

Chinese Energy Engagement with Latin America: A Review of Recent Findings

BY IACOB KOCH-WESER*



Introduction

In China and Latin America, the year 2014 saw important developments in the energy sector. The Chinese government concluded back-to-back gas supply agreements with Russia in May and November, in a bid to make natural gas a larger component of China's energy mix. Beijing also inked a historic deal with the United States to jointly reduce carbon emissions, enacted a price-based resource tax on coal, and unveiled a new strategy for energy development through 2020. All the while, China continued to import vast amounts of oil—China has only been a net oil importer since 1993, but this past year became the world's largest net importer, a testament to its economic growth and high energy intensity.

In Latin America, meanwhile, Mexican President Enrique Peña Nieto signed energy reforms into law in August that are likely to boost private and foreign investment in Mexico's oil sector, reversing years of stagnant output. In contrast, Venezuela's oil-dependent economy continued to deteriorate under Hugo Chavez's hand-picked successor Nicolas Maduro. In Brazil, state-owned oil company Petrobras became mired in a corruption scandal and mounted further debts. The reelection of the Workers' Party to a fourth consecutive term raised concerns that Brazil will maintain its tight grip on domestic oil reserves.

These regional events took place in the context of a changing energy market. The price of crude oil fell to a four-year low in late November. Technological advances—particularly in deep-water and horizontal drilling, hydraulic fracturing, and liquefied natural gas distribution—have increased the global energy supply. On the demand side, weak industrial activity in major economies, coupled with improved fuel efficiency, have dampened growth in energy consumption. Also decisive was the Organization of Petroleum Exporting Countries (OPEC), which opted to maintain high output levels in spite of an impending supply glut, possibly to force smaller producers out of the market.

These events illustrate that China's energy engagement in Latin America is just one piece of a bigger puzzle. Oil is a universally traded commodity, and its market is characterized by high-frequency trading and globally integrated pricing. China's energy engagement is shaped by a host of factors, from geopolitics to the domestic energy mix and the individual decisions of oil companies.

While Latin America has reaped the benefits of agricultural and mineral goods exports to China, the bilateral relationship in the energy sector is more nuanced. Latin America does not account for a large share of China's oil and gas imports. However, it does feature in China's energy security strategy, outbound energy investment, and energy-backed lending.

The aim of this paper is to take stock of existing research and inform debates on China's energy engagement in Latin America. It begins with an overview of important research

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FOREWORD

The Inter-American Dialogue is pleased to publish this report by Jacob Koch-Weser, economic and trade policy analyst for the US-China Economic and Security Review Commission and former researcher at Wharton and Harvard business schools. A product of the Dialogue's China and Latin America program, this report is the second in a series of papers examining China's involvement in specific economic sectors in Latin America and the Caribbean (LAC). Having already profiled China's mining interests in LAC, Koch-Weser now provides an in-depth overview of Chinese energy engagement in the region, drawing from existing English, Spanish, Portuguese, and Chinese literature on the topic.

The report finds that LAC is fairly marginal to China's energy security, but factors into China's efforts to "hedge" its energy acquisition strategies and establish a balanced portfolio of suppliers and assets. The literature also indicates that China's national oil companies, though often supported by Chinese finance and other favorable arrangements, operate rather autonomously in Latin America, and according to profit-based motivations. Most specialists concede, moreover, that China is boosting aggregate global supply by investing in fringe producers and selling in the international marketplace, including in Latin America.

Koch-Weser concludes with suggestions for future research, including analysis of China's post-acquisition strategies in LAC and assessment of China's evolving approach to corporate social responsibility in the extractive sector.

The Dialogue's aim in publishing this report, in addition to our China and Latin America working papers, is to inform and engage policy makers, civil society representatives, and academics from China, Latin America, and the United States on evolving themes in China-Latin America relations. By providing up-to-date analysis on central themes in China-LAC relations, we aim to promote constructive engagement in the region's extractive and other sectors.

Our China and Latin America Working Group, of which Koch-Weser is a member, has been a centerpiece of the Dialogue's China-related programmatic efforts since it was launched in 2011. The group is made up of approximately thirty select policy makers, analysts, and scholars from Latin America, China, the United States, Europe, and Australia. Group meetings generate diverse interpretations of the issues driving China-Latin America relations, highlight opportunities for cooperation, and address emerging challenges.

Previous China program papers and reports have dealt with a wide variety of topics including Chinese state-to-state financing in Latin America, China's free trade agreements in the region, energy-based engagement and cooperation, Latin America's role in renminbi internationalization, and the US-China-Latin America "triangular" relationship.

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on China's energy sector, drawing on Western as well as Chinese sources. The paper then chooses a subset of relevant debates, and concludes with suggestions for further research.

1. Summary Findings

The Literature

- * An extensive literature has developed around China's energy policies and challenges, in line with China's emergence as a leading energy producer, consumer, and importer. Some works address technical issues, such as strategic petroleum reserve policy, domestic energy pricing, and transport logistics. Others focus on China's outbound investments and diplomatic relations with energy producing countries.
- * The writing on China in Latin America does not address energy in much depth, and rarely goes beyond studies of Venezuela, the region's primary exporter of oil to China. Studies on China's engagement with specific regions have focused instead on Africa, the Middle East, and Eurasia.
- * Owing to the Chinese government prioritization of energy policy research, there are now numerous energy experts at state-backed think tanks and universities on the mainland, in addition to Chinese scholars who are active at Western research institutions. These experts publish in top-tier English-language journals such as *Energy Policy*, as well as Chinese-language journals sponsored by Tsinghua University, the Ministry of Land and Resources, the Chinese Academy of Social Sciences, and other public entities.

Key Debates

- * *Latin America's relevance to Chinese energy security.* Latin America is rather marginal to China's energy security, supplying less than 10 percent of China's oil and only a fraction of its imported coal and natural gas. However, the region increasingly factors into China's efforts to "hedge" its energy acquisition strategies and establish a balanced portfolio of suppliers and assets.
- * *Transport security.* China is investing in pipelines to offset the risks of seaborne energy shipments that pass through maritime chokepoints. At the same time, China is building a fleet of state-owned oil tankers. There is disagreement about whether these strategies will substantially

improve transport security. Latin America could gain in relevance if shipping routes for super-tankers improve and requisite refinery infrastructure is put in place.

- * *China's effect on the global energy supply.* China boosts aggregate supply in the world market ("positive sum") by investing in fringe producers and selling in the international market, including in Latin America. However, the political instability inherent to many energy-producing countries, coupled with poor coordination among energy consumers in Asia, suggests that "zero-sum" energy competition is still a reality.
- * *State influence over China's energy security.* The Chinese state supports its national oil companies (NOCs) through high-level diplomacy, state-backed lending, implicit subsidies, and other means. And yet, the degree of state support for China's NOCs varies by company and project. While the Chinese government lacks a central energy agency with a well-defined strategy, the NOCs have become more autonomous and market-oriented since undergoing corporate restructuring in the late 1990s. In view of this, the state's greatest influence is domestic in nature—in the form of price controls, taxes and subsidies, and market regulation, particularly with regard to coal-fired power generation.

Suggestions for Future Research

- * *Outbound investment and energy-backed lending.* International oil company (IOC) divestments in Latin America, coupled with new oil and gas auctions in the region, present a unique opportunity to Chinese companies but may also expose them to more competition from other oil companies, such as India's ONGC. The preference of China NOCs for M&A deals in Latin America also raises interesting questions about post-acquisition strategies. China's loosening of restrictions on outbound investment under the new leadership of President Xi Jinping could further alter outbound investment patterns.
- * *Domestic energy policy in China and Latin America.* China's Energy Development Strategy Action Plan for 2014–2020 demonstrates a strong interest in reducing coal consumption, increasing domestic oil and gas production, improving energy efficiency, and increasing the share of renewable energy in the country's energy mix. Other market reforms and an aggressive anti-corruption campaign could loosen the strictures of the state-controlled

energy sector. In Latin America, domestic economic and energy policies—widely divergent across countries—will influence how much energy the region can export to China.

- * *International institutions and the United States.* Greater energy independence could reduce the United States' willingness to deploy its blue-water navy and invest in equity energy assets overseas, while increasing its willingness to export energy and deploy its energy reserves. International coordination among energy producers (e.g., OPEC), consumers (e.g., International Energy Agency members), and carbon emitters (post-Kyoto) will also influence the China-Latin America energy relationship.
- * *Energy development beyond the oil sector.* China's energy firms are looking beyond the oil sector in Latin America. There is much momentum in the fields of hydropower, electricity grid infrastructure, and offshore natural gas. There are also prospects for biofuels and wind power, though these are less certain.
- * *Corporate governance.* China's policy analysts appear divided on how best to approach corporate social responsibility. Exploring China's behavior on a project-by-project basis remains an important task. Such fieldwork in Latin America has been very limited.

2. Overview of the Literature

2.1 China Energy Issues and Latin American Studies

China has become firmly embedded in the Latin American studies literature over the past decade. In 2006, Harvard political scientist Jorge Domínguez produced a formative work for the Inter-American Dialogue that outlines the historical and institutional contexts of Sino-Latin American relations. Multi-author volumes soon followed, including Paz (2008), Jilberto and Hogenboom (2010), and Hearn (2011), and thematic journal editions of the *China Quarterly* (see Armony 2012) and the *Journal of Current Chinese Affairs* (March 2012). R. Evan Ellis (e.g., 2009, 2011, 2013, 2014), research professor of Latin American Studies at the U.S. Army War College Strategic Studies Institute, provides a wealth of empirical detail on individual Chinese investments, and regularly interfaces with officials and corporate actors.

Economists frequently debate the impact of China's commodity demand and manufactures exports on Latin American economies. Rhys Jenkins, a development economist at the University of East Anglia, has consistently returned to this theme (2008, 2012a, 2012b), as have trade economists at the Inter-American Development Bank (Devlin 2006, IDB/ADB 2012), World Bank (Lederman 2009), Organization for Economic Cooperation and Development (OECD) (Santiso 2007), and United Nations Economic Commission on Latin America (ECLAC) (Rosales and Kuwayama 2012). Kevin Gallagher and Roberto Porzecanski conveyed these trade issues to a wider audience in their 2010 book *The Dragon in the Room: China and the Future of Latin American Industrialization*.

Energy figures far less prominently in the literature on China and Latin America. Palacios (2008) and Ellis (2009) describe China's oil investment projects in the 2000s. Book chapters by Corrales (2010), Johnson and Watson (2011), and Paz (2011) analyze China's energy diplomacy toward the regime of the late Hugo Chavez. The only noteworthy fieldwork thus far is by Ruben Gonzalez-Vicente (2013), Assistant Professor at the University of Hong Kong, who compares corporate governance at China's oil projects in Ecuador with its mining projects in Peru. Far more fieldwork has been done on Chinese mining projects in the region (e.g., Gallagher and Irwin 2012, Gonzalez-Vicente 2012, Kotschwar, Moran, and Muir 2012).

A small subset of literature concerns China's energy-backed loans and portfolio investments. Downs (2011a, 2011b) and Gallagher, Irwin, and Koleski (2012) illustrate the variety in China's concessional lending arrangements in Brazil, Venezuela, and Ecuador, drawing comparisons with Chinese lending in other regions and with lending by international financial institutions. This work can be read in conjunction with studies of energy-related portfolio investments by China's sovereign wealth funds (e.g., Liew Leong and He 2012, Koch-Weser and Haacke 2013, and Sun Xiaolei 2014).

In Spanish and Portuguese-language publications, discussion of China tends to focus on the relative benefits of exporting commodities and importing manufactures from China. Discussion of energy issues is difficult to find.¹

¹ Given the lack of centralized academic databases in Latin America, I may have overlooked valuable work.

Martin Alonso Perez Le-Fort, a political risk consultant and former Director of the Asia-Pacific Center at the University of Chile (Le-Fort 2005), and Maria Florencia Rubiolo, an international relations scholar at the Universidad Nacional de Rosario in Argentina (Rubiolo 2010), discuss China's energy security but do not offer much detailed insight into Chinese activities in Latin America. A Spanish-language Inter-American Dialogue report by Genaro Arriagada and Ramón Espinasa (2014) examines the China, Latin America, U.S. energy triangle, looking in some depth at the effects of rising energy production in the United States.

In view of developments on the ground, the general lack of analysis on China-Latin America energy engagement is somewhat surprising. Energy now accounts for the bulk of Chinese investment and lending in Latin America. In a recent industry report, Hong Kong bank HSBC illustrates that Chinese energy activity is spreading across the Southern Hemisphere, and is increasingly shifting toward Brazil, the region's largest energy consumer and site of newfound offshore oil and gas reserves.² Although energy is still less important for Sino-Latin American goods flows, the region's share of China's oil imports rose from 7 percent to 10 percent between 2010 and 2013, an increase second only to Iraq. To make sense of China's energy activities in the Southern Hemisphere, however, it is often necessary to read news reports or shorter opinion pieces, such as Evan Ellis' publications in the *Latin Business Chronicle* and *Manzella Report*.³

² Laidler, Ben et al. *South-South Special: What a Globalizing China Means for LatAm*. (HSBC Global Research, November 2013). http://www.jsjg.utexas.edu/lacp/files/South-South_Special_What_a_Globalizing_China_Means_for_LatAm.pdf.

³ R. Evan Ellis, "Are China's Big Energy Investments in Latin America a Concern?" *The Manzella Report*, November 23, 2013. <http://www.manzellareport.com/index.php/world/781-are-big-chinese-energy-investments-in-latin-america-a-concern>; R. Evan Ellis, "China, Russia, India, and the Venezuelan Petroleum Industry." *Latin Business Chronicle*, December 11, 2013. <http://www.latinbusinesschronicle.com/esp/article.aspx?id=6660>; R. Evan Ellis, "Latin America: Challenges for China Firms." *LatinVex*, June 18, 2014. <http://latinvex.com/app/article.aspx?id=1473>; R. Evan Ellis, *China Fills the Vacuum Left by the United States in Latin America* (Miami: University of Miami Center for Hemispheric Policy, August 4, 2014). https://umshare.miami.edu/web/wda/hemisphericpolicy/Perspectives_on_the_Americas/Ellis%20Final%20Paper.pdf.

2.2 Congressional Hearings: Strategic Perspectives from the United States

United States congressional hearings convene experts from government, academia, and think tanks to assess the implications of China's global energy engagement for the United States. The U.S.-China Economic and Security Review Commission (USCC), a federal agency that reports to Congress on the U.S.-China economic and security relationship, held a August 2008 hearing on China's energy policies; a January 2012 hearing on China's global quest for resources; and a June 2013 hearing on China's growing activities in the Middle East. The House Committee on Foreign Affairs has also organized numerous hearings on energy trade, inspired by the boom in U.S. natural gas production and the shift of energy consumption to Asia (see April 2013 and March 2014). Also of interest are the Committee's hearings on China's threat to maritime security in Asia (October 2013) and inroads into Central Asia (April 2013, May 2014).

Tying this issue to Latin America is the Subcommittee on the Western Hemisphere of the House Committee on Foreign Affairs. The subcommittee has recently conducted two hearings (March 2013 and April 2013) on energy production in the Americas. China was briefly discussed as an emerging importer and direct investor in the region's oil and gas markets. Moreover, Chinese President Hu Jintao's historic Latin America tour in November 2004, and the follow-up visit of Vice-Premier Zeng Qinghong in January 2005, inspired three China-related hearings by the subcommittee during the George W. Bush administration (April 2005, September 2005, June 2008). The 14 testimonies at these three hearings debate whether or not China poses a threat to U.S. interests in Latin America, making frequent reference to China's support for the oil-dependent Chavez regime. During the 113th Congress in March 2014, the subcommittee also held a hearing on U.S. disengagement from Latin America. The hearing witnesses, including Dr. Michael Shifter of the Inter-American Dialogue and Ilan Berman of the American Foreign Policy Council, voiced concern that China's expanding diplomatic and economic reach could affect U.S. interests.

