An Equitable Green Transition

An analysis of the wind energy supply chain

The case of human rights risks in the Chinese rare earth industry

Master Thesis MSc International Business and Politics

Authors: Group 16535 Tereza Kramlova (103350) Grace Lyndsay Livingstone (102671)

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<u>Supervisor</u> Iver Drabaek

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Abstract

With growing concern around climate change, there is a need for countries to shift to renewable energy. Given this unprecedented shift away from fossil fuels and given the vast mobilisation of resources required to scale up green energy, actors must be aware of the negative impacts this transformation may create. In order to ensure an equitable transition to renewable energy, this master thesis identifies human rights risks present in the supply chain of wind energy companies. Specifically, the thesis examines the sourcing of rare earth elements used in wind turbines. The research uncovers several salient human rights risks from the mining, processing and waste management present in the Chinese rare earth supply chain, where the majority of global supply originates. By critically analysing 30 expert interviews and a range of documents, this unique case uncovers several country-specific and company-specific mechanisms that have hindered the mitigation of human rights risks. The research applies the human rights due diligence framework, along with stakeholder, global governance, global value chain governance and sustainable supply chain management theories to find the root cause of the mitigation barriers and offer tailored recommendations to address them. On a country-level, rare earth supply chains should be established outside of China, and to address the company-level issues, wind energy companies have to embed HRRR. The paper concludes by arguing that binding regulation is needed in order to secure effective change and improve human rights standards throughout the rare earth supply chain.

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Abbreviations

3TG	Tin, tantalum, tungsten and gold
ACFTU	All-China Federation of Trade Unions
ASM	Artisanal and small scale mining
BHRRC	Business and Human Rights Resource Centre
BHR	Business and human rights
CBS	Copenhagen Business School
COVID-19	CoronaVirus 2019
CSO	Civil society organisation
CSR	Corporate social responsibility
DRC	Democratic Republic of Congo
EIT	European Institute of Innovation and Technology
EJA	Environmental Justice Atlas
EU	European Union
EV	Electric vehicles
FPIC	Free, prior and informed consent
GVC	Global value chain
GVCG	Global Value Chain Governance
GW	Gigawatt
HRDD	Human rights due diligence
HRW	Human Rights Watch
ILO	International Labour Organisation
Ю	International organisation
IPCC	Intergovernmental Panel on Climate Change
IRENA	International Renewable Energy Agency
ISO	International Organisation for Standardisation
MSI	Multi-stakeholder initiative
MW	Megawatt

NDRC	National Development and Reform Commission
NGO	Non-governmental organisation
OECD	Organisation for Economic Cooperation and Development
OECD Guidelines	OECD Guidelines for Multinational Enterprises
OEMs	Original equipment manufacturers
PPE	Personal protective equipment
REE	Rare earth elements
REIA	Rare Earth Industry Association
RQ1	The first research question
RQ2	The second research question
RSS schemes	Regulatory standard-setting schemes
SEPA	China's State Environmental Protection Administration
SCM	Supply chain management
SSCM	Sustainable supply chain management
UN	United Nations
UNGA	United Nations General Assembly
UNGP	United Nations Guiding Principles for Business and Human Rights

Chapter 1: Introduction

Climate change is a defining threat of the 21st century. To avoid the worst impacts of climate change and to effectively tackle the issue, it is imperative to limit global warming to two degrees. However, current actions are lacklustre, and the rate of global warming and climate change is rapidly increasing. Indeed, the global average over the past four years was recorded as some of the warmest on record. Combustion engines burning fossil fuel for energy has been identified as the single largest contributor to carbon dioxide emissions (EPA, n.d.), and the need to move away from global fossil fuel consumption is increasingly urgent. Here, the rapid deployment of large-scale renewable energy projects, including wind and solar, and the electrification of traditionally fuel-based industries, play a crucial role in limiting global warming.

However, to be a positive transition that benefits people as it does the climate, it must be an equitable transition that centres around the provision and promotion of human rights. Through recent developments, it is emerging that wind energy companies and their operations exist in a complex domain of conflict and human rights concerns, often associated with their traditional extractive energy counterparts (OHCHR, 2016). Although governments are praising the benefits of renewable energy, and investors are increasingly supporting large-scale investments, the social and environmental externalities of renewable energy projects are not sufficiently scrutinised. There are troubling allegations of systematic human rights violations across the wind-energy supply chain, which is expected to increase as the green transition accelerates.

Renewable energy companies are challenged to ensure the traceability and accountability of human rights in their supply chains. Therefore, the main objective of this thesis is to understand how companies can uphold their duty to "*identify, prevent, mitigate and account*" for their adverse human rights impacts (UNGP 17, 2011). As this thesis is written in a joint effort with Ørsted, a Danish sustainable energy company, the research investigates the supply chain of wind energy companies. As a case study, the rare earth supply chain presents a unique area of study to survey human rights violations, due to the increasing demand for green-transition minerals. As the majority of rare earth elements are mined and processed in China, where low levels of transparency undermine the ability to respect human rights, there is an added level of complexity that wind energy companies face. To understand how wind energy companies can live up to their duty to respect, this thesis examines the human rights risks that are threatened, as well as identifying the stakeholders involved and the mechanisms accelerating the rights violations. The thesis poses the following two research questions:

Research Questions:

RQ1: What are the salient human rights risks associated with the rare earth supply chain in China?

RQ2: Using empirical evidence and theoretical perspectives, what is hindering the mitigation of identified human rights risks, and how can they be addressed?

To identify the actions required to mitigate human rights risks in the rare earth supply chain, and to tailor recommendations (RQ2), the research must first understand how human rights are impacted (RQ1). As China holds a near-monopoly on rare earth mining and processing, this thesis focuses only on the human rights risks of the Chinese market. Furthermore, by applying critical realism and theories, the underlying mechanisms that enable the perpetuation of human rights violations are revealed. Following an analysis, the thesis finds that there are several significant human rights risks in rare earth mining, processing and waste management operations. It is concluded that human rights are undermined due to the Chinese market structure and a lack of adequate human rights due diligence by companies. From this, the thesis draws on established theoretical arguments to construct a number of recommendations for what companies should do in order to mitigate these human rights risks. A supply chain outside of China must be established, and companies must improve due diligence practices. The paper concludes with a call for binding regulations to address human rights risks effectively.

It is important to note that this thesis is not disputing the need to switch to renewable energy and the indispensable role that wind energy companies play in this. Instead, this research aims to uncover the human rights risks that are presented in wind energy supply chains to ensure support from all stakeholders and smooth transition in a truly sustainable manner.

To answer the research questions, this thesis is structured as follows. In Chapter 2, the literature review summarises the academic discussion around renewable energy and human rights, in order to strengthen the analysis, identify research gaps, and provide robust recommendations. In Chapter 3, the scope of the thesis is outlined to clarify the focus of the research, while Chapter 4 outlines the methodological considerations. Here, the critical realist approach is chosen as the underlying methodological framework, further guiding the research approach, design and selection of data collection methods. Next, the factors that ensure the credibility of this research are highlighted in Chapter 5. In Chapter 6, the paper introduces a short theoretical debate and evaluates the relevance of the theories. Specifically, the paper is

analysed through the theoretical lens of stakeholder theory, HRDD framework, global value chain governance, global governance and sustainable supply chain management. The core research of this paper is presented in the analysis in Chapter 7. Here, the empirical findings of both research questions are discussed, and theories are applied throughout. Following this, a critical assessment of the theories further dissects the findings and guides the direction of the recommendations. Finally, Chapter 8 presents the implications of the paper, and the thesis concludes with reflections and suggestions for further research in Chapter 9.

Chapter 2: Literature Review

The literature review provides an overview of the current knowledge within a field of research and identifies emerging trends, developments and academic debates. This literature review follows Bryman's (2012:8-9) recommendations to serve three specific purposes. Firstly, it provided the academic study with a starting point, i.e. a place and context for the research to grow. Secondly, the literature review allowed the researcher to demonstrate an understanding of the influential research in the field of study, helpful when designing the research focus and avoiding 'reinventing the wheel'. Finally, the literature review helps demonstrate the significance of the research topic and study (Bryman, 2012:8-9). Thus, this literature review presents an overview of current knowledge and theories, as well as controversies and unanswered questions and inconsistencies regarding Human Rights aspects in the renewable energy transition.

Climate Change and the role of renewable energy technologies

Climate change can be a natural process where seasonal changes are observed, and ice coverage advances and retreats. However, evidence shows that the current level and rate of change has not been caused by natural phenomenon and is instead the result of human activity (NASA, 2020). By signing the Paris Climate Agreement, 175 nations agreed to lower CO₂ emissions and try to stay below 2 degrees global temperature increase. However, action towards these national targets has been slow, and the world is on track to see the temperature increase by 3.1-3.7 degrees by 2100 (Ritchie & Roser, 2019; IPCC, 2018:4). Significantly more action will be required to limit carbon emissions to halt global warming. In fact, in order to remain below 1.5 degrees of warming, global carbon emissions will need to reduce by 45% by 2030 and reach net zero by 2050 (IPCC, 2018:1).

In 2018, the world emitted 54 gigatonnes of carbon dioxide, the vast majority of which, approx. 35 gigatonnes came from the burning of fossil fuels for electricity and heat production (IEA, 2020). Hence, it becomes clear that the majority of CO₂ emissions reductions will need to come from the energy sector. This assertion is backed up by relevant academic literature. Newbery states that *"the transition to a low-carbon electricity system is a key component of any green economy transition"* (Newbery, 2016:1321). Although slow, this shift towards a green economy based on renewable energy is underway. Many technologies exist that will make this green energy transition both possible and profitable. Traditional energy sources have included coal, gas, oil and nuclear power. Contrastingly, renewable energy is defined as energy derived from natural processes, for instance, sunlight, water and wind, which are replenished at a higher rate than they are consumed. Examples of renewable energy resources are solar, wind, geothermal, hydropower, bioenergy and ocean power (IEA, 2017; Evans et al., 2009:1082).

There are several ways of producing energy using these renewable resources. Of a wide range of technologies, solar, onshore wind and offshore wind power are considered the most practical energy solutions. While the definition includes geothermal, hydropower and ocean power, these depend on the geographic specifications of countries and are not readily available to many countries. Similarly, most bioenergy technologies require arable land to be used for that purpose. While producing energy from municipal waste is less land-intensive, it has not yet grown to provide significant shares of energy produced. Wind and solar technologies, on the other hand, have proven to play a significant role in the energy transition of countries (OECD, 2016). During the 2010s, solar and wind energy technologies went through considerable advancements, leading to sharp cost reductions, resulting in several cases where solar, onshore wind and offshore wind are cheaper than traditional fossil fuel energy sources (IEA, 2019 A). Thus, these energy sources have not only grown to be an alternative to fossil fuels because of environmental aspects but are also becoming an economical choice for energy companies.

Political decisions have also supported investments and research into renewable energy sources, particularly wind and solar. Contia et al. suggest that the establishment of the 2005 EU emissions trading scheme marked a "*significant shift*" in the demand and promotion of renewable energy sources (2018:1997). Renewable energy technologies have since been at the top of the EU agenda. In fact, Backwell (2014:1) points out that wind technology is set to play an increasingly important role for the region in reaching the EU's 2020 energy targets and the Paris Agreement. For instance, in 2019, there was 205GW of wind installed, which generated 15% of electricity consumed. Onshore wind accounted for 89% of total capacity,

and 76% of new installations (Wind Europe, 2019:14). The benefits of these technologies span well beyond CO₂ emissions reduction, including increased energy independence, growth in employment, improved air quality, improved conditions for biodiversity, easier off-grid access and improved gender equality. These benefits are further elaborated below.

Energy Independence

Most countries are net importers of natural resources for traditional energy, such as coal, oil and gas, due to the lack of these resources extracted from within their borders. They are therefore subject to trade disruptions stemming from political decision making, varying levels of supply, conflict, price fluctuations, tariffs and global health crises, among other disruptions. In 2017, China produced approximately half of all coal consumed, while Saudi Arabia, Russia and the US produced approximately 40% of all crude oil (IEA, 2019 B). Though by increasing the renewable energy capacity and diversifying the energy sector, nations can come to rely on the energy harvested from within their borders. The result is strengthened energy independence, prone to fewer disruptions of a political or economic nature (EPA, 2019).

Growth in Employment

Another benefit to renewable energy is the estimation for net growth in employment created by the green transition and shift to renewable energy generation. In 2018, IRENA estimated that 11 million people were employed in the renewable energy sector overall (IRENA, 2019:5-7). By 2030, it is estimated that the low-carbon economy will lead to employment for over 65 million people. This is set to outstrip the job losses from declining sectors, such as coal mining or oil extraction, with estimations showing that low-carbon jobs will lead to a net gain of 37 million jobs globally by 2030 (New Climate Economy, 2018:39).

Air Pollution and Health

The World Health Organisation estimates that outdoor air pollution results in the deaths of over 4 million people each year. The most significant cause of this air pollution is stated as the '*combustion of fossil fuels*', with some of the main drivers being vehicle use, power generation, building heating systems, agriculture and waste incineration, and industry (WHO, 2020). Therefore, a significant health benefit could be seen by moving from fossil fuel to renewable energy generation, which does not create polluting gases when generating electricity.

Biodiversity and Nature

Climate change is one of the most significant, direct drivers of biodiversity and species loss, both on land and in water (IPBES, 2019:5). Furthermore, similar to human populations, pollution, and specifically air pollution, is also a driver of negative impacts for nature (ibid.). By

transitioning from heavily polluting fossil fuel energy to renewable energy, there is a chance of limiting climate change's impact on biodiversity and nature (ibid.).

Access to Electricity

Renewable energy can increase accessibility to the estimated one billion people who still do not have access to electricity (IEA, 2019A:1). Off-grid and mini-grid systems are typically stand-alone systems that power single households or small communities and can be the most cost-effective way to provide power to developing or impoverished communities (IEA, 2017:1-2). Renewables can be the most effective way to build mini- or off-grid systems, with solar, wind turbines and small-scale hydropower currently the most used technologies. By increasing the use of these renewable technologies, it can become easier and cheaper to provide electricity to those who do not have access (ibid.:2).

Gender and Energy

With increasing access to mini- and off-grid energy systems, renewables in rural communities have been linked to greater gender equality (O'Dell et al., 2014). This can be seen on the household level with better access to clean cooking facilities, solar home systems, lighting and refrigeration. As poor air quality from fossil-fuel based, household energy systems have disproportionately impacted women and girls, the switch has improved health significantly (Mohideen, 2012:3). Furthermore, several studies have shown that economic empowerment can lead to poverty reduction as electricity provides access to greater job opportunities and income (Winther et al., 2017:398-9). Some studies have shown that in these situations, women can even earn as much as men (O'Dell et al., 2014).

Just Transition

The concept of a green transition is the shift away from heavily polluting sources of energy such as coal, oil and natural gas, to the renewable energy sources just discussed. Some proponents of the green transition have highlighted that to be a truly beneficial transition, it must be equitable and ensure human rights are safeguarded. The aim of the 'just transition' is to engage stakeholders including workers, labour unions, local communities, the private sector, regulators and others, in a dialogue. This aims to "*ensure that labour has a seat at the table when planning for a Just Transition to a low-carbon world*" (ITUC, 2016; Evans & Phelan, 2016:330). In this way, the transition works in the interests of the workers and communities who are dependent on the fossil fuels industry, while also pursuing "*climate justice for current and future generations exposed to the social and ecological disruptions produced by increasing concentrations of greenhouse gas emissions in the atmosphere*" (Newell & Mulvaney, 2013: 132). Furthermore, despite the fallacy that renewable energy is inherently

good, workers, local communities and indigenous people are also at risk of human rights violations. The just transition seeks to shape the green transition in a way that protects and provides justice to these groups and the environment (ibid.; 133). The following section of this literature review will provide an overview of the human rights impacts from traditional energy and renewable energy that the just transition seeks to highlight and mitigate.

Human Rights

Much of the attention paid to the renewable energy sector so far has focused on these benefits. It is a technology that can lead the way towards a new, low-carbon world. In this way, renewable energy businesses are seen as superior technology when juxtaposed against traditional energy companies. The potential of renewable energy to address the pressing global concerns of climate change, energy independence, jobs growth, biodiversity and access to electricity have sometimes "*encouraged a perception that the sector comes with an inherent social licence to operate*" (OHCHR, 2016:1). However, in recent years, reports have emerged that started to highlight the actual and potential adverse human rights risk linked to the renewable energy sector. Although under-researched in academia, these risks have been documented empirically across the value chain of the renewable sector. The risks range from ensuring decent work and conflict-free supply-chains, addressing adverse impacts on communities at the project development and implementation level, as well as tackling the issue of discrimination linked to the distribution of and access to energy networks. Similarly, these risks have arisen all over the globe, from Europe, North and Latin America, Southeast Asia and Africa (ibid.).

To begin with, it is important to understand the human rights risks in the traditional extractive sector. A study on the human rights impacts from coal mining demonstrates some of the typical impacts that traditional extraction has had. This study, performed by Vattenfall (2017), shows that human rights violations evident in the extraction of coal in Columbia include:

- 1. Workers' Rights (Occupational Health & Safety and Freedom of Association)
- 2. Displacement and Land Restitution in the Internal Armed Conflict
- 3. Involuntary Resettlement
- 4. Environment and Communities

The specific rights in these four categories were wide-ranging and varied, including accident reporting, the safety of labour union leaders, the effectiveness of the consultation process with local communities, air quality and access to water (Vattenfall, 2017:5). Though a private company conducted this study, evidence from a range of other sources demonstrates the same human rights risks across the extractives industries (Spohr, 2016; Human Rights Watch, 2013:48-72; Gomez & Regaignon, 2015:18-43; BSR, n.d.).

The Business and Human Rights Resource Centre lists five key human rights challenges for renewable energy companies: local community rights, land rights, indigenous peoples' rights, community health and safety and labour rights (BHRRC, 2016). So far, the academic debate has centred mostly on the negative impact of renewable energy projects on communities and land rights, mainly due to the large scale of the physical footprint of renewable energy projects. These studies have often been conducted using observations and interviews in the field, where there can be direct access to the indigenous and local communities. On-the-ground field research is invaluable to academics studying these human rights risks (Ramirez, 2019). Vast land requirements risks negatively impact the livelihoods of the local communities in areas where wind or solar farms, biofuel plantations and dams are located. For example, large scale plantation for biofuel is one of the main drivers of deforestation in several countries, and there have been reports of farmers being expelled from their lands, and in severe cases even killed (Smolker, 2012).

All renewable projects can negatively affect the right to an adequate standard of people living in nearby areas. With regards to hydropower, research suggests that large dams disrupt the migration flows of fish and thus have a substantial negative impact on livelihoods on communities who depend on fishing as a source of income and food (Daigneau, 2013). Similarly, geothermal energy requires drilling and building of related infrastructure that can lead to forced evictions, disruption of access to land, and other risks posed to livelihoods (Burke & Cordes, 2016). Land-related conflict is also linked to solar and wind energy projects. Land-ownership of communities is often not recognised for large-scale projects pushed by governments and private investors, and consultation, as well as compensation for the land, has been reported to be mostly inadequate (ibid.). With regards to the right to free, prior and informed consent (FPIC), Gouldson argues that "poorer and more deprived communities are often excluded from exerting influence in the decision-making processes that affect them and that they are disproportionately affected by negative social and environmental outcomes" (2006:402).

Indeed, the question of indigenous people and FPIC presents a significant challenge for companies. For example, Mpeketoni community in Kenya was allegedly not informed about the intention of the Baharini Electra Wind Farm project to acquire their land, and the 8000 residents were not offered any compensation or alternative settlement (Comer, 2016). Inadequate consultation, as well as cases of abuse, were also reported during the Lake Turkana Wind Power Project in Kenya (Danwatch, 2016). The link between large scale renewable projects and abuse of indigenous people has been reported in several studies

(Shah & Bloomer, 2018; UNHCR, 2017; Grady, 2017; Dunlap, 2018; Nolte, 2016; Pasqualetti, 2011). The development of wind farms in Oaxaca, Mexico, has been scrutinised by a number of academic research (Ramirez, 2019; Siamante & Dunlap, 2019). These studies showed how the wind energy developments in Mexico continue in a similar pathway as energy extractive companies, enforcing existing income-inequalities and creating social conflict. They argue that wind farms serve as "*Trojan horses for corporate land grabbing and temporarily mediating capitalism's key contradictions*" (Siamanta & Dunlap, 2019).

With regards to the working conditions, the processing of solar technologies has been reported to generate pollutants harmful to human health and the environment (OHCHR, 2016). In the wind energy operations, workers on wind turbines are exposed to hazardous health and safety conditions on a daily basis, including being exposed to noise, distracting sound and contaminations (Illinois WorkNet Center, 2017). However, it is not only the workers involved in the operation of renewable projects but also the ones connected to the construction of those projects. Here, migrant workers are particularly vulnerable to abuse and human rights exploitation (Buckley et al., 2016). Negative impact on workers rights in the renewable energy industry is especially present further down the supply-chains, where transparency fades away in interwoven supplier connections across countries and industries.

