

The European Green Deal: An Environmental Injustice?

A process-tracing case study of the effects of the European Green Deal energy policy on the divide between the global North and the global South



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Thesis Submitted in Partial Fulfillment of the Requirements for the Degree of Master in Political Science (MSc)

Specialization: Conflict, Power, and Politics

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14 August 2023

18.950 words

Abstract

This thesis examines whether the European Green Deal's energy policy reinforces the divide between the global North and South via an unequal exchange of labor and nature values, that are experienced by the cobalt mining communities in the Democratic Republic of the Congo and nickel mining communities in Indonesia. The reinforcement of the divide between the global North and South is theorized, according to World Systems Theory, to result in exacerbated environmental injustices stemming from 'greenification' of the economy via renewable energy technologies. Through the application of process-tracing case study analysis, various types of evidence have been identified, each carrying distinct levels of significance. Based on 3 Straw-in-the-wind types of evidence, 2 Hoop test types of evidence, and a single Smoking-Gun evidence type of evidence, this thesis concludes that it is highly likely to assume that the European Green Deal's energy policy facilitates an unequal exchange of labor and value of nature for mineral mining communities. This results in exacerbated environmental injustice which manifests itself as a reinforced divide between the global North and global South.

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List of abbreviations

Abbreviation	Definition
DRC	Democratic Republic of the Congo
EGD	European Green Deal
EU	European Union

1. Introduction

The European Union is leading in the implementation of environmentally friendly practices and has committed to becoming the world's first climate-neutral continent by 2050. It makes an effort to promote a sustainable and circular economy that can provide inclusive benefits for all citizens of the European Union. This objective will be achieved through the implementation of the recently adopted strategic framework known as the European Green Deal. The use of sustainable energy technologies to stop the release of fossil fuel emissions is a significant undertaking within the European Green Deal energy policy framework. Renewable energy sources such as wind and solar have gained significant attention for their potential to sustainably supply electricity for all European Member States, considering the eventual phase-out of coal-fired power plants. An additional element of the environmentally friendly policy entails a significant shift toward the use of electric vehicles, as this effectively reduces carbon dioxide emissions too (European Commission, n.d.A). The European Union's dedication to adopting these forms of renewable energy as a means of replacing the fossil fuel sector and promoting sustainable economic growth appears remarkably promising, leading one to question the potential limitations or drawbacks involved.

Scholars have embarked on examining the detrimental effects resulting from technological *greenification* via the implementation of renewable energy technologies. The primary sources of extracted raw materials and processed semi-finished products utilized in these technologies are predominantly derived from non-Western nations, similar to the case of fossil fuel extraction. Acknowledgement of the fossil fuel industry's detrimental impact that it imposes on the natural environment and the well-being of both human beings and animal populations is well known, however, this is not the case with the mineral extraction industry. The implications of this phenomenon, as global Northern nations utilize the discourse surrounding 'climate change' to exploit the natural resources of the global South for their benefit is not fully understood by scholars and academics. In this thesis, I explore the divergent effects and mitigation of climate change in the global North and South, illuminating how this phenomenon deepens already-existing divisions between these two geographic and economic counterparts. This literary gap leads to the following research question:

Does the European Union's Green Deal energy policy reinforce the divide between the global North and South and, if so, how?

As a framework for addressing the main question, Immanuel Wallerstein's World Systems Theory is applied. World Systems Theory provides a framework for understanding the global structure and dynamics of the world economy. It elucidates how economic and political interactions between nations contribute to patterns of inequality, development, and historical change via an unequal exchange of labor values within the larger context of a single interconnected world system. Furthermore, an unequal exchange of nature values extends the notion of the theory beyond economics and politics to include the environmental dimensions of global interactions. It underscores the unequal distribution of both the benefits and the burdens of global environmental interactions. This concept reflects how the dynamics of the world system influence not only economic and political disparities but also environmental sustainability.

This theoretical paradigm offers a comprehensive framework for examining global economic, political, and social systems. It provides an opportunity to gain insights into the interactions between core, semi-peripheral, and peripheral nations within a global capitalist framework, offering valuable perspectives on historical trends, power dynamics, and disparities in development. As will be discussed in Chapter 2, the World Systems Theory offers a better option than alternative theories such as Dependency Theory and Modernization Theory to research the global effect of the European Green Deal's energy policy. This is because World Systems Theory's focus on the world system as a whole instead of nation states, and because of its understanding of the world system as being inherently exploitative, rather than understanding agents as being exploitative in nature or having an exploitative motivation.

The method of process-tracing offers a valuable approach to map and analyze the underlying causal mechanisms and trajectories within the world system. This methodology facilitates the identification and understanding of the dynamics related to core-periphery interactions, power imbalances, and dependency mechanisms in distinct historical contexts. By employing this approach, empirical evidence is harnessed to effectively validate or question the assumptions and forecasts put forth by World Systems Theory. By delving into specific cases and examining the step-by-step processes that unfold, it can strengthen the empirical foundation of this research and contribute to the advancement of the theoretical framework.

There is a significant scarcity of literature about the ramifications of the European Green Deal's energy policy on the global South. The existing body of scholarly research that largely addresses

the central question of this thesis centers on the requisite extraction of mined minerals, as well as the associated local environmental inequities and land acquisition processes entailed in the establishment of a North African-European Energy corridor facilitated by high-voltage power transmission lines (Dunlap & Laratte, 2022). This implies a narrow view of what the ‘global South’ entails. It indicates minimal representation of the South since this study focuses solely on a particular case that is located in Northern Africa, from which it draws conclusions on the overall impacts of the European Green Deal’s energy policy on non-Western states. Moreover, it indicates a gap in the literature: namely an analysis of what the European Green Deal’s negative impacts are viewed from multiple perspectives (i.e., geographic areas) that make up the global South (thereby encompassing the most prominent extracted minerals that are essential to the transition).

Related research on the topic tends to focus on the number of minerals to be mined to facilitate the transition in accordance with the European Green Deal’s policy (Bolger et al., 2021). Related literature on this topic also takes a closer look at the negative consequences of mineral extractivism by wealthy economies in single cases. The articles do not link the European Green Deal policy to the impacted demands for necessary minerals such as cobalt and nickel to power decarbonization technologies for the EU (Bruna, 2022; Weber & Cabras, 2021). To summarize, the current literature is missing a more comprehensive analysis of what the European Green Deal’s effect is on states where predominantly minerals are mined that are of vital importance to the technology that drives change via the policy. The approach of this thesis complements the current literature by generating a better understanding of what the benefits of electrification and greenification in the global North are, relative to the perceived costs by the global South for providing the essential resources to a problem that these states hardly contributed to.

Drawing upon the insights obtained from this thesis, individuals, organizations, and states can make better and more informed decisions, thereby ensuring improved ethical consideration for the proposed solutions aimed at mitigating the impacts of climate change. It also provides an alternative perspective on the environmental sustainability of these proposed ‘green’ technologies. Thus, this thesis has both scientific and social relevance.

So, the purpose of this thesis is to give insight into the perceived effects of environmental injustice by the European Green Deal’s energy policy on mining communities in the global South, and how this practice ultimately strengthens the division between the global North and South. This will be

structured around four forthcoming chapters. In the following section, namely the Theoretical Framework, a concise overview will be provided to elucidate the concepts of climate change and energy transition, to delve into the body of literature about the politicization of climate change. Following this, a comprehensive illustration of the European Green Deal is presented, encompassing its inherently extractivist nature. Then, an examination of the existing body of research on environmental (in)justices is conducted, thereby establishing a connection to the field of (neo-)colonialism. Following this, the analytical framework will be presented, and a comprehensive explanation of the World System Theory will be provided.

Next, an examination of the methodological framework is detailed in the subsequent chapter. This chapter provides insights into various aspects, with a focus on detailing the research design employed in this thesis. It also outlines the data collection methodology and details the approach taken for data analysis. The chapter proceeds with the process of operationalizing the phenomenon under study and concludes by addressing the obstacles and constraints encountered within the course of the research.

The analysis will be conducted in the following chapter. Firstly, a concise overview of the process-tracing tests is provided. Following this, the two aforementioned cases (the Democratic Republic of the Congo and Indonesia) are presented, wherein a range of observations are examined, highlighting potential correlations between an unequal exchange of labor and nature values in the practice of mineral mining. The impact of the European Green Deal on mineral extraction will be analyzed subsequently, following a comprehensive review of the overall supporting evidence.

Lastly, the fifth and final chapter of this thesis effectively concludes the study by providing a comprehensive answer to the research question and restating pertinent information. The chapter ends with suggestions for future research endeavors.

2. Theoretical Framework

In the first section of this chapter, I will present relevant background information regarding climate change and the energy transition. This is necessary to situate the subsequent discussion of the politicization of the climate change literature. In the second section, I will discuss the European Green Deal (EGD) policy and its implications. In the third section, I will present relevant background information regarding environmental injustices and (neo-)colonialism. This is again necessary to situate the subsequent discussion regarding the theory from which the issue outlined in this thesis is analyzed, namely World System Theory and its environmental approach in section four.

2.1. Climate Change

The excessive emission of greenhouse gases by human-induced action has accelerated climate change significantly according to various Intergovernmental Panel on Climate Change reports (Soltau, 2009, p. 21). Greenhouse gases are a collection of approximately ten different synthetic and naturally occurring gases that are present in the atmosphere, with carbon dioxide (CO_2), methane (CH_4) and nitrous oxide (N_2O) being the major culprits in the climate change debate (Center for Sustainable Systems, University of Michigan, 2021). The presence of these gases has increased exponentially due to social and economic changes that marked the era of the Industrial Revolution. States in Northern Europe shifted their focus from an economy based on the production of crops and maintenance of farmland, to a society driven by the use of technology and machinery to enable mass production. These gases are released into the atmosphere through the burning of fossil fuels (like natural gas, oil, and coal) to generate energy and simultaneously by changes in land use, usually through deforestation practices (Uddin, 2017, p. 106). An elevation of carbon emissions through deforestation and fossil fuel usage is responsible for 77 percent of Earth's rising temperature. The contribution of methane and nitrous oxide are comparatively small, accounting for 14 percent and 8 percent of global emissions, in comparison to carbon dioxide (Soltau, 2009, p. 22). Increasing methane and nitrous oxide concentrations appear to carry a greater threat to global warming since these gases bear an increased warming potential of respectively 21 times and 310 times that of carbon dioxide (Wei et al., 2016, p. 633).

Since the onset of industrialization, about half of the carbon emissions released have been absorbed by the biosphere (oceans and plant life on Earth). This entails an accumulation of carbon

dioxide in the Earth's atmosphere to be a sum, consisting of the absorption capacity of the biosphere subtracted from the total amount of carbon. This indicates indirect causality between increased carbon dioxide levels and climate change (Wei et al., 2016, p. 632). Unabsorbed greenhouse gasses remain in the air for a considerable time, thereby staying relevant and dangerous for decades, as these gasses retain their warming abilities (Soltau, 2009, p. 23). In mitigation of this intensifying issue, the United Nations introduced a Framework Convention on Climate Change (UNFCCC) in 1992 to create a foundation for international climate change cooperation and mitigation (Bodansky, 2021). Subsequently, in 1997 the second UNFCCC agreement was ratified, known as the Kyoto Protocol. This treaty established a regulatory international regime that required industrialized economies to reduce greenhouse gas emissions according to established individual targets (Uddin, 2017, p. 107). These individual targets were grounded in common but differentiated responsibilities, by allocation based on developmental stage. Developed states were designated with the obligation of greenhouse gas reduction. Developing countries, on the other hand, were designated no responsibility at the time (Qiao-Franco, 2021, p. 1080). The Kyoto Protocol, as of 2015, has been succeeded by the Conference of Parties (CoP) 21, Paris Agreement (Bodansky, 2021). The Agreement stipulates that all states (developed as well as developing) need to reduce greenhouse gas emissions according to their own nationally determined contributions, to stay on track to limiting a 2-degree Celsius global temperature increase (Brown & Spiegel, 2019, p.149).