2.3 Specialist Research by Mainland Chinese Scholars

Often underappreciated in the energy policy literature is the contribution of mainland Chinese researchers. They stem from diverse institutions comprising state-run institutes and key laboratories, technical and general universities, and energy corporations. The most prominent research institutes include the Chinese Academy of Sciences’ Institute of Policy Management (CAS-IPM), Tsinghua University’s Energy, Environment, and Economic Research Institute, and the China University of Petroleum—a Soviet-era institution that teaches oil, gas, and petrochemical engineering, and conducts energy policy research through its School of Business Administration (see Tables 1 and 2). The proliferation of energy policy research is a testament to China’s integration into international research communities, and Chinese government investment in energy studies.

There is now fluid interplay between Chinese and Western scholarship. Specialized English-language journals,

particularly *Energy Policy* and *Energy Economics*, publish work by Chinese academics. Co-authorship between Chinese and Western scholars is increasing, and China-educated scholars are working at Western research institutions. At Harvard University, for example, a young generation of China energy scholars includes Guy C.K. Leung (Kennedy School of Government), Xi Lu (School of Engineering and Applied Sciences), and Zhou Yun (Belfer Center for Science and International Affairs). Among the older generation is Zhang Jian, an economist at the World Bank; Wu Kang, a Senior Fellow at the East-West Center in Hawaii; and Bo Kong, Assistant Professor at the University of Oklahoma’s College of International Studies.

Articles by Chinese scholars in English-language energy journals offer a wealth of technical analysis on China’s role in global oil markets, including:

- * Modeling China’s strategic petroleum reserve scenarios (Bai Yang 2012, 2014; Fan Ying, Zhang, and Wei 2009, Fan Ying and Zhang 2010; and Wu Gang 2007, 2012);

Table 1: Energy Experts in China

Name	Institution
General Energy Policy	
Bai Yang	Nanjing Normal University School of Business; Nanjing Aeronautics and Astronautics College of Economics and Management
Chen Shaofeng	Peking University—School of International Studies
Fan Ying	Chinese Academy of Sciences (CAS)—Institute of Policy and Management (IPM), Center for Energy and Environmental Policy Research
Feng Lianyong	China University of Petroleum School of Business and Administration
Lin Boqiang	Xiamen University—China Center for Energy Economics Research (CCEER), Economics School; Minjiang University—New Huadu Business School
Wang Jianliang	University of International Business and Economics Department of Economics
Wu Gang	Chinese Academy of Sciences (CAS) Institute of Policy and Management (IPM), Center for Energy and Environmental Policy Research; Beijing Institute of Technology—Center for Energy and Environmental Policy Research
Zhang Zhongxiang	Fudan University—Center for Energy Economics and Strategy Studies; Chinese Academy of Sciences (CAS) Institute of Policy and Management (IPM)
Energy in Latin America	
Wu Guoping	Chinese Academic of Social Sciences (CASS)—Director of Latin American Economic Research Institute
Sun Hongbo	Chinese Academic of Social Sciences (CASS)—Senior Research Fellow at Institute of Latin American Studies
Wang Yue	China University of Geosciences—Professor; Ministry of Land and Resources Center for Oil and Gas Resource Strategic Research—Researcher
Pan Xiping	China University of Geosciences—Professor
Li Xue	Chinese Academic of Social Sciences (CASS)—Researcher at Institute of World Economics and Politics

- * Studying how oil shocks impact China's economy (Zhang Zhongxiang, Tang, and Wu 2010; Du Limin, He, and Wei 2010; Broadstock, Cao, and Zhang 2012);
- * Suggesting ways to improve the efficiency of China's equity oil investments overseas (Fan Ying and Zhu 2010, Chen Shaofeng 2011); and
- * Studying China's maritime shipping security (Zhang Zhongxiang 2011).

China-based scholars have also looked closely at China's domestic energy needs. Examples include:

- * Projecting future domestic oil production (Hu Yan et al. 2011, Ma Linwei et al. 2012) and future supply and demand (Wang Yanjia, Gu, and Zhang 2011);
- * Studying China's nuclear development (Xu Yichong 2008, 2014; Zhou Yun 2011);
- * Studying trends in coal, gas, and renewable energy (Lin Boqiang 2010a, 2010b, 2012a, 2012b; Wang Jianliang 2013 and Li Junchen et al. 2011).

Energy analysis specific to Latin America can be found in Chinese-language journals as well (see Table 3). The *Journal of Latin American Studies* and *International Forum* convene area studies experts, while China's Ministry of Land and Resources publishes energy-related journals that feature articles on Latin America.⁴ The authors featured here fall into two broad groups: Latin America experts, primarily from the Institute of Latin America Studies at the Chinese Academy of Social Sciences (CASS); and energy experts, primarily at the China University of Geosciences and the Center for Oil and Gas Resource Strategic Research at the Ministry of Land and Resources. Chinese-language articles are qualitatively different from what Chinese scholars publish in English-language journals. They tend to be shorter on empirics and literature reviews, instead prioritizing recommendations for decision makers in government and industry. While less useful to Western academic discourse, these articles provide some insight into Chinese policy thinking.

2.4. Mainstream Energy Scholarship

Energy Activities in Regions other than Latin America

Understanding China's energy engagement in other regions helps to establish context and provide points of comparison.

⁴ The China Academic Journals (CAJ) database is the best resource for locating Chinese-language academic publications. Unfortunately, book-length work in Chinese was not considered for this review.

Africa is an interesting parallel: Although poorer than Latin America, it is also geographically distant from Asia, politically fragmented, and strategically important to China because of its resource wealth. Just as scholars in Latin America have focused on Venezuela, those in Africa have written at length on Angola, China's second-largest source of oil imports, to assess how Chinese equity oil investment and energy-backed lending affect poor, institutionally weak countries. Campos and Vines (2007), Corkin (2008, 2011), Ferreira (2008), and Soares de Oliveira (2008) conducted fieldwork there in the early to mid-2000s. More recently, Tachau (2011), Alessi and Hanson (2012), Pegg (2012), and Hendrix and Noland (2013) have reassessed China's oil activities in Africa, focusing especially on corporate governance.

In China's vicinity, energy issues have a direct bearing on regional security. The late Alexandros Petersen was a noted expert on China's energy infrastructure and extraction activity in Central Asia (see Petersen and Barysch 2011). Keun-Wook Paik, an associate fellow at London-based Chatham House, is known for his studies on Russo-Chinese energy trade in the context of Russia's "Asia pivot" and the complex bilateral relationship between Beijing and Moscow (Paik 2012a, 2012b, 2013). Other analysis was prompted by the recent Russia-China gas deal (e.g., Shadrina and Bradshaw 2013, Skalamera 2014a, 2014b, and Koch-Weser and Murray 2014). The Central Asia region evokes compelling questions about China's relations with Muslim countries. Stephen J. Blank, a Eurasia expert at the U.S. Army War College, has looked at China's energy ties with its western neighbors in the context of civil unrest in Xinjiang Autonomous Region—home to the Uyghur minority—and transnational counter-terrorism initiatives (Blank 2009, Blank and Kim 2013). Hong Zhao (2010), a scholar at the East Asian Research Institute of National University of Singapore, examines the diplomatic tradeoffs that China faces in its growing reliance on oil from Shiite-led Iran.

Scholarship on Asian energy security frequently turns to the security of shipping lanes and territorial disputes at extractive sites. Andrew Erickson (2007, 2010), Associate Professor in the Strategic Research Department at the U.S. Naval War College, considers the merits of pipeline and seaborne energy shipping. Others have focused on competing claims to offshore hydrocarbons in the South and East China Seas (e.g., Owen & Schofield 2012 and Hong Zhao

2014). The Arctic region presents a new frontier of research on China's energy-related territorial claims (Manicom 2011, Bennett 2014, and Klimenko 2014).

Asia is experiencing the fastest growth in global oil and gas consumption. Although China's energy needs are far greater than those of its neighbors, the entire region is affected by the changing rules of the game in the global

oil industry (Li Hong and Lin 2011, Wilson 2012, 2014; Vivoda 2009, 2010, 2011; Goldthau 2012, and Dent 2013). Based on workshops conducted over the course of a decade with stakeholders in East Asia, the Nautilus Institute's David von Hippel, Tim Savage, and colleagues published a series of papers in *Energy Policy* in 2011 to suggest ways

Table 2: Key Energy Research Institutes in China

State-run Institutes and Laboratories	
Beijing	Ministry of Land and Resources Center for Oil and Gas Resource Strategic Research
Beijing	Chinese Academy of Sciences (CAS) <ul style="list-style-type: none"> • Key Laboratory of Regional Sustainable Development Modeling • Institute of Policy and Management • Institute of Geographic Sciences and Natural Resources Research
Beijing	Tsinghua University <ul style="list-style-type: none"> • State Key Laboratory of Power Systems, Department of Thermal Engineering, Tsinghua—BP Clean Energy Center • Institute of Nuclear and New Energy Technology • Institute of Energy, Environment and Economy
Beijing	Beijing Institute of Technology—Center for Energy and Environmental Policy Research
Technical University	
Beijing	Tsinghua University Energy Sciences Dept
Beijing	China University of Petroleum School of Business and Administration
Beijing	China University of Geosciences
Hangzhou	Zhejiang Science and Technology University—School of Economics and Management
Hefei	Hefei University of Science and Technology
Xiamen	Jimei University College of Mechanical Engineering
General University	
Beijing	Peking University—School of International Studies
Beijing	University of International Business and Economics Department of Economics
Xiamen	Xiamen University <ul style="list-style-type: none"> • China Center for Energy Economics Research (CCEER), Economics School • The Wang Yan'an Institute for Studies in Economics
Xiamen	Jimei University College of Mechanical Engineering
Shanghai	Fudan University—Center for Energy Economics and Strategy Studies
Shanghai	Shanghai University of Finance and Economics School of International Business Administration
Nanjing	Nanjing Normal University School of Business
Chengdu	Southwestern University of Finance and Economics, Research Institute of Economics and Management
Corporations	
Beijing	China National Oil and Gas Exploration and Development Corporation
Beijing	Petrochina—Marketing Company

to improve coordination of East Asian energy imports and preempt “zero-sum” rivalries.

Oil Companies and Domestic Energy Policy

There is no shortage of work painting the “big picture” of China’s global resource quest, in terms of its impact on international order, climate change, and global energy supply. In their new book, *By All Means Necessary* (2014), Elizabeth Economy and Michael Levi of the Council on Foreign Relations explain to a popular audience how resource markets work and how Chinese energy companies operate. Barbara Kotschwar and Theodore Moran, economists at the Peterson Institute for International Economics, have developed a theoretical framework to evaluate whether China’s

investments are diversifying or “locking up” global resource supplies (Moran 2010, Kotschwar, Moran, and Muir 2012). Luminaries of China energy policy research include Erica Downs, senior analyst for Asia at Eurasia Group; Philip Andrews-Speed, Principal Fellow at the Energy Studies Institute of the National University of Singapore; Michal Meidan, Associate Fellow at the Chatham House Asia Program; and Oystein Tunsjo, Associate Professor at the Center for Asian Security Studies in Norway.

Central to the energy security literature are China’s state-owned NOCs—China National Petroleum Corporation (CNPC), Sinochem Group, China National Offshore Oil Corporation (CNOOC), and China Petroleum and Chemical Corporation (Sinopec). Bo Kong traces the evolution of

Table 3: Key Policy Journals in China

Area of Focus	Journal Name			
	English	Chinese	Frequency	Description
Mining and Energy	Land and Resources Information Monthly	中国国土资源报	Monthly	Academic journal focusing on mining and energy. Published by the Ministry of Land and Resources.
	Natural Resource Economics of China	中国国土资源经济	Monthly	Academic journal focusing on mining and energy. Published by the Ministry of Land and Resources.
	China Mining Magazine	中国矿业	Monthly	Academic journal focusing on mining and energy. Published by the Ministry of Land and Resources and sponsored by the China Mining Association.
	China Petrochemicals	中国石化	Bi-weekly	Industry magazine sponsored by Sinopec, one of China’s three national oil companies.
	Sino-Global Energy	中外能源	Monthly	Academic journal focusing on energy. Sponsored by the China Energy Research Society (CERS).
	China Electric Power	中国电力	Monthly	Academic journal focusing on China’s utility sector. Sponsored by Chinese Society for Electrical Engineering.
	Energy of China	中国能源	Monthly	Academic journal focusing on Chinese energy policy. Published by Energy Bureau of the National Development and Reform Commission.
Regional and International Studies	International Forum	国际论坛	Bi-monthly	International studies journal published by the Center for International Studies at Beijing Foreign Studies University.
	Journal of Latin American Studies	拉丁美洲研究	Bi-monthly	Regional studies journal published the Latin American Studies Bureau of the Chinese Academy of Social Sciences.

NOCs since 1990s and under the aegis of China's "Going Global" outbound investment strategy (Kong Bo 2010). Downs, coauthoring with Meidan (Downs and Meidan 2011), analyzes the reshuffling of China's oil executives by the Chinese Communist Party (CCP) in 2011. In general, scholars ask whether the NOCs are acting at the behest of China's authoritarian leadership, or operating autonomously as profit-seeking enterprises (see Andrews-Speed and Ma 2006, Lin Kunchin 2008, Liou Chih-Shian 2009, Andrews-Speed and Dannreuther 2010, Wolfe and Tessman 2012). These works challenge the notion of China's top-down oil diplomacy suggested elsewhere (e.g. Zweig and Bi 2005, Lai 2007).

A parallel field of scholarship concerns China's domestic energy policies. Writing for the *Harvard Environmental Law Review*, for example, Alex L. Wang scrutinizes the energy-efficiency mandates introduced into China's cadre evaluation system during the 2006–2010 11th Five-Year planning period (Wang 2013). Economists at Deutsche Bank (including Ma Jun, now lead researcher at China's central bank), have explored the economic potential of China's shift to a low-carbon economy.⁵ Analyses of China's domestic utility sector are also useful to understanding the domestic pricing issues that come back to influence electricity demand (Edwards 2012, Betz 2013). Andrews-Speed (2013, 2014) has begun to direct his attention toward the wind and solar industries, as have scholars at the World Resources Institute (e.g., Barua, Tawney, and Weischer 2012). Among the new generation of U.S. experts on Chinese clean energy are Edward Cunningham of Boston University, Joanna Lewis of Georgetown University, and Melanie Hart at the Center for American Progress.⁶

⁵ Mark Fulton, *12th Five Year Plan—Chinese Leadership towards a Low Carbon Economy* (Beijing: Deutsche Bank, April 2011). https://www.db.com/cr/en/docs/China_12th_Five_Year_Plan.pdf; Ma Jun, Michael Tong, and Audrey Shi. "Big Bang Measures to Fight Air Pollution." *Deutsche Bank China Strategy Special Report* (Beijing: Deutsche Bank, February 2013). <http://www.zadek.net/wp-content/uploads/2013/07/China-big-bang-measures-to-fight-air-pollution.pdf>.

⁶ For a list of their respective publications, See Lewis faculty page (<http://explore.georgetown.edu/people/jil9/?Action=ViewPublications>) and Cunningham's CV (<http://www.bu.edu/earth/files/2014/04/Cunningham-Edward-CV-Mar14.pdf>).