In a well-researched field, it would be expected that a wide range of academic and peerreviewed papers would be available on human rights risk throughout the entire supply chain. However, when the researchers of this paper were carrying out the literature review, the platforms of CBS Library, Google Scholar, ResearchGate and Elsevier yielded very few relevant results. As such, the researchers can conclude that the risks towards workers and local communities in the renewable energy supply chain is an under-researched topic. This research gap is perhaps due to the existing focus on more visible risks, where renewable companies have a direct negative impact on the rights of local stakeholders, such as indigenous people. This stark contrast in the academic research available confirms the researchers' notion that labour rights academic research in the renewable energy sector is limited.

As the need for the renewable energy sector continues to grow, so too will the supply chains. With the need to move towards clean energy sources, the expected rise in the demand for green-transition minerals is likely to generate significant negative externalities, including human rights risk linked to environmental and labour rights issues. Thus, these challenges are important for the academic community to highlight in research and literature. It is also vital for private companies to understand the human rights risks they face and work towards their

mitigation. One way in what company can achieve this is to bring transparency to their supply chain and trace the origins of their products.

Supply Chain Traceability

Supply chain traceability systems can be defined as a system that "*keeps records of products and chain parties and shares such information throughout the supply chain so that each unit/batch of a product/component is traceable and trackable*" (Dai et al., 2011:14). T. Governments have become increasingly aware of food safety, and legal regulations have been implemented to protect consumers across many developed nations, including the US, EU, Canada and Japan (Liu et al., 2009:2265). Increasingly so, consumers are also becoming interested in the origin of products, raw material sourcing, methods of production, standards of labour and the environmental impact of the products they are purchasing (Trienekens et al., 2012:55). As such, this increased transparency, especially in the gemstone industry, has first and foremost been driven by increased pressure from non-governmental organisations, the media and regulators. However, as of yet, traceability and supply chain due diligence is quite limited in other industries. Initiatives are starting to emerge, mainly due to growing legal requirements for due diligence, though credible, industry-wide traceability initiatives are scarce (ibid.).

To conclude, as stated in the introduction of the paper, this literature review strived to reflect the characteristics of a high-quality literature review. Firstly, it has provided an extensive overview of the current literature and context available in the fields of climate change, renewable energy, human rights and supply chain traceability. Secondly, controversies were found in the literature on human rights as it demonstrates the lack of regard for human rights in the renewable energy field and the significant number of violations. Finally, this literature review demonstrates that there are a number of unanswered questions in terms of understanding human, and specifically labour rights risks and impact on communities in the supply chain of renewable energy projects. This thesis has been designed to directly fill this gap and present a timely discussion on the topic of human rights and the traceability of commodities in the renewable energy supply chains. Relevant theories have not been discussed in this chapter, and are addressed in Chapter 6. The following chapter provides the scoping of the study.

Chapter 3: Scoping

From the literature review, it is clear that the burning of fossil fuels to generate energy is the most significant cause of carbon emissions (EPA, 2019). According to the overwhelming majority of scientists, this is also exacerbating the climate change emergency, and the shift from fossil fuels to renewable sources is one of the most important and impactful ways to limit climate change. This paper is not the first to suggest this, with the shift known as the green or renewable energy transition. However, the literature review demonstrated that despite the overwhelming benefits, the supply chain, sourcing, development and use of renewable energy technologies also have the potential to violate fundamental human rights. Thus, this paper researches the human rights risks present in renewable energy projects. The following chapter outlines the scoping of the research project, how the focus was narrowed down, and the final research questions to be answered throughout the research paper.

In scoping the project, it was necessary to focus on one renewable energy technology, due to the varying nature of their materials, components, sizes and siting locations. The researchers decided to limit the study to wind energy for two key reasons:

- Carrying out the project from Denmark, the researchers were located in a country and region where offshore wind is highly developed, providing access to many experts knowledgeable in the area.
- 2. At the time of writing, one of the researchers was employed at Ørsted, a wind energy project developer. This resulted in a great deal of background knowledge of the wind industry and access to a greater range of professionals in the industry. Furthermore, this research was carried out in a joint effort with Ørsted, though maintained complete independence.

The first steps taken to narrow the project down further was to map the value chain of Ørsted to understand how each stage might present risks to human rights. After initial meetings with Ørsted representatives, it was found that the majority of mapped human rights risks occurred within tier 1 manufacturing suppliers. Through these conversations, it was also found that Ørsted had a well-developed workstream to identify, assess and mitigate these risks. However, the workstream had not mapped risks beyond this point. Therefore, the researchers decided to address this gap by identifying human rights risks in the upstream supply chain of wind energy. Through the initial mapping of Ørsted's value chain, the researchers found that mineral extraction and processing were the furthest upstream stage with the least visibility, and this became the narrowed focus.

The World Bank identified that the green transition to renewable energy will bring significant changes to the patterns of mining, with exponential growth in demand expected for some minerals (World Bank, 2019). In researching the minerals and metals used in Ørsted's direct-drive offshore wind turbines, the researchers confirmed that the key elements required included: aluminium, chromium, copper, iron, nickel, rare earth elements, steel and zinc (ActionAid, 2018:6; Dominish et al., 2019:14-5). Some of these minerals have been identified as critical minerals for the green transitions, and the World Bank estimates that demand will increase significantly (World Bank, 2019).

As the mining and processing of each of these minerals is different, an individual mineral needed to be chosen. There were four characteristics of the mining and use of the individual minerals that the researchers preliminarily assessed: the amount used (kilograms) in each turbine, whether substitutions are available, the proportion of global supply used for wind energy technology, and expected increase in demand. After assessing all these factors qualitatively, the researchers determined that rare earth elements would be the most relevant and interesting mineral to focus on. As the supply of rare earth elements are highly concentrated in China, with the country controlling approximately 80% of global supply, the primary focus is on Chinese rare earth supply chain. An added benefit of this high figure is that the researchers, with almost certainty, can assume that Ørsted's turbines contain minerals mined and processed in China.

As the literature review demonstrates, the most severe human rights risks for wind energy companies are categorised into environmental rights, local community rights, and labour rights. The researchers analyse mining, processing and waste management of rare earths in China to understand which of these categories of rights are at risk, and specifically which individual right, e.g. access to clean water or safe working conditions. Given the collaboration with Ørsted, the researchers also took the opportunity to provide a practical element to the paper. Therefore, this thesis dedicates a chapter to practical recommendations for how companies can mitigate human rights risks linked to rare earths in their supply chain in China and how they can overcome the challenges that currently enable the prevalence of human rights risks.

The scoping of this paper has shown that there is a need to transition from fossil fuel to renewable energy generation, and offshore wind provides a viable alternative. The wide-scale use of offshore wind turbines, and renewable energy in general, is expected to increase the demand for critical green-transition minerals. However, risks are evident, and there is a need

to focus on human rights risks in the mining and processing of rare earth elements. As such, the research objective of this thesis is to answer the following research questions:

RQ1: What are the salient human rights risks associated with the rare earth supply chain in China?

RQ2: Using empirical evidence and theoretical perspectives, what is hindering the mitigation of identified human rights risks, and how can they be addressed?

Before moving onto answering the research questions, the paper outlines the methodological and theoretical structures that guide this research.

Chapter 4: Methodology

The following chapter presents the underlying methodological framework that ensures the academic credibility of the thesis. Understanding methodology is critical as it guides the selection of methods used in the study as well as denoting the theory required to answer the research question (Moses & Knutsen 2012:4-5). For this, the methodology showcases how reliable knowledge is acquired by building on ontological and epistemological assumptions. Ontology explores whether reality exists independently of our knowledge of it, whereas epistemology explores whether reality can be observed or not (ibid.:4).

Philosophy of Science

Defining the epistemological and ontological approach is crucial as it underpins the Philosophy of Science (PoS) that guides the research (Moses & Knutsen 2012:4). PoS is essential for the research as it helps understand how knowledge is developed, and how the researchers themselves perceive such knowledge, forming the foundation for answering the research question at hand (Saunders et al., 2009). Three main positions of PoS are at the core of the discussion; naturalism, constructivism, and critical realism. Naturalism has been disregarded as it does not allow a subjective perspective of realities to be considered throughout the research, a key consideration when looking at the issue of human rights violations. Constructivism, though more relevant than naturalism due to the subjective interpretation of the collected data, does not accept that there is a single reality, independent of those observing it. This paper takes the position that human rights are indisputable, and thus,

constructivism is discounted. As such, the thesis pursues the critical realist standpoint to knowledge as it effectively overcomes the shortcomings of naturalism and constructivism.

Critical realism combines the ontological assumption of naturalism, that reality exists independent of our knowledge of it, with the epistemological assumption of constructivism, that reality cannot be observed with the naked eye. In critical realism, access to the independent reality is considered complex, where the perception of reality is affected by individual experiences and overall social, historical and cultural contexts. Bhaskar (1978) expands on this, suggesting that critical realists accept the notion of a reality independent from our knowledge. To apprehend the nature of real objects, Bhaskar introduces the three levels of reality to look at the issue from all angles (Plant, 2001:4). The three overlapping levels of reality consist of the real, the actual and the empirical domains. The 'real' world represents the events, flows and sequences that can be reproduced in an experiment, and as a subset of the 'actual' level, the 'empirical' level presents the observable events that one can see with a naked eye (Benton & Craib, 2011:126). Critical realism focuses on the deep reality, the real level, that exists below general explanations of 'empirical' events, which would be sufficient for empiricists to recognise (Ibid.).

Thus, the powers and mechanisms that allow for low transparency and traceability throughout the wind energy supply chain, the 'real' level, represents an important puzzle in tackling the human rights violations, the 'actual' level of reality. The 'real' level of reality must be uncovered to provide recommendations and mitigation actions. Establishing this approach to the research also enables the researcher to select appropriate methods to get as close to the truth as possible, as the truth lies beyond the subjective perspectives of reality.

There is a wide range of qualitative research methods within critical realism (Moses & Knutsen, 2012:14). The research questions should guide research, searching for the causes of human rights violations within the context of complicated global supply chains. Critical realism understands that representations of reality will fall to bias and can be error-prone. Thus, to ensure research validity, methodological pluralism should be employed, with more than one method used to build the research. To accommodate this, document analysis and interviews are used as appropriate research methods. However, before moving onto the description of the research methods, the research approach and research design are described in the section below.

Research Approach

Most common approaches in research are inductive and deductive reasoning. Inductive reasoning draws generalised conclusions and theories from observations and data, whereas deductive reasoning starts with hypothesis or theories and tests the possibilities of concluding the specific observations (Bryman & Bell, 2015; Saunders et al., 2009). However, guided by critical realism and the three levels of reality, this thesis undertakes a more alternative approach to research strategy - retroduction. Retroduction is a type of reasoning that enables the discovery of underlying mechanisms to explain observed realities by mixing the elements of deductive and inductive research (Hu, 2018:118; Malhotra, 2017:175). The aim of retroduction is to note and model regularities and motives while discovering and describing the possible causes of them (Rutzou, 2016). As such, the three levels of reality can be explored by evaluating and comparing different theoretical explanations of a given phenomenon and then selecting the theories which most accurately represent the *'real level of reality'* given our existing knowledge (Hu, 2018:118-139). Simply put, this is done by working back from the data and observations to draw on possible explanations.

Unlike inductive and deductive reasoning that cannot produce new ideas, retroductive reasoning enables the researchers to discover new structures and construct models of mechanisms that have previously not been observed (Malhotra, 2017:173). This is especially beneficial when looking at a newly arising issue, such as the case of human rights violations in the wind energy supply chain. Furthermore, retroduction provides flexibility, as it allows for a change in the direction of the research. This is also enabled by an emphasis on qualitative observations and subjective opinions. Moreover, retroduction does not require a large sample of data, as there are no concerns for generalisation (ibid.:175). As such, retroduction is deemed the most fitting for this thesis as it emphasises the subjective nature of the study and enables the exploration of the underlying causes for human rights violations, in line with the critical realism. By combining the deductive theoretical desk research with the inductive data collection through interviews, the thesis expects to discover and analyse the mechanisms that enable human rights violations, explore new causal mechanisms and offer recommendations outlining mitigatory measures by drawing on relevant theories. This course of action expects to uncover the answer to the research questions and generate an outcome that holds academic credibility.

Case Study Research Design

This study of Ørsted's supply chain, with a focus on rare earth mining and processing in China, is based on the intensive single case study methodology (Gerring, 2004:341). Such case studies are particularly relevant and useful when researchers aim to gain a deep understanding or knowledge of a particular phenomenon. This study is a combination of representative and revelatory cases. A representative case is described as one that aims to "*capture the circumstances and conditions of an everyday or commonplace situation. Thus, a case may be chosen because it exemplifies a broader category of which it is a member*" (Bryman, 2012:70). On the other hand, a revelatory case is one which "*exists when an investigator has an opportunity to observe and analyse a phenomenon previously inaccessible to scientific investigation*" (Bryman 2012; 70). This case is revelatory due to the lack of previous research on human rights risks present in the wind energy supply chain, positioning the nature of this study as relatively new to academic investigations.

Generalisability

However, despite the benefits that a single case study methodology allows for, the most significant drawback that almost all researchers have noted is generalisability (Bryman, 2012:70; Gerring, 2004:341). Researchers can be hesitant to use a single case study to "generalise across a larger set of units" as Gerring suggests, as the case study may not be adequate at explaining multiple instances (2004:341). Bryman suggests that this is indeed a difficulty of the single case study as two individual cases are unlikely to be a perfect fit for one another. However, the combination of the case study typology addresses this issue. The representative case study may be able to generalise about a broader phenomenon, although the revelatory cannot. By using this combination of typologies, this case examines human rights risks in the mining and processing of rare earth elements with the possibility of generalise the underlying conditions for the existence of the human rights risks in these supply chains. Therefore, it cannot be assumed that similar risks are present in the rare earth supply chains outside of China. This is further elaborated in Chapter 8, the implications.

Research Methods

Research methods refer to the techniques and processes through which the researchers collect any data to be able to reach the objectives of the thesis. In this case, the research aims to uncover the mechanisms that hinder the mitigation of human rights risks in the wind energy

supply chain and create better awareness of this topic. Therefore, choosing appropriate research methods is critical in answering the research questions at hand. Here, the critical realist standpoint directed the choice of the data collection methods to be able to explore 'the real level of reality' and get to the truth as close as possible. Moreover, as Yin argues, using multiple data sources is critical for strengthening the validity of a single case study research design (Yin, 2009). As such, a pluralistic approach is necessary to ensure objective findings (Benton & Craib, 2011). However, challenged by the COVID-19 pandemic happening at the time of writing, the data collection methods had to be adapted throughout the research. Consequently, the research has taken document analysis and interviews as the key sources of data. The constraints and drawbacks of the data collection are further elaborated on in Chapter 5.

Document analysis

This thesis employs document analysis to understand the full scope of human rights violations within the wind energy supply chain. Document analysis is a type of qualitative research where documents are interpreted by a researcher to understand the full scope of the topic (Bowen, 2009). A large number of documents have been analysed for two main reasons. First of all, it is necessary to map out the current supply chains of wind energy companies and understand the overall process of rare earth mining and processing, the social and environmental impacts linked to this and how the current political context shapes this discussion. Secondly, all documents are analysed with a theoretical lens to build a comprehensive understanding of the motives and mechanisms that play into human rights violations. This is necessary when analysing the documents, in order to uncover what companies are, and what they are not, doing to address those challenges.

There are many reasons why researchers choose to use document analysis. From an efficiency standpoint, it is an effective form of gathering data in an accessible, manageable and practical format. Given the research, these documents can often be a reliable source of data, as they are far more time and cost-efficient than conducting individual research or experiments (Bowen, 2009). Furthermore, document analysis can be used on either primary or secondary sources to help contextualise one's own research. In many retrospective studies, documents are useful as they provide insight into the cause, effect and change over longer periods of time. As such, the thesis can analyse possible improvements to human rights in the mining and processing of rare earths. Lastly, this form of research can bring to light new questions that may not be observed, and is a valuable tool to ensure research is critical, comprehensive and clear (ibid.).

While there are many forms of document analyses, the most common is likely to be written documents (O'Leary, 2014). The documents analysed in this study consisted of a mix of data from primary sources, such as the OECD Guidelines, UN investigations, human rights investigations, government reports and regulations, companies' sustainability and CSR reports, as well as secondary data, such as credible media articles, and Civil Society Organizations (CSOs), Non-governmental Organisations (NGOs) and academic reports. Moreover, to overcome the challenges posed by the global pandemic restricting in-person meetings and travel at the time of writing, this paper pulls in data collection through innovative digital channels, such as studying satellite images on Google Earths, YouTube videos, documentaries and photos available online. This innovative way of collecting data in the COVID-19 context helped remove some of the limits posed by the inability to conduct field research. Photos and videos of mining sites and local conditions can better provide the researchers with an understanding of the extensive scale of rare earth mining that is difficult to translate into writing (Laurier, 2016).

There are several shortfalls of using document analysis. For example, while the rare earth industry is primarily located in China, only documents available in the English language have been analysed. Furthermore, as the majority of the document analysis has been secondary data, there is a potential risk of secondary data bias. While evaluating a document's value, a researcher should never consider the data as "*necessarily precise, accurate, or complete recordings of events that have occurred*" (Bowen, 2009:33). Similarly, in line with critical realism, Bryman argues that all documents should be approached as "*texts written with a distinctive purpose in mind*" rather than actual reflections of reality (Bryman, 2016). Although many of these issues have been addressed by having transparent processes on how to evaluate an author and document, the thesis employs a secondary data collection to ensure robust and credible research. Thus, interviews are employed as an additional data collection method to discover underlying mechanisms and nuances that could have been overlooked throughout the document analysis.

Interviews

Exploratory interviews were chosen as an additional research method to ensure the credibility and validity of the data as well as in-depth examination of the topic. A semi-structured type of interviewing was selected as it enables the researchers to maintain flexibility and help reveal the answers to questions that arose through the document analysis (Bryman, 2016:470). Although a set of questions have been tailored and prepared in advance of each interview, researchers were able to ask follow-up questions and explore new avenues that were previously not considered or unknown. Informal, open-ended questions were asked, resembling a discussion rather than an interrogation. This allowed interviewers to speak freely about certain issues while maintaining the direction of the discussion through pre-determined questions. This was fundamental, as many different actors in the field were interviewed, and the research was thus able to examine the topic from several perspectives and uncover new controversies. For example, the first four interviews were conducted during the scoping of the thesis and significantly impacting the direction of the research. They demonstrated the well-research nature of violations against indigenous communities during the siting of wind farms, and the researchers came to understand the issue of opaque supply chains of green transition minerals. Therefore, at the end of each interview, the discussion and findings were analysed to uncover emerging phenomena and adapt the focus of the following interviews (ibid.:484).

In total, the researchers conducted in-depth interviews with 30 experts. The relevant individuals selected for the interview were identified through online research but also based on the recommendation of previous interviewees, employing the snowballing technique (Naderifar et al., 2017). The academic research on human rights and wind energy sector is relatively limited, especially on mining and processing of rare earths. It was therefore critical to talk to a wide range of experts from different industries to gather as much information and opinions on the topic as possible and to provide credible findings that address the gap in the current research. As such, the area of expertise ranged from human rights activists, NGOs, researchers and academics, journalists, representatives from the mining industry and initiatives, experts on rare earth supply chains, geologists, company representatives, labour union watchdogs, politicians and mining inspectors. To further build impartial research, broad ranges of background and expertise can better guarantee the validity of collected data as interviews can be cross-checked and to get as close to the truth as possible.

The following table presents the name of the interviewees and their occupation. Group 1 are interviewees from CSOs, such as NGOs, academia, and human rights experts, In the group 2 are interviewees from the private sector, including companies, industry association and certification schemes. Finally, group 3 represents the regulators. See appendix for transcription of interviews.

Figure 1: Interviewees in Group 1.

NAME	OCCUPATION	INTERVIEW DATE
Elsa Dominish	Research Principal at UTS Institute For Sustainable Futures	16th of January 2020
Eniko Horvath	Senior Researcher at Business and Human Rights Resource Center	16th of January 2020
Jacobo Ramirez	Professor at Copenhagen Business School	16th of January 2020
Sophie Kwizera	Policy Advisor at ActionAid	22nd of January 2020
Charlotte Aagaard	Investigative journalist at Danwatch	16th of March 2020
Joseph Wilde	Senior Researcher, SOMO & Coordinator, OECD Watch	20th of March 2020
Nikolaj Houmann Mortensen	Investigative journalist at Danwatch	25th of March 2020
Kayla Green	Corporate Engagement Advisor at the Danish Institute for Human Rights	25th of March 2020
Benjamin Sprecher	PhD Researcher at Leiden University	27th of March 2020
Roberta Pinamonti	Manager at Business Social Responsibility	31st of March 2020
Aidan Chau	Researcher at China Labour Bulletin	1st of April 2020
Nis Høyrup Christensen	Expert on Chinese Affairs	3rd of April 2020
Micheal Rohwer	Director at Business Social Responsibility	10th of April 2020

Figure 2: Interviewees in Group 2.