2.1.1. Energy Transition

To stay on track globally, regarding a maximum 2-degree Celsius increase, the necessity of stabilizing greenhouse gas concentrations in the atmosphere, via a transition to low-carbon energy production and consumption, is vital (Soltau, 2009, p. 40). Renewable energy sources are a major contributor to facilitating the production and consumption of energy that is low in carbon output. Categories of renewable energy sources include solar energy, wind energy, hydropower, and biofuels (United Nations, n.d.). In particular, wind and solar energy play a substantial role in the production of renewable energy globally. The International Energy Agency (IEA) predicts that 90 percent of the energy consumption in 2050 shall be provided via renewables, of which 70 percent consists of wind and solar energy, thereby bearing the greatest responsibility for future energy production (IEA, 2021, p. 20). Decarbonizing the transportation sector via electrification is one of the central applications according to the IEA for renewables. The Paris Agreement dictates the end

of combustion engine car sales by 2035, thereby increasing the reliance on electricity grids to process and charge electric vehicles, in addition to existing infrastructure (IEA, 2021, p. 21). Leading up to 2050 net-zero ambitions, an overhaul of the global electricity grid is deemed necessary in order to meet future demands (IEA, 2023, pp. 48-51). A problem that cannot be overcome with the primary sources of renewable energy is that wind and solar energy do not generate a constant supply of electricity day in and day out. Apart from the fact that the location of the source is chosen carefully, the effectiveness of the source certainly depends on the weather conditions, i.e., whether energy is generated and in what quantity by wind and solar renewables (Liang, 2017, pp. 857-859). Power plants control the supply variation by managing the output of electricity to energy-consuming demand. During favorable weather conditions, renewable energy sources produce excess energy, while during unfavorable weather conditions, these sources produce too little to serve as primary sources. As a result, energy battery storage modules are becoming a necessary part of the chain of action to store and access energy when required (Groppi et al., 2021, pp. 2-3). The IEA predicts an annual global growth trend of 600 Gigawatts in solar energy and an annual capacity increase of 340 Gigawatts of wind renewables. Accordingly, battery storage capacity needs to scale up to be able to accommodate the increasing influx of renewably produced electricity. So, an increase in the number of industrialized battery modules, as well as optimized smaller battery packages for electric vehicles and other modes of transportation, are required to prepare for the future (IEA, 2021, p. 118).

2.1.2. Politicization of Climate Change

The recommendations made by the IEA regarding the implementation of renewable energy technology as the primary solution to the climate issue, via replacing the need for fossil fuel usage, is one of the possibilities to solve climate change. The solutions are politically stigmatized when observed from the supranational level. This is due to differing interpretations of responsibility for climate change occurrence and differing views on global strategic mitigation of the issue in which mutual power relations of states are crucial. These power struggles are reflected in *the Global North and South divide* in climate change governance regarding what are and what are not viable solutions to the issue (Blicharska et al., 2017; Parks & Roberts, 2008; Gräbner-Radkowsch & Strunk, 2023).

This distinction between global North and South originates from the Brandt reports regarding proposals of economic interdependence and global development, initiated by the World Bank. Also known as the Brandt line, this international distinction visualizes the socioeconomic inequalities that split world politics in developed economies (Northern America, Europe, Israel, Japan, the Republic of Korea, Australia, and New Zealand) and developing economies (Africa, Latin America, the Caribbean, the Middle East without Israel, Asia without Japan and the Republic of Korea, and Oceania without Australia and New Zealand) (UNCTADSTAT, n.d.).

It gained momentum after the dichotomy between the East and the West fell apart after the Cold War ended (Jiménez, 2019, pp. 17-18; Lees, 2021, p. 85). After its introduction forty years ago, the relevance of the Brandt line regarding the climate change debate is accurate in terms of political division and economic inequalities (Jiménez, 2019, p. 18; Lees, 2021, pp. 104-105). This is reflected in the debate of how the international community is willing to deal with the climate crisis since a majority of climate science is produced by institutions located in the global North, with the aim of initiating solutions that will benefit the North and its relevant technological industries (Blicharska et al., 2017). According to Parks and Roberts (2008), such reflection heavily depends on the reigning causal beliefs and worldviews of dominating parties (p. 632). Developed states aim to greenify their economies through technological innovation with the underlying assumption of economic growth (an increase in gross domestic product).

Based on economic growth in the global North, the market is able to produce technological solutions that reduce greenhouse gas emissions by decoupling fossil fuels. These technologically complex solutions are hardly applicable in the global South due to the lack of resources and infrastructure to facilitate them, while the negative consequences of producing these technologies are profoundly experienced in the South. Fitting this worldview, developing states bear the same responsibility for greenhouse gas reduction as developed states. This is despite the global South not having completed the same degree of industrialization. The implementation of these measures is therefore not considered fair by the global South and these states oppose such reasoning (Parks & Roberts, 2008, pp. 635-636; Alam et al., 2015). These states are proponents of the worldview that they bear the right to further industrialize through fossil fuels usage in line with the trajectory of development as the global North has completed. According to developing states, growth stops or degrowth should be a measure initiated for developed states to reduce emissions. Degrowth

emphasizes the need to reduce overall production and consumption while prioritizing society's quality of life (Gräbner-Radkowsch & Strunk, 2023).

So, the least developed nations of the global South have the option of supporting climate solutions engineered by Northern industries, with the associated consequences. Or, risking drastic changes in the global climate in which these global Southern states will experience the biggest impact. This is due to their location near the equator, making these places more vulnerable to rising sea levels, loss of biodiversity, rising temperatures, and shifting precipitation patterns (Biermann & Möller, 2019, pp. 153-155).

2.2. European Green Deal

The EGD policy is the European Union's (EU) response to the issue of climate change and environmental degradation. It is a set of policies, a part of which is already implemented or to be implemented in the upcoming decade, with the aim of reducing greenhouse gas emissions by 55 percent in 2030, in comparison to 1990 levels. Furthermore, the EU aims to become climate neutral by 2050 and in order to do so it is investing 1.8 trillion euros in various sectors of the European economy (European Commission, n.d.A).

One of those investment initiatives is the 'Renewable energy directive'. This directive serves as a legal framework for policies according to which the development of renewable energy is implemented across the various sectors comprising the European economy. This directive entered force in 2018 and has been legally binding since 2021. Since the directive was implemented, it has been revised multiple times, thereby raising the established renewable energy target from 32 to 45 percent as of 2030 (European Commission, n.d.B). The European Commission's proposed solution is profoundly situated within the perspective of the global North's climate mitigation worldview, thereby relying on state-of-the-art renewable energy technology to offer a solution that deals with climate change and environmental degradation. The Green Deal aims to decouple resource use from economic growth in which the goal is to leave no person or place behind (in the EU). Renewable energy technologies are intended to be sustainable options that enable the opportunity to continue regular Western life without major modifications in terms of lifestyle. According to Sealey-Huggins "the framing of 'sustainability' in the global North is concerned with the future conditions of Northern citizens, often at the expense of the present existence of people in the global South" (2017, p. 2447).

2.2.1. Extractivism

The production of renewable energy technologies has a direct impact on the quality of life of people situated in the global South. These states experience impact through extensive mineral mining that powers 'sustainable' solutions for the global North. Mineral mining is essential to the production of renewable energy technologies, as well as for the battery modules that store generated energy. These practices of extractivism have an intertwined history with foremost the fossil fuel industry through the discovery of coal and oil in the global South. These practices refer to the act of exporting natural resources to make a profit (Dorn, 2022, pp. 139-140). The extractivist properties of the fossil fuel industry have harmed local populations and their natural environment. These methods of extractivism are currently shifting to initiatives of the renewable energy industry to obtain the necessary resources for mass adaptation (Dunlap, 2018, p. 2). The transition to renewable energy in the global North thus generates similar harmful effects as the fossil fuel industry for the global South. By solely focusing on greenhouse gas emission reduction via technological improvement and without drastic lifestyle changes, this indirectly pushes aspects such as environmental justice to the sidelines via the initiative taken by green industries for Northern governments in the global South (Corral-Montoya et al., 2022, p. 3).

2.3. Environmental (In)justice

In the literature debate encompassing Environmental Justice, scholars define Environmental Justice in multiple manners to highlight the concept for specific applications. The Environmental Justice concept entails the equitable treatment and substantial inclusion of individuals from all backgrounds, irrespective of their race, ethnicity, nationality, or socioeconomic status, concerning the formulation, execution, and implementation of environmental legislation, regulations, and policies. This thesis, however, aims to apply a definition of Climate Justice as a subsidiary concept to Environmental Justice in accordance with the Carbon Trade Watch's definition, stating that: "The recognition that the threats posed by climate change are a consequence of unequal, colonial, economic and social power relations" (Cabello & Gilbertson, 2015, p. 6). The concept of inequality in power relations is central to the consequentialist approach that this definition adheres to. The nature of the acts and the nature of the agents are irrelevant here since what matters are the consequences of the acts and of the agents that are trying to adhere to a maximum temperature increase of two degrees Celsius. These results have so far been negative for the climate and thereby

for the whole environment. The paragraph '2.1.3 Politicization of Climate Change' addresses the current systematic inequality between the global North and South regarding viable solutions to the issue. This inequality in power relations among states dates back to the period of colonialism. To make sense of the inequality in power relations it is necessary to concisely generalize the history of colonization to put the straining of these communities into perspective.

2.3.1. (Neo-)Colonialism

From approximately the year 1500 onward, many European states set up outposts and trade hubs around the globe, from which these states extracted and traded precious metals like silver and gold, as well as spices and other valuable commodities. These lucrative endeavors were eventually expanded into colonizing entire communities, states, and empires with the serving aim of enriching the European states, at the expense of indigenous residents, animals, and resources (Page, 2003; Benjamin, 2007). This continued until the aftermath of the Second World War, when an opportunity for independence presented itself. The colonial powers were resource and manpower depleted and at the same time, popular discontent grew in the colonies. The straw that broke the camel's back was the rising popularity of independence movements and eventually one by one former colonized territories became newly independent states (Page, 2003; Benjamin, 2007). This process ultimately took decades to complete with all its dire consequences. During the 1950's and 60's, while decolonization was in full swing, politically a new international order came into shape (Betts, 2008; Page, 2003; Benjamin, 2007). As the first signs of a globalizing world emerged, terms like 'modernization' and 'underdevelopment' entered people's vocabulary. People became aware of the disparity in wealth and the difference between colonized territories and former colonial powers' standards of living. During that time the term 'exploitation' gained notoriety to situate the past and present relationship between the former colonies and colonizers (Betts, 2012, p. 28). The first president and prime minister of the state of Ghana, Kwame Nkrumah, stated:

The economic exploitation that had been carried out in the colonial period continued unabated after the European flags were taken down and sent home. Neocolonialism was the 'worst form of imperialism' because it assumed no responsibility in the new states it was exploiting. (Betts, 2012, p. 28)

This entails, despite regained sovereignty for the colonized territories, that the political and economic situation of those states is to a considerable degree outside their control as these states wished to develop. Alongside the former colonizers, globalized industries benefited greatly from the situation. Due to financial dependency on investments from former colonial companies, this resulted in structured monopolistic trade relations, thereby accentuating a division between wealthier and poorer states (known as the global North and South divide). According to scholars of World Systems Theory, this is due to the integration into the world system via the maintenance of established colonial economic power structures that ensures the dependency relationship of the global South to the global North (Lees, 2021, p. 88; Dorn, 2022, p. 142).

2.4. Analytical Framework

The previously presented information regarding the politicization of international climate change mitigation, the EU's progressive Green Deal policy, and the underlying colonial power structure that facilitates minerals for Europe's green revolution, results in the expectation that the EGD causes a reinforcement of the global North and South divide via mineral extraction, thereby aggravating environmental injustices. This expectation is scientifically researched based on the World Systems Theory.