3. Relevant Debates

3.1 Latin America's Role in China's Energy Security: Framing the Debate

Latin America is often portrayed as a vital commodity exporter to China, but this refers more to agriculture and mining than energy. Brazil and Argentina are among the world's top-three soybean producers, while Brazil, Peru, and Chile are among the leading suppliers of iron ore and nonferrous metals. At least in terms of goods exports, the relative importance of energy is less pronounced:

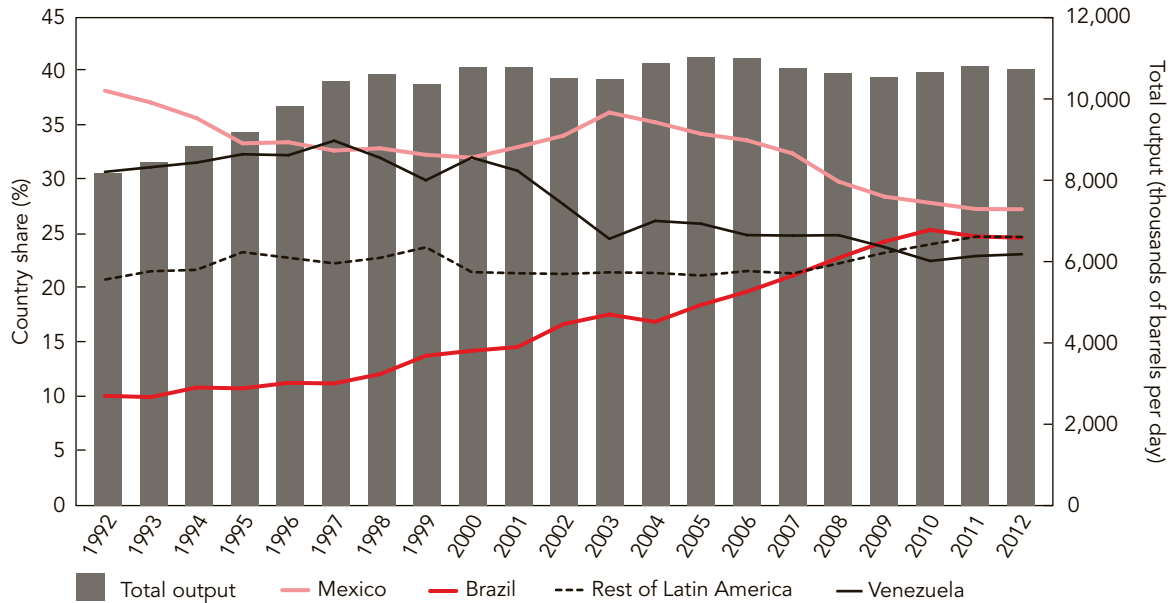
* *Latin America's current supply of energy to China is predominately oil.* China became a net importer of gas in 2006. In addition to pipeline gas from Eurasia, China is receiving maritime shipments of liquefied natural gas (LNG). For the time being, though, LNG shipments stem mainly from the Asian market (Australia and Indonesia) and the Middle East (led by Qatar). China became a net importer of coal in 2008, and in certain months over the past few years has been the world's largest coal importer. But the main suppliers of coal to China are located in North America and Asia.

* *Latin America is not a major supplier of oil to China* (see Appendix Table 1). According to China's own customs data, the region's share of China's crude oil imports has increased gradually, from 7 percent in 2008 to 10 percent in 2013, but is less than Angola (14 percent), let alone the Middle East, responsible for about half of China's imports. Among the 12 members of the Organization of Petroleum Exporting Countries (OPEC), only two—Venezuela and Ecuador—are located in Latin America (compared to four in Africa and six in the Middle East).

With respect to Latin America's energy production, some important features also stand out:

* *Latin America could, in the future, enhance its profile in global energy markets.* Venezuela ranks first in the world in terms of proven reserves (see Appendix Table 2). Offshore oil discoveries in 2007 suggest that Brazil could one day surpass Venezuela in proven reserves. Latin America holds a larger share of world reserves than production; the inverse of China, which is rapidly depleting its domestic reserve base.

* *However, Latin America is struggling to maintain an adequate level of oil output.* Venezuela, once Latin America's leading

Figure 1. Oil Production in Latin America

Source: U.S. Energy Information Administration.

oil producer, has seen its share of global oil output and exports decline precipitously in the 21st century. Brazil, a non-OPEC member, has achieved significant production gains, and by 2012 surpassed Venezuela in terms of output (see Figure 1). And yet, owing to mismanagement, Brazil's oil production and exports have been flagging in recent years as well (see Appendix Figures 1 and 2). A third candidate for major production gains is Mexico, but as with Venezuela, output has been declining.

- * *In energy trade, Latin America is more dependent on China than the other way around.* Data from the U.S. Energy Information Administration (EIA) demonstrate that China is a top-3 export destination for Venezuelan and Brazilian crude, even though these countries only account for a small percentage of China's imports. Although Brazil exports less to China than Venezuela does in volume terms, it is in fact more dependent than Venezuela on the Chinese market (see Figure 2).
- * *Global oil prices have increased over the past decade, but China's imports from Latin America appear a relative bargain.* During the past two decades, China's rising imports have contributed to an increase in world oil prices above \$100 per barrel, causing some to proclaim the end of the "low-cost oil" era. Even the recent oil slump has not returned

prices to previous levels. In the context of high prices, Chinese customs data suggests that China is paying less per barrel of Latin American oil than it does for oil from many other parts of the world (see Appendix Table 1). This is particularly the case for imports from Venezuela.⁷ The China-Latin America relationship will also be shaped by trends in Chinese supply and demand:

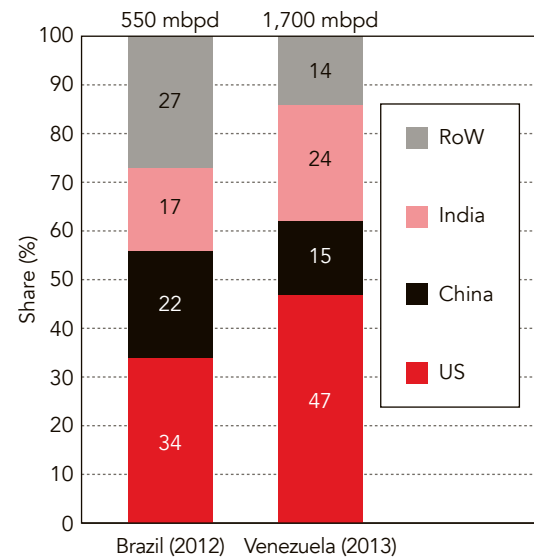
- * *China is now the largest net oil importer and could soon be its preeminent consumer.* In September 2013, China surpassed the United States to become the top net oil importer (domestic production minus domestic consumption). China in 2012 accounted for a greater share of global oil consumption (11.1 percent) than all of Central and South America combined (7.8 percent) (see Appendix Table 3). The EIA predicts that China's oil consumption will surpass that of the United States by 2040 (see Appendix Table 4).
- * *Growth and energy intensity are the principal drivers of China's energy demand.* China's GDP growth rates are slowing, but still lead the world's major economies by a large

⁷ Note that Chinese customs data, as measured in tons, differs somewhat from other statistics on China's oil imports. Nonetheless, it provides a useful point of reference.

margin. Intensity of energy use per unit of GDP is among the world's highest, in spite of efficiency gains since the 1990s (see Figure 3). The country's urbanization rate, per capita income, per capita energy use, and vehicle use per 1,000 residents are all well below developed economy standards. All this suggests that China will continue to drive global energy consumption growth.

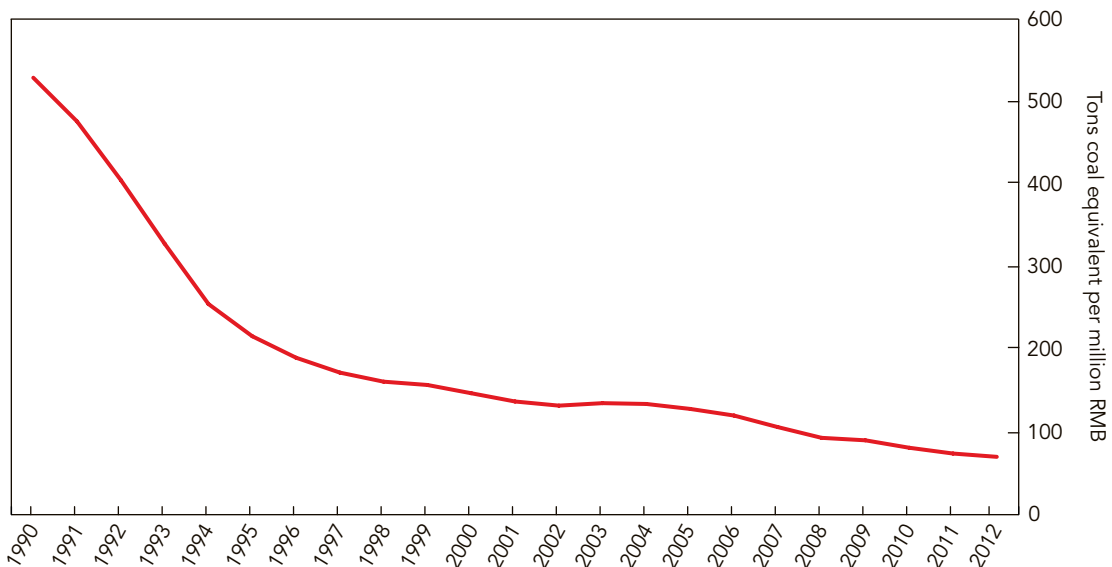
* *Domestic oil and coal supplies afford China a measure of energy security.* China ranks fourth in global oil production, and has sustained output at a high level. Despite depleting reserves, the EIA predicts that China can continue to raise domestic oil output through 2040, albeit incrementally (see Appendix Table 5). Although its oil self-sufficiency is below 50 percent, China is less import-reliant than India, Japan, and Korea (see Table 4). Moreover, while the share of oil, gas, and coal in the U.S. energy mix are comparable in size, in China, oil trails coal by a long margin. China's reliance on coal for electricity generation is extreme by international standards, even as the government begins to integrate other energy sources, such as nuclear, gas, hydro, and wind (see Figure 4).

Figure 2. Brazil's and Venezuela's Crude Oil Exports to China



Source: U.S. Energy Information Administration (Brazil and Venezuela Country Profile).

Figure 3. China's Energy Use per Unit GDP



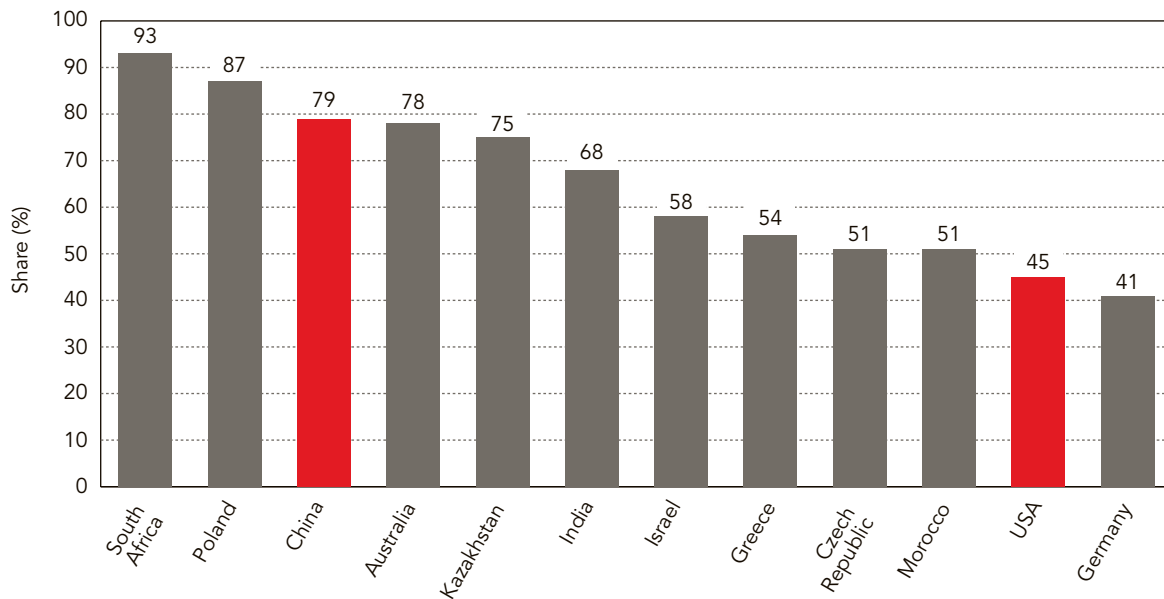
Source: China National Bureau of Statistics, via CEIC.

Table 4: Net Import Reliance among World’s Top Oil Consumers, 2012

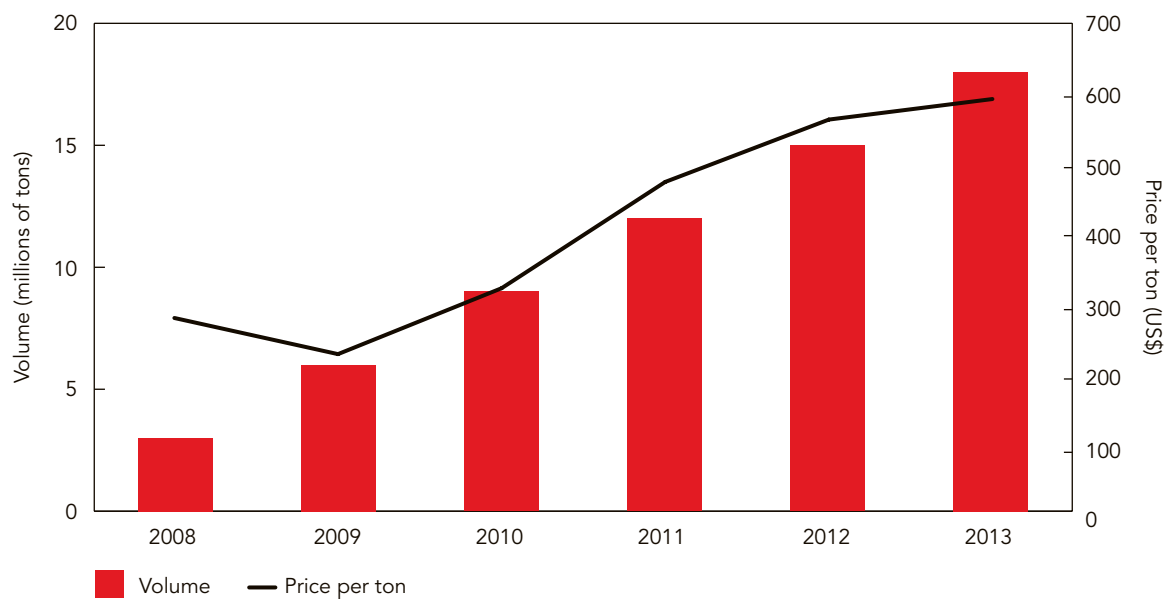
Rank	Country	Consumption	Supply	Net import reliance
1	United States	18,490	11,119	-39.9%
2	China	9,875	4,372	-55.7%
3	Japan	4,695	136	-97.1%
4	India	3,450	990	-71.3%
5	Russia	3,195	10,397	225.4%
6	Brazil	2,997	2,652	-11.5%
7	Saudi Arabia	2,861	11,726	309.8%
8	Germany	2,389	160	-93.3%
9	Canada	2,351	3,856	64.1%
10	Korea, South	2,322	61	-97.4%
11	Mexico	2,086	2,936	40.8%
12	Iran	1,790	3,518	96.5%
13	France	1,772	72	-95.9%
14	Indonesia	1,610	989	-38.6%
15	United Kingdom	1,528	1,009	-34.0%

Source: U.S. Energy Information Administration.

