

Corso di laurea in Strategic Management

Cattedra Chinese Studies

China's Belt and Road Initiative: Balancing Economic Ambitions with Environmental Commitments

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Anno Accademico 2023/2024

ACKNOWLEDGEMENTS

I would like to express my profound gratitude to everyone who has supported me throughout this journey.

First and foremost, I am deeply grateful to Elio, Rossana and Alessandro, my family, whose constant encouragement, love, and support have been fundamental to my success. Your unwavering belief in me has been my greatest source of motivation.

I extend my sincere thanks to my Nina, whose patience, kindness, and unwavering presence have been a comforting anchor throughout this process. Your optimism and confidence in my work have inspired me to keep pushing forward, and I will never stop thanking you and wanting you by my side.

I would also like to thank warmly my thesis advisors, Professor Silvia Menegazzi and Professor Francesca Lotti, for their guidance, insights and constructive feedback. Your expertise and dedication have been instrumental in shaping this work, and I am deeply appreciative of your time and effort.

Last but not least, I would like to thank my travel companion Pasquale, who was able to bring out the best in me. From the day we met, we became like brothers, and I couldn't be happier.

Thank you all for being part of this journey.

ABSTRACT

This thesis examines in depth the Chinese project known as 'Belt and Road Initiative', introducing its origin and founding principles, and attempting to answer the research question " Is China really meeting its international climate and sustainability commitments through the development of the Belt and Road Initiative, or do economic ambitions take precedence over environmental principles? A critical analysis of the contradictions between declared environmental policies, strategies and policies adopted by China with the actual practices in Belt and Road partner countries".

The first chapter initially presents the founding principles of the initiative, analyzing the mainland and sea corridors, continuing with the introduction of the Digital Silk Road, a Belt and Road Initiative's update due to the growing importance of digitalization as an additional means of connecting nations. The chapter focuses on the international relations that have emerged due to this initiative and examines how the project has affected global geopolitical dynamics. The chapter retraces the long road that led to the conception and birth of this initiative, analyzing Deng's policies that first revolutionized the Chinese economy and, secondly, that have also enabled China to embark on its path towards greater proximity to the international community. Special emphasis is placed on the Kigali amendment, to the Montreal Protocol and to the Paris agreement, three crucial agreements that indicate the global commitment to environmental sustainability. The thesis examines the evolution of the BRI in response to climate goals by adopting new green standards and committing to promoting sustainable development. China, as the main player in the BRI, has re-defined its environmental objectives, emphasizing the importance of its commitment to the global environment. The final part of the first chapter will analyze the Belt and Road from a financial point of view and will conclude with the discussion of the Green Investment Principles.

The second chapter of the thesis will highlight some of the main issues related to the Belt and Road Initiative. Initially there will be a focus on the production of electricity through coal-fired power plants, with a study that will highlight the change in China's energy basket. The impact of the Hunutlu plant in Turkey will be analyzed, highlighting its strengths and weaknesses.

The case of the Port of Hambantota, a classic example of a debt trap, will be treated. The modernization of the rail network in Kenya and the Chinese presence in Zambia will also be analyzed. The chapter will close with a focus on the range of challenges that are affecting the Belt and Road Initiative, highlighting some negative themes.

The third chapter focuses on the China-Pakistan Economic Corridor (CPEC), a crucial element of the Belt and Road Initiative. In this chapter, will be examined how the project benefits both China and Pakistan, analyzing its contribution to their economic development. The case of the port of Gwadar will be treated as a strategic point fundamental for Chinese interests and as a symbol of economic restart for Pakistan. The solar park at Quaid-e-Azam will be specifically treated and it will be seen that this is the symbol of the new green principles of the Belt and Road Initiative. As a testimony of the sustainable environmental transition, projects carried out by China in power plants that exploit wind or water energy will be analyzed. The chapter will close with a focus on foreign direct investment, China's most used way to promote sustainable development.

This thesis presents a comprehensive study of the Belt and Road Initiative, emphasizing the relationship between China and Pakistan through CPEC, investigating the advantages and disadvantages of infrastructure projects, emphasizing the significance of sustainability and international cooperation. By critically analyzing key initiatives and their consequences, the thesis enhances our understanding of the BRI's global impact, and the significant role China plays in promoting a more connected and sustainable future.

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CHAPTER ONE

1.1 Introduction and founding principles of the "Belt and Road Initiative"

In 2013, Chinese President Xi Jinping¹ launched an ambitious global project known as the "Belt and Road Initiative" (BRI²), which will bring China closer to seventy other nations, creating a new economic space between Asia, Africa and Europe. This project is the flagship of an infrastructure investment program that aims to strongly develop the collaboration and the connectivity of an area of countries that represents two thirds of World GDP.

Behind the launch of this initiative lies the concept of international development cooperation, a principle deeply rooted in Chinese history, started in the early 1950s with aid to developing countries based on the principles of non-interference and mutual benefit. "Historical memory is very much present in today's Chinese discourses on aid and development cooperation. Chinese leaders often invoke an image of a shared past of joint anti-imperial and anticolonial struggle with other developing countries, when China, despite its poverty, supported others to the best of its ability—and without any political conditions"³.

This principle, although different from the initiatives proposed in the early 1950s, as historical memories testify, is still firmly anchored within the thoughts of the Chinese Communist Party.

Over time, China has created institutions such as the Asian Infrastructure Investment Bank, which, in addition to financing infrastructure projects, serves as a tool for spreading the so-called "speech power" of China and, as we will see during the development of the thesis, will be crucial to support infrastructure projects in different regions of the world, challenging Western narrative and proposing an alternative model of development. This power of speech is a Chinese strategy to influence global public opinion, promoting a positive image of China and challenging the US-led international economic order.

The Belt and Road Initiative is an innovative model of international development cooperation, with which China promotes infrastructure investments and economic development projects in developing countries. The BRI stands as an alternative to the traditional Western approach, emphasizing South-South cooperation based on principles of non-interference, mutual respect and shared benefit. Through this initiative, China aims to reduce the infrastructure gap, stimulate economic growth and foster sustainable development by positioning itself as a key partner in the global international development landscape.

¹ Xi Ximping was elected President of the People's Republic of China in 2013; in addition to this, he also holds the position of General Secretary of the Chinese Communist Party. Xi has taken on the role of a proponent of revolutionary political reforms and has suggested that China should implement structural economic reforms that emphasize sustainability and environmental care. The President has promoted initiatives at international level, such as the BRI, with the aim of bringing China closer to the international community: in this thought, China should play a central role in the creation of an international order that is respectful and equitable both towards the nations themselves and to the surrounding environment.

Xi Ximping has also removed the tie of years for the Presidential term, he has guaranteed to rule for a period of time that is still undefined and has promoted a very hard campaign against corruption within the Chinese Communist Party. ² Stands for "Belt and Road Initiative".

³ Marina Rudyak – "The Past in the Present of Chinese International Development Cooperation", MadeinChina, 2021.

The BRI and the AIIB are therefore concrete examples of how China is seeking to redefine the rules of the game in the field of international development, reserving the memories of the initial concept of international development cooperation, proposing a model of multilateral cooperation that emphasizes sustainability and a new inclusive multilateralism.

President Xi spoked for the first time about this project during a visit to Kazakhstan, starting the "Economic Belt of the Silk Road". Shortly thereafter, he made the proposal to establish the AIIB⁴ in a speech to the Indonesian parliament, which will become operational shortly after when 21 Asian nations signed the memorandum of understanding. Consequently, President Xi announced an economic commitment of 40 billion dollars that has given rise to the Silk Road Fund, with which the project "One Belt, One Road" (OBOR) will be financed. However, this project, which is still operational, has not continued its work under its original name, turning into "The Belt and Road Initiative".

The Chinese authorities decided to change the name of the project going against the OBOR that could suggest "a single path", better emphasizing the plural and inclusive nature of the initiative which includes multiple routes and projects in various geographical and economic sectors.

Despite the change in name, the project's guiding principle remained the same: to rehabilitate the old trade routes and by time, building new infrastructure in friendly countries to speed up the freight transport process even more. This first aim has been pursued since the beginning of the project and will be achieved through the construction of six corridors of freight transport, both by land and by sea, allowing China to increase and make more efficient its trade routes. By doing this, China can gain access to new energy supply sources in the partner countries of this initiative, moving some of its economic surplus towards these same countries, expanding its political and economic influence.

The Chinese government's action plan has two main lines: the land-based (Silk Road Economic Belt) which will connect the production centers of South China to the European consumer markets by rail, and maritime (Maritime Silk Road) will allow Chinese goods to reach the Mediterranean Sea through the Suez Canal and other nations of Asia through the South China Sea.

The first modernization objective, that concerns land-based activities, will be implemented by means of the construction of a railway that will connect the Chinese province of the Jiangsu⁵ to Rotterdam and this will allow to reduce the delivery time of the goods from five to three weeks. The China-Mongolia-Russia corridor will be realized through the construction of highways, railways and through the introduction of

⁴ Stands for "Asian Infrastructure Investment Bank". At today, China is the largest shareholder with 26% voting shares in this Bank and it is the country with the most decision-making power in the operation of the bank.

⁵ Jiangsu is one of the most prosperous and populous provinces in China and is well-known worldwide for its economic and technological hubs. As well as being one of the richest provinces in the whole of China, it is located in a very strategic portion, overlooking the Chinese east coast.

customs facilities. A third corridor will connect the Chinese province of Xiang with Central and Western Asia to the coasts of the Mediterranean and the Arabian Peninsula; a fourth corridor, instead, will join China to Singapore going to contribute to the development of the states bordering the river Mekong. The China-Pakistan corridor will be realized, which will be observed during this thesis and, finally, the Bangladesh-China-India-Myanmar corridor.

The Maritime Silk Road, instead, will allow Chinese goods to reach the coasts of the Mediterranean Sea and East Africa through the Suez Canal and the Asian coasts through the East China Sea. In addition to these two main routes, the Chinese government has announced its intention to establish a "Polar Silk Road⁶" that could be developed along three routes linking China with Russia and Canada.

This project, also known as the New Silk Road, was conceived as a strategic response to China's economic and geopolitical challenges in the early 21st century. Chinese economic growth, while impressive, has highlighted the need to diversify export markets and reduce dependence on traditional maritime trade routes, often dominated by other global powers. In addition, the BRI is a tool to address excess production capacity in key sectors of the Chinese economy, such as steel and cement, by redirecting these resources to infrastructure projects abroad.

This project is based on the idea that international cooperation should be beneficial to all parties involved: in this sense, China promotes the construction of infrastructures that improve global connectivity, facilitating trade and cultural exchanges. The BRI is open to anyone who expresses a desire to be a part of it, not restricted to specific geographical or political areas, but is intended to include nations with different economic sizes and levels of development. This inclusiveness promotes learning and knowledge exchange between countries and creates a balance between the economic benefits for China and those of partner countries: infrastructure investments are designed to stimulate local economic growth, creating new employment and development opportunities. It is for these reasons that international cooperation is one of the founding principles of the BRI.

Another fundamental element of the BRI is infrastructure development: China has identified infrastructures as roads, highways, railways, ports and airports as the essential facilities to improve connectivity to enhance trade. This principle will be achieved through massive investment in Asia, Europe, Africa and Latin America and will enable these continents to be strongly interconnected. Regional economic integration is also one of the founding principles of the BRI, intensely linked with the infrastructure development. This project does not only aim to connect China with partner countries but also to improve the links between the partner countries themselves.

An objective strongly linked to China's interests is access to natural resources, which it does not have, and

⁶The Polar Silk Road is an ambitious project that until a few years ago was unthinkable to carry out. The melting of the Arctic glaciers, representing climate change, is gradually making this initiative viable. The ice cap has now been reduced from 7 square kilometers to almost half its original area. Currently, imposing icebreakers are required to travel this route. However, starting from the decade 2040-2050, travel will be possible without these ships.

which are necessary for its economic growth. Through this initiative and the construction of the vast infrastructure network in countries rich in natural resources, China has sought to secure energy supplies inaccessible to it, minerals and other resources crucial in this era of ecological transition. This principle has guided many of the BRI projects, particularly in Central Asia, Africa and the Middle East. This initiative is also designed to promote local economic development in the participating countries. Through these founding principles, China has sought to stimulate economic growth, create jobs and improve living standards in the regions concerned. This principle is based on the belief that local economic development can lead to greater political and social stability, benefiting both participating countries and China itself.

The BRI is also a tool to expand China's geopolitical influence⁷. Through investment and economic cooperation, China aims to strengthen its ties with participating countries and build a network of strategic alliances. This principle reflects China's ambition to take a global leadership role and counter the influence of other major powers, such as the US and the European Union.

The founding principles of the Belt and Road Initiative reflect a combination of economic, geopolitical and development objectives. These principles have guided the design and implementation of the initiative in its early years, laying the foundations for what has become one of the most ambitious global development strategies of the 21st century, and which, over time, will evolve by incorporating environmental sustainability in its principles.

1.2 Digital Silk Road

The Belt and Road Initiative, from its inception, has been seen as a global connectivity initiative that embraces all possible land and sea physical infrastructures such as ports, highways, power plants and highways. However, with the advent of digital technologies and the growing importance of digitization, China has also targeted this type of connectivity. Starting in 2015, during the second World Internet Forum in Wuzhen, the Digital Silk Road was introduced, a kind of digital evolution of the Belt and Road Initiative aimed at creating a vast network of digital infrastructures that includes e-commerce trade, submarine cables, data centres, communication networks, artificial intelligence, quantum computing and navigation satellites.

This new phase of the Belt and Road initiative was born in response to a potential internal problem that afflicted President Xi who, in fact, at the same conference had declared "the fact that core technology is controlled by others is our greatest hidden danger"⁸ (Xi Ximping, 2016).

⁷ One line of thought has identified a possible link between the BRI's goals, and the initiatives proposed by Xi in recent years. The BRI has been instrumental in establishing many good international relations for China, and in particular, it has made China more advantageous in negotiations with partner countries by building all infrastructure on debt. A possible link is the new Chinese initiative "Global Security Initiative".

⁸ Xi - World Internet Forum, 2016.

The idea of creating the Digital Silk Road was born, with the aim of creating a global network of digital infrastructures that could further promote inclusion between different nations. Obviously, in this dynamic, China emerges as an undisputed leader in the technology sector and makes available to other partner countries its skills and knowledge in the field of tech. DSR⁹ is born to bridge the digital gap between these countries and China, by promoting technology sharing and the adoption of new instrumentation. The birth of this new version of the Belt and Road Initiative represented a major paradigm shift from the principles introduced in its first version in 2013. Alongside physical infrastructure, the importance of technology was recognised and therefore its strong usefulness for stable and lasting economic growth.

The creation of this digital cyberspace however implies the creation of infrastructures to be carried out, such as long submarine cables, a strong 5G network, satellites and data centers in all territories of the countries participating in the Belt and Road initiative. These infrastructures are indeed of vital importance for connectivity and to enable China to make its technological standards known outside of China, in other words in partner countries. In this perspective, the nation presided by Xi appears as the fulcrum of a digital ecosystem, standing out thanks to its expertise in the position of technological leader and, at the same time, it is consolidating its economic and political influence within the governments of other partner nations. This influence can be achieved through investment but above all through the transfer of technological knowhow, human capital formation in developing countries and the promotion of digital inclusion. It is through these actions that China can effectively support other developing nations, By being a partner willing to share its accumulated experience and technological innovations and allow growth over time in the nations that develop along the Silk Road.

Concrete examples of the construction of these digital infrastructures have been driven and implemented by leading companies in their own sectors such as Huawei and ZTE¹⁰, which have been involved in the construction of 5G-related infrastructures in many countries in Asia and Africa. The new stable connection, as well as facilitating electronic commerce, will support local populations in having better and easier access to health services and educational services such as schools. Similar infrastructures are under construction in Pakistan and, as we will see later, they will be essential for the development of the China-Pakistan economic corridor. Also, in relation to Pakistan and the stability of connections is the submarine cable PEACE¹¹, a system of optical fiber cables that aims to connect Asia and Africa, significantly reducing the international connection latency that can be found in most countries of these two continents. This cable system will sensitively improve the accuracy and efficiency within the management systems of valuable infrastructures such as the port of Gwadar and will involve a huge investment of almost two hundred and fifty million

⁹ Stands for "Digital Silk Road".

¹⁰ ZTE is a company that manufactures technologies, partly owned by the Chinese state, leader in the telecommunications sector. Founded in 1985, it has many partnerships with European companies such as Postemobile and WindTre.

¹¹ Stands for "Pakistan & East Africa Connecting Europe".

dollars, funded by the Chinese Huawei and the Pakistani government.

As can be seen in Figure 0, the construction of these digital infrastructures will have a major economic impact, strongly influencing the growing importance of electronic commerce.



Figure 0 shows the trend of the e-commerce sector in China, estimated in trillions CNY¹², in a time span from 2016 to 2025. It can be seen a steady growth of this sector from 2016, exactly the year after the Digital Silk Road was issued. This growth continues until 2018, when it peaked at almost CNY 20 trillion. This strong growth is explained by the penetration of the internet in daily life and the growing confidence of people towards online shopping.

From 2018 onwards, the market has stagnated and declined. It should be remembered that since 2020 the global pandemic of Covid-19 has occurred, which, while on one hand has encouraged citizens to make online purchases, On the other hand, it has strongly slowed down overall economic growth and thus affected the purchasing power of Chinese consumers. This could explain the sharp decline in growth between 2019 and 2020.

Despite these years of decline, the value of growth seems to stabilize from 2020 and will even tend to experience new growth relative to 2025 projections. This slight recovery, although present, indicates that despite the growth rate is not as explosive as in previous years, the market is still strongly significant and with high development potential, probably in less explored areas or geographical areas such as those of developing countries.

The implementation of the Digital Silk Road is vital in pursuing one of China's main goals, namely to

¹² CNY is the ISO code for China's official currency, the Renminbi.

increase its sales abroad through online sales channels. Only through the implementation of this branch of the Belt and Road Initiative will it be possible. This objective is pursued on the one hand through the improvement of land and sea routes, which allow easier movement of goods, than on the digital side, allowing all the partner nations of China to have access to purchase goods that they would not be able to find on their national territory, or at least not at the price guaranteed by the nation presided by Xi Ximping.

