China and Brazil in Sub-Saharan African Fossil Fuels: A Comparative Analysis[1]

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Introduction

For decades, mineral resources in sub-Saharan Africa, in particular oil and gas, remained underexplored for a variety of reasons, including low commodity prices, poor infrastructure, geographical obstacles and political instability. This situation has changed considerably over the past decade because of the gradual political stabilisation of the subcontinent and a surge in commodity prices pushed by a strong demand from emerging economies. According to forecasts by BP (2013a), formerly known as British Petroleum, global energy consumption will increase by 36 per cent between 2011 and 2030, virtually all originating from non-OECD countries, with China and India accounting for half of this growth. The resource boom is a major reason for the improved economic performance of sub-Saharan countries, presently averaging 5 to 6 per cent growth rates of gross domestic product. It also accounts for their high resilience to the recent international financial crisis.

With investment pouring in and exploration receiving an enormous push, the dimension of the region's reserves is becoming better known. The largest sub-Saharan oil reserves are located in Nigeria (37 billion barrels) and Angola (13 billion). Nigeria currently produces 2.5 million barrels per day; Angola 1.7 million. Equatorial Guinea, Gabon and the Republic of the Congo are smaller producers (BP 2013b). New technologies for subsalt drilling offer

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considerable prospects for West Africa and for the opening of new frontiers in hydrocarbon extraction in Central and East Africa. As a result, Chad and Ghana have surfaced as new oil producers. Many more, including Ethiopia, Niger, the Democratic Republic of the Congo, Kenya, Somalia and Uganda, are in the making, although their prospects of eventually exporting hydrocarbons vary considerably.

Sub-Saharan Africa is also becoming an increasingly important exporter of gas, particularly liquefied natural gas (LNG). Nigeria sits on the largest known deposits of the entire subcontinent: 5.2 trillion cubic metres (cum). It presently produces 43.2 billion cum a year (BP 2013b). New producers of LNG are coming online in the Gulf of Guinea, namely Angola and Equatorial Guinea. According to a report by Ernst and Young (2012), their proven gas reserves amount to 366 and 37 billion cum respectively. Massive reservoirs, which presumably contain 3 trillion cum, have recently been discovered off the coasts of Mozambique and Tanzania. Proven reserves in these two countries amount to 126 billion cum. Due to a sparse network of regional pipelines, most of this new production is expected to be shipped overseas. As analysed more closely in Chapter X of this edited volume, shale gas fracking is discussed in South Africa and, to a lesser extent, also in Botswana.

To complete this auspicious picture, sub-Saharan Africa has considerable coal reserves, most of which are located in Southern Africa. Coal still accounts for about 30 per cent of global primary energy consumption and for about 41 per cent of global electricity generation. With a share of 4 per cent of the global coal reserves, South Africa is the largest sub-Saharan producer. Its deposits amount to 30 billion tonnes, the largest known reserves on the entire African continent. South Africa exports a quarter of its production, with China and India as its major clients (Energy Information Administration 2014b). The newspaper *Business Day* reported on 3 May 2013 that Botswana sits on one of the largest coal deposits in the world, estimated at over 200 billion tonnes, but its actual size is yet to be established. Mozambique's

reserves reach more than 20 billion tonnes. Zimbabwe's deposits are estimated to be in the same range (Baruya and Kessels 2014). As these new deposits become better known, Southern Africa may account for a considerable increase in global proven reserves. As noted, the key driver for coal exploration in the region has been the growing demand in China and India. The impact of Southern African reserves on export markets is, however, highly dependent on the development of efficient transport infrastructure, which requires massive investments, in particular in central Mozambique (Scholvin and Plagemann 2014).

Framed by this fast-changing landscape, this chapter looks at two emerging players in fossil fuel exploration in sub-Saharan Africa: China and Brazil. In a context where investment from emerging countries has exceeded that from developed economies in the region, understanding the engagement patterns of emerging players becomes all the more important. China's swelling demand for fossil fuels, particularly oil, has to some extent been a game changer for sub-Saharan fossil fuel markets by pushing up the price and attracting investment from around the globe. Along with China and India, Brazil presently figures amongst the major emerging investors in the region's fossil fuels. Brazil's investment in sub-Saharan fossil fuels predates the 'China factor'. Yet, whilst Chinese (and also Indian) investment in sub-Saharan fossil fuels is largely driven by energy security concerns, Brazil's investment is a by-product of the rising demand from the East, as explained below.