Figure 4. Use of Coal in Electricity Generation, 2012



Source: World Coal Association.

Figure 5. China's Liquefied Natural Gas Imports

Source: China General Administration of Customs, via CEIC.

* *Looking ahead, gas will be an important component of China's energy trade.* Gas accounts for some 5 percent of China's energy mix but China is already the leading gas consumer in Asia and imports about 30 percent of the gas it consumes. Purchases of LNG on the Asian spot market have become more expensive every year, forcing China to seek alternative sources (see Figure 5). China holds the world's most abundant shale gas reserves, providing a potential source of future supply.

Though not a top energy supplier to China, Latin America is strategically relevant to China's energy security in other ways, including:

- * *Transport security.* Shipping energy to China across the Pacific could provide an alternative to other transport routes that are unsafe or costly.
- * *Equity production.* Latin America could provide China with greater control over—and involvement in—the production of energy than it might obtain elsewhere.
- * *Supply diversity.* Latin America can expand China's supply base and reduce its dependence on a select number of large suppliers.
- * *Increasing aggregate global supply.* By investing in or incentivizing production in Latin America, China could increase the global aggregate supply of energy.

3.2 China's Energy Transport Security

As virtually every article on Chinese energy security makes clear, the bulk of China's oil imports pass through maritime chokepoints, the most vital being the Strait of Hormuz (for Saudi, Iraqi, and Iranian oil) and the Strait of Malacca (for all oil from the Middle East and Africa). Chinese analysts fear that maritime bottlenecks could easily be closed by terrorism, piracy, or a foreign navy in a wartime scenario (Erickson and Collins 2007). So far, natural gas imports are less subject to chokepoints—nearly half of China's natural gas is imported via pipeline from Eurasia, and a large share of LNG is sourced from Australia and Indonesia. However, Qatar and other Gulf states are rapidly increasing gas output, as are states along Africa's eastern coastline (Koch-Weser and Murray 2014). In view of China's transport concerns, Latin American oil and LNG shipped across the Pacific could help China to counteract supply disruptions elsewhere.

Of course, the sheer distance from Latin America to China makes shipping energy costly. Latin American exporters and Chinese importers will always favor more proximate markets (Corrales 2010). It takes just four days for Venezuelan oil to reach the Gulf coast of the United States, versus 20 days to reach southeast China, implying

that shipping the same amount of oil at the same rate would require five times as many tankers.⁸ However, improvements in logistics could make oil shipments from Latin America to China far more economical:

- * Super-tankers offer the most cost-efficient means to ship oil to China but are too wide for the Panama Canal. Venezuela and Colombia have been eager to build a pipeline from Venezuela to Colombia's Pacific Coast, thereby circumventing the Canal. If realized, it would cut transport time in half. But the project has been on hold since 2008, due to a combination of China's reluctance to commit the necessary financing and the uneasy relationship between Caracas and Bogota (Ellis 2009, Corrales 2010).⁹
- * *Barring a pipeline, other means are being considered to improve super-tanker shipping lanes.* One is a canal through Nicaragua, apparently financed by a Hong Kong-based firm, with articulated support in some form from China Development Bank (CDB). Curious developments in the preliminary stages, however, have raised doubts about the feasibility of this capital-intensive and logistically complex project.¹⁰
- * Improving refinery infrastructure would be useful as well. Venezuela's heavy crude oil is more costly to refine than conventional light crude. Over half of PdVSA's (Petróleos de Venezuela S.A.) refineries are located outside Venezuela, in the Caribbean and around the Gulf of

Mexico. Only a small fraction of China's current refineries are equipped to deal with heavy crude. One new refinery is being built in China's Guangdong province to handle heavy crude from Venezuela—a 60–40 joint venture between CNPC and PdVSA due to be completed in 2017.¹¹

- * China can improve refinery capacity in Latin America and thereby reduce the weight of its energy shipments from the region, a key factor to consider given that freight shipping costs place Latin America at a disadvantage vis-à-vis China's more proximate markets. Chinese refineries are being constructed in Costa Rica and Venezuela.¹² However, China's overseas refinery development is a fairly recent phenomenon. China's NOCs lack experience in this area, and the strategy may be frowned upon by industrial policymakers in China, who prefer domestic refinery construction that adds value to the local economy (Andrews-Speed and Ma 2013).

3.3 China's Influence over International Oil Supply

The "Positive Sum" Aspects of Equity Oil

Compared with its Asian neighbors, China has made impressive progress in securing equity oil overseas. With 550,000 barrels per day (bpd) in 2005, the equity oil acquired by Chinese NOCs was less than Japan's 700,000 bpd, but higher than South Korea's and India's (Chen Shaofeng 2011). A 2012 report from the International Energy Agency (IEA) asserts that CNPC (42 percent share), Sinopec (30 percent), and CNOOC (20 percent) produced a significant amount of their oil overseas. Roughly one-third of their combined 5.8 million bpd in output originated abroad (since many of the overseas projects involve joint

⁸ U.S. Congress. House Committee on International Relations. Subcommittee on the Western Hemisphere. *Challenge or Opportunity? China's Role in Latin America*, testimony of Robert Shapiro. 109th Cong, 1st sess., September 20, 2005. Washington: U.S. GPO.

⁹ U.S. Congress. House Committee on International Relations. Subcommittee on the Western Hemisphere. *Challenge or Opportunity? China's Role in Latin America*, testimony of Stephen Johnson. 109th Cong, 1st sess., September 20, 2005. Washington: U.S. GPO.

¹⁰ Ellis noted in July 2014: "Those who I spoke to also offered interesting insights on Nicaragua, almost universally agreeing that the Nicaraguan canal is a "crazy" project that will never be built. One suggested that the businessman leading the project, Wang Jing, is simply playing to Nicaraguan dreams. Yet over \$100 million of someone's money has already been spent on the project, and as noted previously, the Nicaraguan government declared in early July that it had selected the route and would begin construction in December. For many in the U.S. and Latin America, how Wang Jing expects to make money from the deal is among the great mysteries of the orient. R. Evan Ellis, "China's Advance in Latin America Has More Challenges than Xi's Visit Suggests," *The Manzanilla Report*, July 18, 2014. <http://www.manzillareport.com/index.php/world/876-china-s-advance-in-latin-america-has-more-challenges-than-xi-s-visit-suggests>.

¹¹ With a capacity 400,000 bpd, the refinery would be able to China's current imports from Venezuela. The plan is to establish an "upgrader" to process heavy crude into a lighter blend in Venezuela, and then to ship this blend to the joint venture refinery in China for further processing (Downs 2011b). China seems willing to make such investments to increase oil shipments. However, China's imports could eventually outstrip this capacity. PdVSA may be asked to co-invest billions in new refineries. But unlike Middle Eastern oil producers, Caracas does not have much capital to offer China (Corrales 2010).

¹² HSBC, *South-South Special: What a Globalizing China Means for LatAm* (November 2013), pp.16-18.

ventures, China's equity share is somewhat lower).¹³ In its 2013 annual report, CNPC, the largest NOC, states that it raised its overseas equity oil and gas output by 12.3 percent in 2012–2013. Its overseas production in Latin America that year was 263,000 bpd—roughly the same amount as it

produced in Sudan, though well behind its output in Iraq (814,000 bpd) and Kazakhstan (600,000 bpd).¹⁴

According to Palacios (2008), Latin America plays a minor role in China's energy imports, but is a leading destination for Chinese equity investment in the energy sector. In Chinese-language publications, analysts frequently point

¹³ International Energy Agency, *Oil and Gas Security: Emergency Response of IEA Countries: People's Republic of China* (International Energy Agency, 2012).

¹⁴ Reuters, "China's CNPC Foreign Equity Oil, Gas Output Up 12.9 Percent in 2013," January 17, 2014.

Table 5: Refineries in China: New and Upgraded (foreign joint ventures in red)

Company owner	Location	Capacity (1,000 bpd)	Start date	Notes
Sinopec	Yangzi	160,000	2014 Q2	Construction; Net refining addition of 90,000 bpd after removing 70,000 bpd from service
	Caofeidian/Tianjin	240,000	2015	Construction; Plans to process crude oil from Saudi Arabia
	Guangdong/Zhanjiang	300,000	2015 Q4	Construction; Developing with Kuwait Petroleum (30%) and TOTAL (20%)
	Zhenhai/Zhejiang	350,000	2016	Expansion; Construction
	Hainan	100,000	2015	Environmental approval received February 2013
	Luoyang	160,000	2016	Expansion
CNPC	Pengzhou	200,000	2013 Q4	Trial operations
	Urumqi	120,000	2014 Q1	Construction; Doubles the existing capacity to 240,000 bpd
	Huabei	100,000	2015	Expansion; Construction
	Anning/Yunnan	200,000	2016	Construction; Plans to process oil from Saudi Arabia and Kuwait via the crude oil pipeline from Myanmar; JV with Saudi Aramco (39%) and local company (10%)
	Guangdong/Jieyang	400,000	2017	Construction; JV with PDVSA (40%)
	Karamay	100,000	2017	Expansion; Processes bitumen
	Chongqing	200,000	2017	Receive oil from China-Myanmar pipeline
	Jiangsu/ Taizhou	400,000	2017	NDRC approval; Environmental approval pending; JV with Qatar and Shell
	Lanzhou Lianhua	200,000	2017	N/A
	Tianjin	320,000	2020	Planning; FID expected in 2017; JV with Rosneft (49%)
Shangqiu/Henan	200,000	2020	N/A	
CNOOC	Ningbo Daxie/Zhejiang	140,000	2014 Q4	Construction
	Huizhou	200,000	2015 Q4	Expansion; Construction
Sinochem	Quanzhou	241,000	2013 Q4	Trial operations
	Ningbo	240,000	2020	Pending approval
	TOTAL CAPACITY	4,571,000		
	FOREIGN JV SHARE	35%		

Source: EIA China country report (last updated February 2014).

out that China's involvement in the Latin American energy sector dates back to the 1990s. Indeed, Latin America was the site of the first major overseas venture by a Chinese NOC: CNPC landed a small exploration project in Peru in 1994, paving the way for its first major oil concession in Venezuela in 1997. According to Liu Qiang (2005), this gives the region special meaning as a beachhead for China's NOCs venturing abroad. A study of China's cumulative outbound investments in the oil sector from 1992 to 2009 demonstrates that Latin America comprised 7 percent of project value over that period, but 14 percent of total projects—suggesting that the region primarily accommodated smaller projects (Kong Bo 2010).

China's equity oil investment in Latin America has accelerated in the wake of the U.S. shale boom and the 2007–2008 global financial crisis. Agreements in 2010 between PdVSA and China's NOCs Sinopec and CNPC intensified China's efforts to explore the new deposits in the Orinoco Belt, benefitting from the then Chavez regime's renewed willingness to cede some control over national assets.¹⁵ A November 2013 report by the Hong Kong bank HSBC lists thirteen large acquisitions between 2006 and 2013, totaling at least \$49 bn (see Appendix Table 6).¹⁶ They comprised equity stakes divested by Western oil companies (Galp, Repsol, Occidental, Total), equity stakes in Latin American national oil companies (Bridas, Petrobras, Encana), and direct acquisitions of oil fields (Statoil, Libra). China's NOCs all purchased roughly equal amounts of assets.

Media reports frequently portray China as “hunting” for resources across the globe to feed its voracious demand, in the process “locking up” supplies through either long-term supply contracts or direct control over production. This may misrepresent the facts. Chen Shaofeng (2011) claims that 93 percent of the NOCs' foreign production in 2005, and “at least two-thirds” in 2006, was sold in international

markets. As little as 4.5 percent of the 88,000 bpd China produced in Ecuador in 2006 was shipped home (Downs 2006). The oil that China procures from Venezuela is mostly traded in Singapore to third markets, with actual shipments often ending up in the United States, where PdVSA owns refinery infrastructure (Corrales 2010).

Several reasons have been put forward to explain the reluctance of China's oil companies to ship equity production home. Chinese refineries may be ill-equipped to process the oil grade produced locally, for example. This is especially the case for Venezuelan crude. China's NOCs may also worry about the safety of transportation over long distances. As Chinese oil companies become more profit-oriented, they have come to favor selling equity production locally and using the proceeds to acquire crude closer to home.

Another reason to question the “locking up” theory is that China's equity oil production can increase aggregate global oil supply. In a study of 13 oil procurement arrangements by China in Latin America, Kotschwar, Moran, and Muir (2012) conclude that most of China's investments have been in “fringe” producers rather than established firms, increasing output where other oil companies are not.

Optimists argue it will only be a matter of time before China's energy strategists place less emphasis on equity production for their home market. According to Dent (2013), China and its East Asian neighbors will begin to afford greater priority to multilateral energy cooperation as energy security interdependencies deepen and they develop a shared interest in exerting leverage over influential suppliers. In China's immediate periphery, the cost of geopolitical conflict potentially outweighs the benefit of small amounts of offshore hydrocarbons (Owen and Schofield 2011). Betz (2013) claims energy policymakers in China are now questioning whether the equity oil investment strategy is a good idea to begin with, given that the associated costs may be higher than for contract oil and may expose NOCs to substantial risks, such as expropriation, labor unrest, and damages to China's international reputation. The case of Sudan is often cited in this context.¹⁷ China may also be realizing that in times of crisis like the Arab Spring, maintaining

¹⁵ The bilateral energy accords signed on April 17, 2010 include not only the framework agreement for the latest EBL but also another MOU between PdVSA and CNPC for the creation of a joint venture company to develop the Junin-4 block in the Orinoco Belt, which the two companies finalized on December 1, 2010. PdVSA and CNPC plan to develop the block over a twenty-five year period. Production is expected to begin at 50,000 bpd in 2012 and reach the design capacity of 400,000 bpd in 2016, although industry experts have expressed some skepticism that those deadlines will be met. The investment required is estimated at \$16.23 billion. CNPC will also pay a \$900 million bonus in eight disbursements (Downs 2011).

¹⁶ HSBC, *South-South Special: What a Globalizing China Means for LatAm* (November 2013), pp.16–18.

¹⁷ For a business case study on this topic, see Regina Abrami and Eunice Ajambo, “China in Africa: The Case of Sudan.” (Cambridge, Ma: Harvard Business School, July 2008).

aggregate supply is more important than outright ownership of energy assets.

These views are echoed to some extent by policy thinkers in China. Fan Ying, Zhang, and Ji (2013) of the Chinese Academy of Social Sciences state:

Because the secure transportation of energy, effective supply and stable energy market are conducive to the common interest of both energy consumers and exporters, so China should strengthen cooperation with oil producers and engage in energy dialogue with other oil importers under [a] global framework to ... avoid energy conflicts and vicious competitions among regions. ... China should also set up energy cooperation with other importers which could involve ... joint investment in overseas projects and reducing zero-sum pursuit of equity oil deals around the globe.

An op-ed in China's *Land and Resources Information Monthly* (2005) recommends that China's NOCs jointly create one or two specialized trading companies, akin to what Western oil majors have established. According to this logic, equity production contributes to China's energy security indirectly—by making capital available that NOCs can use to improve energy security elsewhere. Liu Qiang (2005) recommends that China's NOCs ship Latin American equity oil back to China only in the event of severe shortages.

