

UNCLASSIFIED  
MAY 2018



## FOREIGN INVESTMENT IN AFRICAN ENERGY

Mercyhurst University

ANALYSTS IN NATIONAL SECURITY 627:

Tucker C., Alyssa F., Harry G., Chelsie K., Rebecca M., Robert Ogum.,  
Bereket T., Logan W.,



## Contents

GEOSPATIAL ANALYSIS .....	9
OVERVIEW .....	22
China’s Short and Long-Term Plans/Interests in Africa .....	22
Horn Of Africa Likely To Become China’s Substantial Focus In Future Investments .....	25
COUNTRY STUDIES .....	28
Angola .....	28
Ethiopia .....	31
Kenya.....	35
Nigeria .....	38
Uganda .....	41
Democratic Republic of Congo.....	44
Egypt.....	47
Ghana .....	51
Sudan.....	54
Zambia.....	57
Zimbabwe.....	60
Equatorial Guinea.....	64
Tanzania .....	67
PROSPECTIVE PROJECTS.....	70
China Likely To Invest in Batoka Hydropower Project .....	70
ANNEXES .....	73
Annex 1: Confirmed Chinese Projects.....	73
ANNEX 2: Confirmed Russian Projects .....	77
ANNEX 3: Cancelled/Unconfirmed Projects.....	78
ANNEX 4: Ethiopia ACH .....	79
ANNEX 5: One Belt, One Road .....	80
ANNEX 6: Source Countries of China’s Oil imports 2014 .....	<b>Error! Bookmark not defined.</b>
ANNEX 7: Egypt .....	<b>Error! Bookmark not defined.</b>
ANNEX 8: Equatorial Guinea Information .....	<b>Error! Bookmark not defined.</b>

# Foreign Investment in Africa's Electricity Infrastructure

## Terms of Reference

**Prepared for:** National Geospatial Intelligence Agency

**Provided by:** Mercyhurst University, National Security Class (INTL 627)

**Production Date:** May 2nd, 2018

### Background

Within the last decade, Africa has experienced significant growth across various economic sectors. The growth is the result of foreign investment flowing into the continent. China accounts for a significant amount of the foreign direct investment in Africa across a broad range of industries including oil, mining, agriculture, infrastructure, telecommunications and energy. Russia has also taken an interest. Like China, Russia has invested significantly in projects across Africa, with a focus on resource extraction. Both China and Russia are important trade partners for African nations, accounting for a large percentage of African exports, especially in raw materials, including oil and metals. The African continent is home to some of the largest untapped reserves of natural resources, including oil, gas, and minerals, making it an attractive investment location for resource-hungry foreigners. In addition, Africa is home to some of the fastest growing economies in the world and has the potential to match Eastern Europe in overall GDP.

Africa's energy industry has potential, as the continent accounts for significant percentages of global hydropower, wind power and solar energy reserves. These foreign powers are willing to feed the continent's need for development in exchange for influence and resources. In late 2017, Russia committed to building nuclear power plants in Nigeria and Egypt. China also has ongoing hydroelectric projects in Nigeria, Cote d'Ivoire, Uganda, Zimbabwe, Angola and the Democratic Republic of the Congo. China also assisted in the development of an electricity transmission system in Ethiopia, laying a solid foundation for energy interconnection throughout East Africa. Africa's energy development and infrastructure presents a clear opportunity for foreign powers to invest and retrench themselves as invaluable foreign partners on Africa's path towards global relevance.

The National Geospatial Intelligence Agency (NGA) tasked the team with providing an in-depth analysis of foreign investment in African electric power, with a focus on monetary amounts, location, influence and motivations.

Project Location	Mercyhurst University, Erie, PA
Project Name	Foreign Investment in Africa's Electricity Infrastructure

Project Duration	19 January 2018 – April 2018
Dissemination Date	May 2nd, 2018
Agency	Prepared for National Geospatial Intelligence Agency

### **Objectives**

The analyst team will identify foreign powers actively investing in Africa's electric power. The team will assess the foreign investments' monetary amount, location, influence, and motivation. The team will apply analytic methods to assess the foreign investments in Africa.

### Intelligence Requirements

The following key questions and points shall guide the analysts during this component of the assessment:

- How does electric power contribute to African economies? What is supply vs. demand, and how does imbalance impact them?
- Characterize what the foreign partner's motivation is for each individual investment, if possible. Motivation meaning – is this humanitarian, profit-making, political, prestige, etc.
- Who is investing in electric power in Africa, in what countries are they investing, and how much capital are they investing? (Interested in the host country's investment, and also foreign partners). Priority will be placed on Chinese investments and projects.
- An estimate of future investment in Africa, focusing on Chinese investment.
- Level of influence meaning – are they controlling and operating, only financing, only constructing, or a combination of the three?
- Why is Chinese investment greater in the horn of Africa?

### Methodologies

The analysts expect to apply several structured analytic techniques, including:

- Analysis of Competing Hypotheses (ACH)
- ArcGIS

### **Scope**

The team will provide strategic analysis regarding foreign country investment and development activities in Africa. The team will focus on the actions of major foreign investors first. In regards to investment, the analysts will look closely at Chinese investment.

### **Products**

The analysts expect to complete the following analytical products by 2 May 2018.

UNCLASSIFIED

- Written analytic product, including charts, graphs, infographics, and other supplementary imagery
- PowerPoint briefing
- Archive of sources and source reliability

UNCLASSIFIED

**Analytic Confidence:**

Our overall analytic confidence for this assessment is moderate. Source reliability ranged from high to moderate, with some low reliability sources. The task was completed under adequate time constraint. Analysts' subject matter expertise is moderate. The complexity of the task was moderate. Analysts used analytic methods such as Geospatial Analysis and Analysis of Competing Hypotheses.

## KEY FINDINGS

**Chinese investment in Africa will likely continue to increase.** China is the foreign power most actively investing in Africa's electric power. Countries with the highest amount of financing from China were the focus of this study. Locations of the countries with the highest amount of Chinese investment were in the Western Africa, Central Africa, and the Horn. Chinese motivations for investment are strategies that focus on natural resources, markets for exports, and increased political influence. The average Chinese financed value of projects between 2000 and 2018 was USD 219.854 million. Between 2018 and 2025, projects in this time span, the average financed value increases to USD 1017.19 million. The average cost of projects in this time period is 5 times greater suggesting a continued increase.

**It is highly likely that the Chinese government will continue to encourage Chinese banks and companies to jointly build and finance energy projects in Africa.** We found that 74 projects were both built and financed by China, accounting for 62% of all Chinese projects in Africa. Our findings are consistent with other reporting. The Export-Import Bank of China often requires Chinese companies be hired as a contractor or subcontractor as a condition for financing.

**Electric power contributes to African economies mostly through the powering of the mining industry and other exports to China.** Valuable minerals have helped drive African economies and GDP growth. China is the main destination of imports of the majority of African countries of this study. This electric power is contributing to the production of goods and materials that are exported to China. The electric power is mostly contributing African economies, not the electrification of rural areas which continue to have low rates of access to electricity.

**Current electric supply is not meeting the demand in the majority of African countries.** China's investments in energy projects will increase the electric power in these countries. However, power demand in most countries will not reach the desired need. Rural areas receive a substantially lower amount of electrical power than urban areas do as a result of a lack of connected transmission grids.

**The motivation for Chinese investments in Africa are overarching strategies that focus on access to natural resources, new markets for exports, and increased political influence.** China needs large amounts of natural resources to continue its dominance in manufacturing. The investments in African countries provide these resources while also enabling political influence in these countries that they are helping by providing jobs, increasing access to power and much more. With increase political influence in these countries, it opens new markets for Chinese exports as foreign investments are likely to improve the buying capability of citizens in several of these countries.

**A majority of the project were both built and financed by the Chinese.** Financing included concessional loans. Building included a Chinese contractor or Chinese equipment. Turnkey - give key over or manage until it is paid off.

**The Belt and Road Initiative (BRI) is likely to continue playing a role in Chinese investment within Africa due to routes and access to markets.** The initiative is a modern version of the old Silk Road trade routes that links China with a network of countries in Europe, Asia, and Africa. The infrastructure projects in Africa relating to this initiative provide Chinese companies with work and connects them with markets starving for economic enrichment. The initiative is likely to continue fueling Chinese investments despite the debt concerns that have surfaced about the initiative in certain African countries.

**The Nile River is a critical motivating factor for future Chinese investments in the horn of Africa.** The lack of energy power presents an opportunity for China to become a pivotal player and harness development in the region. The Nile River is a valuable and efficient economic resource which will lead to economic growth in the horn. Geopolitical issues have risen in the region over water supply between Ethiopia and Egypt.





High Priority	Medium Priority	Low Priority
Ethiopia	Egypt	Tanzania
Nigeria	DRC	Equatorial Guinea
Angola	Zambia	
Uganda	Zimbabwe	
Kenya	Sudan	
	Ghana	

## GEOSPATIAL ANALYSIS

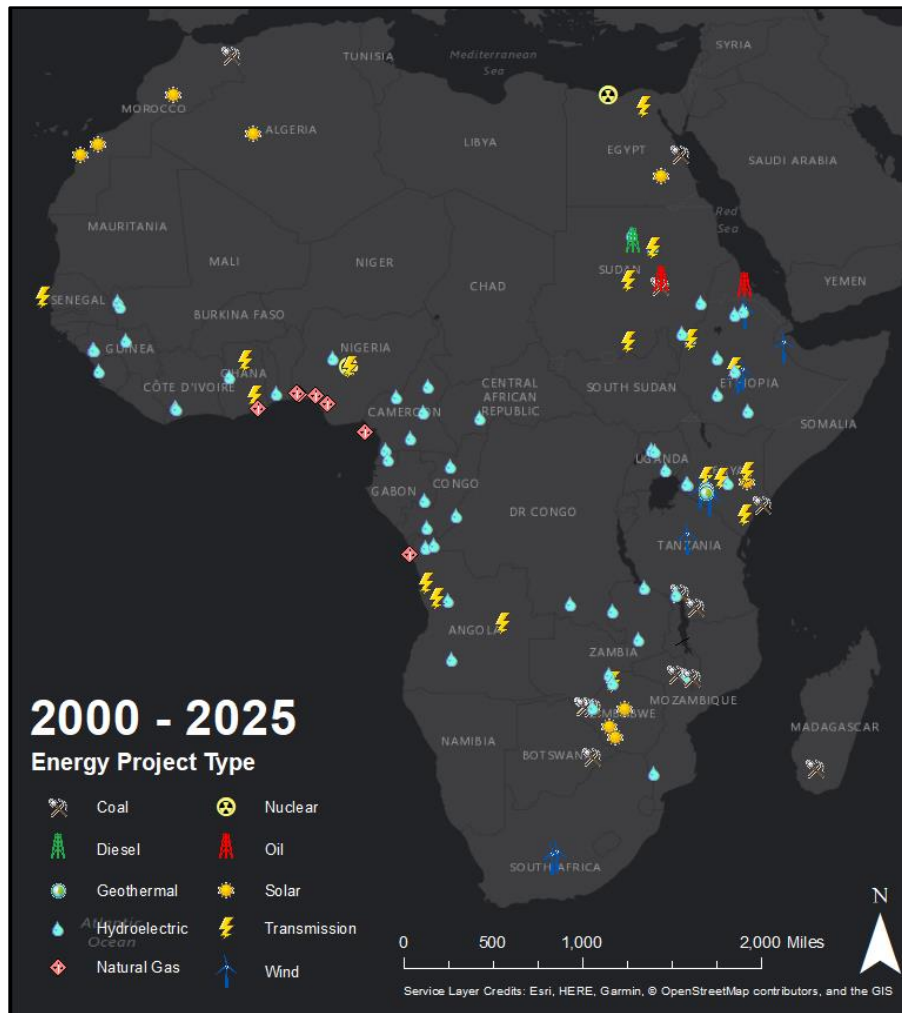


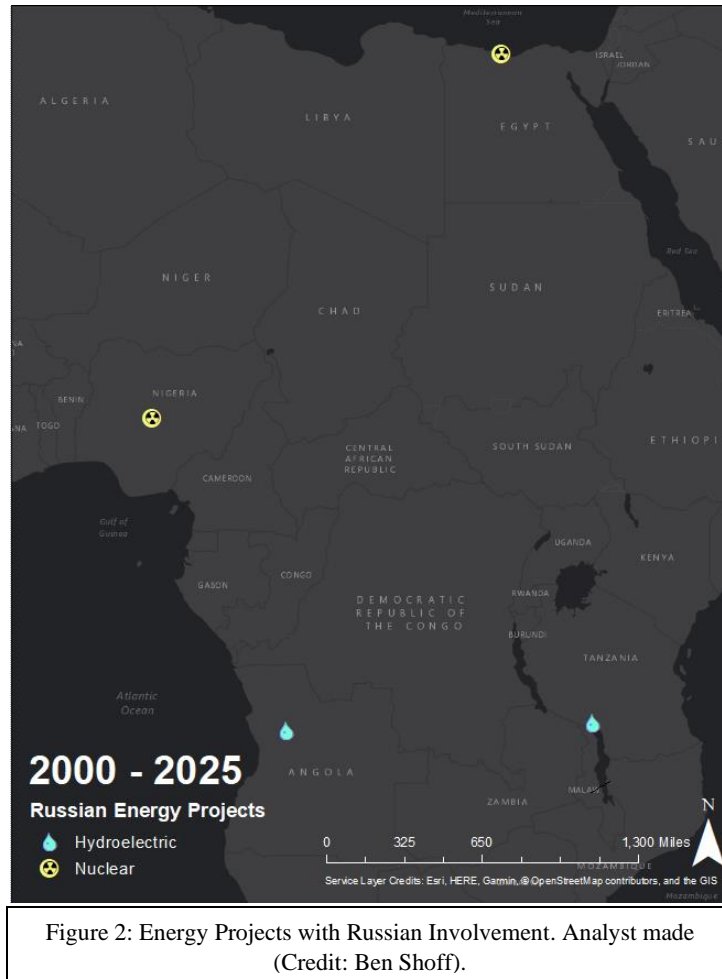
Figure 1: Energy Projects in Africa by Energy Type. Analyst made (Credit: Ben Shoff).

The analyst identified and confirmed the existence of 125 energy infrastructure projects in Africa. The range of the research starts with the construction of the first project in 2000 and ends with the estimated completion of the last project in 2025. China was or is currently involved in the financing and/or construction of 119 energy projects. Russia was or is currently involved in the financing and/or construction of 4 energy projects. Ethiopia, Kenya, and Sudan had the largest number of projects, with 16, 13, and 11 projects respectively.

**NOTE:** In the raw data, the analyst discovered 135 projects (See Figure 1). In 10 projects insufficient information was available to confirm Chinese involvement. These

projects were not included in visualizations. The data for unconfirmed projects can be found in Annex 3.

China was involved in 2 projects that were cancelled during the construction phase. These projects are not recorded in China's count and are not included in visualizations. The data for cancelled projects can be found in Annex 3.



The Russian government has limited overall involvement in energy infrastructure development on the continent (See Figure 2). Of the 4 projects, 2 are nuclear projects and 2 are hydroelectric projects.

In 2017, the governments of Nigeria and Egypt signed Memorandums of Understanding with Rosatom to build nuclear power facilities. The Russian government is providing USD 25 billion in financing for the construction of the Egyptian facility at Al Daabaa located 130 km west of Cairo, which will cost up to USD 30 billion to develop.<sup>1</sup> The agreement in Nigeria may include up to 4 power plants and 2 sites have been located to date.<sup>2,3</sup>

Russian firms were involved with the construction of the Capanda Dam in Angola and the Rumakali Dam in Tanzania. The Russian government did not finance either project. Capanda Dam was completed in 2007 by Technopromexport. Rumakali Dam is under construction and scheduled for completion in 2018. Rumakali Dam is being built by Zarubezhstroy.

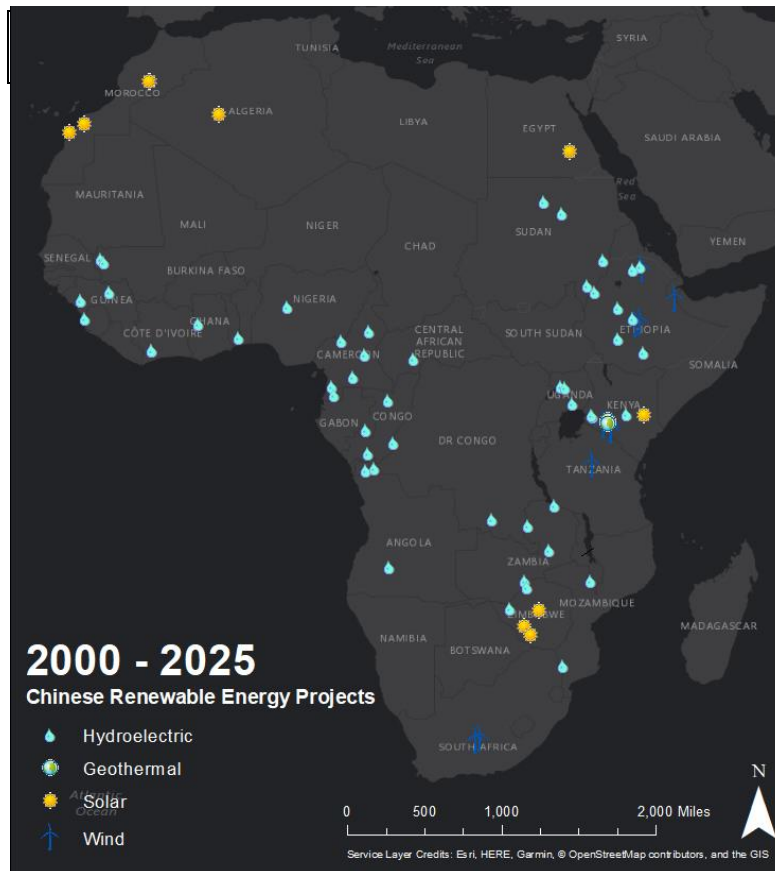


Figure 3: Renewable Energy Projects with Chinese Involvement. Analyst made (Credit: Ben Shoff).

Of the 119 Chinese projects that were identified and confirmed, 75 projects were renewable energy projects (See Figure 3).

China has been heavily involved in hydroelectric power generation dams abroad. Major hydropower projects are under construction or planned on major continental waterways including along the Nile River (and its tributaries), the Congo River, and the Zambezi River. China has been involved with the completion of 32 projects between 2000 and 2018. As of the publishing date of this report, China is involved with 21 projects that will be completed by 2025.

Wind and solar projects make up 18% (22/121) of all projects and is a growing sector for Chinese investment on the continent. Between 2000 and 2018, China built 4 solar and 6 wind power projects. By 2025, China will complete another 7 solar and 5 wind projects.



Non-renewable energy projects consist of a minority of projects in Africa. Coal and natural gas make up 20 of 23 projects (See Figure 4).

Natural gas projects are concentrated around the Gulf of Guinea, which has reserves of oil and natural gas.<sup>4</sup> Of the 7 natural gas projects, 6 have been completed and 1 is under construction.

Coal projects are located primarily in Southern Africa, where there are moderate concentrations of coal deposits.<sup>5,6</sup> Of the 13 coal projects, 4 have been completed, 1 is proposed, 7 are planned, and 1 is under construction.



Figure 5: Transmission Projects with Chinese Involvement. Analyst made (Credit: Ben Shoff).

China is involved in the development of high-voltage electricity transmission expansion projects (See Figure 5). In total, 18 transmission projects were discovered. The country with the highest number of projects is Kenya, with 3 completed and 1 currently under construction. Angola and Sudan each had 3 projects. All of the projects in Angola and Sudan have been completed.

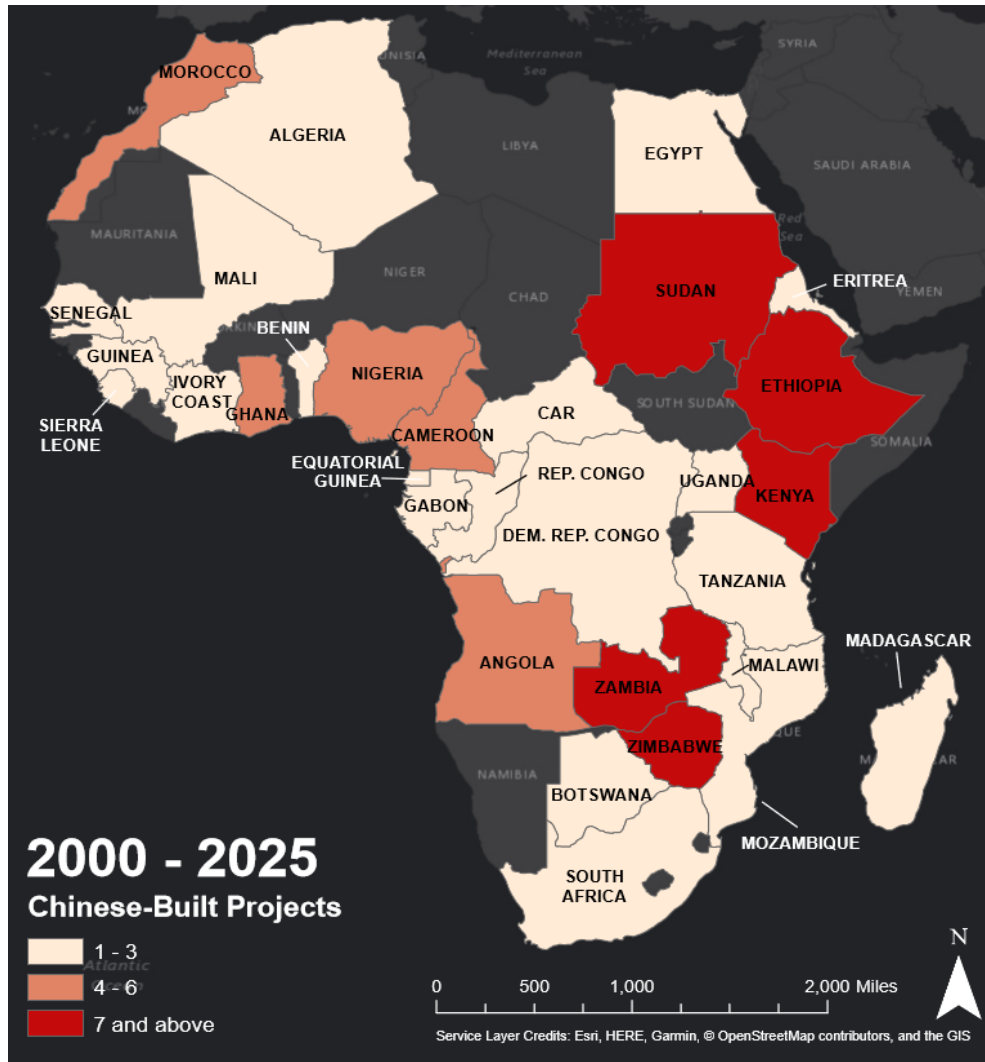


Figure 6: Number of Chinese Built Projects by Country. Analyst made (Credit: Ben Shoff).

From 2000 to 2025, Chinese companies have been or will be involved in 114 projects across Africa (See Figure 6). Thirty eight Chinese companies are engaged in both financed and unfinanced projects. Thirty one of the companies are state-owned companies, either at the national or provincial level. Chinese companies have been involved with the construction or procurement of equipment primarily in Sudan, Ethiopia, and Kenya, with 7 or more projects in each country.





Figure 7: Number of Chinese Financed Projects by Country. Analyst made (Credit: Ben Shoff).

Chinese development banks have provided financing on 81 of the 119 projects. A majority projects were located in Ethiopia and Kenya, with 11 and 9 projects receiving financing from China. Other countries with a moderate number of projects include Angola, Ghana, Nigeria, Sudan, Zambia, and Zimbabwe (See Figure 7).