2.4.1. World Systems Theory

World Systems Theory presents a comprehensive analysis of the historical development and functioning of the capitalist world system. Developed by Immanuel Wallerstein in 1974, the theory states that "nations are part of a worldwide interdependent economic and political system based on the unequal exchange in the division of labor and allocation of resources between core nations, semi-peripheral nations, and peripheral nations" (Bell, 2014). Thereby emphasizing the world system to be the primary unit of analysis instead of nation states (as modernization theory stipulates) to explain the unequal development and accumulation of wealth within modern capitalist societies.

Wallerstein's theory traces the origins of the modern world system to the emergence of capitalism and the expansion of European powers in the 16th century, and challenges Eurocentric narratives and emphasizes the interconnectedness of global historical development (Wallerstein, 2011). The theory stipulates the linkages between agriculture, capitalism, and the rise of the

European led world economy via the transformation from feudalism to modes of capitalist production, concomitant with the enclosure movement (privatization of common land) and the commodification of land in the 18th and 19th century in northwestern Europe. Wallerstein argues that capitalist agriculture practices, based on the production of goods for the market rather than subsistence, were of fundamental importance to facilitate the process of generating a basic capitalist world economy (2011). According to Wallerstein, the concept of a world system is defined as “a social system characterized by an integrated market and a division of labor on a global scale” (2011, p. 37). The trade of goods and the labor force should therefore not be analyzed from a state perspective, but rather from a global perspective, in order to interpret the power structures between prosperous and less prosperous states.

Wallerstein identifies three key structural positions to which a state may belong within the world system, these being: the core, semi-periphery, or periphery. Core countries, consisting of advanced democracies, hold economic and political dominance in global trade relations, while peripheral countries, primarily located in Africa, Asia, and Latin America, provide raw materials and (cheap)labor. Semi-peripheral countries occupy an intermediate position, playing a role in mediating and connecting the core and peripheral regions, for example via the trade of fossil fuels (like crude oil and natural gas) (Wallerstein, 2011). The theory emphasizes the importance of analyzing the world system as a totality rather than focusing solely on individual countries or regions while examining power struggles. The capitalist world system is marked by cycles of expansion and contraction, with core countries experiencing periods of economic dominance followed by periods of economic decline. These cycles are shaped by the pursuit of profit, competition, and unequal power relations within the ‘core’ layer (e.g., British hegemony substituted by American hegemony) as well as in inter-layer struggles (e.g., Chinese dominance challenging American hegemony).

While having a strong foundation in Dependency Theory, World Systems Theory differs conceptually from it. Despite accepting world inequality, imperialism, and world markets, as the basic features of historical capitalism, Wallerstein subverts the central claims of orthodox Dependency Theory. There are two main reasons why, according to Wallerstein, core states do not take advantage of the (semi-)periphery states (as Dependency Theory suggests). Firstly, it is important to emphasize that core capitalist states ‘exploit’ workers in all zones of capitalist economies (not just the periphery), and that surplus value, not "wealth" or "resources", is the most

important factor in redistribution between core and (semi-)periphery. Furthermore, it should be noted that the alleged exploitation of (semi-)peripheral states by core states, as posited by Dependency Theory, does not hold. This is because the capitalist system, based on the World Systems Theory perspective, operates on the basis of an international division of labor, rather than an inter-regional and transnational division of labor (Stryker, 1998). In other words, the worldview of Dependency Theory argues that the motive (the agent's nature) is to exploit the other while the worldview of World Systems Theory comes down to the idea that the motive (the agent's nature) is not exploitative in itself, however, that the system in which the actions take place are exploitative.

In addition, Wallerstein's theory challenges traditional theories of economic development, such as modernization theory, by highlighting the role of systemic global structures and the persistence of inequalities in the current world system. Thereby criticizing modernization theories' focus on the nation-states as the unit of analysis, its presumption that all nations follow the same evolutionary development path, and its disregard for global structures that impede regional and societal growth (Barfield, 1998). The argument is made that the world system is characterized by an inherently exploitative hierarchy, with core countries benefiting at the expense of (semi-) peripheral nations' cheap labor force and raw materials (Wallerstein, 2011).

The foundational concept of the world system has seen many applications. Some examples that stood out were related to the literature encompassing, firstly the 'knowledge economy', secondly 'hidden hunger', and thirdly regarding 'climate change'. The term 'knowledge economy' describes those economies that place a high priority on technical and scientific innovation and in which access to employment opportunities requires substantial levels of technical and scientific knowledge. Such an economy presents a contrast to peripheral economies that rely on agriculture or resource extraction, as well as semi-peripheral economies centered around skilled or unskilled manual labor. Employment opportunities within a knowledge-based economy are typically concentrated in the financial, technological, and service sectors. In the contemporary global landscape, developed nations hold a prominent position within the knowledge economy, as the majority of top-tier technology and financial enterprises are situated in developed countries or the core of the global system, including but not limited to North America, Europe, and parts of Asia and Oceania. The market for products within the knowledge economy commonly is manifested in

peripheral or semi-peripheral nations. For example, countries like India, Brazil, Indonesia, Mexico, Bangladesh, and others are home to a significant portion of Facebook's and WhatsApp's user bases. The interconnectedness of the global knowledge economy extends beyond the classificational boundaries of nation-states. In peripheral and semi-peripheral states, there are regions that actively participate and are integrated into the global capitalist system. Despite being located within a semi-peripheral country, cities like Bangalore and Mumbai in India have attracted international recognition as important centers for finance and information technology (IT). As a result, the knowledge economy's application of the World Systems Theory reveals a significantly complex and interconnected global system rather than the simple existence of a basic division between core and periphery nations (Drew, 2021). The second application that stood out was in research focusing on 'hidden hunger'. This refers to a state of malnutrition characterized by inadequate intake of essential micronutrients and vitamins, despite the absence of visible signs of starvation within populations. Hidden hunger primarily stems from the consumption of nutrient-poor foods, such as packaged products and highly sweetened beverages. While the prominent packaged food corporations are primarily focusing their efforts to 'core' states, their products establish substantial markets within 'peripheral' countries. Sub-Saharan Africa encompasses 18 out of the 20 nations that exhibit the highest prevalence of hidden hunger, while the remaining two are the South Asian nations of India and Afghanistan (Muthayya et al., 2013). The third notable application of World Systems Theory is its syncretization with the environmental approach. This thesis concentrates on the application of World Systems Theory via the causal inference it stipulates regarding the environment.

Roberts and Grimes (1999) concluded that in the eighties and nineties, World Systems Theory scholars severely neglected global environmental issues in their studies. The failure of integrating natural and societal dimensions to form a world order critique was due to a cultural split in social justice and environmental protection academics. Bunker's (1988) work stipulated, as a single voice in a void, that an unequal exchange between periphery and core nations in part could be attributed to 'energy values'. In doing so, Bunker went against the prevailing notion of the Marxist labor theory of value. Most world system analyses, before Bunker's contribution, assumed "that capital accumulation in core areas can be accounted for in terms of asymmetric transfers of surplus value", and only the abuse of human labor is capable of creating that surplus value according to Hornborg

(2020, p. 185). Such a surplus value is in Marxist terms defined “as the difference between the economic cost and output of labor-power” expressed in monetary terms (Hornborg, 2020, p. 185). This thus shows that Bunker’s (1988) work contradicts the assumption of the Marxist labor theory of value and also the measurement method in monetary terms. The underlying problem that Bunker addresses is that the intrinsic value of nature has been undervalued throughout history (1988, p. 31). The work of Bunker and Ciccantell (1999) later on adds to this debate, that the labor theory of value pertains that core nation’s capital accumulation fundamentally relies on resource extraction in peripheral nations which created a “new historical materialism”, and a “recasting of world systems theory to highlight its material and environmental bases” (1999, p. 120). This raises the issue of ‘labor value’ not being the only undervalued commodity in the world system, since ‘value of nature’ is now contradicting the grounded notions of the Marxist theory (Hornborg, 2020, p. 186). It is thus a critique and an addition to how World Systems Theory conceptualizes the role of value and how the conception of “unequal ecological exchange”, as described by Foster and Holleman (2014) is relevant to the concept of the world system. In concrete terms, this means that apart from the unequal distribution of labor value, the environmental effects of resource use are unequally distributed in the world system as well. In earlier work of Hornborg, this is defined as “global distribution of environmental degradation” (Lennerfors et al., 2014, p. 60). Hornborg assumes that our world is a closed system, with a zero-sum implication entailing that resources are not infinite. This signifies that improvements in one part of the system are always offset by declines in other parts of the system. As natural resources are used by the core states to raise living standards in developing parts of the world, the (semi-)peripheral states will suffer environmental and societal detriments as a consequence (Lennerfors et al., 2014, pp. 60-61).

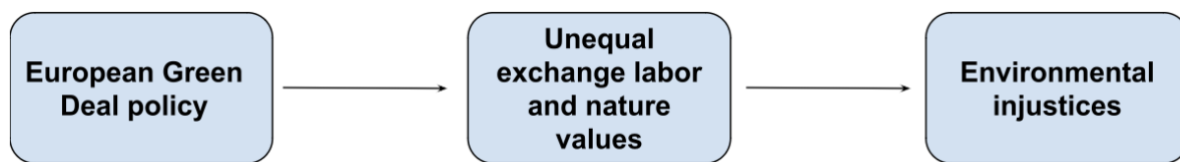


Figure 1: Hypothesized pathway based on World Systems Theory

The development of World Systems Theory in the direction of valuing the uneven allocation of natural resources besides labor value is a key introduced concept that makes the application of this theory for this thesis possible. Figure 1 depicts the argument this thesis intends to make. The EGD

policy is theorized to result in an unequal exchange of labor value and of value of nature via practices of ‘green’ mineral extractivism. The resulting unequal exchange of labor value and value of nature develops in those communities affected by mineral extractivism, into exacerbated environmental injustices based on the World Systems Theory environmental approach. These local environmental injustices, in the areas affected by the policy, then reinforce the perceived divide between the global North and South. The researcher thus interprets an increase of local environmental injustices resulting from the EGD policy as a reinforcement of the divide between global North and South since the EU is benefiting from the results (in the short to medium term) and local communities are off worse. Furthermore, the original perspective of the theory stipulates taking an all-encompassing view on the issue at hand by not focusing on a single case, but a broader perspective. This lags in the current literature, and this is precisely what this thesis contributes through applying the World Systems Theory environmental approach to the EGD’s global economic power implications and exploitations, concomitant with corresponding negative effects for peripheral nations.

2.5. Conclusion

In this chapter the most relevant literature regarding the question of whether Europe’s new energy policy reinforces the divide between the global North and South has been considered. This chapter started with an overview of climate change, whereupon the appropriate solution is discussed: a low-carbon energy transition mainly via wind and solar energy technology and the incorporation of giant battery modules. Thereafter, the politicization of this mitigation has been discussed. After that, the EGD and its extractivist practices were laid out. Furthermore, the consequences of extractivism, namely environmental injustices and the historical development via (neo-)colonialism were examined. This paved the way for the introduction of World Systems Theory, thereby considering what it entails, to which it was a response, and what theory it substitutes. This section concluded with the environmental approach to world system analysis.

3. Methodology

This chapter explains the methodological justification of this thesis. In the previous chapter, the relevant literature was reviewed, and an analytical framework was presented. This framework portrays the exploitative mechanisms of the world system and how it affects practices of extractivism and the flow of resources to facilitate the implementation of renewables. The research technique that is used, which is process-tracing, will be discussed here.

This chapter starts with a description of why a qualitative case study technique was chosen. Accordingly, the second section offers the methods used for gathering the data, with the third section covering strategies and techniques for data analysis. In the fourth section, the operationalization will be discussed. Finally, the challenges and restrictions related to data collection and analysis are covered in the fifth section.

3.1. Research Design

For this study, a qualitative approach was chosen. Qualitative approaches are highly effective for discovering information about topics where little is known about. This connects it well to this study's purpose of gaining more understanding over the influence of the European Green Deal's (EGD) new energy policy towards the division of the global North and South, since little is known about the negative impact of it. A highly effective characteristic of qualitative analysis, is the application of noncomparable observation, meaning that each observation pertains to a distinctive aspect of the researched topic (Gerring, 2017). By means of a quantitative analysis, this study would be unable to decipher the meaning of the EGD's implications truly is, and it would tend to express features of statistical inference instead of generating meaning. Using a quantitative approach would also entail the application of a large random sampling of cases to analyze, contrary to the small sample size used in this analysis thereby better suiting the qualitative approach (Gerring, 2017).