China's Energy-Backed Loans

Proponents of the “locking up” theory often contend that China uses energy-backed loans to secure long-term oil contracts. Such loans make use of China's multitrillion-dollar foreign exchange reserves, a byproduct of China's trade surplus and strict capital and currency controls. China Eximbank and China International Fund first issued energy-backed loans to Angola in the mid-2000s. These totaled some \$14 bn, and were based on “real guarantees” of oil shipments (Corkin 2008, Ferreira 2008). Beginning in 2006, CDB disbursed nine energy-backed loans to Eurasian and Latin American states, worth approximately \$85 bn. Just over half of this total value went to Latin America via five loans, agreed upon in a brief period between 2008 and 2010. The bulk has gone to Venezuela, as indicated in the Inter-American Dialogue's China-Latin America Finance Database.

According to careful research by Gallagher, Irwin, and Koleski (2012), however, the relationship between China's

EBLs and energy security is more complex than meets the eye:

- * *China's EBLs rarely “lock in” oil prices.* If market prices rise so that the barrel becomes worth more than at the time the loan was signed, then the borrowing country can amortize the loan at a faster rate with fewer barrels shipped, or it can maintain the original payment schedule and keep the additional income earned from each barrel. China has also granted its borrowers flexibility regarding repayment methods: if the borrowing country commits to exporting five times as much to China as it needs to for the loan, then China's policy bank will only deduct its portion plus interest from the fund.

- * *China's EBLs are not “soft.”* CDB does lend at below the cost curve for bonds in the secondary market, thus serving as a suitable alternative to less credible borrowers like Venezuela. Still, the interest rate is high enough for CDB to turn a moderate profit. China Exim Bank makes loans on a more concessional basis, though with considerable variation.

- * *Oil does not necessarily act as collateral for loans.* If borrowers refuse to pay, CDB does not have the legal right—or indeed, physical capacity—to seize the oil collateral, as a bank would seize the house or other assets of a bankrupt borrower. CDB instead resorts to other means to reduce risk. First of all, most of the borrowed capital never leaves China—Chinese companies operate the oilfields overseas to pay themselves back. In practice, this means that the NOCs deposit payments for oil shipments in the borrowing country's special account that is used for repaying the Chinese creditor.

Downs (2011b) concludes that the Chinese government's degree of involvement in negotiating EBLs varies from case to case. Brazil and Russia are illustrative:

- * In Russia, the EBL negotiations were closely monitored by China's senior leaders and the Foreign Ministry, since the counterparty was not only an important source of pipeline-based oil and gas supply to China, but also a regional power and fellow member of the Shanghai Cooperation Organization (SCO), adding an important geopolitical dimension.

- * In Brazil, by contrast, the EBL grew out of CDB's efforts to develop business abroad. CDB simply dispatched a work team to Brazil that eventually negotiated two sets of loans

in 2006 and 2009. CDB and Brazil's oil major Petrobras led the negotiations, with only subsequent involvement by the two countries' governments.

The Geopolitics of Energy Acquisition

Although the notion of China “locking up” global energy resources is somewhat exaggerated, strategic competition for finite resources remains a reality of the global energy market. Fan Ying, Zhang, and Ji (2013) note that, although China has been somewhat successful at diversifying away from its largest suppliers in recent years (e.g., top-3 concentration of imports decreased from 48 percent to 40 percent in 2008–2013), this success has been offset by other factors, including the increase in overall import dependence; the small number of large suppliers; and increasing economic risks as equity oil investment grows, such as the dollar exchange rate and volatility of the oil price that influence the stability of costs associated with a purchase.

Realist views are evident among some Chinese energy experts, who express concern about China's excessive dependence on the Middle East and Africa (Zhong Shi 2005, Sun Hongbo 2011). Liu Qiang (2005), for example, promotes Latin America as the key to China's oil diversification strategy, even if the cost and quality of the oil from the region are unfavorable compared to the Middle East. In reference to Venezuela, Su Wen and Yu Zhengwei (2010) state:

In [China's] current situation of an import dependency ratio of 54 percent and rising, we should take steps to further strengthen our economic and cultural ties with Venezuela, and step up our support for state-owned and private firms [from China] to invest there, in order to incorporate Venezuela's oil and gas projects into the strategic ambit of the national “Going Global” strategy, to obtain international resource inputs for our nation's stability and sustainable development.

Several regional studies illustrate that China's ability to purchase large quantities of oil from Africa, Eurasia, and the Middle East is also the result of geopolitical contingencies. The September 11 terrorist attacks and subsequent U.S. invasion of Iraq presented a historic opportunity to China. Conservative voices in Riyadh, seeking more autonomy from U.S. influence, placed pressure on the government to diversify oil exports to Asia. As a result, Saudi Arabia has not only supplied China with oil shipments, but also established a broader foundation for bilateral cooperation, including co-financing of new refinery capacity in China.

The fall of Saddam Hussein, in turn, presented China's NOCs with a rare opportunity to acquire oil assets in a major oil producing country (Downs 2011a). The U.S. invasion of Afghanistan also provided China needed security in Central Asia (e.g., against terrorist insurgents) as it constructed costly pipelines from Turkmenistan and Kazakhstan into western China (Blank and Kim 2013).

Predating September 11, the end of the Cold War also reconfigured the energy landscape. In Central Asia, China capitalized on former Soviet republics' interest in becoming less dependent on Russia (Petersen and Barysh 2011). In Africa, the end of the Angolan Civil War—once a surrogate battleground for Washington and Moscow—opened new possibilities for foreign oil companies after 2002. China deployed major resources to help rebuild the war-ravaged country in exchange for access to low-cost oil (Campos and Vines 2007).

Political contingencies aside, skeptics also point to the fact that higher oil prices will modify the behavior of energy producers and consumers. Already, the rising oil prices of the past decade have increased resource nationalism among energy producers. In 2006, the Chavez regime “renationalized” oil production. Four years later, Brazil's parliament suspended the second round of pre-salt bidding and decided to accord Petrobras a mandatory stake of at least 30 percent in all pre-salt fields.

Competition for scarce resources could magnify as well if large reserve-holders under-invest in output—often as a result of resource nationalism. At the 2005 and 2008 U.S. Congressional hearings on China in Latin America, several speakers voiced concern that China has entered Latin America's oil sector at a time when aggregate output in the region is declining.¹⁸ Even with added foreign investment, Venezuela's state oil company PdVSA may not be able to increase output significantly, given its poor management and excessive control over new oilfields in the Orinoco Belt.

¹⁸ U.S. Congress. House Committee on International Relations. Subcommittee on the Western Hemisphere. *China's Influence in the Western Hemisphere*, testimony of June Teufel-Dryer. 109th Cong, 1st sess., April 6, 2005. Washington: U.S. GPO; U.S. Congress. House Committee on International Relations. Subcommittee on the Western Hemisphere. Challenge or Opportunity? China's Role in Latin America, testimony of Gal Luft. 109th Cong, 1st sess., September 20, 2005. Washington: U.S. GPO; U.S. Congress. House Committee on International Relations. Subcommittee on the Western Hemisphere. *The New Challenge: China in the Western Hemisphere*, testimony of R. Evan Ellis. 110th Cong, 2nd sess., June 11, 2008. Washington: U.S. GPO.

As a result, it may not meet the oil shipment targets set out in its EBLs with China (Johnson and Watson 2011). Ellis (2009) foresees a scenario in which Venezuela must either divert oil from the United States, its main export destination, or break its commitments with China. Although contract shipments to China currently provide less revenue per barrel than sales on the open market, Caracas may decide to honor its commitments to Beijing to retain access to Chinese capital.

Coordination and Competition among Asian Oil Consumers

Higher energy prices can also alter the equation for rival energy consumers. Japan, Korea, and India have begun setting their own targets for equity oil production and are competing aggressively for overseas deals. Chinese policy analysts are well aware of this; noting, for example, the operations of India's ONGC in Venezuela, Mexico, and Colombia, and its partnerships with PdVSA and Petrobras (Sun Hongbo 2011, Jin Yan and Sun 2010, Sun Hongbo 2009). In 2013, ONGC joined Shell to preempt Sinochem's purchase of a 35 percent stake in Brazil's offshore oil field BC-10.¹⁹ Competition for resources is increasing in Eurasia as well. Through aggressive energy diplomacy, China has secured long-term production sharing contracts with Turkmenistan and Kazakhstan, tapping into oil and gas fields that India, Japan, and Korea would like to access (Kim and Indeo 2013, Paik 2012).

In the wake of the 1970s oil embargoes, advanced economies began to take measures to prevent future supply disruptions. This included building strategic petroleum reserves (SPRs) and creating the IEA to coordinate emergency oil sharing arrangements. China has been slow to take similar actions. It only began the process of setting up an SPR when it became a net importer of petroleum products in 1993. After a decade of protracted debate, the Chinese government officially approved the establishment of a national SPR in 2003, to be constructed in three phases over 15 years. Phase I was completed in 2004–2009, covering about 13 days of China's oil consumption and 30 days of crude oil imports. The goal is to complete Phases II and

III by 2020, at which time the reserve is to be equivalent to 100 days of oil imports (Savage and Shin 2011).

A successful SPR in China could help to mitigate oil supply shocks. However, the way in which China built up its SPR has been criticized by the country's energy experts. Many of the reserves installed in phase I were in above-surface tanks rather than sub-surface caverns; above-surface tanks are easier to build but are more dangerous and expensive to maintain (Wu Gang et al. 2012). Fan Ying, Zhang, and Wei (2009) criticize China's plan to reach its full SPR stockpile by 2020 as too conservative—the SPR should be completed sooner, in order to reach the IEA's recommended level of 90 days' worth of oil imports during China's period of high growth in net oil imports.

How can China establish SPRs in a cost-effective manner? Bai Yang (2012, 2014) and his colleagues model different stockpiling scenarios through 2020. They find that the key challenges include balancing the costs of foregoing oil sales with building reserves, and knowing at which point to draw down reserves to dampen prices. Taking oil off the market and placing it in reserves can drive up oil prices, and this “endogenous price increase” can raise stockpiling costs. Wu Gang et al. (2012) simulate three “emergency scenarios”—a sudden natural disaster, a financial crisis, and a local armed conflict—arguing that a substantial drawdown of stockpiles will do more to lower oil prices in an armed conflict than in a financial crisis, since prices in the latter scenario are determined by factors other than supply and demand.

China and emerging countries like India have yet to join the IEA, in part because the organization is linked to OECD membership, which necessitates a requisite level of per capita income and democratic governance. Failure to establish an oil sharing mechanism between emerging and advanced economies means a considerable gap in energy governance (Lieberthal and Herberg 2006). An important meeting did take place in June 2008, however, during which energy officials from China and India agreed to cooperate with IEA members the United States, Japan, and South Korea to stockpile reserves for concerted actions at times of supply disruption. The three IEA members pledged to help China and India to establish oil stockpile systems (Savage and Shin 2011). Savage and Shin envision other forms of cooperation, including:

* *An Asian energy agency.* This option would create a new regional organization and concentrate on building

¹⁹ HSBC, South-South Special: What a Globalizing China Means for LatAm (November 2013), pp.16–18.

regional stocks. Japan has proposed to establish an Asian IEA after China and India set up their national stockpiling plans.

- * *A joint oil stockpile facility to ASEAN.* South Korea and Japan proposed this in 2003. In such a scheme, each country would carry its own stocks, while a “joint-company” stockpile could be created, owned by a few governments, with options or tickets sold to others. ASEAN apparently disagreed, mentioning the enormous financial investment required.
- * *Mutual leasing of spare storage capacity during an interim period.* As China and India build up stockpiles, Japan and Korea could lease spare storage capacity to China and other countries.

However, Savage and Shin recognize the obstacles to such cooperation in Asia, a region where major powers are traditional military and current economic rivals, and joint stockpile participants have “potentially diverging geopolitical interests.” Wilson (2013, 2014) contends that, rather than cooperation, China, Japan, and Korea are engaging in “competitive policy emulation.” They are each adopting “mercantilist resource security strategies” to counteract one another on a range of fronts, from the negotiation of free trade agreements with resource suppliers to sovereignty disputes in hydrocarbon-rich territories in their maritime peripheries.

3.4 Energy Companies and the Chinese State

The Impact of Market Reform on China's Energy Companies

How do China's state-owned energy companies benefit from state support? To what extent does the state control their actions? China's energy sector has certainly undergone extensive reform. The country's three NOCs—China National Offshore Oil Corp. (CNOOC), China National Petroleum Corp (CNPC), Sinopec, and Sinochem—were restructured in the late 1990s, a consequence of oil price shocks, as well as the broader market reform agenda of then-Premier Zhu Rongji ahead of China's accession to the World Trade Organization (WTO). While Sinopec retained the bulk of the country's refineries, CNPC dominated onshore extraction, and CNOOC offshore extraction, vertical integration and exposure to competition has since made these firms more mutually competitive and

market-oriented. Downs and Meidan (2011) argue that the creation of the State-Owned Asset Supervision and Administration Commission (SASAC) in 2003 reinforced this trend by setting new performance metrics based on revenue growth and profitability. At the same time, the NOCs have become less prone to obeying government directives; for example, in terms of shouldering the costs of the strategic stockpiling that began in 2004 (Liou Chih-Shian 2009).

The reform of oil companies was also one facet of broader corporate reform in China's energy sector. China's utility monopoly State Grid Corp. was split off from the country's utility regulator in 1996, and six years later, the government divided up the assets of this monopoly into five large power generation companies and two independent grid operators (Edwards 2012).

Several studies illustrate how market-oriented NOCs and other energy-related companies have become. NOCs lobby the government to pursue outbound investment because downstream refining operations are subject to price controls in China and are therefore much less profitable. New upstream assets are available mainly in international markets, due to the depleted reserve base in China (Downs and Meidan 2011). China's NOCs, in conjunction with local officials, are also playing up fears that non-state actors or foreign navies could interdict oil shipments to China, as a pretext to build refineries and pipelines that create jobs and add value to the local economy (Erickson and Collins 2010). In addition, the establishment of a state-owned tanker fleet is a vested interest for shipyards and steel mills that sustain thousands of jobs as a result of such projects (Tunsjo 2013).

Several Chinese energy experts argue that Chinese firms can be genuinely competitive, even without state backing. China's NOCs employ scores of well-qualified and low-cost engineers, who have gathered experience operating oilfields in China's challenging geological conditions (Su Wen and Yu 2010). Commenting on Sinopec's purchase of a 30 percent stake in the Brazilian subsidiary of Portugal's Galp in 2011, Zhang E (2011) argues that China's NOCs have the capital and technical capacity to buy up assets from IOCs and then develop them with additional capital infusions. Although Sinopec spent over \$3 bn to acquire the actual assets of Galp in Brazil, it budgeted another \$1.7 bn for exploration and production, which will contribute to Sinopec's

ambitious production targets set out under China's 12th Five-Year Plan (2011–15).

NOCs also invest overseas to enhance their competitiveness in emerging service segments of the oil industry. In Latin America, China's NOCs have landed various service and procurement deals. For example, they have secured projects with Brazil's Petrobras and Venezuela's PdVSA via technical cooperation agreements (Downs 2011b). China's sovereign loans often include procurement clauses for services by Chinese contracting firms (Gallagher, Irwin, and Koleski 2012).²⁰ In the case of Venezuela, votes in the bilateral Joint Investment Fund (JIF) are proportional to fund contribution: as the larger contributor to the Fund, China has used its majority vote to allocate procurement projects to Chinese bidders (Ellis 2009). CDB's \$10 bn energy-backed loan to Brazil also involved \$3 bn of oil equipment procurement from China (Downs 2011b).

Sun Hongbo (2009, 2011) suggests that technical services will grow in importance as China's latest oilfield acquisitions in Latin America mature. He recommends that future EBLs include more services and equipment procurement clauses, in order to capitalize on Latin American dependence on imported equipment.

If policy debate in China is any indication, China's energy policymakers are becoming warier of the risks of operating in oil-rich countries with poor governance. Fan Ying and Zhu (2010) argue that China equity oil investment has reached an important turning point, at which a careful evaluation of existing investment strategies is in order. They posit that the gains accrued from low production costs may be offset by other costs (such as onerous tax regimes) and the transaction costs of operating in countries that rank poorly in the World Bank "Ease of Doing Business" report, such as Nigeria and Sudan in Africa and Iran and Syria in the Middle East. China, they argue, should focus on lower-risk countries like Mexico, Canada, and Australia.

With respect to Latin America, several Chinese analysts express concern regarding environmental, labor, and indigenous movements, as well as armed militants, which have disrupted oil projects in the Andean region (Hou Ruining and Peng Qing 2009, Pan Xiping et al. 2011). Despite China's political history, there is little sympathy in China for the actions of Leftist governments against foreign investors.

²⁰ In 2010, about 40 percent of the \$26 bn in buyers' credits issued by the China Export-Import Bank went to overseas construction projects and contracts, and a further 6 percent to equipment purchases.

Zhong Shi (2005), for example, criticizes the Chavez coup of 2002.

To offset risks in host countries, Sun Hongbo (2011) recommends that China:

- * *Allow existing projects to mature before launching new ones.* After a period of aggressive expansion—owing in particular to the pre-salt oil discovery in Brazil and the global financial crisis—the task for China's NOCs is now to develop existing projects and partnerships.
- * *Improve the capabilities of Chinese firms and agencies.* NOCs should bring in more than capital to develop their Latin American assets. Capable engineers are needed, along with experts who understand local markets, legislative frameworks, and politics. Particular attention needs to be devoted to labor and indigenous movements that influence political decisions.
- * *Improve communication among Chinese stakeholders.* China's NOCs should exchange information with one another and with the Chinese government in order to anticipate and coordinate responses to policy changes in foreign countries.
- * *Engage with local stakeholders.* China's NOCs should engage with a broad range of stakeholders, including civil society, oil firms, and opposition political parties, in order to hedge against political contingencies. China's NOCs should learn from the case of Syria, where Sinopec's efforts to improve relations with the country's resource ministry eventually paid dividends.

Energy Diplomacy

Although China's NOCs are increasingly market-oriented, they remain very different from Western oil companies. Due to a legacy of state ownership, for example, CNPC and Sinopec each have a surplus workforce that is difficult to downsize for bureaucratic and socio-economic reasons. The silo-like organizational structures within the NOCs themselves result in intra-company competition; for instance, between drilling and prospecting teams stationed at different regional subsidiaries. Overseas projects serve as an expedient means to mitigate these tensions by generating additional work for NOC personnel (Kong Bo 2010).

Furthermore, China's NOCs may not be competing on a level playing field because they are supported by the state. Common forms of state support are low interest loans from state-owned financial institutions and, by virtue of being majority state-owned, less pressure to turn a profit or pay

out dividends to shareholders (Palacios 2008). As latecomers in a mature market, where the most prized assets are already owned by Western firms, Chinese companies have been willing to take on risks and accept less immediate pay-offs, a strategy made viable by Beijing's support.²¹

Consequently, China's NOCs have been willing to operate in authoritarian countries that Western oil majors try to avoid. For example, China has helped Cuba develop its offshore oil deposits, which are off-limits to U.S. oil companies due to the ongoing U.S. sanctions against Havana.²² In his study of China-Iran relations in the wake of the U.S. embargo, Hong Zhao (2014) finds that China has opted to secure oil in Iran despite U.S. embargoes, undermining its image as a "responsible power." In his analysis of Chinese energy investment in Ecuador, Gonzalez-Vicente (2013) sees a link between China's "noninterventionist" diplomacy and the accommodative response of China's NOCs to abrupt changes in local policy. He writes

It was precisely in the midst of oil companies' widespread hostility toward the new resource policies [in Ecuador under President Correa] that Andes Petroleum became the second company to accept the terms set by Correa's government... Andes Petroleum Company Ltd. is a consortium of the two largest Chinese oil companies, CNPC and Sinopec... Sinopec and CNPC have undergone a formidable evolution in the last 30 years... Yet as former ministries, and despite having acquired remarkable autonomy in foreign ventures, CNPC and Sinopec have important links between their international activities and China's diplomatic endeavors.

While China lacks a central agency to coordinate energy policy, certain actors are more influential than others:

- * Downs and Meidan (2011) illustrate how the CCP is an influential power broker alongside the State Council. The CCP's Organization Department, for instance, uses senior personnel appointments to control SOEs. In 2011, it "reshuffled" the chairmen of the three NOCs.
- * Lieberthal and Herberg (2006) suggest that China's three NOCs fulfill different functions. CNOOC is the most technically capable and market-oriented, and prefers to operate in more competitive but politically safe markets.

CNPC, on the other hand, remains closest to the central government, and is preferred for projects in countries that are less safe and have a closer diplomatic relationship with Beijing, such as Kazakhstan, Venezuela, and Angola. There is also an important distinction between the publicly listed subsidiaries of the three NOCs and their less market-driven parent companies.

- * Among several central government agencies that deal with energy, The National Development and Reform Commission (NDRC) is the *primus inter pares*. The NDRC sets China's energy prices and electricity tariffs; approves domestic capital investments; signs off on the largest outbound investment deals (along with the Ministry of Commerce); and devises long-term energy security strategies, including decisions on the deployment of military forces to protect energy assets. Other energy-related bodies, such as the State Electricity Regulatory Commission and the National Energy Administration, report to the NDRC (Downs 2004). As Xu Yichong (2008) shows in her study of the nuclear sector, the NDRC was able to trump the interests of the domestic nuclear industry by insisting on the procurement of foreign over indigenous technology, placing China's energy independence above industry interests.

While it is easy to see how energy interests can shape diplomacy, in China's case, the causality can also run the other way. China's energy-related overtures toward post-Soviet states in Central Asia are partly aimed at preserving the political stability of these countries to prevent terrorism, reduce Russia's influence, and ensure support for China's policies toward the Muslim Uyghur minority in Xinjiang Autonomous Region (Blank 2010, Blank and Kim 2013). China's energy engagement in Latin America is also informed by a geostrategic calculus. Chinese policy writing on Latin America suggests some wariness about entering the U.S. "backyard," for example. Jin Yan and Sun Hongbo (2010) do not rule out a diversion of the region's oil from the United States to China but are concerned about the consequences:

If Venezuela is unable to fulfill its export contracts to China and the United States, political factors and Venezuela's reliance on Chinese companies and capital could lead it to guarantee exports to China first. As a result, Sino-Latin American energy cooperation should thoroughly assess the adverse

²¹ For business literature perspectives on China's outward direct investment, see Peter J. Buckley et al. "The Determinants of Chinese Outward Foreign Direct Investment." *Journal of International Business Studies* 38:4 (2007): 499–518.

²² Testimony of Teufel-Dryer 2005.

impact of the commercial competition, geopolitical relations, and military activities of the United States in the region.

According to Pan Xiping (2011):

The United States views Latin America as its own energy 'backyard,' so that all of the Americas are within its strategic energy sphere of influence... It takes at most seven days for oil from anywhere in Latin America to reach the United States, versus five weeks from the Middle East. So no matter how you look at it, it is strategic for the United States. Even though Latin American countries independently seek to diversify their relations, none of them are able to escape U.S. influence.

Policy Distortions in Domestic Energy Markets

While the state can influence the way in which China acquires energy overseas, its role is in fact more trenchant in the domestic energy market. In China's high-growth economy, the need for additional energy is taken for granted. But how might policy interventions and market forces alter the rate and composition of energy demand growth?

In a market economy such as the United States, a supply shortage tends to raise the cost of energy—for electricity, liquid fuel, and heating—and impact economic growth. This can happen through several channels, from elevated inflation rates and production costs to market uncertainty and a deteriorating balance of payments. In China's transitional economy, however, these principles do not neatly apply. Zhang Zhongxiang, Tang, and Wu (2010) and Du Limin, He, and Wei (2010) find it puzzling that, during a period when oil prices and China's dependence on oil both increased substantially, China's economy still expanded rapidly and at high rates of energy intensity. Cong Ronggang et al. (2008) also find that oil price shocks do not have a statistically significant impact on the real returns of Chinese stock market indices. Does that suggest that China is less vulnerable to oil shocks than other economies?

Zhang Zhongxiang, Tang, and Wu (2010) conclude that the answer lies in China's system of energy price controls:

* The Chinese government has controlled prices for raw materials upstream and end-users downstream in order to stabilize input costs for producers and strengthen China's comparative advantage in international trade. However, this system has begun to break down as the market price and import share of raw materials increases, translating into heavy losses for resource companies subject to price controls.

- * The government has undertaken price reforms to remedy this situation, but downstream prices (esp. for gasoline) have not been sufficiently liberalized, thereby immunizing consumer price inflation from oil shocks.
- * Higher oil prices do exert a negative effect on China's economy in the long run. In free market economies, producers react to oil price shocks by reducing capacity utilization and passing on costs to consumers, who are forced to economize their consumption. In China, however, consumers immune to world oil prices have little incentive to economize their energy use. On the contrary, Chinese manufacturers have utilized their comparative advantage in energy-intensive industries (e.g., China is the world's leading steel, aluminum, and petrochemical producer).
- * Foregoing investment in additional capacity is more damaging to China's developing economy than it is to mature economies, where existing infrastructure is better. Worse yet, resource companies may incur debts in the process of subsidizing downstream prices. So far, China has had the necessary liquidity to offer fiscal subsidies and bank loans to offset the losses. But this system will be difficult to sustain as economic growth slows and the financial sector is liberalized.

Owing to its indigenous supplies of coal, China would appear to have an energy security blanket that counteracts its vulnerability to oil imports. In future, greater use of electricity-powered modes of transport—such as electric vehicles and mass transit—could also allow China to reduce its dependence on oil imports in favor of an autarkic power supply (Betz 2013). However, supply and demand dynamics in China's coal-heavy utility sector are no less complex than in the oil market. Edwards (2012), Ma Chunbo (2008), and Betz (2013) trace China's checkered history of utility sector price reform:

- * In the 1980s, China created a two-tier system of partial deregulation: Coal producers were forced to sell a certain quota of their output at fixed prices, but could sell at market rates beyond the quota; old power plants sold electricity at command prices, while new plants were allowed to set their own tariffs. This system spurred additional private investment, but as the market boomed, the rift between “in-plan” and “out-plan” production became unsustainable.
- * An overhaul in 1996 eliminated the two-tier system in favor of uniform tariffs, but these were not well-adjusted

to regional energy mixes and did not provide sufficient incentives to coal producers.

- * In 2004, the government introduced a radical new formula, whereby wholesale power prices would co-move with the six-month average floating price of coal on the open market. It also divided power prices into retail and wholesale segments, subject to different tariff-setting rules, and variable taxes and fees at the provincial level. This system remains in place today. However, price liberalization, combined with rising demand, caused an exponential rise in coal prices in the mid to late 2000s, in excess of what government planners had expected. This should have resulted in an automatic increase in the wholesale electricity price, but the NDRC, reserving the right to make price adjustments, refrained from doing so.²³ The electricity industry thus incurred massive losses that caused a lack of investment in more power generation. The “Big-5” power generation companies, meanwhile, used their influence to force coal companies to sell below market, making coal miners hesitant to fulfill contracts.

Going forward, the Chinese government will continue to play a decisive role in determining how China uses its energy. In a bid to improve energy security, as well as mitigate the effects of air pollution and climate change, the 11th and 12th Five-Year Plans lay out ambitious policies to reduce energy intensity in buildings, factories, and vehicles, and for the first time include clear mandates for energy and carbon intensity reductions. Alex L. Wang (2013) finds substantial actions to shut down outdated facilities and production lines under 11th Five-Year Plan, arguing that this was accomplished via environmental performance metrics in the Communist Party cadre evaluation system rather than environmental laws.

A principal problem that China faces is that its renewable energy resources have not been well-integrated into the national electricity grid. China’s much-vaunted growth in wind turbine installed capacity has not translated into much power generation, as grid operators lack incentives to take on intermittent wind supplies and many large-scale wind farms were built far from population centers, necessitating

investments in costly transmission infrastructure (Andrews-Speed, Zhang, and Zhao 2013, Lewis, Wang and Qin 2012). Ma Jinlong (2011) finds that on-grid electricity tariffs for hydropower are too low to encourage costly new hydropower projects. Severe droughts are already affecting the operation of hydropower plants on a seasonal basis.

4. Opportunities for Further Research

4.1. Outbound Investment and Energy-Backed Lending

Brazil’s oil discoveries and Mexico’s oil sector reforms, coupled with the willingness of IOCs to divest assets and form partnerships with emerging market producers, provide a window of opportunity for China’s NOCs in Latin America. However, given the fierce competition for energy assets in the region, it remains to be seen whether China’s NOCs will abandon aggressive oil diplomacy in higher-risk countries such as Angola and Kazakhstan in favor of markets like Mexico and Brazil. Although outbound investment in Latin America so far is quite evenly spread among China’s NOCs, a clearer division of labor could emerge, whereby CNPC is trusted with projects in politically unstable countries where there is less competition, and the other NOCs focus on stable markets where there is greater competition. A potential wild card is Sinochem, the peripheral player among China’s state-owned energy companies, which has concentrated much of its outbound investment in Latin America.

The recent indirect acquisition of oil assets from Western IOCs also raises new questions about China’s corporate governance practices. Will the subsidiaries that China’s NOCs have acquired from Western IOCs continue to do business as usual? Will they sell more oil to China, or focus on international markets? How well does China manage the transaction costs of integrating management and bridging cultural differences?

With respect to monetary and outbound investment policy, China’s new leadership is adopting measures that could change the nature of outbound investment and energy-backed lending. The expanded use of the yuan currency for trade invoicing could influence future decisions about where to sell. While yuan internationalization is necessarily constrained by China’s currency and capital controls, the government has moved ahead with initiatives such as

²³ If the average price increased by 5 percent or more, then the wholesale price of electricity would absorb 70 percent of the increase followed by increases in the retail price for consumers. Therefore, power producers absorbed 30 percent of the increase in coal prices

currency swaps and offshore yuan trading at designated financial centers. Beijing and Moscow, for example, may invoice their long-term offtake agreements in yuan and rubles, in order to circumvent the “petrodollar.”

To be sure, China’s foreign exchange reserves continue to mount, and the government keeps lowering the floodgates for outbound investment. In other respects, though, credit policy appears to be tightening. The July 2013 decision to remove restrictions on lending rates, and a recent move to introduce deposit insurance, suggests that China’s central bank is getting more serious about financial market reform, which could in the future reduce the preferential credit available to state-owned entities. China’s sovereign wealth fund CIC, once an aggressive investor in energy assets, is now scaling back its activities under new management. Since Chen Yuan stepped down as head of the policy bank CDB amid the CCP’s leadership transition, the bank appears less prone to issue multi-billion dollar loans to enterprises and foreign governments.

4.2 Domestic Energy Policy in China and Latin America

The prolonged global recession and low energy prices have a mixed effect on China’s energy policy. Low energy prices improve China’s balance of payments, relieve inflationary pressure, and reduce government spending on energy subsidies. They also provide a window of opportunity to introduce higher taxes on fossil fuels and remove price controls. However, low prices can also encourage “business as usual”—consumers feel less compelled to economize energy use, while producers lack the capital to invest in capacity and technology.

