

# BRI INVESTMENTS IN RENEWABLE ENERGY: OUTCOMES AND PERSPECTIVES

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**Abstract:** The Belt and Road Initiative is celebrating its 10<sup>th</sup> anniversary in 2023, and it presents an opportunity to examine the achieved results within this format and see its strengths and weaknesses while at the same time evaluating potential prospects. Given the current political, economic, and environmental circumstances, this analysis focuses on investments in renewable energy within the BRI since its importance is increasing rapidly. The author used quantitative and qualitative descriptive analysis to study data from 2014-2022, and the database China Global Investment Tracker (American Enterprise Institute and Heritage Foundation) was used as the primary source of investment values. So far, through the BRI, China has invested the most in the energy sector and transportation projects. Investments in the traditional energy sector that uses coal, oil, and natural gas are significantly higher than those in renewable energy, and the main reason for that was the preferences of the involved countries. Renewable energy investments during the ten years followed the trend of other investments within the BRI. The highest volume of FDI and loans in clean energy was registered in 2017, while the lowest was in 2021 and 2022. The analysis showed that China invested the most in Sub-Saharan Africa and East and West Asia. Pakistan, Laos, and Argentina were the top recipient countries. The author concludes that the increasing awareness of the importance of renewable energy and the rising global political, security, and economic volatility make sustainability and self-sufficiency more necessary. Due to those trends, investments in renewable energy within the BRI will increase in the near future, but the traditional energy sector will still be the leading one.

**Keywords:** Belt and Road Initiative, China, renewable energy, investments, results, prospects.

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## CHINA AND RENEWABLE ENERGY – LESSONS TO LEARN

The Chinese economic development model, the so-called *socialist market economy*, established in the late seventies, was based on extensive development of heavy and light industry, traditional energy, and metallurgy. Those sectors, combined with other institutional reforms, helped enormously in achieving great economic results, leading China to become one of the most successful economies in the world. However, with such development, usually there is some cost associated with it, and in the case of China, it came in the form of environmental pollution (Yuan et al., 2020; Wang and Feng, 2021).

This situation was not something out of the ordinary or something that other countries did not experience. In Europe, for example, ever since coal prevailed over wood as a fuel, there was numerous evidence that extensive use of coal was negatively affecting human life. Even in historical documents, we can find evidence for such situations. Halliday wrote that such was the case in the early 1300s in London. Due to the use of coal, the air was so polluted that a royal decree banned coal usage in this city (1961, p. 13). Even though the public recognised that coal had a harmful impact on the environment, especially during the industrial revolution in the 18<sup>th</sup> and 19<sup>th</sup> centuries, serious actions were not imposed until the late 1950s. Since then, scientists and the public have worked together to understand the causes of pollution, identify the most dangerous pollutants, and find ways to neutralise them (Ibid.).

In the early years after World War II, there was a general agreement that the rehabilitation of economies destroyed by war should be encouraged by faster industrial development, which eventually led to higher levels of environmental pollution. In that sense, China was no different from other developed or developing countries that pursued their development based on those already-known facts. However, since Chinese economic development lagged almost several decades behind Europe, the real consequences of extensive economic development, such as environmental pollution, could be found in China in the 1990s. Still, the recognition of those problems on the governmental level did not start until early 2000 (Yuan et al., 2020).

The first institutional steps in the right direction regarding sustainable development happened in China in 1992. That year, China signed and adopted UN Agenda 21, the UN climate resolution from Rio de Janeiro. The second important event was the adoption and implementation of the 10<sup>th</sup> (2001-

2005) and 11<sup>th</sup> (2006-2010) Five-Year Development Plans (Curran et al., 2017). In those documents, it was clearly stated that China recognises to what extent traditional sources of energy pollute the environment and how much industrial development is also increasing pollution. Those two Plans were among the first institutional documents used as a jumping-start for all subsequent environmental reforms in China. These reforms were primarily related to environmental laws and regulations, taxes and contributions that polluting companies have to pay, and a whole series of stimulus measures for the production of all forms of RE. Since then, all levels of government have had the ongoing task of developing a better and more environmentally friendly environment in China. China has also supported and signed the latest climate agreements in Paris in 2016 and Glasgow in 2021, demonstrating its support for international efforts to improve sustainable development.

Sustainable development is also highly prioritised in the latest 14<sup>th</sup> Five-Year Development Plan. That is compatible with China's pledge to become carbon neutral until 2060. It should also be emphasised that, so far, China has been able to exceed renewable energy goals previously formulated in the 11<sup>th</sup>, 12<sup>th</sup>, and 13<sup>th</sup> FYPs (Mei et al., 2023, p. 8). Additionally, if everything goes according to plan and current dynamics, China will probably reach its goal of having installed 1,200 GW of solar and wind capacity five years ahead of schedule, which will be in 2025 (Ibid., p. 8).