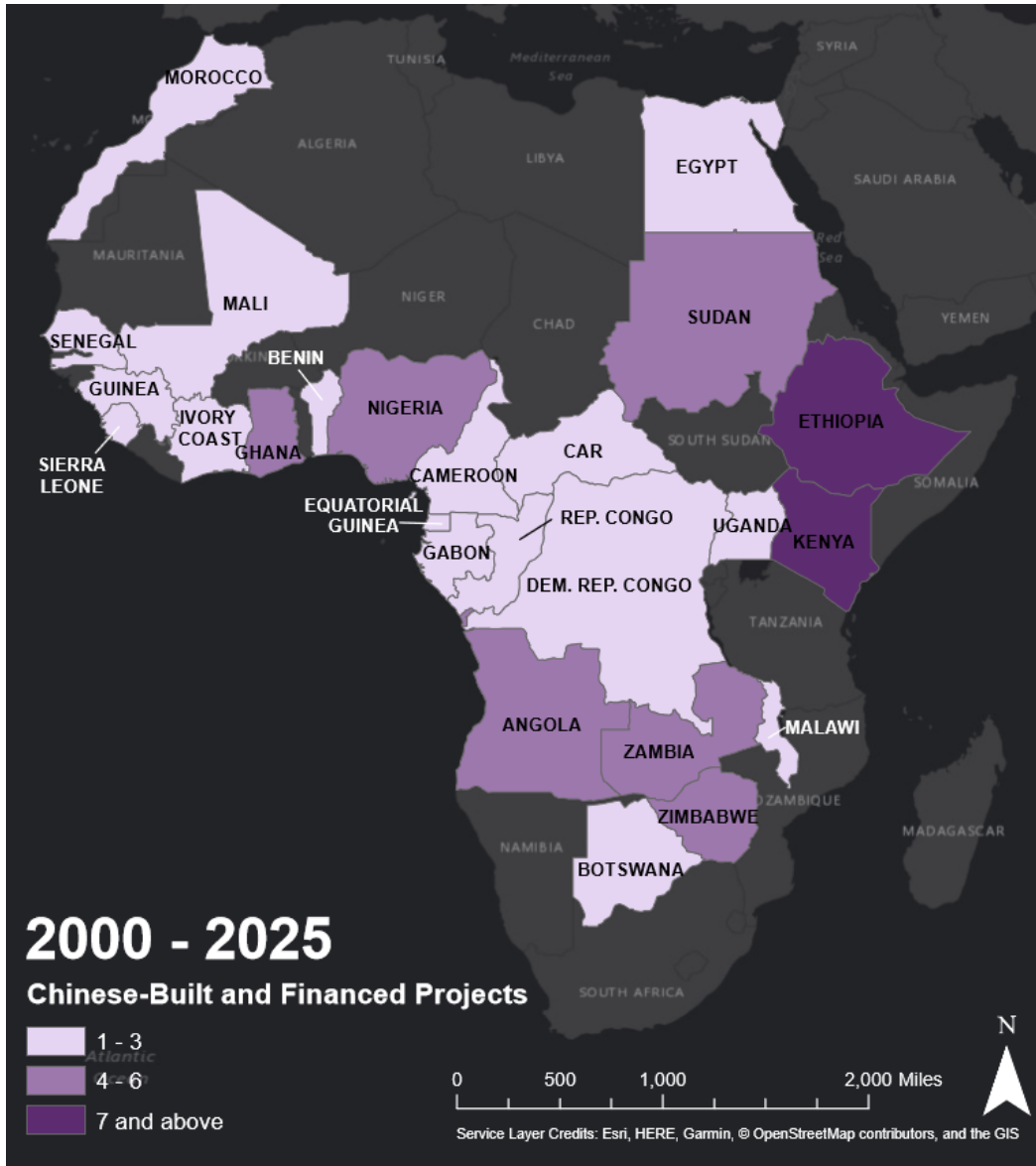


Figure 8: Number of Chinese Built and Financed Projects by Country. Analyst made (Credit: Ben Shoff).

Projects that are being both built and financed by Chinese banks and companies account for 74 of the projects. A majority of projects are located in Ethiopia and Kenya, with 10 and 8 projects respectively. Other countries with a moderate number of projects include Angola, Ghana, Nigeria, Sudan, Zambia, and Zimbabwe (See Figure 8).

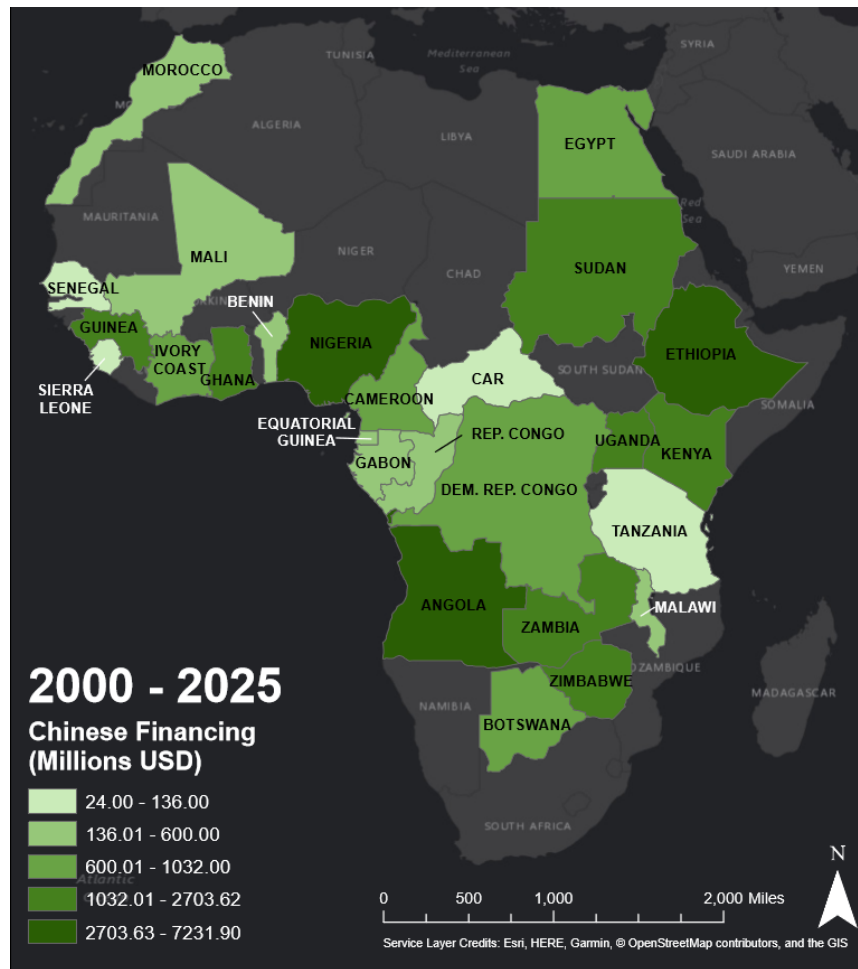


Figure 9: Total Amount of Financing from China by Country. Analyst made (Credit: Ben Shoff).

Figure 9 shows the concentration of confirmed Chinese financing by country from 2000 to 2025. Angola, Ethiopia, and Nigeria record the highest amount of financing with USD 5,043.03 million, USD 3,936.17 million, and USD 6,691.90 million respectively. Ghana, Guinea, Kenya, Sudan, Uganda, Zambia, and Zimbabwe record financing between USD 1,000 and USD 2,700 million.

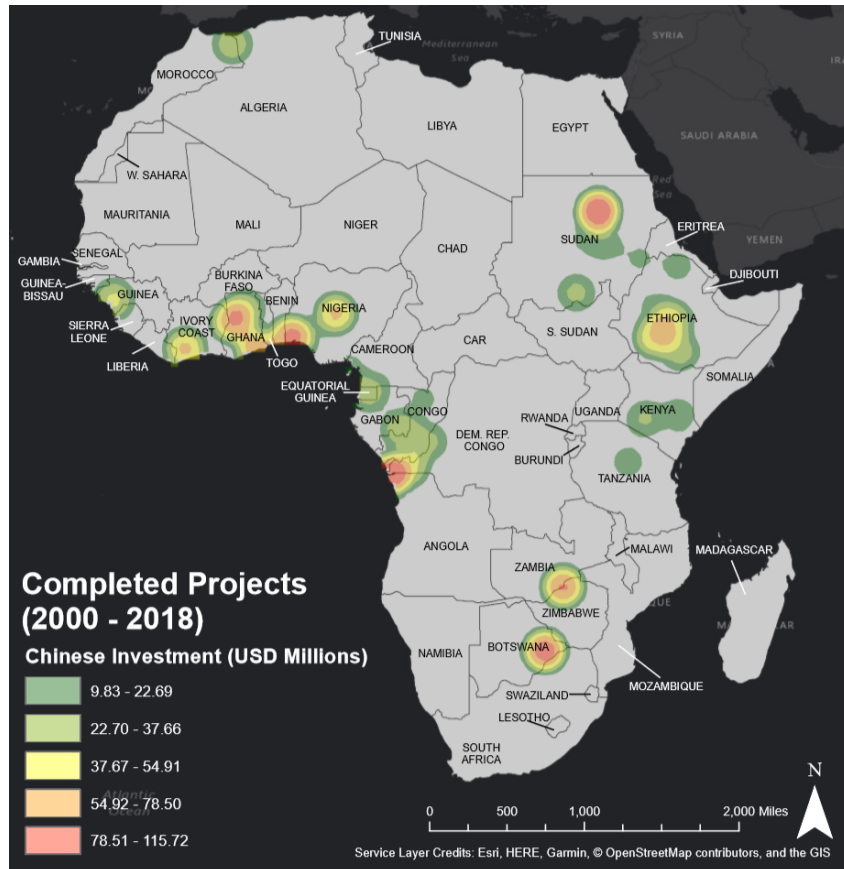


Figure 10: 2000-2018 Kernel Density of Projects by Financing Value. Analyst made (Credit: Ben Shoff).

Figure 10 shows the kernel density weighted by confirmed projects, financed by China between 2000 and 2018. The scale is broken into five categories using Jenks natural breaks. Financing values below USD 9.83 million were excluded for clarity. Red shading indicates high levels of investment in a clustered geographic location, while orange and yellow shading indicate moderate levels of investment.

Between 2000 and 2018, high concentrations of financing are visible in Democratic Republic of Congo, Botswana, Ethiopia, Ghana, Nigeria, Sudan, and Zambia/Zimbabwe.

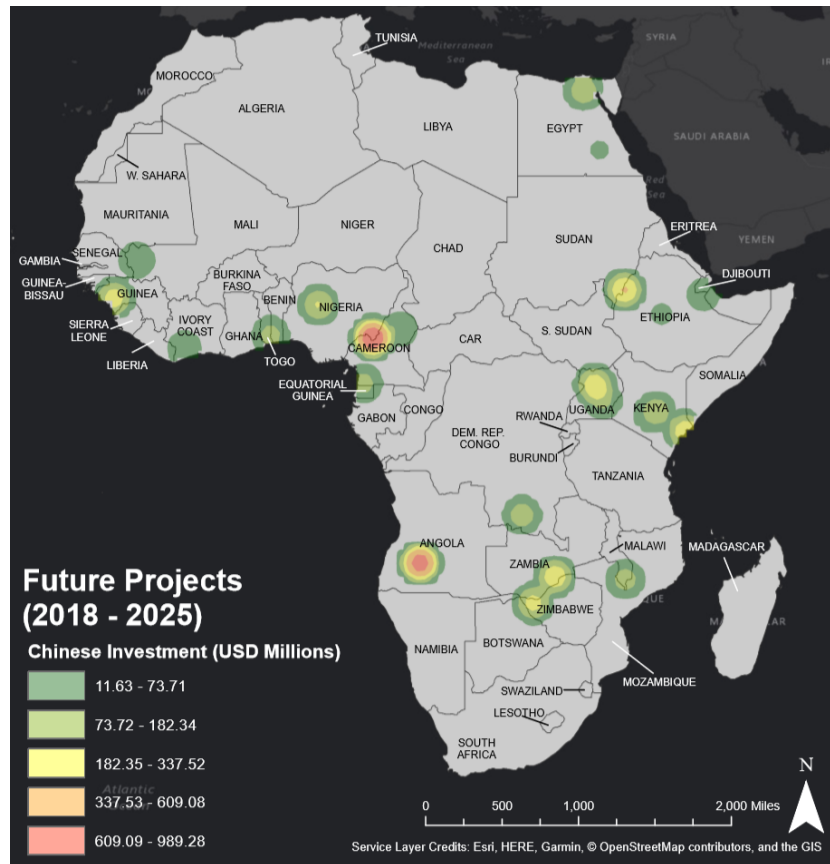


Figure 11: 2018-2025 Kernel Density of Projects by Financing Value. Analyst made (Credit: Ben Shoff).

Figure 11 shows the projected kernel density weighted by confirmed financing values for Chinese-financed projects from 2018 to 2025. The scale is broken into five categories using Jenks natural breaks. Financing values below USD 11.63 million were excluded for clarity. Red shading indicates high levels of investment of project in a clustered geographic location, while orange and yellow shading indicate moderate levels of investment.

The change in the scale is due to both a projected higher number of projects and an increase in investment. From 2000 to 2018, 72 total projects were completed in comparison to the 47 projects that are committed, proposed, planned, or under construction. The average value of projects between 2000 and 2018 was USD 219.864 million. The average value of projects between 2018 and 2025 is USD 1,017.79 million.

High densities in Angola and Uganda suggest a growing interest for Chinese financing. Nigeria continues to be a high-density location for financing, indicating the country's long-term importance to China.

Other areas of continued importance, indicated by yellow shading, include Ethiopia, Kenya, Zambia/Zimbabwe, and Guinea.

**Analytic Confidence:**

Analytic confidence for this assessment is moderate. Overall source reliability is moderate. A majority of sources corroborated. Data sources include William and Mary's AidData database, International Rivers Dams database, World Resources Institute Global Power Plant, SourceWatch, EndCoal Coal Plant Tracker, AEI China Global Investment Tracker. Other data included comes from primary sources and secondary reporting from international, national and local news sources of high to moderate reliability. The analyst's expertise is low. Geospatial analysis was used by applying data to ArcGIS. The task complexity is high and the time available for the task was adequate.

## OVERVIEW

### China's Short and Long-Term Plans/Interests in Africa

#### Executive Summary:

China has four overarching strategic interests in Africa: access to natural resources, markets for Chinese exports, political legitimacy and influence, and sufficient security and stability to continue its commercial activities. African governments look to China to provide political recognition and legitimacy and to contribute to their economic development through aid, investment, infrastructure development, and trade.<sup>7</sup>

#### Discussion:

Momentum behind China's engagement and large-scale investments with Africa is likely stemming from two major initiatives of the Chinese government. The Belt and Road Initiative (BRI) is a modern version of the old Silk Road trade routes that now has modern naval and land capabilities (See Annex 5). The African continent (mainly Sub-Saharan) plays a crucial role in this initiative not only because of its geographical location but also because of its resources. The ports, railways, and highways being built under this initiative will effectively link the countries of Africa to Chinese financed or built ports along the continent. Power projects built by Chinese firms accounted for 30% of new capacity in Sub-Saharan Africa from 2010-2015.<sup>8</sup> Substantial Chinese investment in Africa has been going on for nearly two decades now. However, it has increased over the last 10 years. China's Foreign Direct Investment (FDI) in Africa grew by 166.7% from 2014-2015.<sup>9</sup> This compared to the just 29.5% increase by the U.S. in that time period. According to the Brookings Institute, China's investment accounts for 1/3 of overall investment in Africa in recent years. These increases fall in line with the previously stated 2013 initiative (BRI) set by Chinese President Xi Jinping.

The second initiative that China set forth recently is the "China 2025" initiative. China 2025 aims for China to be self-dependent in technological areas such as artificial intelligence, automobiles, computer chips, 5G mobile communications, aviation, robots, ships, agricultural technologies, and many more. If successful, this USD 300 billion plan would make China nearly self-sufficient in many important industries.<sup>10</sup> However, for this plan to be realistic, China will need vast amounts of energy resources. Like the BRI initiative, this initiative directly correlates with Africa's large investments in African energy projects as many see China's involvement in Africa as a way of gathering control and resources for both of its bold initiatives.<sup>11</sup>

Power generation and transmission are the largest lending segments for China into Africa. All of the USD 6.8 billion in 2017 lending to Africa was for power projects.<sup>12</sup> For the most part, the majority of these energy projects are developed, funded, and labored by Chinese banks and companies.<sup>13</sup> China does not provide grants, it uses financing mechanisms for its projects. Eleanor Albert, a staff member on the Council of Foreign Relations, stated that “China’s investments are strategic, not altruistic. Its efforts to help develop Africa’s oil and mining sector are aimed at feeding China’s growing middle class.” Foreign relations and security experts across the globe are concerned at the large risks countries across Africa are taking in their dealings with China. Consisting of mostly weak governments, Chinese influence has spread and continues to spread throughout the continent as seen in Figure 12.

China does not simply want to help Africa, instead it seeks to gain resources and relationships that will help their country in its long term socioeconomic plans. As many agree, “Helping Africa is important, but China would not do so if it had nothing to gain. Indeed, China emphasizes that any bilateral relationship must be mutually beneficial. China’s investment in Africa does pay itself back in multiple ways economically: development and exploitation of Africa’s natural resources, access to local market, employment opportunities for labor and service contracts for Chinese companies on infrastructure projects that China funds.”<sup>14</sup>

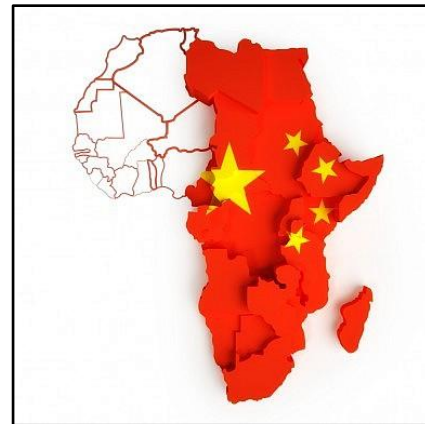


Figure 12: Chinese influence has spread across the African continent due to its large investments and dealings on the continent. Source: [The Diplomat](#)

The top sector financed by Chinese loans is transportation (roads, railways, airports, and ports), not oil or mining. The top recipient of Chinese loans was Angola, a resource-rich country, followed by Ethiopia, a resource-poor country.<sup>15</sup>

China relies on African markets for a steady flow of natural resources to sustain manufacturing. The African resources China imports are varied, covering everything from oil, iron ore, timber, and copper. In exchange for broad access to resources, China exports cheap manufactured goods back to its trading partners, builds much needed infrastructure, provides foreign direct investments, and loans out billions of dollars. In 2014, the value of this trade relationship totaled over USD 200 billion. Furthermore, over half of China’s foreign aid is distributed in Africa.<sup>16</sup>

### Analytic Confidence:



UNCLASSIFIED

Analytic confidence for this assessment is moderate. Source reliability is high with very little conflict among sources and information updated within the past couple of days. The analysts' expertise is minimal. The task complexity was moderate and the time constraint was ample.

UNCLASSIFIED

## Horn Of Africa Likely To Become China's Substantial Focus In Future Investments

### Executive Summary:

Despite pervading geopolitical issues, it is likely that the horn of Africa will become a substantial focus in Chinese future investments explicitly around the Nile River due to Chinese interest in improving its image internationally and increasing its influence in Africa.

### Discussion:

Africa has an abundance of the richest resources in the world but still manages to maintain the highest poverty rates in the world. China continues to be one of the biggest external players in Africa. Chinese investments in energy-based projects are improving Africa's economy, particularly in the horn of Africa (See Figure 13).<sup>17</sup> Despite the country's efforts, China has yet to experience significant return on its investments in Africa, which is an incentive for the country's likelihood to continue funding energy plants in Africa.<sup>18</sup>



Figure 13: Countries in yellow make up the horn of Africa. Source: [Food and Agriculture Organization of the UN](#)

China's One Belt, One Road initiative is a potential project to create large trading routes not only in Africa but through Europe. The project is meant to make shipping methods easily transportable. There will be challenges in the development of this trading route.<sup>19</sup> China's influence and the emergence of infrastructure in Egypt will allow a conduit for interconnection between African and European markets. However, there is a risk that the funds for the One Belt, One Road initiative will be used on projects that will not benefit the evolution of this plan.<sup>20</sup> If the billions of dollars China plans to spend on the project is a success, it will improve China's international image.

The development of infrastructure can lead to the growth in new markets. New markets can be created due to the absence of basic needs, including electricity systems. These deficiencies play key role in Chinese involvement in the continent.

Vulnerabilities in Africa such as the lack for basic necessities, presents an opportunity for China. This allows them to be a pivotal player in the development in the region of the horn of Africa. The Nile River is a valuable economical resource. The implications the Nile creates for Chinese interest in investing around the river is due to the efficiency in this renewable resource. This form of energy utilizes the motive power of water, and a large portion of the water in the horn of Africa flows from the Nile River. The water from the Nile River reaches Egypt, Sudan, South Sudan, Uganda, Kenya, and Ethiopia.<sup>21</sup> Since the water flows to these countries in the horn, it is likely that China will continue to invest in hydro energy plants, utilizing the Nile to power the energy.

China has invested billions of USD in a number of energy plants in Ethiopia. Many of the projects are completed, some are still under constructed and some are just plans. Few of the bigger projects in Ethiopia range between USD 1 to 4 billion, majority invested by China. Most of the costly projects are spent in hydro energy plants and one transmission plant which utilizes natural energy resources, including the Nile River.<sup>22</sup>

China has invested and completed construction in more geothermal and transmission plants, and a hydro plant in Kenya. China's biggest funding in Kenya of over USD 1 billion, has gone to a coal-based power plant that has yet to begin construction called, Lamu Coal Power Plant. The plant has environmental issues that will affect people, land, and sea.<sup>23</sup> Kenya's goal is to increase its current power supply. Geothermal and hydro resources would benefit Kenyan electric power and generate additional power supply and create a safer environment.<sup>24</sup> The power is needed, therefore, an effective way would be to utilize the power from the Nile River.

A number of Chinese investments worth millions of USD have been made in various energy projects in Sudan. Some of the completed, developing, and proposed projects, include, hydro, oil, gasoline, transmission, diesel, and coal. One of China's large investments, over one billion dollars has gone to a hydropower project called the Upper Atbara and Setit Dam. An adequate amount of needed energy will emerge from the dam.<sup>25</sup> The Nile River is capable of supplying Sudan with energy, if installed correctly. The Kajbar Dam is a project still under construction, located on the Nile River, said to generate 360 MW.<sup>26</sup>

With the expectation to finish in 2018, Uganda's Isimba Hydroelectric Power Station in Uganda, currently under construction. China is the primary investor of the hydro

power plant project, contributing USD 1.435 billion out of the total project value, USD 1.68 billion.<sup>27</sup> More use of the water power from the Nile River can supply the country with added essential energy.

The weaknesses in Africa will harness development with Chinese investment. Chinese interest in developing more hydroelectric power plants in the horn is a great strategy for increasing the country's influence but has intensified hostility in the region. Egypt expressed their concern that a large Ethiopian dam under construction, the Grand Ethiopian Dam, will reduce the country's water supply from the Nile River.<sup>28</sup> The dam is expected to be the largest dam in all of Africa.<sup>29</sup>

Geopolitical issues in the region are of importance and may hinder current Chinese investments and future investments.<sup>30</sup> Another issue that builds tension between the Chinese and Africans is that Chinese bring their own builders such as SinoHydro, Dongfang Electric and Electric Power Equipment and Technology Company, along with Chinese employees instead of giving Africans jobs.<sup>31</sup>

As-long-as China remains Africa's largest trading partner and a significant contributor in the area of investment, the continent will continue to see economic growth. The continent is also likely continue to diversify its markets with Chinese engagement.<sup>32</sup> China has made its mark in Africa, because of this, U.S. expansion in the continent is. Although many Africans are yearning for American companies, opportunity to Americans are not clear due to the highly influential China. The U.S. can work alongside other investing businesses and countries.<sup>33</sup> Especially since China positioning its military, will increase its ability to influence the country.<sup>34</sup>

**Analytic Confidence:**

Analytic confidence for this assessment is moderate. The analyst's source reliability was moderate to high, with corroborating sources. The analyst has minimal subject matter expertise. The task complexity was moderate and was completed under sufficient time constraint.

## COUNTRY STUDIES

### Angola

#### Executive Summary:

Although the power demands of Angola have not been met yet, ongoing projects are likely to meet the long-term demand. The Angolan government has focused on hydroelectric power generation to meet the electricity needs of its growing population. China has begun a project that provides a similar magnitude of capacity with the aim of meeting the country's 2025 goal of 60% electrification rate. It is likely China's main motivation for investing in Angola's energy infrastructure is oil.

#### Discussion:

##### Current Demand

One of the Angolan government's highest priorities is increasing the availability of electric power. This is mainly to diversify the country's economy and to meet the electricity demands of a growing population. 40.5% of the population was connected to the public electricity grid as of 2016. The government aims at attaining 60% electrification rate by 2025.<sup>35,36</sup> The government also hopes to achieve a power capacity of 9.9 GW by the same year.

##### Meeting Demand

Although the power demands of Angola have not been met yet, ongoing projects are likely to meet the long-term demand. To attain the government's goal the Ministry of Energy and Water has focused its efforts on hydropower, projecting that by the end of 2018 64% of the country's power will be generated by hydroelectric projects, 12% by natural gas and 24% by fossil fuels.<sup>37</sup> The focus on hydropower is deemed important because Angola's potential for hydropower is among the highest in Africa. It is anticipated that over 18 GW of electricity can be produced in the country from hydropower alone.<sup>38</sup> Hence, foreign investors are likely to invest more on hydroelectricity projects than other sources to help achieve Angola's goal (See Figure 14).



