international cooperation to respond to climate change."⁸³ Additionally, China has stipulated in several international agreements its concrete goals to reduce coal use. If it does not fulfill these promises it could pose challenges to China's economy, international reputation, and political legitimacy. CTL provides a way for China to decrease its coal use, producing less direct air pollution, therefore staying in line with international

⁸² Neil Connor, "Top US diplomat in China quits 'over Donald Trump's climate policy'," The Telegraph, June 06, 2017, accessed November 07, 2017, <http://www.telegraph.co.uk/news/2017/06/06/top-us-diplomat-china-quits-donald-trumps-climate-policy/>.

⁸³ Somini Sengupta, "Why China Wants to Lead on Climate, but Clings to Coal (for Now)," The New York Times, November 14, 2017, accessed November 20, 2017, <https://www.nytimes.com/2017/11/14/climate/china-coal.html>.

agreements, while still making use of its large coal reserves and providing a stable energy source for its ever-growing economy. China's desire to become a green energy leader is motivated both internally, by growing health and economic concerns, and externally through China's desire to become a global political force, which can be seen through its participation in international climate agreements.

Despite China's clear desire to become an international green leader its coal consumption habits and heavy pollution pose large barriers to China's ability to play that role. Not only will it have long-term impacts on worker health and economic growth, it also delegitimizes China's desire to become a green hegemon. China's industrial rise has made it the highest emitter of carbon in the world. This has subjected Chinese citizens to significant health risks. In 2012, "PM2.5 particulate pollutants...were linked to 670,000 premature deaths from strokes, lung cancer" and various other pollutant related illnesses.⁸⁴ The declining health of the workforce due to pollutants has also resulted in significant economic impacts. A study done by RAND Cooperation estimated that in 2012 air pollution cost China 535 billion dollars, or 6.5 percent of its GDP, due to losses in labor activity.⁸⁵

Patterns of declining health and personal financial loss have also resulted in increased social discontent. According to the Council on Foreign Relations "between 1995 and 2010, the number of environment-related petition letters increased from 58,678 to

⁸⁴ Yanzhong Huang, "Tackling China's Environmental Health Crisis," Council on Foreign Relations, May 14, 2015, accessed November 07, 2017, <https://www.cfr.org/expert-brief/tackling-chinas-environmental-health-crisis>.

⁸⁵ Keith Crane and Zhimin Mao, "Costs of Selected Policies to Address Air Pollution in China" (Santa Monica, CA: RAND Corporation, 2015), 21.

701,073.”⁸⁶ Increased social discontent carries serious implications for the stability of the CCP. The Chinese government does not see green energy development as a moral responsibility, but rather as a way to mitigate socioeconomic instability and as a new source of economic growth. China has a lot to gain internally from enforcing sustainable energy methods and developing green technology, however the main reason for China’s pursuit of green energy is as a pathway to increased geopolitical power. This can be seen through the Chinese government’s participation in international agreements and rhetoric.

Externally, China desires to use green energy hegemony as a pathway to increased global influence. China has placed itself under considerable global expectations, and not fulfilling these expectations would work to delegitimize China’s grab for geopolitical power. This pressure comes from commitments made in international agreements, and expectations of international media and environmentalists. The Paris Climate Agreement—under which 188 countries committed to limiting climate change—is the most prominent example of China’s internationally proclaimed commitment to mitigating climate change.⁸⁷ China’s intended nationally determined contributions (NDC), created as part of the Paris Climate Agreement state that China will, “control coal consumption” and “expand the use of natural gas” by 2030.⁸⁸ To help achieve this goal China set a national coal cap target of 4.2 billion tons by 2020 as part of

⁸⁶ Yanzhong Huang, "Tackling China's Environmental Health Crisis," Council on Foreign Relations, May 14, 2015, accessed November 07, 2017, <https://www.cfr.org/expert-brief/tackling-chinas-environmental-health-crisis>.

⁸⁷ "The Paris Agreement: Status of ratification," United Nations: Framework Convention on Climate Change, October 12, 2017, accessed November 09, 2017, http://unfccc.int/paris_agreement/items/9485.php.

⁸⁸ People's Republic of China, Department of Climate Change, National Development & Reform Commission of China, *Enhanced Actions on Climate Change: China's Nationally Determined Contributions*, by Su Wei (2015).

its National Energy Development Strategy Action Plan.⁸⁹ This means that provinces and localities that use a lot of coal such as, Beijing, Hebei, and Tianjin all have local coal capping targets and plans. China's push to reduce its carbon emissions is motivated by its need to legitimize itself as a leader on the global stage. Large commitments made in the Paris Agreement reflect China's desire to be considered as a moral and political authority at an international level. The U.S. pull out of the Paris Agreement has not only placed China in a position of heightened authority, it has also increased the pressure for China to fulfill its environmental goals.