One of the main reasons for such rapid and extensive support for RE<sup>1</sup> in China can be found in the fact that China is the largest emitter of CO<sub>2</sub> in the world, with almost 30% of global emissions (Lu et al., 2021). Therefore, its efforts to reduce pollution on its territory impact the entire planet. Because of that, for the last three decades, China has worked to develop renewable energy sources, first on its territory and then internationally. According to the announcement of China's National Energy Administration (NEA), in 2021, the installed capacity of renewable energy sources in China amounted to 1,063 GW, which accounts for 44.8% of the country's total energy production capacity (S&P Global Commodity Insights, 2022). According to a new report issued by Global Energy Monitor, China is rapidly pursuing its clean energy

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<sup>1</sup> Note: Renewable (clean) energy in this analysis consists of all sources of energy that can be replenished, such as wind, sunlight, water, biomass, or geothermal heat.

development, and it is currently working on upscaling its solar and wind energy with a combined capacity of 750 GW (Mei et al., 2023, p. 4).

There is ample evidence of the rapid development of the solar industry in China. Today, China is the largest producer of solar panels in the world, and almost 80% of the world's production comes from China. Not only does China produce so many solar panels and sell them internationally, but it also installs them on its territory. Currently, China's solar operating capacity is around 230 GW, and the plan is to have an additional 380 GW by 2030 (Mei et al., 2023, p. 9).

When it comes to wind energy, China also performs well. China's onshore and offshore capacities are currently around 310 GW, which equals the capacity of the top seven countries worldwide (Mei et al., 2023, p. 5). The capacity of offshore wind turbines reached 31.4 GW, which is slightly less than 36 GW in the US (Ibid., p. 5). In 2022, China produced 46% more wind energy than all European countries combined, and Europe is the second largest producer of wind energy globally (Bocca, 2022).

Besides solar energy, China is the world leader in hydropower energy. Hydropower plants in China produce about 16% of China's total electric power capacity (IHA, 2022). According to the 2022 report of the International Hydropower Association, the total hydropower capacity in China in 2021 was 391 GW (IHA, 2022), and hydropower ranks second in China's electricity generation, just after power generation in thermal power plants (Duan, 2021). Besides the construction of conventional hydropower plants, China also invests a lot in the construction of reversible hydropower plants. The plan is to increase their capacity to 120 GW in the period from 2021 to 2035 (Ibid.). China has not used all of its hydro potential and has opportunities for additional capacity expansion.

Biomass occupies a small part of green energy production in China, since appropriate technical solutions have not yet been found that would enable lower costs of biomass processing and subsequent energy production. Despite obstacles, China is also trying to achieve better results in this area. Even though China currently produces over 900 million metric tonnes of agricultural and forest biomass each year, which is equal to nearly 400 million metric tonnes of coal, it only uses 90 million metric tonnes for power generation on a yearly basis (Zheng, 2022). However, China is making plans to improve this situation.

Thanks to a targeted and responsible policy in the field of RE, China is today a world leader both in terms of investment in these energy sources on its territory and abroad, as well as in the production and sale of solar panels, wind turbines, electric vehicles, and batteries. Due to all the afore-mentioned facts, it is obvious that there are many lessons that other countries can learn from China's example in developing its economy while, at the same time, strongly investing in renewable energy and sustainable development.

China used its experience in RE to assist countries within the Belt and Road Initiative in pursuing sustainable development. Because of this, the main goal of this research was to see if the Belt and Road investments in RE changed the energy landscape globally and what their impact was. In order to do that, descriptive statistical analysis was applied to analyse RE investments within the BRI framework. The global database China Global Investment Tracker was used as a main source of information regarding the value of Chinese investments in RE. Although this database is not without imperfections, it is still one of a kind, and it can be used as a solidly accurate measure for analysis on a global scale.