NAME	OCCUPATION	INTERVIEW DATE
Johannes Drielsma	Deputy Director of Euromines	30th of March 2020
Anne-Marie Sylvestre	Sustainability Manager at Lynas Corporation	31st of March 2020
Nabeel A Mancheri	Secretary-General of Rare Earth Industry Association	31st of March 2020
Roland Gauss	Thematic Officer Substitution and Recycling at EIT Raw Materials	31st of March 2020
Patrick Nadoll	Senior Advisor, Exploration and Resource Assessment at EIT RawMaterials	31st of March 2020
David Merriman	Manager at Roskill Consultancy	31st of April 2020
Per Kalvig	Chief Advisor at Center for Minerals and Materials (MIMA)	1st of April 2020
Leonard Ansorge	Managing Director at RockLink	6th of April 2020
Lukas Förster	A mining engineer on the CERA Certification project	6th of April 2020
Joel Frijhoff	Lead Sustainability Advisor at Ørsted	8th of April 2020
Chaojun Li	Senior Sustainability Advisor at Ørsted	8th of April 2020
Kenneth Riis Jensen	Sustainability Lead, Strategy Office at MHI Vestas	8th of April 2020
Bastiaan Vader	Sector Specialist Human Capital at Dutch Wind Energy Association (NWEA)	24th of April 2020
Gilbert Rukschcio	Managing Partner at Pantarhei Advisors	24th of April 2020
Jonas Jensen	EHS Specialist at Siemens Gamesa	6th of May 2020

Figure 3: Interviewees in Group 3.

NAME	OCCUPATION	INTERVIEW DATE
Anna Cavazzini	Member of the European Parliament for the Green Party	20th of March 2020
Åsa Persson	Mining Inspector	30th of March 2020

Except for one, all interviews were conducted online, and where possible, recorded and later transcribed. The interviews that were not recorded were conducted mainly to scope the topic and learn more about the subject. During these interviews, the interviewers took written notes that were then analysed the same way as the transcriptions. However, it is important to note that interviews can present several drawbacks. There is a significant personal bias when conducting the interviews, leading to a focus on certain topics, uni-directional discussion and leading questions. Personal bias is also present when assessing the data collected through interviews, as every individual interprets perspectives differently based on their respective knowledge, which can skew the patterns of observations. Nonetheless, researchers tried to avoid these challenges by conducting the interview together in order to limit individual bias, getting a variety of perspectives and attempting to ask questions as openly as possible.

Data Analysis

The benefit of using interviews and document analysis is that the analysis of the collected data can be approached similarly. Data analysis can be understood as a process through which empirical knowledge is produced, and understanding is developed (Bowen, 2009:33). Instead of analysing the data after its collection was finalised, the researchers approached the data analysis as an interactive process. In other words, the process of data collection and data analysis happened simultaneously. Guided by the retroductive research reasoning, the research shifted between data collection, data analysis, and theory application as new findings and phenomenons came to light. This process proved to be especially beneficial, as it allowed researchers a high degree of flexibility and ability to uncover insights that were previously not considered, and followed the lead to dig deeper for the truth.

Although no standardised approach to analysing qualitative data exists, the thesis strived to ensure consistency in the analysis of both interviews and documents. As such, categorisation, i.e. grouping excerpts from the data into categories, was used to structure the data and allow for easier recognition of patterns and principal themes (Saunders et al., 2009). To help with this process, the interviews and documents were analysed through NVivo, a qualitative data analysis software (Bryman, 2016:591). In NVivo, all qualitative data can be coded and organised into different categories, while at the same time accommodating for nuances. NVivo quickly helped the researchers recognise patterns and establish connections between different sources of data, as similar perspectives and opinions from the interviews and documents are grouped under the same category. This is done by breaking the text into 'Nodes' (see example in the appendix). Despite the benefits, there are some drawbacks that

the researchers kept in mind when undertaking the analysis. For example, the narrative of the interview, as well as documents, could be obscured, and data could be wrongly broken up into several nodes, losing its context (Bryman, 2016:598). Hence, the overall picture is kept in mind throughout the data analysis for the data analysis findings to be credible and valid (Bowen, 2009). The following chapter looks into how the researchers ensure that the thesis holds the required academic credibility and validity despite the challenges that arose during the time of writing.

Chapter 5: Research Credibility

The main objective of this thesis is to undertake a thorough analysis of the mechanisms that enable human rights violations and understand how companies can mitigate this. However, as highlighted by critical realism, the researchers' personal experiences and biases inevitably influence the findings of the study. Nonetheless, the researchers tried to uphold the principles of triangulation throughout the research to ensure academic integrity. As Bryman argues, triangulation "refers to the use of more than one approach to the investigation of a research question in order to enhance confidence in the ensuing findings" (Bryman, 2016:392). The methodological triangulation has been upheld by selecting a robust methodological approach with two different methods of data collection. Next, the theoretical triangulation has been strengthened by using four theoretical positions to interpret the data. Finally, this thesis was undertaken by two researchers, supporting the investigator triangulation that argues that more than one research should collect and interpret the data (Denzin & Lincoln, 1998).

The purpose of triangulation is to strengthen the credibility of the findings by increasing the validity and reliability of the research. Validity concerns the external and internal plausibility of the study and its factuality. External validity looks at whether the findings of the study can be generalised (Saunders et al., 2009; Bryman & Bell, 2015). Instead of striving to make generalised conclusions from the sample, the goal of the research is to ensure a high quality of the theoretical inferences made out of qualitative data (Bryman & Bell, 2015:414), further discussed in Chapter 4, Case Study Research Design. On the other hand, internal validity deals with the issue of causality, identifying whether the causality referred to in this specific research is credible. There may be some degree of concern regarding internal validity if the relationships the researchers suggest between the theories used or empirical findings do not hold. To mitigate this, a careful approach has been taken when suggesting casual relationships (Bryman, 2016:384). The thesis does not posit direct causal links. Instead,

through a robust structure, theoretical application and critical evaluation of a wide range of opinions collected through two different methods, some implications can be drawn between the cause and the effect.

Lastly, reliability considers the consistency of the findings and whether the research can be replicated (Bryman & Bell, 2015). This thesis ensures reliability by detailing its methodological and theoretical framework so that another study can verify the conclusion. However, by employing the stance of critical realism, it is debatable whether the research can be replicated or not. This is mainly because critical realism acknowledges that personal biases exist, and everyone perceives reality and truth differently. Nonetheless, to ensure credibility, the researchers have been open about the limits of the methods and the theories, how they have been mitigated, and how the personal biases might have impacted the potential findings. A potential bias is present as one of the researchers was employed at Ørsted during the time of writing, and may have influenced the results. However, as the company has not yet undertaken any scoping nor projects regarding their mineral and metal supply chain, there were no previous results, expectations or official company positions to influence this project. Furthermore, as two researchers conducted this thesis, and the second researcher was completely independent of the wind energy industry, it is concluded that this potential bias has had no significant impact on the findings of this study. Further, transparency has been maintained by providing full names of the interviewees, the transcriptions, and all literature used for the analysis in the bibliography.

Despite the precautions mentioned above, this research has taken, several shortcomings were recognised. These challenges were posed mainly by the ongoing global pandemic COVID-19, that paralysed much of the world during the time of writing. This led to the researchers making difficult practical decisions that changed the direction of the thesis significantly. Most importantly, due to the travelling restrictions, the researchers were unable to undertake field research to collect data through observations and on-site interviews with stakeholders, such as the workers and local communities. Observations as a method of data collection are especially meaningful when dealing with a sensitive topic such as human rights risks, and where research cannot rely solely on the information provided by the companies and governments (Götzmann et al., 2016). For instance, the researchers had planned an on-site visit to a rare earth mining site in the Murmansk region as well as a processing union in Sillamäe, Estonia. As the field trip and examination of human rights violation in the rare earth industry in Russia was no longer possible, the researchers re-aligned their focus on China, as access to both primary and secondary evidence was easier and more developed. To mitigate this set-back, the researchers aimed to strengthen the other two methods of data collection.

Besides reviewing reports, articles and other documents, researchers studied satellite images of the mining sites available on Google Earth, as well as watching several documentaries and videos detailing the atrocities and working conditions in China.

Moreover, a significant number of interviews were undertaken, including with investigative journalists, human rights experts and NGOs, that focus on the topic of mining and processing of rare earth elements, and the human rights externalities of the mining sector in China. However, despite sending many requests, there is still a significant drawback in the fact that no interview was conducted with the stakeholders most critically impacted by the mining and processing operations, such as local community members, and mining and processing workers. However, even if the researchers had interviewed people from these groups, it is not likely that credible information would be received. These rightsholders would be unlikely to open up about human rights violations and abusive conditions to foreigners - not only because of the language barriers but also due to fears of persecution and a high degree of censorship. This also goes for interviews with Chinese mining companies, which declined to take part in the research. Nonetheless, if they would have agreed to an interview, it is unlikely that any credible and valuable information would be provided, as data on human rights violations is usually confidential and Chinese companies are notoriously intransparent, especially towards Western researchers. Also, only one interview was conducted with a representative from the regulatory group, despite several attempts to contact them. Thus, to overcome this limit and achieve credible information, a number of experts on rare earth, as well as human rights risks in mining in China, were interviewed.

Finally, the scope of this research allowed for the in-depth use of 5 theories and concepts. Incorporating more theoretical perspectives, for example, pure sustainability theories, those within organisational management or more strictly political theories, could have provided more useful insights into how the current mechanisms operate and perpetuate human rights violations. However, it is unlikely that the thesis would reach a very different conclusion, as the chosen theories accommodated a range of different perspectives from different studies. The selection of the theories and the reasoning behind this is elaborated in the following chapter.

Chapter 6: Theories

This chapter presents the theoretical framework used for the analysis of the empirical findings. Looking at the issues of human rights violations in the wind energy supply chains, several relevant theories arose that helped analyse and understand the issues. This chapter first presents a range of theories and conceptual backgrounds that have been deemed most relevant for the research and analysis. In the end, the thesis presents how the theories and their respective frameworks are applied to the analysis.

Corporate Social Responsibility

The evolution of business ethics and sustainability can be traced to the 1950s, with the emergence of Corporate Social Responsibility (CSR). However, it was not until recent decades when CSR gained in prominence. The drive behind CSR is to contribute to broader society, ranging from environmental sustainability, employee well-being, community relations to charity work. Categorised by Caroll, expectations are economic, social, ethical and philanthropic (Carroll, 1991:39). Thus, CSR can be seen as an umbrella term for a number of non-financial values that go beyond the traditional understanding of business operations. Although these actions do not stem from legal obligations and are entirely voluntary, CSR is primarily perceived as a tool "*designed to assist the corporation's business, including in terms of its reputation*" (McCorquodale, 2009:391).

Although CSR plays a critical role in navigating companies to assume a higher degree of responsibility for bettering social conditions around the world, the position on the importance of reputation has also become the subject of critique. For example, as to 'recover' the evilcompany reputation, managers need to do something good, such as undertake CSR practices. As Freeman and Dmytriyev argue, according to this CSR view of business, "*managers are akin to gangsters going to church on Sundays*" (2017:8). Furthermore, CSR may cover wrongdoings, and its moral license can be used as a strong communication tool that can overlook or pardon the mistreatment of stakeholders (Ormiston & Wong, 2013). Similarly, companies can exploit CSR to stall governments from formulating stricter regulations. Finally, CSR can be criticised for creating distinctions such as profits vs society and business vs ethics. However, creating profits while contributing to local communities and societies does not need to be mutually exclusive (Freeman et al., 2010). On the contrary, social responsibility and profits are mutually reinforcing and beneficial for all aspects of society, as argued by stakeholder theory.

Stakeholder Theory

Freeman and Dmytriyev (2017) argue that stakeholder theory and CSR are two distinct concepts with some overlap. Although both theories are rooted in integrating social interest of communities and societies into business activities, the primary difference is in the way they prioritise these social responsibilities. For example, stakeholder theory argues that social responsibility is part of the overall business responsibilities and should not be treated differently. In contrast, CSR prioritises social orientation over other business responsibilities (Freeman & Dmytriyev, 2017:8). In other words, CSR often expands its focus beyond the business activities, such as by claiming to contribute to poverty alleviation in developing countries, despite not having any business operation there or particular expertise in that field.

Although stakeholder theory suggests that many interest groups fall within the sphere of influence by corporations, such as the workers across the supply chains, customers, trade unions and local communities (Lamplume et al., 2008), it places its attention within a reasonable reach of the business activities, focusing on surrounding communities where the direct or indirect business activities take place (Freeman & Dmytriyev, 2017:10). As such, stakeholder theory addresses the company responsibility as multi-directional; not only focusing on the societies but also on the workers and suppliers, further enhancing the sustainable supply chain management approach elaborated further in the chapter (ibid.). Building relationships and value-creation for all stakeholders is fundamental to the companies. Therefore, stakeholder theory is based on the idea that a company's interests lie beyond those that have a purely financial interest, and sees profit and social responsibility as mutually reinforcing. As a result, companies should be obliged to engage in other objectives to benefit society outside of their profits. This stems from the idea that companies do not exist in a vacuum, but function as a complex and highly integrated component of society, with implications extending far beyond their operations and supply chains. As such, companies should not only consider their shareholders but also respect all stakeholders and be held accountable for upholding correct practices in risk-based due diligence and human rights.

The stakeholder theory approach to corporate responsibility and its emphasises on stakeholder engagement has served as a base for the Human Rights Due Diligence (HRDD) framework (Matwijkiw & Matwijkiw, 2013). The emerging field of BHR led the movement away from philanthropic and PR reasonings of many CSR theories to a more holistic approach focused on the impact of business activities on a range of stakeholders. This approach was pioneered by the UN Special Rapporteur John Ruggie, who led the establishment of UN

Guiding Principles on Business and Human Rights (UNGPs) that presented the guidance for companies to prevent and mitigate the adverse business impact on human rights.

Human Rights Due Diligence Framework

The UNGPs build on Ruggie's Protect, Respect and Remedy concept to address human rights related to globalisation and international business: the state's duty to protect human rights, the corporate responsibility to respect human rights and access to an effective remedy for right holders when their rights are infringed upon. These principles are examined further.

The state's duty to protect human rights is three-folded. First, the state itself must not violate human rights. Second, the state has a duty to protect against human rights abuses by third parties, such as companies. Finally, the states must ensure that all rightsholders can enjoy their rights fully and can seek remedy if their rights were violated (Ruggie, 2013).

The corporate responsibility to respect human rights refers to the expectation that business actors are to both comply with the laws of the countries they operate in, and to go beyond basic compliance when states fail to protect human rights. In this way, private entities have a responsibility to respect human rights even if the state fails to do so. Ruggie distinguishes between the legal obligations businesses are accountable for, and their moral and ethical responsibility to protect human rights, even if the state itself fails to do so. Respecting human rights lends itself to the social license to operate, as the responsibility to protect human rights is a shared, 'near-universal' social norm (Ruggie, 2013:92). Corporate responsibility with regards to human rights is categorised into three principles: "to not violate them, to not facilitate or otherwise be involved in their violation" (ibid.:95). Therefore, companies are expected to look beyond direct violations and account for their indirect involvement too, through the UNGPs' human rights due diligence (HRDD) framework.

There are several steps to HRDD, as described in Figure 4. As a first step, companies must adopt and embed human rights policy into management systems, to ensure it becomes part of day-to-day operations. Secondly, companies must assess their actual and potential human rights impacts. Acting on these findings, companies must prevent the risks and mitigate any adverse impacts that they contribute to. Next, companies must track the responses, and finally, transparently communicate about how impacts are being addressed, remaining honest about the challenges they are facing (UNGP Reporting Framework; n.d.). Because companies

are responsible for human rights violations through their value and supply chain, they must select and vet partners and suppliers that are respecting human rights and ensuring clear, ongoing HRDD.



Figure 4: The process outlining the key steps of HRDD (OECD, 2018).



Lastly, the UNGPs demand that an effective remedy must be available to all stakeholders. Ruggie explains that this may be judicial, state-based non-judicial and nonstate-based. Judicial refers to the duty of the state to protect human rights through the application of the law, assuming that the state has legislation on human rights and courts are an active part of solving disputes between rightsholders and human rights violators. State-based non-judicial means that rightsholders would receive non-legal support in having their issues heard, such as administrative measures. Finally, nonstate-based remedy refers to solutions that are agreed upon between rightsholders and third parties through their own means. Assuming the process is legitimate and fair, any three of these resources may be effective to solve human rights disputes. The HRDD framework encourages companies to have grievance systems available at local levels to quickly address issues when they arise, rather than relying on local states which may not have the capacity, or desire, to deal with these issues (Ruggie, 2013).

This research adopts the position that companies are indeed responsible for their direct and indirect business activities throughout the value chain and must be accountable to all their stakeholders. As both the stakeholder theory and HRDD framework reinforce each other and

are closely aligned, this research applies them simultaneously throughout the analysis to provide practical recommendations for wind energy companies on how to respect and protect human rights throughout the rare earth supply chain. However, despite the stakeholder theory and the framework providing clear normative guidance on what companies ought to do, today's complex and globalised value chains present significant challenges for companies to uphold their responsibility towards human rights and undertake due diligence in practice and effectively engage with stakeholders. This issue is further reinforced, as several types of value chains can be formed, confirming that no one solution can fit all. Thus, the theory of global value chain governance is also used.

Global Value Chain Governance

Global value chain governance (GVCG) describes relationships among buyers, suppliers and service providers that bring a product or service from inception to its end use (Gereffi et al., 2005:80). Given the increasingly global and spread out nature of value chains, the ways firms must govern themselves internally is driven by a motivation to minimise transaction costs. The article provides a framework that explains governance patterns and structures in global value chains (2005). The authors identify three key variables that affect the balance of power and level of integration between suppliers and buyers along a value chain:

- 1. The complexity of transactions (the more complex and customised the information transfer is between the buyer and supplier, the more likely it will be internalised);
- 2. The ability to codify transactions (the extent to which the information is coordinated and transferred more effectively);
- 3. The capability of the supply-base (as non-standards inputs or more complex designs for parts are used, i.e. increased asset specificity, suppliers are expected to have higher levels of capabilities and transaction costs will increase) (ibid.:85).

The authors derive five typologies of GVCG based on the explicit coordination and power asymmetry between actors: market, modular, relational, captive and hierarchical (ibid.:78).


Figure 5: Five global value chain governance types (ibid.:89).

1. Market

Where the degree of explicit coordination is low, as is the degree of power asymmetry, market linkages can be short-lived, but repeat transactions may also persist over time. The cost for a buyer switching suppliers is low, and vice versa (ibid.:83). In this governance type, transactions are easy to codify, specifications from products are simple, and suppliers require little input from buyers to create the products. As the sellers set prices, market governance is seen and needs little explicit coordination from those involved.

2. Modular

In Modular value chains, there are relatively low levels of explicit coordination and power asymmetry. Suppliers make products at the direction of the buyers, take on more responsibility and sometimes act as a 'turn-key supplier' (ibid.:84). It is common here that suppliers will have high capabilities and "*the competence to supply full packages and modules*" (ibid.:86). With a reduced asset specificity, there is less need for buyer management, and therefore the cost of switching to a new partner remains relatively low for each party.

3. Relational

In a Relational value chain, there is a great deal of mutual dependence between a supplier and a buyer, usually driven by a high level of asset specificity. Both parties have similar levels of power, brought on by high supplier capabilities, complex transactions and uncodifiable product specifications. In particular, *"highly competent suppliers provide a strong motivation for lead firms to outsource to gain access to complementary competencies,"* regulated by reputation, social or other forms of relational ties (ibid.:86). As such, there is a high cost for both parties to switch to a new partner.

4. Captive

In this typology, the lead firm is dominant, with a high degree of power and explicit coordination. In a captive value chain, smaller suppliers are dependent on the large buyer, and there are significant transaction costs associated with the supplier switching buyers. They are therefore 'captured' by the lead firm. This occurs when the supplier has lower capabilities, but the product specification and complexity are high.

5. Hierarchical

In this type, products are complex, and it is difficult to find capable suppliers. As such, the firm is unable to outsource the job and must internalise the task. The result is a fully integrated value chain that connects the suppliers with the buyers through an inter-organisational flow. Managerial control flows from top management to subordinates and from the HQ to market offices.

Figure 6: This table demonstrates the level of complexity, codability and capabilities needed for each typology (ibid.:87).

Governance type	Complexity of transactions	Ability to codify transactions	Capabilities in the supply-base	Degree of explicit coordination and power asymmetry	
Market	Low	High	High	Low	
Modular	High	High	High	↑	
Relational	High	Low	High		
Captive	High	High	Low	Ļ	
Hierarchy	High	Low	Low	High	

Table 1 Key determinants of global value chain governance

The global value chain governance theory is applied in order to analyse the power balance between the suppliers and buyers in the rare earth supply chain in China. This helps the researchers understand how lead firms either have, or do not have power over their suppliers, and as such, how wind energy companies may be able to improve human rights conditions with their rare earth elements suppliers. The theory alludes to the fact that companies do not govern their value chains in a vacuum, as there is a rising number of actors involved. This poses the questions of who can regulate these chains. The actors involved in regulatory settings and the power-play between them is presented below by the global governance theory.

Global Governance

Due to the far-reaching nature of production and business interaction, Abbot and Snidal argue that states are no longer able to regulate highly complex, global supply chains (2009). Governance gaps have therefore emerged, and new actors are stepping in to fill these responsibilities, such as international organisations (IOs), private companies and NGOs. While they may not replace the state, they act as a complementary governance tool, initiating regulatory activities and frameworks that firms may voluntarily adopt and implement. Abbott and Snidal name these systems as regulatory standard-setting (RSS) schemes, which may be created unilaterally by one set of actors or may be the outcome of cooperation between a range of actors, states, IOs, firms and NGOs. While they do not hold judicial capacity, RSS schemes place normative pressure on members and non-members to comply with their own standards (Abbott & Snidal, 2009).

Abbott and Snidal designed a 'governance triangle', which helps map and codify the types of RSS institutions and how they govern. Based on the participation of different actors, one can identify where an institution lies in this governance triangle. This helps in understanding the power and influence different types of RSS institutions hold. Figure 7 illustrates the governance triangle by Abbott and Snidal (2009). Here, seven 'zones' represent the alternative governance combinations. Zones 1 to 3 represents governance by an individual set of actors - states (1), firms (2) and NGOs (3). Zones 4 to 6 represent governance by two sets of actors - states and firms (4), NGOs and states (5), and firms and NGOs (6). Finally, zone 7 represents RSS groups that have all three types of actors.

Figure 7: Governance Triangle (Abbott & Snidal, 2009).



Abbott and Snidal further investigated an outline of the competencies that each three types of actors should possess, elaborated below.

As profit-seeking enterprises, firms are often opposed to regulation that interferes with financial motivations. However, firms are also beginning to see that brand reputation is important, and as such, there is a gradual shift towards consumer insight and awareness of social issues. Firms are therefore motivated to set and adopt standards themselves, to improve their reputation and safeguard profits. In other words, firms lack independence because of their profit interest as the legitimacy of business-focused standard setting is hampered, particularly around monitoring and enforcement. On the other hand, firms play a critical role in the negotiation of the regulation as they are at the forefront of global production channels, and carry great knowledge in the areas they are operating in (ibid.:26).

NGOs can be found operating in a wide variety of causes, from grassroots operations to international relief efforts. They are a value-driven group of actors, brought together in line with a common mission (ibid.:27). Further, NGOs are often domain experts who are seen as independent actors, which gives them credibility and legitimacy when engaged in agenda setting, negotiations and monitoring of regulatory processes. Thus, they place significant normative pressure on other actors who are pushed to establish higher standards and comply with them. On their own, however, they are relatively weak and rely on the cooperation and support of other actors to function (ibid.).

States are actors that ideally represent the public interest and want to maximise public good, as opposed to just defending private actors. In international contexts, they represent the domestic interests of their nation and economy, unlike IGOs, who are value-driven actors operating to further the global public good. As members of IGOs are nation-states, competition for influence is fierce within these organisations. Regardless, state actors are usually viewed as highly legitimate and critical actors in most parts of the regulatory process, as they have access to resources, knowledge and are independent of the private interests of firms (ibid.:25). However, during the implementation and monitoring phase, they are less important as they often lack operational oversight to implement standards at a company-level (ibid.). The operational capacity for oversight is further cumbersome when states are asked to monitor the behaviour of companies operating internationally.

Currently, the most RSS schemes are situated in zone 1 and zone 2 (Abbott & Snidal, 2009). However, genuinely effective governance stems from a hybrid of governance, according to Abbott and Snidal, because the three types of actors can contribute with their unique competencies to strengthen the group. This leads to the most legitimate form of accountability and oversight (ibid.) The legitimacy of global governance schemes in the forms of multi-stakeholder initiatives (MSIs), as well as those initiatives that are purely business-driven, is also explored in the work of Fransen (2012). According to Fransen, MSIs are regulatory schemes led by a group of diverse actors, often bringing together the private, public and non-governmental agencies. All participants have an equal voice and decision power, which allows a unified agenda. Businesses may accept initiatives that have been drawn up by the organisation voluntarily, and given the diverse nature of its members, sound practices for implementation and monitoring are established by non-business actors. On the other hand, business-driven programs are initiated solely by business actors, often favouring business interests by developing self-regulatory standards. Fransen argues that the more fairly distributed the decision making power is, the more legitimate the design of the organisation

will appear to external sensors. Therefore, multi-stakeholder initiatives hold more credibility than business-driven ones (2012).

The global governance theory helps in identifying ways wind energy companies could push for greater transparency and compliance throughout their value chains. In turn, this could lead to more respectful and traceable minerals and metals not only in the rare earth industry but across mining in general. Here, the governance triangle can be used to determine which existing regulatory standard-setting schemes are most effective in promoting human rights, and which channels companies and governments should use in order to achieve certain goals. Finally, Fransen's outlook on the legitimacy of business-driven MSIs can be used when drafting recommendations for how wind energy companies should collaborate with other actors to mitigate human rights violations on a global scale. However, in practice, the establishment of a successful MSI or increasing the transparency in a supply chain is difficult to achieve. By using sustainable supply chain management literature and theories, more practical solutions to this challenge can be addressed.

Sustainable Supply Chain Management

Traditionally, supply chain management (SCM) has been a field that focused on the quality, timing and costs of sourcing goods and services for companies. Though the concept has developed to take into account a range of other variables, including sustainability concerns. Academic papers note that due to the drastic variations in supply chains, and what sustainability might mean in each of them, there is a lack of a single definition of sustainable supply chain management (SSCM) (Touboulic & Walker, 2015:18). Though there is some consensus in the field: that SSCM is often based on the principle of the triple bottom line dimensions of value. One noteworthy paper that has become one of the most influential works in SSCM theoretical literature comes from Carter and Rogers (2008). They define SSCM as *"the strategic, transparent integration and achievement of an organisation's social, environmental, and economic goals in the systemic coordination of key inter-organisational business processes for improving the long-term economic performance of the individual company and its supply chains"* (Carter & Rogers, 2008:368).

Carter and Rogers clearly state that the triple bottom line dimension of economic, environmental and social sustainability needs to be integrated in order to reach truly sustainable management of a firm's supply chain (2008:368). While advocating for sustainable sourcing practices in the supply chain, the writers clearly state that organisations should not

"blithely undertake social and environmental goals relating to the supply chain" (ibid.:369), but instead "the social and environmental dimensions of SSCM must be undertaken with a clear and explicit recognition of the economic goals of the firm" (ibid.). The triple bottom line is further linked to four supporting facets: strategy, organisational culture, risk management and transparency. These four categories are not intended to be mutually exclusive, but instead interconnected, practical enablers of sustainable practices. Carter and Rogers explicitly state that "all four of these supporting facets are an integrated part of SSCM practices" (ibid.:368).



Figure 8: Depiction of sustainable supply chain management (Carter & Rogers, 2008:369)

Along with Carter and Rogers' use of the triple bottom line dimensions of value and the four categories of enablers, this paper draws upon literature from Seuring and Muller. Their influential work on the conceptualisation of a framework for SSCM provides the researchers with an exciting tool for analysis in this paper. Seuring and Muller's framework aims to theorise why firms minimise the "*environmental and social burden incurred during different stages of production*" (2008:1699). As such, the framework centres around the focal company, which are those that "(1) rule or govern the supply chain, (2) provide the direct contact to the customer, and (3) design the product or service offered" (ibid.). These focal companies are likely to experience "*external pressures and incentives set by different groups*," with customers and regulators cited as the most integral and influential stakeholders for focal firms (ibid.:1703). These stakeholders, which can also include NGOs, employees and local communities, "*hold focal companies responsible for environmental and social problems at*

earlier stages of their supply chain" (ibid.). The specific reasons why firms are likely to cooperate with these stakeholder wishes include *"legal demands/regulation, response to stakeholders, competitive advantage, customer demands, reputation loss, and environmental and social pressure groups"* (ibid.).

The authors specifically note that focal companies often deal with these external pressures and incentives by passing the pressure down to their suppliers in order to reduce their risks and improve their sustainability performance. Supplier management for risks and performance encounters both barriers and enablers for the focal company. The main barriers include higher costs, coordination complexity and insufficient communication throughout the supply chain. Seuring and Muller also present three key supporting factors for supplier management, all for risk management and improved performance. Firstly, through increased communication, focal firms can better map, understand and monitor their supply chain and the major environmental and social risks. Secondly, by installing management systems such as the International Organisation for Standardisation (ISO), focal firms can ensure their suppliers are living up to a minimum standard. Finally, through a supplier evaluation process with periodic assessments (including self-assessments), focal firms can better monitor the implementation and effectiveness of management systems and certification schemes (ibid.:1704). The following figure 9 visually demonstrates Seuring and Muller's SSCM conceptualisation:

Figure 9: Triggers for sustainable supply chain management for risks and performance. Authors' adaptation of Seuring & Muller's framework (ibid.:1703-1706).



SSCM is used in this study of the rare earth supply chain in China to understand the pressures and incentives that firms currently face from external stakeholders, and which stakeholders this may be coming from. Furthermore, the researchers can examine how companies use certifications or supplier evaluations to drive change in their supply chain, and analyse how effective these mechanisms are in mitigating human rights risks.

Applying the theories

The research questions are analysed based on two elements; the information gained from the data collection and the theoretical frameworks just presented. Each theory described in this chapter guides the analysis of the empirical evidence. Although the thesis looks at the issue through the lens of all theories presented to deliver better critical discussion, only the approaches of four theories - specifically the stakeholder theory in combination with HRDD framework, global governance, global value chain governance and sustainable supply chain management - are applied in depth. CSR theory has been disregarded in the discussion, as it does not provide a robust analysis tool to uncover the real mechanisms behind the human rights risks. This is because CSR theory takes a very retrospective approach, meaning that it does not address the root cause of human rights risks, but rather the consequences after the violations have already happened. For this reason, CSR theory is not used in the recommendations either, as such an approach is not in line with the normative frameworks of what is expected from companies, which is the approach taken by this thesis.

The theories are applied in the following manner. Firstly, each theoretical approach is applied to the empirical evidence throughout to answers the research questions. Following the empirical analysis, the chapter on relevance of the theories critically analyses all the theoretical perspectives and provides an overall assessment of the rare earth supply chain in China. This assessment takes a critical realist approach to understand the underlying mechanisms of human rights risks and the barriers to mitigation efforts. Using this analysis, the thesis lays down practical recommendations rooted in these theories for a range of actors to follow.

Chapter 7: Analysis

Introduction to the Analysis

The objective of this thesis is to understand how renewable energy companies can live up to their duty to respect human rights present in their supply chains. The research scope has been narrowed down to focus on the Chinese rare earth supply chain, highlighting the mining, processing and waste management. This following introduction describes the rare earth industry in detail, including how the minerals are mined, processed and used in wind turbines, and presents an overview of the Chinese domination of the rare earth sector. The coming subchapters are dedicated to answering both research questions guiding this paper, and following the empirical evidence, further followed by an in-depth theoretical analysis to understand the mechanisms hindering the mitigation of human rights. Finally, using the results of this analysis, the researchers present tailored and practical solutions for the stakeholder involved.

Rare earth industry and use in renewables

Rare earths elements (REE) are 17 elements on the periodic table, known for their critical role in technological solutions. The most widely used rare earth elements are found in permanent magnets and include neodymium, dysprosium, terbium, and praseodymium (David Merriman, interview). These permanent magnets are commonly found in high-tech items, such as MRI machines, mobile phones, electric vehicles, military applications and renewable energy technology (Vahidi, 2016:1). Despite the name, these elements are in fact not rare. They are abundant across the entire world, and are generally mined in combination with one or several other rare earth elements, or other minerals or metals. The 'rare' part of the names comes from the sparse concentration of the minerals deposits in the ground. In other words, it is necessary to mine and process vast quantities of dirt to get modest quantities of the rare earth elements (Joseph Wilde, interview).

Renewable energy technologies are particularly dependent on rare earth elements, with electric vehicles (EVs), energy storage and wind turbines requiring vast quantities (Dominish et al., 2019:3; ActionAid, 2019:2; Church & Crawford, 2018:20). As this paper is focusing on rare earths used in wind turbines, it is necessary to distinguish between two major technologies. Firstly, there are geared turbines which make up 77% of the wind turbine market (Wind Europe, 2018). Though a cheaper turbine to manufacture, these gearboxes experience extreme strain from wind speeds and require high levels of maintenance. As such, they are

suitable for onshore wind farms at low wind speeds. Contrastingly, there are direct drive turbines, which commonly contain a neodymium iron boron magnet, containing approx 35% rare earth elements (Dodd, 2018). Due to their high reliability, lower weight, longer life and low maintenance levels, they are well-suited to locations with higher wind speeds, such as offshore wind farms (World Bank, 2017:19; Lynas, 2020). Though these turbines only constituted 23% of the turbine market in 2015, that is expected to increase to 72% by 2030 (Wind Europe, 2018).

In direct drive turbines, the permanent magnets require up to 225 kilograms of rare earth elements per megawatt (MW) (ActionAid, 2018:7; ISF 2019:15). In 2018, the average size for direct drive turbines was 6.8MW (WindEurope, 2019), though in 2020, direct-drive turbines measured up to 12MW (GE Renewable Energy, 2020) and required up to 2.7 tonnes of rare earth elements each (Chandra, 2019). In comparison, an iPhone typically uses less than 1 gramme (Jonas Jensen, interview). As rare earth elements "*are essential to the permanent magnets*" (Wind Europe, 2018) and any substitutes available are "*less effective*" (USGS, 2020:133), it is clear that the already substantial demand for these elements is set to increase further (World Bank, 2017:19). Though uncertainty surrounds future scenarios, some preliminary conclusions have been made by experts in the field on the expected demand for rare earth elements in the coming years. Barla estimates that "*the offshore and Chinese wind markets contributed more than 65% of demand for REEs in 2017, and that figure is likely to grow to over 80% by 2023*" (Dodd, 2018). Though there is naturally uncertainty in this estimation, it is clear that wind energy technology is likely to be highly dependent on rare earth elements for some time to come (Chandra, 2019).

As reserves of rare earths are substantial, the wind industry is unlikely to run out of these minerals in the long term. However, supply in the short term is unlikely to keep up with demand (Watari et al., 2018:17; Roskill, 2020). Offsetting the demand for virgin materials is therefore becoming increasingly important, with reducing, reusing and recycling a key strategy (Watari et al., 2018:20; Dominish et al., 2019). Watari et. al. predicts that towards 2060, recycling and reuse of materials can offset demand for virgin materials by 20-70% (2018:25). However, currently, there is very little recycling of rare earths, despite the fact that there is a potential to recycle approx 95% (Dominish et al., 2019:15). As wide-scale decommissioning of direct drive turbines emerges through the 2020s and 2030s, this rate will need to exponentially increase to have a chance of mitigating both the demand for virgin materials, and the human rights risks from mining and processing activities.

Global Production

Global legal production of all 17 rare earth elements was recorded as 210,000 metric tonnes in 2019 (USGS, 2020:2). The majority of these minerals were mined in China, though notable production was also seen in the US, Australia and Myanmar.

Country	Mine production 2019 (metric tonnes)	Mine production 2019 (%)	Reserves (metric tonnes)	Reserves (%)
United States	26,000	12	1,400,000	1.2
Australia	21,000	10	3,300,000	2.77
Brazil	1,000	-	22,000,000	18.3
Myanmar	22,000	10	Not available	-
Burundi	600	-	Not available	-
Canada	-	-	830,000	0.7
China	132,000	63	44,000,000	37
Greenland	-	-	1,500,000	1.25
India	3,000	-	6,900,000	5.75
Madagascar	2,000	-	Not available	-
Russia	2,700	-	12,000,000	10
South Africa	-	-	790,000	0.67
Tanzania	-	-	890,000	0.76
Thailand	1,800	-	Not available	-
Vietnam	900	-	22,000,000	18.3
Other	-	Rest Of World: 5	310,000	0.3
Total	210,000	100	120,000,000	100

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Figure 11: Geographic supply of rare earth elements (Buchholz, 2020).

Chinese Rare Earth Industry

Until 2018, China controlled over 80% of all mining of rare earth elements (USGS, 2019). Still today, there are very few major processing facilities located outside of China and as a result, there is a significant global consolidation and China processes approx. 88% of all rare earth elements (Chandra, 2019). In 2018, the country was also the largest importer of rare earth materials (McLeod, 2019). The only significant processing facility, located in Malaysia and owned by the Australian company Lynas Corporation, is dedicated to processing the minerals from the single Australian rare earth mine. The supply from Lynas is responsible for approx. 10-12% of global production (USGS, 2019). The lack of diversification has not only resulted in the Chinese controlling the supply chain, it has also resulted in a significant knowledge deficit of rare earth mining, processing, manufacturing throughout the rest of the world. Not only does China dominate the supply, the country controls the knowledge too (Roland Gauss; Patrick Nadoll; David Merriman, interview).

Mining, Processing and Waste Management in China

There are three dominant methods for the mining and processing of rare earth materials, namely open pit mining coupled with industrial processing and clay mining and elementary processing through either heap leaching or in-situ leaching, conducted before industrial processing. All three methods of mining and processing produce significant amounts of waste. This section briefly describes the chain of mining, processing and waste management of rare earth elements.

Open Pit Mining and Industrial Processing

Open pit mining is one of the most common forms of mining across the world, used in most mineral and metal extraction. After analysing the rock type and identifying deposits of rare earth elements, open pit mining is the excavation of significant amounts of ore from a specific area. Mining operations dig a pit using heavy machinery and excavate the ores. These ores are then transported to an industrial processing facility where three stages of processing occur. Firstly, the ore goes through a cracking and leaching stage where the ore is mixed with sulphuric acid and heated to a high temperature. Secondly, the ores are mixed with a liquid solvent which separates the individual minerals. Finally, the solid minerals are extracted from the liquid solution to become a finished product (Lynas, 2020). The Bayan Obo mining region and processing facilities in Baotou produce approximately 50% of Chinese rare earth elements (Zhou et al., 2017:35).



Figure 12: Bayan Obo open pit rare earth mine, Baotou China (van Dijk, 2012).

Clay Mining and Elementary Processing

Both heap and in-situ leaching are methods for extracting and initially processing rare earth elements from clay deposits (Vahidi, 2016:3). In these clay deposits, 80-90% rare earths are found in the layer of earth between approx. 3-13 metre below ground level, making it very easily accessible (Papangelakis & Moldoveanu, 2014; Vahidi, 2016:2). Through both of these methods, the elements are initially processed on-site, then sent to industrial processing plants, as described above (Zanbak, 2012:12; Vahidi, 2016: 4). Furthermore, the following two methods of mining and processing are not exclusive to rare earth elements and are also used for uranium, copper and potash extraction around the world (Ugorets & Yermakov, n.d.).

Heap leaching of clay deposits is one of the most cost effective and simple ways to extract and process the elements from ore (Thenepalli, 2019:1). The top layers of clay are excavated, very easily and often with rudimental equipment. To extract and process the rare earth elements, the clay is placed on top of large (often cement) slabs and sprayed with various reagents (Zanbak, 2012:9), including alkaline cyanide solutions, sulfuric or hydrochloric acids, ammonium sulfate, sodium hydroxide, monovalent sulphate or chloride salt (Papangelakis & Moldoveanu, 2014). Over 100-320 hours of leaching, the rare earths are dissolved from the clay and recovered in smaller run-off pools (Thenepalli, 2019:7).



Figure 13: A diagram of heaped leaching (Basov, 2015).

Secondly, in-situ leaching does not actually involve the removal of large quantities of ore from the ground, but rather extracts the rare earth elements directly (Standaert, 2019). The in-situ process begins by drilling injection wells, 2-6 metres deep, over an area of 5,000-10,000 metres squared. A piping network is built to connect all the wells with a high level pool, which contains strong chemicals or acids, e.g. alkaline cyanide solutions, ammonium sulfate, sodium sulfate, ammonium chloride or sodium chloride (Vahidi, 2016:3). The chemicals are pumped into the wells over a period of 150-400 days (ibid.:2). During this process, rare earth elements

are dissolved from the clay, seep down to a lower tunnel and captured in a lower level collection pool (ibid.).

Figure 14: A diagram of in-situ leaching (Vahidi, 2016:2).



Fig. 1. Typical layers of mining site for ion adsorption clays (adapted from Zou, 2012).

Waste Management

Through all types of rare earth mining and processing, significant amounts of waste are produced. This waste comes from the unused ores and the separation chemicals. Firstly, during mining, there are significant quantities of ores excavated which generally serve no purpose after the rare earths have been extracted, and become waste. Some of these minerals can be recycled or reused, such as gypsum for use in cement or plasterboards (Lynas, 2020), though these expensive solutions are uncommon (Anne-Marie Sylvestre, interview). Secondly, a common mineral byproduct from processing of rare earths is radioactive waste, including uranium and thorium (Anne-Marie Sylvestre, interview; Lynas, 2020; Zhou et al.,2017:36). This waste is specific to rare earth processing and it is very uncommon to see this same level of radioactivity from other mining waste (Per Kalvig, interview). Finally, the acids used in industrial processing can, in some cases, be recycled. However this is expensive and therefore uncommon (Zhou et al., 2017:36). In China, there are very few examples of responsibly managed acid waste from rare earth mining and processing, and in practice, it often ends up being dumped or stored in permanent tailings (Standaert, 2019, Anne-Marie Sylvestre, interview).

Figure 15: Tailings from Bayan Obo Mine, Baotou China (Maughan, 2015).



As this introduction has demonstrated, renewable energy technology is heavily dependent on rare earth elements, and the wind industry particularly so. These elements are used in high quantities in a growing proportion of wind turbines throughout the world, they are difficult to substitute and recycling rates are low. As such, demand for rare earth elements from the wind industry is set to reach up to 80% of the total rare earth industry by 2023 (Dodd, 2018). Global production shows Chinese companies mine and process the vast majority of these 17 rare earth elements, and as such, the entire world is dependent on the country for the resources, knowledge and expertise. However, the mining and processing of these minerals is particularly harsh, with heavy chemicals used and significant environmental damage. Due to this, there are a number of severe human rights risks associated with the rare earth supply chain that cannot be overlooked, and must be addressed by companies sourcing these products. The following section outlines the full overview of human rights risks seen in the mining, processing and waste management of the rare earth elements in China.

The First Research Question

Assessing a company's operations and identifying the potential human rights risk should be the first step of human rights due diligence. Companies must consider the negative impacts of both current and planned activities on individuals and communities in the surrounding areas, and set out priorities to mitigate those risks that were assessed as most salient. Here, salience refers to those risks that were identified to have "the most severe negative impact through the

company's activities or business relationships." (UNGPs Reporting, n.d.). Identifying the most salient cases of human rights abuse can help businesses with strategic direction, where an understanding of their impact can help them navigate their business operations to avoid harming local stakeholders (Business Respect, n.d.:344). Furthermore, companies must understand these risks from the perspective of impacted stakeholders, such as local communities or workers, and address the most salient risks through prevention, mitigation and remediation (Götzmann et al., 2016:11). As such, the following research question is considered;

What are the salient human rights risks associated with the rare earth supply chain in China?

To answer this first research question, the following chapter identifies the human rights risks throughout the rare earth supply chain in China. This chapter firstly provides a general overview of human rights and business issues in China and the human rights risks inherent to the way the Chinese government operates, before elaborating on specific human rights impacts and risks evident throughout the rare earth supply chain. Using this analysis, the thesis then addresses the second research question and provides specific and practical recommendations that wind energy companies can take to prevent and mitigate the adverse risks identified.

Context of human rights risks in China

China's government sees human rights as an existential threat (HRW, 2020). As Chaojun Li describes in the interview: *"In general human rights are not something to be discussed and to be protected in the open and public context. (...) It is not a popular word."* Indeed, despite the efforts of the government to silence criticism, the Chinese record of human rights abuse is well-known and bleak. For example, Amnesty International and Human Rights Watch, along with the U.S State Department, often present evidence of human rights violations caused by the Chinese government. This evidence showcases abuses in the freedoms of speech, movement and religion of Chinese citizens and minorities within Chinese jurisdiction, such as Uyghur muslims (US Department of State, 2019). Chinese authorities frequently assign different definitions of human rights, introducing economic, social and political rights within the scope of 'national culture' (HRW, 2020). Further, the Chinese government often undermines international human rights systems. Many human rights organisations have brought attention to the Chinese government's human rights abuses, highlighting the frequent use of the death

penalty, workers' rights abuses, the legal and political status of Tibet, Hong Kong and Taiwan, and the well-known issues regarding persecution of journalists and press. Human rights defenders, activists and lawyers are systematically threatened, monitored and intimidated by the Chinese authorities on an ongoing basis, ending with arrests and imprisonment (ibid.). Furthemore, labour rights are poorly protected. Across China, workers are subjected to work in humiliating conditions with extreme working hours, and have to endure discrimination, abuse and explotation. By law, independent labour unions are forbidden, obstructing the right to collective bargaining and freedom of association. Migrant workers are also subjected to serious human rights violations as the Chinese's Hukou system restricts their freedom of movement (US Department of State, 2019). Overall, the lack of legal recognition of human rights is an area for concern in China, where there is no independent judiciary, rule of law and due process surrounding these issues.

The government's position on human rights is also reflected in the way Chinese companies approach the issue. For example, research by António (2007) found out that awareness of CSR "is at its initial stage of development" in mainland with China, only 23% of companies indicating any awareness of CSR, and just 9% of those co mpanies dedicating resources specifically to CSR (2007:120). Many private sector actors are disinclined to be involved in social welfare issues and the socialist themes underlying Chinese society, combined with the State's control, may be to blame (ibid.:119). In one respect, absolute state control and deep bureaucracy contribute to the idea of a centrally planned economy. In another respect, decentralisation and modern economic development suggest an encouragement towards entrepreneurship and private innovation. As a result of these two contrasting, but unified themes, it is easy for entrepreneurs to pursue economic benefit while leaving social welfare as a government responsibility.

Nonetheless, improvements have been made in increasing environmental protection in the scope of the private-sector, mainly due to an environmental tax introduced in 2018, which also impacted the mining sector. For example, during the China Mining Conference and Expo in 2017, green development, sustainability and environmentally-responsible mining were front-and-center (Dolega & Schuler, 2018:2). However, progress in other areas has been hindered, as the lack of legal regulation means companies are not incentivised nor guided in translating CSR commitments to tangible actions. As such, evidence suggests that actual standards in China are far less developed than claimed, resulting in environmental and social outcomes remaining unaddressed (Tan-Mullins, 2014).

At a state level, it is evident that the environment is taking a more central role in China, while human rights and social conditions are still under-prioritised by the government. This is especially evident in the extractive industry, including for green-transition minerals, where social and labour rights records, both domestically and internationally, are generally lacklustre (Tan-Mullins, 2014; Good Electronics, 2018). The Environmental Justice Atlas documented over a hundred conflicts between extractive companies and local communities in China linked to the mining of minerals used for the construction of wind turbines (EJA, n.d.). With no regards for environmental or social policies, basic risk assessments, consultation of stakeholders and functioning grievance mechanisms, a pattern emerges that suggests the Chinese extractive industry lacks any due diligence practices and continuously denies accountability. Most notably, these issues are present in artisanal and small scale mines (ASM), which represent an estimated 55% of the total mining workforce. Although not enough information is available on ASM in China, these mines typically lack the technical and financial capacity to improve their performance, and represent a higher risk for environmental damage and worker exploitation (Dolega & Schüler, 2018:3). As there is a lack of a thorough mapping of human rights issues across the extractive industry in China, the following section provides an outline of the most severe risks identified in the rare earth mining and processing.

Rare earth supply chain in China

As demonstrated, rare earth elements are a critical component of wind turbines and are only expected to increase in importance. In an interview, Joseph Wilde highlighted that "the mining and processing of rare earth metals were identified as a significant risk with severe impact; one of the most [harmful] throughout the wind energy supply chain." Indeed, it is the mechanisms that are used for mining and processing rare earth elements that produce huge quantities of waste, gas and pollution, and pose several social risks to the local communities and workers (Dominish et al., 2019). This is especially critical in China, where high rare earth production coupled with limited environmental regulation and social protection has resulted in "significant environmental damage to the areas surrounding mining and processing operations" (EURARE, 2016:8). Here, operations range from large, state-owned mining companies and processing facilities to small, illegal activities. Although smaller operations have 'little or no environmental controls', stated-owner companies 'have only recently begun adopting such measures' (ibid.). Firstly, this thesis examines the human rights risks posed from mining and processing operations, specifically in open-pit and clay mining, and secondly, elaborates on the risks associated with waste management. Finally, the context of the rare

earth supply chain in China is assessed, and this thesis evaluates the progress reported on in recent years.

Mining and Processing

Although Benjamin Sprecher highlighted that rare earth mining "technically doesn't have to be so bad, as it is not inherently horrible", Joseph Wilde argues that "China sort of lacks any protection, and the regulatory framework in China allows [for violations] to happen." As a result, rare earth mining in China is a devastating industry. Kenneth Riis Jensen agrees, noting that "rare earths are mined under horrible conditions". Though as Per Kalvig states, "we have to distinguish between the two different types of the rare earth deposits within China. Mainly the clay type, the absorption type, and the more traditional mining like Bayan Obo". Although both clay and traditional open-pit mining present similar human rights risks, both come with their own unique challenges. For example, traditional open-pit mining requires a large removal of topsoil and rock, posing severe risks to the surrounding environment and local communities. On the other hand, clay mining, and specifically the process of in-situ and heap leaching, exposes workers and communities to an extremely high level of toxicity and pollutes water sources and contaminates soil.

Open-pit mining and Industrial Processing

ENVIRONMENT

Rare earths are found in small concentrations, and therefore, huge quantities of dirt and rock must be moved in order for the minerals to be extracted profitably during open-pit mining (Ross, 2019). As Joseph Wilde noted in the interview, "*[this] means you have a larger impact on the environment and potentially on communities.*" Major topographic and land-changes occur with thousands of square miles of land altered, representing a permanent impact on the earth. Slow geological processes characterised land changes for mellennia, however mining has caused geological, topographical and hydrological changes of unprecedented scale (Ross, 2019; Anne-Marie Sylvestre, interview). Furthermore, industrial mining is a major cause of water pollution through the release of contaminated water during the extraction of the ore which has long-term effects on local society. Release of acidic water into the soil in surrounding areas threatens biodiversity, farming and economic welfare, as well as the health of individuals living near and harvesting crops from the soil (OECD, 2019:64). Similarly, a substantial increase of contamination levels in soils were found in the mining areas due to the generation of dust containing rare earths during the extraction. An example of this is the soil

pastures surrounding the Bayan Obo mine that have been highly contaminated due to dust from the mine. This has serious health implications for the local communities around the area (EURARE, 2016:8). Lastly, digging up vast quantities of land is a high-energy intensive process, and the machinery, capital and technology required further contributes to pollution and a larger carbon footprint (OECD, 2019:64).

LABOUR RIGHTS

Besides environmental risks posed by open-pit mining, the most frequently reported issue in these operations in China is health and safety. China has the world's worst record of mine safety. On top of this, thousands of deaths are concealed from national authorities (Eckholm, 2001; Handelsman, 2002). China is among the few absentees from the ILO list of reported fatalities from accidents in the category 'mining and quarrying' and the full scope of the issue is therefore uncertain (ILO, 2018 in OECD, 2019). Nonetheless, the reported high number of mining-related deaths indicates large issues around health and safety problems and poor working conditions (CLB, 2019; US Department of State, 2019). Thousands of workers are impacted by China's notoriously hazardous mining industry, and media reports indicate that poor management or safety lapses are to be blamed (Greenovation Hub, 2014:22). In large-scale open-pit mines, heavy machinery usually presents one of the main threats to workers safety. As large quantities of ore must be dug out, there are further physical hazards for workers. For example, Joel Frijhoff noted in the interview that the drivers of trucks that transport ore away from the mines suffer from serious back problems when the ore is repeatedly dumped in the back of the trucks.

Furthermore, exposure to dust containing hazardous substances during rare earth mining also poses a severe risk for the workers (OECD, 2019:21). Though this issue is largely unpublicised, experts liken the impacts to severe health effects seen in traditional mining. In the Chinese coal industry, an estimated 6 million workers are reportedly suffering from black lung diseases and are currently unable to access effective remedy (Aidan Chau, interview). In rare earth mining, The Bayan Obo mine employs more than 7000 workers, and approx. half are regularly exposed to high levels of thorium-contaminated airborne dust, particular around the industrial processing area where the ore is crushed (EURARE, 2016:8). This poses a number of harmful implications to the health of workers, including, but not limited to: higher risks of heart attack; and pneumoconiosis, a deadly lung disease; and nephrogenic systemic fibrosis, a disease where excess tissue forms in the skin, joints, eyes, and internal organs (Moher et al., 2019). Nonetheless, despite these risks, the Chinese mining industry is notoriously bad at issuing safety equipment, further contributing to the poor working environment. In many cases, workers do not have access to better protective personal

equipment (PPE). As Aidan Chau noted, workers are often given the most basic equipment and their work culture, where obedience is prioritised, prevents them from demanding more and better PPEs, and *"[workers] accept the status quo."*

There is also a high risk of forced labour in the Chinese mining industry as convict labour is well established under the "laogai" or "*reform through labour*" program (Funakoshi, 2013). Prisoners, including political dissidents and minor offenders, as well as minorities such as Uyghurs and Tibetian people, are forced to work under exploitative conditions, with long working hours and no salaries. There have been several reports detailing the use of prisoners under slave-like conditions, forced to mine without protective equipment (Handelsman, 2002). For instance, a prison in Sichuan, where several rare earth mines are located, forces around 5,000 of its prisoners to work in coal mining under extremely hard conditions (Spohr, 2016). There is a high risk that such practices are used in the rare earth mining, particularly in Inner Mongolia given its proximity to Xinjiang where more than one million Uyghurs are reported to endure forced labour (Posner, 2019). The validity of this evidence is strengthened by several other reports detailing Uyghurs forced labour throughout China in other industries (Kuo, 2020; Kelly, 2020; BHRRC, 2020).

Finally, another major labour rights violation is the lack of an independent labour union, as it is prohibited under Chinese law (Zhong & Qian, 2014). Workers in China do not have access to freedom of association nor the right to collectively bargain, as there is only one legallymandated trade union, the All-China Federation of Trade Unions (ACFTU) (CLB, 2018). Aidan Chau called the ACFTU "*a toothless tiger in terms of struggling for what the workers want.*" Similarly, Chaojun Li noted that "*the labour union China is an organisation that is responsible for entertainment.* (...) *It does not represent the interest of the workers.*" She continued, describing that the roots of the Union go back to the political system where only one party is allowed in China and there is no competition in that regard. "*Obeying people superior to you is very important. It is a part of the culture, (...) a virtue. So the idea of having a worker's concern or suggestion [challenging] how the company is managed is not a very Chinese way of doing things.*" This also goes hand in hand with the lack of effective grievance mechanisms. Ultimately, Chinese exctrative workers are not represented and have very little access to raise their concerns about health and safety, as well as receive remedy.

LOCAL COMMUNITIES:

Little research has been conducted on the social impact of rare earth mining on nearby communities, as compared to the environmental impact. This is problematic for conducting analysis of these issues (Greenovation Hub, 2014:21). Nevertheless, the social implications

of the rare earth mining industry are extraordinary, and closely linked to the environmental issues. For example, a report conducted by the World Bank and China's State Environmental Protection Administration (SEPA), published in 2007, established that pollution disproportionately affects poorer areas of China, such as Ningxia, Xinjiang and Inner Mongolia, than wealthier provinces (ibid.). These poorer areas are rich in rare earth elements and mining is rife. While these areas may benefit from more employment opportunities provided by the mining industry, the net effect may be negative given the detrimental environmental, social and health impacts. Further, pollution may also cause a decline in fishery and agricultural yield, which further cascades into social problems (ibid.).

Furthermore, similar to the workers, communities living nearby mines are more prone to health risks caused by exposure to contaminated dust blown over from mining and processing sites (Greenovation Hub, 2014:21). This is highlighted by Kessel, noting that respiratory illness is very common in villages situated close to open-pit mines (2015). For example, a study found that cereals coming from rare earth open-pit mining areas in Shandong present a significantly higher degree of rare earth elements and health risks than those coming from the control area. Although the health risks to adults were neglectable, the effects of continuous exposure to rare earth elements on children though cereal consumption could pose a severe damage (Zhuang et al., 2017). The overall impact of rare earth mining on human-health is becoming increasingly evident, as cases of chronic illness grow, there are also reports of abnormal levels of blood proteins in people living close to mines, along with a spike in leukemia cases (Moher et al., 2019). Additionally, children exposed to rare earth elements have significantly lower IQ squares due to a disruption in brain chemistry (Ibid.). Overall, the ability to live a normal life is severely threatened by living in the vicinity of an open-pit rare earth mine (Greenovation Hub, 2014:21).

Besides serious health impacts, rural communities are also being robbed of their land, unable to grow crops, generate income and sustain a living. As highlighted above, water pollution presents serious concern as it threatens communities' right to access drinkable water. Joel Frijhoff stressed that "*mining companies extract a lot of water*", possibly threatening the availability of water for local communities. Indeed, there are two major ways mining impacts water: First, water pollution restricts agricultural productivity by poisoning crops. Second, mining often requires vast quantities of water, pulling water out of the water table and reducing its availability for irrigation and daily life. To make matters worse, many of China's most common rare earth mining grounds are located in areas where water supplies are already scarce (Greenovation Hub, 2014:21). Lastly, a dependence on mining in some towns and regions has impacted resident's livelihood as the land becomes depleted of ore. The National

Development and Reform Commission (NDRC) reported that there were 69 cities classified as "*resource exhausted*" (Greenovation Hub, 2014:21). This is further exacerbated by fluctuations in national and global mining prices.

Clay Mining and Elementary Processing

Clay rare earth resources in China are the cheapest and most accessible source of rare earths in the country. In the southern Chinese provinces, mining operations have used two primary procedures to extract and process minerals from the clay; heap leaching and in-situ leaching. Clay mining and elementary processing, to a large extent, presents the same human rights risks identified in open-pit mining and industrial processing, especially with regards to the pollution and health and safety of communities (Standaert, 2019). Environmental pollution caused by large amounts of water used, as well as soil and crop degradation and land changes submit similar threats to the human rights of nearby residents. This impacts the right to adequate livelihoods as polluted water and soil destroys crops and livelihoods. There are also significant labour rights issues. Health and safety of workers is a severe risk, from long working hours, heavy machinery and not enough adequate PPE has also been reported (CLB, 2019). Similarly, forced labour presents severe risks as well as the inability to pursue collective bargaining and to seek grievance.

On top of similarities between open-pit rare earth mining and industrial processing, rare earth clay mining and elementary processing adds a further level of risk due to the exceedingly high levels of toxic chemicals required, unique to this form of mineral extraction. Clay mining is not necessarily a mining in its traditional sense, but rather a dissolvement (Per Kalving, interview). Unlike ore extracted from open-pit mines that must be crushed through the industrial processing, clay mining sees the processing occur at the same time as the extraction, where heavy chemicals are used to separate the rare earths from the clay on-location. Waste amounts of clay are taken during heap leaching method and put into big pools of toxic reagents to separate out the rare earths. Once this processing takes place, David Merriman noted that *"all of the effluent leftover reagent is released into the water table, negatively impacting both* wildlife and human population as well." In-situ leaching on the other hand, includes practice "where reagents are [injected] into the rock and then the water runoff that comes out of it [is collected]" (David Merriman, interview). Both heap-leaching and in-situ leaching use alkaline cyanide solutions and other chemicals, which are extremely poisonous substances, to separate precious elements (Spohr, 2016). As such, clay mining operations cause serious environmental and social damage, including groundwater contamination and exposure to

much higher levels of deadly chemicals. For instance, in Ganzhou city, extremely high levels of deadly sulfate and ammonia were detected in groundwater surrounding in-situ leaching sites (Huang, 2011 in Huang et al., 2016:534). Furthermore, land changes are also significant, as there is an added level of soil erosion. In-situ leaching causes collapses and landslides, and more than 100 landslides have been reported attributed to in-situ leaching of rare earths (Huang et al., 2016:534). For example, in the mining city of Gejiu in Yunnan, an entire town was moved due to the possibility of landslides occurring from rare earth mining operations (Greenovation Hub, 2014:21), which induced serious economic and social disruption.

Finally, there is an immensely high risk posed by the large proportion of the mines that are classified as ASM. Although a large proportion of ASMs have been reported to extract coal and gold, ASM production of rare earth elements using heap and in-situ leaching technology is also commonly reported (Dolega & Schüler, 2018:3). Clay mining represents a much higher number of artisanal and small scale mines in these operations, as it does not require heavy investment, is very easy to be set up and can be operated without any experience, skill nor oversight. Many of these types of mines and elementary processing facilities are initiated under small contracts with local governments, run by private operators who use exploitative measures to hire migrant workers from poor regions to perform "dirty and dangerous" mining tasks (Eckholm, 2001). As a consequence, this type of mining is prone to illegal operations.

The uncontrolled illegal segment of clay mining is assumed to represent almost 40% of the Chinese rare earth market and 30% of the global market in 2017 (Argas, 2020; USGS, 2018:2). The illegal market also acts as a pricing mechanism, ensuring Chinese prices are kept low and competitive by avoiding all taxes, environmental costs and many operational costs that legal industries face (Liu, 2016). Illegal operations further exacerbate environmental damage and create complications around tracking the environmental impact (ibid.). The Chinese government estimates a \$5.5 billion bill to clean up the environmental damage from illegal mining activities in the Jiangxi region alone (Su, 2019). The Southern province of Ganzhou is a hot-spot for illegal mining and processing activities. This is largely due to the nature of the deposits in the region, which are easy to access and extract, and free of radioactive thorium. Here, reports indicate that organised crime syndicates control illegal mining activities and exploit workers, some of whom are children (Bradsher, 2010 A). As Per Kalvig highlighted in the interview, the clay type of mining and processing is "commonly taken by unskilled workers. (....) because it's very simple". Also, Nis Høyrup Christensen noted that "the fact that a lot of mining was illegal, it shows you something about how far down labour rights was on the agenda... It was not high on the agenda". The effect of illegal clay mining and processing on livelihoods and workers' health is immense. In June 2016, the United Nations Environmental

Programme and Interpol identified illegal rare earth mining as an environmental crime, particularly within the 'illegal extraction and trade in minerals' where 'resource depletion, livelihood challenges and loss of raw material for local industry' are cited as the impacts (Liu, 2016).

Both types of clay mining and elementary processing have a tremendous negative impact on both local communities and the environment. Along with this, large amounts of toxic waste and the current management of tailings present further areas of concern.

Waste management and tailing

In Baotou alone, the Bayan Obo mine, responsible for approx 50% of China's production, produces 10 million tons of wastewater per year. Here, contaminated and radioactive waste from rare earth processing is pumped into nearby trailing dams, such as the one adjacent to Wang's village, 12km west of Baotou (Kaimen, 2014). In fact, a 120km² pool of mud has appeared near Baotou, directly linked to the radioactive waste from the extraction of neodymium. This large area, owned by the Inner Mongolia Baotou Steel Rare-Earth Hi-Tech Company, or Baotou Steel, does not have any proper protection barriers and for the past 20 years the operation has been impacting local communities. One source commented: "*From the air it looks like a huge lake, fed by many tributaries, but on the ground it turns out to be a murky expanse of water, in which no fish or algae can survive. The shore is coated with a black crust, so thick you can walk on it.*" (Bontron, 2012).

Baotou is approximately 35 meters above the downgradient Yellow River, without resistive bottom lines or vegetation cover (Huang et al., 2016). As such, The toxic waste ground is expanding at a rate of 20 to 30 kilometers per year and in the near future, will begin seeping into one of China's main waterways, the Yellow River (Kaiman, 2014; Action Aid, 2018). This toxic and radioactive waste resulted into the groundwater to become radioactive itself, causing plants, animals and people to fall sick and die. The risks are further exacerbated by strong evaporation (Huang et al., 2016:534). The result has been a decline in the local population, dropping from 2,000 to 300 people in just 10 years as local villagers were forced to move to find another source of living (Bontron, 2012; EURARE, 2016:8). However, the remaining villagers, who are also usually the most vulnerable to diseases because of their old age and poor health, cannot afford to leave, as the government fails to provide them with promised compensation (Huang et al., 2016). Near this tailing pond, a village called Dalahai, along with five more villages nearby, represent a bleak foreshadowing of what could happen if contamination moves into China's leading water-ways. Indeed, these villages are known as the 'cancer villages' or 'death village' as the local rate of cancer is many times higher than the

national average (Kaiman, 2014; Seaman, 2019:27). Here, stomachaches are frequent and people often report losing their teeth at around 35-40 years of age. Additionally, respiratory illnesses, cardiovascular diseases, leukemia, osteoporosis and liver cancer are common both with residents and animals. Besides, it is assumed that other illnesses have not yet been diagnosed (Huang et al., 2016:534).

The radioactive waste caused by open-pit rare earth mining and processing is a crisis that cannot be ignored. The environmental and human rights costs are alarming. Baotou is just one of many examples of how mining has laid radioactive waste to the region. The waste from clay mining in Jiangxi, Guangdong, Fujian and Sichuan are mirroring Baotou. Here, the remaining tailing ponds left after shut-down illegal operations are posing 'mounting toxic risks to surrounding water, soil, air and living communities through pond leaking, dust floating, and rain eroding' (EURARE, 2016:8). In fact, clay mining produces residue, where cyanide or sulfuric acid is used as part of the ore extraction process. In most in-situ and many heap leaching facilities, the leach solution leaks into the earth, which can contribute to groundwater contamination (Spohr, 2016:49; Joel Frijhoff, interview). The high degree of toxicity and low degree of oversight over waste management practices cause severe human rights impacts. For instance, in all locations of clay mining, toxic and radioactive waste has contaminated water systems and saturated public drinking water, farm land, causing detrimental effects on human populations in the areas (Seaman, 2019:27). Although unique to rare earth mining and processing, radioactivity is a common problem among all methods of operations due to the specific mineral composition and poses severe risks to the local environment, communities and workers.

Summary of human rights risks

A number of salient human rights risks are present in rare earth mining, processing and waste management in China, especially thanks to the poor environmental regulations and low labour costs (Seamen, 2019). While China has operated a large-scale mining industry since the mid-1980s, only recently have they begun to consider the environmental impact of it (Kaiman, 2014). In particular, mining, processing and waste management of rare earth elements degrades and pollutes the local environment, contaminates water, air and soils, and kills nearby flora and fauna. Nonetheless, as Nins Høyrup Christensen highlighted in the interview, *"there's a lot more focus on the environmental aspect of mining, but not so much on social rights."* Indeed, reports and credible data on human rights violations in the rare earth industry and the impact on workers and communities are lacking. Here, a number of interveeviews

noted that labour rights are one of the most salient human rights risks across the rare earth industry (Eniko Horvath; Micheal Rohwer; Joseph Wilde; Roberta Pinamonti, interviews). As Micheal Rohwer pointed out, from the risk perspective, health and safety of workers and communities are the most prevalent human rights risks across the rare earth supply chain in China. Roberta Pinamonti continued, saying poor working conditions and forced labour are common, further strengthened by the inability of workers to access grievance mechanisms and collectively bargain for better conditions. Nevertheless, they both agree that the most severe risks were the "downstream impacts of the mining", issues like access to clean water and air and the impacts of this on community rights (Micheal Rohwer, interview). Thus, as Rohwer noted, "implications for the surrounding communities are probably more severe than things like freedom of association with [lesser] application to harm then some of these downstream effects like water pollution, air pollution, [land grabs] etc." This is mainly because the downstream impacts threaten the fundamental right to life of current and future generations. The following table summarises the salient human rights risks, clearly presenting that both social and environmental rights are at risks throughout the rare earth supply chain in China.

Figure 16: The following table summarises the salient human rights risks present in the rare earth mining, processing and waste management (Authors' own).

Human rights risks overview in rare earth supply chain in China							
	Step 1			Step 2		Step 3	
	Mining		Processing		Waste		
	Traditional mining	Clay mining					
Type of human rights violation	Open-pit	Heap & leach	In-situ leaching	Industrial Processing	Leaching pools	Tailing pools	Dumped
		Enviror	nmental	Risks			
Water pollution	*	*	*	*	*	*	*
Soil degradation	*	*	*		*	*	*
Land erosion	*	*	*		*	*	*
Landscape changes	*	*				*	*
Air pollution	*	*	*	*		*	
Impact on biodiversity habitat and livestock	*	*	*			*	*
Labour Rights							
Health and safety	*	*	*	*	*		
Working conditions	*	*	*	*	*		
Access to collective bargaining & freedom of association	*	*	*	*	*		
Exploitation of migrant workers	*	*	*	*	*		
Forced labour	*	*	*	*	*		
Local Community Rights							
Adequate livelihoods	*	*	*	*	*	*	*
The right to life	*	*	*	*	*	*	*
Access to clean water	*	*	*	*	*	*	*
Access to clean air	*	*	*	*	*	*	*
Access to remedy	*	*	*	*	*	*	*

Is China moving to better practices?

With some reports of poor rare earth mining practices coming to light, global pressure for improved standards increases. As such, China is integrating 'Green Development' as part of its national strategy. Mining of rare earth was previously a local government issue, and as Chaojun Li pointed out in an interview, "The local governments are notoriously focusing on local economic development and are more willing to sacrifice the environment for economic development." However, Beijing has now strengthened its regulatory authorities, such as the Ministry of Environment and Ecology, and stepped up its enforcement on illegal mining activities, making it a national issue. The Rare Earth Industrial Development Policy was introduced and is being enforced to deter unregulated mining (Mining Global, 2014). Industry consolidation and price-support-measures are helping facilitate the support of improved methods of production and environmental protection standards (Seaman, 2019:27). Furthermore, local officials have been reported to now require companies to upgrade technologies to engage in more costly, but more environmentally friendly mining and processing activities, such as moving the facilities to designated industrial areas with wastewater treatment operations. In an interview, David Merriman reflected on China's response: "Their environmental policies and the controls that are being put on them are much more stringent and the government, both the state and local government, are very quick to find and shut down operations which break those (rules)." He continued to suggest that a key development was when the central government made mining the responsibility of local provincial governments, and started imposing harsh penalties if rules were not met. "The vast majority of those southern China clay projects is now much lower than there were back five, six years ago." Merriman noted.

Further measures to reduce erosion and dust-pollution are also being implemented (Standaert, 2019). In fact, Leonard Ansorge noted that currently, the "standard is very high. [China] increased the requirements for the rare earths which meant that small companies couldn't upgrade their operations and processes and went bankrupt." David Merriman continued, stating that one of the drivers to improve the industry was the fact that "*it was seen as a pride thing*". Indeed, the rising public scrutiny around the use of rare earth metals, particularly in renewable technologies, further encouraged the Chinese government to strengthen environmental regulations and guidelines and exerted this pressure on the entire life-cycle of the product (ERECON, 2015). Nonetheless, both Ansorge and Merriman, together with other interviewees, stated that illegal and small-scale operations which are damaging the environment are still present in the rare earth industry.

To further emphasise that the illegal mining is still at large, on the commitment to clean up illegal mining, local officials are unable to quote how much has been spent on these cleanups, and state media has reported that only around 300 million yuan, or \$43 million has been distributed from the central government to the Jiangxi Province in 2015. Unsurprisingly, local bureaus found that false reporting was evident on replating and erosion control, with exaggerated reports on treatments (Standaert, 2019). Likewise, while Beijing claims it's cracking down on illegal mining and consolidating operations within its six state-owned enterprises, local Guangxi villager protest that these companies are just as bad as illegal operations, if not worse, since they poise the ground and air under the support of local authorities (Su, 2019). This is also confirmed by the Natural Resource Governance Institute who labels China's resource governance as "weak" (Natural Resources Governance Institute, 2017). "The state-owned mines are so politically and economically powerful that the government regulations are selectively enforced" mentioned by a worker in the New York Times documentary produced by Kessel (2015). The documentary highlighted that the city government does not have any power over the mining company saying that "the company does not listen to the city government". As rare earth mining is a critical resource to the income of local communities, little action is taken against state-owned mining companies (Ibid, 2019). In one document, Ma Jun, Director of the Institute of Public and Environmental Affairs in Beijing, commented that "the cost of environmental violations and damage is still way too low," and that China is exporting these resources at an extremely cheap price, which has an environmental cost that is "externalised to local communities" (Kaiman, 2014).

In a similar light, Anne-Marie Sylvestre stated that although environmental issues have improved, she "still [does not] think that they are taking that social issue too seriously". Chaojun Li agreed, saying that the expectations of Chinese companies do not consider human rights but mainly environmental issues. Simply put, human rights are not discussed in the public. Similarly, Micheal Rohwer noted that "China is particularly challenging place to work on these issues, in part because the term human rights is challenging for semantic reasons" He continued saying that working on human rights issues in rare earth operations in China is more difficult then for example working with issues around conflict minerals in the Democratic Republic of Congo (DRC), Tanzani and Uganda, where cases of severe atrocities and worst forms of child labour are common.

In fact, the Chinese government does not allow for any issues to be reported comprehensively and transparently, and as a result, very few people have a full understanding of the human rights risks linked to the rare earth industry in China. Alas, information exchange in the global ecosystem is very limited, and language barriers further complicate the distribution of knowledge between the Chinese and global markets. China regards the issues around rare earths as its own affair and keeps this sector – with its high strategic relevance for industrial policy – sealed off (Dolega & Schüler, 2018:3). The truth is that no one really knows what exactly is happening in China. As Roland Gauss stated in the interview, it is impossible to document environmental and social sustainability and working conditions as "we do not have the ability to really double check and monitor what's happening in some rare earth mine somewhere in Inner Mongolia. It's simply not possible because of the different culture, the different market ecosystem there."

Furthermore, Nabeel Mancheri noted in the interview that although he was able to visit some of the rare earth mining groups, the company specifically told them that the government did not allow the company to show the visitors the mining site, nor even the operations on the concentrate, the early stage processing level. He continued saying that "You cannot go to China. They don't allow any companies, even the customers, to go to their mining site. (...) Especially foreigners are not allowed to assess, you know, how [rare earths are] produced. (...) they don't want us to see how their workers are treated, or what the techniques are ..." They say they have Chinese National Standards, and [they] follow that. So [they] don't need any external intervention like that." (...) [The companies] are open about the fact that the government doesn't allow it". No one from "outside" is allowed to undertake any kind of assessment, unlike other non-Chinese rare earth companies that collect and share all available data, especially on the life cycle assessment; such as what the environmental and social impact are of producing rare earths, especially at the mining stage.

In rare earth supply chains, traceability is a '*relatively unexplored*' aspect (Church & Crawford, 2012:22). Anne-Marie Sylvestre noted that the traceability of the Chinese rare earths is poor, and that sometimes, rare earth elements from illegal activities are mixed with those coming from the state-owned companies. Indeed, it is practically impossible to track and trace where certain rare earth elements are coming from. No one knows the specific of the Chinese processes, where different activities are located or what standards the facilities live up to. This poses a challenging dilemma for companies; How can a company mitigate the human rights risks they face in their rare earth supply chains, in line with the UNGPs when they cannot directly see the challenges, nor the barriers obstructing their efforts? The researchers believe this to be one of the most challenging dilemmas facing companies and other stakeholder, that can directly impact rightsholders in China. Therefore, the thesis poses an additional, second research question to understand how companies can uncover the barriers to human rights risk mitigations, and how they can practically tackle them, addressed later in the chapter.

The Second Research Question

By answering the first research question, this paper has outlined the current state of human rights risks seen in the rare earth supply chain in China. It was found that mining, processing and waste management of these elements presents significant adverse impacts to the workers, environment and local communities. Furthermore, although China is attempting to improve some practices surrounding the rare earth supply chain, most notably the environmental impacts, the results have not yet been seen. This is not only due to high levels of illegal mining, but also the serious lack of transparency that exists in China, especially around human rights concerns. The implications of these findings show that wind energy companies sourcing products with rare earth elements have very little opportunity for transparency in their own supply chains, and even less opportunity to identify, prevent, mitigate and account for their human rights risks are prevalent, the second research question asks:

Using empirical evidence and theoretical perspectives, what is hindering the mitigation of identified human rights risks, and how can they be addressed?

This chapter is guided by the theoretical perspectives and the critical realist approach of this study. The theories are used in conjunction with critical realism to analyse the empirical evidence. The researchers demonstrate how the real, actual and empirical layers of reality can help the researchers uncover the underlying mechanisms that hinder human rights risk mitigation. By distinguishing between the human rights risks and the real mechanisms behind them, the researchers can provide a tailored set of recommendations for various stakeholders throughout the rare earth supply chain. These factors are addressed in the chapter in two main categories; country-level and company-level issues. Firstly, in the country-level issues, the structure of the rare earth industry in China is addressed, with focus on the culture, the Chinese control over the industry and the lack of leverage held by international stakeholders. The theoretical perspectives of stakeholder theory, global value chain governance and global governance are drawn upon throughout the analysis. Secondly, the subchapter addresses the company-level issues to explain how poor due diligence, insufficient audits, price prioritisation and a lack of regulation, have hindered the mitigation of identified human rights risks. These company-level factors are analysed with respect to HRDD framework and stakeholder theory, sustainable supply chain management and the triple bottom line perspective of value. Through this analysis, the researchers are able to understand the real mechanisms behind human rights risks, and provide a set of practical and tailored recommendations to improve human rights risks mitigation.

Country-level issues

Culture

The rare earth supply chain is predominantly located in China, and this paper has found that the cultural elements are some of the most significant factors hindering the mitigation of human rights risks. As outlined in the response to the first research question, Chinese culture does not place significance on human rights, nor human rights risk mitigation efforts. Furthermore, the culture around recycling and reusing materials is also interesting to draw upon. As Jonas Jensen described, "you have a culture in Asia (...) where using waste products as a primary resource is seen as less valuable. So actually, the Asian suppliers are not so interested in taking this back because they don't want to use waste products in the production." This mentality is particularly interesting as it could assist in explaining why there is such a low recycling rate of rare earth elements.

Given the level of control that the Chinese have over the supply chain of rare earths, culture is thus an incredibly relevant point. This evidence puts human rights into context in China and demonstrates that not only do the authorities dislike the concept, they actively work against those attempting to identify and mitigate the risks. Moreover, as the rare earth supply chain is so heavily controlled by the Chinese government (Gilbert Rukschcio, interview), the Chinese companies involved are not required to mitigate risks nor set targets to mitigate them. This strong culture and pressure to obstruct human rights defenders inside the country imply that when external or international NGOs, companies or government is reluctant to aid their efforts.

The Chinese culture can be analysed through the theoretical lens of stakeholder perspective. As indicated by the empirical evidence, the Chinese government has been operating to benefit economic development over the protection of the environment and Chinese people. As David Merriman put it: "There was a huge social backlash to the mining of [rare earths] and the pollution that was being caused (...). And it was seen as an area which was really almost a slight embarrassment (...). That it was damaging (...) the country and population so severely for economic gain." He went on to state that the disregard of other stakeholders in the rare earth supply chain was even "starting to spill out into some dissent for local and state government," a serious impact given China's strict one-party system. Furthermore, Zhang

Guanjun, a senior official of the Ganzhou Party Committee, stated that *"ironically, because the prices of rare earths have been so low for a long period of time, the profits from selling these resources are nothing compared to the amount needed to repair the damage"* (Standaert, 2019). This empirical evidence shows that the Chinese government has not been considering all stakeholders involved in the rare earth supply chain, and this mindset is not sustainable in the long term given the already serious impact that the mining and processing have had on workers and local communities in particular.

Control Over the Supply Chain

The most significant hindrance to mitigating human rights risks in the Chinese rare earth mining and processing comes from the geographical structure of this supply chain. China dominates and controls the supply chain with approx 80% of global mining and 88% of global processing located in the country in 2018. Several interviewees described this global consolidation, supply restrictions and Chinese control over the industry. Benjamin Sprecher described that: "*you have the alternative supply chain by Lynas. And those are your two main options.*" Johannes Drielsma from Euromines specifically linked the Chinese dominance to a high barrier for entry for any other producers entering the market. Leonard Ansorge even described that the rare earth market is not a free market, and is instead managed by the Chinese government.

When Chinese authorities began to shut down illegal mines, the rare earth industry became consolidated under a state controlled process. Through mergers and acquisitions, the many smaller producers became consolidated into 6 large, conglomerate companies that now control the entire Chinese supply of rare earths. In some cases, specifically with China Northern Rare Earths, which is active in the Bayan Obo mining district (Zhou et al., 2017:35), the companies also control the supply from mining to manufacturing, all the way downstream to e.g. permanent magnets for MRI machines or wind turbines (David Merriman, interview; Ballinger et al., 2020:68-9). After the consolidation, the Chinese government imposed restrictive quotas on the supply of rare earth elements in order to maintain their control over the market.

Along with the quotas, the Chinese government maintains their control over the rare earth supply chain through price manipulation. It has been well-established that the price of rare earth elements is not set by market forces, but instead set through a collaboration in the industry. David Merriman stated that "[The prices] are produced on a monthly basis and they are really set as a cooperation between Chinese state governments, the Chinese Rare Earths
Association and the companies themselves, so a lot of control there on what people are paying for it." Furthermore, Leonard Ansorge described that "China controls the prices" and Roland Gauss stated that "these prices are not driven by market dynamics" and "they're artificially set."

This price manipulation helps explain how China has actively worked to disincentive competition from other countries. Firstly, the low Chinese prices have been achieved due to the low costs of labour, reagents for separation, energy and processing. Cost savings have been also achieved through a lack of environmental, labour and local community safeguards. Secondly, the Chinese government has artificially set these low prices and avoided pricing volatility to provide security for customers and to disincentive potential competition from joining the industry (David Merriman, interview). The low and stable costs have resulted in a significant lack of competition as suppliers outside of China are unable to compete with such low prices. The other result seen is that there is no effective protection of human rights, and no mitigation of human rights risks, as these extra costs are not built into the pricing model.

This empirical evidence has shown that the Chinese authorities and producers do. indeed, control the rare earth supply chain globally through a consolidation of the industry, supply quotas, and artificially set, low and stable prices. Here, the global value chain governance can be used to explain the phenomenon. Firstly, this paper finds that due to the specific nature of rare earth permanent magnets, the complexity is relatively high. Secondly, this paper concludes that as each permanent magnet has differing design elements and the information is highly specified, the codification is low. Finally, as the permanent magnets are non-standard assets with a high degree of specificity, this paper concludes that the suppliers have a high degree of capabilities. Given these parameters, the rare earth supply chain in China is indicative of the Relational typology (Gereffi et al., 2005:87). The result is highly competent suppliers that "provide a strong motivation for lead firms to outsource to gain access to complementary competencies" (ibid.:86). In this case, this theory helps explain why the OEMs choose to purchase magnets and draw on the expertise of the suppliers located in China. Furthermore, in this typology, the authors suggest that there is a mutual dependency between the OEMs and the magnet suppliers.

No Alternative Supply Chains

There is a lack of an established supply chain outside of China, which further strengthens the Chinese control. The one supply chain that competes with the Chinese supply is Lynas's mine in Australia and processing facility in Malaysia. However, this supply chain is more expensive than the Chinese production, and is barely profitable due to costs from higher environmental

and social standards. As David Merriman describes, the company relies heavily on subsidies and favourable loan conditions from the Japanese government to remain solvent (interview; Reuters, 2019). The company is also heavily at the mercy of the Malaysian government, which has been placing strict requirements on the company for several years, hindering their production (Anne-Marie Sylvestre, interview).

Due to this constrained supply from Lynas and the incredibly low costs from the Chinese producers, the Chinese authorities know that there are no large-scale alternatives to their domestic supply. Other countries have neither the means to establish their own supply chain, and as Su (2019) stated, there has been "little advancement in diversifying the supply, partially because few other countries are willing to copy China's low-cost, high-pollution version of rareearth processing." As such, the Chinese authorities do not feel pressured nor motivated to improve their practices. When asked about the challenges to mitigating human rights risks, Chaojun Li responded that "I think the biggest challenge is lack of competition. If the mining companies are too comfortable with their market position and they don't see the need to make improvements, then it will be very difficult." As various industries around the world need rare earth elements, and China is the only major supplier, they know that there will be sufficient business, no matter the state of the practices. Bastiaan Vader stated: "your leverage will even decrease when the demand in rare earth elements will rise because they will always be able to sell them, also to sectors which do not value these risks as much as [the wind industry] does." This lack of pressure felt by both the Chinese government and the rare earth conglomerates is an absolutely key factor that has been hindering the mitigation of human rights risks to date.

Knowledge Creation and Dissemination

It can be seen that there is currently no alternative to the Chinese rare earth supply chain due to the control over the mining and processing of the minerals. It is also apparent that as this industry is of such great importance to the China authorities, there has also been a strategic push to control the knowledge surrounding the supply chain too. Politically supported research and knowledge institutions exist, specifically dedicated to the rare earth industry. Leonard Ansorge described that there is a university with over 3,000 students who study only rare earth elements. David Merriman went on to explain that "*the technical knowledge to get to that separated rare earth product state is very limited outside of China. And there's a very limited knowledge pool of how to get there.*" One recent development in the search for alternative supply chains to China has been the circular economy approach. By deconstructing decommissioned wind turbines, and reusing minerals, the demand for primary materials mined

and processed in China could be offset (Jonas Jensen, interview). However, in Europe and the US, where these measures could potentially be established, there is a lack of knowledge surrounding these processes.

The result of this lack of knowledge dissemination throughout the world is a tighter grip on the control of the rare earth supply chain. Consequently, an alternative supply chain or a circular economy are both a long way off. In terms of human rights risk mitigation, the lack of alternative supply chain presents similar hindrances as the lack of alternative supply chain. By controlling the knowledge, competition is unlikely to grow and the Chinese producers face little pressure to improve human rights practices. Therefore, this paper finds that alternative supplies of rare earth elements are incredibly important to develop in order to improve human rights practices and risk mitigation.

Applying the theory of GVCG to both the lack of an alternative supply chain and the knowledge control the Chinese authorities show an interesting development. In the typical Relational typology, the lead firms, i.e. the OEMs, and the suppliers of rare earth magnets would be expected to be mutually dependent upon one another. However, by bringing these factors to light, this paper can demonstrate that the expected power symmetry may in fact be asymmetrical. Further, the asymmetrical power relation is in favour of the suppliers, contrary to the theoretical expectations. This interesting development is further drawn upon in the theoretical discussion below.

Leverage

Based on the above, it is clear that few alternative sources of rare earth elements exist, and the control over the knowledge means it is unlikely one will develop in the short-medium term. Therefore, OEMs, international normative institutions, international NGOs and other states currently hold little leverage over rare earth suppliers or Chinese government to improve human rights practices and risk mitigation in China. In the previous years, there have been several international incidents, where the result demonstrates this lack of leverage in two areas; lack of leverage over the rare earth supply chain; and lack of leverage over China's human rights practices.

In 2010, a Chinese fishing boat entered Japanese waters and the captain was subsequently detained by the Japanese coastguard. After several days of negotiations, the Japanese officials refused to release the captain, and consequently, Chinese officials halted the export of rare earth materials to the country. Japan was quick to release the captain after the initial

blockade, though China did not resume the trading of rare earth elements for almost 2 months, causing significant damage to the Japanese (and global) industries dependent on these minerals (Bradsher, 2010 B; Bradsher, 2010 C).

Furthermore, the US, EU, Japan and Mexico launched a World Trade Organisation complaint against China for obstructing the trade and export of rare earth materials (WTO, 2012; Landler, 2012). The complaint specifically disputed that "the export restrictions comprised export duties, export quotas, and certain limitations on the enterprises permitted to export the products" resulting in higher prices, going against the GATT agreement (WTO, 2014). The President at the time, Barack Obama, and the White House Administration filed the complaint to prod China "to abide by international trade standards" (Landler, 2012). However, analyses after the fact have shown that despite the Chinese government changing practices on paper, there were minimal changes in reality (Benjamin Sprecher, interview; The Guardian, 2015).

Finally, some of the interviewees have briefly touched on the possible threat of retaliation that the Chinese government have signalled. Roland Gauss and Patrick Nadoll from EIT Minerals both described that rare earths are a highly politicised mineral, and the global supply chain of these minerals is dependent on a power game. Benjamin Sprecher stated that these minerals were "*like a pawn in their geopolitical games*", and when asked whether other countries or companies have leverage over China to clean up their supply chain, he responded "*No at all. No, not even remotely.*"

Another area where low leverage over the Chinese authorities has been seen is regarding human rights practices. There were several cases where international normative institutions, including ILO, UNGA, Amnesty International and Human Rights Watch, have called for improvements in Chinese human rights conditions, though the Chinese authorities have been reluctant to take action (ISHR, 2017; HRW, 2019; UN Watch, 2020). Chaojun Li exemplifies this in the interview: "Despite the criticism, despite the pressure from the US, I don't think the Chinese government buys it. They're still doing what they do. There's no right to freedom of speech, freedom of speech, there's no right to collective bargaining etc."

Through these examples, it is seen that stakeholders have little leverage over the Chinese government in terms of both the rare earth supply and human rights risk mitigation. Despite incidences with international normative institutions, NGOs, human rights organisations, the ILO and the UN, there have been no cases where stakeholders hold significant leverage over China, nor pressured the country into mitigating human rights risks in the rare earth supply

chain. As Bastiaan Vader stated, "[human rights is] one of the things that is perhaps almost the hardest to have some leverage on."

The use of the global governance theory is particularly relevant here as it explains that governance gaps may have emerged in the complex rare earth supply chain. Specifically in this case, the gaps are the human rights risks that are still incredibly evident in China. Global governance suggests that gaps such as these can be governed by a wider range of stakeholders, including NGOs, IOs and private companies (Abbott & Snidal, 2009). However, few shortcomings of this theory arise. By taking the perspective of the Chinese state, it can be argued that the state can, and has been, governing the rare earth supply chain. The Chinese authorities have never been secretive that economic development and growth have been their long-time goal. In the past, this was usually done at the expense of environmental and human rights concerns. However, as the economic development was the end-goal, it is argued that the Chinese governance of the rare earth supply chain has been incredibly effective. Through price manipulation, consolidation of the industry, quotas to restrict supply and knowledge control, China has actively governed the rare earth supply chain, resulting in a near-monopoly of the entire global supply.

Transparency

By addressing the second research question so far, it is clear that several key characteristics of the Chinese rare earth supply chain hinder the mitigation of human rights risks. Here, the critical realist approach to uncovering the truth proved useful. On the real layer of reality, China has maintained control over the supply chain as a result of several factors, including the culture, price manipulation and the lack of leverage. This is then demonstrated on the actual level where mitigation of human rights risks is hindered. However, there have been reports in the past years that demonstrate that the risk mitigation in the rare earth supply chain may be improving, as indicated in the first research question. If this is true, it would imply that the culture and government's view around both rare earths and human rights are shifting. However, this research paper acknowledges the inherent intransparency that exists within China, and as several interviewees noted, it is difficult to conclude on whether human rights risks remain the same or if they have improved.

The consolidation of the industry was the first barrier for transparency. Benjamin Sprecher identified that *"there's no traceability because it's all one company,"* with his sentiments echoed by David Merriman and Leonard Ansorge. Secondly, the transparency between producers and customers is heavily limited. As noted in the first research question, outsiders are not allowed to visit rare earth mining sites. This empirical research demonstrates that the

state of rare earth mining is highly intransparent, that accurate, credible and reliable information is almost impossible to get from China, especially regarding such a sensitive topic as human rights.

This subchapter demonstrated that there are a number of barriers evident that make mitigating human rights impacts more difficult. The Chinese culture, control over the supply chain, lack of an alternative supply chain, no competition and a lack of leverage over the Chinese authorities are some of the hindrances seen, due to the specific country-level context. Due to these barriers, and also the intransparency evident, companies have been struggling to mitigate their upstream human rights risks. While the Chinese government has a primary role to protect human rights, the private sector cannot rely on the government for successful outcomes. Companies must also meet their own responsibility to protect human rights and provide a solution for abuses according to the UNGPs (BHRRC, 2018:2). However, in this case, it is seen that many actions taken by companies actually compound the negative effects of the country-level barriers and yet again, increase the hindrance of human rights risk mitigation. The following subchapter presents an overview of the four key company-level barriers to human rights risk mitigation that were identified.

Company-level issues

Poor Due Diligence

It becomes evident that there is still a lack of action from private actors to identify, prevent, mitigate and account for human rights risks. Indeed, this issue is especially prevalent in the renewable energy sector, with its rapid expansions of projects and the 'socially responsible credentials' which boosts support from the general public, investors and governments. For example, a report by BHRRC warned before the 'the benefits of renewable energy risk being tainted by harms to people and livelihoods if the sector does not step up its engagement on human rights' as an alarmingly small percentage of renewable companies have established due diligence processes (BHRRC, 2018:1). Specifically for the wind sector, ActionAid report uncovered that respecting human rights in wind turbine supply chains 'remained a blind spot for most wind turbine manufacturers that supply the Dutch market' (2019:5). The report assessed seven wind turbine manufacturers and found that they 'are lagging far behind government backed normative expectations with regard to due diligence.' In line with this, Joseph Wilde commented that "[wind energy companies] are still quite far away from really doing the due diligence that would be expected by the OECD guidelines". Despite the fact that some of these companies are openly committed to conducting human rights due diligence

throughout their supply chains, 'their reporting does not show how they have prioritised risks on adverse impacts on stakeholders, which concrete actions they have taken to prevent or mitigate harmful impacts, and whether they monitor the implementation and results of these actions.' (ActionAid, 2019:19). In fact, there is an alarming lack of transparency and implementation of human rights responsibilities in the wind energy sector, despite substantial risks in their supply chains (BHRRC, 2016:7).

The poor human rights due diligence is strongly linked to how wind energy companies are being perceived as "clean" actors. Companies are not being pressured by customers to improve their practices and due to the inherent conflict of interest, wind energy companies receive all the support they need from the government and investors without adequate precautions, requirements and risk assessments (Calma, 2016). The praise for their positive contribution to society takes precedence over looking at their potential negative externalities. As Kayla Green highlighted, "The biggest issue that we've seen across the board is what we. at the Danish Institute, refer to as the inherently good fallacy. Because renewables are intrinsically positive, there aren't as many human rights issues coming into play. So for a lot of companies where they normally have good diligence procedures, we're seeing them being overlooked, because it's not considered as critical." Many other interveeviews agreed with this statement, highlighting that wind energy companies are seen as inherently good, often given the free-pass to skip any due diligence processes (Joseph Wilde; Charlotte Aagaard; Nikolaj Homman; Sophie Kwitzera; Elsa Dominish; Eniko Horvath, interview). As Nikolaj Homman noted, "a lot of the things have been able to go under the radar because it has this sort of green label on them". In this case, local communities in China have paid the price for the green transition of Western countries. Homman continued, saying that "INegative impact on human rights] is such a new topic ..." that companies get "annoyed" when guestioned around their due diligence, as they are arguably doing "good things" already.

The lack of scrutiny and belief that renewable companies are assumed to be socially responsible by default, further cascades into how the top management perceives the issues. Roberta Pinamonti argues that *"the sector is not advanced enough like the extractive sector."* Many of these companies do not have these issues under *"their radar."* Kayla Green agrees, adding that the management is often not *"fully aware they are of the risks associated with their operations"* due to the *"novelty of these projects."* Therefore, the companies lack the benefit of hindsight, as it is still a developing practice. Projects around human rights are often considered inessential, are not embedded in the companies' DNAs nor the way they operate, and there is often no training around human rights responsibilities. Moreover, there is an added level of complexity within global supply chains. With many tiers of suppliers, wind

energy companies are often discouraged from attempting to trace minerals used in their turbines. For example, Ørsted has more than 22,000 tier 1 suppliers (Ørsted Sustainability Report, 2018:32). Further compounding these issues of traceability are some of the mineral specific challenges. For example, as Joel Frijhoff described, once the minerals have been processed, they become the same element on an atomic level when they leave the facility. Therefore, unless the minerals come from a single mine to a single processing operation, traceability is impossible.

Due to the poor supply-chain traceability, negative human rights impacts from wind energy companies are 'flying under the radar' (Nazalya & Dobson, 2019). As the ActionAid report uncovered, wind energy companies are still lacking a general overview of their supply chain, and are unable to fully trace the raw material used in the wind turbines (2019:21). No wind energy company was able to present a high degree of supply chain transparency. Here, Nikolai Houmann questioned the secretive nature of supplier relationships, further leading to issues around a perceived reluctance to human rights or simply a lack of control of the origin of minerals. Nonetheless, Kenneth Riis Jensen from MHI Vestas argued that poor traceability is the result of human factors not because the top management would not care, but because "internally, it's guite difficult to work with other departments (...). In essence, Jensen suggests that it's difficult to prioritise procurement to focus on ethical suppliers when procurement teams are already overwhelmed. Micheal Rohwer agreed, saying that he believes that companies are taking these issues seriously, but are currently not doing enough to mitigate the human rights risks. Most companies still distinguish between the core of their business, such as access and price of materials, and the question of sustainability and human rights risks (Micheal Rohwer, interview).

As a consequence of the good fallacy presumption, low pressure from stakeholders, lack of awareness and expertise as well as practical difficulties around traceability in global supply chains, wind energy companies' due diligence practices are falling short in mitigating human rights risks. Companies cannot only require transparency from their suppliers, but must also be transparent themselves. Here, Joseph Wilde noted that "all of the companies could be doing more, even some of the good, transparent Scandinavian ones. [All companies] could be doing more in terms of communicating with their stakeholders (...) about what risks they've identified". Indeed, companies lack the knowledge and expertise to successfully implement SSCM practices, as argued by Carter and Rogers, where human rights, including social and environmental concerns, are heavily integrated throughout a company. In this way, the strategy, organisational culture, risk management and transparency can all contribute to

sustainable and equitable value creation. Unless wind energy companies embrace these four elements, human rights risks are unlikely to be fully mitigated.

Lack of regulatory requirements

Another key aspect that prevents companies from strengthening their due diligence and mitigating human rights is the lack of regulations. As Kenneth Riis Jensen noted, established legal requirements would require companies to fully understand their supply chain and trace all their minerals. Currently, respect for human rights across the supply chain is usually something that is only demanded by Code of Conducts and occasionally targeted by journalists and NGOs. As due diligence is currently not a compliance issue, companies are unlikely to spend significant resources on this. As Sophie Kwizera argued, identifying and addressing human rights is still seen as some "do good project." She stated that "looking at human rights abuses within their supply chain is not necessarily a priority, because nobody is behind them telling them you have to do this or there is no law obligating telling them to do so." Kwitzera continued, saying that due diligence will only reach the top of the agenda when companies are legally required to trace their minerals and metals. Currently, there are regulations that require companies to trace the conflict minerals such as tin, tantalum, tungsten and gold (3TGs) in their supply chains, but currently, there are no binding regulations that require companies to specifically trace rare earth elements.

Here, the theory of SSCM further explains the underlying mechanisms that hinder human rights mitigation. As argued by the SSCM theory, wind energy companies - the focal companies - have not yet been experiencing external pressure or incentives set by different actors, such as governments, investors or other stakeholders to improve the transparency and mitigation of human rights risks in their supply chain of rare earths (Gilbert Rukschcio, interview). Without this external pressure, the focal companies have not been obligated to work together with their suppliers, nor created meaningful change along their supply chain.

Price over human rights

One of the main barriers to ensuring responsible management of supply chains are the high costs. As companies are not obligated to undertake effective human rights due diligence, there is a strong focus on "*Sales first, human rights second or third or fourth or fifth or last*" (Sophie Kwitzera, interview). The question is always first and foremost about where the company is procuring the material, the quality of it and the price, while other issues such as human rights risk assessments are considered retrospectively (Micheal Rohwer, interview). Thus, if OEM

wind energy companies are only able to find one supplier of rare earth materials or who provide the permanent magnets competitively, human rights risks are less likely to be taken into account, as the OEMs will not have any other options. This is particularly relevant in this study as the first research question demonstrated that all six Chinese rare earth producers are likely to have similar and severe human rights risks.

A commercial challenge presents itself, as companies must decide how much they are willing to invest to mitigate these risks in the context of China's political and social system. Instead of questioning the conditions rare earths minerals have been mined and processed in, top management and the procurement teams care first and foremost about the price and the guality. Leonard Ansorge noted "wind energy companies are happy that prices of Chinese rare earth are low". Since 80% of the price of magnets is the cost of raw materials, the cost of magnets goes down significantly for wind energy companies with lower rare earth prices. Indeed, Gareth Hatch said: "China's advancement up the supply chain has been in plain sight for decades and enabled by companies' prioritisation of low costs above supply security" (...) "The market has done this to itself by saying we're going to go for the lowest cost at any cost" (Su, 2019). By placing the burden and negative externalities of rare earth elements on Chinese citizens, the government is able to keep their industry at an extremely competitive point. As Kenneth Riis Jensen noted, with low prices goes hand in hand a very low environmental and social protection. "Once you have a low price, you are of course getting a low quality in terms of the social and environmental issues (...) I've never seen a company with a really high quality but [with terrible conditions]. As such, there is a correlation between what companies pay and the social and environmental standards.

Similarly, companies are still conducting cost-benefit analyses regarding human rights risks assessments. The majority of companies are still looking for the "*business case for human rights*" and the bottom line in terms of avoiding lawsuits and damages, rather than accepting their duty to respect and mitigate human rights risks, as outlined by the UNGP framework. In fact, it is argued that wind energy companies are still driven by price and do not approach their operations from the triple bottom line perspective on value. This demonstrates that the social, environmental and economic issues are not truly integrated in company strategy, organisational culture nor risk management, which undermines the goal of a sustainably managed rare earth supply chain. By only looking at the lowest possible price and prioritising the "economic goals," the ability to integrate the triple bottom line principle is threatened.

If the wind energy companies spend money on improving practices, it is often seen as traditional CSR issues that can benefit the reputation of the company. As Roberta Pinamonti

noted, companies only focus on the direct impact of their direct operations, such as the instalment of wind farms, instead of addressing the human rights risks across the entire supply chain. The purpose being to satisfy the majority of stakeholder attention (Roberta Pinamonti, interview). Nikolaj Homman added to this, commenting that companies are only slightly more engaged now as there is a hint of publicity surrounding the negative externalities of renewable companies, and thus the timing is right to engage in CSR projects, but *"in general, they are, sort of, in denial that there is an actual problem*" (Nikolaj Homman, interview). Hence, it is clear that the interests of all stakeholders are not being taken into account, but rather quick-paced projects are being prioritised, along with shareholders' concerns. By focusing on CSR practices in this way, companies are not undertaking thorough human rights due diligence and neglecting the full range of stakeholder interests rather than embracing UNGPs approach to responsibility; a hands-on collaboration with suppliers.

Audits and certification schemes

The low investment and commitment that hinders human rights risks mitigation is also reflected in a way that the wind energy companies undertake audits. Due to the insufficient resources, sustainability or responsible sourcing teams in companies generally only focus on a limited number of 'higher risk' suppliers, determined by desktop research (Joel Frijhoff, interview). Moreover, it is mostly just the tier 1 suppliers that companies evaluate (Chaojun Li, interview). Many companies still rely on certification schemes and audits that neither address the root cause of the problem, nor lead to the required change at the local level. Joel Frijhoff argued that such audits that are based around ISO standards or certification schemes do not work, as they only provide a "snapshot" of the issues. Audits alone cannot play a determining role in uncovering human rights issues in supply chains as key problems such as harassment and discrimination against minorities can be missed (Shift, 2013). Currently, auditing does not appear to be an effective way to mitigate human rights risks for companies in their supply chains, often because this creates an unequal power paradigm between suppliers and buyers. This power paradigm occurs as suppliers often receive very little help in complying with audit standards, and the consequences disproportionately target suppliers (Manschot, 2018:12). Kenneth Riis Jensen agreed, arguing that audits do not work from the social perspective, especially in countries like China, as it is almost impossible to check if they have made lasting improvements. Often, given the cultural barriers, is it difficult for audits to bring about structural change for workers, such as the lack of collective bargaining and freedom of association, as top management is usually politically connected and not engaged during the audits. Finally, suppliers are alerted before the inspection takes place so cosmetic changes can be made.

In the same line, certification schemes represent the same shortcomings as audits. Here, Joseph Wilde noted that he "never saw a certificate that actually works". According to him, "there's a real danger in certifications and auditing systems because they sort of give you a sense of false security in a lot of ways and they can reduce political pressure for real change.", adding, as an example, the case of Brumadinho tailing dam in Brazil that bursted and killed nearly 300 people, just a few months after being certified as safe. Similarly, Johannes Drielsma noted that certifications "sometimes feels like a little bit of a silver bullet solution that a lot of our stakeholders would like to see without thoroughly thinking about what [the certificate] actually tells you". Often, certification schemes become a for-profit business model. As such, the certification inspectors have an interest in satisfying the customer as they depend on them for their income, working "hand in glove" with the companies. As such, certification schemes are often expensive and time-consuming, and become a *"luxury"* for the companies that can afford it. Many companies are unable to afford or provide these certifications "on the paper", despite living up to their standards. They are therefore "discriminated against" when buyers are unable to source from un-certified suppliers (Chaojun Li; Elsa Dominish, interview). Moreover, credibility of the certification schemes is also hard to ensure, as many certifications can "just be bought off the streets" in countries like India and China (Kenneth Riis Jensen, interview).

Thus, both certification schemes, as well as audits, cannot be treated as panacea to human rights violations and should only be used as an element of due diligence. Currently, companies often see audits as a cheaper alternative to conducting comprehensive due diligence, but the knock-on effect is that the costs are then incurred on society and the environment (Joel Frijhoff, interview). For this reason, some experts, including Joel Frijhoff, regarded certification and audits as "greenwashing". As the UNGPs argue, HRDD should be an on-going process where human rights are embedded in the way the company operates and undertakes its human rights risks assessments. There is a clear division between what is reported during a one-time audit, and what is changed in reality over a longer period of time. As such, companies cannot rely on certifications and audits to identify, prevent, mitigate and account for human rights risks. Often, certification schemes are approached as a part of hybrid global governance, but these are not effective because the methods used are weak. For example, not all stakeholders are involved and most of these certification schemes are run solely by for-profit private actors, financially incentivised by the client. Indeed, the legitimacy of these schemes is flawed and they fall short in addressing the full scope of the issues due to their private nature and the snapshot method (Fransen, 2012). Alas, companies often aim to satisfy shareholders by having a quick-fix paper box-ticking exercise that keeps the costs down instead of undertaking

a genuine approach to risk-based due diligence from a stakeholder theory and UNGP perspective.

Relevance of the theories

So far, this chapter has detailed the barriers that hinder human rights risk mitigation in the Chinese rare earth supply chain. This paper identified that there are a number of country-level and company-level barriers that enable the human right risks to be prevalent, involving a range of stakeholders. Through the chapter, the chosen theoretical perspectives were applied to help the researchers analyse the empirical and actual level of reality, that is the human rights impacts and the human rights risks, respectively. The purpose of the following discussion is to analyse the relevance of the theories in relation to the real layer of reality, to identify the causal mechanisms that have been proliferating human rights risks and those that hinder the mitigation of these risks. Specifically, the paper uses the stakeholder theory in conjunction with HRDD framework, as well as the theories of global value chain governance, global governance and sustainable supply chain management, to draw on their strengths, and highlight the limitations of their application in order to offer tailored recommendations.

Stakeholder theory and HRDD

Stakeholder theory and the human rights due diligence framework are used in this paper to analyse how wind energy companies, as well as Chinese rare earth companies, perceive the importance of stakeholders to their business operations. As argued in this thesis, both wind energy companies and Chinese companies neglect the importance of creating value for all stakeholders. Here too, it can be seen that private actors do not assume their full responsibility for respecting human rights as demanded by the normative principles outlined by the UNGPs and OECD Guidelines. This is mainly due to the fact that companies do not undertake effective HRDD, trace their minerals and fully understand their negative externalities throughout their supply chains. They also do not communicate clearly about their efforts to address human rights risks. The focus continues to be on prioritising the interests of shareholders over stakeholders, by focusing on cost-cutting and box-ticking quick "fixes," which have a limited positive impact.

However, there are certain flaws that one could point to. First of all, both the UNGPs and OECD Guidelines are voluntary measures, and as such, companies are not obligated to follow them. There is also the question of what is considered to be the best practice in the normative

sense and what is actually feasible for companies to achieve. Companies are often criticized for their approach without being guided in the right direction or offered viable solutions upfront. Moreover, one could argue that the stakeholder theory is a very Western-centric perspective, and not applicable to other socio-economic contexts, such as China. Here, many argue that mining was done at the expense of the environment to ensure economic development. In line with this, one could say that the Chinese government is prioritising the needs of stakeholders by eradicating poverty and achieving prosperity by providing economic growth and income for local communities and workers. Therefore, this thesis could be perceived as being biased and overly critical of mining companies, who, with no doubt, bring economic benefit to many impoverished regions and provide employment for millions of Chinese workers.

Nonetheless, the principles of human rights are universal, meaning that all individuals are born with the same rights, regardless of where they live, their gender or race, or their religious, cultural or ethnic background (UNFPA, 2005). Moreover, human rights are also indivisible and interdependent, which means that all rights are equal in importance and none can be fully enjoyed without the others (ibid.) As such, governments and companies cannot pick and choose which rights will be promoted and which rights will be suppressed. Under international law, governments are obligated to respect, protect and fulfil all human rights stated in the nine core international human rights treaties. Furthermore, private companies have not only a moral obligation to upholding human rights, but in many instances, also a legal obligation under international and domestic law (OHCHR, 2012:1).

Contrastingly, CSR allows companies to select issues of focus voluntarily and often in line with a marketing and PR goal, a human rights approach directs companies to respect all human rights, rather than approaching it selectively. A human rights framework should standardise the approach, providing a universally recognised framework that is built around stakeholders rather than companies shareholders (BHRRC, n.d.). Wind energy companies are still fairly young compared to more mature sectors, such as the oil industry, and until very recently, little attention has been paid to wind-energy's negative externalities. However, this is changing now and companies must fully embrace the stakeholder theory and HRDD to ensure long-term relevance and success. The exact practices companies can adopt are elaborated under recommendations.

Global value chain governance

Furthermore, the paper used global value chain governance theory to understand the coordination, transfer of knowledge and relationship between the wind OEMs and the rare earth permanent magnet producers in China. The theory characterises this as a Relational typology, implying a strong sense of mutual dependence between the actors, and arguing that each has leverage over the other. However, the researchers found some shortcomings in the theory that must be addressed in order to provide accurate recommendations. Specifically, the reality and contextual setting of the rare earth supply chain in China means that some of the 'exact type' assumptions that the theory makes must be reviewed.

Firstly, there is a high level of integration of the rare earth supply chain, with suppliers typically controlling the rare earth elements from mine to market. The typology must therefore be adapted to reflect that the supply chain is integrated, rather than dictating individual suppliers and sub-supplier (see Figure 17). Secondly, the demand for rare earth elements has been exceeding supply in recent years (Desai, 2018). The result is that the suppliers can sell to alternative buyers, but buyers cannot necessarily find alternative suppliers. Finally, the lead firms depend on their suppliers for certain quality standards, with human rights performance or risk mitigation being one of these. When lead firms are not satisfied with the performance, they can generally switch to a better performing supplier. However, in the case of rare earth suppliers in China, the OEMs only have five other rare earth suppliers to choose from. Furthermore, as these are all Chinese firms who mine and process using similar methods, it is likely that the human rights risks are the same.

Figure 17: Graphical representation of the difference between the 'exact' Relational typology by Gereffi et al. (2005) and the observed case in the rare earth supply chain (Authors' own).



These three elements of the contextual setting in China have a substantial impact on the assumptions made by the theory. Instead of mutual dependence, as the theory suggests, the result seen is that the supplier of rare earths has an overwhelming amount of power over the OEMs. This power imbalance demonstrates elements of the Captive typology, though instead of captive suppliers, there are captive lead firms. In this unusual and highly irregular case, it signifies that the OEMs have a lack of leverage over the magnet suppliers, and that the OEMs are highly dependent for their continued cooperation.

However, it must be noted that the interviews did in fact demonstrate some factors that might signal limited mutual dependence. Firstly, as the OEMs are customers and have purchasing power, suppliers will always seek to maintain a productive business relationship as switching buyers will result in increased transaction costs. Secondly, although demand is outstripping supply of these minerals, it is estimated that the wind industry constituted 65% of rare earth demand in 2017 (Dodd, 2018). This is an enormous proportion of the rare earth industry, meaning that collectively, the OEMs have significant purchasing power and the suppliers rely heavily on this industry.

This discussion shows that the theoretical lens of global value chain governance does not fit perfectly to this unique case of the rare earth supply chain in China, albait there are some valuable takeaways. By focusing on the strengths of the Relational typology, collectively

improving performance becomes possible. If the OEMs require higher standards of human rights performance or greater risk mitigation in their upstream supply chain, they may be able to minimise the power asymmetry of the Chinese producers. Furthermore, the OEMs can work to leverage both the high switching costs and the demand from the industry to develop their relationship with the supplier and consequently, mitigate human rights risks. This direct understanding of value chain governance is drawn upon in the recommendations.

Global governance

Moving on, global governance is used in this paper to analyse how China governs the rare earth supply chain, the main stakeholders involved and the effectiveness of the governance seen so far. By analysing the intentions of the Chinese government, i.e. their drive towards economic development, this paper found that the governance of the rare earth supply chain is successful as the authorities were able to exert a great amount of control over the entire industry. This control is demonstrated by consolidating the companies, price setting and the control over the knowledge.

However, the categorisation of this 'effective' Chinese governance of the rare earth supply chain has been very one-sided, favouring the Chinese perspective of economic development. It is true that the Chinese government has been very effectively governing and creating economic growth from the mining and processing of rare earths. However, some externalities that emerged cannot be ignored. In particular, the biggest externalities that emerged from the rare earth supply chain are the human rights impacts, specifically linked to the environmental, labour and community rights. As seen in the analysis of the first research question, low environmental and labour standards are likely to negatively impact the workers and communities long into the future. As such, the externalities pose an additional dilemma. By analysing this challenge from a Western perspective, it is argued that the Chinese governance is significantly less effective than initially found, and numerous governance gaps are identified. This ineffective governance is reflected upon with the admission of the Chinese official that described that the cost to clean up the environment impacts and to compensate for the social impacts will be significantly more than the economic gain for the industry in the first place (Standaert, 2019).

Furthermore, these challenges are analysed from a private sector and CSO perspective. Many of the companies sourcing Chinese rare earth products are Western companies based in e.g. the US, EU, UK or Australia, and as such, they must follow the regulation of their home country. The fact emerges that a growing number of Western countries are encouraging

companies to comply with normative frameworks, such as the OECD Guidelines, and even regulating with mandatory due diligence laws. These Western companies are increasingly required to mitigate human rights risks, improve traceability of their products and report on their sourcing in accordance with regulations such as Section 1502 of the Dodd Franks Act, the 2021 EU Conflict Mineral Regulation or the French Loi de Vigilance. Therefore, as the Chinese producers are unwilling to provide transparency regarding their practices, the ineffective Chinese governance of the rare earth supply chain can potentially lead to negative economic consequences for the Chinese suppliers, in the case of Western buyers resorting to alternative countries for supplies to mitigate their human rights risks. Through this lense, the Chinese governance is incredibly ineffective and threatens the future economic development of the industry.

Some challenges with the theory of global governance also exist. As the theory predicts, a combination of RSS schemes could help to close the governance gaps in the Chinese rare earth supply through voluntary activities and frameworks that apply normative pressure on the Chinese government to comply with higher standards. However, as the analysis demonstrates, very few international institutions, including NGOs, governance institutions or CSOs, have meaningful leverage over the Chinese authorities, and as such, normative pressure is unlikely to have an impact. As such, instead of moving towards hybrid governance, the rare earth industry in China is likely to remain in the public governance sphere. Nonetheless, global governance can potentially be useful from a company perspective. Although international and normative institutions do not have a great deal of leverage over the Chinese government, it is possible that Western companies can apply some pressure over the Chinese producers. Here, companies can help in shifting the state-regulated governance of human rights in the rare earth supply chain to hybrid governance. In this way, actors from all groups are able to participate, ensuring greater legitimacy. The paper uses this understanding of effective global governance further in the recommendations.

Sustainable supply chain management

Finally, the paper used the theory of sustainable supply chain management to analyse how companies integrate the triple bottom line principle and how they assume responsibility based on external pressure. Regarding the triple bottom line approach to value creation, it was found that companies are currently prioritising economic sustainability by focusing on cost-cutting, while economic and social sustainability is secondary. Here, the SSCM confirms and strengthens the findings of the stakeholder theory. Companies are currently only "*blithely undertaking social and environmental goals relating to the supply chain*" (Carter & Rogers,

2008:369) in the form of traditional CSR practices where companies pick and choose their voluntary contribution instead of assuming full responsibility for the issues. As such, the social and environmental dimensions of supply chain management are not given the same importance as the economic dimensions, and often only focused on preventing reputational costs.

The lack of integration of these three dimensions is further supported by the fact that the four facets; organisational culture, strategy, transparency and risk management, hinder the facilitation of sustainable practices. For instance, the paper found that companies often lack the much needed organisational culture around human rights. Furthermore, sustainability and responsible sourcing teams often find themselves isolated within the company and need to work hard to engage top management and procurement teams. Next, the strategy is very much focused on cost-cutting and quick fixes, which is also reflected in poor stakeholder engagement that hampers the improvement of transparency. Finally, risk management is mainly focused on ensuring the supply of good quality materials and preventing supply chain disruption, rather than analysing the human rights that could potentially be at risk.

Furthermore, the paper used Seuring and Muller's framework to understand what pressures companies to minimise "*the environmental and social burden incurred during different stages of production*" (2008:1699). Here, the framework centres around the focal company, i.e. the OEMs, and the rare earth suppliers in China. The paper argues that human rights risks continue to persist because there is a lack of external pressure on the OEMs from stakeholders such as the governments, the CSOs as well as employees. This is mainly because companies are not required by the law to trace their rare earth elements and undertake effective human rights due diligence according to the UNGPs and OECD Guidelines to identify, prevent, mitigate and account for the human rights risks. Furthermore, until very recently, there was a significant lack of awareness about the externalities wind energy companies contribute to, creating the phenomenon of 'good fallacy'. By not having the incentive to fully integrate the three key sustainability needs highlighted above companies undermine their ability to achieve risk avoidance , as seen on Figure 18. As such, they are unable to fully mitigate the human rights risks in their supply chains.

Figure 18: Following figure visualises how the pressures and incentives have not yet coerced companies to mitigate their human right risk (Authors' own based on Seuring and Muller, 2008).



However, as with previous examples, few flaws arise when applying the theory. First of all, the theory assumes straightforward supply chains where companies can truly change the practice of their suppliers, despite the challenges that many companies face when trying to exercise their leverage. As such, main barriers to improving sustainability performance seem to depend on the ability of the company to overcome the barriers, disregarding the power imbalance suppliers often exercise, as found by the GVCG. Furthermore, the theory recommends the adoption of certification and the use of audits in order to ensure that suppliers live to minimum standards. Here too, it was found that these elements only work parly. Moreover, there is an added challenge for companies in monitoring the improvement and ensuring credibility data when working in opaque supply chains, like those in China. Nonetheless, the SSCM is especially useful when sketching recommendations for companies, as well as how CSOs and governments can pressure companies into adopting more sustainable practices in their supply chains.

To conclude this theoretical analysis, the four major findings are presented. By using a critical realist perspective to understand the real mechanisms behind the barriers to human rights risks mitigation, the researchers have been able to access the real layer of reality. Firstly, it is seen that the full range of stakeholders impacted by mining and processing activities have not been taken into account by the Chinese government, creating a need for multi-stakeholder

initiatives. Secondly, the Relational global value chain governance typology has some flaws, and does not take into account the integrated nature and power that suppliers in China have over OEMs, which needs to be addressed. Thirdly, as the research uncovered a significant number of externalities in the rare earth supply chain, indicating governance gaps, RSS schemes of governance need to be implemented to limit further externalities. Finally, the lack of external pressure on companies to improve human rights due diligence has limited the proliferation of sustainable supply chain management practices and shown that companies have not truly integrated the triple bottom line perspective of value. As such, this paper exposes the real mechanisms behind the human rights risks and the hindering factors faced by companies, governments and other stakeholders when trying to mitigate them. As such, the researchers have devised three tailored and specific recommendations to combat these specific barriers.

Recommendations

To finalise the answer to the second research questions, this paper outlines recommendations for how human rights risks in the Chinese rare earth supply chain can be addressed, taking into account the identified barriers. The researchers identified three main areas where human rights risk mitigation can be improved, and provided practical solutions for doing so. Firstly, the paper recommends that companies and governments develop the supply chain of rare earth elements outside of China. Secondly, better due diligence practices can be implemented to improve practices in Chinese mining and processing of rare earths. Finally, government action can be taken by implementing mandatory human rights due diligence laws.

1: Develop a supply chain outside of China

The analysis of global value chain governance theory in this case depicts the Chinese supply as a Relational model, with a greater level of integration and power asymmetry in favour of the supplier. This first set of recommendations provide solutions the researchers believe can combat this power asymmetry and minimise the Chinese control over the supply chain, the result being a higher set of global standards as producers begin to compete for buyers. As such, the following recommendations are specific for the rare earth supply chain in China and are unable to be generalised to other industries or supply chains. The main way to achieve this balanced power state is through developing the supply chain for rare earth mining and processing outside of China through mining and processing projects in Australia and the US, and through the development of a circular economy.

1.1 Supply Chain in Australia (Lynas) and the USA (MP Minerals)

As the vast majority of rare earth elements are mined and processed in China, the permanent magnets used in wind turbines have contributed to significant human rights risks. Mining and processing of minerals are large scale, industrial projects and as Julie Klinger stated "*it is difficult to open a rare-earth mine in a particular place without destroying the landscapes and livelihoods that was previously there*" (CNBC, 2018). Therefore, in order for wind energy companies to mitigate these human rights risks, they need to source from alternative suppliers outside of China that aim to mine and process rare earths with a higher regard for human rights. The first notable example is the Mt Weld mine in Australia, with a connected processing facility in Malaysia. The second is the Mountain Pass mine in California, USA.

The Australian operation was set up in order to differentiate the supply chain from the Chinese production, as Anne-Marie Sylvestre from Lynas described in the interview: "*the idea [was] to diversify the supply…* So the idea was to mine this mine, not to go to China and do whatever the Chinese are already doing." She continued to describe that this was a deliberate move as "we want to not only to be outside of China but to be better than them." This motivation has transferred to the operations today, with significantly increased transparency in the way they conduct business and at their facilities. Similar sentiments are seen in the Mountain Pass main in California, with mining sustainability at the forefront of their production (MP Minerals, 2020). Furthermore, as Australia and the US have stricter regulations for environmental and social protection compared to China, these companies are automatically required to produce the minerals with higher human rights protections.

However, Anne-Marie Sylvestre described that human rights risks still occur in the supply chain, noting the management of radioactive waste from their processing plant, water use in their mining operation and social impacts on the indigenous people and local communities. Secondly, as MP Minerals does not yet have processing facilities, all minerals are sent to China to be processed. As such, all the risks from processing outlined in the first research question apply to these minerals. Although traceability is diminished from the US mine, the stricter requirements from the Australian, Malaysian and American governments mean the protection for employees, communities and other stakeholders is significantly stronger than the Chinese producers.

These two alternative sources of rare earth elements are readily available and offer greater mitigation of human rights risks to the Chinese producers. