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ASIA WORKING GROUP, REPORT VI, YEAR I

ASIA

WORKING GROUP

VI CHINA REVIEW GROUP MEETING

APRIL 25, 2018

Connections: Rio de Janeiro, Beijing,
Brasília, São Paulo and Washington, D.C.

Speakers: Adilson de Oliveira, Clarissa
Lins, Izabella Teixeira, Ricardo Besada,
Zhou Xizhou

THEME

Complementarity and
dependency in the Energy
sector and the transition to a
low-carbon economy

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SUPPORT:



ASIA

WORKING GROUP

The Permanent China Review Group promotes a structured reflection on selected themes, with the participation of specialists from the private and public sectors and other think tanks, contributing to public policy formulation and business strategies. During each meeting, one or two speakers will give a brief evaluation of the current situation, followed by a debate with the other participants. The set of evaluations and possible recommendations will be part of a final report for each meeting, which will be later forwarded to group members and guest experts.

PREVIOUS EDITIONS:



REPORT I, YEAR I
SEPTEMBER 22, 2017



REPORT II, YEAR I
OCTOBER 17, 2017



REPORT III, YEAR I
NOVEMBER 22, 2017



REPORT IV, YEAR I
JANUARY 24, 2018



REPORT V, YEAR I
APRIL 25, 2018



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Member of CEBRI's Board of Trustees and Director of the Institute for Brazil-China Studies (IBRACH). She is currently Visiting Professor of the Public Policies, Strategy and Development Program at the Federal University of Rio de Janeiro (UFRJ). She has previously worked at the United Nations, in New York, and as a consultant for the United Nations Conference on Trade and Development (UNCTAD), in Geneva.



SENIOR FELLOW

Tatiana Rosito

Diplomat and economist, having served over eight years in Asia, five of which in the Brazilian Embassy in Beijing, as Minister-Counsellor. She is currently Chief-Representative of Petrobras in China and General Manager for Business Development in Asia. She was Executive Secretary at the Brazilian Foreign Trade Board (CAMEX) and Special Advisor to the Ministers of Finance and Planning, among other roles in the public service.



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Julia Dias Leite

Executive Director at CEBRI since 2015. She previously worked for ten years in the China-Brazil Business Council (CEBC), occupying the position of Executive Secretary. She was recently chosen by the US State Department for the Global Young Leaders program.

SUMMARY

Content

QUESTIONS 06

KEYNOTE SPEAKERS 07

VI CHINA REVIEW GROUP MEETING REPORT 08

How has the meaning of complementarity and dependence in the energy sector evolved in the last ten years? What are the global implications and how do they affect Brazil and China? 08

How are the main players in the energy sector dealing with the growing trade and investment ties with Chinese companies? Will China succeed to play a stronger institutional role in setting global prices through China-based exchanges? 09

How could Brazil and China leverage their bilateral business and political relationship to better prepare for the transition to a low-carbon economy? Are there new bilateral institutional arrangements to be explored? What is the potential for bilateral investment and trade in renewable and alternative sources of energy? 10

Attachments

ATTACHMENT I: XIZHOU ZHOU 12

PRESENTATION

ATTACHMENT II: FACT SHEET 17

Suggested Readings 20

ATTACHMENT III: PARTICIPANTS 21
OF THE VI MEETING

QUESTIONS

How has the meaning of complementarity and dependence in the energy sector evolved in the last ten years? What are the global implications and how do they affect Brazil and China?

How are the main players in the energy sector dealing with the growing trade and investment ties with Chinese companies? Will China succeed to play a stronger institutional role in setting global prices through China-based exchanges?

How could Brazil and China leverage their bilateral business and political relationship to better prepare for the transition to a low-carbon economy? Are there new bilateral institutional arrangements to be explored? What is the potential for bilateral investment and trade in renewable and alternative sources of energy?

VI CHINA REVIEW GROUP MEETING KEY- NOTE SPEAKERS AND COMMENTATORS



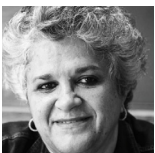
Adilson de Oliveira

Former Professor at the University of Rio de Janeiro (UFRJ), Adilson de Oliveira acted as a consultant for numerous governmental and international organizations. He is Associate Researcher at CINDES, holding a PhD in Economic Development from the University of Grenoble.



Clarissa Lins

Clarissa Lins is Founding Partner of Catavento, a private consultancy on sustainability strategy and business models that aims to influence corporate decision makers, as well as Executive Director of the Brazilian Petroleum, Gas and Biofuels Institute (IBP). She is a Senior Fellow at CEBRI.



Izabella Teixeira

Former Minister of the Environment, Izabella Teixeira played a key role in the process of reversing deforestation in Brazil. She is a member of the United Nations' High-Panel of Eminent Persons on the Post-2015 Development Agenda, as well as a Senior Fellow at CEBRI.



Ricardo Besada

Controlling Executive Manager at Petrobras, Ricardo Besada has worked at the Brazilian oil and gas sector since 2001, in the areas of Business Performance and Gas & Power. His executive formation includes institutions such as the University of Michigan, IHRDC, UTD and INSEAD.



Zhou Xizhou

Zhou Xizhou is a Managing Director of IHS Markit and heads the Power, Gas, Renewables and Coal group in Asia Pacific. Prior to joining IHS Energy and its predecessor Cambridge Energy Research Associates (CERA), Mr. Zhou worked as a consultant on regulatory and energy economics for Industrial Economics, Inc, as well as a research analyst at the World Resources Institute.

VI CHINA REVIEW GROUP MEETING REPORT:

How has the meaning of complementarity and dependence in the energy sector evolved in the last ten years? What are the global implications and how do they affect Brazil and China?

At its sixth meeting, CEBRI's Permanent Working Group on China promoted a wide-ranging debate on the opportunities and challenges emerging for China and Brazil by the new geopolitics of carbon and the ongoing energy transition – characterized, among other trends, by falling costs of renewable sources and by the rise of natural gas as a strategic transition fuel. In this context, participants highlighted the merger between the agendas of energy security and sustainable development worldwide, with implications for both policymaking and investment priorities – since the energy sector accounts for approximately a third of total greenhouse gas emissions globally.

In China, the link between energy and “ecological civilization” emphasized during Xi Jinping's opening speech at the 19th Congress of the Chinese Communist Party clearly illustrates this trend. As such, Chinese energy policymaking would increasingly incorporate sustainability considerations, in addition to traditional calculations on the affordability and security of energy sources. Within this “trilemma” in energy policy, coal-based sources – affordable and secure, but unsustainable – will lose importance in projected growth in Chinese energy demand, giving space to gas and renewable sources as these become more affordable. In fact, wind and solar were projected to account for 30% of future growth in Chinese energy demand, according to the International Energy Association (IEA) – although coal still accounts for a preponderant share of the Chinese power mix.

Furthermore, reflecting the changing role of oil in the new geopolitics of energy, China has transitioned from a net exporter to a net importer of oil in past years, with imports accounting for around 70% of total domestic oil consumption in 2017. In order to manage excessive dependency on external sources, participants highlighted Chinese engagement in a strategy composed by three main components: (i) diversifying oil import sources, (ii) keeping domestic oil supply stable in following years and (iii) managing Chinese growing oil demand, which is predicted to peak between 2030-35. Notably, the first component of this strategy is complimentary to Brazilian oil production, establishing opportunities for Brazilian oil exports. Currently, while China absorbs around 50% of Brazilian oil exports, this value amounts to only 6% of total Chinese oil imports. Thus, any increase in oil exports must also take into account the importance of avoiding overdependence.

Finally, in light of coal's diminishing importance in Chinese new energy additions, natural gas has assumed the role of a key transition fuel, with Chinese gas imports growing rapidly in past years – and currently accounting for 30% of natural gas consumption in China. In fact, according to the IEA, natural gas is projected to account for the majority of Chinese future growth in energy demand (34%).

How are the main players in the energy sector dealing with the growing trade and investment ties with Chinese companies? Will China succeed to play a stronger institutional role in setting global prices through China-based exchanges?

Within the context of Chinese growing global investments, participants reiterated the centrality of the energy sector – accounting for approximately 75-80% of total Chinese investments in Brazil, particularly in the electric and oil sectors. Such investments would aim not only to ensure Chinese control over energy supply chains worldwide, but also to promote learn-by-doing among Chinese state-owned-enterprises (SOEs), particularly through mergers and acquisitions.