## **BRI AND ENERGY PROJECTS**

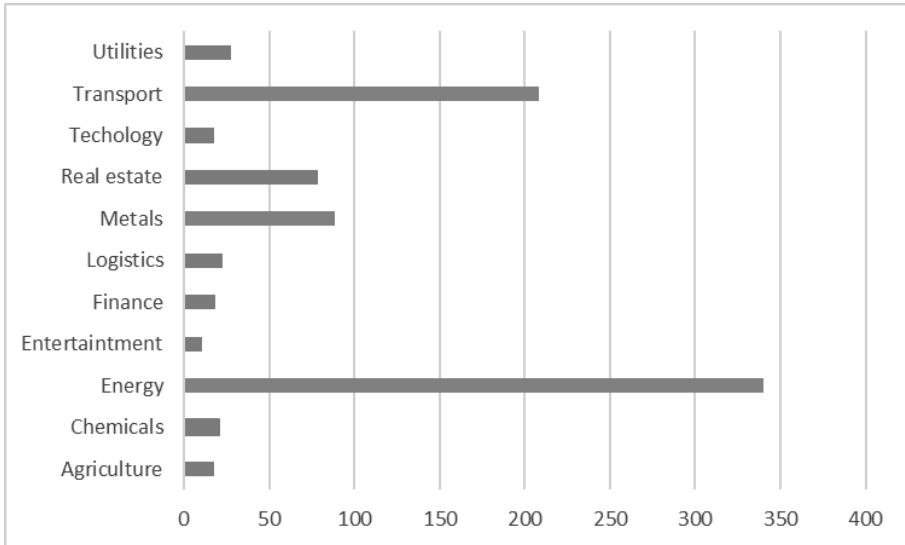
In 2013, Chinese President Xi Jinping introduced the Belt and Road Initiative during his visit to Kazakhstan. The essence of the BRI is that it serves as a platform dedicated to the improvement of economic, political, cultural, and people-to-people connections with countries that are part of this initiative with China while, at the same time, achieving win-win cooperation, sustainable development, and common prosperity. Through this format, China is improving its relations with countries, institutions, and associations around the world, supporting the global fight against poverty, discrimination, and unequal development.

Since the beginning of the BRI, China has pledged to cooperate with each country that wants to be part of this initiative to develop projects that are their own priorities. Therefore, it was up to the involved countries to nominate projects. In some cases, China was proposing them, but in most cases, the countries themselves initiated collaboration. The nature of cooperation varied among developed and developing countries as their needs differed. Moreover, due to those differences, countries had different priorities.

Developed countries lacked finances in mostly industrial or service fields, while developing countries lacked finances in transportation infrastructure. The first group of countries did not prioritise RE projects, as they were already working on them. For the second group, building basic transportation infrastructure was of greater importance, so sustainable development and RE were not a priority. Additionally, their needs in the energy field were mainly focused on traditional energy sources (coal, gas, and oil) in order to achieve two goals: energy security and undisturbed economic development. Recent events, such as the pandemic, the economic crisis, and the crisis in Ukraine, additionally highlighted those problems and goals. On the other hand, developing countries needs for more stable development based on extensive energy production and consumption were going hand in hand with China's own agenda (Zakić and Šekarić, 2021). Namely, China's need to have a stable energy supply for its purposes has also pushed energy projects on top of the BRI agenda, and the following data support those conclusions.

When examining China's investments within the BRI in last nine years, the energy sector had by far the highest volume of investment and construction compared to all other sectors (Figure 1). Overall, the energy sector received funding of 340.3 billion US\$, followed by the transportation sector with 208.3 billion and metallurgy sector with 88.48 billion US\$.

Figure 1. Sector structure of the BRI investments and construction, 2014-2022 (billions of \$US)



Source: Author's calculation according to China Global Investment Tracker. 2023. Global dataset. American Enterprise Institute and Heritage Foundation

In the energy sector, the traditional energy projects (fossil fuels) were the leading ones, as shown in Table 1. It shows the values of finances put into RE and energy as a whole while at the same time providing the percentage of renewable energy investments in relation to total energy investments. The findings show that investments in traditional energy, to this day, have higher values per year and in total, while renewable energy investments have fluctuated over the years. The lowest percentage of renewables within total energy investments was recorded in 2015 at 18.33%, while the most successful years were 2020 and 2017, with renewables accounting for 40.8% and 40.6%, respectively. In terms of absolute values, China invested the most in renewable energy in 2017, allocating 16.86 billion US dollars towards RE projects. Due to the pandemic and the conflicts in Ukraine, renewable energy investments decreased, hitting an all-time low in 2021 and 2022.

Table 1. BRI renewable energy investments and construction within total energy investments, 2014-2022 (billions of \$US, %)

Year	Renewable Energy	Total Energy	% of RE within Total Energy
2014	8.48	43.78	19.37
2015	10.37	<b>56.57</b>	<b>18.33</b>
2016	9.34	44.07	21.20
2017	<b>16.86</b>	41.51	40.60
2018	10.81	38.52	28.06
2019	11.52	39.83	28.90
2020	10.31	25.27	<b>40.80</b>
2021	7.75	27.07	28.63
2022	7.74	23.71	32.65
TOTAL	93.18	340.33	Average 27.38%

Source: Author's calculation according to China Global Investment Tracker. 2023. Global dataset. American Enterprise Institute and Heritage Foundation

In total, from 2014 until 2022, China invested in RE projects 93.18 billion US dollars within the BRI, out of which 28.55 billion was in the form of investment and 64.63 billion US dollars in the form of construction (Table 2). This ratio between investments and construction is not uncommon compared to other sectors in which China has invested. In addition, since most costs in construction were associated with hydropower projects, which were mainly funded by loans (Graph 6), and they cost more than solar or wind energy projects, these results were expected.