Set against this background, this chapter analyses the commonalities and differences in the approaches, motivations, roles of state and resulting strategies of China and Brazil to fossil fuels in sub-Saharan Africa. The main finding is that different motivations (and institutional backgrounds) have led to diverse engagement patterns. Brazil's approach is more corporate in nature, whilst the Chinese model appears more reliant on state support. There is nonetheless scope for both cooperation and complementarity: cooperation deriving from meaningful similarities, namely the extension of oil-backed credit lines and the knitting together of fossil

fuel exploitation with infrastructure development, and complementarity from their respective competitive advantages, that is, Brazil's technical expertise and China's unmatched financial capacity.

China and Sub-Saharan Fossil Fuels

In 2010, China became the world's largest energy consumer. Two years later, it accounted for 22 per cent of the global energy intake. The major share of China's primary energy consumption is covered by burning fossil fuels: 68.5 per cent coal, 17.7 per cent oil and 4.8 per cent gas (BP 2013b). Coal has historically dominated the energy matrix of the People's Republic due to the fact that it abounds in China's subsoil. Diversification and efficiency policies are expected to gradually diminish the share of fossil fuels in China's energy mix. However, coal, oil and gas will still account for the bulk of it in the foreseeable future, that is, 82 per cent in 2030 (BP 2014b).

As of 2012, China held 13 per cent of the world's known coal reserves and accounted for 47.5 per cent of global production. Oil and gas are, contrariwise, of rather short supply in China. In 2012, the People's Republic produced 107 billion cum of gas and consumed 143.8 billion, a remarkable increase of nearly 600 per cent since 2000 (BP 2013b). The US Energy Information Administration (2014a) projects gas consumption in China to triple by 2040. Oil is, however, Beijing's largest external reliance. China became the world's second largest oil consumer in 2009 and is forecasted by some accounts to be the world's largest importer in 2014 (Energy Information Administration 2013a). By 2020, China is likely to meet 70 per cent of its oil demand through imports, as the *Petroleum Economist* reported on 22 August 2013. In short, rampant domestic consumption, pushed by the rapid pace of industrialisation and urbanisation, is outstripping domestic production, pushing Beijing to look abroad in order to ensure its energy security. Along with Central Asia and South America, sub-Saharan

Africa has emerged over the past decade as an important element within China's energy security strategy.

Although China has, until now, been able to feed its energy needs by buying on the international market, the sheer size of its domestic consumption has made it particularly vulnerable to price fluctuations and shortages caused by, for example, cartelisation and transportation disruptions. Continued economic growth, and ultimately social stability and the survival of the regime, has become increasingly reliant on securing energy resources overseas (Zweig and Jianhai 2005).

The first concerns regarding energy security emerged in the 1990s and the strategies developed then emphasised self-sufficiency, encouraging energy companies to expand domestic production (Meidan, Andrews-Speed and Xin 2009). The surge in domestic consumption and the subsequent increasing external reliance in the 2000s, however, demanded outward-oriented policies to ensure energy security. In addition to a gradual diversification of import sources, securing long-term supply contracts and the acquisition of producing assets abroad started to play an increasing role in China's strategy. In a quest to diminish over-dependence on a small group of large but unstable Middle Eastern suppliers, Beijing has increasingly been importing oil from other parts of the world. Although most of China's oil imports still come from the Middle East, sub-Saharan Africa has seen its share increase steadily over the past decade as a result of China's diversification effort. About 14 per cent of China's oil imports in 2013 came from Angola alone, currently the second largest single supplier of the People's Republic after Saudi Arabia. Much smaller quantities are purchased from Equatorial Guinea, Gabon, the Republic of the Congo, South Sudan and Sudan (Energy Information Administration 2014a).

Until recently, Beijing sourced most of its gas through pipelines from nearby neighbours, namely Central Asian countries and Russia. Strong investment in LNG terminals along

China's coast in recent years is rapidly changing this picture though, contributing towards an increasing share of LNG in imports and enabling Beijing to diversify its suppliers' basket. In 2012, already half of China's gas imports came as LNG. Nearly two-thirds of China's LNG imports originate presently from its maritime periphery, that is, Australia, Indonesia and Malaysia. China is also importing smaller quantities of LNG from countries further afield, such as Nigeria, currently its largest sub-Saharan supplier (Energy Information Administration 2014a). It is likely that, when new producers in East Africa come online, the subcontinent's share in China's LNG imports will increase substantially.