Figure 14: Angola's largest hydropower Lauca in operation  
Source: [Lahmeyer International](#)

Several hydropower projects have been built and are in the process of construction along the Caunza River, the country's largest river. Lauca hydropower plant is one of the major projects with a generating capacity of 2.1 GW at a cost of USD 4.5 billion. The project began in 2012 by a Brazilian company Odebrecht, and the first of six turbines of Lauca went on line in July 2017. An Austrian company Andritz was awarded a contract in 2014 to supply electromechanical equipment for the plant.<sup>39</sup> As of February 2018, the plant has provided 4 million people access to electricity, and it is expected to provide for 8 million people in total. Lauca was partly financed by a Brazilian credit facility.<sup>40</sup> Capanda and Cambambe are the next two dams currently contributing to the power generation in the country, with 520 MW and 960 MW capacities respectively. The second phase of Cambambe, financed by the World Bank at a cost of USD 512 million, provided additional 180 MW capacity to the dam.<sup>41</sup> With these projects going on line Angola seems to be reaching its generating capacity goal as of 2018. To fulfil the country's goal of 9.9 GW by 2025, the government of Angola has began building Caculo Cabaca Hydropower Plant, generating yet another 2.1 GW. Caculo Cabaca is being constructed by China Gezhouba Group and is financed by Industrial and Commercial Bank of China. The project is estimated to take over six years and is expected to participate around 10,000 workers.<sup>42</sup>

### **Chinese Motivation**

China established a diplomatic relation with Angola in January 1983.<sup>43</sup> Since then, China has granted Angola more than USD 60 billion.<sup>44</sup> Angola used the loans for several infrastructure projects, such as building power stations, hospitals, roads and bridges.<sup>45</sup> Repayments for these loans are often paid with oil or funds that go directly to Chinese construction firms.<sup>46</sup> This increases costs for ordinary Angolans because the money does not end up entering the real economy.<sup>47</sup>

China has taken a strong interest in Angola since 2002. Due to Angola's challenges in reconstructing the country after 30 years of independence and civil war, the Angolan government started seeking help from China. The Chinese Exim Bank extended a USD 2 billion loan in 2004 for Angola's infrastructure projects. The bank has been doubling its loan each year until 2007. In 2010, the bank provided an additional USD 6 billion totalling the bank's loan to around USD 10 billion. These aids came with China's interference in Angola's oil production. Angola is China's largest oil supplier in Africa.<sup>48</sup> The China Petroleum and Chemical Corporation (Sinopec) has been purchasing a considerable amount of oil banks in the country. By 2009, 39% of Angola's oil exports were sent to China.<sup>49</sup>

The top exports of Angola in 2015 were crude petroleum (USD 31.2 billion), diamonds (USD 1.67 billion), coal tar oil (USD 501 million) and refined petroleum (USD 316 million). China receives the largest portion of these exports (USD 14.3 billion) followed by India (USD 2.81 billion) and the United States (USD

2.47 billion).<sup>50</sup> Angola is likely to leverage its export economy and its strong relationship with the world's largest economies, including China, to meet its infrastructure needs.

Currently there are around 50 Chinese state companies and 400 private companies that operate in Angola.<sup>51</sup> Chinese state-owned CITIC Group invested in steel and aluminum plant in Angola.<sup>52</sup> This plant is expected produce 10,000 tons of aluminum per year for China. Per their arguments Chinese companies are supposed to use 30 percent Angolan labor, however this is rarely enforced.

### **Political, Social, Economic, and Environmental Implications**

China has helped Angola reconstruct its infrastructure after the civil war and post-independence period by providing continued investment loans. China's continuous investment and trade relationship has helped it become Angola's primary commercial partner. In 2010, China became the largest destination of Angola's petroleum and diamond, the two resources that make up the largest portion of Angola's export economy. In the past two years, however, the portion of oil in the commercial trade between Angola and China has reduced, and Angola has been limiting Sinopec's control of the oil industry.<sup>53</sup> This is mainly due to the increase of Angola's debt to China, which is estimated to be around USD 25 billion, and Angola's limited oil to prop its budget problems.<sup>54</sup> Angola deems that its dependence on non-renewable resources poses a threat to the country's economy in the long-run. Furthermore, it aims at reducing its dependence on non-renewable resources as its long-term sustainable economic development could be in danger.

### **Analytic Confidence:**

Analytic confidence in this assessment is moderate. The analysts used sources of moderate to high reliability. The subject matter expertise of the analysts is minimal. However, plenty of time was given to complete the estimate.

## Ethiopia

### Executive Summary:

Due to the nature of China's loans to Ethiopia, strategic advantages of a strong relationship between the two countries, and the unsustainability of hydropower in Ethiopia, it is likely China's main reason for investment in Ethiopia is influence. Despite the economic benefits of Chinese investment to Ethiopia, it is unlikely altruistic reasons are a primary motive.

### Discussion:

#### Current Power Demand

According to the World Bank, 27.2% of Ethiopia's population has access to electricity.<sup>55</sup> In rural areas, this falls to 12.2% where 80% of the population lives.<sup>56,57</sup> Demand will rise as the population increases by 2.3% a year, and Ethiopia's GDP increases at an annual rate of 11%.<sup>58</sup>

#### Meeting the Demand

The government of Ethiopia has set the goal of becoming a middle-income country by 2025.<sup>59</sup> This goal will greatly increase Ethiopia's demand over the years. The Government of Ethiopia (GoE) has determined private investment as the means to this goal.<sup>60</sup> One of the biggest challenges facing Ethiopia in this goal are hard currency shortages needed to pay IPP tariffs.<sup>61</sup> Ethiopia's largest project, the Grand Ethiopian Renaissance Dam has a capacity of 6,000 MW, but Ethiopia's grid is not large enough or robust enough to absorb doubling its capacity.<sup>62</sup>

#### Chinese Motivations

Between 2000 and 2014, Ethiopia was the second largest receiver of Chinese loans.<sup>63</sup> It received USD 21.2 billion in this time period.<sup>64</sup> According to African Business, "Chinese lending in Africa is usually done in opaque countries such as Angola, Ethiopia and Sudan, so we have both parties not being transparent about the deals they have agreed on."<sup>65</sup> The Chinese have made borrowing easy for Ethiopia. Loans for infrastructure are mostly concessional loans with longer grace periods and/or lower interest rates.<sup>66</sup> Because of China's policy of non-interference, Chinese loans come with less stringent preconditions.<sup>67</sup>

Ethiopia is a mostly resource-poor country, so China is not gaining strategic resources through its investment in the country.<sup>68</sup> China is interested in its strategic location and "potentially large market, should its fast growth of the past 15 years prove sustainable."<sup>69</sup> In 2011, Ethiopia implemented the Climate- Resilient Green Economy (CRGE) strategy. This strategy focuses on conventional development by means of harnessing clean energy sources like hydropower, wind, geothermal, solar and biomass, and implementing energy-efficient technologies in the transport and



industrial sectors.<sup>70</sup> Ethiopia has estimated hydropower potential up to 45,000 MW, making it the second largest producer of hydropower in Africa (See Figure 15).<sup>71</sup>

China also sees boosting Ethiopia's economy as an investment. Ethiopia is the fastest growing African economy.<sup>72</sup> There is massive potential for a large consumer market and as an economic partner.<sup>73</sup> The country has a population of over 100 million, and it has low cost labor and transport links. Ethiopia's economy is becoming increasingly focused on manufacturing.<sup>74</sup> Its goal is to grow its manufacturing to account for 25% of the economy by 2027.<sup>75</sup> China has helped Ethiopia reach this goal by funding industrial parks.<sup>76</sup> China no longer wants

to be a factory to the world; it wants to move up in the value chain.<sup>77,78</sup> Chinese investment in Ethiopia is likely to use the country as a new consumer market and as a manufacturing hub to reach this goal. The country is a linchpin in China's Belt and Road infrastructure scheme.<sup>79</sup> Its strategic location next to Djibouti, which has a Chinese naval base, would enable access to European markets via the Suez Canal.<sup>80</sup>

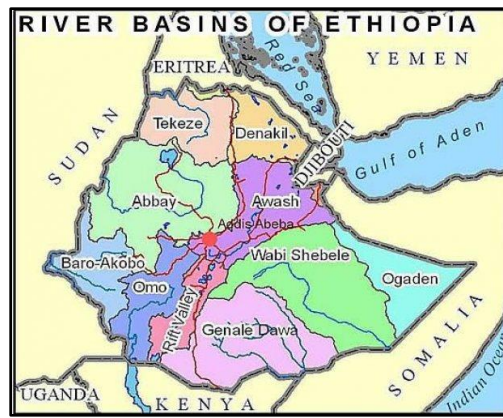


Figure 15: Ethiopia is known as the “Water Tower of Africa” with nine rivers. Source:

[Ethiovisit](#)

In addition to economic advantages, influence over Ethiopia helps China in the United Nations (UN). China has been utilizing its soft power resources policy in Africa. Chinese cultural soft power has two main purposes, “one is to enhance national cohesion and creativity and meet the demands of the people. The other purpose is to strengthen China's competitiveness in the contest for comprehensive national power in the international arena.”<sup>81</sup> China's is a veto holder on the UN Security Council, this allows China to exert influence and seek to establish credibility both domestically and internationally.<sup>82</sup> Currently, Ethiopia has a non-permanent seat on the UN Security Council.<sup>83</sup> Africa is the largest voting bloc in the UN with 54 members.<sup>84</sup> In the past, Africa as a voting bloc has supported China to defeat the eleven attempts to criticize China's human rights records.<sup>85</sup> In addition to that, in 2007, China leveraged the African voting bloc in response to a U.S. sponsored resolution to end political repression and human rights violations.<sup>86</sup> China's use of soft power to cultivate economic relationships could eventually position China in a hard power role to leverage its military and economic strength over a weaker state.<sup>87</sup>

China is likely not investing in Ethiopia for altruistic reasons because of how unsuitable hydropower is in Ethiopia. 90 percent of Ethiopia's electricity is generated from hydropower.<sup>88</sup> It is extremely risky for Ethiopia to depend on hydropower as the

main source of electrical power due to the amount of droughts that occur in Africa and climate change.<sup>89</sup> Ethiopia's Grand Renaissance Dam poses a large financial risk of an estimated USD 4.8 billion that would add to Ethiopia's national debt.<sup>90</sup> When GERD is completed, the dam will have the capacity to generate 6,000 MW of electricity.<sup>91</sup> However, due to the majority of the Ethiopians living in the rural areas, very few will receive power from the Grand Renaissance Dam.<sup>92</sup>

### **Political, Social, Economic, and Environmental Implications**

It is likely that the dams will create further strain on Ethiopia's relationship with neighboring countries such as Egypt, Sudan and Kenya. The size of the dams will likely deplete the water supply that Egypt, Sudan and Kenya depend on for survival. Despite the promise of electricity the Gibe III Dam and the Grand Renaissance Dam projects are expected to produce, hydropower is not sustainable over time.

The Gibe III Dam construction began 2011 along Ethiopia's Omo River. The Commercial Bank of China (ICBC) funded USD 500 million in equipment to begin this project.<sup>93</sup> The World Bank and the European Investment Bank financed smaller hydroelectric projects on the Omo River, but refused to finance the Gibe III Dam due to social and environmental implications this large project would have on Ethiopia and its surrounding countries.<sup>94</sup> The Omo River makes up 90% of Kenya's Lake Turkhana, which is a freshwater lake in the middle of the desert.<sup>95</sup> A large dam along this river like the Gibe III Dam will deprive 300,000 Kenyans of the water needed for agriculture, cattle herding and fishing.<sup>96</sup> According to the African Development Bank report, changes to flood patterns could affect up to 70% of species living around Lake Turkhana.<sup>97</sup>

The Ethiopia's Grand Renaissance Dam is predicted to bring more power to Ethiopia but this project is also creating tensions over water rights with Sudan and Egypt.<sup>98</sup> 74% of Ethiopians do not have access to electricity.<sup>99</sup> When the Grand Renaissance Dam is completed, the dam will have the capacity to generate 6,000 MW of electricity (See Figure 16).<sup>100</sup> The World Bank estimates that Ethiopia can earn roughly USD 1 billion a year exporting the power from the Grand Renaissance Dam to surrounding countries.<sup>101</sup> This project is constructed along the Blue Nile River, which is

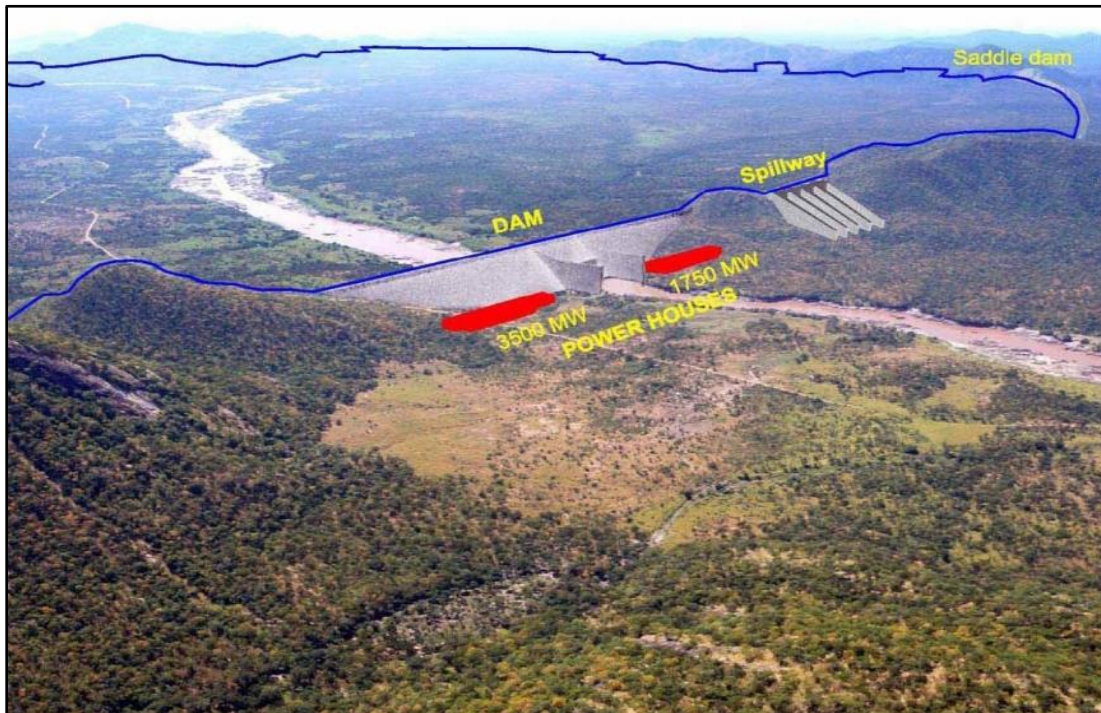


Figure 16: Construction of the Grand Renaissance Dam started in April 2011 after the ETB80bn (USD 4.7bn) engineering, procurement and construction (EPC) contract was awarded to Salini Costruttori. Source: [Water Technology](#)

responsible for 60% of the water supply that flows into the Nile River.<sup>102</sup> The Nile River is the primary water source for Egypt and Sudan. "Egypt is extremely water-poor: it has only 20 cubic meters per person of internal renewable freshwater resources, compared to 1,258 m<sup>3</sup> per person in Ethiopia and 8,836 m<sup>3</sup> per person in the US."<sup>103</sup> The dam will likely deprive Egypt even more of their already scarce water situations.

### **Analytic Confidence:**

Analytic confidence for this assessment is high. The analysts have little subject matter expertise, but worked as a team. Sources tended to corroborate and were of moderate or high reliability. Analysts also used a structured analytic technique (See Annex 4). The task complexity was low, and the analyst had sufficient time to complete it.

## Kenya

### Executive Summary:

The investment of Chinese power companies in Kenya has been a mutually beneficial relationship despite environmental concerns rising from plans to build the first coal-fired power plant in East Africa (See Figure 17). The coal plant, which has a large potential to address the country's electricity needs, has been halted. Consequently, Chinese investment in the country has not helped meet the power demand yet. China has also invested in clean renewable energy sources such as, geothermal and wind power. China is interested in Kenya's natural resources such as mineral ores and animal products. Despite regional competitive challenges from Chinese products, Kenya can potentially gain from Chinese knowledge and cheap Chinese imported finished products to boost its economy.



Figure 17: December 2016 march against the Kenyan government opposing the construction of a coal plant in Lamu. Source: [Price of Oil](#)

### Discussion:

#### Current Power Demand

Kenya has been able to increase its electrification rate from 24% in 2011 to 46% in 2015, up to 56% in 2016.<sup>104,105</sup> The government aims for a universal access by 2020.<sup>106</sup> The current electricity demand is 1600 MW and is expected to rise to 2,600 to 3,600 MW by 2020.<sup>107</sup> The peak power demand has increased by 7.8% from 1,586 MW in 2016 to 1,710 MW in 2017.<sup>108</sup>

#### Meeting the Demand

Chinese investments in Kenya have not helped meet the electricity demand. This is mainly due to environmental issues leading to low transmission grid problems and a halt in one of the largest current projects. The country's current installed capacity is 2.3 GW. However, the grid-connected capacity is only 1,429 MW. 52.1% of power generation comes from hydro, 32.5% from fossil fuels, 13.2% from geothermal and the rest 2% comes from biogas and wind.<sup>109</sup> Kenya has a 30% off-grid accessibility due to its use of solar panels. This number is one of the highest in the world and is

helping those without access to electricity. However, Kenya still needs to attain 5% increase in power output every year to meet current demands.<sup>110</sup>

Environmental degradation poses a great threat to Kenya's effort to achieve its electrification goals.<sup>111</sup> The country's plan to build East Africa's first coal-fired powered plant is a good case in point. This USD 2 billion project, which is largely financed by the Industrial and Commercial Bank of China, is part of a plan that will more than double Kenya's electricity generation to around 6,700 MW. It poses an environmental threat to the nation. Environmentalists fear that the plant will terminate the marine environment of Lamu, a town in the coastal area near Somalia.<sup>112</sup> The building of the project has been paused pending the result of a court case as prosecutors are routing for projects using only renewable and cheaper sources such as hydro, solar, and wind.<sup>113</sup>

### **Chinese Motivations**

Chinese investments in Kenya are hardly altruistic and are instead guided by mutual benefits to both sides. While Kenya has received thousands of jobs from these power investments, China is interested in Kenya's natural resources, primarily its mineral ores and certain animal products. The top exports of Kenya in 2016 to China were titanium ore at 42%, niobium, tantalum, vanadium, and zirconium ore at 24%.<sup>114</sup> In 2016 Kenya's main exports from China was worth USD 5.59 billion.<sup>115</sup> Most of these imports were finished products such as telephones (2.1%), electric generating sets (1.9%), insulated wire (1.7%), computers (1.5%), et cetera, while Kenya has been sending natural minerals to China in return.<sup>116</sup> In the same year Kenya has made exports worth USD 92.5 million to China. The majority of these were mineral enriched ores such as titanium ore (38%) and niobium, tantalum, vanadium and zirconium ore (18%).<sup>117</sup>

China has shown interest in investing in clean and renewable energy sources in Kenya. On July 28, 2017 a Chinese company, Jereh Group, announced that it has successfully won a bid at a price of USD 94.5 million to build a geothermal power plant in Olkaria, Kenya. Once completed, it will have a total installed capacity of 61 MW.<sup>118</sup> In addition, a Chinese company, PowerChina, agreed on a turnkey contract to build a wind power plant near the capital Nairobi. China is sponsoring USD 41.62 million out of the USD 53 million needed for this power plant, which will generate 51 MW, enough to provide for the output of the whole capital city.<sup>119</sup>

### **Political, Social, Economic, and Environmental Implications**

The current projects are transforming the country's clean resources into economic advantages driving local development. In a 2014 survey, 93% of Kenyan companies reported they were hiring Kenyan employees for the construction of projects. This created nearly 2,200 direct jobs, equivalent to 5.3% of the total jobs created by



foreign direct investment.<sup>120</sup> Experts have noted that if Kenya takes advantage of Chinese technology and Chinese cheap imports to support the basic needs of its population, it can grow its export business in areas of competitive advantage and boost its economy.

Kenya faces competitive price pressure from China in the regional market mainly on textile products, clothing, footwear and soap. This poses a challenge for the manufacturing exports of Kenya to neighboring countries Uganda and Tanzania. Furthermore, the cheap Chinese products have been the choice for local consumers as they are more affordable despite their low qualities. Although this has been a challenge to local enterprises due to competitions in the domestic market, it has been a source of relief from economic and political pressure on the government.<sup>121</sup>

**Analytic Confidence:**

Analytic confidence in this assessment is moderate. The analysts used sources of moderate to high reliability. The subject matter expertise of the analysts is minimal. However, plenty of time was given to complete the estimate.

## Nigeria

### Executive Summary:

Despite social unrest and political disagreements stemming from alleged lack of Chinese labor opportunities, China is likely to continue investing in projects involving natural resources. Due to the lack of access to electricity in Nigeria and China's growing domestic need for resources, China will simultaneously utilize Nigeria's large population and military to garner more influence throughout the region.

### Discussion:

#### Current Demand

With a GDP of USD 394.8 billion, Nigeria has one of the largest economies in Sub Saharan Africa.<sup>122</sup> The growth of the economy and the country's revenue is primarily due to the export of agriculture. Nigeria contains natural resources such as natural gas, petroleum, coal, tin, iron ore, limestone, niobium, lead, zinc, and arable land.<sup>123</sup> Nigeria is the continent's largest oil producer and has the ability to generate more power.

USAID states that Nigeria's installed capacity is 12,522 MW, which leaves the country with an access rate of 45%. However, most days Nigeria is only able to generate around 4,000 MW.<sup>124</sup> Hydroelectric power reaches roughly one-third of Nigeria's electrical power. China is Nigeria's number one importing partner, importing machinery, chemicals, transport equipment, and manufactured goods.<sup>125</sup>

#### Meeting Demand

China is likely to continue investing in more projects involving both natural and renewable resources in Nigeria. Due to its current investments in the country and that it has yet to fully exploit Nigeria's crude oil reserves.

The majority of the country's natural resources, including petroleum, renewable resources, and solar energy, have not been tapped.<sup>126</sup> Renewable solar energy would benefit the country, yet it is the least utilized renewable resource in Nigeria.<sup>127</sup>

Combining large investments from China and the Power Africa initiative, Nigeria's target is to have universal electrical access by 2030.<sup>128</sup> The largest project in Nigeria with investment of USD 4.93 billion from China is the 3,050 MW hydro energy plant called Mambilla Hydropower Plant. Construction began in 2018 and completion of the project is expected to be completed by 2024.<sup>129</sup>

#### Chinese Motivations

Due to the abundance of available resources and China's influence in the country, China is likely to increase their investments in efforts to provide more electricity for

Nigeria and to inject these resources into China's growing middle class and technological initiatives.

With its large population and military, Nigeria has been an ideal country to continue the development of China's Belt and Road Initiative (BRI).<sup>130</sup> This provides them with more real estate to further its Belt and Road Initiative and gain more of a regional foothold.<sup>131</sup>

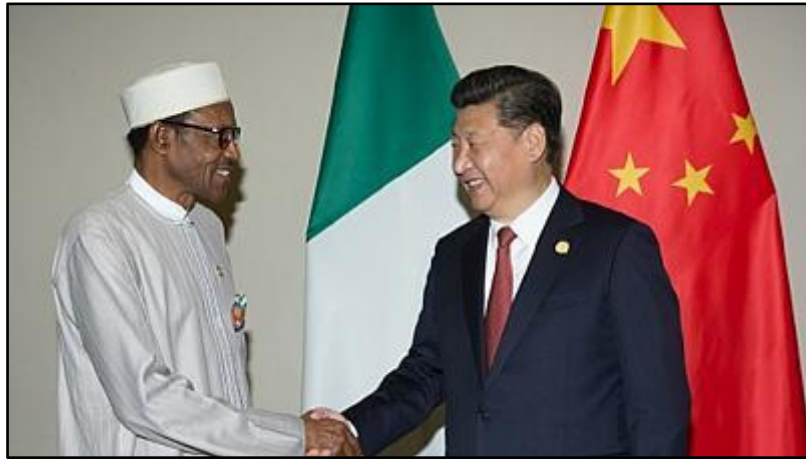


Figure 18: Nigerian President Muhammadu Buhari and Chinese President Xi Jinping shake hands in December 2017 after China committed to an additional USD 40 billion for investment in Nigeria. This deal came shortly after Nigeria's official recognition of China's "One China" policy. Source: [Africa](#)

The strength of the Nigerian and Chinese political relationship exhibits itself through enhanced cooperation within the United Nations. Along with other African nations, Nigeria has reciprocated China's "generosity" by supporting them in United Nations matters such as their territorial disputes in the Asia-Pacific region (See Figure 18).<sup>132</sup>

China has also provided a great deal of assistance to Nigeria's regionally prominent military. Particularly, in the struggles against insurgencies (Boko Haram) in the oil rich Niger Delta.<sup>133</sup> Western countries like the United States have refrained from sending assistance to this area because of the security concerns and instability. China filled this void and it has allowed them to gain even more of an influence over the Nigerian economy, government, and military. With the vast support of the political elite within Nigeria, China is likely to use its increasing influence in Nigeria to assist in spreading similar influence and actions in other countries in the region.

### **Political, Social, Economic, and Environmental Implications**

Chinese investment is likely to facilitate some development and strengthening of Nigeria's infrastructure and enable economic diversification. Similar to the complaints of other African countries, many Nigerians including some elites, believe they are being used by the Chinese as an outlet to satisfy Chinese domestic employment demands. Complaints remain widespread about the lack of adequate labor opportunities for Nigerians on many of the proposed Chinese investments.<sup>134</sup> The United States has openly cautioned Africa and Nigeria in particular, against this large-scale relationship with China.<sup>135</sup>



**Analytic Confidence:**

Analytic confidence for this assessment is moderate. The analysts have little subject matter expertise. Sources corroborated and were moderately or highly reliable. The task complexity was moderate and the analysts had sufficient time to complete the task.

## Uganda

### Executive Summary:

Due to Uganda's poor rate of electricity access and the large oil and gas reserves that have yet to be exploited, China is likely to increase investments in the Ugandan energy sector. Despite increasing debts, systemic corruption, slowing exports and declining agricultural output, China still views Uganda as a strategic investment.

### Discussion:

#### Current Demand

According to USAID statistics, 22% of Uganda's population has access to electricity.<sup>136</sup> The nation has one of the lowest electrification rates in Africa, with only 12% of the rural population having access to electricity compared to 52% of the urban population.<sup>137,138</sup> The nation also has one of the lowest per capita electricity consumption rates in the world with 215 kWh per capita per year (Sub-Saharan Africa's average is 552 kWh per capita, while the world average is 2,975 per capita).<sup>139</sup> There are 31 million households without access to power.<sup>140</sup> Currently, Uganda has 947 MW of installed generating capacity. Approximately 645 MW is hydroelectric power and 101.5 MW is thermal (oil, biofuels) power.<sup>141</sup>

#### Meeting Demand

Despite the support for off-grid actors, and the deficiency in a connected power grid, China is likely to invest in the development of proposed hydroelectric projects secured on to the power grid. China is also likely to invest in projects based from Uganda's oil reserves that were discovered.