Table 2. BRI renewable energy investments and construction, 2014-2022 (billions of \$US)

Year	Investments	Construction	Total Value
2014	2.72	5.76	8.48
2015	1.96	8.41	10.37
2016	5.34	4.00	9.34
2017	3.23	13.63	<b>16.86</b>
2018	4.28	6.53	10.81
2019	2.70	8.82	11.52
2020	2.59	7.72	10.31
2021	2.98	4.77	<b>7.75</b>
2022	2.75	4.99	<b>7.74</b>
TOTAL	28.55	64.63	93.18

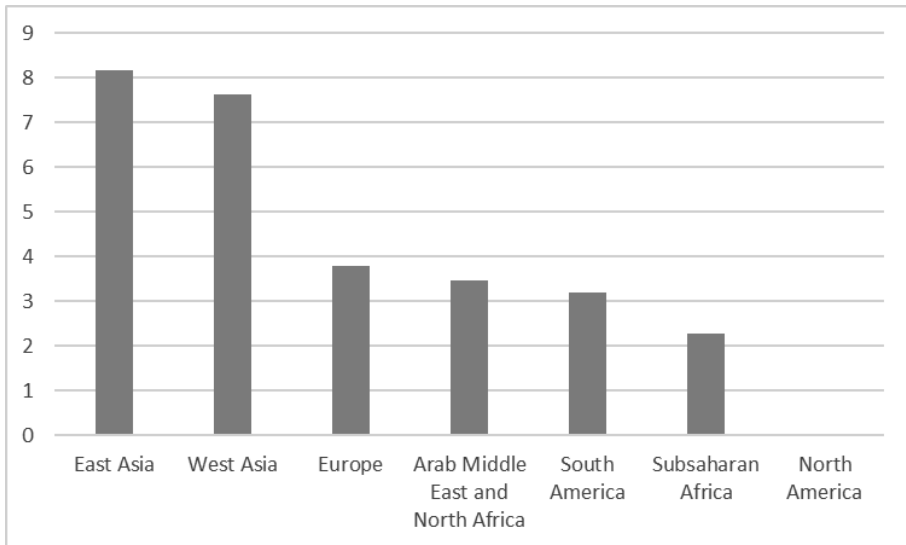
Source: Authors calculation according to China Global Investment Tracker. 2023. Global dataset. American Enterprise Institute and Heritage Foundation

## **BRI AND RENEWABLES- RESULTS AND DISCUSSION**

Renewable energy development within the BRI will be further analysed in the following section. That includes analysing the distribution of finances across different regions, identifying the countries that used the most BRI resources for funding RE projects, and determining the most prominent types of RE projects.

In an effort to show how many regions received direct investments vs. loans, two separate figures are shown (2 and 3). Figure 2 displays the amount of RE investments within different regions, and we can see that East Asia was the leading region in those regards, with 8.18 billion US dollars. In the second place is West Asia with 7.63 billion dollars, and in the third place are countries in Europe that are part of the BRI, in which China invested 3.8 billion US dollars.

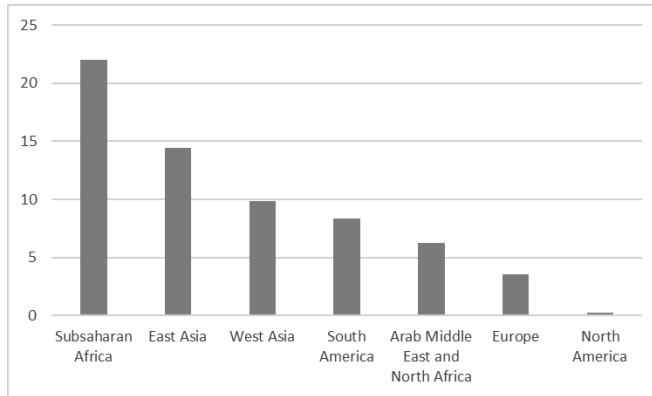
Figure 2. BRI investments in renewable energy, in 2014-2021, regions (billions of \$US)



Source: Author's calculation according to China Global Investment Tracker. 2023. Global dataset. American Enterprise Institute and Heritage Foundation

Figure 3 shows that the regional distribution of loans directed towards RE projects was different from investments. In this case, the Sub-Saharan region was the leader with 22.04 billion, followed by East Asia with 14.4 billion and West Asia with 9.82 billion.