In choosing the right design for this study, the choice fell upon performing a case study analysis. The reason for this decision is that the value of a case study approach boils down to directly dealing with the individual cases within their naturally occurring context. The case study method has the advantage of dealing with each unique instance in its genuine environment and as Yin states "case studies get as close to the subject of interest as they are able to, in part through direct observation in natural settings and in part through their access to subjective factors (thoughts,

feelings, and desires)” (2016, p. 68). Also, according to Yin, variables are not the focus of the case; it is the case itself. So, case studies can be utilized for theoretical elaboration or analytic generalization, even if the primary goal of case study research is to create knowledge of the particular event.

This research adopted a purposeful case selection method that focuses on “typical, diverse, extreme, deviant, influential, most similar, or most different cases” (Seawright and Gerring, 2008, p. 296). This entails a selection method based on the most extreme and influential cases within the renewable energy sphere. Democratic Republic of the Congo (DRC) and Indonesia were selected considering their prominent role as the sources of cobalt and nickel respectively, and because these minerals are vital for the development and storage of renewable energy. These cases were also selected based on their geographical location. Coming from two different continents, namely Africa and Southeast Asia, these continents represent the global South to a high degree.

3.2. Data Collection

Document analysis has been the primary method of collecting data, which refers to “any written or recorded material other than a record that was not prepared specifically in response to a request from the inquirer” (Lincoln & Guba, 1985, p. 277). It would be desirable to obtain primary data by conducting interviews and observation in the selected case countries. However, time and resource restrictions made this task challenging. To overcome this limitation, this research leveraged a variety of sources encompassing scientific literature, official government documents, institutional websites, (online) newsletters, books, and (activist) blog posts. As stated, the most consulted source of data originated from scientific literature focusing on subjects related to climate change, energy transition, (neo-) colonialism, the global North and South divide, extractivism, and environmental injustice. Accordingly, the EGD and associated European Union (EU) policies were retrieved from the official website of the European Commission and related EU websites. Newsletters and reports of international origin were retrieved from LexisNexus, complimented by Google searches.

3.3. Data Analysis

For this study, demonstrating the theorized causal relationship between the implementation of the EGD and a perceived increase in environmental injustices for mining communities is done best via a process-tracing method. Process-tracing analysis according to Collier is “the systematic

examination of diagnostic evidence selected and analyzed in light of research questions and hypotheses posed by the investigator” (2011, p. 1). It constitutes an analytical methodology that comprises causal inference to investigate and understand the underlying mechanisms observed regarding outcomes in social science research. It provides a rigorous and transparent framework for evaluating causal processes and offers a systematic approach to assess the plausibility of different arguments (Fairfield & Charman, 2017). Specifically, this study follows the World Systems Theory environmental approach by tracing the implications of an unequal exchange of labor and environmental values regarding the Global North and South divide and the unequal development between the two blocks.

In the field of social science research, process-tracing has gained much ground in recent years. Many scholars have contributed to the advancements made in the last two decades. The works of Van Evera (1997) and Bennett (2010) especially have made significant contributions to the field of process-tracing analysis. Despite these helpful contributions, the works of Collier (2011), Fairfield & Charman (2017), and Ricks & Liu (2018) made efforts to come up with practical guidelines to conduct qualitative process-tracing analysis in the social sciences. Based on their works, the process-tracing analysis is carried out in this thesis. Going forward, the researcher will give an in-depth description of how process-tracing is applied with concise elaboration on the various steps.

The first step is to identify a testable argument rooted in theory, which is opposed by a rival explanation. The second step involves establishing a timeline that depicts a sequence of relevant events to the testable argument (this is done in the introduction per case). The third step entails constructing a causal graph that depicts the argumentation to be made (as visualized in section 2.4.1.) (Ricks & Liu, 2018, pp. 842-843). Steps four and five are closely linked and build on one another. So, for relevant events in the causal graph, an alternative choice could have been made. It is therefore possible to identify theoretically grounded alternatives, as the step-by-step guidance suggests. These alternative choices then produce potential counterfactual outcomes (Ricks & Liu, 2018, p. 844). By contrast, Slater and Ziblatt (2013) describe making use of controlled comparisons as an alternative to steps four and five of Ricks & Liu’s step-by-step guide. A controlled comparison entails comparing the cases of interest with empirical alternatives. This demands comparing the two cases with one another, to establish whether it leads to the same outcome. To properly conduct a process-tracing analysis according to the step-by-step guidance, step one up to

and including step five needs to be conducted before data collection begins, thus meaning before the start of presenting evidence. Step six involves systematically gathering evidence (multiple pieces of different weights) to see whether the argued explanation holds in both cases, or whether it should be refuted. Thus, step six involves researching whether in both cases comparable results can be found. On the basis of the evidence, it is assessed whether the hypothesized argumentation is a comprehensive explanation for the sequences of events depicted in the causal graph.

Not all findable evidence is of the same type, so distinguishing between the various types is necessary, since as Ricks & Liu state “some data are necessary to establish causation; others sufficient and then there are data that are neither or both” (2018, p. 844). For practical usage, the tests developed by Van Evera (1997) are the straw-in-the-wind, hoops, smoking gun, and doubly decisive tests. These are applied in the analysis, after a further explanation of these tests is given in section 4.1.

3.4. Operationalization

In this section the required concepts are operationalized, to make these concepts measurable while performing the analysis. In doing so, the first step is to indicate what the perceived cause and perceived effect are in this study and what explanations will be tested via a process-tracing analysis. Thereafter, the necessary concepts are operationalized.

The perceived cause of this study entails the EGD policy. The perceived effect in question is the global North and South divide. Via a causal mechanism, the perceived cause and effect are connected and, according to Gerring, this stipulates “the pathway(s) through which X might affect Y” (2010, p. 1500). This pathway is not a singular connection between the perceived cause and effect, moreover, there is a form of methodological individualism at play as described by Weber. Weber (1978) stipulates that methodological individualism is concerned with explaining social phenomena as the resulting behavior of individual actors. This concept entails that social phenomena are fundamentally important in understanding why actors act the way they do. So, in concrete terms, this requires understanding social phenomena as the (un)intended consequences of actions by individual actors at the local level, with the actions shaped by their pre-existing social context (Udehn, 2002). Then the possible pathways (explanations) are introduced. The testable explanations for the cases of cobalt mining in the DRC and nickel mining in Indonesia are created

equal since there is no change in theoretical expectations between the two cases. Hereby the presented argued explanation and an alternative explanation:

Argued explanation: *The European Green Deal energy policy facilitates an unequal exchange of labor and value of nature for mineral mining communities. This results in an exacerbated environmental injustice, which manifests itself as a reinforced divide between the global North and South.*

Alternative explanation: *The European Green Deal energy policy does not facilitate an unequal exchange of labor and value of nature for mineral mining communities, thereby not resulting in an exacerbated environmental injustice.*

To complete the operationalization section, the terms *Unequal exchange of labor* and *Unequal exchange of value of nature* need to be made measurable. Based upon the works of Wallerstein (2011), Bunker (1988), Bunker and Ciccantell (1999), Foster and Holleman (2014), and Hornborg (2020), an *unequal exchange of labor* is measured as a disproportionate transfer between the costs of labor and the benefits from that labor between the global North and global South. Following that same logic, an *unequal exchange of value of nature* is measured as a disproportionate transfer between the value of devastated nature and the value of benefitted nature between the global North and global South.

The assessment of the effects of the EGD involves a thorough analysis of data concerning the measurable rise in solar and wind energy production capacities, as well as the rates of adoption of electric vehicles, both preceding and following the implementation of this policy. These measurements are chosen since the EGD policy focuses on wind and solar energy, and the introduction of electric vehicles, and therefore the increases in these energy sources and vehicle usage are the most prominent indicators of the EGD policy's effect regarding its aim to decarbonize.

On the basis of causal-process observations (CPO's), as described by Collier (2011), measurable evidence is sought to confirm or deny the validity of the argued explanation via the four tests developed by Van Evera (1997) and further developed by Collier (2011).

3.5. Challenges and Limitations

During the various stages of this study, challenges and limitations have presented themselves. The availability and quality of collected data pose a challenge. Due to the dependency on secondary literature, the researcher was limited in gathering the highly specified data that was necessary for conducting the process-tracing analysis. Incomplete or limited data may hinder the accurate implementation of the various causal tests that were discussed in the previous section and so wrongly impact the acceptance or rejection of the argued or alternative explanation. In addition, the researcher's interpretation of the data is also a potential issue since it heavily depends on the cultural context and the social values in which it is exercised. This may result in an outcome bias that is overlooked, however, due to the practice of reflexivity this problem is mitigated as much as possible. This entails acknowledgment of the social position, cultural background, and personal experiences that influence the perception of the researcher. Engaging in self-reflection is one way to identify one's assumptions and potential prejudices that could have an impact on the awareness of biases. This is also countered by the application of triangulation of data sources, which aims to mitigate the problem as much as possible.

4. Analysis

In this chapter, the analysis of this study is performed. This chapter analyzes whether a pathway can be found in the case of the Democratic Republic of the Congo (DRC) and in the case of Indonesia, where the European Green Deal (EGD) causes a reinforced divide between the global North and South via an unequal exchange of labor and an unequal exchange of nature value (argued explanation), or whether this pathway cannot be found (alternative explanation). To start the analysis, it is necessary to describe the process-tracing tests discussed in paragraph 3.3. Once this explanation has been completed, the case of the DRC will be introduced in paragraph 4.2., in which will be shown that in this case, there is a case of unequal exchange of labor and nature value. In 4.3., the same will be done for the case of Indonesia. Lastly, in paragraph 4.4., the effects of the EGD policy will be discussed and connected to the cases.

4.1. Process-tracing Tests

As stated in section 3.3., the four process-tracing tests which are used to evaluate the observations are clarified in this section. The first distinguished test is the *Straw-in-the-Wind test*, which is able to increase plausibility or raise doubt about a given explanation. As Collier states, “Straw-in-the-wind tests thus provide neither a necessary nor a sufficient criterion for accepting or rejecting a hypothesis, and they only slightly weaken rival hypotheses” (2011, p. 826). Of the various tests, the Straw-in-the-Wind is acknowledged to be the weakest one. However, it can provide valuable knowledge as an initial assessment, especially when passing multiple Straw-in-the-Wind tests.

The second test, referred to as the *Hoop test*, is more demanding. The argumentation, as Collier phrases it, “must ‘jump through the hoop’ to remain under consideration, but passing the test does not by itself affirm the hypothesis” (2011, p. 826). This test is thus not a sufficient criterion to accept the plausibility of an argumentation, however, it can eliminate an argumentation.

The third established test, also known as the *Smoking Gun*, bears a greater opportunity to establish “a sufficient but not necessary criterion for accepting the causal inference. It can strongly support a given hypothesis, but failure to pass does not reject it” (Collier, 2011, p. 827). When a given argumentation passes this test, it results in severely weakened alternative explanations.

The *Doubly Decisive Test* is the final and all-encompassing one that eliminates all alternative explanations and confirms the one in question. It “meet[s] both the necessary and sufficient standard for establishing causation” (Collier, 2011, p. 827). Such an opportunity is rare

in social science, however, by combining multiple different tests, both standards of necessity and sufficiency *can* be met so that a single explanation can be confirmed, and rival explanations can be eliminated. Following these four tests, the causal-process observations are evaluated, thereby executing steps six of the process-tracing analysis.

4.2. Democratic Republic of the Congo

To establish whether the EGD policy affects environmental injustices related to mineral mining activities in the DRC, it is first necessary to establish a brief history of cobalt mining in the country.