1.3 International Relations: background or consequence of the BRI

Taking a step back, the process of evolution of Chinese ethics and policies has very long roots. The ancient routes of the Silk Road have always been the setting for compelling stories, full of romance and action, and in the common imagination, this represents the emblem of man's continuous search to be part of a common unified vision. From the trees of his birth, around the Silk Road has developed an active and prosperous economic community made of continuous trade and cultural exchanges that has created the meeting point between the most developed Eurasian regions. Originally, this route was created for the silkworm trade, a fabric that had such unique properties that it stimulated demand comparable to gold: the most precious religious vestments, the clothes of merchants, lords, kings and emperors were prepared by means of the silkworm.

Along the trade route of this precious material have developed the Silk Roads that trace "the Heartland", one of the main areas of economic interest that still govern issues related to geopolitics stability still today.

The original situation of the Silk Road is strongly linked to the current situation and refers to what is happening in the world economic system, with an increasing interest in those regions of the world that are rich in energy resources such as the Middle East, Asia and Africa. Since Xi Ximping was elected as president of the Chinese government, there has been a radical change in interests and objectives of Chinese politics: Xi replaced collective leadership with strong man's government, centralized decision-making and firmly imprinted his personal imprint on party politics. These initiatives have strongly influenced China's foreign policy, rapidly transforming China's relations with the West from a difficult relationship, at first, in an open confrontation. The Belt and Road Initiative, which was seen as China's attempt to expand its geopolitical influence under the guise of infrastructure building, resulted in a significant rapprochement with the countries of the West.

It took a long time before China opened to such a radical change. This process began under the Deng government, starting in 1978, with gradual and pragmatic economic reforms aspired at moving the Chinese economy. One of these was aimed at an opening to international trade: Deng encouraged the development of joint ventures with foreign companies, allowing his own enterprises to internalize practices, modern management methods and new technologies. At the same time, as a response to this new policy, there has

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been a significant increase in the export of manufactured goods by China which, in the short term, has become one of the main players in world trade. This sharing of technology and knowledge has been pursued through the promotion of cultural and scientific exchanges with western countries, by sending Chinese researchers and scholars abroad and by hosting foreign researchers.

As a result of these reforms, there was a period of extraordinary economic growth witnessed by the Chinese GDP¹³ that has grown vertiginously bringing China from agricultural economy to manufacturing power level world¹⁴. In this way, China has become a partner of many global economic actors and an integral part of international economic organizations.

Another example is the entry into the World Trade Organization (WTO) in 2001, which allowed China to access new markets and to consolidate its international trade relations. In the same years, the "Going Global Strategy"¹⁵ was implemented which aimed to push Chinese companies to invest capital abroad with the aim of expanding China's economic presence globally, to obtain natural resources, technologies and know-how. This policy has in fact prepared Chinese companies to operate in international contexts and laid the foundations for the BRI, setting up a network of global economic relations.

This international opening has also allowed China to start collaborating with world powers such as the USA, Russia and the European Union, promoting the so-called strategy of "Major Power Diplomacy". By playing an assertive role in global dynamics and avoiding direct clashes with other nations, China has managed to maintain its political integrity by promoting its economic development.

This openness has also had important repercussions with other countries, which are not regarded as world powers but as developing countries such as Latin America, Africa and Asia, by offering low-interest financial assistance and technology sharing to try to make strategic agreements.

Moreover, China has further intensified this international participation by joining other organizations such as the UN¹⁶, the G20, ASEAN¹⁷ and the SCO¹⁸.

¹³ Stands for "Gross Domestic Product".

¹⁴ Agriculture played a significant role in the Chinese economy prior to Deng's political reforms, accounting for about 30% of GDP and employing approximately 70% of the Chinese workforce. One of the reforms that has drastically changed the balance was the "Agricultural Responsibility" which has enabled farmers to start selling their surplus production on free markets. After this period of forms, the share of agriculture in China's GDP has declined dramatically and has been largely replaced by the manufacturing sector. This change has had important repercussions: the population has moved rapidly from rural areas to cities and towns, China has attracted foreign investors and the standard of living of the Chinese has improved significantly (there was a sharp increase in per capita income).

¹⁵ To keep pace with globalization, the Chinese government implemented in 1990, and then realized in 2001, the Going Global Strategy. This act aimed to diversify and extend the risk of Chinese companies far beyond the Chinese domestic market which now appeared to be limiting for both government and business. At the same time, this opening of China with other nations would allow it to reach natural and non-natural resources: these were not available before and were crucial for the Chinese economic expansion. Furthermore, one of the first-level objectives of this policy was to raise the reputation of Chinese companies and make them known internationally; the Chinese government has been working to expand China's political influence and open the way for larger initiatives such as the Belt and Road.

¹⁶ Stands for "United Nations".

¹⁷ Stands for "Association of South-East Asian Nations".

¹⁸ Stands for "Shanghai Cooperation Organization".

The pre-BRI historical and geopolitical context clearly shows how China has progressively built the foundations for its global expansion, and, in this sense, the construction of international relations cannot be seen because of the BRI, but as a natural arrival from a much longer and more rooted process of openness.

1.4 BRI changes in climate objectives

Sustainable development was not a stated objective of the original Belt and Road Initiative model, but it has been added later when China became involved in important climate agreements. The importance of China's signing these agreements is immense, since it is precisely China that is emitting the most C02 in the world.



Figure 1 shows that China is the nation with the most carbon emissions, with 12,466 megatons¹⁹ produced annually and it turns out that the C02 production is more than twice as high as in the United States. The following countries, which have lower emissions, are India with 2648 megatons, Russia with 1942 megatons, Japan with 1084 megatons, Iran, South Corea, Indonesia, Saudi Arabia and Canada with emissions between 500 and 600 megatons. The top six nations in this ranking represent about 50% of the world's population and represent 62% of the world's GDP: all of them have experienced an increase in carbon emissions production compared to the previous year.

Of these nations, China accounts for about 33% of the weight of total emissions: it is by far the country that emits the most substances in the environment. Total emissions reflect the outcomes of economic policies in the Deng's era: in 1980, China's total output was about 1 megatonne, in 1990 was about 2.5 megatons, in the 2000s it had reached the level of 3.7 megatons while the largest increase was between the years 2000 and 2010 when China first exceeded its 10 megatons of total C02 emissions.

¹⁹ One megatonne is about 1.000.000.000 of grams.

This enormous figure of carbon dioxide production is due mainly to the production of electricity obtainable from fossil combustion processes which, thus, released into the atmosphere gases that in contained quantities could also cause positive effects on the health of the Earth but produced in large quantities, causes considerable problems as the known greenhouse effect. Considering the many foreign investments that are comprehensible within the Belt and Road Initiative, it's clear that this data will increase even more. This consumption is increasing in both already economically developed countries such as China, which will reach the emissions ceiling by 2030 and, even more, in developing countries. In the latter, the construction of infrastructure useful to the population requires a greater effort at energy level which therefore leads these nations to see their pollution rate grow skyward.



Looking at figure 2, which shows the levels of carbon emissions per capita, it is possible to see that the country at the top of this ranking is Palau with 59 megatons, although very small and sparsely populated, followed by other nations such as Qatar, Kuwait, Saudi Arabia and Bahrain. In this ranking, China is very low with a per capita consumption of 9 megatons. It is no coincidence that China is the most densely populated country on this list. China, to date, is the second most developed economy in the world, considering its total GDP; the same cannot be said of per capita GDP. This assumption shows on the one hand that there is still a great deal of room for development for China and, on the other hand, how important it is to evaluate these two figures in view of even more threatening future environmental problems. Domestic environmental issues, such as air, water and soil pollution are directly proportional to the amount of carbon emissions, mainly due to the production of electricity. China has faced years of great uncertainty due to these environmental issues and, therefore, in order not to lose international credibility²⁰, it had to face

²⁰ China has been integrated internationally since the early 2000s, supporting major environmental decisions by the major powers of the West. The signing of important international agreements, such as the Paris Agreement or the Kigali Amendment, has strengthened China's credibility in the eyes of other nations and investors.

this situation. Consequently, the effects of these decisions have also affected the Belt and Road Initiative. To counter these problems, China has established basic principles on which to build its initiatives and policies: environmental protection is one of them. In 2010, despite these goals, China had a very low environmental sustainability index, ranking almost at the bottom of the world.

The green shift in the Belt and Road Initiative came in 2016 when President Xi Ximping, in a speech in Uzbekistan²¹, argued that ecology would be a further feature of the international cooperation of the Belt and Road Initiative. To explain this change of course, it is possible to say that this is a testimony of how there a paradigm shift from quantity to quality of economic growth has been: in this sense, the pursuit of economic growth is not abandoned but it is researched in a sustainable way. In addition, with economic growth, there has been a marked increase in the middle-class population who are calling for sustainable measures to preserve their environment.

The openness to sustainability, as well as for internal reasons such as energy production, represents an additional opportunity for growth and technological affirmation at international level. It should be remembered that about 80% of energy production is still based on fossil fuels, so it is clear how technological innovation will have to drive this development process in this field. By doing this, China is promoting the development of green technologies at home and at the same time it is enhancing the position of Chinese companies engaged in developing and implementing these green technologies beyond national borders.

Another explanation behind this shift is the bad reputation that the Belt and Road Initiative has built: few host country rights and regulations, and massive infrastructure projects that burden the planet with their boundless use of resources. This shift, in other words, was sought to try to give new light to the BRI.

1.5 A turning point: the Paris agreement

After the statement by Xi Ximping of the ambitious project of the Belt and Road Initiative, China has gradually opened to the Western world, integrating itself with the Western climate policies. A first step in this direction was taken in 2015 when China participated in the signing of the Paris Agreements. The agreement was started on December 12th. during the COP21²² in Paris, was signed by 195 nations, including China, and subsequently made operational by 189 nations.

²¹ International relations between China and Uzbekistan are well established and improving year by year. Major global strategic agreements have been signed recently, ranging from infrastructure construction to sustainability agreements. China is supporting the political integrity of Uzbekistan, contributing to the construction and modernization of many districts and cities.

²² Stands for "Conference of the Parties".

The ratification of these agreements was a turning point in the fight against global warming and climate change more generally. For the first time in history, almost all the world was agreed that we had to take note of a situation which was increasingly at stake and therefore needed immediate attention. The purpose of these agreements is to bind countries that have signed and agreed on carbon and thus greenhouse gas emissions.

The agreement, which entered into force on 5 October 2016, takes as a historical reference point the industrial revolution, which took place between 1850 and 1900. This historical period has been taken into consideration as a reference point to establish a climatic threshold of endurance, that is a reference temperature which respects the planet and which cannot be exceeded, both current and future temperatures. In particular, the objective is to stop global warming and limit the increase of temperatures not more than two degrees above the optimum temperature: that was before the period of the Industrial Revolution²³.

In order to ensure that the commitments made during the Paris Agreement can be verified, every five years each country must certify the commitment taken at national level which will then be verified and validated at international level; it is precisely this last control, which is most important, representing the certification of success and therefore respect of the Paris agreement. The objectives pursued over the five-year period must be clear and comprehensible, and at the end of the five-year period, a new objective must be set which has as its minimum starting point the value just achieved; and from here, a new target point for the next five years must be set that is as high and efficient as possible.

In this context, the agreement provides for a differentiation between developing and developed countries. To the former are given some marginality on their achievements, while the already developed countries, such as China, are required to play a leading role, basing ecological objectives on a close link with economic development and therefore greater firmness in the respect of the agreement.

While the Paris agreement is climate-related, it does not impose any obligations on the modalities: developing countries must therefore access the financing of other already developed countries to equip themselves with green infrastructures that can help them in the race to respect the parameters of the Paris agreement. Every two years, the already developed countries that have provided funding must present a report in which the quality and quantity of the funds given out are to be highlighted.

In 2021, President Xi Ximping made an extremely important act by announcing that China would no longer provide funding to other countries for the construction of power plants that use coal. A promise kept only half because from the United Nations report of 2022, it is evident that China has given 50% of its financing

²³ The Industrial Revolution represented a turning point for human lives, representing the highest point of economic and social transformation. The different phases of this revolution were marked by the different materials that have been used in industrial processes. Before this period, man used as energy sources two renewable sources such as water and wood; with the period of the Industrial Revolution, coal became the main source of energy to enable the operation of steam engines, production halls and trains. This intensive use of coal led to a considerable release of carbon dioxide into the atmosphere, which caused a fierce rise in temperatures from the 18th to 20th century.

to the construction of coal-fired power plants. The remaining part was donated for the construction of power plants using renewable sources, connected to water, wind or solar sources.

A change of course that seems to be confirmed for 2023, where the share of financing granted for sustainable power plants has exceeded the wall by 50%, reaching almost 65%. Since 2022 there has been a green shift of the BRI, confirming China's commitment to international agreements.

The Chinese commitment is not only about the funding granted but also about the research of materials that can be fundamental for the implementation of renewable energies, such as lithium, crucial for the production of electric vehicles. Hungary, the European country that has most exchanges with China under the Belt and Road Initiative, is a testament to this. China, as the world's leading manufacturer of electric car batteries, has invested almost \$8 billion with CATL²⁴ company in the construction of a new production facility in the European country.



Figure 3 illustrates the above in relation to China's funding after Paris Agreement, analyzing the relationship between China's public debt and its gross domestic product. This measure is of prime importance when it comes to highlighting a nation's ability to repay its debts. A low value of this ratio shows the excellent capacity of that country to be able to repay its debts. In this case, it is possible to notice the drastic increase of this indicator between 2016, where it was 50%, and 2022, when it rose to 77.09%. The increase of this indicator is even greater if we estimate its growth from 2022 to 2029, where it will reach 110%, reaching a delta of almost 33% compared to 2022. In general, the figure shows a growing trend of the ratio between Chinese public debt and its GDP, testifying how China has increased its level of indebtedness compared to the size of the economy it has generated in recent years. A subsequent increase in the value of this report

²⁴ Stands for "Contemporary Amperex Technology Co.". The company founded in 2012 in the province of Fujian has been the protagonist, in recent years, of an exponential growth that has led it to become a world leader in the production of batteries for electric vehicles. In addition to batteries, the company produces energy storage stations and charging stations which are essential for charging electric vehicles. The CATL is well integrated into the international scene, boasting close contacts with major Western companies such as Tesla, BMW or Honda, and it is also establishing itself strongly within the sector of battery disposal.

could suggest financial crises for China; the same cannot be said when this increase is mainly due to the financing of projects that will bring benefits in the medium-long term.

To try to better highlight the causes that have led to such a high increase in this rate, it is necessary to analyze the growth or de-growth rate of gross domestic product.



Analyzing Figure 4 and so the fluctuations suffered by the Chinese Gross Domestic Product adjusted for inflation, a credible indicator of a nation's economic performance, it is possible to see that in 2013 the Chinese economy was booming with a growth of 7,7% and, as in the following years, showed a slight decrease. In particular, there was a clear decline in 2020, probably due to the global pandemic of Covid-19²⁵. Since 2021, when growth was marked by a strong post-pandemic recovery²⁶, growth has stabilized at around 5% per year.

For these reasons, with a constant or increasing GDP growth rate, it is plausible to say that what is shown in Figure 3, namely a continuous increase of the ratio between the national debt and gross domestic product, is mainly due to the large amount of funding provided under the Paris Agreement commitments and for the many projects under the Belt and Road Initiative. Specifically, infrastructure construction requires large sums of money that have been financed at the expense of public debt and although these will bring benefits

²⁵ Like the rest of the globe, for China 2020 was a year of strong economic decline. The health emergency imposed strict measures to control and contain the virus, forcing China to carry out lockdowns that also involved companies. These closures have caused considerable inconvenience and disservice, as many global economic sectors depend on Chinese supplies; in addition, demand for Chinese products has decreased, causing a recession from the export point of view. The confinement in homes, then, has reduced the demand for non-essential goods of the Chinese people, who have limited themselves to making their own expenditures on consumer goods.

²⁶ The GDP growth rate in 2021 has jumped by 8.45%, demonstrating the effectiveness of measures taken by China to contain Covid-19 and the strong resilience of the Chinese economy.

in the long run, they have required a great deal of effort in the short run, increasing the ratio of public debt to GDP and increasing the risk of insolvency of the Chinese state.

China's commitment to the Paris agreements is a turning point for global eco-sustainability. Thanks to its continuous research in the field of technology, the nation of Xi Ximping will be able to represent a reference point for other developing nations, being able to have a considerable technological know-how and large capital to invest. The feasibility of these intentions will depend on China's ability to balance its GDP with environmental sustainability through its domestic and foreign policies, in accordance with these international agreements.

1.6 The Montreal Protocol and the Kigali Amendment

Another international event that has had a profound impact on environmental management was China's entry into the United Nations in 1971. One year later, UNEP²⁷ was established as an organization to coordinate and manage environmental policies common to all the UN nations. This organization works with each individual nation to identify emerging environmental problems, fight climate change and support policies at international, national and regional levels that can safeguard the planet.

In 1987, UNEP implemented an effective tool to safeguard the planet by establishing the Montreal Protocol, which became effective in 1989 and was ratified by almost 200 countries, including China. This protocol is of extreme importance for sustainability as it imposes limits and deadlines within which signatory countries commit themselves to limit the use, and secondly, not to use substances which could further damage the stratospheric ozone layer. These substances include hydrofluorocarbons, hydrochlorofluorocarbons²⁸, followed by halon, carbon tetrachloride, methyl chloroform, methyl bromide and chlorofluorocarbons. At the same time, the Protocol sets out rules for relations between signatory countries: it requires exchanges of information, communication of monitoring data and scientific research between developed and developing countries.

To achieve its aims, the Montreal Protocol established the Multilateral Ozone Facility in 1990, through which it was possible to finance most of the planned initiatives. This fund is funded by almost 50 countries that signed the protocol on a three-year basis and, in the 2018-2020 three-year period, presented a total budget of about 550 million dollars. Thanks to the work of this fund, it has been possible to finance

²⁷ Stands for "United Nations Environment Programme".