China also imports most of its coal from nearby Australia and Indonesia but, as its external reliance expands, the People's Republic will increasingly be pushed to diversify its supply sources. As massive coal and gas deposits in Mozambique, Tanzania and the Great Lakes region come on-stream, it is reasonable to expect that China will source more coal from this region.

One of the first instruments developed by Beijing to secure long-term supply contracts was the so-called infrastructure-for-resources loans. According to these agreements, partner countries, such as Angola and Nigeria, gain access to subsidised credit lines that they guarantee with revenues from the sale of crude oil (or other resources) to a Chinese company. The credits are used to pay for infrastructure to be built by Chinese construction enterprises, ranging from hospitals and housing to railway lines and cross-country roads. Most contracts signed in the context of infrastructure-for-resources loans cover a repayment period of 10 to 15 years with interest rates below commercial benchmarks. Through this financing model, China guarantees the repayment of the loan, secures business for its companies and ensures a steady supply of oil in the long term (Alves 2013a). In some countries (i.e. Angola, Nigeria), this type of deal has in in addition facilitated the acquisition of oil assets on the side lines of the loans (Alves 2011).Thus, these packages represent an advantageous economic statecraft

instrument serving the expansion of Chinese national oil companies (NOCs) in sub-Saharan Africa as they provide access to these markets without having to compete with established international oil companies (IOCs).

Another important instrument for China's overseas energy policy is the direct acquisition of assets, particularly oil acreage, by Chinese NOCs. Benefiting from strong political and financial backing, these enterprises have significantly expanded their hydrocarbon-exploration assets all over the world during the past decade. Their expansion gained momentum from the onset of the financial crisis in mid-2008 because Chinese NOCs are amongst the few global players with the liquidity to invest. Their mostly Western rivals have been forced to undo part of their assets or seek partnerships to develop new projects (Alves 2013b). Prior to the financial crisis, and as a latecomer in sub-Saharan Africa's fossil fuels, Chinese NOCs invested primarily in greenfield projects in marginal deposits, for example, in Chad and Niger, and non-conventional areas that either were marginalised by Western companies – most importantly Sudan/South Sudan – or suffered from severe infrastructure deficits, such as parts of Angola and Nigeria .

Three NOCs dominate China's rush for fossil fuels in sub-Saharan Africa: the China National Offshore Oil Corporation (CNOOC), the China National Petroleum Corporation (CNPC) and the China Petroleum and Chemical Corporation (Sinopec). CNPC has the longest and strongest presence in the region. It is involved in exploration and production of oil, refining, and pipeline operations. CNPC acquired its first sub-Saharan asset in Sudan in 1996, when Western companies withdrew because of the sanctions imposed against the al-Bashir government. CNPC constructed a 1,600 kilometre pipeline, linking the exploration wells in what is today the border region between South Sudan and Sudan to Port Sudan on the Red Sea. Within few years, the People's Republic became the main buyer of Sudanese oil and the

main investor in the country (Energy Information Administration 2013b). As Carlo Koos and Thea Gutschke explain in Chapter X of this edited volume, China is also a key player in South Sudan, which still depends on Sudan in order to access world markets.

CNPC's regional portfolio grew significantly in the 2000s. Today, it operates in Chad, Mozambique, Niger, Nigeria, South Sudan and Sudan. In the case of its Mozambican assets, the latest addition to CNPC's portfolio, the Chinese company benefitted from the lack of liquidity of their Italian competitor ENI, which was unable on its own to develop a massive gas project in northern Mozambique. CNPC acquired 28.6 per cent of ENI East Africa, gaining control of 20 per cent of Area 4 of the Rovuma Basin, which is estimated to contain nearly 2 trillion cum of gas, as the *Oil & Gas Journal* reported on 29 July 2013.

Despite CNPC's (2012) considerable portfolio in the region, sub-Saharan Africa currently accounts for a relatively small amount of its overseas business when compared to its operations in Central Asia and the Middle East. This situation may, however, change in the near future as projects under development come online and the company expands its footprint in the region. The growing thirst of the Chinese company for sub-Saharan assets is evidenced by its just mentioned acquisition in Mozambique, its largest ever in the continent with an investment volume of USD 4.2 billion.