In Brazil, participants highlighted the central role played by SOEs such as State Grid and China Three Gorges. Since 2010, State Grid has represented a key player in the electric sector, with control over the operation or construction of around 14 thousand kilometers of transmission lines nationwide. Such engagement would have an important technological impact, considering the employment by these companies of new technologies such as smart grids and ultra-high voltage (UHV) lines, previously developed in China. Both SOEs, furthermore, have been increasingly taking part in concession bids for transmission lines and generators in Brazil, reflecting an overall long-term commitment to the electric sector in the country. Similarly, in the oil sector, Chinese SOEs such as Sinopec and Sinochem have engaged in significant acquisitions in past years, while CNPC and CNOOC have joined the consortium that won the bid for the pre-salt Libra field in 2013, the first under production sharing agreement. Chinese NOCs have also participated in 2017's bidding rounds for pre-salt exploratory blocks and signaling interest in future bids scheduled for 2018.

Furthermore, participants highlighted the global impact of Chinese trade and investments in the oil sector, with important implications for Brazilian companies. First, China was characterized as a “demand game changer”, being responsible for around 50% of the increase in global demand for oil in the past fifteen years. Additionally, China would have acted as a main source of capital for Brazilian companies – including Petrobras – particularly after the 2008 financial crisis and the oil price crunch of 2013-4. In the particular case of Petrobras,

participants emphasized the company's strategic imperative of reducing its debt and normalizing its capital structure, including by selling assets and reducing capital expenditure.

Notably, participants reiterated the fundamental distinction between investment returns observed in the “golden age of fossil fuels” and those currently practiced. In this context, companies would face the key challenge of adapting their portfolios and ensuring shareholder value in light of the energy transition. Additionally, the risk profile of investments within the “sustainability revolution” was highlighted as fundamentally different from that of the “information technology revolution”, in which choices were less risky. In this respect, considering the necessity of structuring often-risky business opportunities and “betting” on new technologies, the use of venture capital was noted as a useful approach to mitigate risks in the sustainability revolution.

Finally, in the trade dimension, China's transition from a net exporter to a net importer of oil – in addition to its strategy of diversifying import sources – would establish vast opportunities for Brazilian oil exports, particularly in light of pre-salt exploration bids. This trend was regarded as part of an overall shift of oil demand to Asia, with India recently surpassing Japan as the third largest oil importer globally. Ultimately, there would be a latent opportunity for Brazil to enhance its access to the Asian oil market.

How could Brazil and China leverage their bilateral business and political relationship to better prepare for the transition to a low-carbon economy? Are there new bilateral institutional arrangements to be explored? What is the potential for bilateral investment and trade in renewable and alternative sources of energy?

The transition to low carbon economies was highlighted as a key global trend associated to numerous business opportunities for private actors – but also with potentially disruptive effects for a number of subfields within the energy sector. As such, participants reiterated the importance of policy choices that create service and industrial opportunities, reflecting underlying alliances between the public and private sectors. While the speed and direction of the transition remain uncertain, participants noted that diversification has been a common approach worldwide, including in Brazil and China. Accordingly, renewable sources have been increasing rapidly in China's power mix in past years – with solar, wind and hydro accounting for around 60% of new additions to the Chinese power system in 2017. In fact, China was reiterated as a key investor in renewable energy and energy efficiency, with investments in this area growing 31% annually since 2004. On the other hand, coal still accounts

for around 65% of total current energy demand in China, with renewables representing less than 10% of this figure.

In Brazil, conversely, renewables are projected to account for only 14% of future growth in energy demand, while these sources already represent around 42% of Brazilian power mix – particularly due to the participation of hydropower and biomass. As such, participants reiterated Brazil's comfortable position in the energy transition – as well as the country's distinctive position as a key global player in the sustainable development agenda, assuming an ambitious nationally determined contribution (NDC) under the Paris Agreement. In this respect, by enhancing action to neutralize emissions associated to land use, Brazil could potentially strengthen its role as a major global carbon sink. Additionally, despite China's dominance of the solar panels' global market, Brazil could benefit from enhancing domestic solar panel production in strategic stages of their value chains, given the huge potential for solar power generation in the country.