China's desire for environmental leadership can also be seen through the rhetoric used by political leaders. In Xi Jinping's address to the 19th Communist Party Congress he used the word "environment" and other related terms 89 times.⁹⁰ Meanwhile, the word "economy" was only used 70 times, dropping from 104 times five years ago.⁹¹ Xi used his speech to reaffirm China's commitments to green energy and environmentalism. Saying that China will continue initiatives to, "do better when it comes to conservation, and develop eco-friendly families, schools, communities and transport services."⁹² Under Xi, the government has placed a high priority on lowering levels of smog and promoting green energy. Xi's commitment to green energy and smog reduction satisfies international pressure for China to become a green leader after the U.S. pullout for the Paris Climate Agreement, and works to further legitimize the Chinese government in the

⁸⁹ "China unveils energy strategy, targets for 2020," China Daily, November 19, 2014, , accessed November 08, 2017, http://usa.chinadaily.com.cn/china/2014-11/19/content_18943912.htm.

⁹⁰ Emma O'Brian and Eric Lam, "Xi's Speech Had 89 Mentions of the 'Environment,' Just 70 of the 'Economy'," Bloomberg.com, October 18, 2017, accessed November 09, 2017, <https://www.bloomberg.com/news/articles/2017-10-18/in-xi-s-vision-for-china-environment-edges-out-economy>.

⁹¹ Ibid.

⁹² Chong Koh Ping, "19th Party Congress: Xi Jinping affirms China's commitment on green development," The Straits Times, October 18, 2017, accessed November 09, 2017, <http://www.straitstimes.com/asia/east-asia/19th-party-congress-xi-jinping-says-china-must-cooperate-with-other-nations-on>.

eyes of the international community. Although CTL is a large emitter of carbon dioxide, it allows China to significantly reduce its coal emissions, a concrete goal China stated in the Paris Climate Agreement. CTL is a manifestation of the CCP's inability to prioritize its energy policy goals. In this way, CTL is not a mistaken tangent of China's energy policy as other theories may suggest, but actually an intentional compromise between two geopolitical goals. China's energy strategy simply cannot be understood without a careful analysis of the many ingrained geopolitical goals of the CCP. Such forces require, in-depth, rigorous and thoughtful study.

V. IMPLICATIONS

The production of CTL technology is not costless. China's investment in CTL has economic, environmental, and political implications for China's future and international image. Economically, CTL has both positive and negative implications. On the one hand, the central government is required to dish out enormous investments for something that has questionable financial profitability and limited returns. Furthermore, putting such enormous pressure on China's coal reserves runs the risk of prematurely depleting those reserves, leading to either energy shortages or increased coal imports from Indonesia and Australia.⁹³ On the other hand, CTL projects can help stimulate economic growth in localities and potentially provide opportunities for those relying on subsistence farming to join China's modern economy.

CTL also has large environmental implications. Not only will CTL production undoubtedly release large amounts of greenhouse gases into the atmosphere it will also

⁹³ Joseph John. Narus, Coal to oil in China: scientific development or crossing the river by feeling the stones? Master's thesis, Portland State University (2010) 117.

contribute to widespread water contamination. The effects of such environmental degradation on the living conditions of those in the margins of CTL projects cannot be underestimated. Developing an industry that increases water consumption by 200 to 500 million tons per year in one of China's most arid regions is a dangerous proposition.⁹⁴ Were China to experience water shortages in the northwest or along the Yellow River, it would cause unrest, migration and an inevitable increase in food and grain imports. Additionally, it is unclear if those who rely on water for irrigation will be treated fairly, or compensated for water lost to CTL development. Although CTL allows China to lessen its coal use, there is no doubt that it will contribute to irreversible environmental damage in other ways.

Investment in CTL and the pursuit of contradictory energy goals also affects China's image as an environmental leader. Beijing is not blind to the fact that its energy policy is under the watchful eyes of the rest of the world.⁹⁵ Local and foreign media have started to erode China's image as an environmental leader, using CTL production as a way to question the validity of China's wider energy policy direction. Although energy analysts tend to focus on China's massive renewable energy expansion and view the nation as a global energy leader,⁹⁶ CTL has worked to create a more controversial opinion. Indeed, reviews of China's CTL use have been all but positive. An article in the *Financial Times* calls China's CTL projects "water-guzzling coal-conversion plants."⁹⁷ A report compiled by Chinese energy experts warned that the "Chinese government and

⁹⁴ Ibid

⁹⁵ Sigfrido Burgos. Caceres and Sophal Ear, *Hungry Dragon: How China's Resource Quest is Reshaping the World* (Place of publication not identified: Routledge, 2015).