As for CNOOC and Sinopec, despite having invested seven times as much capital abroad as CNPC in the last five years, their presence in sub-Saharan Africa remains modest. CNOOC holds assets in Equatorial Guinea, Gabon, Kenya, Nigeria, the Republic of the Congo and Uganda. Sinopec has invested in Angola, Cameroon, Ethiopia, Gabon, Nigeria, South Sudan and Sudan. Both companies concentrate largely on upstream operations, that is, exploration and production of crude oil and gas. Some of their assets date from the early 2000s, when the first infrastructure-for-resources loans were granted. The vast majority has, however, been acquired in the context of the global financial crisis:

- In 2009, Sinopec purchased the Canadian enterprise Addax Petroleum, which was then in need of a financial injection to expand its projects in Iraq and West Africa (CBC News 2009). The acquisition gave Sinopec access to considerable reserves and production in Gabon and Nigeria.
- Three years later, CNOOC (2013) acquired one-third of the UK-based Tullow Oil's exploration rights in Lake Albert, Uganda, as part of a farm-out deal designed to finance a USD 10 billion development project. The project in Uganda includes the construction of a refinery and a pipeline to the port of Mombasa, Kenya, on the Indian Ocean. Oil production there is expected to reach 300,000 barrels per day.
- In early 2013, CNOOC also bought Canadian NEXEN. NEXEN holds 20 per cent of the Usan Field off the Nigerian coast with a production capacity of 180,000 barrels per day.
- Just a few months later, Sinopec announced the imminent purchase of 10 per cent of an oil block in Angola from US-based Marathon Oil (Xinhua 2013). According to a report published in the *Oil & Gas Journal* on 31 January 2013, the block has a production capacity estimated at 150,000 barrels per day.

The two last-mentioned acquisitions also have to be seen in the context of the recent hydrocarbons boom in North America that is compelling Canadian and US companies to divest from overseas to fund projects at home as explained in Chapter X of this edited volume. When given the opportunity, Chinese NOCs clearly prefer to walk away from greenfield operations and rather invest in producing assets, mostly through mergers and acquisitions (Alves 2011). This strategy not only reduces the time required to develop assets and access assets with greater potential, but also enables Chinese companies to access expertise in terms of management, marketing and knowledge of markets and, more importantly, to cutting-edge technologies that they still lack. In this changing context, the authorities in Beijing face a puzzling dilemma: the need to nurture the autonomy of their NOCs to improve their

competitiveness in the international market and, at the same time, the need to maintain a level of control that ensures that these companies contribute towards the objective of energy security of China. At present, the overseas oil production of Chinese NOCs corresponds to only about one-third of the oil consumption deficit. Most of it is actually traded in the international market, having thus in reality a very limited contribution to closing the domestic gap in demand (Alves 2011). In addition, China's overseas oil production is still too small to shield China from market volatility by having a substantial impact on the supply side in the international market.

The period of crisis was also particularly prolific in new oil-backed infrastructure loans, suggesting that this remains a useful economic statecraft instrument for Beijing. Angola alone signed three new credit lines for infrastructure with China in 2010 and 2011: USD 3 billion with the China Exim Bank, USD 2.5 billion with the Industrial and Commercial Bank of China and USD 1.5 billion with the China Development Bank (CBD); only the CBD loan is not secured by oil revenue (Alves 2012). Nigeria concluded each a USD 3 billion loan for infrastructure with the China Exim Bank and the CBD in 2012 (AllAfrica 2013). A number of other loans for major development projects with new and upcoming oil producers are reportedly under negotiation, namely Kenya (USD 5 billion) and South Sudan (USD 8 billion) (BBC 2012).

Unlike previous loans, none of these has produced any collateral equity upstream for Chinese companies. Some of the new oil-backed loans seem to focus instead on paving the way for Chinese NOCs to penetrate midstream and downstream, without having to compete directly with other companies (Alves 2013a). In 2011, the government of Ghana signed a loan of USD 3 billion with the CDB to finance various infrastructures, including the infrastructure needed to develop the newly found offshore oil and gas fields. Sinopec was contracted for the construction of the gas infrastructure project, whilst China International United Petroleum

and Chemicals (Unipec), a subsidiary of Sinopec, signed an off-taker agreement with the Ghana National Petroleum Corporation to secure the loan repayment (Ghana Oil Watch 2012). The Nigerian National Petroleum Corporation has signed a memorandum of understanding with the China State Construction Engineering Corporation to build three refineries and an oil complex – a project that amounts to USD 28.5 billion and is to be funded by a consortium of Chinese banks (Amanze-Nwachuku 2013). A series of similar deals are in the pipeline, such as a joint venture between Sinopec and PetroSA to build a USD 10 billion oil refinery in Port Elizabeth with the capacity to produce 360,000 barrels a day, as *Business Day* reported on 26 March 2013.

In the coal sector, the scenario is very different. Chinese coal companies remain focussed on domestic operations justified by the magnitude of their national production, the sheer size of the internal market and the still relatively low external dependency of this commodity. Examples of Chinese investments in the coal sector in sub-Saharan Africa are rare. One of the few cases is the partnership between the Shandong Taishan Sunlight Group and Oldstone Investments in Zimbabwe. According to the agreement signed by the two companies in 2012, the Chinese will inject up to USD 2 billion in coal mining, coal bed methane extraction and power generation. A coal-fired power station built in the course of the Sino–Zimbabwean cooperation is scheduled to generate 600 megawatts of electricity by 2015. A coking coal plant will, according to official announcements, produce 300,000 tonnes of coke a year (Xinhua 2012). As domestic competition grows in the Chinese coal sector, investment overseas is likely to increase in ways similar to the just-mentioned case.

Brazil and Sub-Saharan African Fossil Fuels

Brazil is in a much more comfortable position than China with regard to energy. Brazil's energy generation has been rising faster than domestic demand in recent years. Its energy

matrix contains a large share of renewables – biofuels and hydropower account for 15.4 and 13.8 per cent of the used energy respectively (Empresa de Pesquisa Energética 2013). The domestic hydrocarbons sector is thriving, owing to the recent discovery of massive offshore deposits. Pre-salt layers off the coast of Rio de Janeiro are expected to contain 70 to 100 billion barrels of hydrocarbons. So far, 15 billion barrels, equalling 2.1 per cent of the known global reserves, have been proven there (BP 2013b). Brazil became a net-exporter of oil already in 2006. Experts predict the country's oil exports to increase by a factor of ten by 2030. By then, Brazil will have become Latin America's largest oil producer, surpassing both Mexico and Venezuela (BP 2014a). As a consequence, Brazil's engagement in sub-Saharan African energy markets is very different from that of China.

Since the oil shock in the 1970s and the ensuing drive to reduce external reliance by developing alternative energy sources, Brazil has been outstandingly strong in the biofuels sector. As a side-note, the South American emerging power has become the second largest producer of biofuels after the United States and possesses state-of-the-art upstream and downstream industries. This explains why the expansion of the biofuels industry is a priority in Brazil's energy agenda in sub-Saharan Africa and a very distinctive feature when comparing Brazil with China. Owing to geographical and climatic similarities, some sub-Saharan countries constitute a natural expansion ground in this regard. A number of investments are already in place such as a sugar plantation and associated refinery operated by Petrobras, the semi-public oil company, in Mozambique's Cabo Delgado Province and a sugar plantation run by Odebrecht, which is a major construction company, in in Malange Province in Angola.

The economic counsellor's offices at Brazilian embassies in sub-Saharan Africa and various other state agents – such as the Brazilian Agricultural Research Corporation (*Empresa Brasileira de Pesquisa Agropecuária*) and the Getulio Vargas Foundation (*Fundação Getulio*

Vargas) – have been particularly active in lobbying for the implementation of biofuels projects in order to open new markets, also for related services and technologies (Diplomat at the Brazilian embassy in Zambia, pers. comm., 14 July 2011).

Despite the headway in renewable energy, fossil fuels still account for 56 per cent of Brazil's energy matrix. Oil plays a dominant role with a share of 39.2 per cent, followed by gas with 11.5 per cent. Coal is of rather marginal relevance. It only contributes 5.4 per cent to Brazil's energy mix (Empresa de Pesquisa Energética 2013). Domestic oil consumption has nearly doubled over the past two decades, increasing from 1,478 barrels per day in 1990 to 2,805 in 2012 (BP 2013b). This growth in demand has, so far, been matched by the steady expansion of production in the Campos Basin, located offshore near Rio de Janeiro, and further deposits found in the nearby Santos Basin in the mid-2000s. These deposits are located more than 5,000 metres under the surface of the Atlantic Ocean and below a 2,000 metre thick salt layer. The huge technical challenges raised by this new exploration frontier have pushed Petrobras to the forefront of ultra-deepwater drilling technology.

Unlike the oil traditionally produced by Brazil, which is of heavy grades, the pre-salt oil is mostly light crude. Light crude oil produces more diesel/petrol and has less severe environmental side-effects than heavy crude oil. For Brazil, however, this presents a challenge because most of Brazil's refinery complex is geared towards processing heavy crude grades. For that reason, Brazil will continue importing heavy crude for some time, whilst it adapts its refinery complex to process light crude oil. Sub-Saharan Africa is currently Brazil's main source of imported oil, the bulk of it from Nigeria and small quantities from Angola, the two Congos and Equatorial Guinea (Agência Nacional do Petróleo, Gás Natural e Biocombustíveis 2013).

As noted, gas represents a small portion of Brazil's energy mix. It is, however, expected to rise in coming years as the Brazilian government decided to put in place gas-fired thermo-

electrical plants to reduce the overreliance of the electricity sector on hydropower, following several blackout incidents in the 2000s caused by severe droughts (BBC 2013). With a small production off and rising demand for gas, Brazil became a net importer of gas in 1997. It presently produces 17.4 billion cum and consumes 29.2 billion (BP 2013b). The bulk of its gas imports are currently sourced from neighbouring Bolivia.

However, in 2006, the Bolivian government forced Petrobras to renegotiate its long-term contract in the course of the renationalisation of Bolivia's hydrocarbon resources, making Petrobras pay considerably higher royalties. Concerned about the reliability of Bolivia as a supplier of gas, Brazil has built a number of facilities for processing LNG along the Atlantic coast, targeting the more expensive but secure production that is expected to come from the pre-salt deposits. Meanwhile, LNG imports have increased substantially, now comprising 22 per cent of Brazil's total gas imports. At present, most of this gas comes from Qatar (36 per cent) and Trinidad and Tobago (28 per cent). Nigeria is the main sub-Saharan African supplier, accounting for 15 per cent of Brazil's LNG imports in 2012 (Agência Nacional do Petróleo, Gás Natural e Biocombustíveis 2013).

Although, as said, coal plays a marginal role in Brazil's energy mix, coal imports are expected to nearly double until 2020 because of Brazil's thriving steel industry and ensuing demand for metallurgical coal (Reuters 2011). Brazil now sources most of its metallurgical coal from Australia and the U S. Domestic deposits are mostly of thermal coal, which is not suitable for steel production.

Unlike Chinese NOCs, Petrobras and Vale, which are the two major Brazilian players in sub-Saharan fossil fuels, are driven by profit and market considerations, not by long-term resource-seeking strategies.

The Brazilian government remains the majority shareholder of Petrobras and has a considerable indirect say in Vale. Under the Lula presidency, state intervention in the

economy increased considerably. The successive governments of the Workers Party (*Partido dos Trabalhadores*) have also pursued a pro-active African agenda, supporting the expansion of Brazilian enterprises into Africa (Alves 2013c). However, Petrobras and Vale are also accountable to private shareholders that are completely detached from the government. Hence, Petrobras, Vale and numerous other Brazilian companies that are not tied at all to the state do not seek primarily to pursue a national strategy for energy resources. They position themselves on the global market, acquiring assets that are geographically close to Asia's emerging markets, in particular China and India. Therefore, they apply corporate strategies, in particular greenfield investments, mergers and acquisitions, and bidding in open-licensing rounds. Brazil's economic statecraft and the commitment of its government to Africa play, at best, a secondary role. Petrobras ventured in hydrocarbons in Angola and Nigeria on its own many years before the Brazilian government shifted its foreign policy focus to Africa. What is more, Petrobras and Vale have been sourcing funding for their operations from capital markets, particularly after they were publicly listed in the 1990s (Alves 2013c).

Until recently, the lack of a pressing national interest and the scarcity of financial resources impaired the development of comprehensive instruments by the state to support the expansion of Brazilian companies overseas (de Abreu Campanario, Stal and da Silva 2012). The Brazilian National Development Bank (*Banco Nacional de Desenvolvimento Econômico e Social*, BNDES) has favoured, in some cases, resource revenue as a guarantee for its export credits. Oil-backed credit lines have existed with Angola since 2004. They are worth USD 5.2 billion. The BNDES is interested in applying this same guarantee formula to its credit lines to Mozambique, which is about to become a major exporter of coal, and also to Ghana using oil revenue (Official of the BNDES's International Department, pers. comm., 23 May 2012). However, the resource-backed credits provided by the BNDES are not tied to long-term supply contracts for Brazilian companies as is the case for the Sino–African

infrastructure-for-resources agreements. As overseas investment becomes increasingly critical to improving the competiveness of Brazilian companies, stronger financial support from state institutions should be expected. For example, the Brazilian government is considering the creation of both an export-import bank, to encourage foreign trade and investment, and a sovereign wealth fund, to channel some of Brazil's foreign exchange reserves into new investment opportunities abroad (de Abreu Campanario, Stal and da Silva 2012).

Against this background, it is not surprising that Brazil's footprint in sub-Saharan fossil fuels is less impressive than China's but still sizeable. The first assets, which were acquired by Petrobras in Angola, date back to the late 1970s. Brazil's interests in sub-Saharan hydrocarbon explorations have, however, expanded considerably since the beginning of this century, pushed largely by the globalisation drive of Petrobras. Sub-Saharan Africa – Angola, Benin, Gabon, Namibia and Nigeria, to be precise – is the second largest regional destination for Petrobras's investments after South America. In Angola, Petrobras has stakes in six offshore oil blocks. It holds operatorship in three of them, but only one is in production. In Nigeria, where Petrobras ventured in 1998, it holds non-operatorship stakes in two oil blocks in the Niger Delta.

Only in 2009 and 2010 did Petrobras shift its investment to the new oil frontiers emerging in the region. It got a foothold in the massive offshore gas field in East Africa through the acquisition of 50 per cent of the shares of two hydrocarbon blocks in Tanzania, which are expected to contain 1.7 trillion cum of gas. Based on its competitive technological advantage, it also acquired a number of stakes in promising pre-salt deposits: a 50 per cent stake in a pre-salt block in southern Namibia, with the option of assuming the operatorship; a 50 per cent non-operator stake in a block off the coast of Benin; and 50 per cent operatorship stakes in

two blocks off the shore of Gabon. Most of these fields are still undergoing seismic studies and exploratory drilling.[2]

Currently Petrobras generates only 6 per cent of its oil production abroad, that is, 151,077 barrels per day. The company has nonetheless a large number of operations scattered across several countries. The Americas, excluding Brazil, account for 60 per cent of its non-domestic production (89,000 barrels per day), whereas the entire African continent accounts for 40 per cent, coming from only two countries: Nigeria (58,000 barrels per day) and Angola (2,000 barrels per day) (Wertheim 2012). Petrobras was forced to halt its buying spree suddenly in 2012 when its domestic investment requirements bulged as a result of the decision of the Brazilian government to enlarge Petrobras's responsibilities in the development of the Brazilian pre-salt deposits. In line with this new focus, the company signed an agreement in 2013 with BTG Pactual, a private Brazilian investment group, to set up a joint venture to take over the assets of Petrobras in sub-Saharan Africa. Through this vehicle, the company plans to uphold and expand its current investments in the region.

Following in the footsteps of Petrobras, a number of private Brazilian companies have recently invested in sub-Saharan Africa, for example Cowan Petróleo e Gás and HRT Participações em Petróleo SA, which, by capitalising on their pre-salt expertise and technology, have acquired stakes in Namibia's offshore fields. They are presently prospecting for hydrocarbons there, as reported by the *Allgemeine Zeitung* and *The Namibian* on 13 June and 11 January 2013 respectively.

With regard to coal, Brazil has a much more substantial presence than China in sub-Saharan Africa. Vale, one of the largest mining companies in the world, not only mines minerals but also operates railroads, ports and power stations that are integrated with its mining operations.

[2] For further information see: http://www.petrobras.com/pt/quem-somos/presenca-global/.

Vale's Moatize project in Mozambique (Tete Province) is its largest investment in sub-Saharan Africa. Vale acquired a 26-year licence to mine coal from the Mozambican government in 2006. The output of Vale's mine is presently transported via the Sena Railway Line to the port of Beira. In 2011, Vale's board of directors approved the second phase of Moatize, which includes increasing production capacity to 22 million tonnes a year; the construction of a new deep sea port in Nacala; and the rehabilitation of a railway line that connects Nacala to Moatize. Chapter X of this edited volume analyses the recent resource boom in Mozambique more closely.