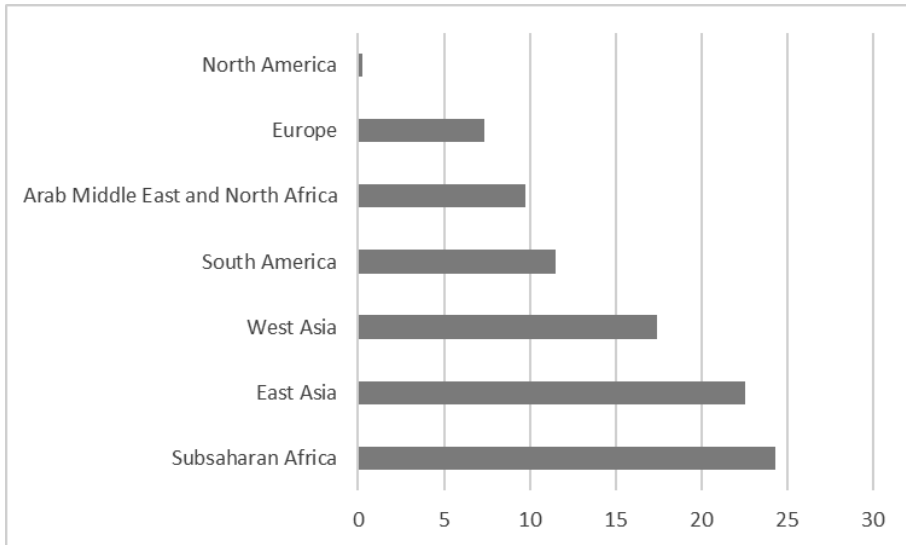
Figure 3. BRI construction in renewable energy, in 2014-2021, regions (billions of \$US)



Source: Author's calculation according to China Global Investment Tracker. 2023. Global dataset. American Enterprise Institute and Heritage Foundation

In total (Figure 4), Sub-Saharan, East, and West Asia were the regions leading in pursuing RE projects, while North America and Europe were the least interested in this kind of cooperation. Of course, in the case of North America and Western Europe, those results were expected since they are not part of the initiative, and, on the other hand, as previously mentioned, they have enough resources to fund RE development solely.

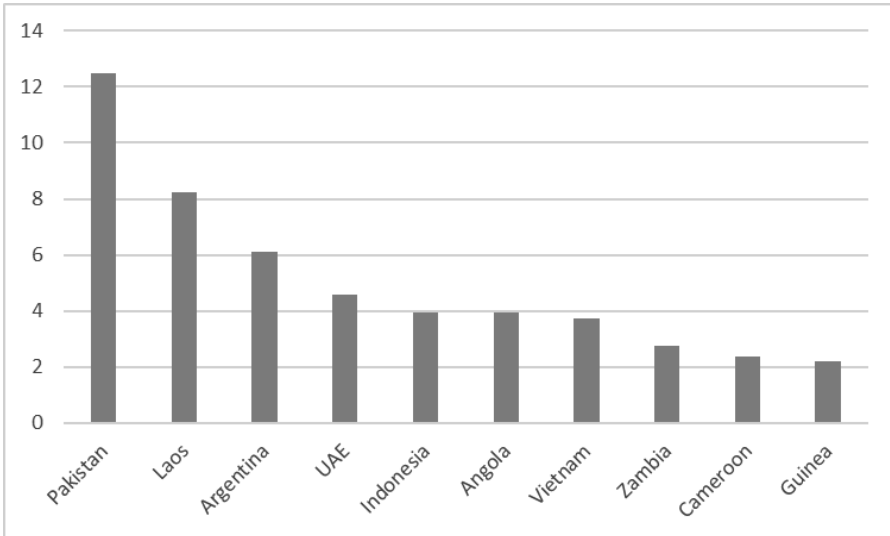
Figure 4. BRI construction and investments in renewable energy, in 2014-2021, regions (billions of US\$)



Source: Author's calculation according to China Global Investment Tracker. 2023. Global dataset. American Enterprise Institute and Heritage Foundation

The top ten recipient countries in the RE field within the BRI countries were Pakistan (12.47 billion), Laos (8.22 billion), Argentina (6.11), the UAE (4.59), Indonesia (3.96), Angola (3.96), Vietnam (3.74), Zambia (2.75), Cameroon (2.36), and Guinea (2.19) (Figure 5). Pakistan is the absolute leader in this group, which achieved this position by pursuing the construction of hydropower plants, and wind energy, and, in recent times, solar energy (Jillani, 2022).

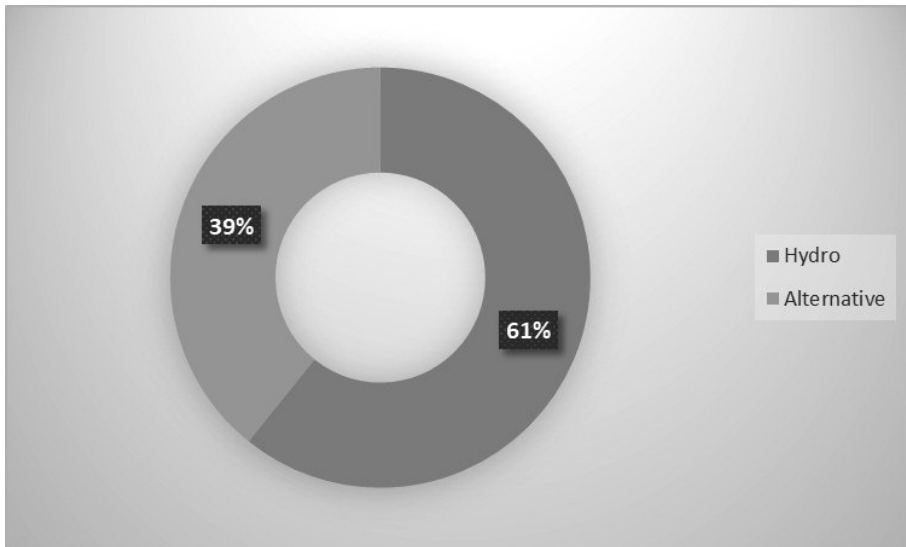
Figure 5. Top ten recipient countries within BRI in terms of investments and construction in renewable energy, 2014-2021 (billions of US\$)



Source: Author's calculation according to China Global Investment Tracker. 2023. Global dataset. American Enterprise Institute and Heritage Foundation

Due to the costs of construction/acquisition/FDI of hydropower plants, it was expected to see that hydro energy investments were leading among other renewables, which is shown in Figure 6. Solar, wind, geothermal, and biomass energy participated with 39%. In absolute value, green energy projects were worth 36.56 billion US dollars, which is a very promising result considering that mostly developing countries participated in them. Knowledge about renewables is increasing, and these data are a testament that everyone is doing their best to decrease the level of environmental pollution.

Figure 6. Structure of RE investments within the BRI, 2014-2022 (%)



Investments in RE fluctuated over the years as they depended on the demand from the BRI countries and global economic, political, and energy circumstances. Additionally, those countries have various geographic and energy situations that also affect the number and value of RE projects. However, it is worth noting that China has made significant contributions to improving the global energy structure through its substantial resources and finances dedicated to increasing renewable energy production and consumption. That is important to know since developing countries require 1.7 trillion US dollars annually to achieve global climate goals by 2030, according to UNCTAD analysis (UNCTAD, 2023). The same report claims that investments in clean energy are constantly decreasing due to current political and economic challenges. In this context, more developed nations must assist those in need, which will benefit the entire planet. In practice, that is not always the case. According to a previously mentioned UNCTAD report, 30 developed countries have never invested in outward clean energy projects. Even though the report does not provide a list of those who are not investing, it does have a list of countries that are leaders in this field, and China is one of them, among the US, Japan, Germany, and the UK.

Nevertheless, there were concerns and negative assessments regarding overall Chinese international investments in the energy sector, including traditional (coal) and green energy. The list of reasons for those views varies. Most of the criticism derives from the fact that China funded the construction of many thermal power plants, which are the biggest polluters compared to other energy producers, while at the same time the world is facing the highest pollution levels. Additionally, the matter of the national security of different countries and Chinese investments in their energy sector was pointed out in Turcsanyi's research as one of the potential problems (2017, p. 719). Others observed that in the case of green energy, China is funding those projects internationally because they are helping them with domestic overcapacity since companies in this field have high governmental support (Gippner and Tourney, 2017). At the same time, countries should be aware of China's unfair competition in the green energy field that Europe has already witnessed, both in terms of antidumping prices and in terms of trade barriers that China has imposed on European companies interested in working in China (Curran et al., 2017). Even though these views gained a lot of attention and provided different types of facts, we should be aware that energy and climate problems did not arise just from China, and many other actors are involved in this problem.