At the beginning of the 20th century, during the peak of colonialism, cobalt-containing copper ore was first discovered in large quantities in DRC by the Belgium mining company Union Minière in 1914. The company started to extract the mineral directly in the year 1924, instead of obtaining the mineral as a byproduct of copper mining, and it claimed to be the world's biggest producer of cobalt by the year 1926 (Nzongola-Ntalaja, 2013). During the interbellum period, the application of cobalt was predominantly reserved for usage in precision tools and magnet alloys. Following the end of World War II, the mineral became predominantly applied by the United States in new military technology to match the growing demand for propulsion systems of newly invented jet airliners and engines of weapon systems. Since then, cobalt has taken a prominent role in the battle for technological supremacy by great powers, culminating in the Cold War (Gulley, 2022). After the colonization period ended and the Congolese people regained independence, general elections were held in the year 1960, however, without a conclusive result. As a result, the Congo crisis erupted: a period characterized by a political impasse following the elections, resulting in several rebellions and international competition to gain influence in the resource-rich underdeveloped (peripheral) state. The great powers of the Cold War (the United States and the Soviet Union) projected their powers by supporting, interfering, and dictating policies of foreign states, as was the case in the Congo. This resulted in the rise of Army Chief of Staff Joseph-Désiré Mobutu to take power through a military coup, thereby ending the crisis (Gulley, 2022; Nzongola-Ntalaja, 2013). Mobutu received support from Western allies to keep the flow of important minerals to the West secure. In the eastern part of the DRC, where Mobutu had significantly less control, a secessionist communist state was established led by Laurent Kabila, who received aid from the People's Republic of China (Abbott, 2014). During Mobutu's reign, multiple major errors were made in directing the supply of cobalt into the international market. This degraded slowly, as a

violation of his authority, and eventually his government collapsed in 1995 (Nzongola-Ntalaja, 2013). Subsequently, Laurent Kabila's opportunity presented itself, backed by militias supported by Rwanda and Uganda, to take control of the state in 1996, thereby starting the First Congo War (Gulley, 2022). In 1998, a second Congo War erupted because Kabila wanted to separate its ties with his former supporters (the militias backed by Rwanda and Uganda) (Abbott, 2014; Nzongola-Ntalaja, 2013). These military conflicts devoured the DRC until 2003 and had a major effect on the willingness of Western companies to invest in the resource-rich but unstable nation. Together with continued economic and political instability, the everlasting possibility of nationalization of assets by the government caused a major outflow of Western (mining) companies at the time (Gulley, 2022).

As of 2007, the People's Republic of China has invested heavily in the Congolese mining and infrastructural sector. According to the 'minerals for infrastructure' agreement, a multi-billion-dollar investment was made by the Chinese government and associated state-owned companies. In exchange for building a variety of infrastructural projects (e.g., highways and railroads), these Chinese state-owned mining enterprises got access to mining rights for valuable areas within the Copperbelt province (Jansson, 2011). As a result, Chinese mining enterprises currently dominate the market of cobalt extraction in the DRC (Reuters, 2015). The vast majority of cobalt is mined within the Congolese Copperbelt province of Katanga and five of the ten largest active mining companies in the region are Chinese-owned enterprises. The same applies to mines that are under construction as well. Three out of five major projects under construction are Chinese-owned (Mining-Technology, 2023A).

The influence of China on the global supply chain of cobalt extends far beyond only mining the mineral in the Congo. Refining the mined cobalt is a necessary step in order to make the mineral usable for its various applications. In the process of cobalt refinement, China again dominates this part of the supply chain and is estimated to refine approximately 73 percent of the mineral from various mining sites around the world. Furthermore, it takes on a strategic role in the subsequent phases of the supply chain, particularly in the production of battery cell components. Notably, China currently possesses a significant share of 78 percent of the global cell manufacturing capacity for electric vehicle batteries. These batteries are subsequently assembled into modules and utilized for the construction of battery packs. Additionally, the nation is home to a significant majority (75

percent) of the global lithium-ion battery mega-factories, while simultaneously being recognized as the world's largest consumer of the minerals it refines (Castello & Purdy, 2022; Cobalt Institute, 2023).

China is thus a major player within the entire supply chain of mining, refining and eventually developing cobalt into various products. This shows that due to China's significant influence in the supply chain, other countries that prioritize environmental sustainability rely heavily on Chinese companies throughout the supply chain and the operational practices that go along with them, like the upholding of human rights and environmental protection (Amnesty International, 2017). Given China's significant global influence, as a nation situated in a semi-peripheral position, it effectively shapes the behavior and policies of both (Western) core nations and peripheral nations. Alongside the Chinese-owned mining companies, there are a variety of Western-based companies active within the Congolese Copperbelt province of Katanga (Mining-Technology, 2023A). These firms generally operated in a similar industrial manner. In addition to the industrial mining operations, a considerable portion of the mining is performed by artisanal miners who are active in the Copperbelt region.

4.2.1. Unequal Exchange of Labor and Nature Values in the Congo

To establish whether the EGD aggravates the unequal exchange of labor and nature values, it is necessary to establish first whether an unequal exchange of labor and nature values is occurring without the additional burden of an increased demand for certain minerals by the EGD policy.

All of the major mining operations (henceforth referred to as large-scale mining) currently active within the Congolese Copperbelt province are violating both international human and environmental laws, however, the circumstances of artisanal miners (henceforth referred to as small-scale mining) are off worse (Amnesty International, 2013; Human Rights Watch, 2022; Business & Human Rights Resource Centre, 2023A). Large-scale mining techniques, which frequently combine surface scrapers, bulldozers, and diggers with excavators, dump trucks, dynamite, and acid, are used to extract about 80 percent of the nation's cobalt. These techniques thus make extensive use of large equipment and a high degree of automation and mechanization. On the other hand, 98 percent of the workforce is employed in small-scale mining operations, which only accounts for 20 percent of the total extraction. The small-scale mining process is characterized by the utilization of outdated technology, significant reliance on manual labor, and the presence of

considerable hazards, posing a heightened risk to the miners (Sovacool et al., 2020). The documentation of the environmental damage brought on by the small- and large-scale mining of cobalt, includes incidents like the exposure of mining workers to uranium and toxic metals, as well as the contamination of drinking and bathing water with heavy metals. Occupational health and safety measures are severely lacking, resulting in a high incidence of workplace injuries, mine collapses, and accidents. Furthermore, workers are consistently exposed to hazardous substances such as mercury, dust, fumes, and other environmental risks including rock falls and landslides. There exists a pronounced state of environmental degradation, characterized by a lack of consideration for local environmental protection and ecosystems. This is evident through actions such as the direct disposal of waste and tailings, discharge of effluents into rivers alongside the air pollution caused by discharges and emissions and alluvial regions, soil erosion, deforestation, and the irreversible loss of biodiversity and deforestation practices (Banza Lubaba Nkulu et al. 2018; Tsurukawa et al., 2011; Sovacool et al., 2021). The World Bank (2008) recognized the extensive ways in which such operations can destroy the local ecosystem and characterized the environmental effects of small-scale mining in the DRC as ‘deplorable’. Furthermore, the ecosystems of the wetlands are negatively impacted by the treatment of slimes (viscous waste products from mining operations) and tailings, which change the dynamics of river flows and sedimentation patterns. The environmentally harmful effects of mining tunnels include soil erosion, land instability, ground subsidence, and widespread contamination of the environment with dangerous dust particles. While the mine is only one contributing factor, pollution is undoubtedly present at other points along the operational chain, such as slurry sites, trading depots, and processing facilities (Andrews et al., 2008; Sovacool et al., 2020).

Since small-scale mining operations employ the greatest number of workers who are actively employed in this industry, this research places more emphasis on this mode of cobalt mining in seeing whether an unequal exchange of labor occurs. Small-scale mining of cobalt manifests itself in two main ways in the DRC. One method entails the effort of miners, mainly young men, exerting their efforts in excavating underground passageways using tools like shovels, chisels, and mallets, reaching depths of about 30–40 meters. In addition, there is a situation where people, mainly women and children, engage in cobalt excavation and collection activities close to or inside industrial mining authorized areas, where there are discarded tailings and slurry present. Both categories of small-scale mining operations have experienced increased growth during the

recent surge in cobalt demand for green technologies (Haider and Rohwerder, 2015; Sovacool et al., 2021).

These mining operations, especially those excavating underground passageways, are carried out in dangerous working environments where safety precautions are lacking, and where the welfare of children is not given adequate consideration. Poverty is widespread in the small-scale Congolese cobalt mining industry, with a significant proportion of miners being subsistence diggers who struggle to earn a sufficient livelihood. A significant number of individuals who seek refuge are displaced due to ongoing conflicts and ethnic tensions within the region, while another portion consists of orphaned individuals. The utilization of child labor in mining operations is prevalent, as numerous orphaned individuals and former child soldiers are actively pursuing economic opportunities presented by small-scale cobalt mining, mainly as a result of insufficient incentives for pursuing formal education or alternative employment. Children are required to transport ore sacks that weigh more than their body weight regularly. Additionally, some findings suggest that children frequently endure instances of physical abuse including incidents involving security guards wherein they are subjected to beatings, whippings, and attempted drownings. Moreover, reports highlight cases of drug abuse, violence, and sexual exploitation to which these children are exposed. There have also been documented instances suggesting that groups of individuals, particularly women and children, are victims of economic exploitation by traders and supervisors who intentionally fail to adhere to proper weighing practices. As a result, these individuals are being remunerated insufficiently, at rates that do not align with current market standards, due to the underestimation of cobalt sack weights through visual means (Banza Lubaba Nkulu et al. 2018; Faber et al., 2017; Sovacool et al., 2020).

Likewise, gender discrimination persists despite the fact that women make up approximately half of the small-scale mining labor force. Societal gender norms perpetuate a lower status for women compared to men, resulting in unjust practices such as assigning women to less favorable job positions with lower remuneration. Additionally, women encounter significant barriers to land ownership, limited access to education, and a prevalence of engaging in sex work as a consequence of these inequitable circumstances (D'Souza, 2007; Sovacool et al., 2020). There is also a noteworthy deficiency in the implementation of optimal techniques and equipment, as evidenced by insufficient levels of mechanization, subpar recovery efficiency, inadequate ventilation and lighting, and rudimentary mining methodologies. When valuable mineral resources

such as cobalt are discovered in those communities, they are often subjected to dispossession by governmental or corporate entities, which deny them the necessary mining licenses or permissions. In more severe cases, the communities are forcibly relocated from these sites, as exemplified by the eviction of a significant number of individuals following the discovery of a cobalt deposit near Kolwezi with an estimated value of £75 billion British pounds (Baker, 2019).

The *unequal exchange of labor* concept is measured as a disproportionate transfer between the costs of labor and the benefits from that labor between the global North and global South. This can be demonstrated based on the following observations.

The aforementioned are the summarized labor cost implications faced by the mining communities in the Democratic Republic of Congo. This is reflected in, among other things, the enormous employment rate of 98 percent of the workforce, which is using outdated technology and manual labor to mine. It is inefficient and an inadequate practice that poses significant risks to miners due to a lack of occupational health and safety measures. The working conditions for these miners are dangerous since they lack safety precautions and inadequate consideration for the welfare of children. The mining operations involve young men excavating underground passageways with rudimentary tools (at danger of tunnel collapses), and women and children illegally collecting cobalt in authorized mining areas near heavy equipment. Many miners are struggling to earn a sufficient livelihood, therefore poverty is widespread in the industry. Child labor is also prevalent, with orphaned individuals and former child soldiers being exploited due to limited alternatives. These children are subjected to physical abuse, drug use, violence, and sexual exploitation. Furthermore, women in the mining labor force face discrimination, lower status, limited access to education, and barriers to land ownership. Additionally, communities with valuable mineral resources like cobalt often face dispossession and forced relocation by governmental or corporate entities.

The costs for the workers of the DRC in these mines are high, with their monetary compensation being low. This allows the global North to profit from the hard labor of the global South (since they can obtain the mined minerals for a low price), without sacrificing much hard labor itself to retrieve the minerals.