The coal mined in Moatize is 70 per cent metallurgical, which means that it can be used for steel production. For this reason, most of it will be sold to the booming Chinese and Indian economies, which are relatively easy to reach via the Indian Ocean. This project is a valuable asset for Vale as it also complements its iron ore business. Beyond Mozambique, Vale is active in Angola, where it carries out seismic studies, in Guinea, where it mines iron ore, and in the Congolese–Zambia border region, where it mines cobalt and copper.[3] Vale has opened the door for many other Brazilian enterprises to enter sub-Saharan markets. This is the case for Camargo Correa and Odebrecht, which are – with funding from the BNDES – building some of the infrastructure for the transport corridor from Tete Province to the aforementioned port of Nacala in the Indian Ocean (Scholvin and Plagemann 2014).

Conclusion

Energy security concerns, particularly China's growing external reliance on oil, are evidenced by growing oil imports from sub-Saharan Africa and the fast expansion of Chinese NOCs in the region. Whilst there are clear signs that Chinese state-owned enterprises are

[3] For further information see: http://www.vale.com/PT/aboutvale/across-world/Paginas/default.aspx.

investing heavily in hydrocarbon exploitation across the region, a similar development in the coal sector can reasonably be predicted but is yet to materialise. Because China is a latecomer on the subcontinent, with expertise and technologies still far short of that of its Western competitors, the success of Chinese incursions initially seemed to be interlaced with China's economic statecraft, namely the extension of credit lines to sub-Saharan African governments for infrastructure development and niche investment. However, Chinese companies have become increasingly confident in venturing out on their own. The main catalyst for this change was the 2008 financial crisis that left most of their Western rivals short of capital.

As Chinese companies expand their operations in sub-Saharan Africa, they also increase their exposure to challenges, criticism and new business models. This has led to a learning process that is transforming China's modus operandi in sub-Saharan Africa. The strategies of Chinese NOCs are increasingly driven by commercial interests, namely profit, acquisition of expertise and cutting-edge technologies – sometimes to the detriment of energy-security considerations. Proof of this is the fact that most of the overseas production of Chinese NOCs is sold on the international market rather than sent to China, where fuel prices are subsidised (Downs 2011), resulting in smaller profit margins.

As the NOCs become more autonomous from the government, they are increasingly expected to resemble their competitors, such as those from Brazil, in terms of their management, objectives and strategies. This does not mean, however, that China will stop supporting the internationalisation of its companies. On the contrary, the recent wave of credit lines granted by China suggests that this will continue to be an important instrument in the promotion of business expansion of its NOCs abroad, especially downstream.

Unlike their Chinese counterparts, Brazilian hydrocarbon and coal companies have followed a corporate strategy from the very start, to a great extent explained by their different ownership structure and Brazil's energy context. Political and financial support plays a much

smaller part in the expansion of these companies in sub-Saharan Africa. Business opportunities and opening new markets matter, rather than the need to secure resources on behalf of the state. As Brazil's economy grows, Brasília is belatedly attempting to set up diplomatic, financial and institutional instruments to back the expansion of its companies overseas. It is, however, much less motivated to do so than its Chinese counterparts. Its decision to force Petrobras to develop the hard-to-exploit domestic pre-salt resources has caused a tremendous backlash for the overseas expansion of the parastatal.

There are, nonetheless, a number of similarities between China's and Brazil's investment in fossil fuels in sub-Saharan Africa. As with China, Brazilian credit lines to sub-Saharan countries appear to favour resource-backed financing models and target infrastructure development. They are also tied to the procurement of services and equipment in Brazil. Sub-Saharan Africa will see more investment in fossil fuels from emerging economies that have an energy deficit, in particular China, than from self-sufficient emerging economies, such as Brazil, which have fewer incentives to invest in sub-Saharan oil assets and are more likely to concentrate on developing their domestic potential. However, whilst emerging economies that run short of energy resources have increasingly deep pockets, in most cases they lack the expertise and technologies necessary to develop unconventional deposits. This is where Brazil, and perhaps also other emerging economies that have domestically gained experience in exploiting unconventional deposits, will retain some leverage despite a lack of strategic incentives to acquire resources abroad.

What remains to be examined in depth is, hence, the potential for and the reality of cooperation between energy companies from emerging economies drawing on their apparent complementarities. As explained in this chapter, Brazil has the expertise and technologies that Chinese NOCs lack. The Chinese on the other hand possess the necessary capital to develop the untapped fossil fuel deposits of sub-Saharan Africa. Such potential new forms of

cooperation can be expected to have a tremendous impact on sub-Saharan Africa in a context where established IOCs from the West appear to be withdrawing given their insufficient liquidity and the shale gas boom in the U S and, possibly, also in Europe. However, the geopolitical and economic implications of this new reality for the region are yet to be ascertained.

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