AN OVERVIEW OF CHINESE ACTION AND PRESENCE AT AFRICA'S ENERGY TRANSITION[1]

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The energy transition is a necessary process to contain global warming. Some essential elements for its achievement are financing from more developed countries and collaboration between countries, especially with technology transfer. This article aims to understand China's role in the African energy transition process. To do this, we start with a qualitative analysis of what is systematized by the African Union (AU) and international energy agencies (International Renewable Energy Agency – IRENA and International Energy Agency – IEA) to provide an overview of the energy transition processes on the African continent. Next, Chinese investments in the energy sector on the African continent are presented, paying special attention to projects carried out between 2015 and 2022, in order to verify whether these investments are in line with debates held in international arenas.

Keywords: energy transition; China-Africa; decarbonization.

UMA VISÃO GERAL DA AÇÃO E DA PRESENÇA CHINESA NA TRANSIÇÃO ENERGÉTICA DA ÁFRICA

A transição energética é um processo necessário para conter o aquecimento global. Alguns elementos essenciais para sua realização são o financiamento de países mais desenvolvidos e a colaboração entre os países, especialmente com a transferência de tecnologia. Este artigo tem por objetivo entender qual o papel da China no processo de transição energética africana. Para isso, parte-se de uma análise qualitativa do que é sistematizado pela União Africana (African Union – AU) e pelas agências internacionais de energia (International Renewable Energy Agency – IRENA e International Energy Agency – IEA) para realizar um panorama dos processos de transição energética no continente africano. Em seguida, apresentam-se os investimentos chineses no setor energético do continente africano, dando atenção especial para projetos realizados entre 2015 e 2022, a fim de verificar se esses investimentos estão de acordo com os debates realizados nas arenas internacionais.

Palavras-chave: transição energética; China-África; descarbonização.

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PANORAMA DE LA ACTUACIÓN Y PRESENCIA CHINA EN LA TRANSICIÓN ENERGÉTICA DE ÁFRICA

La transición energética es un proceso necesario para contener el calentamiento global. Algunos de los elementos esenciales para su realización son la financiación de los países más desarrollados y la colaboración de los países, especialmente con la transferencia tecnológica. El presente artículo hace una evaluación a respeto del rol de China en el proceso de transición energética africana. A partir de un análisis cualitativo de los materiales producidos por la Unión Africana (African Union – AU) y por las agencias internacionales de energía (International Renewable Energy Agency – IRENA y International Energy Agency – IEA), se hizo un mapeo del proceso de transición en el continente africano. En seguida, se presentaron las inversiones chinas en el sector energético del continente africano, con especial atención para el periodo entre 2015 y 2022. El objetivo principal es averiguar si dichas inversiones estaban de acuerdo con los debates internacionales.

Palabras clave: transición energética; China-África; descarbonización.

JEL: Q4; Q2; F5.

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1 INTRODUCTION

Climate change has impacted the way the international system works, since its consequences affect both the productive system of countries and humanitarian issues (such as migration and refugee, food security, housing, access to healthcare, etc.). The burning of fossil fuels, a fundamental component of the global energy sector, is one of the main causes of climate change. And it has been the subject of several debates, especially at the beginning of the 21st century. Thus, this sector is at the center of debates about the transition to a production mode that is less harmful to the environment and more sustainable, a process that has been called energy transition.

The energy transition processes are crossed by issues related to inequality of power in the international system. Analysis of per capita energy consumption data reveals that developed countries significantly outpace developing nations in energy consumption (BP Statistics, 2022). However, as poorer countries experience population and economic growth, they tend to escalate their global primary energy consumption. This trend is particularly pronounced in Asia where energy consumption is projected to soar to 600 quadrillion (Btu) in 2050. Although "rich countries" forecast population growth, there is a stagnation tendency in energy consumption because of the development of energy efficiency technology, which has been a tendency of the Organisation for Economic Co-operation and Development (OECD) (EIA, 2021).

In addition the repercussions of global warming disproportionately affect the poorest countries the most. This disparity arises from several factors, including

the lack of economic resources to shield themselves from hazardous situations or invest in transitioning to a cleaner model at the required pace (Altvater, 2010). Thus, international debates revolve around key questions: how global warming manifests, its ramifications, attributions of responsibility, strategies for mitigating negative impacts, ensuring equitable transformations, and fostering international cooperation to avert the impending viability crisis facing life on Earth. Within this debate is the issue of countries' energy transition to renewable and sustainable sources.

These questions have also played a central role in shaping countries' domestic policies. In this regard, African countries have announced their goals and projects on sustainable development and energy transition. Some countries have garnered attention for their leadership and ambitious climate targets, notable examples being Morocco, Gambia and South Africa. On the other side, a couple of countries stand out because fossil fuel production is an important component of their economies which increases the challenges faced by the African continent, such as Angola and Nigeria.

In addition to decarbonization policies, two elements shape the international order within which African countries operate: international cooperation initiatives and external financing. One notable example of international cooperation is the Great Green Wall Initiative,[4] aimed at enhancing environmental conditions across the Sahara region through large-scale tree planting efforts. In the field of foreign financing, there are several activities spread across the entire continent. It is estimated that Africa will need around US$ 30 to US$ 50 billion annually by 2030 to cover the costs of climate adaptation, but between 2016 and 2020, the continent obtained just US$ 19,5 billion in financing, indicating significant financial gaps (Matola and Ekeruche, 2023). Even so, these bilateral and/or multilateral partnerships constitute an essential element in the energy transformation necessary for the African continent.

The issue of the energy transition to a low-carbon economy has also been an important topic in multilateral and bilateral discussions between African countries and China. China stands out for having the second largest gross domestic product (GDP) in the world, the largest population on the planet and for being one of the largest emitters of gasses harmful to climate change. At the same time, this country invested in a low-carbon economic model, becoming the largest producer of manufacturing for the global energy transition. Furthermore, it is one of the largest investors on the African continent and most

4. Launched by the African Union (AU) in 2007, a plan by Sahel countries to plant trees across a strip of tens of thousands of square kilometers, to contain the expansion of the Sahara desert by 2030. Available at: https://www.gov.br/abc/pt-br/assuntos/noticias/brasil-cooperara-com-avanco-da-grande-muralha-verde-na-africa.

countries have the Chinese as their main commercial partner, including financing renewable and non-renewable energy projects.

Relations between China and the continent are historic. Diplomatic ties between Africa and China began during the Mao era (1954-1976), when China developed a relationship with the newly independent countries of the Non-Aligned Movement so that the country could acquire international political influence. Deng Xiaoping (1975-1989) renewed the relationship by moving from an anti-colonial approach to a more pragmatic one based on economics and trade.

Therefore, this publication has the following questions: what is the current landscape of energy transition processes on the African continent? What are the primary challenges confronting African countries in their energy transition efforts? How is China engaging in the energy transition within Africa? What cooperation projects are underway between China and African nations in the energy sector? What investments have been executed and what commitments are anticipated in the forthcoming years in this sector?

This research aims to: present the debate on energy transition at the international level; make a described outlook of energy transition processes on the African continent; present Chinese investments in the energy sector on the African continent, paying special attention to those made between 2015-2022; and, verify whether these investments are in line with the debate in the international arena.

To achieve this, a qualitative research method will be used, which includes a bibliographical review and documentary analysis on foreign policy aimed at China's energy sector. For this, there was an analysis of documents produced by key institutions, such as: official documents published by the Chinese government (such as presidents' speeches and official news), the Chinese five-year plans (specifically the fourteenth 2021-2025), the White Paper of Energy and the New Era Development Plan. To understand the African position, since there are many countries with several different positions, a survey of documents consolidated by the AU (especially the African Energy Commission – AFREC) was carried out. To analyze international energy cooperation agreements, speeches and documents produced by the Forum for China-Africa Cooperation (FOCAC) were collected. For studies on investments made by China in Africa, documents made available by the United Nations Conference on Trade and Development (UNCTAD), agencies/companies specialized in energy (such as: International Energy Agency – IEA) were reviewed. BP Statistical Review of World Energy, Oil Change International (OCI), government websites from China and African countries, as well as data from tertiary sources such as news from newspapers and specialized journals.

The text is structured into five sections, the first being this introduction. The second section addresses the concept of energy transition and its relationship with international debates on climate and the inequalities present in the arenas where these discussions take place. The third section presents a snapshot of the current situation of the energy sector on the African continent, highlighting the main challenges faced to ensure the transition. The fourth section presents the main agreements, investments and cooperation projects in the energy sector between China and African countries. Finally, brief considerations will be presented.

2 ENERGY TRANSITION: DEFINITIONS AND THE INTERNATIONAL DEBATE

Before specifically debating the Chinese role in Africa's energy transition process, it is imperative to comprehend what energy transition is and how it fits into discussions about the international climate regime. Firstly are presented some definitions of the concept of energy transition, which is under debate in the international context.

The energy transition is understood as the process of changing the paradigm in the global energy matrix, moving away from fossil fuels to renewable fuels, towards a low-carbon economy. Thus, the term is usually related to something specific related to the types of primary energy sources used mostly in the economy. However, as Laird (2013) claims, the change in productive bases influences the entire social life of individuals, influencing several sectors, especially political-social, which has consequences that go far beyond factors related to energy production specifically. It is understood, therefore, that man's relationship with energy resources historically presents profound complexities.

Smil (2010) states that historically, man's action in relation to the transformation of nature has been closely associated with energy, especially three factors: discovering sources of natural energy, conserving these resources and developing different ways of using these available energy flows. To exploit this energy, it is necessary to create infrastructure that involves not only tangible factors (such as the construction of transmission lines), but also intangible factors (such as the development of administrative and organizational arrangements in society), which usually generate considerable socioenvironmental impacts. considerable. The very operationalization of the use of energy consumes it. Therefore, the cost of developing a type of energy directly influences its feasibility of implementation. However, this cost is not measured in energy terms, but in monetary terms. Altvater (2010) points out that this value is measured differently over time, depending on the economic dynamics in which this system is involved.

Thus, the energy transition encompasses significant changes in: sources, technologies, consumption patterns, efficiency levels, markets and public

policies. It is important to note that promoting the transition does not mean completely abandoning 'old' energy sources (Cepik, 2017). Despite the emergency of new energy sources, 'old' energy sources persist in usage, contingent upon the political, social and economic structure of a region. However, their utilization typically occurs on a reduced scale compared to newer alternatives. For instance, while oil ascended as the world's primary energy source in the 1970s, China continues to rely predominantly on coal as its primary energy resource, as will be discussed further. So, even when the energy transition occurs, it doesn't mean every country will not use the 'old' energy. Also, the decision whether or not to use an energy source as a basis for development depends not only on the availability of a resource, but on its economic viability.

Another relevant element for the decision to use an energy source is related to the concentration of relative power. Historically, one of the main variables that contribute to the accumulation of power is the use of a greater quantity of resources, more efficiently, combined with sufficient energy infrastructure to support productive growth. Therefore, there is great competition between States for these scarce resources and for the capacity for innovation and increased efficiency in the use of energy-productive systems, since zero-sum logic prevails in this regard (Oliveira, 2015). This pursuit for power underscores the centrality of debates on the geopolitics of energy,[5] which also encompasses considerations of energy security,[6] central for understanding the countries positioning in the international energy regime.

Altvater (2010) explains that in addition to the security and economic problems, the exploitation of fossil fuels without dealing with the environmental adversities generated by this exploitation has been taking a high toll on countries in terms of the populations' quality of life. Which, in the near future, could result in an intensification of social disputes and even the unviability of the current production system.

In essence, the term "energy transition" is the global effort to replace an energy matrix based on non-renewable fossil fuels with one based on less polluting and renewable sources (Cepik, 2017). Although this is not the first transition

5. "Geopolitics, as a method of studying international relations, highlights the importance of location factors on relations between countries. Thus, geopolitics considers geographic factors as important determinants of government policy and the relative position of nations" (Conant and Gold, 1981, p. 18). Geopolitics helps to understand how energy powers define the direction, use and ownership of strategic natural resources for energy production.

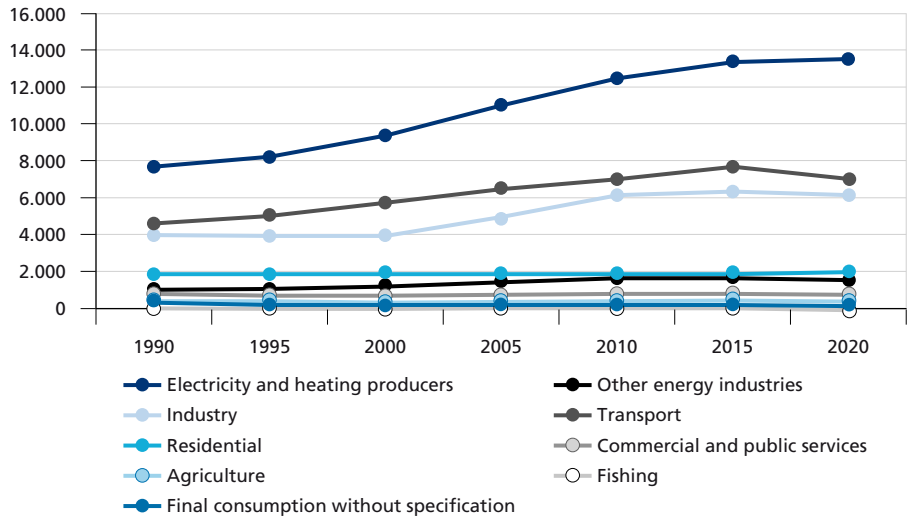
6. Oliveira (2015) points out that there is theoretical diversity in international relations regarding the essential factors to guarantee energy security, but highlights that there is a certain consensus on three factors that countries seek to maintain: sufficient supply, continuous supply and reasonable price for energy . In other words, energy security would be an 'ideal' state in which the country has "(…) a level of energy availability that is sufficient to maintain reasonable rates of economic growth and development, maintaining or, preferably, progressively improving energy conditions of its population" (Oliveira, 2015, p. 8). Which in the long term means the ability of each country to increase energy consumption without obstacles from both a geopolitical and environmental and socioeconomic point of view.

process that the international system has undergone, it will possibly be the fastest, requiring agility from decision makers and also greater attention to the social conflicts resulting from it.

2.1 International debates about energy transition

The energy issue is a concern for different schools of thought within international relations, but after the 1990s energy also became central to debates dealing with environmental problems and climate change. When the United Nations Framework Convention on Climate Change (UNFCCC) came into force in 1994, it was evident that energy production was the sector responsible for the largest emission of greenhouse gasses (GHG), a circumstance that remains to the present day, as illustrated in figure 1 (Leite, Alves and Picchi, 2020).

FIGURE 1
CO_2 global emissions ($MtCO_2$ eq)



Source: IEA, 2022. Available at: https://www.iea.org/data-and-statistics/data-tools/energy-statistics-data-browser?country=WORLD&fuel=CO2%20emissions&indicator=CO2BySector.
Authors' elaboration.

From this point on, the energy transition got consolidated in the international climate regime at an international level. The urgency of a rapid energy transition to countein global warming levels below 1.5ºC becomes evident. Therefore, countries began to create various national and international mechanisms to try to achieve this goal.

In 2001, the 9th session of the United Nations Sustainable Development Comission had "energy for sustainable development" as one of its agendas. And in

2002, the center of debate of the World Conference on Sustainable Development was the goals and deadlines for adaptation to renewable energy and reduction of fossil fuel subsidies. This reflected in Kyoto Protocol negotiations,[7] which came with an ambitious calendar of targets for reducing global warming gas emissions (GHG) and where the development of renewable energy was highlighted.

The inequalities between North and South countries also became increasingly evident in the international arenas where these debates and goal definitions took place. Najam (2005) argues that initially the countries of the global South were against the environmental measures promoted by the countries of the North, because they perceived them as an attempt to interfere in the national policies of the countries of the South. It was only with the inclusion of concepts such as "common responsibilities, but differentiated"[8] that the idea of equivalence in the commitments made internationally on the climate agenda was disseminated. However, this inequality extends beyond the pressure to adhere to these commitments; it also manifests in the consequences experienced as a result of climate change advancements, among other aspects.

According to data from the IPCC (2023), there is a very different regional distribution of human impacts on climate change, especially when analyzing data such as energy access, energy consumption per capita and amounts of emissions. The panel divides the global population into three groups of countries: the first, represents 41% of the world's population living in countries that have very low GHG emissions per capita (less than 3 tCO_2-eq.), but a large part of these population does not have access to modern energy; the second group, made up of 35% of the world population, who live in countries with high GHG emissions per capita (more than 9 tCO_2-eq.); a third group of 24% of the world's population lives in countries with medium emissions. In per capita terms, GHG emissions by region, Southeast Asia (2.6 tCO_2-eq. per capita) and Africa (3.9 tCO_2-eq. per capita) emerged as least polluting, while North America (19 tCO_2-eq. per capita), Australia, Japan, New Zealand, Eastern Europe, Western-Central Asia and the Middle East (13 tCO_2-eq. per capita) concentrated the highest values. In cumulative historical terms (between 1850-2019) by region, North America (23%) is also the largest emitter, followed by Europe (16%), while the Middle East (2%), South Asia, Australia, Japan and New Zealand (4%), and Africa (7%) are the smallest emitters.

The clash between developed countries and developing countries led to the establishment of the Clean Development Mechanism (CDM), which allowed

7. Kyoto Protocol became to be negotiated in 1997 and came into force in 2005.

8. The principle of "common but differentiated responsibilities" states that "parties shall protect the climate system for the benefit of present and future generations on the basis of equity and in accordance with their respective capabilities". Available at: https://antigo.mma.gov.br/component/k2/item/15142-contribui%C3%A7%C3%B5es-para-o-documento-base.html.

the purchase of certified reductions in carbon emissions in different places. Between 2003 and 2020, it is estimated that more than 13,000 projects were financed by this mechanism, 87% of them in the energy sector (Leite, Alves and Picchi, 2020). However, despite there being a consensus that developed countries have a history of pollution and greater responsibilities for global warming, compensating for inequalities is still a subject of dispute between the parties and is always present in international discussions.