In an attempt to provide more energy China is investing in two large hydropower facilities. The first of these is the 600 MW Karuma hydroelectric dam and the second is the 183 MW Isimba falls hydroelectric dam.<sup>142</sup> It is apparent that these projects alone will not be sufficient to allow the country to reach its 2020 goals for its expansion of electricity generation. However, the nation has many other installed power generation projects in development and it is likely that they shall reach the goal by the year 2025.

The 2006 discovery of oil and gas reserves in Uganda that contains an estimated 6.5 billion barrels of oil, and of that, 1.4 billion of which is feasible.<sup>143</sup> In April 2017, the process of oil refinement began in Uganda's oil fields.<sup>144</sup> The oil and gas discovery along with the implementation of the first oil refinery is likely to attract further Chinese investment.

### Chinese Motivations

Despite Uganda's ever-increasing debts, China is likely to increase investments into the Ugandan energy sector. Due to its large oil and gas reserves in the Albertine rift basins and its relatively stable political development.

Uganda discovered commercial hydrocarbon deposits in the Albertine rift basin that straddles its border with the Democratic Republic of Congo in 2006. It estimates the deposits hold around 6.5 billion barrels of oil as well as commercial deposits of natural gas.<sup>145</sup> Production has been repeatedly delayed since then by contractual disagreements, tax disputes, and infrastructure setbacks.<sup>146</sup> Permits, licensing, and planned construction started in 2017 as Uganda cautiously



Figure 19: The six oil block regions of Uganda. New definitive agreements made by the nation has led to the development of the first of what is expected to be many new oil refineries. Source: [Independent](#)

makes sure that their country and people reap the benefits of these oil and gas reserves. The state-owned Chinese National Offshore Corporation has invested USD 2 billion as Uganda seeks to pump its first barrel of oil by 2020.<sup>147</sup> With current investment trends in Uganda and across the continent, China is likely to play a big role in oil and gas projects in Uganda. (See Figure 19).

China's Belt and Road Initiative (BRI) is also a factor of Chinese investment in Uganda. The Standard Gauge Railway that links Kenya's port city of Mombasa to landlocked neighbors including Rwanda and Uganda via a network of high speed lines remains one of the key projects in the initiative on the continent.<sup>148</sup> The construction and implementation of Belt and Road projects in Uganda will further spread Chinese influence in the country and provide Chinese companies with work.

### Political, Social, Economic and Environmental Implications

The progression of oil refineries in Uganda will increase the feasibility of the regional oil market. These large oil and gas projects will lead to growth in employment and improve domestic development.<sup>149</sup> The projects will benefit Uganda's economy which is growing at a rate of 4.7% as of 2017.<sup>150</sup> Due to Uganda's systemic corruption, oil resources and production are unlikely to provide fast economic improvements.<sup>151</sup> According to Fiona Magona and Marion Angom, from MMAK Advocates, a Ugandan law firm:

The question whether Uganda will use its” black gold” to propel her economy to a desired middle income status by 2020 depends largely on the Ugandan governments commitment to among other things prioritize national participation, promote environmental sustainability especially in ecologically sensitive exploration areas and the strategies in place to avert the oil curses that has struck other oil rich nations.<sup>152</sup>

President Yoweri Museveni, in power for 32 years, is accused by critics of squandering debt relief and mortgaging much-anticipated oil revenues before crude starts to flow in 2020. China has loaned Uganda nearly USD 3 billion and is in talks for USD 2.3 billion more as part of its vast overseas development Belt and Road Initiative.<sup>153</sup> This comes twelve years after the World Bank forgave (USD 3.5 billion) nearly all of Uganda’s debt. External debt is now at USD 11.2 billion, according to figures from the central bank. The central bank recently stated that Uganda’s debt may be moving from a level of low to moderate risk of distress.<sup>154</sup>

**Analytic Confidence:**

Analytic confidence in this estimate is moderate. The analysts utilized multiple sources rating moderate to high reliability. However, the analysts were given ample time to complete the estimate.

For questions or comments, please contact the analysts:

## Democratic Republic of Congo

### Executive Summary:

Chinese energy investments are unlikely to meet the energy demand in the Democratic Republic of Congo (DRC) due to the location of energy investments and the country's ongoing political instability. China's main motivation for investing in the DRC is likely cobalt and copper. This is due to the nature of Chinese deals in the area, its reliance on the DRC for cobalt, and the location and type of the energy infrastructure China has built in the country. Despite the many infrastructural investments by China, altruistic motives are likely not the driving force for Chinese interests.

### Discussion:

#### Current Power Demand

The Democratic Republic of Congo has one of the lowest rates of electrification.<sup>155</sup> Of the 83 million people in the DRC, only 13.5% of the population have access to electricity.<sup>156</sup> Of the rural population, only 0.4% has access to electricity.<sup>157</sup> Currently only half the 2,590 MW capacity in the DRC is available at any given time due to breakdown or maintenance issues.<sup>158</sup>

#### Meeting the Demand

China's energy investments are unlikely to meet the DRC's demand for power. Demand has increased due to a five-year economic growth rate of 51% and a population growth rate of about 3%.<sup>159,160</sup> USAID names governance and electric utility performance as the two biggest bottlenecks and issues facing electrification in the DRC.<sup>161</sup> 99% of the DRC's power capacity comes from hydropower and it has the greatest potential for hydropower in Africa (100 GW).<sup>162,163</sup> The unmet demand is estimated to be 3,000 MW, though Chinese projects such as the Inga-3 project would total 4,800 MW, 2,500 MW are reserved for South Africa, 1,300 MW are reserved for the DRC's mining sector, and then 1,000 MW are for the country's domestic demand.<sup>164</sup> There is also currently no interconnected national transmission grid network in the country.<sup>165</sup> In addition, previous dams, the Inga 1 and 2 dams only produced 40% of their first stated capacity.<sup>166</sup> There is no guarantee Inga 3 will run at its full capacity.

#### Chinese Motivations:

The Democratic Republic of Congo is home to almost half of the world's cobalt.<sup>167</sup> DRC produced 64,000 tons in 2017.<sup>168</sup> The country produced over 1 million tons of copper in 2016, and it boasts some of the highest quality copper.<sup>169</sup> China has sought out these minerals in energy infrastructure deals with African countries including the DRC. The Pulitzer Center notes "China's model of investment is defined by deals in which Chinese companies extract minerals or oil in exchange for building roads, bridges, and hospitals, desperate for modern infrastructure."<sup>170</sup> While the U.S. has

engaged sub-Saharan Africa by trying to strengthen democratic institutions and supporting human rights, China has followed a policy of noninterference with domestic affairs and tried to seek mutual benefits.<sup>171</sup>

Though China has invested over USD 3 billion to build roads, hospitals, and universities in the capital, humanitarian benefits is not its motivation.<sup>172</sup> The DRC government views China as a source of funding for road and railway development.<sup>173</sup> China acknowledges it is too reliant on the DRC for cobalt.<sup>174</sup> In September of 2017,

China ordered joint investors, Sicominex, to stop exporting raw copper and cobalt from the DRC (See Figure 20).<sup>175</sup> Others in Chinese mining industries are looking to Canada and Australia for cobalt investments.<sup>176</sup> China is also adopting regulations and standards for labor standards and human rights. The China Chamber of Commerce of Metals, Minerals, & Chemicals Importers & Exporters (CCMC) launched the Guidelines for Social Responsibility in

Chinese Outbound Mining Investments in 2014.<sup>177</sup> But, Chinese companies have not been supportive of mining regulations since. In January of 2018, Chinese company, China Molybdenum Co., opposed changes to the DRC's mining code that were approved by its parliament.<sup>178</sup> The code would raise the cost of doing business for investors in Africa and boost the state's share of mining revenue.<sup>179</sup>

The announcement in 2013 of the USD 14 billion Inga 3 hydropower project, as part of the Grand Inga project, was at first exciting.<sup>180</sup> The project is slated to deliver between 10,000 and 12,000 MW of power. However, institutions such as the World Bank have been reported to have pulled out support because the project is not

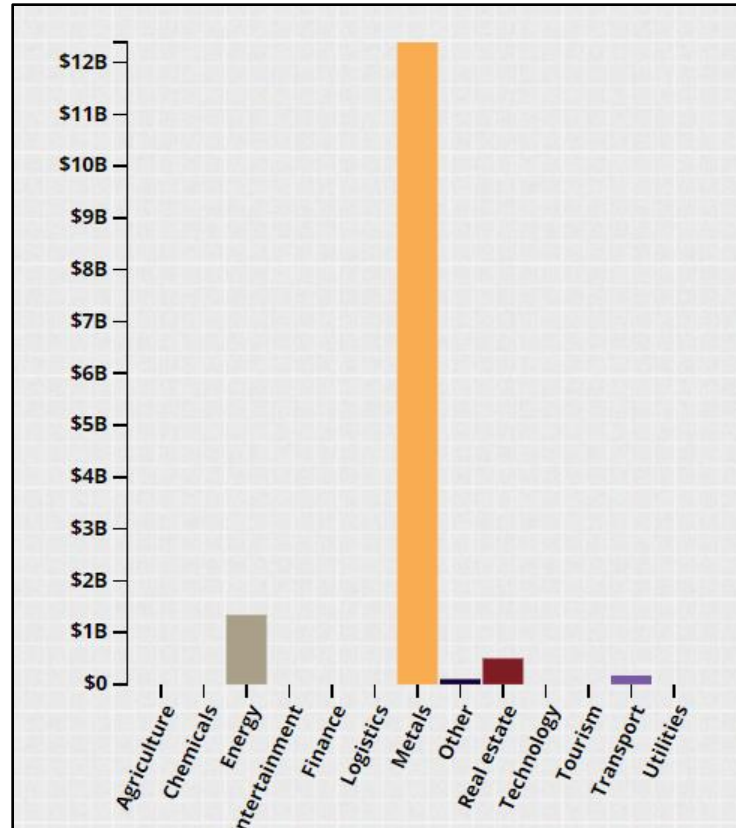


Figure 20: This graph shows total Chinese investment from 2007 to 2017. Energy investment has largely benefited its metals investment. Source: [AEI](#)

expected to provide access levels to the 90% of the DRC population with no access to electricity.<sup>181</sup> Instead most of the electricity production will be directed to powering DRC's industrial mines.<sup>182</sup> China is expected to be the chief bid for the construction of the dam project.<sup>183</sup> In addition, a report by International Rivers discovered that the DRC could harness wind and solar more affordably and faster than current hydropower projects.<sup>184</sup> These types of projects would also be more sustainable.<sup>185</sup> According to the American Enterprise Institute, China has not done any energy investment in the DRC outside of hydropower.<sup>186</sup> China's focus on hydropower is likely due to its competitive advantage building hydropower and the amount of control hydropower companies are able to have over projects. PowerChina has a 50% share of the international hydropower construction market.<sup>187</sup> Chinese hydropower companies can be responsible for all engineering, procurement, and construction contracts, and even wait to recover investment costs after building until handing back ownership to the government.<sup>188</sup>

### **Political, Social, Economic Implications**

Politically, China has taken a policy of non-interference in the DRC.<sup>189</sup> It views Western demands for institutional transparency as neocolonialism.<sup>190</sup> But, recent political unrest in the DRC may change China's policy. The DRC recently passed new laws in February 2018 to add royalties and increase taxes on metals including cobalt.<sup>191</sup> Corruption in the DRC is its biggest political and economic problem. Joseph Kabila, the current president, is likely to benefit the most from these new taxes.<sup>192</sup> A report by Global Witness noted that the DRC "is losing a fifth of all of mining revenues because of corruption and mismanagement."<sup>193</sup> If China decides Kabila's policies are too costly, there is the possibility China will interfere.<sup>194</sup>

China has started to become an integral part of everyday life in the DRC. Chinese investment in infrastructure in exchange for minerals has led to a significant Chinese migrant population in the country.<sup>195</sup> Chinese companies, restaurants, and stores are starting up in the country.<sup>196</sup> The Congolese have taken out their frustration with Chinese support of the Kabila regime on Chinese businesses.<sup>197</sup> Though China has taken a stance of non-interference, this is what allows Kabila to continue his corruption and take a large cut of Chinese investment for himself.

### **Analytic Confidence:**

Analytic confidence for this assessment is moderate. The analyst has little subject matter expertise and worked alone on this analysis. Sources tended to corroborate and were of moderate or high reliability. The task complexity was low and the analyst had sufficient time to complete it.

## Egypt

### Executive Summary:

China is likely investing in Egypt's energy infrastructure to help the country develop into a major trade partner along the One Belt One Road trade route. Egypt is a critical country on the maritime route of the One Belt One Road Initiative, serving as the link between the Red Sea and the Mediterranean. Egypt's strategic location makes it a prime location for outsourcing Chinese manufacturing, which is becoming more expensive in China.

### Discussion:

#### Current Energy Demand

Egypt is one of the most populous countries on the African continent, and the 15<sup>th</sup> largest population in the world, with 93.38 million inhabitants.<sup>198</sup>

Egypt's electrification rate is nearly at 99.8%.<sup>199</sup> Its growing population has a growing need for energy. Egypt's hydroelectric potential is virtually at its limit. The Aswan high dam, built in the 1970's, along with several other hydroelectric station once comprised the majority of

electric production in Egypt, but now form a small fraction of output. These hydropower projects provide between 5 to 10% of Egypt's energy needs.<sup>200</sup> Despite its existing energy infrastructure, Egypt faces a growing need for energy that it struggles to fulfill. Stress on the energy supply is manifested by blackouts, most frequent during the hottest months of the year. According to the EIA, "Egypt experiences frequent electricity blackouts because of rising demand, natural gas



Figure 21: China and Egypt signed a 17 billion USD infrastructure deal in 2016. Source: [CSMonitor.com](http://CSMonitor.com)



supply shortages, aging infrastructure, and inadequate generation and transmission capacity”.<sup>201</sup> Egypt has sought to supplement its energy needs with coal, natural gas and renewable energy sources like wind and solar. Many of these projects are being financed and/or built by Chinese firms (See Figure 21).<sup>202</sup>

### Meeting the Demand

A major Chinese-financed energy project in the works is the Hamrawein coal-fired power plant, which will have a capacity for 6,000 MW when built.<sup>203</sup> The project is currently up for bidding with several firms, including the Chinese consortiums Shanghai Electric and Dong Fang Electric.<sup>204</sup> China has financed a major industrial park near the Suez Canal. This is called the China Egypt Suez Development Zone. In addition, China is financing a new extension to Egypt’s capital worth USD 45 billion.<sup>205</sup>

Russia is also offering investment and its technological knowledge to improve Egypt’s energy output. Russia and Egypt have agreed on the construction of a nuclear power plant named the Dabaa nuclear power plant(See Figure 22). The plant will have four nuclear reactors, each with a generation output of 1,200 MW, for a total output of 4,800 MW. The plant will be located 140 km northwest of Alexandria, Egypt.<sup>206</sup> Russia is offering a loan of USD 25 billion to finance the majority of the projected USD 30 billion cost.<sup>207</sup> The plant will be built by Russian state-owned firm Rosatom. Construction is expected to be completed in 2026.

Additionally, China is investing in Egypt’s energy transmission infrastructure. In 2016, Egypt’s state-owned Egyptian Electricity Transmission Company signed a USD 757 million loan from the export import bank of China.<sup>208</sup> This credit will finance develop electricity transmission lines within the country. The total length of transmission lines is 1,210 km. The Chinese firm, State Grid, will be constructing the projects. These projects further bolster Egypt’s growing demand for electricity.

Energy investment by Russia and China will help Egypt meet its growing energy demand. However, meeting the growing demand is a huge challenge even with the amount of foreign investment.

Egypt’s need for energy is so great that Egypt’s legislature voted to allow coal imports in 2014.<sup>209</sup> As aforementioned, coal will be the



Figure 22: Plans for Egypt’s first nuclear power plant have strengthened ties with Russia.  
Source: [Alarabiya.net](http://Alarabiya.net)

fuel for the massive Hamrawein plant, which is in the process of talks with a consortium of bidders.

### **China's Motivations**

Egypt's major resources in crude oil, natural gas, and gold. Egypt's proven oil reserves are around 4.4 billion barrels of oil.<sup>210</sup> Egypt fluctuates between being a net exporter and a net importer of natural gas and oil, and struggles with declining oil production.<sup>211</sup> Despite its oil resources, Egypt is not a major exporter of oil, and is not a vital source of China's foreign oil imports.<sup>212</sup> According to a recent report, "The government has set a goal of building about 7,200 MW of wind power capacity by 2020."<sup>213</sup>

More important than its natural resources, Egypt offers Chinese business interests a vital gateway into European and African markets. Egypt is in a strategic location for China's One Belt One Road development plan. The maritime route of the development plan includes Egypt's Suez Canal as a route from Asia into Africa, and then into Europe. Egypt has signed several memorandums of understanding with China to participate in this initiative. The new hub will serve as a conduit for outsourced Chinese manufacturing.<sup>214</sup>

### **Russia's Motivations**

Russia's investment in Egypt's energy infrastructure is by no means altruistic. Egypt is a close ally of the United States, and Egypt receives a large amount of military aid from the United States. However, Egypt has shown willingness to for Russia by allowing Russian military aircraft to operate in Egyptian airports and airspace.<sup>215</sup> In addition, the two countries have conducted joint military exercises, solidifying ties.<sup>216</sup> Egypt is a strategic geographical location for Russia, especially with Russia support of Syria's Bashar Al-Assad. By helping Egypt with nuclear power, Russia will build closer ties with the country, in a region with increasing tensions caused by Syria's civil war.

### **Political, Social, and Economic Implications**

Egypt's foray into nuclear energy has sever political implications. Eric Trager is an expert on Egyptian politics. In a 2016 article for the Washington Institute, Trager describes the deal as a costly pride project.<sup>217</sup> Trager suggests the al-Sisi wants to construct the nuclear plant project to build domestic support.<sup>218</sup> Having a nuclear power plant, no matter how impractical, would signal to Egyptians that the country has modernized and is on its way to joining the rank of the world's developed nations. Secondly, Trager suggests the project will provide Egypt with alternative foreign outreach.<sup>219</sup>

The economic cost of the nuclear plant will be very costly. Constructing the nuclear plant will force Egypt to rely heavily on Russia's expertise. Fuel for the plant will have to be imported. Russian workers will be needed to service and maintain the plant. There is also a heavy debt burden. On the debt burden, Trager writes, "Russia's state-owned firm Rosatom will build the reactors; the USD 25 billion loan will finance 85% of the project, with Cairo paying the remainder. Egypt will eventually repay the loan at 3% interest, over a twenty-two-year period that begins in 2029."<sup>220</sup> Trager describes the loan terms as relatively favorable, but explains that on a per dollar basis, the nuclear plant is inefficient compared to other financed projects for gas and wind powered schemes.<sup>221</sup> Clearly, Egypt wants to build its image as a developing power, while Russia wants to curry favor with Egypt, and build influence in the region.

**Comment:**

Egypt, Sudan and Ethiopia have been in conflict over construction of Ethiopia's Grand Renaissance dam. USD 400 million of Chinese investment has been invested into the structure.<sup>222</sup> The countries have engaged in talks to find a diplomatic solution over tensions. The Grand Renaissance Dam reservoir needs to be filled over a period of years. These talks do not include China. China is invested in both countries and has not taken a side. As of 6 April 2017, Egypt, Sudan and Ethiopia have failed to reach an agreement.

**Analytic Confidence:**

Analytic confidence in this estimate is moderate. The analyst utilized multiple sources of moderate to high reliability. No structured analytic technique was used in the analysis. However, the analyst was given ample time to complete the estimate.

## Ghana

### Executive Summary:

It is highly likely that China will leverage bauxite from Ghana amid increasing prices and decreasing supply. Ghana continues to rely on Chinese resource-backed loans to fuel growth and infrastructure development. Ghana continues to maintain friendly ties with China, despite increasing debt as a result of loan-backed spending.

### Discussion:

#### Current Power Demand

According to 2016 World Bank data, Ghana's electrification rate is 79.3%.<sup>223</sup> This represents a steady rise from 2006, when the electrification rate was 55.09%. In addition to a rising electrification rate, Ghana's population increased from the period of (2006 to 2016) from roughly 22 million inhabitants to just over 28 million.<sup>224</sup> The growing population and use of electricity has greatly increased the demand for energy. Throughout the same segment of time Ghana's electricity generation capacity has more than doubled from 1,730 MW in 2016 to 3,798 MW in 2016.<sup>225</sup> In spite of the gains in infrastructure, Ghana struggles with meeting energy demands. This energy shortfall is manifested by chronic power shortages in Ghana.

#### Meeting the Demand

Chinese funded projects have helped increase the electric supply by a moderate level. The Bui hydroelectric dam, financed with USD 586 million, was completed in 2013 and added a generation capacity of 400 MW (See Figure 23).<sup>226</sup> In addition, the Sonon Asogli Thermal Power Station, completed in 2016, contributed and additional 200 MW. The plant the option to expand to a total capacity of 550 MW, and was financed with USD 560 million.<sup>227</sup> In addition to power generation, China financed two recent transmission projects to improve energy distribution and access. In 2003, Ghana borrowed USD 32.8 million to extend electricity access to communities displaced by dam reservoirs.<sup>228</sup> In 2010, China gave Ghana's Energy Commission a grant of USD 300 million for rural electrification.<sup>229</sup>



Figure 23: The Bui dam, partially funded by export credits, provided an additional 400 MW of capacity.  
Source: [Ghana News](#)

#### China's Motivations

It is highly likely that China is positioning itself for favorable access and pricing to Ghana's bauxite reserves. Ghana is sitting on 960 million tons of bauxite deposits, the

key material used in the production of aluminum, worth an estimated USD 460 billion.<sup>230</sup>

Bauxite exports from Ghana to China increased 156% between July and November 2017, growing from 43,904 to 112,587.<sup>231</sup> The increase preceded a 30% cut in aluminum smelting and refining operations across China between November 2017 and March 2018 for pollution control.<sup>232</sup> Chinese production and demand for aluminum has depleted local bauxite stores, forcing the country to import 30 to 40% of its requirements.<sup>233</sup> Reflecting the shortages, Chinese bauxite imports surged 46% in August while those of alumina soared 123%.<sup>234</sup> It is likely that the Chinese were stockpiling stores of bauxite and aluminum to hedge its own shortages and the fluctuation in prices.<sup>235</sup> The shutdown came amid declining local supply in bauxite rising and alumina prices in Henan Province (415 CNY/ton in March 2018 up from 390 CNY/ton the same time last year, a 106% price increase).<sup>236, 237</sup> Additionally, metal prices hit a 14-month low, further depressing China's aluminum production.

In July 2017, the Ghanaian and Chinese governments agreed to new loan facilities worth USD 19 billion for further investment into Ghana's infrastructure. Included in the deal is a USD 10 billion Memorandum of Understanding with China International Railway Company to secure access to Ghana's bauxite deposits.<sup>238</sup> In exchange the company will construct aluminum refineries and a high-speed railway to connect the mine to production sites in the country and provide a transportation line to Burkina Faso.<sup>239</sup> The Chinese Development Bank will provide the financing for the loan facility.<sup>240</sup> The Ghanaian government has agreed to back the loans with a guarantee of 5% or less of the country's total bauxite reserves.<sup>241, 242</sup>

The loan facility is one of several commodity/resource-backed agreements between China and Ghana. Ghana experienced significant growth after the discovery of oil deposits in 2007, largely contributed by foreign investments and loans. The Bui Dam was China's first major investment in the country which amounted to USD 562 million in loans tied to cocoa exports.<sup>243</sup> This followed with a USD 3 billion loan for development in oil and natural gas infrastructure in the Jubilee oil fields, backed by guaranteed oil futures.<sup>244</sup> These loans and declining commodity prices, contributed to the current decline in Ghana's financial solvency and sovereignty.

The loans are intended to pay for infrastructure development but are also being used to pay down government debt. As of May 2017, Ghana's debt-to-GDP ratio was 72.4% with a budget deficit of 10% of GDP.<sup>245</sup> As of October 2016, China owned 8% of Ghana's debt, accounting for USD 2.256 billion of Ghana's total debt.<sup>246</sup> China's share of Ghana's debt is likely to grow as Ghana continues to use its ties with China to seek favorable loans in exchange for continued exports.

**Political, Social, and Economic Implications**

Some Ghanaian people feel resentment toward China's migrant population because they view the country's relationship with China as plunderers rather than mutually beneficial.<sup>247</sup> There are accusations of illegal mining in Ghana against China.<sup>248</sup> In 2016, the Minister of Lands and Natural Resources estimated Ghana lost USD 2.3 billion to Chinese citizens' illegal gold mining.<sup>249</sup> Up to 70% of gold production in Ghana may be unlawful.<sup>250</sup> In addition to illegal activities, locals feel resentment when foreign-financed projects employ Chinese migrants.<sup>251</sup>

The country's energy sector is dominated by the government and monopolizes the distribution of energy. Political instability has hindered energy production. Independent Power Producers (IPPs) are likely to increase power production and access.<sup>252</sup> In 2007, Kosmos Energy discovered commercial quantities of oil and gas off the coast Ghana.<sup>253</sup> Today, Ghana remains a small producer of oil in the Gulf of Guinea. Currently it has an output at 126,000 barrels of oil per day.<sup>254</sup> There is a broad range of environmental concerns such as oil discharges, the use of chemicals, accidental spills, and drill cuttings that can occur from day-to-day operations.<sup>255</sup>

Chinese has played a financial role in Ghana for several years. Ghana signed a USD 50 million agreement with China to construct the Jamestown fishing port complex.<sup>256</sup> This project will increase the productivity of the fishing sector in Ghana. It is estimated that the project will create over 1,000 job opportunities in 2018.<sup>257</sup> The government does not always accept financial aid from China. Ghana recently rejected a USD 3 billion oil infrastructure loan from China.<sup>258</sup>

**Analytic Confidence:**

Analytic confidence for this assessment is moderate. Source reliability is high, and sources corroborated each other. The analysts' expertise is minimal, and the analysts worked together. The task complexity is moderate and the time available for the task was adequate.

\

## Sudan

### **Executive Summary:**

It is likely that China is investing in Sudan for its natural resources. China is currently investing about USD 2 billion in Sudan's energy, but it mainly in the area of oil as resources. Sudan offers numerous long-term economic opportunities to the Chinese, such as natural resources. Sudan's largest resource is petroleum, but also possesses other resources, such as copper and silver that may interest China for the long-term future with a growing population.

### **Discussion:**

#### **Current Demand**

Sudan's current power capacity is about 3,000 MW.<sup>259</sup> This only reaches about 40% of the population, and this number drops to 22% for the rural population.<sup>260 261</sup> Sudan has an annual population growth of 2.4% and GDP growth of 4.7%.<sup>262 263</sup> In order to keep up with the growth of demand, the Sudanese investment minister, Mubarak Al-Fadil, says the country needs at least 5,000 MW more.<sup>264</sup>

#### **Meeting Demand**

It is unlikely Chinese investments will help meet demand in the long term. Though Sudan's largest resource is petroleum, only a fifth of its electric generation is derived from oil.<sup>265</sup> The remaining  $\frac{4}{5}$  of electric generation is from hydropower.<sup>266</sup> The Upper Atbara and Setit Complex will help meet demand for the short term, but it is only "a matter of a few years before growth catches up to the capacity boost the dams will provide."<sup>267</sup>

#### **Chinese Motivations**

Sudan has several resources that interest China. For example, Sudan's largest resource is petroleum. Sudan has about 1.5 million barrels of proved oil reserves.<sup>268</sup> This remains an essential element of most developed and developing countries' economies. The country also has significant deposits of chromium ore, copper, iron ore, mica, silver, gold, tungsten, and zinc.<sup>269</sup> All of these natural resources are important for a wide variety of reasons such as manufacturing. Silver and gold are both rare and very valuable. Copper and tungsten are both important in the electronic industry.

China's most significant interest in Sudan is its oil.<sup>270</sup> PetroChina helped establish an effective oil system in Sudan.<sup>271</sup> China clearly did this because of its oil interests in the country. As a country, China demands an incredible amount of petroleum to keep the country running due to its industries and large population. With this large demand, China



Figure 24: The Khartoum Refinery Co. Ltd. Installation is largest refinery in Sudan. Source: [Time](#)

understands that it will need resources from other countries that are rich in oil. For example, Sudan exported a total of USD 3.09 billion in 2017 (See Figure 24).<sup>272</sup> The forefront of this was its oil industry. China even sent soldiers as “peacekeepers” during a war-torn time in the country that many believe were to keep its ties to the oil in the country. China trained the workers in Sudan for the oil project and Sudan really believes that China's interest in its oil is beneficial for the country. The Chinese investment was viewed as mutually beneficial for the country of Sudan, who received an investment and a partner in China.

China's oil investment in Sudan is its most significant oil investment abroad.<sup>273</sup> Outside of its oil investments, China does not import many other natural resources from Sudan.<sup>274</sup> It is expected that not much, if any financial investment has been allocated for the country's other natural resources from China, however, this is likely to change as the relationship between the two countries develop. Sudan is beginning to export more outside of oil, these exports includes other natural resources such as copper and silver. Sudan has the world's largest copper reserve.<sup>275</sup> It possesses about 5 million tons of metal.<sup>276</sup> Similarly, silver is becoming a lucrative export for Sudan as well. Even though it is has a much smaller reserve than the copper, it still has significant deposits to make it one of Sudan's leading exports.<sup>277</sup> China is expected to see the benefits from Sudan's other natural resources such as copper and silver. China already has good engagement in the country and could continue to take advantage of that for the other resources that China uses in manufacturing and much more. China needs all the resources it can get, and will look to expand outside of oil into other important natural resources, such as copper and silver.

### **Political, Social, Economic Implications**



Chinese investment in Sudan's oil sector recently passed USD 15 billion.<sup>278</sup> Because China controls 75% of oil investment in Sudan, Sudan has to buy oil for local use from China's share of the national oil production.<sup>279</sup> <sup>280</sup> Sudan still owed China USD 2 billion at the end of 2016 for this oil.<sup>281</sup> Sudan lost more than 75% of its oil revenue with the separation of South Sudan in 2011, and therefore had to rely on China more.<sup>282</sup> Sudan asked for additional delays to repay its total debts of USD 10 billion to China in January 2018.<sup>283</sup> Already in August 2017, China offered USD \$160 million in debt relief.<sup>284</sup>

Sudan has faced several Human Rights issues relating to the displacement of people due to the constructions of dams. The Merowe Dam, completed in 2008, doubled the electricity generations in Sudan.<sup>285</sup> This project however, relocated over 50,000 people from the Nile Valley to arid desert locations.<sup>286</sup> Under construction currently, Kajbar Dam is expected to generate 360 megawatts of electricity. This dam is estimated to destroy 500 archeological sites and displace over 10,000 more people.<sup>287</sup>

China has played a political role in Sudan for many of years. In 2007, China blocked sanctions against Sudan at the United Nations and force the Security Council to take a moderate approach with the Sudanese government on oil regulations.<sup>288</sup> China would have suffered large losses if the sanctions passed. Voeten's (2011) affinity scores data shows that Sudan averaged a 91 percent voting alignment with China from 1999 to 2011 on United Nations matter.<sup>289</sup> In addition, Sudanese labor law requires that international companies consist of staff which is 80 percent Sudanese.<sup>290</sup> However, the foreign minister admits that Chinese companies have failed to comply with this.<sup>291</sup>

**Analytic Confidence:**

Analytic confidence for this assessment is high. Source reliability is high with very little conflict among sources and information updated within the past couple of days. The analysts' expertise is very minimal but the analysts worked as a team. The task complexity is moderately complex, and the time constraint did play a role in collection.

## Zambia

### **Executive Summary:**

Due to China's impact on Zambia's copper industry, China is likely to continue its influence in the country by investing more in hydroelectric energy projects. Despite social unrest about Chinese involvement and actions in the mining industry.

### **Discussion:**

#### **Current Demand**

Zambia has an abundance of natural resources including uranium, silver, cobalt, copper, coal, lead, zinc, emeralds, and gold. Zambia has the second largest reserve of cobalt and seventh largest reserve of copper in the world. In 2016, Chinese investment in Zambia grew by USD 295 million, ranking first among African countries.<sup>292</sup> The country produced around 800,000 tons of copper in 2017.<sup>293</sup>

To date, only 26% of Zambia has access to electricity, of that percentage, only 3% of rural households and 45% of urban households have electricity.<sup>294</sup> 95% of Zambia's electricity comes from large scale (>20 MW) hydropower, getting the balance from diesel generators and mini-hydro schemes.<sup>295</sup> Zambia's hydropower potential is around 6,000 MW but has installed a capacity of 1,948 MW.

#### **Meeting Demand**

Due to Zambia's power shortage and the number of proposed hydroelectric power plants, China is likely to invest more in the current Zambian energy projects.

The government of Zambia has stated its desire for electricity for 91% of urban households and 51% of rural households by 2030.<sup>296</sup> To attain this goal, external financing is required. Zambia has the second largest potential for solar power in the world, along with an abundance of rivers and water resources in the area.<sup>297</sup>

Several hydropower energy plants have been completed, are under construction or are planned. A hydroelectric plant that China has invested in at USD 1.5 billion is the Kafue Gorge Lower Dam and Hydroelectric Station. The plant is currently under construction and expected to be completed by 2023.<sup>298</sup> The Gorge is looking to house five 150 MW generators, forecasted to produce a total of 750 MW, and may be the third largest hydropower station in the country.<sup>299</sup>

#### **Chinese Motivations**

Despite the ongoing discourse throughout Zambia regarding China's vast involvement in the copper industry, it is likely that China will continue to invest and expand its influence in the country.

The Chinese-Zambian energy related relationship soared after the 2010 mining cooperation agreement that also permitted a joint economic zone to be put into place. China has been utilizing Zambia for her important energy and raw materials supply while simultaneously opening new markets for Chinese products.<sup>300</sup> Due to the numerous massive projects and rapid growth of trade between the two countries, China is enjoying unprecedented influence in Zambia today.<sup>301</sup> China uses “resource cooperation” as the basis for the majority of their deals and financing projects in Zambia. Zambia Electric Supply Corporation (ZESCO) owns most new capacity in Zambia. However, China’s taken the lead on both the construction and financing arrangements in most of the recent power generation infrastructure. This gives China a distinct upper hand in the “win-win” economic strategy that China has touted across Africa. “In Zambia, Chinese investments are primarily resource seeking and to a small extent market seeking – and once businesses are fully operational, firms may use Zambia’s central location to sell to surrounding countries.”<sup>302</sup>

China relies on Zambian copper and cobalt production. Several Chinese companies, state and private, have invested large swaths of money into copper and cobalt. According to the Ministry of Mines Permanent Secretary Paul Chanda, demand of copper and cobalt is expected to remain high, especially since both are major components in electric cars. China is widely considered to be at the forefront of the electric car industry.<sup>303</sup> In many cases, Zambian mining companies have large debts to Chinese banks. If relations within the country between the Zambian people and Chinese mine workers continue to deteriorate, it will be difficult for Zambia to do much with how much influence China has on the industry.

### Political, Social, Economic, and Environmental Implications

The heavy dependence on hydropower exposes it to seasonal water level variations that have recently resulted in load shedding.<sup>304</sup> With its reliance on hydropower, Zambia leaves itself vulnerable to the effects of climate change.



Figure 25: Protestors gathered outside of the Chinese embassy to protest the alleged mistreatment of Zambian mine workers by Chinese owners. Source:

PRI

Zambia has plenty fertile land for agriculture production but only utilizes a small portion of it.

Labor disputes among Chinese run copper mines have caused problems over the years within Zambia. Recent arrests of Chinese workers for “illegal copper mining” offenses along with years of alleged violence between Chinese workers and Zambian workers/civilians have caused a nationwide stir of emotions over China’s role in Zambian society (See Figure 25).<sup>305</sup> The country’s former president Michael Sata won the presidency in 2011 in part by campaigning on anti-Chinese sentiment and raised the minimum wage. Zambia’s current president Edgar Lungu has taken an especially harder line against perceived opposition, though Lungu hasn’t expressed animosity towards the Chinese in the country.<sup>306</sup>

The strong relationship between the two countries gives Zambia access to (unlike conventional western aid) unconditional aid, Foreign Direct Investment, and development in the form of infrastructure and other sectors. The International Monetary Fund’s (IMF) 2017 analysis that Chinese loans have put Zambia at risk of debt distress should be alarming to Zambians and the people of Africa as a whole.<sup>307</sup>

**Analytic Confidence:**

Analytic confidence in this assessment is moderate. The analysts used sources of moderate to high reliability. The subject matter expertise of the analysts is little. However, ample time was given to complete the estimate.

## Zimbabwe

### Executive Summary:

Despite Zimbabwe's recent political instability, China is likely to continue to invest in Zimbabwe's energy sector to help stabilize the country and cultivate a better investment market. Due to the proposed economic reforms, and its increase in renewable energy projects.

### Discussion:

#### Current Demand

Zimbabwe is struggling to supply energy to the country. According to the World Bank's 2014 statistics, 32.3% of Zimbabwe's population has access to electricity.<sup>308</sup> More specifically 21% of the rural population and 80% of the urban population has access to energy.<sup>309</sup> According to Africa-EU Renewable Energy Cooperation program, Zimbabwe faces an energy deficit of 60%.<sup>310</sup> Furthermore, "The Zimbabwe Electricity Supply Authority (ZESA) generation capacity was measured in February 2016 as producing at only 845 MW, against a projected national demand of 2,200 MW and an installed capacity of approximately 1,940 MW."<sup>311</sup>

The country is gradually increasing its energy needs at a slow pace. In May of 2017, a 15 MW generator, the Tokwe Mukosi dam, was completed.<sup>312</sup> Due to the poorly developed and ineffective electricity grid which causes a lack of energy supply, Mozambique and South Africa import power to Zimbabwe which is expensive.<sup>313</sup>

#### Meeting Demand

China is likely to actively pursue investments in more clean energy projects particularly in rural areas. Due to opportunities available to invest in renewable energy, the creation of new dams, and the lack of accessible energy in rural areas.

With large additional generation capacities, energy projects financed by China are likely to meet the demand. However, transmission and distribution remains a major hurdle as mentioned above, in the production of Zimbabwe's electric generation, at approximately half of the total output of installed capacity.<sup>314</sup>

Alternative methods are crucial in providing essential power to Zimbabwe. The country has an abundance of renewable resources which have yet to be exploited. A number of hydroelectric and coal-based plants heavily funded by China, have been completed or are currently under construction. Many of its renewable energy-based projects, current and future, are solar projects, planned to increase the energy supply.<sup>315</sup> Solar projects would expand the national grid and offer solar energy everywhere in the country at any point in time.<sup>316</sup>

The largest Chinese investment, in terms of financing, is the extension to the Hwange Thermal Power Station. This project is being financed by China's Export-Import bank in the amount of USD 1.2 billion.<sup>317</sup> An additional capacity of 600 MW will be added to the facility's output once completed. China is also financing an extension to the existing Kariba dam. The dam currently has an output of 750 MW and will have an additional capacity of 300 MW when the project is completed, slated for 2018.

Another large project is the solar energy-based project, the Gwanda Solar project, which was finally approved in 2017, after many objections to reverse the project.<sup>318</sup> The solar project is said to benefit 10,000 Matenkani villagers in South Gwanda and will generate 255 watts out of each of the 400 solar panels. In total, this will produce 99 KW, equating to .099 MW.<sup>319</sup>

### **Chinese Motivations**

China is likely to increase its investments in the Zimbabwean energy sector. This is due to current energy project investments, possible economic reform, and its large reserves of coal. Despite its recent political instability.

Zimbabwe is well endowed with natural resources. Gold, platinum nickel, coal, diamonds, chemicals, and others. The country's natural resources bring in 26.9% of its GDP.<sup>320</sup> Despite Zimbabwe's abundant mineral wealth, very little of these natural resources are exported to China. China's top import from Zimbabwe is tobacco.<sup>321</sup> Zimbabwe's primary trade partner is South Africa.<sup>322</sup> The vast majority of trade volume for exports and imports is between Zimbabwe and South Africa. The country's GDP is at a low \$33.87 billion with a growth rate of 2.8%.<sup>323</sup>

China has been a great friend and ally to Zimbabwe since their independence in 1980. Chinese investment is the country's largest source of investment.<sup>324</sup> In 2016, trade between the two countries reached USD 1.1 billion.<sup>325</sup> Western countries imposed sanctions on Zimbabwe in 2002 in response to their questionable elections and other domestic political activities. In turn, Zimbabwe turned to China to fill the void. Since then, Chinese investments have influenced the country as well as other African countries. China's military engagement and assistance greatly increased in this time-period and remains high to date.

Robert Mugabe led Zimbabwe from its independence until November 2017 when he was forced out of office due to a military coup allegedly stemming from the removal of his deputy, Emerson Mnangagwa, which was done to pave the way for Mugabe's wife Grace to take power when he passed away. Grace Mugabe has limited support



Figure 26: Zimbabwean General Constantino Chiwenga visited China just days before the military coup that ousted then President Robert Mugabe. The visit was described as a routine military meeting between the two friendly nations. Source: [BBC News](#)

among the people of Zimbabwe due to her lavish spending and lifestyles throughout the years. The Zimbabwean military accused President Mugabe and his ruling party (Zanu PF) leadership of attempting to purge supporters of the vice-president.<sup>326</sup> Days before the coup, Zimbabwe's top military general visited China on a state visit that was said to be a routine military meeting. During the coup, China never condemned the removal of President Mugabe, instead stating that "they were watching it closely for developments (See Figure 26)."<sup>327</sup> China's possible involvement or influence on the coup sparked international curiosity. Wang Hongyi, an associate research fellow at the Institute of West-Asian and African Studies, noted that concerns had begun to grow over the long-term safety of Beijing's investment in its African partner. Hongyi believes that the policies and decisions of former President Mugabe caused many investment projects to shut down or move to other countries, causing large losses for China.<sup>328</sup> Large investment losses would likely give China a reason to support leadership change in Zimbabwe.

Unlike Ethiopia, Sudan, or Angola that are strategic partners for China, or markets with lucrative potential such as Nigeria and South Africa, Zimbabwe is far from being China's main priority on the continent. With a World Bank Ease of Doing Business rank of 159, it's no surprise that Chinese companies have found the investment climate in Zimbabwe to be challenging.<sup>329</sup> With the current lack of political stability, Chinese diplomats and companies are waiting for better days in Zimbabwe. Current President Emerson Mnangagwa has pushed for economic reforms that are aimed increasing investments into the country.<sup>330</sup> When and if this comes, it is likely that China's investment in the country will drastically increase, while inflating its vast influence throughout the country and government.

**Political, Social, Economic, and Environmental Implications**

Zimbabwe's economy is heavily reliant on its agriculture and mining. The mines greatly impact communities both socially and economically that are close to mining areas.<sup>331</sup> Foreign and domestic investments are constantly hampered due to the lack of land reinforcement and inability to refurbish the land.<sup>332</sup> The challenging investment climate stems from systemic corruption and flawed regulatory policies.<sup>333</sup> Corruption is currently at the forefront of the aforementioned proposed and licensed Gwanda solar plant and the recent remarks of Ex-President Mugabe about USD 15 billion worth of diamond mining revenue being stolen.<sup>334</sup> Corruption allegations on these levels not only hurt the add to the Zimbabwean people's lack of trust in their government, but it could erode their popular support for Chinese influence in the country as well due to Chinese money and influence in many of these cases.

**Analytic Confidence:**

Analytic confidence in this estimate is moderate. The analysts utilized multiple sources of moderate to high reliability. No structured analytic technique was used in the analysis. However, the analysts were given ample time to complete the estimate.



## Equatorial Guinea

### Executive Summary:

China is likely investing in Equatorial Guinea's energy sector to help the country develop into a more robust market for Chinese exports. Despite having an oil-dominated economy, Equatorial Guinea's proven oil reserves are miniscule compared to other African countries. China does not rely on oil imports from Equatorial Guinea. The country has little more than oil in terms of exportable resources, and economic prosperity has failed to spread among the population. However, with its high GDP per capita and increasing development, Equatorial Guinea is a growing export market for Chinese consumer goods.

### Discussion:

#### Current Power Demand

According to the World Bank's 2016 statistics, 67.9% of Equatorial Guinea's total population has access to electricity.<sup>335</sup> However in urban areas, 90.76% of residents are electrified.<sup>336</sup> Rural communities are less electrified, with an access rate of 52.5%.<sup>337</sup> Equatorial Guinea suffers from a transmission and delivery problem. According to Segesa, the national electric company, the country has the highest generation capacity per capita in central Africa.<sup>338</sup> Generating enough electricity is not a problem, transmission to rural areas is the major impediment to meeting energy demands.

#### Meeting the Demand

There are two major Chinese-funded energy projects recently developed in Equatorial Guinea. The first is the Malabo turbogas facility, a natural gas power plant located near the island capital. This facility, financed with USD 143 million, was initiated 2009 and completed in 2012.<sup>339</sup> The second project is the Djibloho Dam, built with USD 257 million in Chinese financing. The dam was initiated in 2008 and completed in 2012.<sup>340</sup> Despite the country's low overall electrification rate, the gas power plant at Malabo in conjunction with the Djibloho Dam will likely help Equatorial Guinea to meet its energy needs. Djibloho dam stands as the largest generation center in the country contributing 120 MW. In addition to the two Chinese funded projects, a larger project, called the Sendje dam is under construction through a different financier. When completed this project will add an additional 200 MW.<sup>341</sup> Combined with all other generation infrastructure, the Chinese-backed projects are helping Equatorial Guinea meet its energy demands.

### **China's Motivations**

China is motivated to help Equatorial Guinea grow and diversify its oil-dependent economy into a larger market for Chinese goods and services. The 2016 monetary value of Chinese goods traded to Equatorial Guinea was USD 264 million, and is accounted for 16% of total trade flowing into Equatorial Guinea.<sup>342</sup> China's goal of cultivating a bigger market is reflected in a 2015 finance package of USD 2 billion dollars, loaned by the Industrial & Commercial Bank of China to Equatorial Guinea's government.<sup>343</sup> This loan will finance other government infrastructure projects, and was designed to help the economy move beyond reliance on oil.<sup>344</sup> This aid package comes 3 years after the two energy projects were completed. Because of its low population, Equatorial Guinea has one of the highest GDP's per capita on the continent of Africa and has great economic potential if able to diversify its economy.<sup>345</sup> Declining oil output and declines have led to great volatility in the economy. This is characterized by years of steep GDP growth and years of sharp GDP decline. The overall trend is for decreased GDP growth in the next couple years.

Equatorial Guinea's major natural resources are crude oil, natural gas, and timber.<sup>346</sup> However, Equatorial Guinea's oil reserves are not very large compared to other states. The Energy Information Agency estimates Equatorial Guinea's oil reserves at 1.3 billion barrels.<sup>347</sup> Other African producers like Nigeria, which has 37 billion barrels of oil reserves, dwarfing Equatorial Guinea. Equatorial Guinea is not a strategic resource trade partner for China. The country exports little else than energy and lacks any other strategic resources China desires.

In terms of crude oil exports, Equatorial Guinea sells oil to several countries including the US and countries in Europe.<sup>348</sup> In 2015, Equatorial Guinea exported USD 5.92 billion worth of goods. The majority of this amount, 69%, was petroleum.<sup>349</sup> Additionally, 23% of exports were natural gas.<sup>350</sup> In the same year, only 17% of total Equatoguinean exports were sold to China.<sup>351</sup> In the same year, Equatorial Guinea imported 16% of its total imports, USD 1.64 billion, from China.<sup>352</sup> These figures represent an even balance of trade between China and Equatorial Guinea. Thus, China does not completely dominate the trade partnership with Equatorial Guinea. However, recent development deals suggest China would like to aid the country in development as a means of increasing the market for Chinese goods in the country.

### **Political, Social and Economic Implications**

The recent Chinese-funded energy investments are creating closer ties between Equatorial Guinea and China. In a recent state visit with China Equatoguinean President Mbasogo praised his country's relations with China.<sup>353</sup> Despite the increase in energy generation, the average inhabitant of Equatorial Guinea is yet to see benefit from the project. Despite the country's high GDP per capita, the poverty rate remains

high at over 60%.<sup>354</sup> Additionally corruption is endemic, the country has a corruptions perceptions index score of 17. This ranks near the very bottom, 171<sup>st</sup> out of 181 countries.<sup>355</sup> If the economic climate fails to trickle down, residents are unlikely to prosper from increased electrical access.

**Analytic Confidence:**

Analytic confidence in this estimate is moderate. The analyst utilized multiple sources of moderate to high reliability. No structured analytic technique was used in the analysis. However, the analyst was given ample time to complete the estimate.

## Tanzania

### **Executive Summary:**

China is likely to continue investing large amounts of money into the African nation of Tanzania due to its rich natural resources and geographical location. Despite international opposition based in climate change concerns to resources like coal and to a lesser extent hydropower.

### **Discussion:**

#### **Current Demand**

Tanzania has been working to expand electrification in the country, current estimates show 32% of its citizens have access to electricity. In rural areas, this decreases to almost 17%.<sup>356,357</sup> Tanzania's regulatory and legal frameworks are very robust, so they encourage the construction of small power projects.<sup>358</sup> Average consumption per capita is 108 kWh per year.

#### **Meeting Demand**

Current installed power capacity is 1,450 MW.<sup>359</sup> Tanzania predicts its annual power demand to increase 71% from 2016 to 2020.<sup>360</sup> By 2020, Tanzania expects demand to be 13,430 GWh. Increase in demand is due to “accelerated productive investments, increasing population, and increasing access to electricity.”<sup>361</sup> The biggest issues facing energy investment in Tanzania include governance, lack of creditworthy off-taker, and lack of cost-reflective tariffs.<sup>362</sup> Chinese investments are key to transforming the society from agricultural to semi-industrial.<sup>363</sup> In the future, it is likely China will be placing a major role in meeting the demand for electricity in Tanzania. To achieve the goal of 10,000 MW in 2025, Tanzania will need to attract private capital.<sup>364</sup> It is planning on reforming its electric supply industry through investments.<sup>365</sup> China as Tanzania's major investor, is likely to be essential in meeting this goal.<sup>366</sup>

#### **Chinese Motivations**

China relies on imports of Tanzanian raw materials, both natural resources and agricultural products, to help power and sustain their economy. Tanzania does not have the ability to produce large scale manufactured or capital goods. Therefore, it relies on exporting its natural resources to countries such as China. Despite a trade imbalance that heavily favors China (USD 1.2 billion in 2015), relations between the two governments remain strong and investment strategies continue to increase in magnitude and frequency.<sup>367</sup> Data released by the Chinese embassy in Tanzania stated that Tanzania accounted for 16.3% of China's Foreign Direct Investment (FDI) in all of Africa in 2014 totaling USD 4 billion. Tanzanian President John Magufuli has

expressed the need for the country to drastically increase its power generation. His goal is to increase power generation from 1,500 to 10,000 MW by 2025.

The Tanzanian government has warmly welcomed investors looking to invest in power generating sources such as coal, gas, and solar.<sup>368</sup> Tanzania attracts foreign investors due to its rich resources and political stability. Currently, there are more than 500 Chinese invested enterprises in Tanzania (See Figure 27). Along with the rich land and resources, Tanzania offers a rich labor force, as about 70% of the population consists of people below the age of 35.<sup>369</sup> Many Chinese firms in Tanzania provide on-the-job training and, in some cases, send Tanzanian managerial staff to China for training programs. Most Chinese private firms are involved in low-tech, labor intensive industries, such as light manufacturing and assembly, and many firms compete with domestic companies in Tanzania.<sup>370</sup>

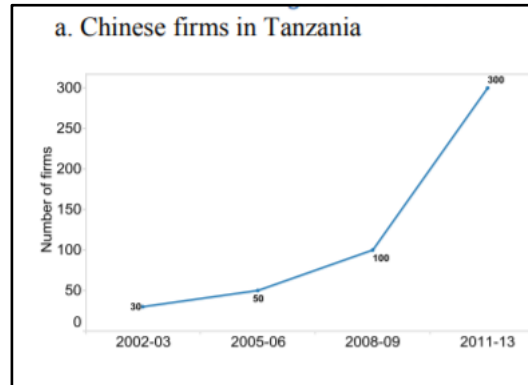


Figure 27: The number of Chinese firms in Tanzania have drastically increased over the last decade. Source: [World Bank](#)

Along with utilizing its resources, Tanzania is critical in other areas of interest for China. Tanzania is strategically in line with the Belt and Road initiative. China is behind the development of the Bagamoyo Port. This is considered the largest and most modern port in all of Africa. Bagamoyo can handle up to twenty times more cargo than the Dar es Salaam port in Tanzania. Coincidentally, China also won a deal to build a 34 km road between Bagamoyo and Mlandizi. This road links the port with The Tanzania-Zambia railway.<sup>371</sup> Along with this, the Kiwara Coal mine was also one of the largest projects brought on by Chinese investment in the country.

### **Political, Social, and Economic Implications:**

China's trading habits with Tanzania is likely to continue to boost the economy in Tanzania. China is the largest trading partner of Tanzania with over USD 3.88 billion exchanged in 2016.<sup>372</sup> China has 724 companies registered with the Tanzania investment center.<sup>373</sup> Dr. Susan Kolimba, the Deputy Minister of Foreign Affairs and East African Cooperation, predicted that Chinese investment would generate more than 1,700 jobs in Tanzania in the year 2017.<sup>374</sup>

China funded a center in Tanzania to give agricultural technology that enables them to farm the land more efficiently. Since the center's creation in 2012, the Chinese trained over 2,000 farmers to increase productivity.<sup>375</sup> The center has eleven Chinese experts

who work closely with their local peers in assisting farmers to follow best crop husbandry practices.<sup>376</sup>

To pave way for the construction of the Singida Wind Power project, approximately 250 families were relocated.<sup>377</sup> However, the government offered aid to these families to make the relocations as smooth as possible.<sup>378</sup> With the growing demand for electrical power, the government will likely build more wind power projects. These projects offer more stability in the long run and have less impact on the environment. Currently, the majority of Tanzania's power supply comes from water and gas reserves.<sup>379</sup> However, hydropower offers little stability long-term due to droughts.<sup>380</sup>

**Analytic Confidence:**

Analytic confidence in this assessment is moderate. The analysts used sources of moderate to high reliability. The subject matter expertise of the analysts is little. However, there was plenty of time to complete the estimate.

## PROSPECTIVE PROJECTS

### China Likely To Invest in Batoka Hydropower Project

#### Executive Summary:

Due to China's previous investment in hydropower on the Zambezi River, where the power of the Bakota Hydropower Plant will go, and its dependence on hydro-powered mining, it is likely China will invest in the Bakota Hydropower Plant. Despite China financing fewer hydropower projects and the fact that China could finance the project, but not win the contract.

#### Discussion:

Batoka Hydropower Plant is located at the end of the Kariba Dam, and it is currently reserved as a potential site for future development. The plant would be worth USD 4 billion.<sup>381</sup> The hydropower station would sit between Zambia and Zimbabwe. China has already helped finance Zimbabwe's Kariba Dam and Zambia's Kafue Gorge Lower.<sup>382,383</sup> In addition, China's SinoHydro was contracted to construct Zambia's Itezhi Tezhi hydropower project as well as Kafue Gorge Lower.<sup>384,385</sup> China would have a larger amount of influence over the hydropower on the Zambezi River, if it chooses to invest in the Batoka Hydropower project. Zambia and Zimbabwe both have important economic relationships with China. In 2016, Zambia was named as one of China's main partner countries and investment destinations, and China is Zimbabwe's largest source of investment and fourth largest trading partner.<sup>386,387</sup> Currently, the World Bank believes that the Batoka Gorge HES is the more economically feasible project among all prospective projects located in the Zambezi River Authority (Batoka Gorge HES versus Devils Gorge HES).<sup>388</sup>

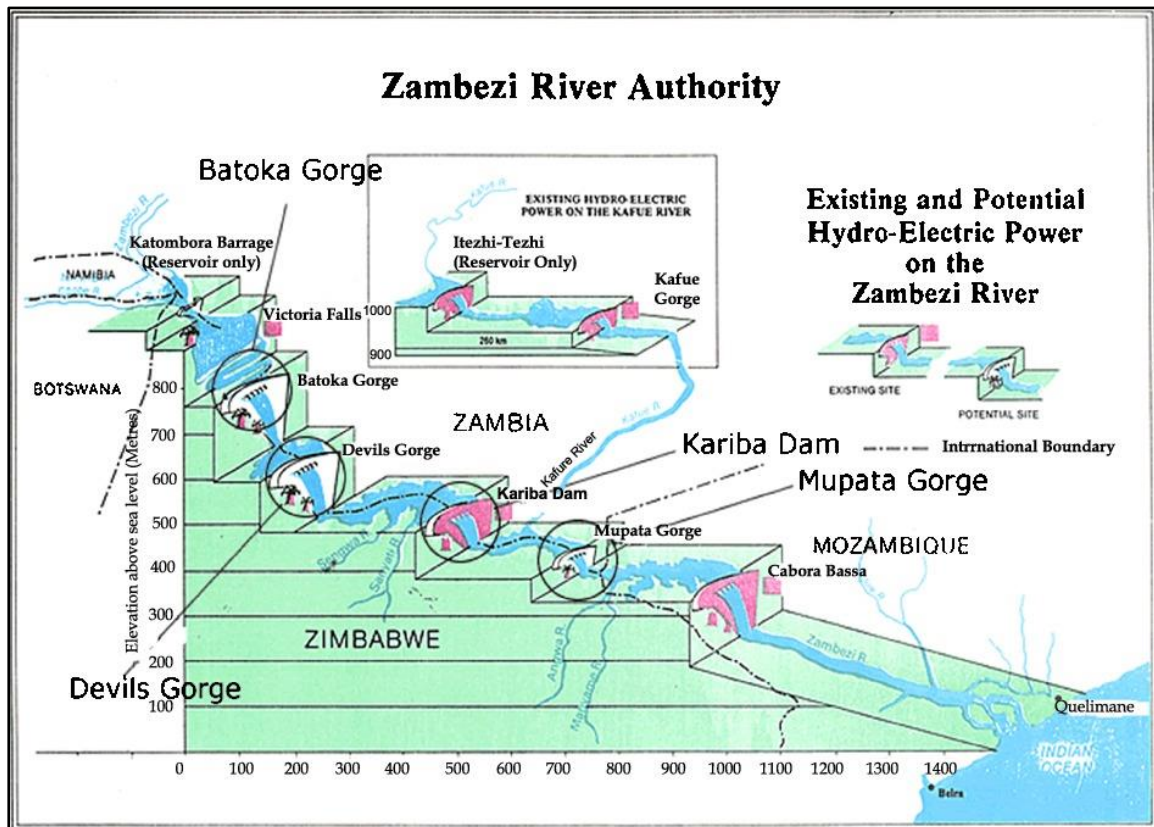


Figure 28: China has already made several investments along the Zambezi and Kafue Rivers. These hydropower plants help power important mining infrastructure. Source: [Victoria Falls 24](#)

China is likely to invest in Zambia over other countries or organizations because it will contribute solely to the Southern African Power Pool (SAPP) (See Figure 28).<sup>389</sup> The Batoka Hydropower Plant will not provide any electricity to its rural, local population.<sup>390</sup> The mining sector dominates power demand in SAPP.<sup>391</sup> China is a dominant investor in African mining, and it would benefit from the SAPP's energy for its various mining projects.

Despite the Chinese financing fewer hydropower projects than commonly believed, Batoka Hydropower Plant's purpose fits in line with past strategic projects of China.<sup>392</sup> China is more likely to fund a hydropower project, if it will provide power for mining. China financed or attempted to finance hydropower projects in the Democratic Republic of Congo, Gabon, and Zambia.<sup>393,394,395</sup> China's dependence on Zambian copper is likely the main reason it helped finance the Kafue Gorge Lower. With the creation of this dam, Zambia was looking to increase its power generation to match supply with demand.<sup>396</sup> This dam will provide power to the SAPP as well.<sup>397</sup>

Many believe that China does not allow countries to hold competitive tenders for projects that it finances.<sup>398</sup> However, this is not true for hydropower projects.<sup>399</sup> In



addition, a representative of PowerChina has said many Chinese companies are interested in investing in this project due to its viability.<sup>400</sup> Therefore, even if a Chinese company did not win the construction bid, Chinese companies would likely still invest. John Hopkins also noted that “Chinese companies have actually been known to partner with a different Chinese financing partner in order to compete as a package.”<sup>401</sup> It is even possible that more than one Chinese company will look to invest.

**Analytic Confidence:**

Analytic confidence for this assessment is moderate. The analyst has little subject matter expertise and worked alone on this analysis. Sources tended to corroborate and were of moderate or high reliability. The task complexity was low and the analyst had sufficient time to complete it.

**ANNEXES****ANNEX 1: Confirmed Chinese Projects**

<b>Name</b>	<b>Country</b>	<b>Energy Type</b>
Algeria Solar Photovoltaic Plant	Algeria	Solar
Caculo Cabaca Hydroelectric Project	Angola	Hydroelectric
Luena Transmisison Line	Angola	Transmission
Quifangondo (Kifangondo), Mabubas Transmission Lines and Substation	Angola	Transmission
Cambambe, Luanda Transmission Line	Angola	Transmission
Soyo I Combined Cycle Power Plant/Transmission	Angola	Natural Gas
Benin-Togo Adjarala Dam	Benin	Hydroelectric
Morupule B Power Station	Botswana	Coal
Memve'ele Dam	Cameroon	Hydroelectric
Mekin Hydroelectric Dam	Cameroon	Hydroelectric
Lom Pangar Dam	Cameroon	Hydroelectric
Bini Hydropower Dam Project	Cameroon	Hydroelectric
Boali III Dam	Central African Republic	Hydroelectric
Soubre Dam	Cote d'Ivoire	Hydroelectric
Gribo-Popli Hydropower Project	Cote d'Ivoire	Hydroelectric
Busanga Dam	Democratic Republic of Congo	Hydroelectric
inga III Dam	Democratic Republic of Congo	Hydroelectric
Imboulou Hydroelectric Power Plant	Republic of Congo	Hydroelectric
Liouesso Hydroelecric Dam	Republic of Congo	Hydroelectric
Zongo II Hydroelectric Station	Democratic Republic of Congo	Hydroelectric
Moukouloulou Dam	Democratic Republic of Congo	Hydroelectric
Djiploho Hydropower Station	Equitorial Guinea	Hydroelectric
Malabo Turbogas Generation Facility	Equitorial Guinea	Natural Gas
Hirgigo Power Plant	Eritrea	Oil
Adama I Wind Farm	Ethiopia	Wind
Adama II Wind Farm	Ethiopia	Wind
Bole-Lemi and Kilinto Industry Zone Power Transmission Project	Ethiopia	Transmission
Aysha Wind Farm Project	Ethiopia	Wind
Messabo Harrena Wind Farm	Ethiopia	Wind
Aba Samuel Dam	Ethiopia	Hydroelectric

## UNCLASSIFIED

Fincha-Amerti-Neshe Hydroelectric Dam	Ethiopia	Hydroelectric
Geba Hydropower Station	Ethiopia	Hydroelectric
Genale Dawa III Hydropower Project	Ethiopia	Hydroelectric
Grand Ethiopian Renaissance Dam (GERD) Project	Ethiopia	Hydroelectric
GERD Transmission	Ethiopia	Transmission
Gilgel Gibe III Dam	Ethiopia	Hydroelectric
Tekeze Hydropower Station/Dam	Ethiopia	Hydroelectric
China-Egypt Transmission Lines Project	Egypt	Transmission
Benban Solar Farm	Egypt	Solar
Hamarawein IPP Coal Project	Egypt	Coal
Grand Poubara Dam/Power Plant	Gabon	Hydroelectric
Volta Lake Resettlement Township Electrification Project	Ghana	Transmission
Rural Electrification Grant	Ghana	Transmission
Bui Dam Complex	Ghana	Hydroelectric
Sonon Asogli Thermal Power Station (Phase 1 and 2)	Ghana	Natural Gas
Kaleta Dam	Guinea	Hydroelectric
Souapiti Dam	Guinea	Hydroelectric
Ginkang Hydropower Plant and Tinkisso Hydropower Plant	Guinea	Hydroelectric
Garissa Solar Power Station	Kenya	Solar
Nyahururu-Maralal Transmission Network	Kenya	Transmission
Kenyan Power Transmission Improvement Project (Garissa - Wajir)	Kenya	Transmission
Kenyan Urban Power Grids	Kenya	Transmission
Kenya Urban Power Grid Upgrading Project	Kenya	Transmission
Lamu Coal Power Plant	Kenya	Coal
Sondu-Miriu Hydroelectric Power Station	Kenya	Hydroelectric
Sang'oro Hydroelectric Power Station	Kenya	Hydroelectric
High Grand Falls Hydropower Dam	Kenya	Hydroelectric
Limuru Wind Farm	Kenya	Wind
Chagem Wind Farm	Kenya	Wind
Kajiado Wind Power Station	Kenya	Wind
Kipeto Wind Farm	Kenya	Wind
Olkaria IV Geothermal Power Station	Kenya	Geothermal
Olkaria IV Geothermal Power Station Drilling	Kenya	Geothermal
Suswa Geothermal Power Project	Kenya	Geothermal
Imaloto Coal Power Station	Madagascar	Coal
Kapichira Hydroelectric Dam	Malawi	Hydroelectric
Kamwamba Coal Project	Malawi	Coal
Felou Hydroelectric Dam	Mali	Hydroelectric

## UNCLASSIFIED

Gouina Hydroelectric Power Station	Mali	Hydroelectric
Noor Ouarzazate 4 Photovoltaic Station (Noor PV 1)	Morocco	Solar
Noor Laayoune Photovoltaic Station (Noor PV 1)	Morocco	Solar
Noor Boujdour Photovoltaic Station (Noor PV 1)	Morocco	Solar
Noor Ouarzazate I Photovoltaic Station	Morocco	Solar
Noor Ouarzazate II, III Photovoltaic Station	Morocco	Solar
Jerada Power Station	Morocco	Coal
Ncondezi Power Station	Mozambique	Coal
Massingir Dam	Mozambique	Hydroelectric
Mambilla Hydropower Plant	Nigeria	Hydroelectric
Zungeru Hydropower Plant	Nigeria	Hydroelectric
Ologbo Thermal Power Station	Nigeria	Natural Gas
Omotosho (I/II) Power Plant	Nigeria	Natural Gas
Nigeria Power Transmission Project	Nigeria	Transmission
Olorunsogo (I/II) Power Station	Nigeria	Natural Gas
Paplatano Power Plant	Nigeria	Natural Gas
Port Loko Hydropower Dam	Sierra Leone	Hydroelectric
Dakar Power Transmission Project	Senegal	Transmission
Mulilo De Aar 1 Wind Farm	South Africa	Wind
Mulilo De Aar 2 Wind Farm	South Africa	Wind
Upper Atbara	Sudan	Hydroelectric
Merowe Dam	Sudan	Hydroelectric
Merowe Transmission Project	Sudan	Transmission
South Kordofan State Transmission Line	Sudan	Transmission
NEC Transmission Line	Sudan	Transmission
Roseires Dam	Sudan	Hydroelectric
Kajbar Dam Project	Sudan	Hydroelectric
Dongola Power Plant	Sudan	Diesel
Khartoum North Thermal Power Station	Sudan	Coal
Garri (El Jaili) Power Station	Sudan	Oil
Ngaka Power Station	Tanzania	Coal
Mchuchuma-Liganga Power Station	Tanzania	Coal
Singida Wind Power Station	Tanzania	Wind
Ayago Hydroelectric Power Station	Uganda	Hydroelectric
Karuma Hydroelectric Power Station	Uganda	Hydroelectric
Isimba Hydropower Project	Uganda	Hydroelectric
Kariba North - Kafue West Transmission Network	Zambia	Transmission
Kafue Gorge Lower Dam/Hydroelectric Station*	Zambia	Hydroelectric
Itezhi-Tezhi Dam Power Station	Zambia	Hydroelectric
Lusiwasi Lower Dam	Zambia	Hydroelectric

## UNCLASSIFIED

Lunzua Mini-Hydro Power Plant	Zambia	Hydroelectric
Musonda Falls Hydro Power Station	Zambia	Hydroelectric
Gwayi Integrated Coal-Gas-Power Project	Zimbabwe	Coal
Hwange Makomo Power Station	Zimbabwe	Coal
Hwange Thermal Power Station	Zimbabwe	Coal
Kariba North Bank Power Station	Zambia	Hydroelectric
Kariba South Bank Power Station	Zimbabwe	Hydroelectric
Gwayi-Shangi Dam	Zimbabwe	Hydroelectric
Insukamini Solar Project	Zimbabwe	Solar
Gwanda Solar Project	Zimbabwe	Solar
Munyati Solar Project	Zimbabwe	Solar

**ANNEX 2: Confirmed Russian Projects**

<b>Name</b>	<b>Country</b>	<b>Energy Type</b>
Capanda Hydropower Plant	Angola	Hydroelectric
Daabaa Nuclear Power Plant	Egypt	Nuclear
Nigeria-Russia Nuclear Projects	Nigeria	Nuclear
Rumakali Dam	Tanzania	Hydroelectric

**ANNEX 3: Cancelled/Unconfirmed Projects**

<b>Name</b>	<b>Country</b>	<b>Energy Type</b>	<b>Status</b>
Aboano Power Station	Ghana	Coal	Cancelled
Al-Fulah Gas-Fired Power Station	Sudan	Natural Gas	Cancelled
Lagdo Dam	Cameroon	Hydroelectric	Unconfirmed
Gilgel Gibe IV Dam	Ethiopia	Hydroelectric	Unconfirmed
Halele Werabesa Dam	Ethiopia	Hydroelectric	Unconfirmed
Kinkon Dam	Guinea	Hydroelectric	Unconfirmed
Ambodiroka Hydropower Project	Madagascar	Hydroelectric	Unconfirmed
Lumangwe Falls Project	Zambia	Hydroelectric	Unconfirmed
Kalungwishi Hydro Project (Kabwelume Falls Station)	Zambia	Hydroelectric	Unconfirmed
Kalungwishi Hydro Project (Kundabwika Falls Station)	Zambia	Hydroelectric	Unconfirmed
Devil's Gorge Hydroelectric Scheme	Zambia	Hydroelectric	Unconfirmed
Batoka Gorge Hydroelectric Power Station	Zambia	Hydroelectric	Unconfirmed

## ANNEX 4: Ethiopia ACH

		Type	Credibility	Relevance	H: 1	H: 2
					China is investing in Ethiopia for influence.	China is not investing in Ethiopia for influence.
	Weighted Inconsistency Score ⇄				-2.0	-3.0
	Enter Evidence					
E7	European Investment Bank financed smaller hydroelectric projects on the Omo River, but refused to finance the Gibe III Dam due to social impacts and environmental implications this large project would have on Ethiopia and its surrounding countries.		MEDIUM	MEDIUM	I	C
E6	The Ethiopia's Grand Renaissance Dam (GERD) is predicted to bring more power to Ethiopia but this project is also creating tensions over water rights with Sudan and Egypt.		MEDIUM	MEDIUM	I	C
E5	Ethiopia is a mostly resource-poor country, so China is not gaining strategic resources through its investment in the country.		MEDIUM	MEDIUM	C	I
E4	There is massive potential for a large consumer market and as an economic partner in Ethiopia.		MEDIUM	MEDIUM	C	I
E3	The country is a linchpin in China's Belt and Road infrastructure scheme.		MEDIUM	MEDIUM	C	I
E2	Currently, Ethiopia has a non-permanent seat on the UN Security Council.		MEDIUM	MEDIUM	C	N
E1	Loans for infrastructure are mostly concessional loans with longer grace periods and/or lower interest rates.		MEDIUM	MEDIUM	N	N



### ANNEX 5: One Belt, One Road



- <sup>1</sup> <https://www.reuters.com/article/us-egypt-russia-nuclear/russia-to-lend-egypt-25-billion-to-build-nuclear-power-plant-idUSKCN0YA1G5> (Reliability: high)
- <sup>2</sup> <https://www.bloomberg.com/news/articles/2017-10-30/russia-signs-agreement-with-nigeria-to-build-nuclear-power-plant> (Reliability: high)
- <sup>3</sup> <https://www.yahoo.com/news/nigeria-selects-two-sites-nuclear-power-plants-122001531--finance.html> (Reliability: high)
- <sup>4</sup> <http://nigerianoilservices.com/tag/gulf-of-guinea/> (Reliability: moderate)
- <sup>5</sup> [https://www.worldcoal.com/cbm/07012014/coal\\_prospects\\_in\\_southern\\_africa\\_383/](https://www.worldcoal.com/cbm/07012014/coal_prospects_in_southern_africa_383/) (Reliability: moderate)
- <sup>6</sup> <https://www.thenational.ae/business/southern-africa-looks-to-prosper-from-rich-coal-resource-1.82845> (Reliability: moderate)
- <sup>7</sup> [https://www.rand.org/pubs/research\\_reports/RR521.html](https://www.rand.org/pubs/research_reports/RR521.html) (Reliability: high)
- <sup>8</sup> <http://africaoilandpower.com/2017/07/13/china-makes-inroads-into-african-energy/> (Reliability: high)
- <sup>9</sup> <http://africaoilandpower.com/2017/07/13/china-makes-inroads-into-african-energy/> (Reliability: high)
- <sup>10</sup> <https://www.nytimes.com/2017/03/07/business/china-trade-manufacturing-europe.html> (Reliability: high)
- <sup>11</sup> <https://www.nytimes.com/2017/03/07/business/china-trade-manufacturing-europe.html> (Reliability: high)
- <sup>12</sup> <https://www.bloomberg.com/news/articles/2018-03-12/china-seen-slowing-spending-on-belt-and-road-energy-projects> (Reliability: high)
- <sup>13</sup> <https://thediplomat.com/2018/03/chinas-private-army-protecting-the-new-silk-road/> (Reliability: high)
- <sup>14</sup> <https://www.brookings.edu/blog/up-front/2013/04/05/chinas-increasing-interest-in-africa-benign-but-hardly-altruistic/> (Reliability: high)
- <sup>15</sup> <https://thediplomat.com/2016/06/understanding-china-africa-relations/> (Reliability: high)
- <sup>16</sup> <http://harvardpolitics.com/world/chinas-investment-in-africa-the-new-colonialism/> (Reliability: high)
- <sup>17</sup> <http://natoassociation.ca/the-horn-of-africas-economy-boosts-due-to-chinese-investments/> (Reliability: high)
- <sup>18</sup> [https://www.cfr.org/backgrounder/chinas-big-bet-soft-power?gclid=Cj0KCOjw8MvWBRC8ARIsAOfSVBW\\_V0RvuZSEg3hxvYmaLOgqdQ-ayUTgC7LPSwvVtggQyrw8rzdJrmEaAgB4EALw\\_wcB](https://www.cfr.org/backgrounder/chinas-big-bet-soft-power?gclid=Cj0KCOjw8MvWBRC8ARIsAOfSVBW_V0RvuZSEg3hxvYmaLOgqdQ-ayUTgC7LPSwvVtggQyrw8rzdJrmEaAgB4EALw_wcB) (Reliability: high)
- <sup>19</sup> <https://www.mckinsey.com/global-themes/china/chinas-one-belt-one-road-will-it-reshape-global-trade> (Reliability: high)
- <sup>20</sup> Ibid
- <sup>21</sup> <https://www.britannica.com/place/Nile-River> (Reliability: high)
- <sup>22</sup> <http://www.nepad.org/content/grand-ethiopian-renaissance-dam> (Reliability: moderate)
- <sup>23</sup> <https://www.nation.co.ke/news/In-Lamu--a-coal-power-plant-faces-opposition/1056-4378174-dajthdz/index.html> (Reliability: high)
- <sup>24</sup> <https://www.nation.co.ke/lifestyle/smartcompany/Fuelling-Sh3-trillion-plan-to-power-the-nation-/-/1226/1392060/-/k44xjw/-/index.html> (Reliability: moderate)
- <sup>25</sup> <https://www.hydroworld.com/articles/2017/02/sudan-inaugurates-us-1-9-billion-upper-atbara-and-setit-dam-hydropower-project.html> (Reliability: high)
- <sup>26</sup> <https://www.internationalrivers.org/campaigns/kajbar-dam-sudan> (Reliability: high)
- <sup>27</sup> <http://eng.sinohydro.com/index.php?m=content&c=index&a=show&catid=42&id=379> (Reliability: high)
- <sup>28</sup> <http://www.scmp.com/week-asia/geopolitics/article/2128064/gulf-crisis-expands-horn-africa-and-china-sits-eye-storm> (Reliability: high)
- <sup>29</sup> <https://www.salini-impregilo.com/en/projects/in-progress/dams-hydroelectric-plants-hydraulic-works/grand-ethiopian-renaissance-dam-project.html> (Reliability: moderate)
- <sup>30</sup> <http://www.scmp.com/week-asia/geopolitics/article/2128064/gulf-crisis-expands-horn-africa-and-china-sits-eye-storm> (Reliability: high)
- <sup>31</sup> [https://www.cfr.org/backgrounder/chinas-big-bet-soft-power?gclid=Cj0KCOjw8MvWBRC8ARIsAOfSVBW\\_V0RvuZSEg3hxvYmaLOgqdQ-ayUTgC7LPSwvVtggQyrw8rzdJrmEaAgB4EALw\\_wcB](https://www.cfr.org/backgrounder/chinas-big-bet-soft-power?gclid=Cj0KCOjw8MvWBRC8ARIsAOfSVBW_V0RvuZSEg3hxvYmaLOgqdQ-ayUTgC7LPSwvVtggQyrw8rzdJrmEaAgB4EALw_wcB) (Reliability: high)