In this context, participants highlighted the strategic relevance of the Brazil-China bilateral relationship, acting as a catalyst to the global energy transition and assuming leadership in the sustainability agenda. In fact, participants recalled the important role played by the bilateral relationship in the process leading to the signature of the Paris Agreement, featuring previous bilateral understandings in the field of reforestation. Furthermore, the field of biofuels was highlighted as a key area of mutual interest and vector for bilateral cooperation, particularly for the development of second generation ethanol – considering both countries' vast agricultural production and waste generation – although large scale operations remain an ecological challenge. Additionally, the recent adoption by China of a target for having 10% of ethanol mixed to gasoline by 2020 was reiterated as a huge opportunity for Brazilian ethanol exports to the Chinese market.

Regarding the expansion of electrical mobility worldwide, participants noted the possibility of coexistence between the electric vehicles sector and the biofuel industry, considering the trend towards diversification in the energy transition. The speed of the expansion of electrical mobility, however, would depend on two main factors: consumer preferences and global investments of automotive companies. Additionally, the viability of electric vehicles' large-scale production would be contingent on the competitiveness of battery prices, which would remain a significant bottleneck for the sector.

In order to promote bilateral cooperation in such segments, including reforestation, biofuels and electric vehicles, participants highlighted the importance of establishing adequate bilateral institutional arrangements, including in the scope of COSBAN – the Sino-Brazilian High-Level Commission for Coordination and Cooperation. Considering that sustainability and environmental issues have not figured as a priority in the commission's agenda, participants noted the possibility and potential of creating a specific Sub-Committee on these matters within COSBAN. Ultimately, the strengthening of bilateral cooperation on the transition to low carbon economies could positively enhance multilateral cooperation on the matter.

ATTACHMENT I: ZHOU XIZHOU PRESENTATION

IHS Markit | ENERGY & NATURAL RESOURCES Presentation

For Centro Brasileiro de Relações Internacionais

China's energy policy making matrix

25 April 2018

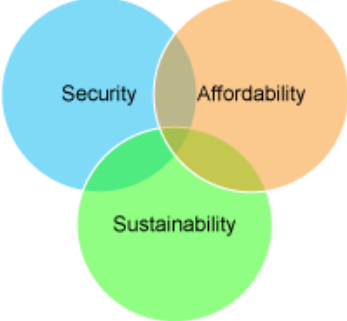
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The energy policymaking matrix



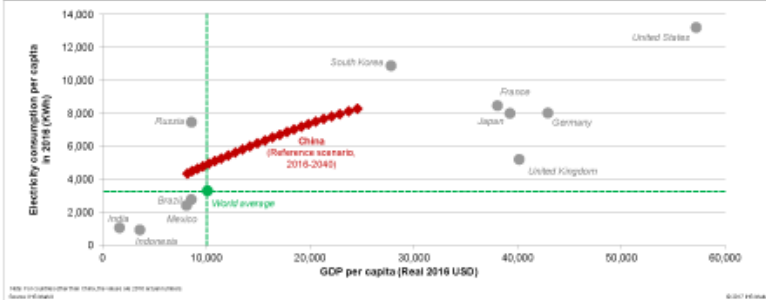
The diagram consists of three overlapping circles. The top-left circle is blue and labeled 'Security'. The top-right circle is orange and labeled 'Affordability'. The bottom circle is green and labeled 'Sustainability'. All three circles overlap in a central region.

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China remains a developing country with relatively low per capita income, making affordability an important consideration in energy policymaking

Per capita GDP and power consumption comparison



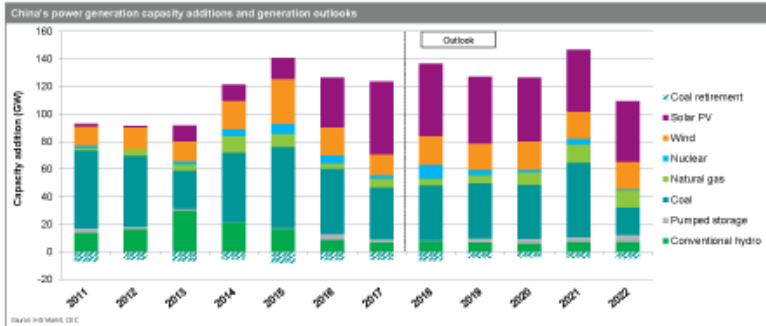
What did President Xi Jinping say about energy and oil/gas during his 3.5-hour speech at the 19th Party Congress?