The creation of the International Renewable Energy Agency (IRENA), in 2010, was a milestone for this process of international consultation on the energy transition and its relationship with climate change. IRENA is responsible for carrying out studies that serve as an international basis for the topic, just as the IEA, created in the 1970s, is responsible for establishing parameters and measurement methodologies that allow comparisons and the establishment of consensus.

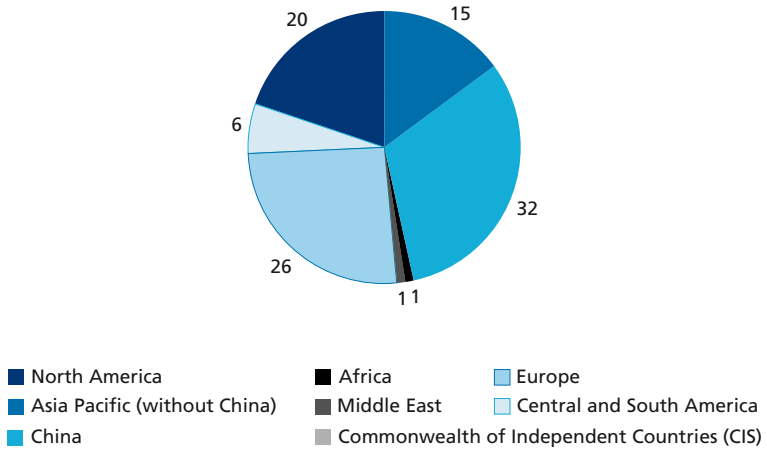
The complexity of these inequalities and the establishment of rigid rules of Kyoto Protocol was not having the expected effect. So, a new attempt of articulation was held in 2015 at Conference of the Parties (COP21) held in Paris. The Paris Agreement established GHG reduction targets based on voluntary contributions from countries, which involved local governments in Nationally Determined Contributions (NDC). In the NDCs, countries' individual commitment to reducing their emissions is evident, and in general, they include voluntary targets related to increasing energy efficiency and transitioning to clean energy production.

These documents are essential for understanding the individual goals and challenges of African countries and China, and have been important for progress in curbing global warming and for analyzing the performance of individual countries. In addition to the voluntary policies, technology is another important point for the energy transition. Developed countries have a greater accumulation of technology and are able to present more efficient adaptation policies, since they already have a certain basis in terms of access to basic resources. So, in general, the most developed countries also have the majority of technologies for the energy transition. This has been the subject of international debate and also places China and the African continent in opposing positions.

Figure 2 makes it clear that, based on data available until 2021, China, Europe and the United States were the largest producers of renewable energy. Since 2015, China is the leader in the production of solar panels. In 2016, Chinese companies already held 24% of the global market for wind energy equipment and 46% of the market for photovoltaic panels (Andrews-Speed and Zhang, 2019). According to Chinese government data, the country was responsible for the production of around 70% of the components necessary for the global energy

transition in 2022 – such as photovoltaic panels, wind turbines and gearboxes[9] (China…, 2023).

FIGURE 2
Renewable energy production in 2021 (TWh)
(In %)



Source: BP Statistical (2022).
Authors' elaboration.

On the other hand, Africa concentrates the majority of the population without energy access in the world. It is estimated that around 528 million do not have access to electricity nowadays. And at the same time, Africa is one of the smallest producers of renewable energy in this period, despite being one of the most important mineral producers (such as cobalt in Democratic Republic of the Congo) (IRENA, 2023).[10]

Some recent events, such as the covid-19 pandemic, have demonstrated that it is possible to reduce GHG emissions. However, there are still many steps left for this process to be effective, efficient and have a positive impact on the human development of countries, especially in the global South. In 2021, the BP Statistical Review of World Energy (2022) estimated that around 82% of global primary energy was derived from fossil fuels, i.e., a significant part of primary energy consumption still comes from sources that difficult transition. Thus, based on reflection on the concept and international efforts for this necessary transformation, data will be presented to contextualize the position of African countries in this scenario. Therefore, the next section will present an African panorama and its challenges in meeting the goals of the Paris Agreement.

9. Gearboxes are gears that improve the energy efficiency of energy production, especially wind.
10. Available at: https://www.iea.org/topics/critical-minerals.

3 AFRICA IN THE GLOBAL ENERGY TRANSITION: SINGULARITIES, ADVANCES AND CHALLENGES

In global terms, African countries (with rare exceptions) do not stand out as either energy producers or consumers. In Africa, especially in the sub-Saharan region (except in South Africa), a large part of the population does not have access to clean energy for both electricity and cooking. Despite this, the African continent stands out for being a strategic region for the extraction of essential minerals for the global energy transition. In this context, one of the main challenges on the African continent has been expanding access to energy while adapting existing fossil-based structures. This section provides an overview of the African energy transition and it is divided into three parts: in the first, there is an overview of the current African energy situation; in the second part, information on third-party financing for the transition on the continent is presented; finally, the issue of fossil fuels in Africa and how some countries are adapting.

3.1 Energy transition in Africa: the challenge of energy access and the renewables

The case of the African continent is emblematic in the energy transition debate. Until 2018, less than half of the population (46%) of sub-Saharan Africa had access to electricity and only 20% of the energy generated on the continent came from renewable sources. This demonstrates that, for this continent, the priority is not only to make the energy transition, but also to expand access to energy. Furthermore, it demonstrates the difficulties that Africa faces with the transition, since, in 2019, around two-thirds (72%) of the new energy capacity generated around the world came from renewable sources, but on the African continent this number was just 2%. The development of renewable sources requires investments in new technologies and efficiency, which is difficult for many countries. It is estimated that it is necessary to invest twice as much in African energy systems by 2030 (around US$ 40-65 billion per year) so that they can remain within the targets set in 2015.[11]

According to data from the 2021 annual report on the Sustainable Millennium Goals (SDGs) on energy (SDG 7) carried out by a partnership between the IEA, the IRENA and the United Nations Statistics Division (UNSD), World Bank and the World Health Organization (WHO), not only is access to energy a problem, but covid-19 has led to a setback in international financing for poor countries, in addition to promoting an increase in energy prices. Regulatory agencies estimated annual funding needed to achieve targets by 2030 of around

11. Available at: https://www.irena.org/publications/2021/March/The-Renewable-Energy-Transition-in-Africa#:~:text=A renewables-based energy transition,jobs and boosting energy security.

US$ 1.4-1.7 trillion per year in infrastructure. But this investment never reached this amount and in 2021, it was only US$ 10.8 billion (IRENA, 2023).

Furthermore, the SDG 7 report points out that, although globally the number of people without access to energy has reduced by almost half, in sub-Saharan Africa[12] this number has remained almost unchanged since 2010. Between the 20 countries with the largest population without access to energy, 17 were in sub-Saharan Africa. The countries with the largest population without access to energy are Nigeria (86 million), Democratic Republic of Congo (76 million) and Ethiopia (55 million), these three countries being the same as in the 2010 report. There are differences within rural and urban populations. Globally, in 2021, 98% of the urban population had access to energy and only 85% of the rural population. In sub-Saharan Africa, the expansion of electrification in rural areas was less than population growth, which left around 524 million people in rural areas without access to energy in 2021. As for the population of the North African region, the expansion of electrification was at the same pace as the region's population growth. Despite the difficulties, the report highlights that the energy transition can represent an important alternative to creating energy generation structures outside the countries' connected grid, especially solar energy, which would reduce costs in connecting large grid structures (IRENA, 2023).

Access to clean energy for cooking is still denied to 2.3 billion people. The African continent has the greatest difficulty in solving this problem, with around 25 countries with less than 25% of their population having access to clean energy.[13] Due to the lack of access to modern resources, the sub-Saharan region of Africa still has one of the highest consumption of traditional biomass (IRENA, 2023).

Despite advances in the presence of renewables in the African energy matrix, the AU report on the energy agency's balance and indicators (AU and AFREC, 2021) points out that most countries have fossil fuels as their main source and there is little participation of renewable energies in the energy matrix. Also according to the document, in Morocco, a country considered an example by the United Nations, only 9.8% of the country's primary energy matrix comes from renewable sources, with coal still being the country's main source of primary energy.

12. Usually, the term "sub-Saharan Africa" refers to the part of the continent that lies below the Sahara desert. It is worth remembering that the term presents problems, as it reinforces divisions carried out by actors external to the continent. Despite this, it is used in this study since the data brought by regulatory agencies groups the countries in that region.

13. For example: Mali, with only 0.9% of the population having access to clean energy for cooking; Niger, with 3%; Chad 8%; Central African Republic, 0.9%; Somalia, 3.8%; Madagascar 1.4%; Mozambique 5.4%; Malawi 1.6%; Tanzania 6.9%; Uganda 0.7%; Benin 4.6%; Guinea 1%; Liberia 0.4%; Sierra Leone 0.8%; Guinea-Bissau 1%; Gambia 1.7%; and Democratic Republic of Congo 4.3%.

3.2 Financing energy transition in Africa

Given that the repercussions of global warming, while more devastating in poorer countries, still impact wealthy nations, collective action is imperative to address this crisis. Some developed countries have committed to investments and technological transfer, as well as training labor to carry out the transition in developing countries, especially on the African continent. However, the promises are not being fulfilled as expected, which has been constantly denounced by the African Union (AU).[14]

Additionally, it is widely recognized that energy transition processes and efforts to adapt to and mitigate climate change necessitate substantial investments and collaboration among various international stakeholders. Therefore, international financing and cooperation are pivotal for African countries to successfully achieve their energy transition goals. However, barriers persist in accessing these two critical elements. In 2009, rich countries promised to donate at least 100 billion dollars a year to the most vulnerable nations for the purpose of mitigating and adapting to the impacts of climate change, yet this commitment remains unfulfilled (Adow et al., 2022).

The AU has held several meetings to defend the just transition and that the continent's priority should be to expand the population's access to energy, since, according to the organization, 600 million still do not have access to energy.[15] Furthermore, African countries consistently report that the promised funds do not reach their final destination and, in some cases, African countries are pressured to take out loans to carry out cooperation (African…, 2022). Meeting in Cairo in preparation for COP 27, which would take place in Sharm El Sheik in 2022, African countries stated that they receive less than 5.5% of global funding for transition (Africa…, 2022). Although, due to covid-19 pandemic, international funding for energy transition fell globally in 2020, flows to the sub-Saharan Africa region grew by around 45% (reaching US$ 1.2 billion), however, still below the necessary (IRENA, 2023).

According to the report *Adapt or die: an analysis of African climate adaptation strategies*, by the non-governmental organization (NGO) Power Shift Africa, an average of 4% of the GDP of African countries had to be allocated to cover expenses with the climate crisis. The report also shows that of the 100 billion promised, the majority was allocated to wind energy and solar panel businesses with the aim of cutting emissions and not for climate adaptation measures (Adow et al., 2022). Also according to the publication, during the three years of research, more than half of the World Bank's investments went to fossil fuels,

14. Available at: https://au.int/sites/default/files/pressreleases/42363-pr-PR_AUC_IEA_High-Level_Meeting_COP_27.pdf.
15. See footnote 13.

which confirms that a significant part of the financing that should promote the transition and help combat the harmful effects of climate change is still intended to encourage fossil fuels. Other data shows that between 2014 and 2016, 60% of international public financing for the African energy sector was directed to fossil energy, leaving only 18% for clean alternatives (OCI) (Russel, 2018).

The African example illustrates that developed countries have promoted the energy transition in their territories and exported investments in projects that designate the burning of fossil fuels to countries in the so-called global South. Between 2016 and 2021, public and private financial institutions invested at least US$ 132 billion in loans and underwriting in 964 projects of gas, oil and coal in Africa (Geuskens and Butijn, 2022). The vast majority of this financing came from financial institutions based outside the continent, both commercial banks and public institutions such as development banks and export credit agencies. According to the authors, of the fifteen main financial institutions behind this amount, ten are commercial banks and five are public financial institutions. Most of the biggest financiers of fossil fuels are from North America and Europe, in particular the United States, the United Kingdom and France.

Those based in North America, Europe and Australia together provided US$ 73 billion in financial support, 55% of the total. Asian-based financial institutions, mainly from China and Japan, provided US$ 42 billion of the total value, equivalent to 32%. In contrast, African-based financial institutions provided just $15 billion, or 11% of financing. The largest single financier of fossil fuel projects and companies in Africa during this period is the China Development Bank.

Furthermore, data from the report *Who Finances Energy Projects in Africa?* shows that from 2012 to 2021, G20 countries and the multilateral development banks (MBDs) committed around US$ 197.17 billion to energy projects in African countries, distributed across different energy sources. Gas/LNG projects received the highest value ($42.43 billion), followed by nuclear ($25 billion), hydropower ($24.72 billion), mixed fossil fuels ($16.20 billion), oil ($13.96 billion), solar ($11.92 billion), coal ($10.66 billion), wind (US$ 4.63 billion), geothermal (US$ 1.77 billion) and biomass (US$ 0.41 billion). Projects without a designated energy source received US$ 45.46 billion (Moses, 2023). Therefore, renewable energy (solar, wind and biomass) still receives much less investment than fossil and nuclear energy.[16] This means that to achieve the energy transition, the African continent needs a change in the global financing structure.

16. Although nuclear energy is considered clean energy by some sources, it still presents problems regarding waste, therefore, it is not considered renewable energy here.

3.3 Resistance of fossil fuels dependency

According to data from the EIA (2021), in 2021, Africa was the region that required the least oil consumption in the world, being responsible for demand of just 4 mb/d. However, there is constant growth in demand for oil (around 100-200 kb/d per year) due to population growth and this population's access to fossil fuel-based transportation. Furthermore, despite having low consumption, several countries on the African continent are listed as suppliers of crude oil and derivatives to other countries, highlighting the Organization of the Petroleum Exporting Countries (OPEC) participants: Libya, Algeria, Angola and Nigeria. However, the production capacity of African countries has fallen and they have been competing for international investment in the sector.

For the BP Statistical Review of World Energy (2022), despite oil experiencing a record price increase in 2021 (the second highest since 2015), production increased by around 1.4 million b/d, well below the increase in consumption which was 5.3 million b/d. In Africa this represents a change in revenue dynamics, there are some producing countries, which are extremely dependent on revenue from this source of resources (such as Nigeria and Angola); and other consumers, who suffer economically from rising prices (such as Mozambique). In terms of oil, OPEC+[17] is responsible for three-quarters of the increase in production, with Libya largely responsible for the increase (at 840,000 b/d). However, in the same period other African countries experienced a decrease in production, notably Nigeria (-200,000 b/d) and Angola (-150,000 b/d).

In terms of oil production trends, Libya stands out as the only country experiencing growth, with production projected to reach 1.3 million barrels per day (mb/d) by 2026. However, this growth trajectory hinges on political stability and infrastructure repairs necessitated by the country's conflict situation. In 2020, Libya produced 1 mb/d, albeit in an unstable manner due to political unrest that resulted in infrastructure blockades for eight months. On the contrary, Angola has been witnessing a consistent decline in production since reaching its peak of 1.8 mb/d in 2015. By 2020, production had dropped to 1.3 mb/d, and several companies, including Total, have announced their intentions to divest from projects in the country. Similarly, Nigeria, while producing 1.8 mb/d, is expected to see a reduction in production to 1.6 mb/d by 2026. This decline is attributed to inadequate investment and legal uncertainties, with the country undergoing constant reforms in its oil sector (IEA, 2021).

Global oil consumption projections for 2026 are 104.1 mb/d, which, despite the covid-19 crisis, indicates an increase of 4.4 mb/d in global consumption

17. OPEC and Russia. Among OPEC+ members, seven out of thirteen members are African (Libya, Nigeria, Angola, Algeria, Democratic Republic of Congo, Equatorial Guinea and Gabon).

compared to 2019. On the other hand, there is a tendency for production to fall by 2.6 mb/d, which represents a tendency for prices to increase. A large part of these supplies must come from developing countries (Africa, the Middle East and Latin America) and are mainly destined for Asia, since there is a tendency for consumption in the United States and Europe to stabilize by 2026. Thus, despite Libya, other African producers (Angola, Nigeria, Algeria, Gabon, Congo, Sudan, South Sudan, Egypt and Equatorial Guinea) tend to reduce their production until 2026. Other producing countries (such as Kenya, Uganda, Senegal and Ghana) that had projects to receive investment for expansion, had their plans delayed due to problems generated by the covid-19 pandemic. These, however, tend to increase their production in the coming years if these plans come to fruition (IEA, 2021).

Furthermore, apart from Nigeria, which has a more significant role, the African continent plays a very small role in oil refining, being a large importer of refined products, a trend that tends to continue over time (despite forecasts pointing to so that Australia, Indonesia, Singapore and New Zealand surpass the continent in this regard in the coming years). China, on the other hand, despite being a large importer of crude oil (especially from the Atlantic basin and the Middle East), has a strong petrochemical industry specialized in refining and the production of derivatives, which tends to guarantee its consumption in addition to catering to exports.

Although this information is not directly related to the topic of energy transition, it is important to note that, contrary to international discourses and the climate emergency, there is still a large investment in the fossil fuel sector. And that, despite investment in the sector being in decline, they directly affect local elites in several African countries, which tends to change the continent's geopolitics in the short term.

4 CHINESE PRESENCE OVERVIEW IN AFRICAN ENERGY TRANSITION: AGREEMENTS, PROJECTS AND EXPECTATIONS

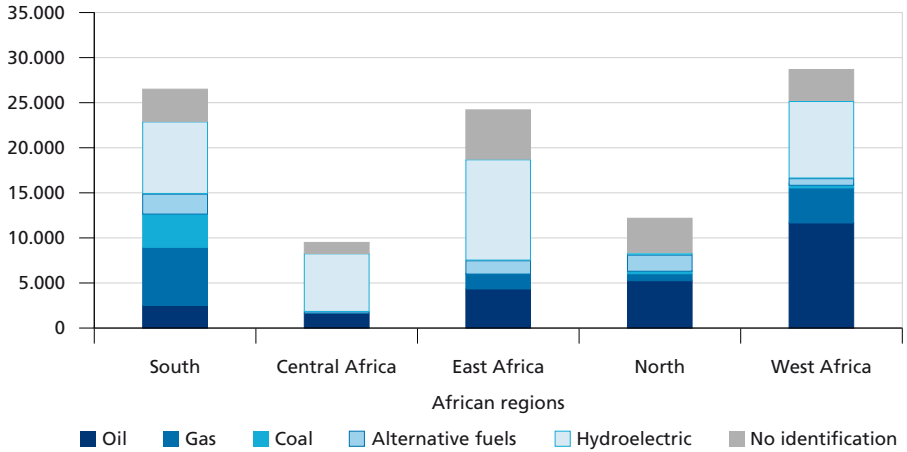
Ramo (2004) described Chinese diplomacy in Africa (and more broadly, Chinese diplomacy in developing countries) with the concept of "Beijing consensus", a concept coined in opposition to the "Washington consensus" and which helped to design policy strategies external movement from China to the African continent.

When it comes to energy specifically, analysis of China's policy guidelines on Africa (released in 2006, 2010, 2013 and 2015) reports that cooperation in the energy sector has increased in importance in recent years. Today, China is the largest energy investor on the African continent. The Asian country has invested considerably in renewable energy projects in Africa, such as solar and wind farms.

It can be said that the country adopts a contradictory stance regarding investments in renewable and fossil energy, like most international actors, including Brazil.

According to the China Global Investment Tracker database,[18] in Africa,[19] China carried out 197 investment and construction operations, between 2010 and 2023, valued at more than US$ 101 billion. However, of the energy investments identified by the database,[20] 42.5% are still concentrated in fossil energies (oil, gas and coal), while only 40% are in hydroelectric plants and alternative energies, as shown in the graph below.

FIGURE 3
Chinese investment in Africa in energy sector (2010-2023)
(In US$ millions)



Source: China Global Investment Tracker. Available at: https://www.aei.org/china-global-investment-tracker/.
Authors' elaboration.

Of the five main Chinese investments in Africa, between 2010 and 2023, the China Global Investment Tracker identifies that of the five largest investments, three are destined for oil (in Niger US$ 4,990 million, in Nigeria US$ 2,500 million, and in Uganda US$ 1,820 million) one for gas (in Mozambique of US$ 4,210 million) and one was not identified (in Egypt of US$ 3,100 million). Of the main Chinese constructions carried out in Africa, there is a greater share of hydroelectric plants with three constructions (in Angola worth US$ 2,770 million, in Zambia for

18. All investments and constructions carried out by China in the energy sector were considered in this value. Available at: https://www.aei.org/china-global-investment-tracker/.

19. In this study, African countries are considered to be countries participating in the AU, and the division by regions was adopted the same as that institution. The China Global Investment Tracker, however, does not present data from some African countries, namely: Gambia, Burundi, Central African Republic, Comoros Seychelles, Somalia and the Sahrawi Republic.

20. About 17% of Chinese energy investments and construction in Africa were not identified in the data source. It is necessary to take into account that some of the transactions refer to transmission and transformation lines.

US$ 2,010 million and in Kenya for US$ 1,750 million), but there are still two constructions aimed at for oil (both in Egypt of US$ 1,990 million). Focusing on investments and constructions in alternative energies, the South region received the highest amounts, a total of US$ 2,250 million between 2010 and 2023. Which represents much lower amounts related to fossils.

Regarding green energy, China financed the construction of the largest solar plant in Africa, located in Benban, Egypt (Baraniuk, 2018). The country has also supported the construction of several hydroelectric plants in Africa, including the Kariba hydroelectric plant (in Zambia and Zimbabwe), and the Bakun hydroelectric plant (in Cameroon). These projects aim to increase clean energy generation capacity and reduce dependence on more polluting energy sources.[21] However, nowadays the social and environmental impacts of hydroelectric plants are being considered as aggravating climate change, which has been the subject of criticism for Chinese projects (Murg, Staden and Duanyong, 2021).

As for energy infrastructure in Africa, including transmission lines, distribution networks and energy storage systems, Chinese participation is also relevant. The investments made aim to improve energy efficiency, security of supply and access to electricity in remote areas.

Although Chinese investments in nuclear energy in Africa are limited, China has expressed interest in collaborating with some African countries to develop nuclear power plants for peaceful purposes. For example, China has signed agreements with Kenya and Sudan to explore the possibility of building nuclear power plants (China…, 2016).

When it comes to investments and international cooperation in the energy sector, there is a varied range of activities. It is possible to divide these two categories based on the actors involved, that is, bilateral projects – directly involving China with another African country –, triangular – involving three actors –, and/or multilateral – involving several actors and/or international organizations.

There are bilateral projects, between China directly and African countries, some of which have already been mentioned previously. According to Barcelos and Gomes (2022), "China sought to establish individual relations with the 55 countries on the continent, avoiding the homogenizing tendency of other powers to think of Africa as one". For these authors, the Asian country manages to establish a differentiated relationship with African countries, adopting a less welfare perspective than other traditional partners.

21. Available at: https://www.aei.org/china-global-investment-tracker/.

Regarding multilateral projects, the activities take place via FOCAC, within the scope of the Belt and Road initiative or direct partnerships with international organizations such as the AU. China has been cooperating with the African Development Bank (AfDB) to capitalize on the Africa Growing Together Fund and create energy projects with their respective infrastructures and, according to Daniel Schroth, director of the Department of Renewable Energy and Energy Efficiency at the bank, there is potential to expand these partnerships to areas of water resources, solar, geothermal energy along the East African rift valley and wind energy, both offshore (outside the territory) and onshore (in the territory) (Banco..., 2022).

The AfDB estimates that the continent needs up to US$ 1.6 trillion between 2020 and 2030 to limit and adapt to climate change. However, Africa has already lost between 5 and 15% of its GDP growth due to climate change and the continent estimates a financing deficit of around US$ 1.3 trillion between 2020 and 2030. Between 2016 and 2019 the continent received around US$ 18.3 billion to finance adaptation to climate change (Africa..., 2022).