²⁸ The hydrochlorofluorocarbons, or HCFC, are gases that have been introduced to replace chlorofluorocarbons and are therefore considered second generation gases. Although less polluting, they are still gases that damage the ozone layer. Used in the production of feedstocks and foams. They are a transition gas category and will therefore be phased out in accordance with the Montreal protocol.

investment, research, and technological conversion activities in 147 developing countries. Since its establishment, it has funded \$3 billion to eliminate 400,000 tons of highly invasive ozone substances. China, the nation that emits most ozone-depleting substances, has worked closely with, and benefited from this fund. Supported initiatives to phase out hydrochlorofluorocarbons, Reconverting production lines with innovative practices and methodologies that may not be harmful.

China has been a great innovator: it has been the protagonist of many pilot projects, experimenting with technological solutions that can then be implemented in developing countries. In addition, training for their own technicians has also proved to be a winning move as they are better able to absorb the potential problems of new technologies, thus managing new developments in processes and materials.

Another breakthrough came during the 28th Meeting of the Parties to the Montreal Protocol in Rwanda, in 2016, when the Kigali Amendment was adopted: this act provides for the phasing out of a harmful substance such as hydrofluorocarbons, mainly used in air cooling systems. HFC²⁹s were introduced by the Montreal Protocol to replace chlorofluorocarbons (CFC), which are the gases most responsible for ozone depletion. Over time, scientific research has shown that hydrofluorocarbons do not directly damage the ozone layer but are nevertheless damaging as they cause a sharp rise in temperatures and thus global warming, being thousands of times higher in terms of environmental damage than carbon dioxide.

The Kigali amendment has led to a reduction of this substance from 2019, with the aim of bringing this substance to zero by 2047. As far as these directives are concerned, countries with already developed economies will have to cut the use of these substances by 10% from 2019, while developing countries are divided into two sub-categories: some countries will have until 2024 to apply these cuts, others will have until 2028.

To meet the commitments of the Montreal Protocol and the Kigali Amendment, nations will have to use technology: only technological innovation will make it possible to eliminate these substances without loss of operability and efficiency.

²⁹ Stands for "Hydrofluorocarbons",



Figure 5 highlights the most popular and in-demand technologies that China is promoting in its Belt and Road Initiative campaign. The most promoted technology is solar photovoltaic, which with its 256 billion dollars represents the most requested technology in 56% of cases. This explains the need for solar energy, exploiting the abundance of solar resources found in most BRI countries.

The second most requested technology is wind, with 88 billion dollars of expenditure, representing 19% of total demand. Immediately after we find the hydro category, representing hydroelectric power, which although less relevant than the other two technologies already presented, represents a good solution in remote and depressed areas; it cost almost 80 billion dollars, accounting for 17% of the total. Other sustainable solutions such as biomass (5%), geothermal (1%), small hydro power plants (0.02%) and other technologies follow with a total of 2%.

1.7 China's investment in BRI

As already noted above, China is supporting copious investments in its Belt and Road Initiative partner countries. While there is a desire to promote common values, such as interaction with other nations, collaboration and mutual support, it is clear that the nation led by Xi Ximping is doing all this even for personal interests.

Specifically, the target sector of the Chinese economy has been energy, with key resources such as gas and oil representing the heart of China's demand. The policies introduced by the Deng era have led to a significant increase in the quality of life of Chinese citizens who, having more economic resources, have begun to reproduce more, resulting in a massive increase in the number of Chinese population.



As we can see from figure 6, from 1980 to 2020 there was a steady increase in the total number of Chinese population. In the first ten years we considered, from 1980 to 1990, this figure increased by a maximum of 156 million people, again testifying to the goodness of the decisions taken by Deng. From 1990 to 2000, there was a further growth of 124 million people.

There is also a positive change for the decade from 2000 to 2010 and for the period from 2010 to 2020, albeit in a smaller percentage. The striking figure is that of the forecasts for the end of the decade 2020-2029, where a negative change in the Chinese population will be recorded for the first time in the last fifty years.

The population increase has led to a progressive increase in energy demand and, at the same time, has forced China to find alternative ways of providing food to the population: during the era of Deng, the transition had occurred, China, from an agriculture-based economy to a manufacturing economy where companies had begun to take hold and represent the beating heart of the new Chinese society.

These reasons have led Xi to find supply routes abroad, especially mineral and energy in rich countries like the rest of Asia, Africa and Latin America. These countries have guaranteed China a constant supply of gas and oil, playing a key role in enabling and ensuring the country's energy security.

In these countries, under the Belt and Road Initiative, "small but beautiful" works have been carried out to extract precious gas and minerals, which are functional and aimed at reducing their environmental footprint, making those investing nations profitable and improving China's international appeal. In the last two years, between 2022 and 2023, China has incurred immense expenditure: almost 2.7 billion dollars in Africa, about 9.8 billion in the Middle East and 1.3 billion in Central Asia.

These copious investments have not raised a dust in the international scene in terms of environmental contribution and costs, unlike the massive infrastructure projects promoted in the first decade of the Belt and

Road Initiative. While the Chinese proposal is now made up of highly sustainable projects, its request is always aimed at sources of supply. In this sense, China is trying to diversify its energy demand as much as possible: it is always looking for new potential partners, so that it is not dependent on gas and oil supplies from one single nation, fighting and thus averting the possibility of a potential energy crisis. These collaborations have allowed China to be, today, world leader in the processing of lithium, aluminum and cobalt, indispensable resources for the production of electric vehicles that will characterize the green turning point of the European Union. In addition to this, China is responsible for the global supply chains of copper and nickel.

The importance of the Belt and Road Initiative is directly proportional to the creation of an international system where you can create a kind of circular economy, where developed economies get the mineral resources they seek and, those developing countries, make these valuable materials available to the world's great leaders. This strategy is called "win-win" and is based on the idea that two or more parties can work together to obtain benefits from the same project.

The "Digital Economy Report"³⁰ of 2024 found that developing countries can barely bear the huge cost of digitization, failing to benefit from it; they welcome investments, accumulate digital waste, exporting raw materials with low added value.



Figure 7 shows the level of resources obtained from China, underlining its importance in global supply chains. Between the deposits in China and resources obtained in the rest of the world, China occupies a

³⁰ Report on the management of environmental impact in the industry of "Information and Communication Technology" (ICT), focused on the growing ecological footprint of this sector which in 2020 accounted for almost 3% of global greenhouse gas emissions.

prominent position in access to these precious minerals.

The most important resource is natural graphite: there are several stocks of this material in different areas of China, making China a leader in various industrial applications such as the production of batteries, lubricants and electrodes. Next is manganese, where China gets 93% of the total world supply. This material, essential for the production of steel, is also indispensable in the production of lithium-ion batteries; China has stocks of this material on its territory, especially in the province of Guangxi and the region of Xinjiang. China is also a world leader in rare earth resources, accounting for almost 90% of total availability worldwide. These elements, which include seventeen elements of the periodic table, are used in various industrial processes and are essential for the production of sustainable technologies such as magnets for wind turbines, catalysts for car exhaust pipes, for military applications and also for medical applications, such as medical imaging where they are used as contrast for magnetic resonance imaging.

Another distinctive strategic element is copper: used in the production of energy infrastructures, given its excellent characteristics for the transmission of energy, it is fundamental for the electricity and telecommunications industry. China has a direct 38% availability, being able to compete with other nations that have plenty of it like Peru, Chile³¹, the United States and Congo.

All these valuable materials involve considerable costs in their extraction and, in most cases, require processes that are not very environmentally friendly. For this reason, obtaining these materials is a challenge: while they are indispensable for the global green revolution, their supply and access require great care

1.8 The BRI from a financial point of view

The BRI is undoubtedly one of the most important initiatives for the whole of China's foreign policy and its implementation has required huge sums of money, financed through a combination of different instruments, testifying to its immense scope and complexity. The general uncertainty behind the initiative, also reflects on financial data: reliable estimates speak of a total expenditure of one trillion dollars, others lead to the share of eight trillion dollars. This last estimate seems far-fetched, even considering the very high number of projects that have been completed, are on the way or have been promised by China. Also, considering that the initiative could extend until 2049, the centenary year for the People's Republic of China, estimates are set to be even higher. The most recent data suggest that even the estimate of \$1 trillion is not plausible and, given the decrease in funds reserved for the Belt and Road Initiative, it will not be confirmed in the coming years.

The difficulty in finding the exact figure, the exact estimate, also reflects China's internal needs. China's desire to become one of the world's most important economic players, credible and reliable, is hidden behind

³¹ Chile is one of the largest countries in the world with large deposits of copper, including Chuquicamata and Escondida.

these estimates. In the early 2000s, ADB³² estimated that Asia would need almost \$8 trillion for significant infrastructure development. This is the link that has led some international publications to estimate this number as the real scope of the Belt and Road Initiative. In fact, the project that is taking shape today is not what was planned by Xi Ximping. His initial idea was for an even wider scope, which would probably require such a demand for money.

Initially, to support the investments of the Belt and Road Initiative, China specifically established the Silk Road Fund, registered in Beijing on 29 December 2014. This fund, financed mainly by Chinese financial institutions such as the China Development Bank and the China investment corporation, could account for almost 40 billion dollars. The Fund, operating since 2015, has in the following years obtained important collaborations, such as that with the Pakistan Private Power and Infrastructure Commission, the Saudi International Electricity and Water Company and the Asian Infrastructure Investment Bank to support infrastructure investments in Pakistan, the UAE³³ and other regions of Asia. The Fund, in addition to financing activities, was the main actor in 2019 when the GIPs³⁴ were signed, representing one of the first institutions to adopt this new line of action. To continue its green line, the Fund established a Sustainable Investment Committee in 2022 to better assess environmentally friendly investment opportunities, Respecting the guidelines of the Belt and Road Initiative and international standards.



Figure 8 examines the composition of the funds in the Silk Road Fund. It can be seen that the bulk of the funds, 65% of the total, was financed by SAFE³⁵, an administrative agency of the People's Republic of

³² Stands for "Asian Development Bank".

³³ Stands for "United Arab Émirates".

³⁴ Stands for "Green Investment Principles".

³⁵ Stands for "State Administration of Foreign Exchange".

China whose purpose is to manage the activities of the foreign exchange market and the management of foreign currency reserves: it performs tasks related to the management of monetary capital. Another 15% is financed by the Export-Import Bank of China, responsible for managing state policies relating to foreign policy, trade and industry; and, again at 15%, financed by the China Investment Corporation, China's largest sovereign wealth fund for the management and maintenance of Chinese foreign exchange reserves. The last, smallest slice of 5% was donated by China Development Bank, established in 1994, manages China's internal and external economic development policies.

In general, apart from foreign institutions and funds, the majority of infrastructure investments are supported by Chinese public spending, by sovereign banks like China Development Bank and by the Export-Import Bank of China, by sovereign wealth funds such as the Silk Road Fund and the China Investment Corporation, and other financial facilities granted by the government itself in the form of tax concessions and soft loans.

While these large investments explain the strong growth in public debt, there is considerable uncertainty about the return of these funds from the countries hosting the infrastructure construction of the Belt and Road Initiative; these loans are never granted by governments, or bilaterally. The transfer of credits is from one company to another: in most cases they are transferred from Chinese national bodies to foreign state enterprises, thus hiding the collection of credits to statistical offices in developing countries, tend to ignore these claims, underestimating the actual credit dependence of individual countries on China.

This also circumvents the work of major rating publications, such as Moody's or Standard & Poor's, which usually collect data on flows from one firm to another or from a firm to a sovereign, but never collect data on sovereign loans, as the Chinese.

China, to combat the possibility of non-repayments of copious amounts of investment, seems to be implementing a circular strategy, which will certainly lead to a repayment of loans. In this way, the loans are not granted directly to the government that will host the infrastructure project but are granted directly to the (Chinese) company that will be responsible for carrying out the work: thus, the money does not go out of the Chinese system, staying in them, allocating the funds completely to the realization of the work. Another advantage of this circular strategy is that since the funds are not transferred to other foreign countries, they do not need to be explained and reported to the Belt and Road Initiative. Thus, the host countries' real debt ratios are further hidden.

The most recent estimates of these money transfers place a very particular situation where almost 50% of loans would be made in this way. Some examples of this situation are attributable to countries like Venezuela and Iran, which, although they do not have official debts with China, have taken on substantial amounts of money in the last few years.

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1.9 Green Investment Principles

One of the symbols of China's increased participation and cooperation within international organizations is the emanation of so-called "Green Investment Principles". GIP³⁶s are a set of guidelines promoting green initiatives, structured on three different levels: innovation, operations and strategy.

Since their foundation, they have been adopted by a large number of international financial institutions, thus leading to the creation of new projects for environmental safeguards, with a specific focus on the promotion of renewable energies within Belt and Road Initiative projects and the scaling down of carbon dioxide emissions.

Specifically, regarding Green Investment Principles, reference is made to seven basic principles. The first principle is to fully integrate sustainability into China's culture and business strategy, with careful pre and post construction analysis of the infrastructure to analyze the possible ecological impacts that a project may require and what are the future effects that such a project will entail. This first principle is directly linked to the second, which provides for the identification of social and environmental risks: China has set itself the objective of trying to study the environmental standards and laws of the host countries, for a total compliance with these countries.

The third principle is also linked to the second: after a thorough study of environmental and nonenvironmental laws, the aim of GIPs is now to disseminate environmental data on the use of pollutants, emissions, and conservation of natural resources. This information, once collected as described in the third principle, will be disclosed to partner countries in accordance with the fourth principle.

The fifth principle then encourages access to green finance, with reference to the nature of the funds and in order to mitigate any risks associated with BRI projects. The sixth principle is linked to this last one, which provides for a careful analysis and integration of eco-sustainable principles within the Chinese value chain. The last principle has a long-term reference: China has set itself the objective of deeply establishing these principles within its political and economic organizations, The objective of cooperation with multilateral organizations in order to develop sound instruments for environmental protection.

³⁶ Stands for "Green Investment Principles".

CHAPTER TWO

2.1 Coal power station for electricity production

While China's international commitments are promoting its image as a country at the forefront of technology and capable of promoting sustainable initiatives, on the other hand, the reality leads to talk about a nation still strongly anchored to the consumption and use of fossil fuels, such as coal. Coal is used in thermal power plants where it is heated and burned to bring water to a boil which in turn generates steam which, after being strongly pressurized, leads to the movement of the blades of a turbine. The turbine is connected to an alternator that generates electricity.

This process is not only the most used in China for the production of electricity, but it is also the most harmful to the environment, since this process causes a considerable creation of carbon oxide: more than any other industrial process. In addition to the damage to the ecosystem during its use for energy production, coal requires an extremely prohibitive cost to be obtained, largely paid by freshwater reserves: for the extraction of coal, in fact, almost 50% of all water required for the entire energy production is used in all sectors.



Figure 9 shows the energy basket of China in 2012: it is immediately visible the strong Chinese dependence on the use of coal, which, in 69% of cases, is the most used energy source. This data once again underlines the Chinese dependence on this resource to meet the growing energy needs of their citizens. Immediately after we find petroleum, used in 17% of cases, used in the sectors of industry and transport. Despite a strong increase in its use, the use of natural gas occupies only 5% of the Chinese energy basket, representing a practical alternative to the use of coal. The use of renewable source of hydroelectric is also growing, totaling a share of 7%. Renewable energy and nuclear power barely reach 1%, representing poorly used sources of energy.



Analyzing Figure 10, it is possible to observe, in comparison with Figure 9, an improvement in the dependence on coal: if in 2012 it was equal to 69%, ten years later it represents a share of 55%: a partial testimony of the respect of international agreements. The share of oil use remained almost unchanged, growing by 1% compared to the previous decade. Nuclear energy and hydroelectric also grew by 1%. The most significant increases are in natural gas and renewable energy. The latter, with a delta of 7%, is the category which has experienced the largest increase.

«We must strive for harmony between people and nature. We must respect, protect and follow the rules of nature. We must commit to green development, protecting the environment is protecting and increasing productivity. This is the truth. We must also work for systemic governance: mountains, rivers, lakes, deserts, all are part of the same ecosystem, and we must balance all these aspects of nature. The environment is about the well-being of people in all countries, and we are responsible for future generations»³⁷. This is what Xi said during the Leaders' Summit on climate organized by Joe Biden.

One year earlier, he had set a very demanding target, stating «We aim to reach a peak of CO2 emissions before 2030 and achieve carbon neutrality by 2060. However, the simple fact that China recognises the dramatic threat of climate change and the need for further action is crucial. From a domestic policy point of view, the set of challenges to be faced on the climate and environment front is such as to create a sense of social urgency within the country. However, achieving the new target will be a huge challenge. In China,

³⁷ Xi Ximping, Class Editori – Xinhua Ceis, 22/04/2021.

fossil fuels account for ... and coal, the most carbon intensive of all, generates two-thirds of electricity».³⁸ These statements by the CPC³⁹ leader underline once again the commitments made by China. However, when looking at the data on new projects from the Belt and Road Initiative, there is a strong discrepancy with what has been said.

As shown by the 2021 data in figure 1, China is the country that emits the largest amount of carbon dioxide: it emits more than the world average of all other nations. The large use of this resource is explained by the natural abundance available in China, which owns 95% of total resources. This availability represents a double opportunity for China: an internal opportunity that can be used to produce energy and also an external opportunity, which can be exported to other partner countries and used in power plants. Not surprisingly, the number of coal-fired power plant projects completed or still under construction, as far as the Belt and Road Initiative is concerned, continues to skyrocket, blurring the image of China as an environmentally friendly nation.

According to the latest GEM⁴⁰ report, China has been the protagonist in the implementation of 95% of new coal-fired power plants, only in 2023; projects are under way for a total energy capacity of 70 GW⁴¹, compared to a total production in the rest of the world of only 4 GW. On the one hand, the exponential number of power plants produced by China, on the other hand, the lowest number ever recorded for the rest of the world.



³⁸ Xi Ximping, The Diplomatic service of the European Union – Josep Borrell, 23/10/2020.

³⁹ Stands for "Communist Party of China".

⁴⁰ Stands for "Global Energy Motor".

⁴¹ Stands for "Gigawatt".



If we compare Figure 11 with Figure 12, we see that China has maintained the same number of power plants produced over almost ten years, with a sharp decrease only from 2016 to 2019; in the rest of the world, starting from a much lower base of 25 GW than that of China in 2015, this number has been even more reduced, reaching the minimum share of 4 GW. An explanation for the high growth of coal-fired power plants can be identified in a China response to the energy crisis that is afflicting the world since the outbreak of the conflict between Russia and Ukraine⁴². Most new construction is not directly related to China, but to many of the countries hosting the Belt and Road Initiative including, the most representative ones, Pakistan, Vietnam, Turkey, Russia, India, and Indonesia.

To counter the growing need for energy and take advantage of the deep know-how already possessed in terms of coal power plant production, despite international commitments, China is promoting this technology on a large scale. The construction of these plants not only benefits the economy, but also has political implications; their construction often sparks internal debates in the host countries, demonstrating China's strong influence not only economically but also politically.

The construction of coal-fired power stations has given rise to serious environmental concerns. These power plants are among the largest emitters of greenhouse gases, which are accelerating climate change. In many of the countries where China has invested, people are particularly vulnerable to the effects of this phenomenon,

⁴² The armed conflict between Russia and Ukraine, which broke out in 2022, caused significant international disruption such as disruptions to natural gas and oil, leading to substantial increases in energy supply prices. While this situation has meant huge increases in energy costs for most countries, it has been an opportunity for China. The lack of Russian supplies to the countries of the European Union represented for the nation of Xi Ximping an opportunity to obtain energy at low cost. Russia, in fact, to balance the lost revenues from the European Union, had to find new markets where sell its energy supplies, finding a reliable buyer in China, strengthening even more the ties between the two nations. The conflict also provided an opportunity for China to diversify its supply of energy sources.

making these energy choices even more controversial. In addition, coal-fired power plants worsen air quality, putting the health of communities living near them at risk.

2.2 Relations between China and Turkey: Hunutlu thermal power plant

One of the most active country participating in the Belt and Road Initiative is certainly Turkey: its geographical position, between Europe and Asia, has made it highly attractive to China, which considers it a key strategic partner. This initiative has resulted in a deep collaboration between the two countries: on the Turkish side, the BRI is synonymous with extreme improvements in infrastructure that will enable it to act as a glue between Europe and Asia, thus becoming an important transport hub; from the Chinese side, a direct outlet to Europe is obtained, completing a key part of the central terrestrial corridor. This collaboration has produced several infrastructure projects such as the Baku-Tbilisi-Kars railway, which connects Turkey with Azerbaijan, another partner country of China, via Georgia; China has also participated in the construction of special economic zones and ports.

As a testimony of this close relationship can be indicated the value of trade between the two nations, which with reference to 2023 alone, amounts to about 47 billion dollars. Note the strong imbalance of this exchange: Turkey, in fact, imported technological goods and not from China for about \$44 billion.

A possible remedy for this economic imbalance has been identified in the Belt and Road Initiative, with direct foreign investment from China directed to Turkey. This condition would benefit both nations, since China would have its state enterprises working abroad and Erdogan⁴³ could continue his process of Turkish modernization, thus avoiding losing electoral votes.

The relations between China and Turkey have been strengthened since 2015, with the acquisition by a Chinese consortium of 65% of the third largest container terminal in the country of Anatolia based in Istanbul. Since then, Chinese investment in infrastructure has continued to increase, with positive effects on the Turkish president's mega-projects. Chinese financial support allows Erdogan to bypass seeking assistance from Western-led institutions like the International Monetary Fund, which would require him to implement reforms and take other steps that might weaken his tight grip on the country's economy.

Another example of this close collaboration is the construction of the coal-fired power plant at Hunutlu. This project, presented in 2012, was confirmed in 2015 and, looking at the monetary data, represented the most expensive foreign direct investment of China in Turkey. Despite many internal disagreements, which led to numerous legal inquiries, the plant has been built and since 2022 is operational in the province of Adana. The construction of the coal-fired power plant was completed thanks to a joint venture agreement between Shanghai Electric Power, Avic-Intl Project Engineering Company and two Turkish investors: Mete

⁴³ Erdogan is the President of Turkey, in office since August 2014.
Bülgün and Adnan Demir; Shanghai Electric Power⁴⁴ holds 78%, the two private investors each hold 9,4% while Avic-Intl Project Engineering Company⁴⁵ holds 3%.

The cost to construct the Hunutlu power plant was approximately USD 2100 million, with the joint venture's creators covering 20% of the expenses. The remaining funds came from financial institutions such as China Development Bank and Bank of China. Russia is the source of the coal used.

The Hunutlu power plant has a production capacity of about 1320 megawatts and, although built with cutting-edge technologies, is still a heavily polluting site compared to other less economically viable but more sustainable alternatives.

The plant, for its lack of sustainability, has attracted the attention of many non-governmental agencies: some of these have launched the initiative "Clean air for Adana" to try to raise awareness about the strong environmental impacts caused by the plant. The forecast of the plant's environmental impacts is terrifying: the coal used must be cooled once it has been burned, and sea water is used for this process. The same water is then poured into the sea and, according to environmental organisations, the water temperature increases by about seven degrees. This rise in water temperature would cause environmental disasters, severely damaging the Turkish aquatic fauna. In addition, the area where the plant is located already has a high level of air pollution: the operation of the plant would end up worsening the situation, causing at least 2000 premature deaths. In addition to the environmental damage, the data show that the plant is not even economically sustainable, as its operation will not be able to pay back the investment in thirty years. Moreover, the Chinese companies that were commissioned to build it have not drawn up plans according to which the environment can be preserved, operating in a context of absolute non-transparency. The coal plant releases carbon dioxide into the environment, which mixes with air and falls back to the ground once the atmospheric precipitation takes hold. This process would also cause a deep pollution of the

The approval of the construction of the Hunutlu power plant was a controversy for Turkish policy, which set itself the goal of no more carbon dioxide emissions from 2053 onwards, as stated during the Paris Agreements. With the plant's implementation, Turkey will be even more dependent on this technology and therefore will be further away from its green goal. It should be considered that in 2020 Turkey is the fifth country in the world for planned investments in coal-fired power plants, the first in Europe.

water table from which local agriculture is supplied, devastating the local biodiversity.

⁴⁴Shanghai Electric, formally known as Shanghai Electric Group Company Limited, is a Chinese multinational corporation based in Shanghai. Founded in 1880, the company is dedicated to the design, manufacture and sale of a wide range of equipment including power generation and distribution, transformers, switches, transport machinery, mechanical tools, lifts, and technologies for environmental protection. Shanghai Electric is also recognized as the world's largest producer of steam turbines.

2.3 The Port of Hambantota

While Turkey is the strategic link between Europe and Asia, Sri Lanka has been an ideal location for a major outlet to the Indian Ocean, with many trade routes crossing in that direction. The government of Sri Lanka, in an attempt to develop the southern part of the country⁴⁶, has agreed to join the Belt and Road Initiative, allowing China to build a port infrastructure that, once completed, it will be the largest land-based port in the world. For the construction of the port, the city of Hambantota was selected, given its highly strategic position. Its location on the Indian Ocean means that it is flanked by ships from all over the world, which travel along trade routes between East Asia, the Middle East and Europe; in particular, it is flanked by the routes that lead gas and oil to China, South Korea and Japan.

This strategic position has attracted the attention of China, allowing it to have a potential logistics hub for the supply, maintenance and handling of goods.

The construction of the port took place in two phases and was carried out by the China Harbour Engineering Company⁴⁷ and part of the China Communications Construction Company. During the first phase, which began in 2008, the port basin and a whole series of basic infrastructures were built to allow the docking of vessels by 2010. Great part of the realization of the port has been allowed by a loan from the Export-Import Bank of China that has covered 85% of the total costs while, the remaining 15%, is financed by the government of Sri Lanka. The total cost was about USD 300 million, financed at a rather low interest rate. Also the second phase, begun in 2012, has been of competence of the China Harbour Engineering Company and has sought the finality to expand the port and to increase the depth of the same, allowing it the docking of still bigger ships. As in the first phase, the works were financed by a loan from the Export-Import Bank of China totalling USD 757 million, with rates of return very similar to those already granted for the first construction.

At first, the construction of the port of Hambantota has proved to be a good move. The industrial area in the south of the country has been redeveloped and industrialised, allowing Sri Lanka to create many new jobs, stimulating economic growth in the country. This, at the expense of local populations, who have been forced to abandon their homes to allow the construction of this incredible infrastructure, causing at the same time not a few problems in terms of environment.

Despite initial considerations by the Sri Lankan government, which looked at commercial advantages and logistical feasibility, the situation around the port soon precipitated. Its geographical position, although strategic for the proximity to many trade routes, has proved to be a failure due to the absence of industrial

⁴⁶ The southern part of Sri Lanka is much less economically developed than the capital Colombo. It was chosen, as well as for its strategic position, because it was the birthplace of the former president of Sri Lanka, Mahinda Rajapaksa, who had warmly sponsored the realization of the project.

⁴⁷ The China Harbour Engineering Company is a branch of China Communications Construction Company, is the second largest dredging company in the world and offers construction services for highways, subways and harbours.

centres in the immediate vicinity. This situation meant that there were no direct customers who needed the port's stock. In addition, the volume of handling of ships and cargo was much lower than expected, preventing the port from making the expected profits, vital to obtain the funds needed to repay the Chinese loan. The port has failed to attract international shipping partners for the supply, loading and unloading of goods, given the poor competitive advantages of the port. The presence of the port of Colombo, which has already been in operation for some time, has also weighed on the situation and proved to be the preference of maritime companies. In addition, despite the low use of the port, operating costs such as infrastructure maintenance and new personnel costs were very high, which only made the situation worse.

This situation of unrealised profits has created many political and social debates, leading to growing concern about Sri Lanka's ability to repay its debt to China. Sri Lanka has been overwhelmed by a large and growing debt burden, which has posed a serious threat to the country's economic stability.

To remedy this situation, given the inability to repay the loan, the government has started negotiations with China Merchants Port Holdings Company⁴⁸, to try to identify a possible situation. Negotiations led to an agreement in 2017, when the government of Sri Lanka agreed to cede operational control of the port to CMPort⁴⁹ for a total of ninety-nine years. In contrast, China has paid 1.1 billion dollars, repaying part of the debt contracted with China itself.

What happened in Sri Lanka perfectly reflects what is called the "debt trap": as a result of Chinese foreign direct investment, a nation is trapped within the investment itself, being unable to repay it and therefore being forced to sell a strategic asset on its national territory to China itself. In this case, Sri Lanka lost direct control of its port for ninety-nine years, allowing the nation of Xi Ximping to significantly extend its economic and political influence within a partner country of the Belt and Road Initiative. The control of the port has aroused the concerns of many international actors such as India and the United States of America who fear that the port will be used not only for commercial purposes but also as a reference for military activities, thus threatening the integrity of surrounding nations such as India. Even at the economic level, the agreement was viewed with contempt: although it provided liquidity to alleviate Sri Lanka's public debt, It did not solve the economic problems of the port of generating profits and many political organizations expressed their frustration at the lack of tangible benefits that could motivate Chinese investment.

⁴⁸China Merchants Port Holdings Company is a partially state-owned company, originally founded in May 1991, considered a "Red Chip" company as it has its registered office in Hong Kong. However, the company has much older origins, even leading to a date of establishment that can be traced back to 1872, being the first ship company of the Qing dynasty. ⁴⁹ Stands for "49China Merchants Port Holdings Company".

2.4 Standard Gauge Railway in Kenya

After examining the construction of the coal-fired power station in Hunutlu and the port of Hambantota, it is time to examine in detail the implementation of rail networks, highlighting their strengths and weaknesses. The rail network is another of the infrastructure features of the Belt and Road Initiative and in fact, since the launch of this initiative, the number of kilometers of Chinese railway coverage has increased dramatically.



Figure 13 shows the Chinese domestic rail coverage, which in 2010 was ninety-one thousand kilometres. Three years later, in 2013, the altitude reached one hundred and thirty thousand kilometers, with a variation of 13%. In 2022, the maximum of 155,000 kilometres was reached, with a 70% change from the initial figure of 2010. These figures would be even more extensive if the total extension of the rail network built outside China, like the many built within the Belt and Road Initiative, were considered.

One of the most majestic works in China, as part of this initiative, was the construction of the Nairobi-Mombasa railway project, also known as the Standard Gauge Railway. As the name suggests, the project has taken off in Kenya, with the aim of modernising the country's ancient and rugged railway network, improving the connection between the capital Nairobi and Mombasa, home to the main Kenyan port. The SGR⁵⁰, in fact, embodies one of the initial main objectives of the Belt and Road Initiative, namely the modernisation and requalification of old trade routes. The previous rail network, the Lunatic Express, was now in poor condition and thus limited the capacity of the Kenyan country to manage the volume of goods that would have to cross the country.

Work on the rail network began in December 2014 and was conducted by one of China's leading

⁵⁰ Stands for "Standard Gauge Railway".

construction companies, China Road and Bridge Corporation, with an estimated cost of \$5 billion. As with the other Belt and Road investments, almost all of the money was loaned by China on favourable market terms, with \$3.6 billion from the Export-Import Bank of China. The remaining \$1.4 billion was advanced by the Kenyan government.

Chinese technological know-how has made it possible to completely modernise the old railway line: a standard gauge rail has been built, which allows large-scale trains to travel over it, much higher and much heavier than those borne by the old railway. It also allows both the transport of goods and people: as a maximum capacity, it is estimated that twenty-two million tonnes per year and about five thousand people per day can be handled.

The modernization of the railway has greatly stimulated economic growth around the new railway stations, with activities that have arisen right near the stations and the creation of many jobs for the maintenance and management of the railway itself. Another key objective of the Belt and Road Initiative, such as reducing the time taken to transport goods, has been achieved through the modernisation of this infrastructure. Before the work, goods took almost twelve hours to travel from Nairobi to Mombasa, compared with a transfer time of four to five hours on the new Standard Gauge Railway.

This operation, although very costly, was made possible by the adoption of pro-business policies that promote investment in infrastructure, thus enabling Kenya to develop rapid growth.



This rapid growth has allowed the Kenyan government to become a trading partner of one of the strongest economies in the world, such as China, which now accounts for 27% of Kenya's total imports, as can be seen in Figure 14. Among the most popular products are chemicals such as fertilizers and pharmaceuticals, machinery and electronic equipment, vehicles and spare parts, but also clothing and building materials such

as cement, steel or glass. Only India is trying to approach with a share of Kenyote imports of 11%, most represented by food products. Far behind the UAE with 7%, Japan with 4% and finally Saudi Arabia with 3% total.

Although the construction of the railway stimulated the local market with the creation of jobs and the exchange market with the other neighbouring nations, the construction of the rail network did not bring the expected benefits, or at least did not fully confirm what was estimated. Kenya, like Sri Lanka, is now in a difficult situation, unable to repay its debt to China. In addition, the construction of this immense infrastructure work has caused considerable damage to national parks and nature reserves which must now be used to being crossed every day by heavy vehicles.

When it was inaugurated, the operational management of the railway was entrusted to a Chinese company such as Africa Star Railway Operation Company, a subsidiary of the China Road and Bridge Corporation. The management by this company was a choice agreed upon from the time of the first modernisation works and should allow the new railway to be operated to high standards, the same as those required by such a large infrastructure. The initial plan was that over time, management would be transferred to people from Kenya, as it was in 2020. Management was entrusted to the KRC⁵¹ and has reduced dependence on external Chinese management. Similarly, internal management has primarily enabled the development of the necessary skills for managing complex infrastructures, like training for employees, and has led to much lower operating costs than those previously incurred by entrusting the management to the as Africa Star Railway Operation Company.

Overall, the SGR investment has had a strong impact on Kenya's fiscal balance in terms of debt and economic sustainability. The debt contracted with China has led to public debt reaching very high levels, reaching 68.5% of GDP in 2022, imposing serious reasoning on how to ease the tax burden. In addition, as leaked documents, the agreement between the two nations included a clause that would provide for China's control of the port of Mombasa, one of the country's leading infrastructures, if Kenya was unable to repay its debt. To respond to this situation, the Kenyan government has allocated a portion of the national budget to the repayment of debt and at the same time increased the fees for the use of Standard Gauge Railway; in 2023 this increase reached 50%, concerning the passenger traffic from Mombasa to Nairobi. Another measure was the rescheduling of the debt: after a long negotiation with the Chinese government, Sri Lanka obtained better terms for repayments, as an extension of the repayment time horizon and a significant reduction in borrowing costs.

These new conditions are allowing the Kenyan government to try to respond to this investment, doing its best not to be forced to leave it in the hands of China. It would have been another case of foreign direct

⁵¹ Stands for "Kenya Railways Corporation".

investment that turns into the so-called debt trap.

2.5 The Chinese presence in Zambia

The situation in Zambia clearly illustrates how financing and investment from China, under the Belt and Road Initiative, may lead a developing country to give up control of its strategic resources due to difficulties in repaying accumulated debts.

Zambia, like many other countries on the African continent, is a very rich nation at the territorial level, especially in minerals and resources. It is one of the main producers of copper in the world and represents most world exports: has many mines from which it is possible to extract copper of very high quality. Cobalt, another rare metal, is often found into these places. This strong availability has attracted China, one of the world's leading copper-consuming nations that uses this material within the electronics industry, especially in the production of electrical cables. Cobalt, on the other hand, is becoming increasingly important because it is actively linked to the construction and production of electric vehicles and, for these reasons, it is also indispensable for the Chinese government.

Much of Zambia's GDP depends on copper exports and therefore it is easy to see how economic stability depends on fluctuations in the market value of this mineral. A period of falling copper prices has had catastrophic consequences for Zambia, reducing revenues considerably and increasing the need for financing to cover this budget deficit. At the same time, Zambia has needed to modernise many of its infrastructures, such as railways and power plants, but especially hospital facilities. With a growing population, Zambia has also seen an increase in demand for public services such as health and education. These operations have required a large amount of capital, but the government did not have it.

To support its economy and the implementation of these projects, such as the modernisation of the Tazara railway, the expansion of the Kariba hydroelectric power plant or the upgrading of the Lusaka-Ndola Road, the Zambian government has had to borrow heavily from other nations. And one of the countries that has contributed most to this financial support was China.

In the 1990s, the Zambian government initiated a programme of privatisation of mineral resources, on the advice of the World Bank and the International Monetary Fund. Since then, the state-owned company ZCCM-IH⁵² was created which controlled and managed most of the country's mineral reserves. Over time, however, the fluctuations in the copper market have imposed severe crises, including the decrease in production and the increase in extraction costs, forcing the state of Zambia to grant part of ZCCM-IH's assets to private investors while retaining control of these assets.

China's first entry into these dynamic dates to 1998 when CNMC⁵³, the leading state-owned mining

⁵² Stands for "Zambia Consolidated Copper Mines-Investment Holdings".

⁵³ Stands for "China Nonferrous Metal Mining Group".

company in China, saw an opportunity for expansion and diversification in copper supply and decided to acquire the Chambishi mine, highly rich in copper and cobalt. This acquisition has given new life to the mine which, although located in the heart of the Zambian Copperbelt, due to lack of funds and lack of profitability, had been closed in 1987. The CNMC invested heavily in the mine, modernizing its mining and processing facilities, developing the Chambishi Multi-Facility Economic Zone, a special area to attract foreign direct investment and thus promote local development.

Having regard to the successful operation of upgrading the Chambishi plant, China Nonferrous Metal Mining Group continued its process of expanding the Zambian mining sector by acquiring additional shareholdings in other mines⁵⁴, thus becoming one of the most important foreign economic players in the sector. After successfully recording these transactions, CNMC further extended its reach by acquiring holdings in ZCCM-IH. The transaction followed a progressive dynamic, constituted at the beginning by the acquisition of participations in specific projects: this participation was used as leverage to influence the activities of ZCCM-IH, directing its activities. Subsequently, CNCM became the main player in minority acquisitions.

As time went by and the Zambian state-owned company found it difficult to settle its debt with China, ZCCM-IH was forced to ask for financial assistance from China again. In most cases, the Zambian mining company obtained new financing and instead of using it to repay the debt, it used its corporate shares in the country's mines. This resulted in an increase in liquidity for the Zambian state-owned company and a consequent decrease in holdings that ended up in the hands of the Chinese company. This dynamic led to a progressive and increasingly insistent control of the mines owned by the ZCCM-IH by the CNMC. Although ZCCM-IH did not sell direct shares in the company, it was forced to sell its holdings in key assets such as the mines.

Although ZCCM did not sell direct shares in the company, it was forced to sell its holdings in key assets such as the mines. As Chinese participation increased, Zambia's control over its own resources gradually diminished, creating concerns about the country's ability to manage its strategic resources independently. All this has strengthened Zambia's dependence on China, not only economically but also in terms of the management of these assets.

Once again, the Chinese advent has caused many problems to the host country. Although in this case China has failed to gain direct control of some strategic assets, it has succeeded in part in this goal. The partial control of some of Zambia's largest mines has progressively reduced the nation's control over copper, the most exported asset. At the same time, although Chinese investments have led to increased operational

⁵⁴ China Nonferrous Metal Mining Group acquired additional shares in other mines: in 2009 it acquired another major mine in the Copperbelt, the Luanshya mine, which had also been closed for financial reasons. After having modernized it, the CNMC reopened and brought back to life one of the most prestigious mineral resources and financial resources in the country.

efficiency, allowing for more profitable and better extractions, most of the profits made in this sector were repatriated to China, by taking away a large part of the possible profits from the government of Zambia.

2.6 The challenges behind the Belt and Road Initiative

When the Belt and Road Initiative manifesto was first presented by the Communist Party of China, the project aimed at interconnection and inclusiveness had suggested a long list of potential positive effects on China's partner countries. Ten years after its implementation, a long series of challenges and problems have emerged which are now gripping the countries that have decided to join this global initiative and which seriously question sustainability, both economic and environmental, and equity.

One of the biggest questions regarding the BRI is related to lack of transparency in contracts and financial arrangements between China and host countries. The vast majority of contracts under this initiative are characterised by opaque agreements, often negotiated behind closed doors and even worse without the active participation or supervision of local governments in China's partner countries.

"When it comes to public procurement of BRI-related contracts, two questions arise. First, how does procurement work - who gets contracts and on what basis? Second, to what extent do the procurement practices applied in BRI projects align with international good practices and differ from ones used in national procurement tenders?" (The Trade Post - Tania Ghossein, Bernard Hoekman, Anirudh Shingal 2018).

On this issue, there is little data and indications regarding the functioning of public procurement and the provision of the companies that will carry out the works of modernization of the infrastructure. According to the Centre for Strategic and International Studies, 70% of tenders are awarded to Chinese companies while only 30% are awarded to non-Chinese financial institutions. In addition, as with the CPEC⁵⁵, which will be discussed in more detail in the next chapter, the procurement process has remained private, limiting participation to only a few Chinese companies. In fact, it is impossible to assess whether this dynamic has allowed the respect of international rules against collusion, precisely because there was a total lack of transparency. This situation certainly does not encourage the creation of a level playing field between all suppliers: a change of course on this front would mean an improvement in the conditions for signatory countries, which would see their projects entrusted to the best-placed companies, providing a better guarantee that the winning company is the one that has committed to a more competitive and truthful price. Compliance with international standards would enable host countries to obtain the best possible price, as is the case in all tenders that are compliant and therefore have the objective of economic efficiency; to entrust the implementation of projects to firms which are really in the best conditions, logistically and otherwise.

⁵⁵ Stands for "China-Pakistan Economic Corridor".

This lack of transparency in the access to contracts is also reflected in the number of participating companies. Many companies in the European Union, who would like to take part in the initiative, are limited to do so since only 10% of the cases know about the project that will be carried out, based on public news. European companies tend to play only a few, mostly niche roles: their participation is required only to carry out projects that Chinese companies would not be able to implement, for example, for the lack of availability of machinery that should be used.

"At the same time, partners acknowledged that the unique characteristics of state-driven Chinese investment risks exacerbating existing local governance gaps. Partners identified five key governance gaps: lack of justification for project feasibility; lack of publicly available environmental and social assessments; issues regarding financing structure, including unjustified loan guarantees and failure to account for the impact the projects may have on the debt burden of recipient countries; transparency gaps, including lack of freedom of information legislation; insufficient governance and oversight."⁵⁶ (Center for International Private Enterprise – Kendra Brock, 10/01/2022).

The total lack of transparency and these mechanisms not very much in line with international standards, explains the absence of participation in these projects of international financial institutions such as the World Bank or the Asian Investment Bank for Infrastructure, which meet very precise standards.

And, moreover, the lack of transparency not only leads to an increase in corruption but also limits the possibilities of host countries to influence and have decision-making power on the implementation of new initiatives that will necessarily have a strong impact on their lives. These contracts, most of the time contain clauses that end up making things worse: the work to be carried out is often entrusted to Chinese companies, not considering the possible participation of local companies, preventing the latter from participating in the process of sharing the revenues relating to projects for the renovation or construction of new infrastructure. In this way, China also puts into practice a mechanism to defend its own interests: as we had already discussed in the previous chapter, Chinese institutions converge the investments necessary for the realization of the projects directly towards (Chinese) companies that will be responsible for the implementation of the works, going in some sense to save themselves economically from a possible non-repayment of loans. This creates a kind of closed mechanism, where the Chinese state lends loans to Chinese companies, controlled by the State, ensuring the correct use of loans and a repayment almost certain.

Another important issue related to the Belt and Road initiative projects is the so-called "debt diplomacy". China is supporting economically and not the implementation of numerous infrastructures in developing countries that, to become more efficient in different sectors such as energy production, they accept large amounts of funding which are then used to build infrastructure. Within these financing contracts and the

 $^{^{56}}$ Center for International Private Enterprise – Kendra Brock, 10/01/2022

construction of works, in most cases there are loan repayment plans that, however, highlight the values of actual construction very difficult to achieve. The expected profits that are promised by China to host countries are often inflated and do not reflect the profits that will be made. This situation leads to the creation of the mechanism of the debt trap, as already seen for the Hambantota port or for the mines of Zambia. In essence, the host country of turn is not making the profits that had been budgeted and, seeing the debt to China grow exponentially, are forced either to seek further funding from other nations or to relinquish strategic control of those infrastructure works that should have supported domestic economic growth.

This dynamic highlights many issues of economic sustainability in the implementation of these projects. Many of these have been criticized as being heavily oversized and not properly planned, with the risk of representing "cathedrals of the desert", that is, buildings that require large economic investments but which then, In the long run, they do not produce the revenues that were estimated at the time of project acceptance and approval. This situation is particularly burdensome for developing countries, as they would need to make a lot of profits in order to sustain their economic growth. The latter, being tied to profits, do not have the resources necessary to sustain investments, thus further aggravating their levels of indebtedness.

At the same time, through the Belt and Road initiative, China has been able to address and solve a major domestic problem such as excess labour and production capacity. In the vast majority of projects under this initiative, China appoints the companies to carry out the work, thus not giving the possibility for national companies to participate in the calls for proposals. In this way, Chinese companies bring their own manpower, solving part of the problem of domestic labour surplus and relegating local workers to small and marginal roles, often underpaid. This, moreover, can lead to greater inequality within developing countries and could result in strong social tensions that could lead to social upheavals and thus cause even more political instability.

Host governments try to increase local employment rates in the implementation of projects, with specific economic objectives: to increase local income and transfer valuable intangible resources to their workers. On the other hand, China tries to keep labour costs to a minimum by requiring only its own Chinese labour to be assigned jobs. Behind this dynamic, there are several reasons that could partly explain it. Some very complex infrastructure projects require highly skilled labour: this would lead to the choice of Chinese manpower at the expense of local labour which, before being able to start the works, should be adequately qualified, bringing up labour costs. Another reason is related to the productivity of workers: according to several studies, Chinese are four times more productive than those in any other developing country. In addition, Chinese workers are often forced to work themselves: once they arrive in the host country, their passports are confiscated, they cannot return home so they are obliged to continue working. These precarious working conditions lead to the conclusion that labour is being used with force, subjected to unacceptable working conditions, often against their will. These workers do not have the possibility to protest these

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conditions, since often these complaints are ignored by Chinese embassies who do not respond to requests and complaints of Chinese citizens working abroad.

Another possible explanation for importing Chinese workers into the host countries is purely political. In this way, Chinese companies do not have to interact with local workers' unions, as happened in Greece during the construction of the port of Piraeus⁵⁷.

Although there are concrete examples where no Chinese workers have been imported, as in Cambodia, it can be said that the local workforce is chosen in most cases for low-profile jobs while Chinese workers were appointed to management positions. This limits one of the host countries' primary goals for economic growth, namely the transfer of resource and working methods.

The environmental impact of the Belt and Road initiatives must be added to these issues. Many of these projects have been heavily criticized for their devastating impact on local communities. The vast majority of host countries, to cope with the continuous growth in energy demand, had to accept to give up part of their environment, such as natural reserves and forests, to make room for Chinese buildings. This trade-off has brought many environmental problems to the host countries, where there have been poor updates of air quality and in most cases serious water pollution rates. This not only damages the local flora and fauna but ends up impoverishing even more the affected areas of these developing countries which are heavily dependent on what the land offers them. To date, the construction of coal-fired power stations, which include fossil fuel combustion, continues to represent the main answer in the continuing energy demand at the expense of other green opportunities, as those that involve the exploitation of energy produced from water or from wind.

As with the above, there are those related to geostrategic implications. China's infrastructure expansion is viewed with concern by the Western powers, led by the United States of America, who see control of strategic assets as a potential threat to their stability and integrity. This situation has resulted in an increase in geopolitical tensions that has prompted the Western powers to propose alternative solutions to the Belt and Road Initiative to give the opportunity of choice to those developing nations who want to pursue the goal of economic growth. This competition that has been created, risks to transform these countries in development delay in theatres of geopolitical rivalries, with serious consequences on the stability of those territories. The Belt and Road initiative, in its branch of the Digital Silk Road, has also raised concerns regarding digital sovereignty. This term refers to the control that a state exercises over its digital assets such as data,

⁵⁷ The port of Piraeus is one of the oldest and most important ports in the European Union. Located in Athens, it has always been used for trade and military activities, today it is one of the most used ports for the transfer of containers. Its strategic location, on the eastern Mediterranean, links Europe and Asia. From 2009, the port began to suffer the Chinese influence: the Chinese company COSCO Shipping, in fact, has obtained the concession for the management of two of the three container terminals. Seven years later, the same Chinese company has increased its control even further, acquiring almost 70% of the shares in the Piraeus Port Authority, the company that managed the port. Thanks to these two dynamics, the port has been profoundly modernized and redeveloped, representing today one of the main transit points for Chinese goods to Europe.

communications, information infrastructure and online content. Digitization is increasingly changing the way in which people live, permeating every aspect of people's lives, highlighting even more an extreme need for data management security. The Belt and Road is raising concerns in this regard, with the possibility that partner nations may lose control over these fundamental aspects of their sovereignty to China. The most critical aspect concerns the construction of infrastructure by Chinese companies in foreign territories: although these companies claim to operate as independent entities, contacts between the Chinese government and state-owned technology companies are known to be very strong. The Chinese government may use the data collected through these infrastructures for surveillance purposes, which raises concerns. This possibility raises important questions about the actual data protection capacities of host countries which may not be able to enforce their citizens' privacy. Moreover, since many infrastructures are integrated into government services, there is a serious risk that the technological dependence on China could turn into risks of espionage and compromise of the national sovereignty of these countries.

Another key aspect at a global level is data control, one of the leading resources today. Thanks to the Belt and Road initiative, China has built important data storage centers that store huge amounts of personal, financial and business information. If partner countries fail to manage this situation, they may lose not a physical asset but decision-making power over the collection and processing of these sensitive data with national security implications, for privacy and the economy.

China only partially meets some of the requirements introduced as an international standard by GDPR⁵⁸, the world's most stringent data protection legislation. China enacted the PIPL⁵⁹ in 2021, establishing rules for the collection and processing of personal data, approaching the GDPR only in some aspects, such as user consent and giving some subjects the right to access their data. On the other hand, there are significant differences. While GDPR does not allow government use of data processing, PIPL allows wide access to the Chinese government to personal data for safeguarding national security, economic development and public order. In doing so, the Chinese authorities have the right to request data from companies and individuals without the tight control that would be in Europe.

Chinese companies operating abroad continue to follow the rules imposed by PIPL, having to adapt to those imposed by GDPR only for the request and collection of data from citizens of the European Union. However, operating outside the European context, Chinese companies are not required to comply with GDPR, as is the case of the Belt and Road Initiative partner countries in Africa and Asia, especially with regard to transparency and data transfer.

These differences in data processing are significant and have contributed to the intensification of the conception of digital sovereignty as a geopolitical battleground, with so many countries trying to protect

⁵⁸ Stands for "General Data Protection Regulation".

⁵⁹ Stands for "Personal Information Protection Law".

their data and networks from growing Chinese influence. Thus, a trade-off emerges in which on the one hand developing countries are supported from the technological point of view with positive implications for economies, on the other hand, the security and integrity of their consumers' data is at risk of falling into the hands of the Chinese government and therefore not being used in a fully transparent manner and in accordance with international standards.

CHAPTER THREE

3.1 The China-Pakistan Economic Corridor

Among all the maritime and terrestrial connections, the China-Pakistan Economic Corridor represents the most strategic and ambitious of the entire project of the Belt and Road Initiative.



Figure 15, source: GeeksforGeeks

Figure 15 shows the full extent of the CPEC⁶⁰, which extends for more than three thousand kilometres and connects the port of Gwadar in the Balochistan province of Pakistan with Kashgar, a city in the autonomous region of Xinjiang in China. This corridor is of vital strategic importance for China, representing a crucial hub for international trade as it allows for a more convenient and fast transfer of goods between Asia, the Middle East and Africa.

The corridor is also a viable alternative to the Strait of Malacca, an aquatic space linking the Indian and Pacific Oceans, the shortest sea route between Europe and the Far East. This strategic crossing point, however, thanks to military agreements, is in fact controlled by the United States of America which could substantially weaken the supply of China by imposing naval blockades, since almost 80% of Chinese energy sources passed through these waters, before the construction of the economic corridor with Pakistan. This is why the CPEC has a vital strategic importance, offering a viable alternative to any attempt at navigational flow through the Strait of Malacca.

Another aspect that makes this economic corridor extremely important is its ability to improve significantly the existing connection between China and the rest of the world. The final point of arrival in Pakistan is represented by the Port of Gwadar, located near the Hormuz Strait, through which passes a very high

⁶⁰ Stands for "China-Pakistan Economic Corridor".

proportion of the entire world trade in oil and that at the same time allows China to have access to the energy resources of the Middle East, bypassing the bottlenecks and reducing transport costs and times. Thanks to this corridor, China has gained direct access to the Arabian Sea and thus to world trade routes.

As stated by the Belt and Road Initiative, this corridor was also designed to support the economic growth of this country's partner with China. Pakistan, in fact, for years, is experiencing serious economic crises that have resulted in a chronic lack of modern infrastructure and therefore of sustainable economic development. Pakistan's economic situation, prior to the collaboration with China in the Belt and Road initiative, presented many challenges. In the foreground, there were severe energy shortages that often led to blackouts, both in rural and urban areas. These shortcomings not only severely limited the productive capacity of firms but also discouraged foreign direct investment, contributing to anaemic economic growth and a growing rise in social malpractice. The infrastructure was also poor: highways, ports and railways were obsolete, resulting in continuous slowdowns and slow freight speeds. These shortcomings were affecting the GDP which could not cover the increase of the Pakistani population. In this line, the CPEC, with its vast infrastructure investments including railways, motorways, ports, data storage centres and special economic zones, responds powerfully to these shortcomings by offering a practical and precise solution.



Figure 16 shows the evolution of Pakistan's GDP⁶¹ between 2010 and 2022, with a progressive increase

⁶¹Since 2010, Pakistan's GDP has evolved from a predominantly agricultural economy to a more diversified one with an increasing role for industry and services. From 2010 to 2015, agriculture accounted for about 20-25% of GDP, with major crops such as wheat, rice, cotton and sugar constituting a substantial part of exports. However, this sector has gradually lost its economic impact due to challenges such as water scarcity, outdated infrastructure and a shift towards other economic sectors. The industrial sector, which includes manufacturing, mining and energy production, has grown, contributing about 18-20% to GDP. The services sector has recorded the most significant growth and today is the main driver of Pakistan's GDP, accounting for about 55-60% of the total. This sector includes commerce, transport, telecommunications, financial services and education, and has seen a significant expansion due to growing urbanization and digitization.

from 230 billion dollars in 2010 to 374 billion dollars in 2022.

Looking at the data, it is noted that between 2010 and 2013 GDP growth was relatively moderate, from \$230 billion to \$258 billion, indicating the economic difficulties that Pakistan faced during that period. These difficulties can be attributed to various factors, including political instability, infrastructure shortages and energy problems, which have held back the country's economic expansion.

From 2013 onwards, economic growth has accelerated, with GDP rising to \$300 billion in 2016 and continuing to grow to \$374 billion in 2022. This acceleration coincides with the entry of Pakistan into the Belt and Road Initiative (BRI) in 2013, and in particular to the China-Pakistan Economic Corridor which has brought significant investments in transport, energy and industrial infrastructure, fostering greater economic growth and making it stable in the future.

The large infrastructure investment of some USD 62 billion has helped to address some of the major obstacles to growth, such as electricity shortages, which were a major challenge for local businesses. Participation in the BRI has attracted additional foreign investment, not only from China but also from other interested nations to new business opportunities created by improved infrastructure. In addition to direct investment, improved infrastructure has had a spill-over effect on various sectors of the economy, including agriculture, manufacturing and services. For example, improved transport links have reduced logistics costs and made Pakistan's exports more competitive.

Pakistan's participation in the Belt and Road Initiative has certainly stimulated economic growth in the country through massive investments in infrastructure and energy projects. However, this economic momentum brings with it several critical issues that raise questions about sustainability and the equity of long-term benefits. One of the main critical issues concerns the sustainability of the debt accumulated by Pakistan because of loans granted by China to finance CPEC projects. The massive inflow of foreign capital has fuelled economic progress, but it has also created a significant debt burden. This puts Pakistan at risk of a debt crisis, especially if the economy fails to maintain a sufficient growth rate to repay its financial obligations. The growing economic and financial dependence on China not only limits Pakistan's negotiating autonomy, but could also make it vulnerable to geopolitical dynamics, reinforcing its strategic subordination to Beijing.

Moreover, BRI investments have not been evenly distributed across the country, with areas such as Punjab benefiting more than less developed regions. This imbalance risks accentuating regional economic and social inequalities, exacerbating internal tensions and limiting the inclusiveness of economic benefits. The concentration of investment in certain areas could create a growing gap between regions, reinforcing existing disparities and generating potential social conflicts.

Another crucial aspect is its potential capacity to promote stability and security in the region. Pakistan, particularly in the region where the Port of Gwadar is located, has been facing serious security crises linked

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to terrorism and political instability. In this line, the many Chinese infrastructure investments should support local economic growth, thus leading to an improvement of social well-being and quality of life for people living around Balochistan. This marked improvement in socio-economic conditions should largely reduce the causes of instability. In these areas, such as Balochistan, special economic zones have been established that have attracted significant investment, both from China and other nations, further fuelling economic progress. These economic zones, with their modern infrastructure, tax incentives and facilities, have attracted many national and international economic actors. Thus, several industries have been allowed to develop and have ensured that the quality of life of citizens has improved through job creation. These special economic zones include the so-called "Gwadar Free Zone", which is designed to house light industries, food processing plants, warehouses and logistics facilities. In this economic zone, the investments are mainly of Chinese nature, through the China Overseas Port Holding Company, which manages the entire port of Gwadar.

These reasons also explain why the corridor is becoming important from a geopolitical point of view. Cooperation between China and Pakistan strengthens Chinese influence in South Asia, seriously challenging India, which sees this corridor as a threat to its sovereignty. The corridor crosses the disputed region of Gilgit-Baltistan, a part of Kashmir administered by Pakistan but claimed by India. For India, the passage of the CPEC through this area represents a violation of its sovereignty and a tacit recognition of Pakistan's claims to this region. This has led India to formally protest the project, accusing China of ignoring territorial sensitivities and supporting Pakistan's claims on disputed territory. The situation further aggravates the already complex Sino-Indian relations, fuelling a climate of mistrust and military tensions.

3.2 The importance of the Port of Gwadar

The port of Gwadar, located in the province of Balochistan, on the Arabian Sea, is one of the most significant strategic assets of the China-Pakistan Economic Corridor (CPEC) and, more generally, of the Belt and Road Initiative of China. Originally conceived as a project to develop a regional trading hub, the port of Gwadar has quickly acquired a key role in the geostrategic ambitions of China and Pakistan, becoming a symbol of close economic and political cooperation between the two countries.

The port of Gwadar was built in several stages with significant support from China since its inception. The project started in the early 2000s and involved significant investment and Chinese technical expertise. Construction of the port of Gwadar was launched in 2002 with financing of USD 248 million, of which about 75% was provided by China in the form of grants and soft loans. The initial project was carried out by the China Harbor Engineering Company. CHEC⁶² has continued the construction of the main docks, piers

⁶² Stands for "China Harbor Engineering Company".

and basic port facilities, completing the work in 2007. During this phase, the first container terminals, storage facilities and several infrastructures essential to make the port operational have been developed. China's involvement was not limited to financing; it also provided the technical, logistical and engineering support needed to overcome the project's challenges, such as harsh weather conditions and the region's arid terrain.

After the completion of the first phase, the port was initially managed by the Port of Singapore Authority from 2007 to 2013. However, the management by PSA⁶³ has not been able to exploit the full potential of the port due to various bureaucratic, financial and security obstacles. For these reasons, in 2013 the management of the port of Gwadar was officially transferred to the China Overseas Port Holding Company, a move that marked the beginning of a direct involvement of China in the operations of the port. This transfer was part of a strategic agreement between China and Pakistan, with the aim of developing Gwadar as one of the main maritime hubs in the region. China has invested heavily in port expansion, adjacent infrastructure and support facilities including storage terminals, road networks and energy projects to ensure efficient operation of the port. One of the main investments of COPHC was the extension of port infrastructures, which included the construction of new container terminals, extended docks and storage areas for dry and liquid goods. These improvements have significantly increased the port's cargo capacity, allowing more large ships to be handled simultaneously and reducing waiting times. The new infrastructure has made Gwadar a port able to compete with other major ports in the region, facilitating maritime trade and increasing operational efficiency. The COPHC's investments were also directed towards the development of supporting infrastructures, such as roads and transport networks, linking the port of Gwadar with the main cities in Pakistan and the Xinjiang region of China, integrating the port into the wider China-Pakistan Economic Corridor. These infrastructures not only facilitate the movement of goods through Pakistan, but also allow China to have direct access to the Arabian Sea, reducing dependence on trade routes through the Strait of Malacca, known as a critical point in terms of maritime safety.

Another crucial investment was the development of the Gwadar Free Zone, a special economic zone adjacent to the port designed to attract international investors through a range of incentives such as tax Customs exemptions, and advanced logistics infrastructures. The Gwadar Free Zone was created with the aim of hosting light and manufacturing industries, including food processing plants, electronic component assembly, and storage logistics. This project aims to transform Gwadar into a vital industrial hub, stimulating the local economy, creating thousands of jobs and promoting economic development in Balochistan, one of the least developed regions of Pakistan.

COPHC, together with the Chinese government, has also financed the construction of the new Gwadar

⁶³ Stands for "Port of Singapore Authority".

International Airport, destined to become one of the largest in Pakistan. This airport is designed to handle both cargo and passenger flights, significantly improving the region's connectivity with the rest of the world and facilitating access for investors. The airport is part of the strategy to make Gwadar a hub not only maritime, but also air, enhancing the city's ability to serve as a gateway to global markets.

On the one hand, the port's efficiency has had positive effects from an economic point of view, but the same cannot be said from an environmental point of view. The construction of the port, roads and special economic zones has altered natural habitats and increased the risk of marine and land pollution. Dredging to increase the depth of the port and the expansion of infrastructure have modified the coastal ecosystem, putting at risk marine biodiversity. In addition, increased maritime traffic has the potential to increase greenhouse gas emissions, contributing to air pollution and climate change.

To mitigate these negative effects resulting from the expansion of the port and related industrial activities, sustainable initiatives have been taken. One of the most significant initiatives has been the implementation of cleaner technologies in port terminals to reduce air pollutant emissions and improve energy efficiency. Emission control systems for ships calling at ports have been introduced to limit emissions of sulphur dioxide, nitrogen oxides and particulate matter. Another crucial initiative concerns water management. Given the water scarcity in the Balochistan region, the port has implemented wastewater treatment systems and started using recycling and desalination technologies. These plants treat wastewater from port and industrial operations for reuse in non-potable processes, reducing pressure on the already limited local water resources. The project also includes the development of water conservation plans to improve water efficiency and prevent waste.

In the field of renewable energy, the port of Gwadar has started to integrate cleaner energy sources to power its operations. Solar plants have been installed and wind projects planned to reduce dependence on traditional fossil fuel energy sources. Digitising the port through smart technologies and automated systems improves logistics efficiency, reduces ship waiting times and minimises emissions, helping to create a more sustainable port infrastructure. In addition, the use of real-time environmental monitoring systems allows emissions to be tracked and managed, improving environmental responsibility. The use of these renewable technologies not only helps to reduce greenhouse gas emissions, but also helps to create a more sustainable development model for future expansions.

The port of Gwadar has the potential to transform Pakistan's local and national economy, creating thousands of jobs and promoting industrial development in the region. However, to reach its full potential, it requires continuous improvement of the supporting infrastructure and political stability that guarantees investment security. The future of Gwadar will depend largely on the ability of Pakistan and China to manage internal and external challenges, ensuring that the port becomes a hub for international trade and not a point of geopolitical tension. Gwadar has faced significant challenges from an internal security perspective due to the

instability in the Balochistan region. The province is the scene of insurgencies and separatist movements, which see Chinese involvement as an economic invasion and a threat to local sovereignty. Attacks on Chinese projects and foreign workers have led to increased security measures, with Pakistan deploying troops to protect CPEC's infrastructure and the port itself.

Although the benefits of the port are more cost-effective than others, the port's modernisation has contributed significantly to sustainable development and the achievement of global climate goals. Reducing carbon emissions at the port of Gwadar has become a central priority in the sustainability initiatives implemented by China Overseas Port Holding Company and the Pakistani authorities. With the introduction of cleaner technologies, such as emission control systems for ships and the adoption of renewable energy sources, including solar and wind power plants, the port is taking significant steps to reduce its carbon footprint. These measures not only improve the air quality in the region, but also help to make the port a model for sustainable development under the Belt and Road Initiative. Soon, it is expected that the continued deployment of renewable energies will further reduce carbon emissions from the port. Solar plants already operational and those planned for the near future could cover a significant portion of the port's energy needs, reducing dependence on fossil fuels. In addition, the

progressive integration of energy efficiency technologies and emission monitoring systems will help to optimise resource use by further reducing emissions.

If these initiatives are fully implemented, carbon emissions could fall by 30-40% over the next five years, according to projections based on current global trends of decarbonisation in modern ports. This commitment to reducing emissions will not only strengthen the position of Gwadar port as a sustainable logistics hub, but also contribute to national and international climate change targets, positioning Gwadar as a positive example of responsible industrial development in the South Asian region.

3.3 The Quaid-e-Azam Solar Park: A Green Pillar of the CPEC and a Model of Sustainable Energy within the Belt and Road Initiative

The Quaid-e-Azam Solar Park, located in the Bahawalpur district of Punjab province, Pakistan, is one of the most emblematic infrastructures of the China-Pakistan Economic Corridor (CPEC) and is a key pillar of the energy transition towards renewable sources under the Belt and Road initiative. This giant solar plant was conceived as part of the Pakistani government's strategy to address the national energy crisis, reduce dependence on fossil fuels and promote a more sustainable energy future.

The construction of the Quaid-e-Azam Solar Park has been developed in several phases, reflecting a complex and collaborative process that involved numerous actors, mainly Chinese companies and Pakistani institutions. The first phase of construction began in 2013 and involved Chinese companies, such as TBEA

Xinjiang SunOasis Company, which played a crucial role as main contractor. TBEA, a Chinese renewable energy giant, has been commissioned to supply the photovoltaic modules, equipment and management technologies for the first part of the solar park.

During the second phase, the park expansion work was further developed under the coordination of Zonergy Corporation, another major Chinese company specializing in large-scale solar projects. Zonergy was responsible for the design, supply and installation of an additional 300 MW⁶⁴ capacity, bringing the total installed power of the park to around 400 MW. This phase saw a large deployment of human and technical resources, employing hundreds of local workers and Chinese engineers, reflecting effective transnational collaboration oriented towards technology transfer. Zonergy has used advanced photovoltaic modules and intelligent monitoring systems to maximize energy efficiency and minimize losses, implementing control technologies that allow real-time management of plant performance.

The third phase of the project, still in full swing, will see further expansion to reach the final target of over 1.000 MW, making the Quaid-e-Azam Solar Park one of the largest in the world. This next phase will involve further investment and participation by other Chinese and Pakistani companies, with a focus on integrating new solar technologies that are even more efficient and resilient. The Pakistani authorities, together with their Chinese partners, are exploring the integration of energy storage technologies to improve the stability of the electricity grid and ensure a continuous energy supply even in non-solar hours.

The solar park required a significant investment, with financial support of over USD 1.3 billion, most of which came from Chinese funds and loans granted under the bilateral cooperation. This project is not only notable for its impressive size but also for its transformative impact on the Pakistani energy sector. Before its construction, Pakistan faced a severe energy shortage, with frequent blackouts⁶⁵ that damaged the economy and negatively affected the quality of life of citizens. The Quaid-e-Azam Solar Park is designed to mitigate these problems, contributing significantly to the national energy supply with clean and renewable energy. In fact, one of the most important aspects of this infrastructure is its capacity to generate enough electricity to meet the needs of over 200.000 homes, equivalent to a significant portion of the population in adjacent areas and contributing significantly to reduce the energy deficit of the country. In terms of reducing carbon emissions, the solar park is a remarkable example of how the transition to renewable energies can have a direct impact on air quality and the local environment. The project is estimated to contribute to avoiding around 90,750 tonnes of carbon dioxide emissions per year, a significant contribution to global efforts to mitigate climate change and improve environmental sustainability. The Quaid-e-Azam Solar Park

⁶⁴ Stands for "Megawatt".

⁶⁵ During the peaks of the crisis, between 2007 and 2015, power outages lasted up to 12-18 hours a day in some urban areas, while in rural areas, blackouts could last even longer. These prolonged interruptions not only disturbed the daily life of families, who often remained without electricity and running water due to problems related to electric pumps, but also hit hard the industrial and commercial sector, with economic losses estimated in billions of dollars per year. Companies, specially manufacturing and textile companies, which are a pillar of the Pakistani economy, have been forced to reduce production or invest in expensive dieselpowered backup generators, further increasing their operating costs.

is therefore considered one of the "greenest" infrastructures not only of the CPEC but of the entire energy of Pakistan.

The project fits perfectly into the Belt and Road Initiative and its new green objectives, which promotes the development of sustainable infrastructure along the new trade corridors linking China with Asia, Europe and Africa. The Chinese participation was crucial not only for funding but also for providing advanced technology, technical expertise and project management. Chinese companies have brought cutting-edge photovoltaic technologies to the Quaid-e-Azam Solar Park, including state-of-the-art solar modules and innovative energy management systems that maximize efficiency in electricity production and distribution. This exchange of technology and know-how is a concrete example of how the Belt and Road Initiative promotes international cooperation for sustainable development, transferring critical expertise to participating countries and accelerating their transition towards a low-carbon future. Another significant aspect of the Quaid-e-Azam Solar Park is its economic and social impact on local communities. The construction and management of the park has created thousands of jobs, not only during the construction phase but also in long-term maintenance and operation. This has allowed the development of technical skills among the local workforce, improving employment prospects and contributing to poverty reduction in the region. The project also stimulated the development of local infrastructure, improving access to resources and encouraging further investment in traditionally underdeveloped areas. In addition to electricity, the park has also generated indirect benefits through the development of associated technologies and supporting infrastructure, such as new road construction and improvements in electricity distribution

networks.

The Quaid-e-Azam Solar Park not only addresses Pakistan's immediate energy challenges but also acts as an open-air laboratory for innovation in solar technologies. Partnerships between local universities and Chinese research institutions are helping to develop new technological solutions that can be tested and implemented in the park, contributing to the creation of an innovation ecosystem in the renewable energy sector. This multidimensional approach further strengthens the links between China and Pakistan, promoting a continuous transfer of knowledge.

The presence of the Quaid-e-Azam Solar Park within CPEC also represents an important step forward for Pakistan in the context of the Sustainable Development Goals of the United Nations, in particular regarding access to clean and affordable energy, climate action and the promotion of sustainable industrialisation. By reducing dependence on fossil fuels, Pakistan not only improves its energy security but also contributes to a reduced global carbon footprint, aligning with international climate commitments. The project demonstrates how bilateral cooperation between China and Pakistan can have a positive impact on global sustainability, representing a replicable model for other nations wishing to embark on the renewable energy path.

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The impact of the solar park goes beyond national borders, positioning itself as a model for international cooperation for sustainability. Lessons learned from its design and operation can be applied to other global contexts, promoting an integrated approach to renewable energy development that combines infrastructure investment, technology transfer and local capacity building. This holistic approach not only contributes to economic growth but also ensures that development is in harmony with climate and environmental objectives.

In addition to the environmental and economic benefits, the project has strategic significance for Pakistan and China, strengthening the economic and political ties between the two countries. For Pakistan, the success of the Quaid-e-Azam Solar Park is a demonstration of the potential of the CPEC to transform the national economy, providing not only the energy needed to sustain industrial growth but also a source of inspiration for further sustainable development projects. For China, the solar plant highlights its role as a reliable partner and promoter of clean technologies internationally, strengthening its position as a global leader in renewable energies.

3.4 CPEC Wind and Hydro Projects: towards a Sustainable Energy Transition

Pakistan, by agreeing to participate in the construction of the economic corridor with China, has paved the way for a series of sustainable initiatives that are playing a key role in diversifying the energy mix from which the country can draw. After introducing the major projects such as the Gwadar Port and the Quaid-e-Azam Solar Park, it is essential to examine the importance of wind and hydro power projects developed under the CPEC. These projects not only generate clean energy, but also represent a further and different strategic response to the energy crisis that has plagued Pakistan for decades, offering sustainable solutions for the country's future.

The Jhimpir⁶⁶ Wind Project, located in Thatta district, Sindh province, is one of the first and most significant wind power plants in the country, and represents a fundamental example of the integration of renewable energies into the national energy mix. The construction of the Jhimpir Wind Project began in 2012, with the involvement of several Chinese companies, including HydroChina Corporation and Sinohydro Group, which not only have provided their workforce, but also have made available capital and know-how. necessary for the implementation of the wind farm. The plant started production in 2013, with an initial capacity of 50 MW, which was later expanded to over 200 MW, becoming one of the largest wind turbines in the country. This project is particularly relevant in the context of the Belt and Road Initiative, as it represents an example of how Sino-Pakistani cooperation can facilitate the development of sustainable infrastructure and contribute to global climate goals.

⁶⁶ The Jhimpir region has been identified as an ideal site for wind energy development due to its favorable wind conditions, which provide a constant and abundant resource for clean energy production.

The importance of the wind farm is twofold: on the one hand it produces energy for more than one hundred thousand homes, on the other hand the Jhimpir Wind Project helps to avoid the emission of over 400,000 tons of carbon dioxide per year, Significant contribution to Pakistan's efforts to mitigate climate change and improve air quality, particularly in urban areas where pollution is a growing concern.

The choice to invest in wind energy was motivated not only by the favourable climatic conditions, but also by the desire to diversify Pakistan's energy mix, reducing vulnerability to international fluctuations in fossil fuel prices and improving the resilience of national energy systems. Wind energy has the advantage of being an abundant, safe and environmentally friendly renewable energy source that can be exploited on a large scale with relatively low operating costs once the infrastructure is installed. Once the infrastructure is built, wind turbines require relatively simple and inexpensive maintenance compared to traditional coal or gasfired power plants, and do not require continuous supplies of raw materials such as coal or oil, which are subject to price and availability changes. This makes wind energy not only an environmentally friendly choice, but also economically beneficial in the long term.

Another significant benefit of wind energy is its positive impact on energy security. Since wind turbines can be installed in different areas of the country, even in remote locations or hard to reach from other energy sources, wind power makes it possible to decentralize energy production, reducing reliance on centralised transmission networks and minimising the risks associated with infrastructure failures or attacks on individual critical structures. This decentralized approach increases the robustness of the overall energy system, making communities more self-sufficient and less vulnerable to external disruptions, responding to the additional challenges of the country's internal political instability.

The expansion of wind energy also has a positive impact on reducing water pollution. Unlike traditional power plants, which often require large amounts of water for cooling and other operations, wind turbines do not consume water, a significant advantage in a country like Pakistan, where water scarcity is a growing problem. By reducing the demand for water resources, wind energy helps to preserve water reserves for agriculture, domestic use and conservation of natural ecosystems. Another advantage of wind energy is its potential to integrate other forms of renewable energy, such as solar, into a diversified and balanced energy system. In many regions, wind conditions are best during the hours or periods when solar generation is lowest, such as evening or winter. This allows for synergy between the two technologies, creating a more stable and continuous energy supply, reducing the need for fossil fuel-based energy reserves and improving the overall efficiency of the grid.

Wind energy offers a wide range of benefits beyond just generating power, including in terms of urban and spatial planning. Wind farms have a relatively limited impact on land use, as turbines can be installed on agricultural land or desert areas without significantly compromising land use for other activities. This coexistence allows for a more efficient use of land resources, allowing farmers to continue their activities

alongside wind turbines, creating a double benefit for the local economy.

Alongside wind projects, CPEC's hydro power projects play a crucial role in diversifying Pakistan's energy mix and reducing greenhouse gas emissions. Among these, the Suki Kinari Dam, located on the Kunhar River in Khyber Pakhtunkhwa province, is one of the most significant hydroelectric projects of the CPEC. With a capacity of 870 MW, this hydroelectric plant contributes to the improvement of water resources management, reducing flood risks and improving water availability for irrigation and domestic use. The project, developed with technical and financial support from Chinese companies such as China Gezhouba Group Corporation, is an example of how energy infrastructure can be designed to maximize environmental, economic and social benefits.

China Gezhouba Group Corporation's involvement in the Suki Kinari Dam was made possible through a foreign direct investment model, with an EPC⁶⁷ turnkey construction contract. This model allows for integrated project management, where the Chinese company takes care of all technical and managerial aspects, minimising the risks to the Pakistani government and ensuring that the project is completed in accordance with international quality and safety standards. The project has an estimated value of over \$1.9 billion, largely funded by Exim Bank of China and supported by other Chinese investors. Chinese involvement has also extended to the environmental management of the project, with the implementation of mitigation plans to reduce the dam's ecological impact, the protection of river biodiversity and ensuring sufficient water flows for downstream communities. These efforts demonstrate a commitment to ensure that hydroelectric development is carried out in a responsible and sustainable manner, minimizing negative impacts on local ecosystems.

The Suki Kinari Dam is designed to reduce Pakistan's carbon emissions by around 3.2 million tons per year, thanks to electricity generation without burning fossil fuels. This represents a significant contribution to Pakistan's commitments under the Paris Agreements.

Another infrastructure using hydro-electric power is the Karot dam, located in the Punjab region of Pakistan, where the Jhelum River flows. With a capacity of 720 MW, the project was developed by Karot Power Company Limited (KPCL), a subsidiary of China Three Gorges South Asia Investment Limited (CSAIL), which holds the majority of shares. The financing of the dam was secured through a combination of direct investments from the China Three Gorges Corporation and loans granted by Chinese financial institutions, including the Silk Road Fund, which provided long-term capital for the project, demonstrating China's commitment to supporting the development of sustainable infrastructure in the Belt and Road Initiative partner countries.

Construction of the dam began in December 2016 and was completed in 2022. The dam is designed to be a run-of-river plant, which uses the natural flow of the river to generate energy, minimizing the environmental

⁶⁷ Stands for "Engineering, Procurement and Construction".

impact compared to traditional large dams with reservoirs. The dam began operations in June 2022 and produces around 3.2 billion kWh of electricity per year, providing enough energy to power around five million people. The project is particularly relevant not only for its generating capacity, but also for its contribution to environmental sustainability; it is estimated that the Karot dam will reduce CO emissions by around 3.5 million tonnes per year, positioning itself as a key element in Pakistan's efforts to mitigate the effects of climate change and improve air quality.

Environmental mitigation measures have been implemented, including systems to ensure the passage of fish and sediment management, as well as plans for the conservation of natural resources in surrounding areas. These initiatives reflect a responsible approach to water management, an essential aspect of a project of this scale. The dam is a key infrastructure not only for its energy impact, but also for its role in promoting resilience to climate change, managing water flows to prevent flooding during periods of heavy rainfall and ensure a stable water supply even during drought periods. This ability to manage water resources is essential for the agricultural communities along the Jhelum River, which depend on irrigation for their economic survival.

3.5 The importance of foreign direct investment in CPEC

One of the ways that China has been pursuing to support Pakistan's growth and more generally in its Belt and Road Initiative has undoubtedly been through foreign direct investment. These foreign direct investments can also be classified as "greenfield investments", investments aimed at the establishment of new production facilities such as factories, research centres, data storage centres and production plants, in this case of energy, with the aim of increasing the production capacity of the host country. We have seen that in some cases these investments led to the emergence of innovative projects and infrastructures, in other cases they took place through the acquisition of a major participation in a foreign company, as happened for the port of Hambantota in Sri Lanka.

Entry through the acquisition of shareholdings allows China to enter the market quickly, to position itself immediately with a certain market share already achieved and to have knowledge about the characteristics of the market and competition. On the other hand, however, the process of integration between different companies creates management and organizational problems.

In the context of the BRI, China invests heavily in greenfield projects as it finances and builds new infrastructure such as roads, railways, ports, airports, power plants and renewable energy production facilities in participating countries. These investments are not limited to improving existing infrastructure but aim at creating new productive and logistic capacities from scratch, which is a distinctive feature of greenfield investments. These investments in the BRI are key to improving connectivity between the

countries involved and these projects not only facilitate international trade and transport, but also strengthen regional links, helping to reduce logistics costs and improve overall economic efficiency. An emblematic example is the construction of the railway between China and Laos, a greenfield project that created a new land-based trade route, significantly improving connectivity between Southeast Asia and China. Another key aspect of greenfield investment in the Belt and Road Initiative is the expansion of energy capacities in partner countries. China finances and builds new power plants, including coal-fired, hydroelectric, solar and wind power, which not only provide the energy needed for local industrial development, but they often also introduce advanced energy technologies that would otherwise not be available.

The BRI also envisages the creation of special economic zones through greenfield investments, which serve as hubs for manufacturing industry, logistics and services. These SEZ⁶⁸ attract further foreign investment through modern infrastructure, tax incentives and favourable regulatory regimes. For example, the construction of the Gwadar Special Economic Zone in Pakistan is a greenfield project that aims to transform the port city into a strategic trade and logistics centre for the region.

Foreign direct investment is a key lever for economic and infrastructural development in developing countries, especially in economies involved in large transnational initiatives such as the China-Pakistan Economic Corridor. However, despite their transformative potential, FDI⁶⁹ faces several challenges that can limit its long-term effectiveness and sustainability. Among these, inflation and market risks emerge as critical factors that can significantly influence the success of foreign investment, jeopardising not only economic stability but also the ability of beneficiary countries to maximise the benefits associated with FDI. The CPEC is a prime example of how FDI can drive infrastructure development and promote economic growth in significant ways. However, CPEC's reliance on Chinese investment has exposed Pakistan to numerous economic challenges, including inflation, market volatility and the risks associated with debt management.

One of the main obstacles to FDI in the context of the CPEC is inflation. The inflow of foreign capital, if not managed properly, can lead to significant inflationary pressures. In the case of Pakistan, massive inflows of Chinese infrastructure investment have led to an increase in demand for local goods and services, resulting in price pressure. Inflation has a direct impact on project development costs, making construction materials, labour and other essential inputs more expensive. This increase in costs can reduce the profit margins for investors and slow down project completion, undermining the overall effectiveness of FDI. Inflation can also erode the purchasing power of local people, raising the cost of living and generating social discontent. This is particularly worrying in contexts where average income is already low and where people are particularly

⁶⁸ Stands for "Special Economic Zones".

⁶⁹ Stands for "Foreign Direct Investments".

vulnerable to increases in the price of necessities. In the case of Pakistan, inflation has led to higher energy costs, making the benefits of new energy infrastructure less accessible to local households and businesses. This problem is further exacerbated by rising interest rates, often used as a measure to control inflation, which make the cost of capital higher for local businesses and reduce the availability of credit.

Exchange rate fluctuations are another significant risk, especially in a country like Pakistan, whose currency is often subject to rapid depreciation against major global currencies, including the US dollar and the Chinese renminbi. When the local currency depreciates, project costs, which are often denominated in foreign currency, increase in local currency terms, further exacerbating inflation problems. This scenario makes projects less cost-effective and may lead to an increase in public debt, as the government may need to resort to additional funding to cover the financing gap created by the devaluation. Political instability is another risk factor affecting FDI in the CPEC. The area crossed by the corridor includes regions with a history of political instability and conflict, such as the province of Balochistan in Pakistan. Local tensions, ethnic conflicts and insurgencies can disrupt project implementation, increase security costs and create an uncertain investment environment that discourages further capital inflows. In addition, sudden changes in economic policies or regulations may create uncertainties that discourage

investors because they might fear changes in contractual terms or access to previously agreed incentives.

Debt management is another important issue associated with FDI, especially in large-scale projects such as those of the CPEC. Inflows of foreign capital often go hand in hand with loans and financing arrangements which, if not carefully managed, can lead to an unsustainable accumulation of debt. Pakistan, for example, has faced growing concerns about its ability to repay the debt incurred to finance CPEC projects. This problem is exacerbated by the terms of some financial arrangements that provide for relatively high interest rates and short repayment periods, creating significant pressure on the country's foreign reserves. The increase in external debt not only reduces the capacity to spend on other crucial sectors such as health and education, but also exposes the country to external pressures, because failure to comply with repayment obligations could jeopardise diplomatic and commercial relations with foreign creditors. Moreover, excessive reliance on foreign capital for development financing can limit a country's economic autonomy, making it vulnerable to external influences and reducing the government's ability to make independent economic policy decisions.

To address these challenges, it is essential that Pakistan implement risk mitigation strategies that include stable macroeconomic policies, prudent debt management and the creation of a regulatory environment that promotes transparency and predictability of investments. Measures to control inflation, such as strengthening foreign reserves, managing liquidity and diversifying energy supply sources, can help stabilise prices and reduce inflationary pressure. Similarly, policies that promote political stability and security, especially in the most vulnerable regions, can reduce risks perceived by investors and ensure project continuity.

3.6 Conclusion

The Belt and Road Initiative is arguably one of the most massive economic and infrastructural development projects of our time, bringing with it the promise of greater global interconnection and new growth opportunities for the countries involved. However, the critical analysis reveals a complex and sometimes contradictory picture of China's stated goals, particularly regarding its international commitments on climate and sustainability. The central research question of this thesis, whether China is actually meeting its sustainability commitments through the BRI or whether economic interests are taking precedence over environmental principles, has varied and multifaceted answers.

From the case studies examined, it is clear that the BRI is driven primarily by China's economic ambitions: China uses the initiative as a tool to expand its geopolitical influence and ensure access to resources crucial to its industrial development. The construction of strategic infrastructures such as ports, railways and power plants in the participating countries, although it brings undoubted economic benefits and contributes to the improvement of local infrastructure, is often linked to financial and practical conditions that place partner countries in situations of economic vulnerability and dependence on China, as evidenced by the cases of the port of Hambantota in Sri Lanka and the Standard Gauge railway in Kenya.

The concept of "debt trap" is particularly emblematic for understanding the nature of the economic relations promoted by the BRI. In many situations, loans granted by China to finance large infrastructure projects are associated with opaque and often burdensome conditions for the recipient countries, that they are likely to relinquish control of strategic assets when they fail to meet their financial obligations. This dynamic not only raises questions about the economic sustainability of such investments, but also casts doubt on China's effective will to promote equitable and inclusive development through this initiative.

From an environmental perspective, the BRI presents itself with significant contradictions to China's international commitments, such as those enshrined in the Paris Agreement, in the Kigali amendment and in the Montreal Protocol. Although China has announced several "green" initiatives and is committed to promoting sustainable development practices, the facts show that many of the infrastructures built remain heavily dependent on polluting energy sources such as coal. The example of the Hunutlu thermal power plant in Turkey, despite being built with advanced technologies, is a classic case of investment that, while contributing to local economic growth, opposes commitments to reduce CO2 emissions. China continues to finance and build coal-fired power plants in several partner countries, questioning the sincerity of its environmental commitments.

Another critical aspect concerns the effective implementation of the Green Investment Principles that China

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has promulgated under the Belt and Road Initiative. Although GIPs represent a step towards integrating sustainability into investment practices, project analysis shows that their uptake is often limited and many of the declared sustainable practices remain on paper. The lack of transparency in procurement and environmental impact assessment processes continues to undermine the credibility of China's "green" initiatives, leaving wide margins for discretion in applying environmental standards. On the other hand, it is undeniable that the BRI has stimulated a significant global debate on the need for sustainable infrastructure and the importance of international cooperation to address climate challenges. China, as a leader in green technology production, has the potential to drive a global energy transition towards renewable sources, as demonstrated by investments in solar, wind and hydro projects in numerous partner countries, especially into the CPEC. However, to turn this potential into a real and lasting impact, China needs to adopt a more transparent and accountable approach, aligning its investment practices with international standards and ensuring that BRI projects are truly environmentally and socially sustainable.

This ambiguous behaviour is also evident in the context of the Digital Silk Road, a component of the BRI that aims to build a global digital ecosystem to facilitate trade and technological interconnection between participating countries. While this initiative offers tremendous opportunities for e-commerce growth and the digitisation of emerging economies, it also raises serious concerns about digital sovereignty and data security. The predominance of Chinese companies like Huawei and ZTE in building digital infrastructures exposes partner countries to control and surveillance risks, fuelling a climate of mistrust between China and other global actors.

In contrast to what has been concluded so far there is the China-Pakistan Economic Corridor. The CPEC is one of the key projects of the Belt and Road Initiative, not only for its strategic relevance but also for the potential it offers in promoting sustainable development. Through the CPEC, China has demonstrated its ability to implement infrastructure that not only stimulates economic growth but can also drive the transition to a greener future. The case of the Quaid-e-Azam solar park, one of the largest in the world, is emblematic of how China is investing in clean energy technologies in partner countries, promoting the use of renewable sources such as solar and wind. This approach not only helps reduce Pakistan's dependence on fossil fuels, but also provides a benchmark for other developing countries that are aiming for sustainable growth. The CPEC is therefore not just an infrastructure development initiative, but a test case for China's ability to combine economic growth with environmental sustainability. Thanks to its technological leadership and willingness to invest in green projects, China has the opportunity to establish itself as a leader of ecological transition, showing the world that it is possible to promote development which respects both economic and environmental needs.