The *unequal exchange of value of nature* concept is measured as a disproportionate transfer between the value of devastated nature and the value of benefitted nature between the global North and global South. This can be demonstrated based on the following observations.

Both small-scale and large-scale mining cause environmental damage through the exposure of areas to toxic metals, contamination of water sources, waste disposal, pollution of rivers and air, soil erosion, deforestation, and loss of biodiversity. Furthermore, wetlands and surrounding ecosystems are negatively impacted by mining waste treatment, altering river flows and sedimentation patterns. In addition, mining tunnels also contribute to soil erosion, land instability, and widespread contamination. This occurs throughout the operational supply chain, including slurry sites, trading depots, and processing facilities.

The global North's intention of maximizing its benefitted nature entails optimizing the quantity of nature within its space, thereby minimizing the extent of ecological degradation. The global North profits from the minerals mined in the global South that cause a degradation of nature and ecosystems in the global South, without sacrificing any of their own nature and ecosystems to extract these minerals. Furthermore, resources from the global South are exploited to extract minerals, which leads to ecological preservation in the global North. This, however, will be more extensively discussed in section 4.4. when the EGD energy policy is added to the case.

The previously presented information establishes that an unequal exchange of labor and nature values occurs for the communities that work in the cobalt mining industry in the DRC.

This is considered without the added burden that the EGD policy will have on the mining industry of the country. This evidence thus partly confirms the argued explanation's basis since an unequal exchange of labor and nature values should at least be present, as the argued explanation states, without the intervention of the EGD. This type of evidence satisfies the requirements of the *Hoop test*, since for this evidence to remain under consideration it necessitates the 'jump through the hoop' obligation. It demonstrates that the basic foundation of the explanation is present, however, it does not yet validate the argued explanation fully since it merely confirms the base premise of an unequal exchange of labor and nature values. It does severely undermine the alternative explanation's plausibility.

4.3. Indonesia

To ascertain the impact of the EGD policy on the environmental injustices associated with mining operations in Indonesia, it is imperative to first provide a concise overview of the historical context of nickel mining within the nation of Indonesia.

The historical background of nickel mining in Indonesia reveals that nickel ranks among the crucial metal commodities within the country, alongside gold, silver, copper, tin, and aluminum. Nickel mining operations have been conducted since the era of Dutch colonial rule. In the year 1901, an expert from the Netherlands discovered the initial deposits of nickel ore within the mountainous region of Verbeek, located in Sulawesi. Subsequently, in 1909, the Pomalaa region in the Kolaka Regency of Southeast Sulawesi witnessed the identification of nickel ore by the esteemed Dutch geologist, E.C. Abendanon. This breakthrough presented new prospects for the establishment of a nickel mining sector in Indonesia. A comprehensive examination of nickel deposits in the Sorowako region was ever since conducted by geologists from the Canadian mining corporation (PT Inco Limited). Initial exploration operations commenced in 1934, focussing on the Pomalaa region, as well as Maniang Island and Lemo Island. During the time frame of 1936 to 1941, the Dutch Boni Tolo Maatschappij initiated the implementation of the production procedures in Pomalaa and subsequently extended its operations to Maniang Island between 1942 and 1945. The mining operations at Pomalaa were subsequently resumed by Toraja Mining NV, a domestic corporation. In the beginning, Toraja Mining NV engaged in the exportation of accumulated stockpiles of nickel ore extracted towards the end of the Dutch and Japanese colonial periods. This was subsequently succeeded by the establishment of a new mine on Maniang Island between 1959 and 1960. Nonetheless, the Indonesian government assumed control of Toraja Mining NV, culminating in the establishment of Indonesian Nickel Mining PN in 1961. The acquisition of the nickel mining company was grounded following their Legal Statute stating that nickel mining would from that moment be classified as a strategic mineral that can solely be exploited by the government. In 1968, the government established a State-Owned Enterprise known as PN Aneka Tambang by consolidating various mining companies and projects. This led to the initiation of nickel ore exports to Japan in 1969, which was the predominant market. In the 1970s, the International Nickel Company initiated the establishment of metallurgical operations, which resulted in the commencement of commercial nickel production in 1978 (Arif, 2018).

As of January 2014, the Indonesian government implemented a restriction on the export of nickel ores, to promote the establishment and growth of domestic smelter industries. The ban imposed in 2017 was subsequently rescinded, as per the Indonesian government's decision to allow mining companies to resume ore exports until 2022. However, in 2019, the authorities revised the deadline to January 2020. Government minister Luhut Binsar Pandjaitan affirmed the government's objective of facilitating the involvement of Indonesian companies in the manufacturing of lithium-ion batteries' supply chain (Wallace, 2019).

The Indonesian government's desire to exercise more control over the nickel ore supply chain has created an opportunity for the foreign smelter industry to process nickel locally in Indonesia. Based on the official records of the Ministry of Investment/Investment Coordinating Board (BKPM), Indonesia is currently home to a total of 14 nickel smelters. While the smelter companies in question bear legal registration in Indonesia, it is noteworthy that the predominant ownership and investor base are of Chinese origin. Chinese investors and companies have reportedly exerted significant control over 90 percent of Indonesia's nickel industry, with domestic Indonesian firms filling in as a supplementary force, according to Marwan Batubara, Executive Director of the Indonesian Resources Study (Da Costa, 2022). As an illustration, it is noteworthy to mention that in the year 2013, a collaborative investment of 1.5 billion US dollars was initiated by Tsingshan Holding Group and the Indonesian mining company, Bintang Delapan Group, to establish the Indonesia Morowali Industrial Park. At present, this facility stands as the largest mining and processing establishment, playing a significant role in contributing roughly 50 percent of Indonesia's nickel product output. As of October 2022, the total investment received by Morowali Industrial Park amounts to 15.3 billion US dollars, contributed by 18 prominent companies. Furthermore, there are projected plans for the industrial park to attract an additional 22 companies by 2025, bringing the total number of companies to 40 (Rahayu, 2022). As part of the overall investment, in 2017, the Tsingshan Holding Group made a significant investment towards the establishment of a state-of-the-art ferronickel smelter plant. Two years later, Tsingshan collaborated with PT Vale Indonesia Tbk in setting up a state-of-the-art battery-grade nickel plant. Another actor, Zhejiang Huayou Cobalt serves as an additional Chinese investor in this context. In the year 2019, Huayou established collaborative partnerships with PT Aneka Tambang Tbk, a state

mining enterprise, as well as Shandong Xinhai, to jointly undertake nickel projects in Indonesia (Da Costa, 2022).

The nickel mining industry in Indonesia presents a multi-faceted issue due to various factors. One aspect is the occurrence of human and environmental rights infringements in the mining sites where nickel extraction occurs, while another aspect relates to the occurrence of similar violations in the processing phase as nickel is transformed into a semi-finished product within the nation by (predominantly) foreign actors. Both sides of the story will be explored further to establish whether an unequal exchange of labor and nature values occurs.

4.3.1. Unequal Exchange of Labor and Nature Values in Indonesia

To determine if the EGD exacerbates the disparity in the exchange of labor and nature values, it is imperative to initially ascertain whether an unequal exchange of labor and nature values exists in the absence of increased demand for specific minerals brought on by the policy.

Nickel mining operations take place on a diverse array of islands, with 127 mines in operation today (Mining-Technology, 2023B). There are however several mining and processing hubs, of which the island Sulawesi houses the most significant nickel mining site (Sorowako Mine) and the largest processing and mining facility (Morowali Industrial Park). Supervision and monitoring of these mining and processing facilities fall within the purview of the national government, which operates following the provisions outlined in the 2009 Mineral and Coal Mining Law (Law No. 4/2009). Following the aforementioned provision, the state has control over land, waters, and natural resources and works to use them as effectively as possible for the welfare of the populace. For an entity to engage in mining activities, it is imperative to obtain a permit granted by the national government (Huber, 2021).

For local communities and residents, there are challenges associated with the processing of licenses, characterized by lengthy and complex bureaucratic procedures that can be resource intensive. Hence small-scale miners often display hesitancy in acquiring permits. Therefore, they are often involved in mining operations that are deemed illicit. The local population has strong financial motivations to engage in these illicit small-scale mining operations, as they have previously played a significant role in sustaining local livelihoods and bolstering regional economies. However, the proliferation of unauthorized mining activities exacerbates tensions and social strife within the neighboring communities. Frequently, there are instances where the

involvement of major corporations in addressing illegal mining leads to conflicts. After receiving authorization from the state, certain companies are seeking to displace local miners from their mining sites. This frequently results in conflicts characterized by forceful attempts by companies to establish and uphold their authority in the realm of production, which leads to adverse consequences including displacement, economic instability, and, most notably, loss of human lives (Resosudarmo et al., 2009).

Illegal mining activities have additionally given rise to environmental concerns. These activities lead to the erosion of hillsides and hilltops, causing significant soil erosion and the deposition of sediments in streams. Additionally, in certain areas, these activities give rise to acid rock drainage. The presence of dumped mercury, cyanide, oil, waste, and mining residue along the riverbanks also poses a significant concern. Moreover, there are health-related matters to consider. Illegal mining operations are frequently conducted under substandard working conditions (Rushdi et al., n.d.). Mining operations carry inherent risks, and proper adherence to safety protocols is frequently disregarded. These miners exhibit infrequent use of gloves, exposing their skin directly to the harmful effects of mercury. They do not consistently utilize ear protection despite prolonged exposure to intense mechanical vibrations for extended periods of 6 to 8 hours. Additionally, they neglect to wear appropriate footwear or protective gear when working in water bodies, thereby putting themselves at further risk. Furthermore, they consume water from rivers that are contaminated with mercury and often prioritize seeking treatment from traditional healers (dukun) rather than medical professionals when they are unwell. Furthermore, there is an absence of authoritative government statistics elucidating the health ramifications of illicit mining activities, as well as the precise enumeration of fatalities resulting from mining mishaps. A considerable number of incidents occurring at unauthorized mining sites remain unreported, leaving a significant portion of injured miners without adequate medical care (Resosudarmo et al., 2009).

Furthermore, due to the recently implemented export restriction, illegal miners are now prohibited from the sale of nickel. At first, foreign actors used to receive regular shipments of nickel, but complying with the current restrictions on the export of nickel has rendered this practice infeasible. Consequently, the product is exclusively available for domestic trade, restricted to smelters that concurrently undertake the role of quality inspector. Because the nickel has been extracted without the appropriate licensing, the sole viable course of action is to sell it at a significantly discounted rate to the smelters, as a precautionary measure to avoid any additional

legal ramifications (Morse, 2021). The degradation of the environment in mining locations has both direct and indirect consequences on the well-being of the workers, as well as on the welfare of their families and the local community. Women and children regularly encounter hazardous air pollutants and contaminated water, despite their lack of active engagement at said locations (Yeung, 2023; Rushdi et al., n.d.).

Contrasting the small-scale miners are the large-scale mining companies and processing facilities, which are situated across the nation as well. Among the significant roster of operational mining companies, it was previously emphasized that the predominant economic ramifications of this industry are concentrated geographically on the island of Sulawesi. This is primarily attributed to the Sorowako Mine and the Morowali Industrial Park, where the industry's foremost economic impact is observed. As a result of the significant impact exerted by these two companies in the Indonesian nickel industry, the analysis heavily relies on the pivotal role played by these entities.

For over half a century, since the initiation of nickel development by PT International Nickel Indonesia (PT INCO) in Sorowako, the local communities including indigenous groups, farmers, and fisherfolk have encountered a multitude of challenges within the expansive concession area spanning 70,566 hectares. In recent years, Sorowako has witnessed a surge in development activities including the proposed construction of a new smelter and mining expansions, in response to the growing demand for nickel. Consequently, the local communities have been confronted with escalating concerns and challenges. Initially, the expansion of the Sorowako nickel mine has resulted in the deprivation of farmland, which constitutes a crucial source of sustenance for the local populace. Farmers were obliged to vacate the concession area as the mining operations expanded into their agricultural lands (FoE Japan, 2023; Eurasiareview, 2023). Several farmers have expressed dissatisfaction with the compensation they received, stating that it did not adequately cover the costs incurred for labor, fertilizers, and other essential expenses associated with their agricultural activities. Additionally, there have been documented instances wherein the extent and terms of remuneration display inconsistency, including situations where no form of compensation is provided, resulting in the fragmentation of local communities (Rushdi et al., n.d.).