- <sup>32</sup> <https://www.forbes.com/forbes/welcome/?toURL=https://www.forbes.com/sites/realspin/2017/10/18/china-is-africas-biggest-economic-partner-but-what-role-for-the-united-states/&refURL=&referrer=>  
(Reliability: high)
- <sup>33</sup> Ibid
- <sup>34</sup> [https://www.cfr.org/backgrounder/chinas-big-bet-soft-power?gclid=Cj0KCQjw8MvWBRC8ARIsAOfSVBw\\_V0RvuZSEg3hxvYmaLOgqdQ-ayUTgC7LPSwvVtggQyrw8rzdJrmEaAgB4EALw\\_wcB](https://www.cfr.org/backgrounder/chinas-big-bet-soft-power?gclid=Cj0KCQjw8MvWBRC8ARIsAOfSVBw_V0RvuZSEg3hxvYmaLOgqdQ-ayUTgC7LPSwvVtggQyrw8rzdJrmEaAgB4EALw_wcB) (Reliability: high)
- <sup>35</sup> <https://www.hydroworld.com/articles/2017/07/2-070-mw-lauca-hydropower-project-in-angola-expected-to-begin-generation-this-week.html> (Reliability: moderate)
- <sup>36</sup> <https://data.worldbank.org/indicator/EG.ELC.ACCS.ZS> (Reliability: high)
- <sup>37</sup> <https://www.export.gov/article?id=Angola-Electric-Power-Generation> (Reliability: high)
- <sup>38</sup> <https://www.hydroworld.com/country-profiles/angola> (Reliability: moderate)
- <sup>39</sup> <https://www.hydroworld.com/articles/2017/07/2-070-mw-lauca-hydropower-project-in-angola-expected-to-begin-generation-this-week.html> (Reliability: moderate)
- <sup>40</sup> <https://macauihub.com.mo/2018/02/06/pt-aproveitamento-hidroelectrico-de-lauca-produz-energia-electrica-para-milhoes-de-angolanos/> (Reliability: moderate)
- <sup>41</sup> <https://www.hydroworld.com/articles/2017/07/2-070-mw-lauca-hydropower-project-in-angola-expected-to-begin-generation-this-week.html> (Reliability: moderate)
- <sup>42</sup> <https://www.hydroworld.com/articles/2017/08/angolan-officials-break-ground-on-2-170-mw-caculo-cabaca-hydropower-plan-generation-begins-at-2-070-mw-lauca.html> (Reliability: moderate)
- <sup>43</sup> <https://macauihub.com.mo/2018/01/11/pt-emprestimos-da-china-a-angola-superam-60-mil-milhoes-de-dolares-em-35-anos/> (Reliability: high)
- <sup>44</sup> <https://macauihub.com.mo/2018/01/11/pt-emprestimos-da-china-a-angola-superam-60-mil-milhoes-de-dolares-em-35-anos/> (Reliability: high)
- <sup>45</sup> <https://www.reuters.com/article/us-angola-china-insight/angolans-resentful-as-china-tightens-its-grip-idUSKCN0PJ1LT20150709> (Reliability: moderate)
- <sup>46</sup> Ibid
- <sup>47</sup> Ibid
- <sup>48</sup> <https://macauihub.com.mo/2018/01/11/pt-emprestimos-da-china-a-angola-superam-60-mil-milhoes-de-dolares-em-35-anos/> (Reliability: moderate)
- <sup>49</sup> <http://humphreyreview.umn.edu/china-angola-pros-and-cons-chinas-aid-structure> (Reliability: moderate)
- <sup>50</sup> <https://atlas.media.mit.edu/en/profile/country/ago/> (Reliability: high)
- <sup>51</sup> <https://www.reuters.com/article/us-angola-china-insight/angolans-resentful-as-china-tightens-its-grip-idUSKCN0PJ1LT20150709> (Reliability: moderate)
- <sup>52</sup> <https://macauihub.com.mo/2018/01/11/pt-emprestimos-da-china-a-angola-superam-60-mil-milhoes-de-dolares-em-35-anos/> (Reliability: moderate)
- <sup>53</sup> <http://www.osisa.org/books/regional/chinese-involvement-angola> (Reliability: moderate)
- <sup>54</sup> <https://www.reuters.com/article/angola-oil-finance/growing-chinese-debt-leaves-angola-with-little-spare-oil-idUSL5N16H3EV> (Reliability: high)
- <sup>55</sup> <https://data.worldbank.org/indicator/SP.RUR.TOTL.ZS?locations=ET&page=1> (Reliability: high)
- <sup>56</sup> Ibid
- <sup>57</sup> <https://data.worldbank.org/indicator/SP.RUR.TOTL.ZS?locations=ET&page=1> (Reliability: high)
- <sup>58</sup> <https://au.int/sites/default/files/documents/32251-doc-ethiopian-energy-sector-highlight-lome-togo-december-2017-final.pdf> (Source: moderate)
- <sup>59</sup> [https://www.usaid.gov/sites/default/files/documents/1860/EthiopiaPACFS\\_3-13-2018\\_1.pdf](https://www.usaid.gov/sites/default/files/documents/1860/EthiopiaPACFS_3-13-2018_1.pdf)  
(Reliability: high)
- <sup>60</sup> Ibid
- <sup>61</sup> Ibid
- <sup>62</sup> <https://spectrum.ieee.org/energy/policy/the-grand-ethiopian-renaissance-dam-gets-set-to-open>  
(Reliability: high)
- <sup>63</sup> <http://africanbusinessmagazine.com/sectors/finance/africas-debt-spree-precursor-new-debt-crisis/>  
(Reliability: high)
- <sup>64</sup> Ibid

- 65 Ibid
- 66 <http://allafrica.com/stories/201709120719.html> (Reliability: moderate)
- 67 Ibid
- 68 <https://www.ft.com/content/0f534aa4-4549-11e7-8519-9f94ee97d996> (Reliability: high)
- 69 Ibid
- 70 <https://www.hydropower.org/country-profiles/ethiopia> (Reliability: moderate)
- 71 [https://energypedia.info/wiki/Ethiopia\\_Energy\\_Situation#Hydropower](https://energypedia.info/wiki/Ethiopia_Energy_Situation#Hydropower) (Reliability: moderate)
- 72 <https://www.nazret.com/2018/04/17/ethiopia-overtakes-ghana-as-fastest-growing-african-economy-imf/> (Reliability: moderate)
- 73 <https://www.cnbc.com/2018/02/23/china-investment-state-of-emergency-ethiopia-latest.html>  
(Reliability: moderate)
- 74 <https://www.cnbc.com/2018/04/06/ethiopia-has-new-prime-minister-while-china-style-economics-continue.html> (Reliability: moderate)
- 75 Ibid
- 76 Ibid
- 77 <https://www.youtube.com/watch?v=XINwf7xj5to> (Reliability: high)
- 78 Ibid
- 79 <https://www.cnbc.com/2018/04/06/ethiopia-has-new-prime-minister-while-china-style-economics-continue.html> (Reliability: moderate)
- 80 Ibid
- 81 <https://digitalscholarship.unlv.edu/cgi/viewcontent.cgi?article=3491&context=thesisdissertations>  
(Reliability: moderate)
- 82 <https://digitalscholarship.unlv.edu/cgi/viewcontent.cgi?article=3491&context=thesisdissertations>  
(Reliability: moderate)
- 83 <http://www.un.org/en/sc/members/> (Reliability: high)
- 84 <https://digitalscholarship.unlv.edu/cgi/viewcontent.cgi?article=3491&context=thesisdissertations>  
(Reliability: moderate)
- 85 <https://digitalscholarship.unlv.edu/cgi/viewcontent.cgi?article=3491&context=thesisdissertations>  
(Reliability: moderate)
- 86 Ibid
- 87 <https://digitalscholarship.unlv.edu/cgi/viewcontent.cgi?article=3491&context=thesisdissertations>  
(Reliability: moderate)
- 88 <https://www.internationalrivers.org/blogs/433/10-things-you-should-know-about-africa%E2%80%99s-largest-dam> (Reliability: moderate)
- 89 Ibid
- 90 Ibid
- 91 <https://www.internationalrivers.org/blogs/433/10-things-you-should-know-about-africa%E2%80%99s-largest-dam> (Reliability: moderate)
- 92 Ibid
- 93 <https://www.cbsnews.com/news/chinas-backing-for-ethiopia-dam-riles-activists/> (Reliability: high)
- 94 <https://www.cbsnews.com/news/chinas-backing-for-ethiopia-dam-riles-activists/> (Reliability: high)
- 95 Ibid
- 96 <https://www.cbsnews.com/news/chinas-backing-for-ethiopia-dam-riles-activists/> (Reliability: high)
- 97 Ibid.
- 98 <https://thewire.in/62771/the-most-important-dam-you-probably-havent-heard-of/> (Reliability: moderate)
- 99 Ibid.
- 100 <https://www.internationalrivers.org/blogs/433/10-things-you-should-know-about-africa%E2%80%99s-largest-dam> (Reliability: moderate)
- 101 <https://thewire.in/62771/the-most-important-dam-you-probably-havent-heard-of/> (Reliability: moderate)
- 102 Ibid.
- 103 Ibid.

- <sup>104</sup> [https://www.usaid.gov/sites/default/files/documents/1860/Kenya\\_Power\\_Sector\\_report.pdf](https://www.usaid.gov/sites/default/files/documents/1860/Kenya_Power_Sector_report.pdf)  
(Reliability: high)
- <sup>105</sup> <https://data.worldbank.org/indicator/EG.ELC.ACCS.ZS> (Reliability: high)
- <sup>106</sup> <https://www.usaid.gov/powerafrica/kenya> (Reliability: high)
- <sup>107</sup> [https://energypedia.info/wiki/Kenya\\_Energy\\_Situation](https://energypedia.info/wiki/Kenya_Energy_Situation) (Reliability: moderate)
- <sup>108</sup> <https://www.nation.co.ke/business/Demand-for-electricity-hits-three-year-high/996-4161162-duv7sw/index.html> (Reliability: moderate)
- <sup>109</sup> [https://energypedia.info/wiki/Kenya\\_Energy\\_Situation](https://energypedia.info/wiki/Kenya_Energy_Situation) (Reliability: moderate)
- <sup>110</sup> <http://www.powerforall.org/blog/2016/10/21/kenyas-2020-target-fires-up-market> (Reliability: moderate)
- <sup>111</sup> <http://kenya.um.dk/en/danida-en/nrm/> (Reliability: moderate)
- <sup>112</sup> <https://www.reuters.com/article/us-kenya-coal/kenyans-at-loggerheads-over-coal-plant-at-world-heritage-site-idUSKBN14PIU5> (Reliability: high)
- <sup>113</sup> <https://www.nytimes.com/2018/02/27/climate/coal-kenya-china-power.html> (Reliability: high)
- <sup>114</sup> [https://atlas.media.mit.edu/en/visualize/tree\\_map/hs92/export/ken/chn/show/2016/](https://atlas.media.mit.edu/en/visualize/tree_map/hs92/export/ken/chn/show/2016/) (Reliability: high)
- <sup>115</sup> <https://atlas.media.mit.edu/en/profile/country/ken/> (Reliability: moderate)
- <sup>116</sup> [https://atlas.media.mit.edu/en/visualize/tree\\_map/hs92/import/ken/chn/show/2016/](https://atlas.media.mit.edu/en/visualize/tree_map/hs92/import/ken/chn/show/2016/) (Reliability: high)
- <sup>117</sup> [https://atlas.media.mit.edu/en/visualize/tree\\_map/hs92/export/ken/chn/show/2015/](https://atlas.media.mit.edu/en/visualize/tree_map/hs92/export/ken/chn/show/2015/) (Reliability: moderate)
- <sup>118</sup> <https://renewablesnow.com/news/to-the-point-powerchina-unveils-50-mw-wind-deal-in-kenya-502721/> (Reliability: moderate)
- <sup>119</sup> <https://renewablesnow.com/news/to-the-point-powerchina-unveils-50-mw-wind-deal-in-kenya-502721/> (Reliability: moderate)
- <sup>120</sup> <https://www.brookings.edu/blog/future-development/2016/05/16/three-myths-about-china-in-kenya/>  
(Reliability: moderate)
- <sup>121</sup> <https://www.africportal.org/publications/the-impact-of-china-africa-trade-relations-the-case-of-kenya/> (Reliability: moderate)
- <sup>122</sup> <https://www.cia.gov/library/publications/resources/the-world-factbook/geos/ni.html> (Source Reliability: high)
- <sup>123</sup> Ibid
- <sup>124</sup> <https://www.usaid.gov/nigeria> (Source Reliability: high)
- <sup>125</sup> <https://www.cia.gov/library/publications/resources/the-world-factbook/geos/ni.html> (Source Reliability: high)
- <sup>126</sup> <https://www.britannica.com/place/Nigeria> (Source Reliability: high)
- <sup>127</sup> Ibid
- <sup>128</sup> <https://www.usaid.gov/nigeria> (Source Reliability: high)
- <sup>129</sup> <https://www.hydroworld.com/articles/2017/09/nigerian-government-approves-contract-to-build-3-050-mw-mambilla-hydropower-plant.html> (Source Reliability: moderate)
- <sup>130</sup> <https://guardian.ng/features/the-belt-and-road-new-opportunities-for-china-nigeria-cooperation/>  
(Source Reliability: high)
- <sup>131</sup> <https://guardian.ng/features/the-belt-and-road-new-opportunities-for-china-nigeria-cooperation/>  
(Source Reliability: high)
- <sup>132</sup> [https://video.vice.com/en\\_us/video/trump-in-dubai-and-china-in-africa/5786c80b32e0306802cd53d8](https://video.vice.com/en_us/video/trump-in-dubai-and-china-in-africa/5786c80b32e0306802cd53d8)  
(Source Reliability: high)
- <sup>133</sup> <https://leadership.ng/2017/06/24/nigeria-china-relations/> (Source Reliability: high)
- <sup>134</sup> <https://www.nytimes.com/2015/12/06/business/international/in-nigeria-chinese-investment-comes-with-a-downside.html> (Source Reliability: moderate)
- <sup>135</sup> <https://www.cnbc.com/2018/03/09/us-tillerson-warns-against-china-loans-to-africa.html> (Source Reliability: high)
- <sup>136</sup> <https://www.usaid.gov/powerafrica/uganda> (Reliability: high)



137

<https://data.worldbank.org/indicator/EG.ELC.ACCS.RU.ZS?end=2016&locations=UG&start=2016&view=bar> (Reliability: high)

138 <https://www.usaid.gov/powerafrica/uganda> (Reliability: high)

139 <https://www.export.gov/article?id=Uganda-Energy> (Reliability: high)

140 <https://www.usaid.gov/powerafrica/uganda> (Reliability: high)

141 <https://www.export.gov/article?id=Uganda-Energy> (Reliability: high)

142 <https://www.export.gov/article?id=Uganda-Energy> (Reliability: high)

143 <http://www.mmaks.co.ug/articles/2017/07/31/state-oil-and-gas-uganda-2017> (Reliability: moderate)

144 <https://www.ogj.com/articles/2018/04/uganda-inks-deal-for-country-s-first-refinery.html> (Reliability: moderate)

145 <https://www.cnbc.com/news/2017/07/26/new-oil-reserves-account-4-ugandan-economy/> (Reliability: high)

146 <https://www.reuters.com/article/uganda-oil/update-2-uganda-ops-oil-reserves-estimate-by-85-pct-finds-natural-gas-idUSL5N0QZ1EW20140829> (Reliability: high)

147 Ibid

148 <https://www.bloomberg.com/news/articles/2018-04-09/china-s-belt-and-road-gains-momentum-from-kunming-to-mombasa> (Reliability: high)

149 Ibid

150 [https://www.cia.gov/library/publications/the-world-factbook/geos/print\\_ug.html](https://www.cia.gov/library/publications/the-world-factbook/geos/print_ug.html) (Reliability: high)

151 [https://www.transparency.org/news/feature/corruption\\_perceptions\\_index\\_2017](https://www.transparency.org/news/feature/corruption_perceptions_index_2017) (High)

152 <http://www.mmaks.co.ug/articles/2017/07/31/state-oil-and-gas-uganda-2017> (Reliability: moderate)

153 <https://www.reuters.com/article/us-uganda-road/chinese-built-expressway-divides-uganda-as-debts-mount-idUSKBN1FK0V1> (Reliability: high)

154 Ibid

155 <https://www.usaid.gov/powerafrica/democratic-republic-congo> (Reliability: high)

156 <https://data.worldbank.org/indicator/EG.ELC.ACCS.ZS?locations=CD> (Reliability: high)

157 Ibid

158 [https://www.icf.com/-/media/files/icf/projects/eecdp/drc\\_project\\_summary.pdf?la=en](https://www.icf.com/-/media/files/icf/projects/eecdp/drc_project_summary.pdf?la=en) (Reliability: high)

159 <http://global-climatescope.org/en/country/dr-congo/#/enabling-framework> (Reliability: high)

160 <https://data.worldbank.org/indicator/SP.POP.GROW> (Reliability: high)

161 <https://www.usaid.gov/sites/default/files/documents/1860/DR Congo PACFS DEC 2017.pdf> (Reliability: high)

162

<https://www.mckinsey.com/~media/mckinsey/industries/retail/our%20insights/east%20africa%20the%20next%20hub%20for%20apparel%20sourcing/brighter%20africa%20the%20growth%20potential%20of%20the%20saharan%20electricity%20sector.ashx> (Reliability: high)

163 <http://global-climatescope.org/en/country/dr-congo/#/enabling-framework> (Reliability: high)

164 <https://www.enerdata.net/publications/daily-energy-news/dr-congo-requires-single-bid-inga-3-hydropower-project.html> (Reliability: high)

165 [https://www.icf.com/-/media/files/icf/projects/eecdp/drc\\_project\\_summary.pdf?la=en](https://www.icf.com/-/media/files/icf/projects/eecdp/drc_project_summary.pdf?la=en) (Reliability: high)

166 <https://www.internationalrivers.org/campaigns/the-inga-3-hydropower-project> (Reliability: high)

167 <https://pulitzercenter.org/projects/congo-china-economy-development-investments-rich-minerals> (Reliability: high)

168 <https://www.statista.com/statistics/339834/mine-production-of-cobalt-in-dr-congo/> (Reliability: moderate)

169 <https://www.export.gov/article?id=Congo-Democratic-Republic-Mining-and-Minerals> (Reliability: moderate)

170 <https://pulitzercenter.org/reporting/chinas-congo-plan> (Reliability: high)

171 Ibid

172 <https://pulitzercenter.org/projects/congo-china-economy-development-investments-rich-minerals> (Reliability: high)

- 173 [http://asq.africa.ufl.edu/files/v16a6.Kabemba.HD\\_.pdf](http://asq.africa.ufl.edu/files/v16a6.Kabemba.HD_.pdf) (Reliability: high)
- 174 <https://www.reuters.com/article/us-china-metals-electric-vehicles/china-urged-to-ease-reliance-on-drc-for-cobalt-idUSKBN1D70GT> (Reliability: high)
- 175 Ibid
- 176 Ibid
- 177 <http://eprints.lse.ac.uk/75715/1/Africa%20at%20LSE%20%E2%80%93%20A%20revised%20DR%20Congo%20mining%20code%20could%20lead%20to%20a%20decrease%20in%20Chinese%20investment%20in%20the%20country.pdf> (Reliability: high)
- 178 <https://www.bloomberg.com/news/articles/2018-03-03/congolese-president-to-meet-mining-bosses-to-discuss-new-code> (Reliability: high)
- 179 Ibid
- 180 <https://www.internationalrivers.org/campaigns/the-inga-3-hydropower-project> (Reliability: high)
- 181 Ibid
- 182 Ibid
- 183 <https://phys.org/news/2017-06-drcongo-joint-chinese-spanish.html> (Reliability: moderate)
- 184 <https://www.internationalrivers.org/resources/renewable-riches-how-wind-and-solar-can-power-drc-and-south-africa-16532> (Reliability: high)
- 185 Ibid
- 186 <http://www.aei.org/china-global-investment-tracker/> (Reliability: high)
- 187 <https://www.internationalrivers.org/blogs/435/reflections-on-chinese-companies%E2%80%99-global-investments-in-the-hydropower-sector-between-2006> (Reliability: high)
- 188 Ibid
- 189 [http://asq.africa.ufl.edu/files/v16a6.Kabemba.HD\\_.pdf](http://asq.africa.ufl.edu/files/v16a6.Kabemba.HD_.pdf) (Reliability: Moderate)
- 190 <https://www.lowyinstitute.org/the-interpretor/china-s-cobalt-conundrum-congo> (Reliability: moderate)
- 191 Ibid
- 192 Ibid
- 193 <https://www.aljazeera.com/news/2017/07/dr-congo-loses-750m-corruption-mismanagement-170721154134478.html> (Reliability: high)
- 194 <https://www.lowyinstitute.org/the-interpretor/china-s-cobalt-conundrum-congo> (Reliability: moderate)
- 195 <http://www.scmp.com/news/china-insider/article/1321910/chinese-migrants-thrive-congo-worlds-poorest-nation> (Reliability: Moderate)
- 196 <https://www.the-american-interest.com/2014/01/10/chinas-congo-plan/> (Reliability: moderate)
- 197 [http://asq.africa.ufl.edu/files/v16a6.Kabemba.HD\\_.pdf](http://asq.africa.ufl.edu/files/v16a6.Kabemba.HD_.pdf) (Reliability: moderate)
- 198 <https://www.cia.gov/library/publications/the-world-factbook/geos/eg.html> (Reliability: high)
- 199 <https://data.worldbank.org/indicator/EG.ELC.ACCS.ZS> (Reliability: high)
- 200 <http://www.nortonrosefulbright.com/knowledge/publications/74735/renewable-energy-in-egypt-hydro-solar-and-wind> (Reliability: moderate)
- 201 <https://www.eia.gov/beta/international/analysis.cfm?iso=EGY> (Reliability: moderate)
- 202 <http://english.alarabiya.net/en/business/energy/2016/01/11/Egypt-s-renewable-energy-sector-offers-6b-investment-opportunity-.html> (Reliability: moderate)
- 203 <https://www.egypttoday.com/Article/3/19008/Building-of-Hamrawein-coal-plant-to-start-May-2018-Official> (Reliability: moderate)
- 204 <https://www.egypttoday.com/Article/3/28045/Hamrawein-coal-plant-contracts-to-be-signed-in-mid-2018> (Reliability: moderate)
- 205 <http://africanbusinessmagazine.com/region/north-africa/egypt-turning-towards-china-investment/> (Reliability: moderate)
- 206 <https://besacenter.org/perspectives-papers/egypts-nuclear-deal-russia/> (Reliability: moderate)
- 207 <https://besacenter.org/perspectives-papers/egypts-nuclear-deal-russia/> (Reliability: moderate)
- 208 <https://defence.pk/pdf/threads/egypt-signs-757m-loan-with-exim-bank-state-grid-of-china-to-build-1-210-km-lines.461996/> (Reliability: moderate)
- 209 <https://oxfordbusinessgroup.com/overview/opening-new-channels-growing-population-means-looking-energy-production-traditional-and-non> (Reliability: high)

- <sup>210</sup> [https://www.eia.gov/beta/international/data/browser/#/?pa=000000000000000000000008&c=rurvrvvvfvfvyvrvvvvvvvvvvvvvvvo20evvvvvvvvvvvvvvo&ct=0&tl\\_id=5-A&vs=INTL.57-6-AFG-BB.A&cy=2017&vo=0&v=H](https://www.eia.gov/beta/international/data/browser/#/?pa=000000000000000000000008&c=rurvrvvvfvfvyvrvvvvvvvvvvvvvvvo20evvvvvvvvvvvvvvo&ct=0&tl_id=5-A&vs=INTL.57-6-AFG-BB.A&cy=2017&vo=0&v=H) (Reliability: high)
- <sup>211</sup> <https://www.eia.gov/beta/international/country.cfm?iso=EGY> (Reliability: high)
- <sup>212</sup> <https://www.afdb.org/fileadmin/uploads/afdb/Documents/Policy-Documents/Cata%20Energie%20Anglais.pdf> (Reliability: high)
- <sup>213</sup> <https://www.afdb.org/fileadmin/uploads/afdb/Documents/Policy-Documents/Cata%20Energie%20Anglais.pdf> (Reliability: High)
- <sup>214</sup> <http://africanbusinessmagazine.com/region/north-africa/egypt-turning-towards-china-investment/> (Reliability: Moderate)
- <sup>215</sup> <https://jamestown.org/program/russia-fit-egypts-strategic-plan/> (Reliability: Moderate)
- <sup>216</sup> Ibid.
- <sup>217</sup> <http://www.washingtoninstitute.org/experts/view/trager-eric> (Reliability: Moderate)
- <sup>218</sup> <http://www.washingtoninstitute.org/experts/view/trager-eric> (Reliability: Moderate)
- <sup>219</sup> <http://www.washingtoninstitute.org/experts/view/trager-eric> (Reliability: Moderate)
- <sup>220</sup> <http://www.washingtoninstitute.org/policy-analysis/view/egypts-costly-nuclear-project> (Reliability: Moderate)
- <sup>221</sup> <http://www.washingtoninstitute.org/experts/view/trager-eric> (Reliability: Moderate)
- <sup>222</sup> <http://china.aiddata.org/projects/1375> (Reliability: Moderate)
- <sup>223</sup> <https://data.worldbank.org/indicator/EG.ELC.ACDS.ZS?locations=GH> (Reliability: high)
- <sup>224</sup> <https://data.worldbank.org/indicator/SP.POP.TOTL?locations=GH> (Reliability: high)
- <sup>225</sup> <https://www.cgdev.org/sites/default/files/electricity-situation-ghana-challenges-and-opportunities.pdf>
- <sup>226</sup> <https://www.water-technology.net/projects/bui-dam-hydro-power-ghana/>
- <sup>227</sup> <https://www.modernghana.com/news/438732/1/asogli-power-plant-to-become-electricity-exporter-.html>
- <sup>228</sup> <https://www.ghanaweb.com/GhanaHomePage/NewsArchive/Ghana-Acquires-Electrification-Loan-From-China-9608>
- <sup>229</sup> <https://www.ghanabusinessnews.com/2010/08/19/china-gives-300m-grant-for-northern-ghana-rural-electrification/>
- <sup>230</sup> <https://www.bloomberg.com/news/articles/2017-06-28/ghana-signs-10-billion-bauxite-project-agreement-with-china> (Reliability: high)
- <sup>231</sup> <https://www.alcircle.com/news/bauxite/detail/29273/republic-of-ghanas-bauxite-export-to-china-increases-156-since-july-2017> (Reliability: moderate)
- <sup>232</sup> Ibid.
- <sup>233</sup> <https://www.coreconsultantsgroup.com/china-demand-bauxite-buoys-prices/> (Reliability: high)
- <sup>234</sup> <https://www.reuters.com/article/us-alumina-shortages/alumina-shortages-to-increase-as-chinese-crackdown-bites-idUSKBN1CO24F> (Reliability: high)
- <sup>235</sup> <https://www.reuters.com/article/us-alumina-shortages/alumina-shortages-to-increase-as-chinese-crackdown-bites-idUSKBN1CO24F> (Reliability: high)
- <sup>236</sup> <https://www.hydro.com/en/products/Bauxite-and-alumina/> (Reliability: high) Bauxite is refined to create alumina. Alumina is needed in order to create aluminum.
- <sup>237</sup> <https://www.reuters.com/article/china-metals-alumina/chinas-alumina-restarts-hindered-by-bauxite-shortage-antaike-idUSL3N1QY3F4> (Reliability: high) Henan province is responsible for over 80% of bauxite mining, alumina and aluminum producing in all of China.
- <sup>238</sup> <https://af.reuters.com/article/africaTech/idAFL8N1JP3Q8> (Reliability: high)
- <sup>239</sup> <https://af.reuters.com/article/africaTech/idAFL8N1JP3Q8> (Reliability: high)
- <sup>240</sup> <https://www.linkedin.com/pulse/ghana-steps-up-infrastructure-drive-new-funding-from-china-van-esch/> (Reliability: high)
- <sup>241</sup> <https://www.myjoyonline.com/business/2017/July-4th/bawumia-outlines-20-projects-from-chinas-15bn.php> (Reliability: moderate)
- <sup>242</sup> <https://www.linkedin.com/pulse/ghana-steps-up-infrastructure-drive-new-funding-from-china-van-esch/> (Reliability: high)
- <sup>243</sup> [https://fsi.stanford.edu/sites/default/files/CISAC\\_Thesis\\_Thompson.pdf](https://fsi.stanford.edu/sites/default/files/CISAC_Thesis_Thompson.pdf) (Reliability: high)



- 244 <https://cddrl.fsi.stanford.edu/publication/choosing-china-ghana-3-billion-loan-decision> (Reliability: high)
- 245 <http://africanbusinessmagazine.com/sectors/finance/africas-debt-spree-precursor-new-debt-crisis/> (Reliability: moderate)
- 246 [https://jubileedebt.org.uk/wp-content/uploads/2016/10/The-fall-and-rise-of-Ghanas-debt\\_10.16.pdf](https://jubileedebt.org.uk/wp-content/uploads/2016/10/The-fall-and-rise-of-Ghanas-debt_10.16.pdf) (Reliability high)
- 247 <https://www.ghanabusinessnews.com/2017/04/11/despite-deporting-more-than-4500-chinese-they-still-contribute-to-2-3b-illegal-gold-mining-loss-to-ghana/> (Reliability: moderate)
- 248 <https://www.mining-technology.com/features/blessing-curse-understanding-social-impact-chinese-mining-africa/> (Reliability: moderate)
- 249 <https://www.ghanabusinessnews.com/2017/04/11/despite-deporting-more-than-4500-chinese-they-still-contribute-to-2-3b-illegal-gold-mining-loss-to-ghana/> (Reliability: moderate)
- 250 Ibid
- 251 Ibid
- 252 <https://www.globallegalinsights.com/practice-areas/energy-laws-and-regulations/ghana> (Reliability: high)
- 253 <https://www.oxfordenergy.org/wpcms/wp-content/uploads/2018/04/Ghanas-Oil-Industry-Steady-growth-in-a-challenging-environment-WPM-77.pdf> (Reliability: high)
- 254 <https://www.oxfordenergy.org/wpcms/wp-content/uploads/2018/04/Ghanas-Oil-Industry-Steady-growth-in-a-challenging-environment-WPM-77.pdf> (Reliability: high)
- 255 <http://www.reportingoilandgas.org/wp-content/uploads/Assessing-the-Environmental-Impact-of-Oil-and-Gas-Exploration-in-Ghana-.pdf> (Reliability: moderate)
- 256 <https://www.howwemadeitinafrica.com/the-ghanaiian-revival-since-january-2017/61250/> (Reliability: moderate)
- 257 Ibid
- 258 <http://thehill.com/opinion/national-security/385021-trumps-trade-policy-leaves-china-wide-open-on-its-path-to-dominance> (Reliability: moderate)
- 259 <https://af.reuters.com/article/africaTech/idAFL8N1N93ET> (Reliability: high)
- 260 Ibid
- 261 <https://data.worldbank.org/indicator/EG.ELC.ACCS.RU.ZS> (Reliability: high)
- 262 <https://data.worldbank.org/indicator/SP.POP.GROW?locations=SD> (Reliability: high)
- 263 <https://data.worldbank.org/indicator/NY.GDP.MKTP.KD.ZG?locations=SD> (Reliability: high)
- 264 <https://af.reuters.com/article/africaTech/idAFL8N1N93ET> (Reliability: high)
- 265 <https://intpolicydigest.org/2017/03/11/energy-policy-in-sudan-ignores-climate-risks/> (Reliability: high)
- 266 Ibid
- 267 Ibid
- 268
- [https://www.eia.gov/beta/international/analysis\\_includes/countries\\_long/Sudan\\_and\\_South\\_Sudan/sudan.pdf](https://www.eia.gov/beta/international/analysis_includes/countries_long/Sudan_and_South_Sudan/sudan.pdf) (Reliability: high)
- 269 [https://www.huffingtonpost.com/entry/china-south-sudan-future\\_us\\_5769a47fe4b0c0252e778e38](https://www.huffingtonpost.com/entry/china-south-sudan-future_us_5769a47fe4b0c0252e778e38) (Reliability: moderate)
- 270 <https://www.azomining.com/Article.aspx?ArticleID=191> (Reliability: moderate)
- 271 [http://www.china.org.cn/business/2016-05/27/content\\_38548205.htm](http://www.china.org.cn/business/2016-05/27/content_38548205.htm) (Reliability: high)
- 272 <https://atlas.media.mit.edu/en/profile/country/sdn/> (Reliability: high)
- 273 <https://www.hrw.org/reports/2003/sudan1103/26.htm> (Reliability: high)
- 274 [https://atlas.media.mit.edu/en/visualize/tree\\_map/hs92/import/chn/sdn/show/2016/](https://atlas.media.mit.edu/en/visualize/tree_map/hs92/import/chn/sdn/show/2016/) (Reliability: high)
- 275 <https://www.middleeastmonitor.com/20171118-sudan-has-worlds-largest-copper-reserve/> (reliability: Moderate)
- 276 Ibid
- 277 <https://www.kalalunsons.com/importer-exporter-directory/sudan-importer-exporter-directory> (Reliability: Moderate)
- 278 <https://www.middleeastmonitor.com/20170826-chinese-investment-in-sudan-oil-hits-15bn/> (Reliability: moderate)
- 279 <http://www.sudantribune.com/spip.php?article59816> (Reliability: moderate)

- 280 <https://www.middleeastmonitor.com/20170826-chinese-investment-in-sudan-oil-hits-15bn/>  
(Reliability: moderate)
- 281 Ibid
- 282 <http://www.sudantribune.com/spip.php?article61958> (Reliability: moderate)
- 283 <http://www.sudantribune.com/spip.php?article64417> (Reliability: moderate)
- 284 <http://www.sudantribune.com/spip.php?article63346> (Reliability: moderate)
- 285 <https://www.internationalrivers.org/blogs/227/new-chinese-dam-project-fuels-ethnic-conflict-in-sudan>  
(Reliability: moderate)
- 286 <https://www.internationalrivers.org/blogs/227/new-chinese-dam-project-fuels-ethnic-conflict-in-sudan>  
(Reliability: moderate)
- 287 <https://www.internationalrivers.org/campaigns/kajbar-dam-sudan> (Reliability: moderate)
- 288 <https://digitalscholarship.unlv.edu/cgi/viewcontent.cgi?article=3491&context=thesesdissertations>  
(Reliability: moderate)
- 289 <https://digitalscholarship.unlv.edu/cgi/viewcontent.cgi?article=3491&context=thesesdissertations>  
(Reliability: moderate)
- 290 <https://thediplomat.com/2017/06/sudan-chinas-original-foothold-in-africa/>(Reliability: moderate)
- 291 Ibid
- 292 <http://www.eastasiaforum.org/2017/03/31/china-and-zambias-resource-nationalism/> (Reliability: high)
- 293 <https://www.reuters.com/article/us-zambia-mining/zambia-targets-one-million-tonnes-copper-output-this-year-idUSKBN1GW14O> (Reliability: high)
- 294 <https://www.usaid.gov/powerafrica/zambia> (Reliability: high)
- 295 [https://www.princeton.edu/sites/default/files/content/Zambia%20Final%20Final%20Report\\_27Apr2016.pdf](https://www.princeton.edu/sites/default/files/content/Zambia%20Final%20Final%20Report_27Apr2016.pdf) (Reliability: high)
- 296 [https://www.princeton.edu/sites/default/files/content/Zambia%20Final%20Final%20Report\\_27Apr2016.pdf](https://www.princeton.edu/sites/default/files/content/Zambia%20Final%20Final%20Report_27Apr2016.pdf) (Reliability: high)
- 297 <https://www.azomining.com/Article.aspx?ArticleID=89> (Reliability: moderate)
- 298 <https://www.power-technology.com/projects/kafue-gorge-lower-kgi-power-station/> (Reliability: moderate)
- 299 Ibid
- 300 <http://ijecm.co.uk/wp-content/uploads/2018/01/6116.pdf> (Reliability: high)
- 301 Ibid
- 302 <https://www.africalegalnetwork.com/zambia/newseices/silk-road-or-dragon-path-the-impact-of-chinese-investment-in-zambia/> (Reliability: moderate)
- 303 <https://thediplomat.com/2018/03/we-are-chinese-how-china-is-influencing-sierra-leones-presidential-election/> (Reliability: high)
- 304 Ibid. (Reliability: high)
- 305 <https://qz.com/999630/china-and-zambia-are-in-a-diplomatic-clash-over-illegal-copper-mining/>  
(Reliability: moderate)
- 306 Ibid.
- 307 <https://jamestown.org/program/belt-road-initiative-china-putting-money-mouth/> (Reliability: high)
- 308 <https://data.worldbank.org/indicator/EG.ELC.ACCS.ZS> (Reliability: high)
- 309 <https://www.rvo.nl/sites/default/files/2017/11/renewable-energy-market-study-zimbabwe-2017.pdf>  
(Reliability: high)
- 310 <https://www.africa-eu-renewables.org/market-information/zimbabwe/energy-sector/> (Reliability: high)
- 311 Ibid
- 312 Ibid
- 313 Ibid
- 314 Ibid
- 315 Ibid
- 316 <https://dev.newsday.co.zw/2017/gwandas-successful-solar-power-project/07/> (Reliability: moderate)

- 317 <http://www.scmp.com/news/china/diplomacy-defence/article/2120094/five-ways-china-building-influence-zimbabwe> (Reliability: high)
- 318 <http://www.zimbabwesituation.com/news/zimsit-m-ema-approves-gwanda-solar-plant-project/>  
(Reliability: moderate)
- 319 <https://www.newsday.co.zw/2017/07/gwandas-successful-solar-power-project/> (Reliability: moderate)
- 320 <https://www.cia.gov/library/publications/resources/the-world-factbook/geos/zi.html> (Reliability: high)
- 321 <https://www.herald.co.zw/zim-china-trade-to-reach-1bn-mark/> (Reliability: moderate)
- 322 <https://atlas.media.mit.edu/en/profile/country/zwe/> (Reliability: high)
- 323 Ibid
- 324 <https://www.cnn.com/2017/11/17/africa/china-zimbabwe-mugabe-diplomacy/index.html> (Reliability: moderate)
- 325 <http://www.bbc.com/news/world-africa-42012629> (Reliability: high)
- 326 <https://www.independent.co.uk/news/world/africa/zimbabwe-news-latest-situation-coup-military-robert-mugabe-grace-mugabe-take-over-updates-crisis-a8056181.html> (Reliability: high)
- 327 <http://www.bbc.com/news/world-africa-42012629> (Reliability: high)
- 328 <https://www.cnn.com/2017/11/17/africa/china-zimbabwe-mugabe-diplomacy/index.html> (Reliability: moderate)
- 329 <http://www.bbc.com/news/world-africa-42012629> (Reliability: high)
- 330 <https://www.cnbc.com/2018/01/24/zimbabwe-is-open-for-business-new-president-emmerson-mnangagwa-tells-davos.html> (Reliability: high)
- 331 [https://www.gichd.org/fileadmin/GICHD-resources/rec-documents/external-documents/Zimbabwe\\_National\\_Mine\\_Action\\_Strategy\\_2018-2025.pdf](https://www.gichd.org/fileadmin/GICHD-resources/rec-documents/external-documents/Zimbabwe_National_Mine_Action_Strategy_2018-2025.pdf) (Reliability: high)
- 332 <https://www.cia.gov/library/publications/the-world-factbook/geos/zi.html> (Reliability: high)
- 333 <https://www.azomining.com/Article.aspx?ArticleID=90> (Reliability: high)
- 334 <http://nehandaradio.com/2018/04/19/minister-summoned-over-chivhayo-solar-project/> (moderate)
- 335 <https://data.worldbank.org/indicator/EG.ELC.ACCS.ZS>
- 336 <https://data.worldbank.org/indicator/EG.ELC.ACCS.RU.ZS>
- 337 <https://data.worldbank.org/indicator/EG.ELC.ACCS.RU.ZS>
- 338 [www.segesa.gq/equatorial-guineas-vision-for-electricity/](http://www.segesa.gq/equatorial-guineas-vision-for-electricity/)
- 339 <http://aiddata.org/china>
- 340 <http://aiddata.org/china>
- 341 <http://www.segesa.gq/wp-content/uploads/2015/10/The-State-of-Energy-MMIE.pdf> (Reliability: Moderate)
- 342 <https://atlas.media.mit.edu/en/profile/country/gnq/> (Reliability: Moderate)
- 343 <https://www.reuters.com/article/us-china-equatorial/china-agrees-2-billion-infrastructure-deal-with-equatorial-guinea-idUSKBN0NK16I20150429> (Reliability: moderate)
- 344 <https://thediplomat.com/2015/04/china-offers-2-billion-to-oil-rich-equatorial-guinea/> (Reliability: moderate)
- 345 Ibid.
- 346 <https://www.cia.gov/library/publications/the-world-factbook/geos/ek.html> (Reliability: High)
- 347 [https://www.eia.gov/beta/international/data/browser/#/?pa=000000000000000000000008&c=rurvvvfvvtvnyvvurvvvvfvvvvvfvvvvou20evvvvvvvvvvnuvo&ct=0&tl\\_id=5-A&vs=INTL.57-6-AFG-BB.A&cy=2017&vo=0&v=H](https://www.eia.gov/beta/international/data/browser/#/?pa=000000000000000000000008&c=rurvvvfvvtvnyvvurvvvvfvvvvvfvvvvou20evvvvvvvvvvnuvo&ct=0&tl_id=5-A&vs=INTL.57-6-AFG-BB.A&cy=2017&vo=0&v=H) (Reliability: high)
- 348 <https://atlas.media.mit.edu/en/profile/country/gnq/> (Reliability: moderate)
- 349 Ibid.
- 350 Ibid.
- 351 Ibid.
- 352 Ibid.
- 353 [www.xinhuanet.com/english/2018-02/26/c\\_137001512.htm](http://www.xinhuanet.com/english/2018-02/26/c_137001512.htm) (Reliability: Moderate)
- 354 <https://borgenproject.org/poverty-in-equatorial-guinea/> (Reliability: Moderate)
- 355 [https://www.transparency.org/news/feature/corruption\\_perceptions\\_index\\_2017](https://www.transparency.org/news/feature/corruption_perceptions_index_2017) (Reliability: High)
- 356 <https://data.worldbank.org/indicator/EG.ELC.ACCS.ZS> (Reliability: high)
- 357 <https://data.worldbank.org/indicator/EG.ELC.ACCS.RU.ZS?locations=TZ> (Reliability: high)
- 358 <http://global-climatescope.org/en/country/tanzania/#/enabling-framework> (Reliability: high)

- 359 Ibid
- 360 <https://www.tanzaniainvest.com/energy/power-demand-forecast-2020> (Reliability: moderate)
- 361 [https://www.usaid.gov/sites/default/files/documents/1860/Tanzania%20 IG 2015 05 03.pdf](https://www.usaid.gov/sites/default/files/documents/1860/Tanzania%20IG%202015%2005%2003.pdf)  
(Reliability: high)
- 362 <https://www.usaid.gov/sites/default/files/documents/1860/TanzaniaPACFSDEC2017.pdf> (Reliability: high)
- 363 <http://www.chinese-embassy.org.za/eng/znj/t1483917.htm> (Reliability: high)
- 364 <https://www.tanzaniainvest.com/energy/power-demand-forecast-2020> (Reliability: moderate)
- 365 Ibid
- 366 <http://venturesafrica.com/china-emerges-as-tanzanias-major-investor/> (Reliability: moderate)
- 367 [http://www.chinadaily.com.cn/world/2017-07/07/content\\_30030868.htm](http://www.chinadaily.com.cn/world/2017-07/07/content_30030868.htm) (Reliability: moderate)
- 368 [http://www.chinadaily.com.cn/world/2017-07/07/content\\_30030868.htm](http://www.chinadaily.com.cn/world/2017-07/07/content_30030868.htm) (Reliability: moderate)
- 369 [http://www.chinadaily.com.cn/world/2017-07/07/content\\_30030868.htm](http://www.chinadaily.com.cn/world/2017-07/07/content_30030868.htm) (Reliability: moderate)
- 370 <http://documents.worldbank.org/curated/en/241321468024314010/95161-REPLACEMENT-FILE-PUBLIC-China-FDI-Africa-conference-Final-1-May-2015-Final.pdf> (Reliability: high)
- 371 <https://www.dccchina.org/2017/02/china-massive-investments-projects-cross-special-economic-zone-tanzania-in-2017/> (Reliability: moderate)
- 372 [http://www.xinhuanet.com/english/2018-04/17/c\\_137117826.htm](http://www.xinhuanet.com/english/2018-04/17/c_137117826.htm) (Reliability: moderate)
- 373 [http://www.xinhuanet.com/english/2018-04/17/c\\_137117826.htm](http://www.xinhuanet.com/english/2018-04/17/c_137117826.htm) (Reliability: moderate)
- 374 <http://www.thecitizen.co.tz/News/Chinese-investments-to-generate-over-1-700-jobs-in-Tanzania/1840340-4117692-afxppiz/index.html> (Reliability: low)
- 375 <http://tz2.mofcom.gov.cn/article/chinanews/201601/20160101239191.shtml> (Reliability: moderate)
- 376 Ibid
- 377 <http://allafrica.com/stories/201612090032.html> (Reliability: moderate)
- 378 Ibid
- 379 Ibid
- 380 Ibid
- 381 <http://www.zambianinvest.com/energy/zambia-announces-capacity-expansion-of-800-mw-at-batoka-gorge-hydro-power-project> (Reliability: moderate)
- 382 <http://www.bbc.com/news/world-africa-24898743> (Reliability: high)
- 383 <https://www.power-technology.com/projects/kafue-gorge-lower-kgi-power-station/> (Reliability: high)
- 384 <http://eng.sinohydro.com/index.php?m=content&c=index&a=show&catid=42&id=134> (Reliability: high)
- 385 <https://www.daily-mail.co.zm/kafue-gorge-lower-power-surplus-dream/> (Reliability: moderate)
- 386 <http://www.zambianinvest.com/economy/trade/zambia-named-by-italy-and-china-as-main-destination-in-africa-for-trade-and-investment> (Reliability: moderate)
- 387 <http://www.bbc.com/news/world-africa-42012629> (Reliability: high)
- 388 [http://siteresources.worldbank.org/INTAFRICA/Resources/Zambezi\\_MSIOA - Vol 3 - State of the Basin.pdf](http://siteresources.worldbank.org/INTAFRICA/Resources/Zambezi_MSIOA_-_Vol_3_-_State_of_the_Basin.pdf) (Reliability: high)
- 389 <http://www.zaraho.org.zm/sites/default/files/BGHES%20Brochure.pdf> (Reliability: High)
- 390 Ibid
- 391 [http://www.esmap.org/sites/esmap.org/files/BN004-10\\_REISP-CD\\_South%20African%20Power%20Pool-Transmission%20&%20Trading.pdf](http://www.esmap.org/sites/esmap.org/files/BN004-10_REISP-CD_South%20African%20Power%20Pool-Transmission%20&%20Trading.pdf) (Reliability: high)
- 392 [https://static1.squarespace.com/static/5652847de4b033f56d2bdc29/t/569f41cbdc5cb40e1bcc03e7/1453278368598/CARI+WP+01\\_Hydropower.pdf](https://static1.squarespace.com/static/5652847de4b033f56d2bdc29/t/569f41cbdc5cb40e1bcc03e7/1453278368598/CARI+WP+01_Hydropower.pdf) (Reliability: high)
- 393 <https://www.internationalrivers.org/campaigns/the-inga-3-hydropower-project> (Reliability: high)
- 394 <https://www.nytimes.com/2009/02/22/world/africa/22gabon.html> (Reliability: high)
- 395 <http://www.miningnewszambia.com/zambia-seeks-increased-power-generation-eyes-us2-billion-kafue-gorge-lower-hydro-power-plant/> (Reliability: moderate)
- 396 Ibid
- 397 Ibid
- 398 [https://static1.squarespace.com/static/5652847de4b033f56d2bdc29/t/569f41cbdc5cb40e1bcc03e7/1453278368598/CARI+WP+01\\_Hydropower.pdf](https://static1.squarespace.com/static/5652847de4b033f56d2bdc29/t/569f41cbdc5cb40e1bcc03e7/1453278368598/CARI+WP+01_Hydropower.pdf) (Reliability: High)
- 399 Ibid

---

<sup>400</sup> <https://www.lusakatimes.com/2017/04/01/many-investors-shown-interest-batoka-gorge-hydro-electric-power-project-mutati/> (Reliability: Low)

<sup>401</sup> [https://static1.squarespace.com/static/5652847de4b033f56d2bdc29/t/569f41cbdc5cb40e1bcc03e7/1453278368598/CARI+WP+01\\_Hydropower.pdf](https://static1.squarespace.com/static/5652847de4b033f56d2bdc29/t/569f41cbdc5cb40e1bcc03e7/1453278368598/CARI+WP+01_Hydropower.pdf) (Reliability: High)