Opening Address at the 19th Congress of the Chinese Communist Party (18 Oct 2017)

- The word “Energy” appeared 4 times, and all 4 times as part of “**ecological civilization**” discussion:
 - “Clean energy industry”
 - “Promoting energy production and consumption revolution”
 - “Constructing an energy system that is clean, low-carbon, safe, and highly efficient”
 - “Reducing energy consumption”
- The word “ecology” appeared 43 times
- The word “environment” appeared 21 times

Overall very strong emphasis on the sustainability of energy production and consumption

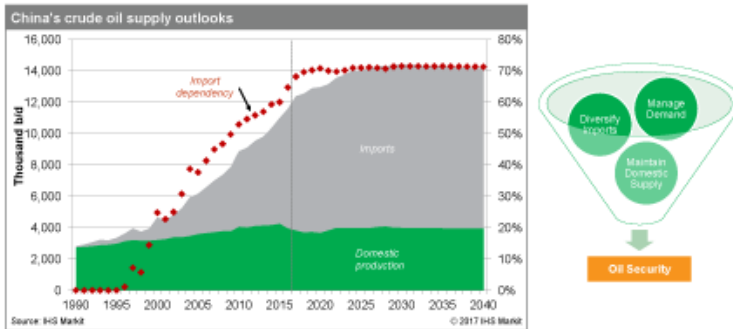
Renewables are increasing rapidly in China's power mix



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Despite the deceleration in energy demand growth, China's oil demand will continue to rise,

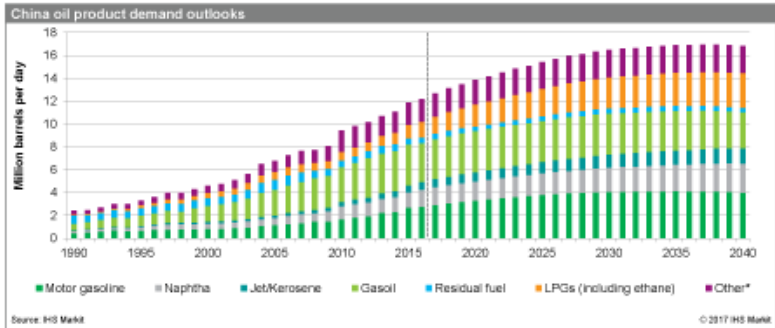


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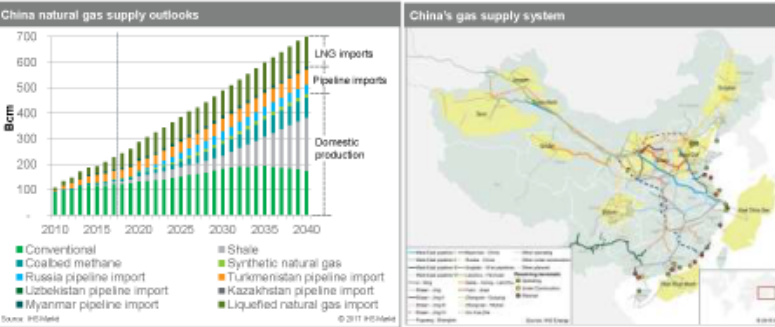
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Total oil product demand increases by 38% and peaks in the 2030s
 What can be done to manage demand to a lower scenarios?

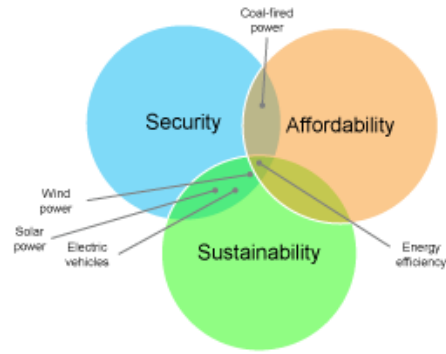


China's natural gas imports will also rise, but the supply mix will become increasingly diversified



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What types of policies and strategies fit these three objectives?



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ATTACHMENT II: FACT SHEET

The VI Meeting of CEBRI's Permanent Group of Analysis on China will discuss the energy sector and the implications of the transition to a lower carbon economy for Brazil, China and bilateral relations, taking into account the global scope of such themes. Participants will have the chance to hear from Chinese and Brazilian energy experts, Brazilian executives in the energy sector and Brazilian scholars and policymakers on the main challenges and opportunities that may affect both countries and their business and political relations. Starting with an overview of the Chinese energy sector, its main policy priorities for domestic and foreign investment and main risks associated to the short and medium term, the debate will also address the oil and gas sector in Brazil and the strategic priorities of the main players in dealing with China and positioning for the transition. The debate will also draw attention to potential new institutional arrangements between Brazil and China and emerging business opportunities. Speakers and commentators are encouraged to also explore one or more of the Questions above, according to their main focus.

The overall theme of complementarity and dependence in Energy could be approached from both global and bilateral perspectives. Climate change and its impact is a typical “problem of the commons” and it requires a global-negotiated solution if it is to be successfully tackled. The transition to a low carbon economy is bound to profoundly alter the global production chains and geopolitics of the post-II World War and post-1970s oil crises, and it has financial implications as well. In previous sessions, the group has analyzed the issue of bilateral complementarity and dependence in the agribusiness sector. Although Brazilian exports of oil play a much smaller role in total Chinese oil imports than in soybeans, in the O&G sector we see much larger volumes of Chinese investment in Brazil. The different underlying sectoral incentives and regulations are important drivers in this trend. Still, within the overall bilateral relationship, those investments have created new forms of complementarity and dependence, whose impacts on Brazil may be larger or smaller depending on many country-specific factors and the evolution of the global environment.

As the world transitions to a low-carbon economy we are bound to live in a very different world in 20 or 30 years. The technological changes entailed by the efforts to address global climate change constitute both enormous challenges and opportunities to the energy sector and systems of production as a whole, on a global scale. In view of its aspiration to be a global leader by 2050, China has been implementing steadfast policies to ensure a leadership role in the industries that shape present and future innovation. Those include artificial intelligence, the Internet of Things, new materials and genomics etc. but also renewable energy, forests, clean carbon, smart grids and smart cities, electric vehicles, and all things related to the green economy. In fact, the environmental challenge has been highlighted as one of the three main priorities for China in the New Era by the new leadership, on a par with poverty reduction and combatting financial risks. This is so not only because of its long-term economic implications, but also because of the strong negative

impact on the environment caused by economic development in China in the last 40 years, of which water and air pollution are the most visible. As China transitions from a quantitative-centered to a qualitative-centered economic development mode, ensuring sustainable development - both domestically and globally - is intertwined with China's aspiration for national rejuvenation and a leading role in the next technological paradigm.

Despite the serious challenges still faced by the Chinese society with regard to the environment and sustainable development, China is the leading global investor in renewable energy. Solar and wind energy industries have seen dramatic cuts in their costs on a global scale due to the participation of Chinese companies and their incremental innovations, which created a commoditization of solar panels in the global market. Although fossil fuels will continue to play a large role in China's and the global energy matrix in the future, China's domestic oil production is declining and investments overseas will continue to grow. But the incentives towards increasing the participation of natural gas in the economy have dominated most of the recent debates in China. Also, estimating the changes that electric vehicles in all their different forms will play in the future is crucial for the energy and transportation sectors. In tandem with its domestic strategy, China has been playing a more active role in recent years in setting the new rules for global carbon emissions. The bilateral agreements between US and China and between Brazil and China, among others, were crucial for setting the framework to the Paris Agreement in 2015.

In December 2017, China launched its carbon market by allocating emissions quotas for a cap-and-trade ETS scheme, following pilot schemes implemented since 2013. Plans had been announced by Chinese President Xi Jinping in September 2015 during the summit with United States former President Obama. (<https://www.theclimategroup.org/news/china-launches-world-s-biggest-carbon-market>). China's nationwide scheme covers almost all of China's power plants, which are estimated to produce 33% of China's national emissions. China's market is expected to bring about a quarter of the world's emissions under some kind of trading system. (<https://thefuturescentre.org/signals-of-change/216934/china-launches-carbon-market-set-be-worlds-largest>). Finally, China, which is now the world's largest net and absolute crude oil importer, has recently established a renminbi-based oil futures exchange market in Shanghai, aiming at redefining its role in the global oil market in the medium to long term.

Because Brazil has a unique energy matrix based extensively on hydropower, especially compared to other peer economies, the specific challenges ahead of the country are very different from those faced by China. Yet Brazil has also played a leading role in setting the global framework for the transition to a low carbon economy. The country is among the four largest economies in terms of wind power potential (behind the United States, China and Germany) and is stepping up investments in photovoltaic energy. There would be enormous room for bilateral cooperation with regard to common aspirations, not only on renewables but also in combatting deforestation. In the Paris Agreement, Brazil committed to cutting carbon emissions by 37% by 2025, compared to 2005 levels, to ending illegal deforestation and to restoring 120,000 square meters of forest by 2030. China

has a positive track record in forest restoration. Also, China has set the target of having 10% of ethanol mixed to gasoline in all provinces by 2020, which opens new avenues for potential cooperation both in first and second generation ethanol. Being one of the largest car markets in the world, Brazil potential for EV also entails new infrastructure challenges.

The electric sector has attracted over half of the total direct investment of Chinese companies in Brazil. According to the Bimonthly Newsletter on Chinese Investment in Brazil published by the Ministry of Planning of Brazil, from 2010 to 2017, Chinese confirmed investments in the electric energy sector totaled approximately US\$ 25 billion in 20 projects. The main entrance mode for Chinese companies has been M&A, such as State Grid's first acquisition of transmission companies in 2010 and the controlling stake in CPFL in 2017, and China Three Gorges (CTG) acquisition of 49% of EDP Renováveis Brasil and Triunfo Participações. There has also been increasing participation of Chinese companies in concession bids for crucial new or existing infrastructure projects, such as Belo Monte transmission line and Jupia and Ilha Solteira generators, and the acquisition of São Simão hydropower by State Power Investment Corporation. According to public records, as of 2016, State Grid controlled 100% of over 9,300 Km of transmission lines in operation or construction and had 51% of participation in other 4,600 Km, with partners such as Furnas and Copel. CTG has installed capacity in Brazil of over 6 GW, being the second largest private generation company in the country. The extension of Chinese investments in the electric sector imply a long-term partnership of Chinese companies - mostly state-owned - with Brazilian players. It also offers an important platform for Chinese companies to extend their markets for heavy equipment, including for renewable sources of energy.

As for oil and gas, Chinese companies have also increased significantly their participation in Brazil since 2010, when Sinopec acquired 40% of Repsol Brasil. In 2011, Sinochem acquired 40% of the Peregrino field from Statoil, and Sinopec acquired 30% of Petrogal Brasil. In 2016, Repsol Sinopec was the third largest oil and gas producer in Brazil, followed by Petrogal Brasil, although production is largely dominated by Petrobras. A new milestone for Chinese companies in Brazil was the participation of CNPC and CNOOC in the winning consortium for the Libra field bid, the first to take place under the production sharing framework, in 2013. The resumption by ANP – the Brazilian sector regulator - of bids for exploratory blocks in 2017 has also attracted the interest of the Chinese oil and gas companies, all of which were parties in winning consortia for pre-salt or concession bids. In 2017, Petrobras and CNPC have announced the beginning of negotiations for a strategic partnership, which could involve all segments of activities, including financing. Also, Chinese shipyards have played an increasing role in the last years with regard to the construction of production units that will operate in the pre-salt area. Brazil exports of crude oil to China account for a growing part of national exports but only to approximately 6% of total Chinese imports.

Petrobras has recently joined the Oil and Gas Climate Initiative (OGCI), which was launched in 2014. Current members include BP, CNPC, Eni, Pemex, Repsol, Saudi Aramco, Shell, Statoil and Total. The adhesion is in line with Petrobras' strategy to prepare the company for a future

based on a low carbon economy, as disclosed in its 2018-2022 Business and Management Plan.

- How has the meaning of complementarity and dependence in the energy sector evolved in the last ten years? What are the global implications and how do they affect Brazil and China?
- The energy sector, including both oil and gas and the electric sector, is the main destination – by far – of Chinese investments in Brazil. How are the main players in the sector dealing with the growing trade and investment ties with Chinese companies?
- Will China succeed to play a stronger institutional role in setting global prices through China-based exchanges?
- How could Brazil and China leverage their bilateral business and political relationship to better prepare for the transition to a low-carbon economy? Are there new bilateral institutional arrangements to be explored? What is the potential for bilateral investment and trade in renewable and alternative sources of energy? What role do electric vehicles play in Brazil and China? Could ethanol have an enlarged bilateral role?

Suggested Readings

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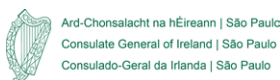
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