The surrounding area of the Sorowako mine is experiencing environmental pollution, which poses significant risks to the well-being and safety of the neighboring communities. In February 2023, residents of Asuli village, located in the Towuti district, voiced their concerns through a peaceful demonstration, requesting swift attention from PTVI in response to the adverse changes

observed in a nearby spring, previously relied upon by the community for its potable water requirements. These changes were characterized by the discoloration of the spring water, rendering it brown and muddy, and at times, complete depletion of the water source. Moreover, during the water testing conducted in October 2022, it was discovered that the levels of hexavalent chromium in this water source exceeded the drinking water quality standards set by the Indonesian government (0.05 mg/L). This occurrence is not an isolated incident (FoE Japan, 2023; Eurasiareview, 2023). This has happened recently on numerous occasions. In the year 2014, the Lampia Sea experienced environmental pollution due to an oil spill caused by PT Vale Indonesia. Later, in 2018, Lake Mahalona experienced significant pollution as a result of the deposition of soil derived from previous mining activities. In August 2021, the operations conducted by PT Vale harmed the aquatic biota, as well as the health and livelihoods of the residents, due to water pollution on Mori Island. In addition, it is anticipated that this trend will persist (Business & Human Rights Research Centre, 2022; Business & Human Rights Research Centre, 2023B).

In light of the aforementioned concerns, it is imperative to redirect focus toward the Morowali Industrial Park, as it has emerged as the epicenter of significant environmental and human rights violations in Indonesia's nickel industry. The establishment of the industrial park has incurred significant social and environmental implications. Employees allege that fatalities and incidents resulting in physical harm occur with regularity at IMIP. According to healthcare experts and environmental advocates, the detrimental effects of air and water pollution encompass respiratory ailments, illnesses, ocular damage, as well as the widespread destruction of valuable forested areas and fisheries. The surrounding communities and infrastructure have been put under tremendous strain as a result of the accelerated drive to scale up production, putting them in danger of deteriorating (Morse, 2021; Rushdi et al, n.d.).

Moreover, thousands of individuals have relocated from various regions within the archipelago nation in pursuit of suitable livelihood opportunities. Based on data from the Manpower Ministry of Indonesia, the number of employees at IMIP increased from 28,000 in 2019 to 43,000 in 2020. The current figure stands at approximately 66,000 employees. Given the absence of substantial data regarding its broader population, it is believed by local residents that the count of internal migrants engaged in the service industry is three times higher than official figures

suggest. Based on accounts from IMIP employees, a significant proportion of them has recently joined the organization within the past six months.

Individuals have reported engaging in excessive working hours of up to 15 hours per day while earning a remuneration below 25 US dollars. That amount falls below the median salary in Indonesia, which is approximately 30 US dollars per day, and is further compounded by the fact that individuals in this situation have been deprived of any days off for the past three months. According to Katsaing, the regional head of the National Workers' Union (SPN), the working conditions at IMIP can be described as hazardous and potentially life-threatening. Current health and safety regulations lack effectiveness and prioritize financial gains over the welfare of the employees (Yeung, 2023; Business & Human Rights Research Centre, 2023B).

The Indonesian government has adjusted labor safeguards in an effort to attract investment to its nickel industry. President Joko Widodo's administration succeeded in enacting the contentious "Omnibus Law on Job Creation" last year, overcoming a lengthy period of constitutional and legal obstacles. This legislation entailed the relaxation of environmental safeguards and labor regulations. The government presented it as a means to facilitate international investment. Opponents of the environmentalist perspective hold the view that the authorities are showing a significant inclination towards avoiding conflicts with Chinese companies, primarily due to the substantial financial investments these companies are making in Indonesia. The extensive exploitation of labor, natural resources, and local communities constitutes a serious violation of fundamental human rights (Morse, 2021; Yeung, 2023).

The *unequal exchange of labor* concept is measured as a disproportionate transfer between the costs of labor and the benefits from that labor between the global North and global South. The labor cost implications detailed above are a concise representation of the challenges encountered by mining communities in Indonesia. This can be effectively illustrated by considering the following observations.

Illegal small-scale mining poses challenges for local communities and residents due to lengthy and complex bureaucratic procedures for acquiring licenses. This leads to an increase in illicit mining activities, which contribute to social tensions and conflicts with major corporations often displacing local miners from their sites, resulting in economic instability and loss of life. Furthermore, the health and safety of miners are compromised due to substandard working

conditions and a lack of adherence to safety protocols. Export restrictions on nickel have made it difficult for illegal miners to sell their products, forcing them to sell at discounted rates to smelters. The number of employees at the Morowali Industrial Park has increased significantly, along with the number of reports of hazardous working conditions and excessive working hours with below-average wages. The operations have led to various challenges for local communities, including the displacement of farmers with inadequate compensation. The Indonesian government has relaxed labor and environmental regulations to attract investment, thereby prioritizing financial gains over the welfare of employees.

As with the case of the DRC, the costs for the workers in the Indonesian mines are high, with their monetary compensation being low. Again, this allows the global North to profit from the hard labor of global Southern countries without sacrificing much hard labor itself to retrieve the minerals or providing the Indonesian workers with a fair compensation.

The *unequal exchange of value of nature* concept is measured as a disproportionate transfer between the value of devastated nature and the value of benefitted nature between the global North and global South. This can be demonstrated based on the following observations.

Illegal mining has significant environmental concerns, including soil erosion, acid rock drainage, and contamination of rivers with mercury and other harmful substances. The degraded environment affects not only the miners but also their families and the local community. Women and children are exposed to hazardous pollutants and contaminated water, despite not being directly involved in mining activities. In addition, the expansion of the Sorowako mine has deprived farmers of their farmland, and they have expressed dissatisfaction with the compensation they received. The surrounding areas have experienced environmental pollution, including the contamination of spring water with hexavalent chromium. Similar incidents of pollution have occurred in the Lampia Sea, Lake Mahalona, and Mori Island. Morowali Industrial Park has also been linked to air and water pollution, causing respiratory ailments and ocular damage, as well as the destruction of forests and fisheries.

The objective of the global North is to leverage its advantageous position by maximizing the preservation of natural resources within its territories, consequently minimizing ecological degradation in comparison to a situation in which the minerals were to be retrieved from its own geographical territory. It is not impossible to extract nickel from within Europe-territory. However,

the decrease of nickel extraction in Europe might also be an indicator for Europe wanting to outsource nickel extraction and its environmental hazards along with it. Nickel extraction in Europe primarily occurs in Finland, Greece, France, and Spain, but has decreased from 326.100 metric tons in 2011 to 243.500 metric tons as of 2021 (Garside, 2023C). This is a relatively small amount compared to the amount of extracted nickel in Indonesian mines, as will be more extensively discussed in section 4.4.

The preceding observations provide evidence of an unequal exchange of labor and nature values for the communities engaged in the nickel mining sector in Indonesia. This is evaluated without considering the additional impact that the implementation of the EGD policy could have on the country's mining sector. The presence of an unequal exchange of labor and nature values is anticipated, according to the argued explanation, which is supported in part by this evidence. This particular evidence fulfills the criteria outlined in the Hoop test, as its continued relevance requires it to meet the obligation of 'jumping through the hoop'. This finding serves as evidence of the fundamental basis of the argued explanation, however, it is currently insufficient in fully substantiating the argued premise, as it merely affirms the initial assumption of an uneven exchange between labor and nature values. However, it does significantly weaken the plausibility of the alternative explanation.

4.4. The Effects of the European Green Deal

The EGD policy came into effect in 2018 and became legally binding in 2021, as described in Chapter 2 of this thesis. Based on these dates, it is expected that there will be a substantial shift in the amount of applied or used solar and wind power, as well as in the introduction of electric vehicles since the EGD came into effect in comparison to the most recent or current data. An exponential increase of wind energy, solar energy, and electrical vehicles should correspond with a similar increase in the amount of mined cobalt in the DRC, mined nickel in Indonesia. Wind renewables are categorized, like solar renewables, to be the primary solution for the energy transition. However, building and applying wind farms is a more challenging project than encouraging European citizens to privately invest in solar panels or the formation of public solar farms (these have comparatively fewer expected obstacles to overcome). Bureaucratic red tape will have an influential effect on the building process of wind renewables, due to the common

complaints of noise and visual disturbance concomitant with the fact that windmills are generally built in larger configurations due to the complexity of the building process and to reduce the cost of construction. With the development of offshore wind farms, there is a strong likelihood that this red tape situation will worsen (Van Boom, 2023; Gordon, 2023). This may result in reduced annual growth of wind renewables as opposed to its solar counterpart. Wind renewables are thus still an indicator that should be taken seriously, but to do so, margin growth will be observed.

As of 2022, the EU demonstrated a solar energy capacity of 227.799 megawatts, indicating considerable progress in sustainable solar energy development. During the specified timeframe (2018-2022), there was a consistent upward trend in the figures observed annually. During the reporting period, there has been an approximate increase of 115.500 megawatts in the EU's solar energy capacity. As a result, the amount of solar energy during the 2018-2022 period has doubled in contrast to a gradual increase of 28.110 megawatts during the period of 2013-2018 (IRENA, 2023).

Regarding wind renewable energy, as of 2022, the EU demonstrated a capacity of 204.122 megawatts. Although the progress made in sustainable wind energy development is noteworthy, it doesn't reach the same level of impressiveness as solar energy. This is due to an increase of merely 55.166 megawatts during the period of 2018-2022 compared to an increase of 43.289 megawatts in the period 2013-2018 (IRENA, 2023). Though it does not exhibit the same exponential rise as solar energy, the impact following the EGD's passage is still obvious. Nevertheless, as previously mentioned, this outcome was anticipated.

The introduction of electric vehicles in the EU during the period of 2018-2022 saw a formidable growth in annual sales. In 2022, 2.7 million electric vehicles were sold, contrary to a mere 0.4 million electric vehicle sales as of 2018. Which amounts to an exponentially distributed increase among the years. Contrast this to the annual growth from 2016 to 2018 where there appeared to be a mere increase from 0.2 million to 0.4 million annual electric car sales (IEA, n.d.).

As already mentioned, the increase in wind energy, solar energy, and electrical vehicle adaptations should correspond with an increase in the amount of mined cobalt in the DRC and mined nickel in Indonesia. The following evidence shows that this is indeed the case.

Between 2010 and 2023, the mining production of cobalt has sought to reach new heights. As of 2010, the mining production of cobalt in the DRC accumulated to 60.000 metric tons. With slight fluctuations, this amount increased to 71.000 metric tons in 2017. As of 2018, a record high of 104.000 metric tons of cobalt was extracted in the DRC. Since then, the amount has continued to increase, however with slight fluctuations in and around 2020 (Garside, 2023A). The fluctuation in the extraction of cobalt as of 2020 (98.000 metric tons) was due to a distortion in the highly fragile economy of the country, which is dependent on international markets to gain a profit. This was distorted by the eruption of the COVID-19 pandemic, resulting in a dramatic drop in cobalt prices. Many of the small-scale mining operations therefore started extracting copper as an alternative since this mineral maintained a more stable price, hence damaging the livelihoods of small-scale miners less drastically (Perks & Schneck, 2021). The market experienced a successful recovery during 2021 and 2022, with record highs of 119.000 and 130.000 metric tons extracted (Garside, 2023A).