The State Council’s newly released Energy Development Strategy Action Plan (2014–2020) indicates that, on paper at least, China’s policymakers are making constructive decisions. The document sets the stage for the 13th Five-Year Plan (2016–2020) due out in 2015. It outlines five strategic tasks for China’s energy development:

- (1) *Achieve greater energy independence.* The government will promote clean and efficient use of coal, increase domestic oil production, and develop renewable energy. The document sets specific targets for oil and gas output to be achieved by 2020. It plans to develop new and existing oilfields in nine regions where it has large proven reserves, which will

intensify offshore oil and onshore shale gas exploration. China appears open to co-developing these sites with foreign corporations.

- (2) *Cutting coal use in favor of other energy sources.* The plan calls specifically for non-fossil fuels to reach 15 percent (currently 9.8 percent) and natural gas 10 percent (currently 5 percent) of China’s energy mix by 2020, in conjunction with a reduction of coal to 62 percent of the energy mix. The plan also allows for nuclear plants to be built along the coast “at a suitable time” while studying the feasibility of inland nuclear plants.
- (3) *Curb excessive energy consumption and implement energy-efficiency programs.* In this context, the plan calls specifically for reducing coal consumption in the Pearl River delta, Yangtze delta, and the Beijing-Tianjin-Hebei-Shandong nexus, which presumably would reduce both their total energy consumption and also diversify into other energy sources.
- (4) *Pursue international solutions.* Expand international cooperation in energy, establish regional markets and participate in global energy governance.
- (5) *Improve technology.* Promote innovation in energy-related technology, comprising exploration technologies for oil and gas as well as clean and renewables sources like wind and nuclear.²⁴

In conjunction with long-term energy plans, China’s new leadership is cracking down on corruption and increasing the role of market forces in the energy sector, which could break up the “fiefdom” of the big-three NOCs and open up China’s upstream energy sector to greater competition. These changes could spill over into the overseas operations of Chinese energy companies. Synergies are emerging, whereby Chinese companies invest in advanced economies, and Western oil majors seek to partner with Chinese companies in East Asia.

In Latin America, domestic economic and energy policies will affect the relationship with China as well. Brazil’s policy of subsidizing domestic gasoline has done grievous damage

²⁴ Xinhua, “An Analysis of the Three Main Points in the Energy Development Strategy Action Plan (2014–2020) [Jiedu ‘Nengyuan fazhan zhanlue xingdong jihua (2014–2020)],” November 20, 2014. http://news.xinhuanet.com/energy/2014-11/20/c_127231672.htm; Angela Meng and Bloomberg, “More Nuclear Plants and Renewable Energy under New Development Plan,” *South China Morning Post*, November 19, 2014. <http://www.scmp.com/news/china/article/1643831/more-nuclear-plants-and-renewable-energy-under-new-development-plan>.

to Petrobras's balance sheet, which is already strained by legislation requiring the state-owned company to co-develop the pre-salt oil and gas fields. Recent revelations that Petrobras received bribes from construction companies in Brazil have further damaged the reputation of the Rousseff government in the eyes of investors and the general public. In her second term, the Brazilian president may reduce the role of the state in setting prices and determining ownership rules in the energy sector; the nomination of Joaquim Levy, a "Chicago school" economist, as finance minister suggests as much.

More broadly, future research could consider how much oil and gas Latin American countries can actually export, in light of domestic economic growth, energy intensity, and downstream price controls. Reversing declines in regional energy production may require policies more amenable to foreign investment, akin to those pursued by Mexico, Colombia, and Peru. However, the strategic and symbolic value of patrimony over domestic resources makes this a sensitive issue.

4.3 International Institutions and the United States

International energy governance could influence the China-Latin America relationship in the coming years as well. Important variables include:

- * *Shifts in OPEC strategy.* OPEC, accounting for some two-fifths of global output, remains a force to be reckoned with in oil markets. As U.S. demand growth declines, the organization's attention will shift toward Asia, especially China and India. China might benefit from its positive diplomatic relationship with the largest OPEC member Saudi Arabia. For Latin America, it is worth asking whether Venezuela will ever regain importance within OPEC, and whether Brazil or Mexico might eventually join the group.
- * *Expanded membership in the IEA.* The IEA has the potential to mediate disputes over scarce energy supplies by convening the key consumers at one table. China has not joined the organization—nor, for that matter, have the largest energy consumers in Latin America.
- * *International efforts to reduce carbon emissions.* Since the Kyoto Protocol, no binding agreement has been reached to reduce carbon emissions. China has made minor concessions, such as creating carbon intensity targets, piloting carbon trading platforms, improving information on

domestic emissions levels, and most recently, a vague commitment with the United States to cap emissions by 2030. In a next phase, an international climate deal, an international carbon trading platform, and/or aggressive carbon taxation would exert a more far-reaching impact on energy markets. A March 2013 study by the International Monetary Fund, "Energy Subsidy Reforms: Lessons and Implications," recommends that countries reduce both *pre-tax* energy subsidies (i.e., those provided directly to fossil fuel producers) as well as *post-tax* subsidies (i.e., subsidies that result from not taxing the environmental externalities of fossil fuels).²⁵

If the United States achieve as a higher measure of energy independence, its behavior could also change in tangible ways:

- * *Export permitting.* The United States could liberalize permitting for LNG exports (currently subject to Department of Energy licensing for all non-FTA partners) and lift its ban on crude oil exports. In a recent policy brief, Cathleen Cimino and Gary Hufbauer of the Peterson Institute for International Economics argue that the United States should do so for three reasons: (1) The United States regularly opposes export restraints on natural resources by other countries; (2) contrary action by the United States would violate World Trade Organization rules and lead other countries to follow in suit; and (3) LNG export restrictions would contradict the Obama administration's stated goal of expanding U.S. exports.²⁶ China, for its part, would likely welcome greater U.S. exports if they help reduce Asian LNG spot prices and diversify China's sources of imports.
- * *Deployment of strategic reserves.* More frequent deployment of SPRs by the United States could stabilize global prices, particularly if done in concert with China and other Asian countries.
- * *Reduced competition for overseas equity oil.* U.S. IOCs may compete less for overseas equity oil fields, both because they have less need to search abroad for upstream assets and because they have less capex space to do so given

²⁵ For more information, see Peterson Institute for International Economics event, http://www.iie.com/events/event_detail.cfm?EventID=270.

²⁶ Cathleen Cimino and Gary Hufbauer, *U.S. Policies toward Liquefied Natural Gas and Oil Exports: An Update*. PB14–19. (Washington, D.C.: Peterson Institute for International Economics, July 2014). <http://www.piie.com/publications/pb/pb14–19.pdf>.

their investments in the U.S. unconventional oil and gas market.

- * *Reluctance to guarantee maritime security.* The United States could at some juncture find it unreasonable to safeguard maritime shipping lanes if the energy being shipped goes primarily to Asia rather than the United States.

4.4 Energy Development beyond the Oil Sector

It is also important to observe China's engagement in other areas of the Latin American energy sector. These projects serve as a means for Chinese energy companies to increase their profits and international profile:

- * *Natural gas.* Technological innovations, led by gas liquefaction and storage and unconventional gas recovery, have made gas more price-competitive, abundant, and tradable over the past decade. Latin America could one day service the Chinese LNG market, or alternatively, generate supplies that push down global gas prices to China's advantage. Gas output in Latin America is currently quite limited, and is traded primarily within the region via pipelines. Nonetheless, Chinese companies are already heavily invested in the U.S. shale gas sector. There are large shale reserves in Argentina and Mexico. The Peruvian government recently approved an environmental permit allowing CNPC to conduct \$1 bn of exploratory work in a natural gas block purchased from Brazil's Petrobras.²⁷
- * *Ethanol.* Brazil is the world's premier sugarcane ethanol producer. China in the past has experimented with domestic biofuel production from corn, cassava, jatropha, and other sources. A 2009 cooperation agreement between Petrobras and CNPC envisions cooperation in biofuels development. However, the sector remains underdeveloped, not least due to high staple crop prices and the recent dip in fossil fuel prices. Brazil exports ethanol to Japan and Korea, but almost none at all to China (Masiero 2011). In September 2014, Brazil's Finance Minister Guido Mantega stated that the government will offer tax benefits as part of a broader program designed to stimulate ethanol sales abroad. This came after Brazil's sugar and ethanol producers complained

that the Rousseff government has discouraged investment in new biofuels production capacity by subsidizing the price of gasoline.²⁸

- * *Wind.* China now hosts the world's largest wind market by installed capacity, and several of the world's top wind turbine producers are Chinese. Goldwind, China's largest turbine maker, has supplied wind farms in Panama, Chile and Ecuador, and is aggressively pursuing a Latin America strategy through its Chicago-based subsidiary, Goldwind USA. However, wind energy is marginal to the Latin American energy mix, which is built around hydro-power, petroleum, and gas. It has also been difficult to incentivize grid operators to build transmission lines to wind farms and cope with wind power's intermittency and dispatching issues.
- * *Hydropower and utilities.* China's 2008 Latin America Policy Document lists hydropower as one of the strategic infrastructure sectors in which Chinese firms should invest in the Latin America region.²⁹ China is home to some of the world's largest hydropower companies, including Three Gorges, Dongfeng Harbin, and Sino-Hydro. Such companies have already made small inroads into Venezuela, Colombia, and Ecuador. For instance, China helped finance and construct Ecuador's CCS hydropower plant in 2009 (Ellis 2009). Concurrently, State Grid Corp. of China, China's dominant grid operator, has purchased electricity transmission networks in Brazil, following the same pattern of "indirect acquisition" as in the oil sector, by which indebted European companies sell their Latin American assets to Chinese firms.³⁰ State Grid said in 2012 that it planned to invest \$5 bn in Brazil over the ensuing five years. A consortium led by State Grid and Brazil's Eletrobras was tipped in February 2014 as the

²⁷ "UPDATE 2-China CNPC Sees to Invest at Least \$2 Bln in Peru after Petrobras Deal," Reuters, May 27, 2014. <http://www.reuters.com/article/2014/05/28/china-peru-investment-idUSL1N0OE03920140528>.

²⁸ Paulo Trevisani and Jeffrey T. Lewis, "Brazil Readies Fresh Aid for Sugar and Ethanol Producers," *Wall Street Journal*, September 10, 2014. <http://online.wsj.com/articles/brazil-readies-fresh-aid-for-sugar-and-ethanol-producers-1410369414>.

²⁹ People's Republic of China, "Zhongguo dui Lading Meizhou he Jialebi zhengce wenjian [China's Policy Document on Latin America and the Caribbean],"

³⁰ David Winning and Chun-Wei Yap, "China's State Grid to Buy Brazilian Power Firms," *The Wall Street Journal*, December 22, 2010. <http://online.wsj.com/articles/SB10001424052748703581204576032841364944586>; Charlie Zhu and Michelle Chen, "China's State Grid to Buy Brazil Assets from Spain's ACS," Reuters, May 29, 2014. <http://www.reuters.com/article/2012/05/29/us-state-grid-brazil-idUSBRE84S0C520120529>.

favorite to win Brazil's auction for the Belo Monte dam complex transmission system.³¹

4.5 Corporate Governance

Certain policy analysts in China are well aware of the acute governance issues facing Latin America, such as inadequate protection of the Amazon rainforest and poor compensation of communities affected by extractive activities (Pan Xiping et al. 2011, Hou Ruining and Peng 2009). They recommend that China's NOCs actively garner the support of local communities, develop a good corporate image, and

take an interest in the general economic well-being of their host countries (Pan Xiping et al. 2011, Sun Hongbo 2009).

Still, there is an undercurrent of resentment about the difficulties that these local interests pose to Chinese companies, which are accustomed to low compliance costs in their home market. Hou Ruining and Peng (2009) argue that environmental rights activists in Peru are always "out to get foreign oil investors," and that social movements reduce certainty for long-term investments. Jin Yan and Sun (2010) claim that overly stringent environmental laws exact excessive compensation and delay production. For example, the need to accommodate indigenous groups delayed CNPC's exploration of oil fields in Ecuador's Amazon region in 2007 (Sun Hongbo 2009).

³¹ Chris Davis, "China to Bid on Troubled Brazilian Dam Project," *China Daily*, February 6, 2014. http://usa.chinadaily.com.cn/epaper/2014-02/06/content_17269256.htm.

Appendix

Appendix Table 1: China's Crude Oil Imports by Region: Volume, Value, and Unit Value

	VOLUME					VALUE					UNIT VALUE	
	Thousands of tons		Share (%)		CAGR '08-'13	US\$ millions		Share (%)		CAGR '08-'13	US\$/barrel	
	2008	2013	2008	2013		2008	2013	2008	2013		2008	2013
World	178,891	282,144	100.00	100.00	9.5	129,224	219,549	100.00	100.00	11.2	101.06	108.87
Saudi Arabia	36,368	53,899	20.33	19.10	8.2	25,854	42,320	20.01	19.28	10.4	99.46	109.85
Angola	29,895	40,013	16.71	14.18	6.0	22,353	31,784	17.30	14.48	7.3	104.61	111.13
Oman	14,583	25,482	8.15	9.03	11.8	11,265	19,881	8.72	9.06	12.0	108.07	109.16
Russia	11,638	24,446	6.51	8.66	16.0	8,589	19,824	6.65	9.03	18.2	103.26	113.46
Iraq	1,860	23,514	1.04	8.33	66.1	1,311	17,886	1.01	8.15	68.6	98.63	106.42
Iran	21,322	21,441	11.92	7.60	0.1	15,759	16,873	12.19	7.69	1.4	103.40	110.10
Latin America	12,687	27,703	7.09	9.82	16.9	7,624	18,709	5.90	8.52	19.7	84.07	94.49
Venezuela	6,467	15,748	3.62	5.58	19.5	3,435	10,179	2.66	4.64	24.3	74.31	90.44
Brazil	3,022	5,241	1.69	1.86	11.6	1,887	3,787	1.46	1.72	14.9	87.36	101.09
Colombia	1,141	3,939	0.64	1.40	28.1	781	2,808	0.60	1.28	29.2	95.73	99.74
Mexico	—	1,097	0.00	0.39	—	—	751	0.00	0.34	—	—	95.78
Argentina	771	842	0.43	0.30	1.8	508	619	0.39	0.28	4.0	92.11	102.79
Ecuador	1,048	709	0.59	0.25	-7.5	821	491	0.64	0.22	-9.8	109.63	96.84
Cuba	—	127	0.00	0.05	—	—	75	0.00	0.03	—	—	82.16
Bolivia	38	—	0.02	0.00	—	42	—	0.03	0.00	—	156.80	—
Peru	201	—	0.11	0.00	—	150	—	0.12	0.00	—	104.77	—
Rest of World	50,537	65,647	28.00	23.00	5.4	36,469	52,271	28.00	24.00	7.5	100.96	111.40

Note: "CAGR" refers to compound annual growth rate

Source: China General Administration of Customs, via CEIC.