The energy transition is an integral part of the global environmental agenda dedicated to achieving climate goals and decreasing levels of pollution and world average temperatures. As an emerging economic power, China cannot be overlooked in those regards, and we should carefully assess its place and dedication to those climate goals, especially regarding its energy investments within the Belt and Road Initiative. Over the past nine years, China has invested, in the form of loans or investments, 53.7 billion dollars in different kinds of coal projects within the BRI (CGTI, 2023). However, the number and volume of investments in coal started to decrease after 2020. Just two coal projects were financed after that year—one in 2021 and one in 2022. The main reason lies in Xi Jinping's "aggressive promise" in 2021 not to invest in coal-related projects within the BRI (Wang and Lin, 2022) and China's dedication to providing more environmentally friendly development. The only exception to this promise was made in the case of Indonesia, which received 310 million dollars in 2022 to invest in a thermal power plant project (CGTI, 2023).

If we compare investments in coal versus renewable energy, we will see that from 2014 to 2022, within the BRI, China invested 53.7 billion versus

93.18 billion US dollars. While investments in traditional energy related to coal usage are decreasing, renewable investments are increasing. Judging by those trends, we can conclude that China is shifting its interest regarding energy investments and is becoming even more involved in the energy transition in developing countries.

## CONCLUSION

China, which bases its development model on extensive industrial and energy development, is nearing achieving two main goals: becoming a developed economy and eradicating poverty. However, achieving those goals came at a high cost. For generations, Chinese people worked tirelessly to achieve a developed economy in the shortest possible period, which was an incredibly challenging mission. Additionally, achieving sustainable development was another crucial and daunting task, which came later in China's development. China was aware of environmental problems caused by intensive development, but it had to prioritise tasks. Once China stabilised its economy, it embarked on environmental reforms. Since 2000, China has undertaken many legal reforms, enabling the country to focus more on sustainability while providing many benefits for those involved in sustainable development. Renewable energy was one of the most significant questions and problems that China was solving during this time, and it put substantial financial, technical, and human resources into improving the situation regarding clean energy. Today, China is undoubtedly one of the world leaders in this field.

China used its knowledge regarding renewables to assist other countries in their pursuit of sustainable development and energy security through its flagship project, the Belt and Road. Developing countries that are part of this initiative were prioritising projects and sectors they wanted to improve, so clean energy was not on the top of their agenda as much as fossil fuels were. This situation is slowly changing, and more countries are investing in renewables. Over a period of nine years, China invested a total of 93 billion US dollars in renewables within the BRI, which is a great accomplishment. Sub-Saharan countries and countries in East and West Asia were the leading regions investing in renewables. Bearing in mind that most countries in those regions are lower-income countries, this is a serious achievement. Pakistan,



Laos, and Argentina had the highest volume of investments and loans in RE projects. Green energy projects comprised almost 40% of all financed projects, while hydro energy accounted for 60%. The BRI has helped participating countries realise their potential in renewable energy and provided them with resources to achieve their goals. Due to those efforts, the level and volume of installed clean energy capacity are increasing, helping on a global level to achieve climate goals. Without the BRI, the number and volume of projects would, for sure, be much lower. On the other hand, there is no evidence that the investments within the BRI in fossil fuels (gas and oil) will decrease.

However, there is still enough room to improve renewable energy cooperation. China has resources to fund and help BRI countries, but they need to take a more active role in the initiative. Some countries are doing more, others less. However, it is hopeful that times are changing and people are becoming more aware of the need for sustainable development. Working together globally is crucial to achieving positive climate change. Without joint effort, our planet and people will continue to suffer.

## REFERENCES

- Bocca, R. (2022, March 9). China rapidly expands wind power capacity: Here's what you need to know about the global energy transition this week, *World Economic Forum*, retrieved from <https://www.weforum.org/agenda/2023/03/china-wind-power-energy-transition-power-global-energy-crisis-6-march/>. Accessed 8 August 2023.
- [CGIT] China Global Investment Tracker. (2023). Database. American Enterprise Institute and Heritage Foundation. Available at: <https://www.aei.org/china-global-investment-tracker/>.
- Conte, N. (2022, August 30). Visualizing China's Dominance in the Solar Panel Supply Chain, *Visual Capitalist*, retrieved from <https://www.visualcapitalist.com/visualizing-chinas-dominance-in-the-solar-panel-supply-chain/>. Accessed 8 August 2023.
- Curran, L., Lv, P. and Spigarelli, F. (2017). Chinese investment in the EU renewable energy sector: Motives, synergies and policy implications, *Energy Policy*, 101, pp. 670-682, DOI: <https://doi.org/10.1016/j.enpol.2016.09.018>.

- Duan, B. (2021). Discussion on the development direction of hydropower in China, *Clean Energy*, 5 (1), pp. 10-18, DOI: <https://doi.org/10.1093/ce/zkaa025>.
- Gippner, O. and Torney, D. (2017). Shifting policy priorities in EU-China energy relations: implications for Chinese energy investments in Europe, *Energy Policy* 101, 649–658, DOI: <https://doi.org/10.1016/j.enpol.2016.09.043>.
- Halliday, E. C. (1961). A historical review of atmospheric pollution, *Air Pollution*, World Health Organisation Monograph Series, (46), Geneva. pp. 9-37, retrieved from [https://apps.who.int/iris/bitstream/handle/10665/41722/WHO\\_MONO\\_46.pdf?sequence=1#page=9](https://apps.who.int/iris/bitstream/handle/10665/41722/WHO_MONO_46.pdf?sequence=1#page=9). Accessed 8 August 2023.
- [IHA] International Hydropower Association. (2022). Country profile – China, retrieved from <https://www.hydropower.org/country-profiles/china>. Accessed 8 August 2023.
- Jillani, S. (2022, November 18). Analysis: China’s shifting energy investments in Pakistan, from coal to renewables, *The Third Pole*, retrieved from <https://www.thethirdpole.net/en/energy/analysis-chinas-shifting-energy-investments-in-pakistan-from-coal-to-renewables/>. Accessed 28 August 2023.
- Lu, X., Chen, S., Nielsen, C. P. et al. (2021). Combined solar power and storage as cost-competitive and grid-compatible supply for China’s future carbon-neutral electricity system, *PNAS*, 118 (42), DOI: <https://doi.org/10.1073/pnas.2103471118>.
- Mei, D., Weil, M., Prasad, S., O’Malia K., and Behrsin, I. (2023). A Race to the Top: China 2023, *Global Energy Monitor*, retrieved from <https://globalenergymonitor.org/wp-content/uploads/2023/06/GEM-RTTT-China-2023-report-English-1.pdf>. Accessed 20 August 2023.
- S&P Global Commodity Insights. (2022, September 23). China could exceed renewables generation target of 33% by 2025, *S&P Global*, retrieved from <https://www.spglobal.com/commodityinsights/en/market-insights/latest-news/energy-transition/092322-china-could-exceed-renewables-generation-target-of-33-by-2025>. Accessed 8 August 2023.
- Schonhardt, S. (2023, January 30). China Invests \$546 Billion in Clean Energy, Far Surpassing the U.S., *Scientific American*, retrieved from

- <https://www.scientificamerican.com/article/china-invests-546-billion-in-clean-energy-far-surpassing-the-u-s/>. Accessed 8 August 2023.
- Turcsanyi, R. Q. (2017). Central European attitudes towards Chinese energy investments: The cases of Poland, Slovakia, and the Czech Republic. *Energy Policy*, 101, pp. 711-722, DOI: <https://doi.org/10.1016/j.enpol.2016.09.035>.
- [UNCTAD] United Nations Conference on Trade and Development. (2023). World Investment Report 2023 – Investing in sustainable energy for all: Overview, United Nations, Geneva, pp. 1-60, retrieved from [https://unctad.org/system/files/official-document/wir2023\\_overview\\_en.pdf](https://unctad.org/system/files/official-document/wir2023_overview_en.pdf). Accessed 7 July 2023
- Wang, X., and Feng, Y. (2021). The effects of National High-tech Industrial Development Zones on economic development and environmental pollution in China during 2003–2018, *Environ Sci Pollut Res* 28, pp. 1097–1107, DOI: <https://doi.org/10.1007/s11356-020-10553-1>.
- Wang, B., and Lin. P. (2022) Whether China’s overseas energy infrastructure projects dirtier or cleaner after the Belt and Road Initiative?, *Energy Policy*, 166 (113007), DOI: <https://doi.org/10.1016/j.enpol.2022.113007>.
- Yuan, J. et al. (2020). Ecology of industrial pollution in China. *Ecosystem Health and Sustainability*, 6(1), 1779010. DOI: 10.1080/20964129.2020.1779010.
- Zakić, K. and Šekarić, N. (2021). China’s energy cooperation within the 17+1, *Međunarodni problemi*, 73 (1), pp. 7-38, DOI: <https://doi.org/10.2298/MEDJP2101007Z>.
- Zheng X. (2022, December 15). Biomass technology shows huge growth, *China Daily*, retrieved from <http://global.chinadaily.com.cn/a/202212/15/WS639a8b61a31057c47eba48e5.html>. Accessed 7 July 2023.