There is a noticeable discrepancy in the quantity of cobalt extracted pre- and post-2018. This aligns with the implementation of the EGD policy. Nevertheless, the notable surge in growth will not be solely attributed to the EU's EGD policy. Numerous other nations are also undertaking efforts to promote environmental sustainability and circularity within their economies. However, this causal-process observation indicates a potential impact of the EGD policy since the amount of cobalt extraction has increased considerably since the implementation of the policy. Therefore, the causal process observation is classified as passing the Straw-in-the-Wind test. This is attributed to the fact that it strengthens the argued explanation's credibility, thereby weakening the alternative explanation. However, it fails to establish a sufficient criterion for accepting the argued explanation due to the influence of possible third parties on the amount of extracted cobalt.

Indonesia's mining production of nickel has exploded in recent years. As of 2010, the nickel mining industry extracted an accumulated 236.000 metric tons in the country. With noticeable fluctuations, this amount increased to reach a quantity of 345.000 metric tons in 2017. In 2018, Indonesia achieved a historical milestone with the extraction of an unprecedented 606.000 metric tons of nickel. There has since been a consistent upward trend in the quantity of mined nickel, albeit with minor variations around 2020 (Garside, 2023B). The diminished nickel extraction in 2020, amounting to 771.000 metric tons, can be attributed to economic instability within the country. This fragility stems from heavy reliance on international markets as a primary source of

profit. The outbreak of the COVID-19 pandemic had a significant impact on the nickel market, leading to a sharp decline in prices. The initial anticipation by market analysts was that the imposition of the Indonesian nickel ore export ban would result in an upward trajectory for nickel prices in 2020. However, this expectation did not materialize as intended and instead produced negative consequences via the COVID-19 outbreak (Sappor, 2020). The market underwent a rapid and prosperous resurgence in the years 2021 and 2022, culminating in exceptional milestones of 1.040.000 and 1.600.000 metric tons extracted respectively (Garside, 2023B).

There is an apparent disparity in the volume of nickel extracted before and after the year 2018. This is in line with the strategic execution of the EGD initiative. However, the significant increase in growth cannot be exclusively ascribed to the EU's Green Deal policy. As previously mentioned, other nations are actively advocating for environmental sustainability and the principles of circularity. Nonetheless, this causal-process observation suggests that the EGD policy has potentially led to a substantial increase in nickel extraction since its implementation. Consequently, the observation is deemed to meet the criteria of the Straw-in-the-Wind test. This can be attributed to the fact that it enhances the credibility of the argued explanations, consequently weakening the alternative explanation. Nevertheless, it does not adequately establish a conclusive standard for accepting the argued explanation, as the quantity of extracted nickel may be influenced by external actors.

The substantial growth of wind and solar renewable energy technologies, along with the notable surge in electric vehicle adoption following the implementation of the EGD, suggests a strong correlation between these developments and policy measures. Should the substantial surge in wind and solar energy, complemented by a considerable rise in the adoption of electric vehicles, indeed stem from the implementation of the EGD, it follows that the procurement of minerals from the Congo and Indonesia becomes imperative for the functioning of these technologies, consequently leading to an upsurge in the mining activities related to these minerals. These extracted minerals are subsequently linked to an unequal exchange when it comes to labor and environmental values. As a result, it can be deduced that the EGD leads to an increased discrepancy in the exchange of labor and nature values. This indicates that the policy inadvertently reinforces environmental injustices, further accentuating the divide between global Northern and Southern states.

Therefore, the substantial growth of wind and solar renewable energy technologies and the notable surge in electric vehicles following the implementation of the EGD is classified as a *Smoking-Gun* type of evidence, since it sufficiently and strongly supports the argued explanation of this thesis.

The European Commission is deeply committed to realizing its net-zero targets by 2050. To achieve a circular and emission-free economy, there is a significant need for a substantial increase in the extraction of various mined minerals, thereby far surpassing the current mineral utilization for renewable energy technologies. Such a scenario depends on the full implementation of all possible measures on a global scale to maintain a temperature rise just below the threshold of 2 degrees Celsius (Meinshausen et al., 2021). This represents an optimistic outlook, considering the extensive range of anticipated and unanticipated factors that must be addressed, including measures, regulations, and challenges related to international collaboration and alignment with the actor's individual needs. In such a scenario the projection is that the utilization of solar and wind technologies will lead to a substantial surge in the EU's requirement for, amongst other minerals, cobalt and nickel. The estimation indicates a potential increase of up to 500 percent in 2030 and a staggering up to 1500 percent in 2050. In a more 'high demand' scenario, where the EU will have to exponentially decarbonize its energy sources relative to the desired scenario, the demand for cobalt and nickel by more than 500 percent by 2030, primarily driven by the growing need for batteries used in electric vehicles, wind power, and solar technologies. Furthermore, by 2050, the demand for cobalt and nickel is expected to rise by more than 1500 percent (Bolger et al., 2021; Dunlap & Laratte, 2022).

These forecasts are based on the current figures and might therefore be considered redundant in the (near) future. The researcher deemed it essential to include these figures as they offer insights into the prospective utilization of these minerals. However, it is advised to exercise caution in attributing excessive significance to these figures. For that matter, this causal-process observation is classified as passing the *Straw-in-the-Wind* test. The attribution strengthens the argued explanation's credibility, thereby undermining the validity of the alternative explanation. Nonetheless, it does not provide a definitive or comprehensive standard for validating the explanation, as the unpredictability of the future renders it insufficient.

4.5. Overview of the Evidence

Thus far, an analysis has been conducted on the two pertinent cases of the Democratic Republic of Congo and Indonesia, focusing on causal process observations, to ascertain the degree to which an unequal exchange of labor and natural values occurs. The EGD's potential effects on those areas that are important suppliers of mineral raw materials to support Europe's eco-friendly initiatives were also covered in the discussion. The analysis led to the identification of the following categories of evidence in favor of the argued explanation: *Straw-in-the-wind* (3 times), *Hoop test* (2 times), and *Smoking-Gun* (1 time). A substantial body of evidence has been compiled, thereby significantly increasing the likelihood that the proposed explanation is indeed accurate. Nevertheless, it is essential to note that absolute certainty cannot be attributed to this assumption, given the untraceable nature of the irrefutable type of evidence (*Doubly Decisive Test*). While an extensive review of relevant literature did not yield this specific type of evidence, the discovered alternative evidence significantly supports this claim.

5. Conclusion

The aim of this thesis was to shed light on the effects of the European Union's Green Deal energy policy, in the light of environmental justice. The European Green Deal came into being through the desire of the European Union to become the world's first climate-neutral continent, in which no individual would be left behind. However, the conditions under which the minerals necessary to execute the European Green Deal's energy policy are mined in countries of the global South seem to violate both human and environmental rights. This seems to suggest that the European Green Deal's energy policy might not be as just as it claims or aims to be, possibly affecting the already existing divide between the global North and the global South. The aim of this thesis was thus to shed light on this problem, by investigating whether the European Green Deal's energy policy affects the harsh conditions of the mining communities, specifically in the Democratic Republic of the Congo and Indonesia, in any way so that it could be understood as an environmental injustice. The research question that accompanied the aim of this thesis was:

Does the European Union's Green Deal energy policy reinforce the divide between the global North and South and, if so, how?

On the basis of the World Systems Theory, the argued explanation was that the European Union's Green Deal energy policy does indeed reinforce the divide between the global North and the global South, through a pathway of an unequal exchange of labor and an unequal exchange of nature values, resulting in a situation characterized by environmental injustice.

Through a process-tracing analysis of two cases (cobalt mining in the Democratic Republic of the Congo, and nickel mining in Indonesia), the mutually exclusive argued explanation and alternative explanation were tested. The analysis revealed multiple pieces of evidence with various degrees of significance (*Straw-in-the-wind*, 2 times and *Hoop test*, 2 times) indicating that there is an unequal exchange of labor and nature values occurring in the Democratic Republic of the Congo and Indonesia. Both cases show comparable results regarding the presence of an unequal exchange of labor and nature value. Furthermore, the process-tracing analysis of The European Green Deal's energy policy has demonstrated that the policy currently and, in the future, will facilitate an exacerbation of the unequal exchange of labor and nature values, through a range of compelling evidence of varying levels of significance (*Straw-in-the-wind*, 1 time and *Smoking-Gun*, 1 time).

Unfortunately, as the argued explanation suggests, this inevitably results in environmental injustices worsening for the mining communities in the Democratic Republic of the Congo and Indonesia. Again, for both cases, the observations show comparable results regarding the European Green Deal's energy policy's effects on the unequal exchanges of labor and nature values. As theorized in Chapter 2, aggravated environmental injustices in the two cases will most likely lead to the reinforcement of the divide between the global North and global South via the implications of the European Green Deal. So, given the substantial volume of total evidence discovered ((*Straw-in-the-wind* (3 times), *Hoop test* (2 times) and *Smoking-Gun* (1 time))), it is highly likely to posit that the argued explanation "*The European Green Deal energy policy facilitates an unequal exchange of labor and value of nature for mineral mining communities. This results in an exacerbated environmental injustice, which manifests itself as a reinforced divide between the global North and South*" provides an accurate clarification for the events analyzed. These same observations thus also show that it is quite unlikely that the alternative explanation (i.e., that the European Green Deal does not reinforce the divide between the global North and the global South through a pathway of unequal exchanges in labor and nature value), is true.

The researcher adopted a constructivist approach in conducting the research, which involved a research methodology that emphasized a holistic perspective and prioritized the larger context rather than specific variables in order to conduct the study. For that reason, the decision to include World Systems Theory was made. It aims to provide an encompassing overview of the global system and offer insights into events through an economic lens, with a historical power perspective. The European Green Deal policy emphasizes the imperative of promoting economic growth in Europe while simultaneously acknowledging the need for substantial transformations to achieve a decarbonized economy. Nevertheless, the theory proved to be highly relevant due to its application to the correlation of labor and nature as an expense that necessitates global consideration and the assumption of responsibility over it. Due to a lack of sufficient survey data and a predominant focus on the lived experiences of mining communities, the research methodology ultimately employed a process-tracing analysis approach. By employing investigative methods, it became feasible to establish a correlation between identifiable policy implications and the adverse real-life experiences of those mining communities, to uncover the injustice perpetrated against them for economic benefit.

The study's findings unintentionally revealed China's broad influence on the development of green technology and its associated supply chain. According to the World Systems Theory, semi-peripheral states connect the core and peripheral states via trade flows of labor and semi-finished products. China has effectively assumed a significant position in the supply chain of green technologies by establishing a stronghold on the extraction and processing of minerals needed for these technologies in peripheral states. This has resulted in a state of dependence for Western nations and the countries involved in the extraction of these minerals. Given that the aforementioned research has reached its conclusion and has shed light on China's dominant role in this particular process, the researcher would have liked to dedicate greater attention to this aspect in the course of the research.

For additional research, it is therefore advisable to further investigate the role that the Chinese state and its companies play in facilitating an unequal exchange of labor and nature values between the core and peripheral states, regarding the production of renewable energy technologies. By engaging this actor, a thorough understanding can be gained regarding the creation of technologies and the primary beneficiary of these advancements. This can result in the emergence of more alternative options available to core states, by developing a deeper understanding of the effects of one's current actions and transformation potential, thereby enhancing the overall well-being of mining communities in the process.

A second suggestion stemming from the findings of the research is to expand the scope of analysis by examining additional cases involved in the extraction of minerals for the application in renewable energy technologies. For example, lithium mining in Chile would be an appropriate case for such an analysis. Such research would enable the enhancement of the representation of the global South and would also gain a more comprehensive understanding of the ongoing relevance of China's significant position in a broader supply chain context.

This research has made a valuable contribution by addressing a notable gap in the existing body of literature. It entails a comprehensive analysis from multiple perspectives across different geographical regions in the global South, specifically examining the negative implications of the European Green Deal on mineral extraction. When developing strategies to deal with the effects of climate change, policymakers, organizations, and states can improve their decision-making

abilities by drawing on the findings revealed in this thesis. It also presents an alternative outlook regarding the environmental sustainability of these proposed 'green' technologies.

If there is a collective aspiration to promote sustainability, it is imperative that we ensure the inclusion of all stakeholders in this endeavor. Therefore, it is crucial that we adopt a global perspective and seek an all-encompassing solution that extends beyond the confines of Europe and the global North.

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