Appendix Table 2: World Proven Reserves of Oil

	Billions of barrels				Share (%)				Change '10-'13
	2010	2011	2012	2013	2010	2011	2012	2013	
World	1,355.7	1,473.8	1,526.0	1,646.0	100	100	100	100	
Middle East	753.4	752.9	799.6	802.2	55.6	51.1	52.4	48.7	-6.8
Saudi Arabia	262.4	262.6	267.0	267.9	19.4	17.8	17.5	16.3	-3.1
Iran	137.6	137.0	151.2	154.6	10.2	9.3	9.9	9.4	-0.8
Iraq	115.0	115.0	143.1	141.4	8.5	7.8	9.4	8.6	0.1
Kuwait	104.0	104.0	104.0	104.0	7.7	7.1	6.8	6.3	-1.4
United Arab Emirates	97.8	97.8	97.8	97.8	7.2	6.6	6.4	5.9	-1.3
Qatar	25.4	25.4	25.4	25.4	1.9	1.7	1.7	1.5	-0.3
Central & South America	124.6	237.1	238.8	325.9	9.2	16.1	15.7	19.8	10.6
Venezuela	99.4	211.2	211.2	297.6	7.3	14.3	13.8	18.1	10.7
Brazil	12.8	12.9	14.0	13.2	0.9	0.9	0.9	0.8	-0.1
North America	206.3	208.9	210.5	213.9	15.2	14.2	13.8	13.0	-2.2
Canada	175.2	175.2	173.6	173.1	12.9	11.9	11.4	10.5	-2.4
United States	20.7	23.3	26.5	30.5	1.5	1.6	1.7	1.9	0.3
Africa	119.1	123.6	124.2	127.7	8.8	8.4	8.1	7.8	-1.0
Nigeria	37.2	37.2	37.2	37.2	2.7	2.5	2.4	2.3	-0.5
Angola	9.5	9.5	9.5	10.5	0.7	0.6	0.6	0.6	-0.1
Sudan and South Sudan	5.0	5.0	5.0	5.0	0.4	0.3	0.3	0.3	-0.1
Eurasia	98.9	98.9	98.9	118.9	7.3	6.7	6.5	7.2	-0.1
Russia	60.0	60.0	60.0	80.0	4.4	4.1	3.9	4.9	0.4
Kazakhstan	30.0	30.0	30.0	30.0	2.2	2.0	2.0	1.8	-0.4
Asia & Oceania	40.1	40.3	42.0	45.4	3.0	2.7	2.8	2.8	-0.2
Rest of World	13.31	12.08	11.88	12.02	1.0	0.8	0.8	0.7	-0.3

Source: U.S. Energy Information Administration and EIA.

Appendix Table 3: Oil Consumption by Country and Region, 1992–2012
(thousands of barrels per day)

	Consumption (1,000 bpd)					Share (%)					CAGR	
	1992	1997	2002	2007	2012	1992	1997	2002	2007	2012	92–02	02–12
World	67,384	73,464	78,217	86,048	89,128						1.5	1.3
North America	20,519	22,456	23,853	25,207	22,936	30.5	30.6	30.5	29.3	25.7	1.2	-0.4
United States	17,033	18,620	19,761	20,680	18,490	25.3	25.3	25.3	24.0	20.7	1.1	-0.7
Central & South America	3,946	4,907	5,244	5,988	6,924	5.9	6.7	6.7	7.0	7.8	2.0	2.8
Brazil	1,521	2,031	2,132	2,355	2,997	2.3	2.8	2.7	2.7	3.4	1.5	3.5
Europe	14,969	15,855	16,061	16,232	14,447	22.2	21.6	20.5	18.9	16.2	0.2	-1.1
France	1,934	1,969	1,992	1,979	1,772	2.9	2.7	2.5	2.3	2.0	0.1	-1.2
Germany	2,841	2,917	2,710	2,407	2,389	4.2	4.0	3.5	2.8	2.7	-1.9	-1.3
United Kingdom	1,815	1,810	1,739	1,751	1,528	2.7	2.5	2.2	2.0	1.7	-0.3	-1.3
Eurasia	6,832	3,893	3,830	4,095	4,531	10.1	5.3	4.9	4.8	5.1	0.5	1.7
Russia	4,423	2,562	2,636	2,697	3,195	6.6	3.5	3.4	3.1	3.6	0.5	1.9
Middle East	3,736	4,424	5,117	6,267	7,817	5.5	6.0	6.5	7.3	8.8	3.5	4.3
Africa	2,157	2,375	2,668	3,121	3,497	3.2	3.2	3.4	3.6	3.9	2.8	2.7
Asia & Oceania	15,225	19,554	21,444	25,139	28,976	22.6	26.6	27.4	29.2	32.5	2.5	3.1
Australia	730	848	921	988	1,074	1.1	1.2	1.2	1.1	1.2	1.5	1.5
China	2,662	3,916	5,161	7,534	9,875	3.9	5.3	6.6	8.8	11.1	6.8	6.7
India	1,275	1,765	2,263	2,801	3,450	1.9	2.4	2.9	3.3	3.9	4.7	4.3
Indonesia	707	942	1,126	1,335	1,610	1.0	1.3	1.4	1.6	1.8	3.5	3.6
Japan	5,478	5,702	5,319	5,009	4,695	8.1	7.8	6.8	5.8	5.3	-1.3	-1.2
Korea, South	1,527	2,255	2,149	2,240	2,322	2.3	3.1	2.7	2.6	2.6	-0.1	0.8
Taiwan	557	775	894	952	925	0.8	1.1	1.1	1.1	1.0	2.1	0.3

Source: U.S. Energy Information Administration.

Appendix Table 4: World Liquids Consumption by Region, 2009–2040

	History		Projections				
	2009	2010	2020	2025	2030	2035	2040
Millions of barrels per day							
Total OECD	45.8	46.0	46.4	45.9	45.3	44.8	44.7
Total Non-OECD	38.7	40.7	51.2	55.9	62.1	68.3	74.7
Americas	28.9	29.5	31.2	31.0	31.1	31.4	32.1
United States	18.6	18.9	19.2	19.0	18.6	18.5	18.4
Mexico/Chile	2.4	2.4	2.7	2.8	2.8	2.8	2.9
Brazil	2.5	2.6	3.1	3.2	3.4	3.7	4.1
OECD Asia	7.7	7.7	8.0	7.9	7.7	7.4	7.2
Japan	4.4	4.4	4.3	4.2	4.0	3.9	3.6
South Korea	2.2	2.3	2.6	2.6	2.5	2.5	2.4
Australia/New Zealand	1.1	1.1	1.2	1.1	1.1	1.1	1.1
Non-OECD Asia	18.4	19.8	26.5	30.2	34.8	39.0	43.2
China	8.5	9.3	13.1	14.7	16.9	18.8	20.0
India	3.1	3.3	4.3	4.9	5.5	6.1	6.8
Other	6.7	7.2	9.1	10.7	12.3	14.2	16.4
Total World	84.5	86.8	97.6	101.8	107.4	113.1	119.4
Share (%)							
Total OECD	54.2	53.1	47.5	45.1	42.2	39.6	37.4
Total Non-OECD	45.8	46.9	52.5	54.9	57.8	60.4	62.6
Americas	34.2	34.0	31.9	30.5	28.9	27.7	26.9
United States	22.0	21.8	19.7	18.6	17.3	16.3	15.4
Mexico/Chile	2.8	2.8	2.8	2.7	2.6	2.5	2.4
Brazil	2.9	3.0	3.2	3.1	3.2	3.3	3.5
OECD Asia	9.1	8.9	8.2	7.7	7.1	6.6	6.0
Japan	5.2	5.0	4.4	4.1	3.7	3.4	3.1
South Korea	2.6	2.6	2.6	2.5	2.4	2.2	2.0
Australia/New Zealand	1.3	1.3	1.2	1.1	1.0	1.0	1.0
Non-OECD Asia	21.8	22.8	27.1	29.7	32.3	34.5	36.2
China	10.1	10.8	13.4	14.4	15.7	16.6	16.8
India	3.7	3.8	4.4	4.8	5.1	5.4	5.7
Other	8.0	8.3	9.3	10.5	11.5	12.5	13.8

Source: U.S. Energy Information Administration.

Appendix Table 5: World Petroleum and Other Liquids Production by Region, 2009–2040

	History				Projections			
	2009	2010	2011	2020	2025	2030	2035	2040
Millions of barrels per day								
OPEC^a	34.1	35.4	35.7	38.7	40.7	44.4	48.2	52.1
Non-OPEC	50.4	51.9	52.1	58.9	61.1	63.1	64.9	67.2
United States	8.9	9.4	9.8	14.2	13.9	13.2	12.9	12.4
China	4.1	4.4	4.3	5.1	5.4	5.5	5.6	5.7
India	0.9	1.0	1.0	1.1	1.2	1.3	1.3	1.4
Latin America	7.3	7.5	7.7	9.0	9.9	11.0	11.9	12.9
Ecuador and Venezuela	3.0	2.9	3.0	3.1	3.2	3.3	3.5	3.8
Brazil	2.4	2.5	2.5	3.2	4.0	4.8	5.3	5.6
Other	1.9	2.1	2.1	2.7	2.7	3.0	3.1	3.4
Total World	84.5	87.2	87.8	97.6	101.8	107.4	113.1	119.4
Share (%)								
OPEC^a	40.4	40.5	40.7	39.7	40.0	41.3	42.6	43.7
Non-OPEC	59.6	59.5	59.3	60.3	60.0	58.7	57.4	56.3
United States	10.5	10.7	11.1	14.6	13.6	12.3	11.4	10.4
China	4.8	5.0	4.9	5.2	5.3	5.2	5.0	4.7
India	1.0	1.1	1.1	1.1	1.2	1.2	1.2	1.2
Latin America	8.7	8.6	8.7	9.2	9.7	10.3	10.5	10.8
Ecuador and Venezuela	3.6	3.3	3.4	3.2	3.1	3.0	3.1	3.2
Brazil	2.8	2.9	2.9	3.3	3.9	4.5	4.7	4.7
Other	2.3	2.4	2.4	2.8	2.7	2.8	2.8	2.9

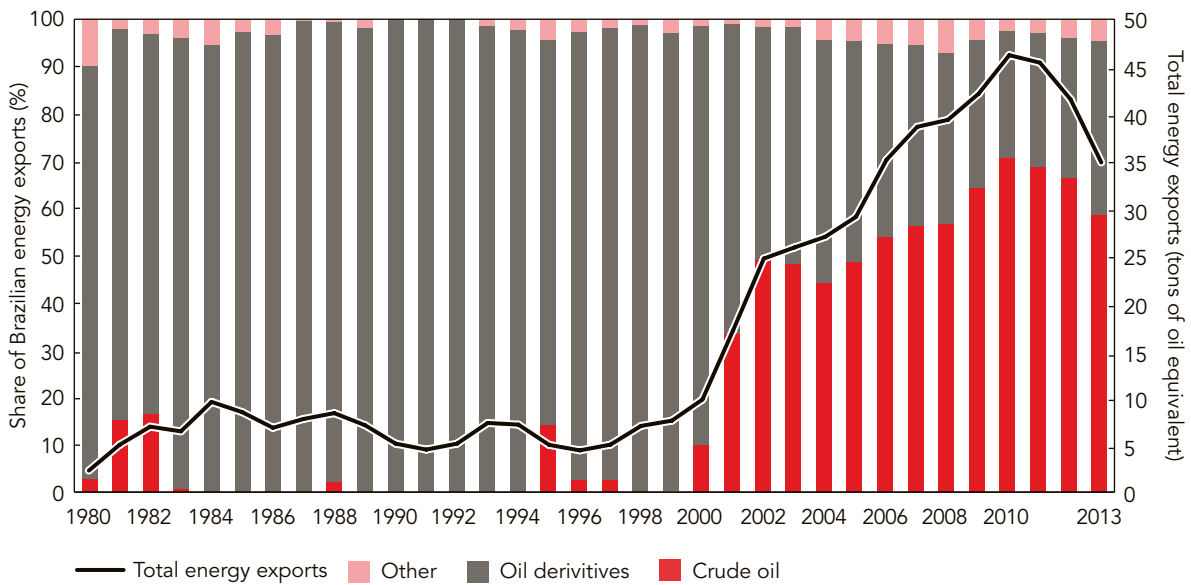
Source: U.S. Energy Information Administration.

Appendix Table 6: China's Major Oil and Gas Acquisitions in Latin America

Year	Country	Target	Type	Value (US\$ billions)
CNPC				
2006	Ecuador	Encana	M&A (Encana's oil and pipeline business)	1.5
2013	Brazil	Libra auction	Bid (10% stake in consortium)	10.0
2013	Brazil (Peru)	Petrobras (Peru)	M&A (100% acquisition of Petrobras Peru subsidiary)	2.6
Sinopec				
2006	Ecuador	Encana	M&A (Encana's oil and pipeline business)	1.5
2010	Spain (Brazil)	Repsol YPF (Brazil unit)	M&A (40%)	7.1
2010	United States (Argentina)	Occidental (Argentina unit)	M&A (100%)	2.5
2011	Portugal (Brazil)	Galp Energia SA (Brazil unit)	M&A (30%)	3.5
CNOOC				
2010	Argentina	Bridas	M&A (50%)	3.1
2010	Argentina	PanAmerican Energy	M&A (60%)	2.5
2013	Brazil	Libra auction	Bid (10% stake in consortium)	10.0
Sinochem				
2009	UK	Emerald Energy	M&A (100%) (assets in Colombia, Peru, Syria)	0.9
2010	Norway (Brazil)	Statoil	Oil field stake (40% of Statoil's stake in Brazil's Peregrino offshore oil field)	3.1
2012	US (Colombia)	Total (Colombia)	M&A (Total's Colombian oil and pipeline unit)	1.0
2013	Brazil	Petrobras	Oil field stake (30% of BC-10 oil field) > preempted by ONGC and Shell	1.5

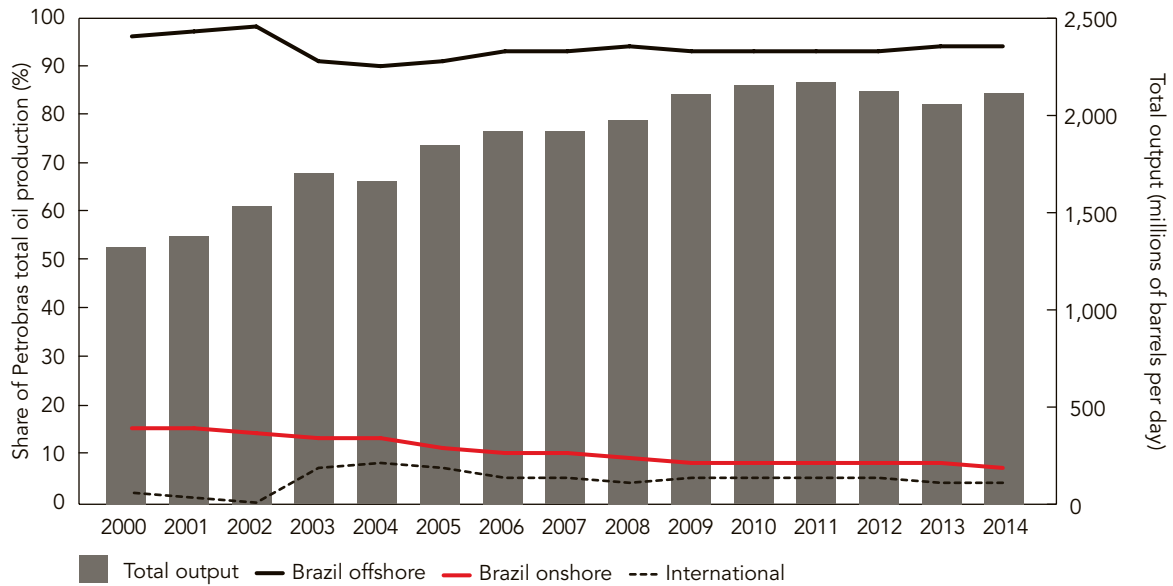
Source: HSBC.

Appendix Figure 1. Brazilian Energy Exports



Note: "Other" denotes vapor coal, electricity, ethylic alcohol, and vegetable coal
Source: Brazil Ministry of Mining and Energy, via CEIC.

Appendix Figure 2. Petrobras Oil Production



Source: Petrobras.

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