To answer the research question in a concrete way, it can be concluded that although the BRI represents an

unprecedented platform for international economic cooperation, its implementation has so far been more oriented towards promoting China's economic and geopolitical interests than towards meeting declared environmental commitments. China has certainly made progress in integrating sustainability objectives into its policies, but the balance between economic growth and respect for the environment is still far from being achieved. The presence of controversial investments and continued dependence on polluting energy sources indicate that, despite declarations of intent, the transition to a sustainable development model is still in its early stages and requires a stronger and more coherent political will.

In terms of future prospects, the BRI will face several crucial challenges to evolve from a mere instrument of economic expansion to a model of sustainable cooperation. First, China will need to improve the transparency of its investment practices by adopting international standards for assessing the environmental and social impacts of projects. It is essential that the participating countries are actively involved in decision-making processes, ensuring that projects actually respond to local needs and comply with national and international environmental regulations.

Secondly, greater efforts are needed to reduce dependence on fossil fuels, both through the promotion of green technologies and through the implementation of policies that encourage the use of renewable energies in partner countries. The BRI energy transition will require a dedicated decarbonisation funding plan to support developing countries in their shift towards cleaner and more sustainable energy sources.

Finally, China will need to work to strengthen international trust in the BRI by addressing the data sovereignty and security criticisms in the Digital Silk Road and demonstrating a concrete commitment to fair and transparent cooperation. Only through a real alignment between policy statements and concrete actions can the BRI become a true driver of sustainable development, contributing not only to economic growth, but also to the protection of the environment and the improvement of living conditions in the regions concerned. In conclusion, the Belt and Road Initiative represents a unique opportunity for China and its partners to redefine the future of economic relations and global development. However, to truly live up to its ambitions, the BRI will need to face its internal contradictions decisively and demonstrate that its commitment to sustainability is not just a facade but a concrete path towards a greener and more inclusive future.

BIBLIOGRAPHY

- Alberto Galvi,(2013) "Pakistan. L'importanza del porto di Gwada"r, Notizie Geopolitiche, January. Available on: https://www.notiziegeopolitiche.net/pakistanlimportanza-strategica-del-porto-di-gwadar/)
- Alessia Amighini (2020); "Chi finanzia la BRI?"; ISPI90; December. Available on: https://www.ispionline.it/it/pubblicazione/chi-finanzia-la-bri-2875
- Alessio Stilo (2017); "Asia: una calamita per il mercato delle rinnovabili", Rienergia, May; Available on:https://rienergia.staffettaonline.com/articolo/32828/Asia:+una+calamita+per+il+ mercato+delle+rinnovabili/Stilo)
- Anjelina Patrick (2020); "China Sri Lanka Strategic Hambantota Port Deal"; National Maritime Foundation.
- Arthur P.J., Neil Carter (2006); "China's Environmental Governance in Transition"; Academic notes provided by the Professor Menegazzi Silvia.
- Cecilia Springer (2022); "Understanding China's Global Power"; Boston University Global Development Policy Center. Available on: https://www.bu.edu/gdp/files/2022/10/GCI_PB_016_CGP_EN_FIN.pdf
- Ceren Yarta (2022), "AN OVERVIEW OF THE CORPORATE HUMAN RIGHTS RESPONSIBILITY IN TURKEY", MAD.
- China Daily (2023); "The Belt and Road Initiative: A Key Pillar of the Global Community of Shared Future", China Daily. Available on: https://global.chinadaily.com.cn/a/202310/11/WS6525de2ba31090682a5e7d01.html
- Chris Massaro (2024); "China's Belt and Road Initiative plagued by corruption and political backlash: report"; FOX NEWS. Available on: https://www.foxnews.com/world/chinas-belt-road-initiative-plagued-corruption-political-backlash-report
- CHRISTOPH NEDOPIL WANG, LAWRENCE ANG, MATT CARPIO (2024); "New study China coal exit: Opportunities for China-led financing of early phase-down of coal-fired power plants in Pakistan and Vietnam"; Green Finance and Development

Center; Available on: https://custommapposter.com/article/countries-of-the-belt-and-road-initiative-bri-green-finance-development-center/1781

- David Sacks (2021); "Countries in China's Belt and Road Initiative: Who's In And Who's Out"; Council on Foreign Relations. Available on:https://www.cfr.org/blog/countries-chinas-belt-and-road-initiative-whos-and-whosout
- Demostenes Floros (2024), "Come cambia il paniere energetico cinese", ANALISIDIFESA; February. Available on:https://www.analisidifesa.it/2024/02/comecambia-il-paniere-energeticocinese/#:~:text=I%20consumi%20di%20energia%20primaria,0%2C9%25%20medio %20annuo)%3B
- Editorial Staff (2021), "Cina e carbone: contrordine, compagni!"; ISPI90. Available on:https://www.ispionline.it/it/pubblicazione/ispitel-cina-e-carbone-contrordine-compagni-31931
- Editorial Staff (2023), "Fondo Multilaterale per l'Attuazione del Protocollo di Montreal", Ministero dell'Ambiente e della Sicurezza Energetica. Available on:https://www.mase.gov.it/pagina/fondo-multilaterale-lattuazione-del-protocollo-dimontreal
- Editorial Staff (2018), "Guidance on Promoting Green Belt and Road", MINISTRY OF ECOLOGY AND ENVIRONMENT THE PEOPLE'S REPUBLIC OF CHINA. Available on:https://english.mee.gov.cn/Resources/Policies/policies/Frameworkp1/201706/t2017 0628_416864.shtml
- Editorial Staff (2023), "Il Protocollo di Montreal", Ministero dell'Ambiente e della Sicurezza Energetica. Available on:https://www.mase.gov.it/pagina/il-protocollo-dimontreal
- Editorial Staff (2019), "Kigali, approvato l'emendamento al Protocollo di Montreal", Ministero dell'Ambiente e della Sicurezza Energetica. Available on:https://www.mase.gov.it/pagina/kigali-approvato-lemendamento-al-protocollo-dimontreal-0
- Editorial Staff (2024), "Perché gli attacchi al porto di Gwadar, nel Belucistan, preoccupano anche Pechino", Il Foglio; Available on:https://www.ilfoglio.it/esteri/2024/03/23/news/perche-gli-attacchi-al-porto-digwadar-nel-belucistan-preoccupano-anche-pechino-6359908/
- Editorial Staff, "Silk Road Fund"; Official Website. Available on:https://www.silkroadfund.com.cn/enweb/)
- Editorial Staff (2024), "State Administration of Foreign Exchange", Wikipedia. Available on:https://it.wikipedia.org/wiki/State_Administration_of_Foreign_Exchange
- Editorial Staff, "Trattato di Parigi", Parlamento Europeo. Available on:https://www.europarl.europa.eu/about-parliament/it/in-the-past/the-parliamentand-the-treaties/treaty-of-paris
- Editorial Staff, "Un ponte tra l'Italia e la Cina"; China Investment. Available on:https://www.china-investment.it/
- Editorial Staff (2022), "Understanding China's Global Power: 2022 Update", Boston University Global Development Policy Center. Available on:https://www.bu.edu/gdp/2022/10/19/understanding-chinas-global-power-2022update/
- Editorial Staff (2020); "China's Belt and Road projects lack transparency, say European firms"; Business Standard. Available on:https://www.businessstandard.com/article/pti-stories/lack-of-transparency-in-china-s-belt-and-roadprojects-eu-firms-120011600166_1.html
- Editorial Staff; "CPEC Vision and Mission"; Official Website. Available on:https://cpec.gov.pk/vision-mission/3

- Editorial Staff (2022); "Forced Labor: The Hidden Cost of China's Belt and Road Initiative"; United States Department of State.
- Editorial Staff (2024); "Green Investment Principles"; UK-China Green Finance Centre. Available on:https://www.ukchinagreen.org/green-finance/green-belt-androad/text-of-the-gip/
- Editorial Staff; "Hambantota Seaport"; Lakpura LLC. (https://it.lakpura.com/pages/hambantota-seaport)
- Editorial Staff (2021); "I porti e la "trappola cinese del debito": il caso Sri Lanka"; ShipMag. Available on:https://www.shipmag.it/i-porti-e-la-trappola-cinese-del-debitoil-caso-sri-lanka/
- Editorial Staff (2021); "Il mega porto dello Sri Lanka costruito dai cinesi sarà pronto entro un anno"; ShipMag. Available on:https://www.shipmag.it/porto-hambantota-pechino/
- Editorial Staff (2017); "Railway projects under Belt and Road Initiative: Mombasa-Nairobi railway", Xinhua Silk Road Information Service. Available on:https://en.imsilkroad.com/p/312444.html
- Editorial Staff (2021); "Timeline for the PRC restoring its lawful seat at UN"; Global Times. Available on:https://www.globaltimes.cn/page/202110/1237162.shtml
- Editorial Staff (2024); Digital economy report 2024- Shaping an environmentally sustainable and inclusive digital future; United Nations Trade & Development. Available on:https://unctad.org/publication/digital-economy-report-2024#:~:text=China%20handles%20over%20half%20of,mineral%20demand%20pres ents%20economic%20opportunitie
- Embassy of the People's Republic of China in Italy (2023); "The Belt and Road Initiative: A Key Pillar of the Global Community of Shared Future". Available on:https://global.chinadaily.com.cn/a/202310/11/WS6525de2ba31090682a5e7d01.htm l

- Enrico Casale (2017); "Kenya: si inaugura la nuova linea ferroviaria Nairobi-Mombasa"; Soledad. Available on:https://www.africarivista.it/kenya-si-inaugura-lanuova-linea-ferroviaria-nairobimombasa/114105/?srsltid=AfmBOor8fkojW8xmmWFEDBJef7oPnjB8V6P3If0SPVpkN hQPrUlJ8u6V
- Fakhar Hussain, Zakar Hussain, Muhammad Ikramullah Khan, Ali Imran (2024); "The digital rise and its economic implications for China through the Digital Silk Road under the Belt and Road Initiative"; Sage..
- Filippo Fasulo (2024); "Meloni a Pechino: 10 grafici per capire i rapporti Italia-Cina", ISPI90. Available on:https://www.ispionline.it/it/pubblicazione/meloni-apechino-10-grafici-per-capire-i-rapporti-italia-cina-181883
- Francesca Costantini (2018), "La Belt and Road Initiative avvicina Pechino all'Europa"; Diplomazia Economica Italiana Farnesina (MF);
- Francesca Marino (2022); "La Cina sfrutta materie prime e manodopera in Pakistan per arricchirsi", Il Foglio. Available on:https://www.ilfoglio.it/esteri/2022/12/15/news/la-cina-sfrutta-materie-prime-emanodopera-in-pakistan-per-arricchirsi-4765139/
- Francesco Carlani (2017); "Lo strano affare cinese nel porto di Hambantota / IL CASO"; The Medi Telegraph. Available on:https://www.themeditelegraph.com/it/transport/ports/2017/08/10/news/lo-stranoaffare-cinese-nel-porto-di-hambantota-il-caso-1.38155530
- Futura d'Aprile (2022); "La nuova centrale a carbone turca che minaccia l'ambiente (e il successo elettorale di Erdogan)"; Linkiesta. on:https://www.linkiesta.it/2022/08/carbone-turchia-erdogan-green/
- Gabriele Manca (2023); "Una Belt and Road più green", ISPI90. Available on:https://www.ispionline.it/it/pubblicazione/una-belt-and-road-piu-green-149335
- Ghulam Yaseen Kalhoro(2021); "The Role of Off-Grid Solar Electrification Sustainability in the Economic Growth of Pakistan".
- Gianluca Di Donfrancesco; "COP27, le emissioni di CO2 paese per paese"; Lab24 Sole24Ore. Available on:https://lab24.ilsole24ore.com/cop27-dati-CO2mondo/?refresh_ce=1

- Giovanni Caprara (2024); "I rapporti economici tra Cina e Turchia e il "pivot to Asia" di Ankara"; MedOr. Available on:https://www.med-or.org/news/i-rapporti-economici-tra-cina-e-turchia-e-il-pivot-to-asia-di-ankara
- Global Energy Motor (2023), "China risks missing multiple climate commitments as coal power approvals continue".
- Hoong Chen Teo, Alex Mark Lechner, Grant W. Walton, Faith Ka Shun Chan, Ali Cheshmehzangi, May Tan-Mullins, Hing Kai Chan, Troy Sternberg and Ahimsa Campos-Arceiz (2019); "Environmental Impacts of Infrastructure Development under the Belt and Road Initiative"; MDPI.
- Huaxia; "Xiplomacy (2024): With upgrade in ties, China, Uzbekistan ready for closer win-win cooperation", Xinhua. Available on: https://english.news.cn/20240126/a3b2e6c9f9ca40d083a769e543cac592/c.html
- James McBride, Noah Berman, and Andrew Chatzky (2023); "China's Massive Belt and Road Initiative"; Council on Foreign Relations. Available on:https://www.cfr.org/backgrounder/chinas-massive-belt-and-road-initiative
- Jennifer Hillmann, Alex Tippett (2021); "Who Built That? Labor and the Belt and Road Initiative"; The Internationalist. Available on:https://www.cfr.org/blog/whobuilt-labor-and-belt-and-road-initiative
- Jianguo Liu, Peter H. Raven (2010); "China's Environmental Challenges and Implications for the World".
- Jonathan E: Hillmann (2019); "Corruption Flows Along China's Belt and Road"; CSIS. Available on:https://www.csis.org/analysis/corruption-flows-along-chinas-beltand-road
- Kendra Brock (2022); "BRI Monitor: Bringing Local Voices and Transparency to the Belt and Road"; Center for International Private Enterprise. Available on:https://www.cipe.org/blog/2022/01/10/bri-monitor-bringing-local-voices-andtransparency-to-the-belt-and-road/

- Luca Tarantino (2019); "Le criticità del Pakistan nell'ambito della Belt and Road Initiative"; CESI. Available on:https://www.cesi-italia.org/en/articles/le-criticita-delpakistan-nellambito-della-belt-and-road-initiative
- Lucio Biancatelli (2015), "Eliminare il carbone fa bene al pianeta e all'aria che respiriamo", WWF. Available on:https://www.wwf.it/pandanews/ambiente/eliminareil-carbone-fa-bene-al-clima-e-allaria-cherespiriamo/#:~:text=Il%20carbone%20non%20solo%20ha,contribuendo%20a%20ca usare%204%20milioni
- Luis Franceschi (2019); "The future of State capture: Lessons from the Standard Gauge Railway"; NATION. Available on:https://nation.africa/kenya/blogsopinion/blogs/dot9/franceschi/the-future-of-state-capture-lessons-from-the-standardgauge-railway-234294
- Massarrat Abid and Ayesha Ashfaq, "CPEC: Challenges and Opportunities for Pakistan".
- Maurizio Sgroi (2021); "La digital silk road cinese va avanti in PEACE"; The Walking Debt. Available on:https://thewalkingdebt.org/tag/peace-cavo-sottomarino/
- Minxin Pei (2022); "Xi Jinping's Political Agenda and Leadership: What do we know from his decade in power", CLM. Available on:https://www.prcleader.org/post/xijinping-s-political-agenda-and-leadership-what-do-we-know-from-his-decade-inpower
- Molly Lempriere (2024); "China responsible for 95% of new coal power construction in 2023"; CarbonBrief. Available on:https://www.carbonbrief.org/china-responsiblefor-95-of-new-coal-power-construction-in-2023-report-says/
- Muhammad Imran and Abdul Sattar (2022), "Heterogeneous analysis of free trade agreement between Pakistan and China: a policy guideline for CPEC".
- Muhammad Suhrab, Atta Ullah, Chen Pinglu, Magdalena Radulescu (2023); "Boosting green energy: impact of financial development, foreign direct investment, and inflation on sustainable energy productivity in China–Pakistan economic corridor (CPEC) countries".

 Patricia Vulpe (2021); "IL "DILEMMA DI MALACCA" – LE VIE ALTERNATIVE ALLO STRETTO SUD-ORIENTALE"; IARI. Available on:https://iari.site/2021/02/09/il-dilemma-di-malacca-le-vie-alternative-allo-strettosudorientale/#:~:text=Gli%20Stati%20Uniti%2C%20in%20particolare,di%20dispute%2

orientale/#:~:text=Gli%20Stati%20Uniti%2C%20in%20particolare,di%20dispute%2 0internazionali%20con%20Pechino

- Phebe Wilson-Andoh (2022); "China's Belt and Road Initiative in Kenya"; Foreign Policy Research Institute. Available on: https://www.fpri.org/article/2022/05/chinasbelt-and-road-initiative-in-kenya/
- Qingyang Wua, Chang Tan, Daoping Wang c, Yongtao Wu a, Jing Meng d, Heran Zheng (2023), "How carbon emission prices accelerate net zero: Evidence from China's coal-fired power plants".
- Sen Gong, Jing Gu, Fei Teng (2019); "The Impact of the Belt and Road Initiative Investment in Digital Connectivity and Information and Communication Technologies on Achieving the SDGs"; K4D.
- Silvia Menegazzi (2022), "La narrazione cinese nel dibattito sullo sviluppo internazionale. Il caso della AIIB", Available on:https://iris.luiss.it/handle/11385/222138
- Spencer Feingold (2023), "China's Belt and Road Initiative turns 10. Here's what to know"; World Economic Forum. Available on:https://www.weforum.org/agenda/2023/11/china-belt-road-initiative-trade-bri-silk-road/
- SRM; "Belt and Road Initiative Position paper"; Confetra.
- Tamanisha J. John (2024), "Guyana: Myth of capitalist resource extraction as development", ELSEVIER.
- TANIA GHOSSEIN, BERNARD HOEKMAN, ANIRUDH SHINGAL (2018); "Public procurement in the Belt and Road Initiative"; The Trade Post. Available on:https://blogs.worldbank.org/en/trade/public-procurement-belt-and-road-initiative
- Xin-an Lu, Jie Lu; "The leadership theories and practices of Mao Zedong and Deng Xiaoping", Academic notes provided by the Professor Menegazzi Silvia.