⁹⁶ Tim Buckley and Simon Nicholas, "China's Global Renewable Energy Expansion: How the World's Second-Biggest National Economy Is Positioned to Lead the World in Clean-Power Investment," *Institute for Energy Economics and Financial Analysis*, January 2017, accessed April 18, 2018.

⁹⁷ Lucy Hornby, "China's Coal-Conversion Plants Surge Back to Life," *Financial Times*, April 12, 2017, accessed October 29, 2017, <https://www.ft.com/content/02931290-1d94-11e7-a454-ab04428977f9>.

investors should be prudent when developing it [CTL technology]” due to economic and health concerns.⁹⁸ Furthermore, observation of popular social media sites, such as Twitter, reveals widespread criticisms. *Water News Global* tweeted that China’s “Coal-to-liquid conversion plan would worsen #GlobalWarming.”⁹⁹ Another user commented, “Factories that transform coal into liquid fuels may ensure China continues to foul the air and water with pollution.”¹⁰⁰ By using CTL technology China risks losing its image as an environmental leader and therefore any soft power that comes with that.

It is no secret that China wishes to broaden its scope of international influence. In his speech to the 19th Communist Party Congress, Xi remarked that China must succeed in its goal to “become a global leader in terms of composite national strength and international influence.”¹⁰¹ China sees pursuing green hegemony as its best growth option. Not only does it protect the government’s political legitimacy it also provides an opportunity for greater geopolitical power and a new economic growth. China is currently using its greening efforts as a platform on which to base much of its foreign policy and energy diplomacy. However, these efforts conflict with China’s increasing need for oil independence. Contradictory energy policies weaken China’s green energy platform, causing the state to look weak and indecisive. CTL provides a peek into the mind of the CCP, where it is possible to detect wider struggles within the Chinese political inner circle, such as corruption, weak state capacity, and bifurcated policy.

⁹⁸ Yang Kong et al., "EROI Analysis for Direct Coal Liquefaction without and with CCS: The Case of the Shenhua DCL Project in China," *Energies* 8, no. 2 (2015).

⁹⁹ Water News Global, Twitter post, February 23, 2015, 9:15 a.m., <https://twitter.com/WaterTrends/status/569908446130085888>

¹⁰⁰ Dan Ewald, Twitter post, February 27, 2015, 2:55p.m., <https://twitter.com/DanEwald/status/571443493446549504>

¹⁰¹ Xi Jinping, "Secure a Decisive Victory in Building a Moderately Prosperous Society in All Respects and Strive for the Great Success of Socialism with Chinese Characteristics for a New Era" (speech), October 18, 2017, accessed November 20, 2017. 25.

VI. CONCLUSION

This essay has used the evolution of CTL in China as a central point against which to examine the different and contradictory drivers of China's energy policy. This phenomenon could be understood from an institutionalist perspective, by connecting CTL production to corruption and weak state capacity. However, I argue it is not that the Chinese government is unable to pursue its geopolitical desires, but rather that the overriding political motivations behind China's energy policy are split. On the one hand, the CCP desires to become a global green hegemon and environmental technology leader. On the other hand, it is necessary to secure China's oil supply for continued economic growth through becoming oil independent. The confrontation of these two contradicting priorities can be seen manifested in the production of CTL technology. CTL provides a way to appease both of China's objectives without having to choose one over the other.

The interplay between China's two predominant geopolitical goals in the making of energy policy raises real questions about the integrity and future of China's energy policy. As the world's largest energy consumer, and one of the fastest growing economies in the world, China will influence the global energy market and global emissions no matter what decision the government makes.¹⁰² As China's domestic and international circumstances evolve, so will the need for CTL. For example, an oil shock or an escalation in tensions between the U.S. and China could push China to increase the importance of energy security, and by extension the CTL industry. Or, an extended drought that leads to social unrest in Northern China could lead to coal-to-oil

¹⁰² Sarah O. Ladislaw and Jane Nakano. "China-Leader or Laggard on the Path to a Secure, Low-Carbon Energy Future?" *Center for Strategic and International Studies*, September 2011.

development falling out of favor.¹⁰³ How the CCP decides to prioritize its energy policy goals could very well determine the future international reputation of China, as well as the health and stability of its economy. The increasing tension in China's energy sector foreshadows the central challenges that China will face in the coming decade as the demand for a sustainable energy strategy continues to increase.

¹⁰³ Joseph John. Narus, Coal to oil in China: scientific development or crossing the river by feeling the stones? Master's thesis, Portland State University (2010).

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