In the Belt and Road Initiative (BRI) – also known as New Silk Road or Belt and Road Initiative – which is an economic development project proposed by the Chinese government in 2013, in its report the Investment Report of 2021 BRI no coal projects received Chinese funds that year.[22] However, between 2014 and 2020, the Chinese government invested US$ 160 billion in coal-fired thermal plants and their infrastructure outside the country. The report also shows that although the number of coal projects has decreased, investments in oil and gas jumped from US$ 1.9 billion in 2020 to US$ 6.4 billion in 2021. In the same period, the amounts allocated to renewable energy remained stable, rising from US$ 6.2 billion in 2020 to US$ 6.3 billion in 2021.

For example, in 2022, the French oil company, Total Energies, and China National Offshore Oil Corporation (CNOOC), a Chinese company, signed a contract with the state-owned companies of Uganda and Tanzania to build a pipeline of almost 1,500 km from the oil fields on the banks of the Lake Albert to the coast of Tanzania. Total energies aims to turn Uganda into an oil producer and export its oil through the world's longest heated pipeline. The project includes the development of two oil fields on the shores of Lake Albert and the construction of the 1,443 km East African Petroleum Pipeline (Eacop) which, at full production, will channel 230,000 barrels per day to the Tanzanian coast for export. In a press release, Total said the project represents a total investment of

22. A Reuters article talks about the Chinese steel sector, highlighting that the country plans to increase the use of scrap in its steel mills to consume less coal and, thus, reduce emissions from the sector. Over the next 3 years, the goal is to start recycling more than 300 million tons of scrap annually. This is an important part of plans to develop a greener steel industry. The plan pointed to a single goal: that the sector's carbon emissions would begin to fall from 2030 onwards.

around US$ 10 billion, with production expected to begin in 2025 – almost 20 years after the discovery of commercial oil in Uganda. At the time, the country's energy minister, Ruth Nankabirwa, wrote on Twitter that US$ 15 billion to US$ 20 billion in investments are expected over the next five years. However, the project did not provide explicit information about financing, as many international banks have reduced investments in fossil energy projects.

Indeed, it is important to note that many oil exploration projects on African soil, such as the Lamu coal plant in Kenya, have been canceled due to financing challenges. Also according to the Climate Home News, the project is associated with significant socioenvironmental impact, including causing the displacement of people due to the negative impacts caused by the project (Farand, 2022).

5 FINAL CONSIDERATIONS

China indeed plays a significant role as a major investor on the African continent, positioning itself as a key beneficiary of the continent's energy resources, both in terms of minerals, essential for the energy transition, and fossil resources, which allow for Chinese energy security. By 2026, China is expected to rely more on the Atlantic region and the Middle East as sources of fossil resources to fuel the refining industry in Asia. Conversely, Africa currently lacks the infrastructure to refine crude oil at a sufficient scale, rendering the continent a significant importer of Chinese refined products. However, Europe and the United States are still the main destination markets for the African continent's energy resources.

Africans have claimed the disparity of power in terms of energy resources in international organizations. At the COP 27, in Sharm el-Sheikh (Egypt), one of the continent's claims was that the aid proposals from developed countries fell far short of what was promised. The consequences of the lack of investment and financing for the African energy transition mean that this continent continues to bear greater costs – caused by climate change, environmental disasters generated by the exploration of fossils and social conflicts, resulting from these issues – without having contributed in any way. significantly to global warming, with less than 2% of global GHG emissions.

China and Africa have sought to cooperate to resolve these issues. China brings in its international speech the importance of a just transition for developing countries, which includes African countries in some aspects. Furthermore, within the there is a working group focused on climate issues which, in 2020, was in its third implementation. Furthermore, since 2009, there has been an area of cooperation within FOCAC specialized in climate change that includes the energy transition. There are also bilateral agreements on climate change that include the issue of energy, called "Complimentary Supplies for Addressing

Climate Change" with Benin, Burundi, Cameroon, Egypt, Ethiopia, Ghana, Madagascar and Nigeria (Weidong, 2020).

Based on these debates, China has made several investments, especially in the construction of hydroelectric infrastructure and the construction/restructuring of railways that aim to both expand the population's access to energy and transport, and decarbonize the African matrix. There are also some specific initiatives to build wind farms and solar farms, which are less frequent, but are still important. Thus, it is estimated that between 2007 and 2020, China invested around US$ 23.5 billion in renewable energy in Africa, at the same time that it invested US$ 19 billion in transport, US$ 13.5 billion in energy projects, fossil fuel and US$ 4.6 billion in telecommunications.

Analyzing these contexts, it becomes evident that the Chinese energy transition is intertwined with two significant processes. Firstly, there's the government's endeavor to address internal social pressures within the country. Secondly, there's China's role as a producer of renewable energy technologies. Given China's substantial technological advancements in this sector, it faces mounting pressure from international actors to play a more substantial role in assisting developing countries, particularly those that supply a significant portion of the raw materials required for manufacturing renewable energy equipment.

African countries are on another side of the table. In general, Africans are developing countries, which face several difficulties in making this energy transition, or even having access to energy. Africa is among the regions that still have great difficulty with energy poverty among part of the population, especially in access to electrical energy. On the other hand, despite consuming little energy, Africans have important reserves, both of oil and minerals essential for the global energy transition. At the same time, the African continent, along with Southeast Asia, tends to be the most affected by climate change caused by global warming. Global warming tends to generate major environmental imbalances that, in addition to intensifying migratory flows, tend to harm the continent's energy infrastructures. So, international actors, and China is not different, tend to transfer their necessity of fossil fuel exploitation to Africa and also mining of so-called "critical minerals" for energy transition.

The consequence of that, is that Africa is becoming once again an energy exporter without really a better economic social life of its people. Like we have seen in this paper, Africa did not improved get in energy access to the population in the past 10 years and also received less investment for energy transition than was promised. On the other hand, Africa was crucial for energy supply, especially for Europe, United States and China.

In the Chinese specific case, the African continent is one of the major receiver of the surplus of investment. But, the benefits of its investment is turning to China, once it exports its own products (i.e. especially in the case of photovoltaic panels and wind turbines) without dealing with the environmental problems they bring together (like the big dams of hidropowers and the mining of critical materials). Although it is necessary to consider that African elites connected to oil also have their own responsabilities in this process. It became evident that what China is trying to do for its own, is completely different from what it is trying to sell to Africa, once the investment in fossil fuels is much higher than the renewable energy sources. It is crucial to rethink policies to have real South-South cooperation in these cases.

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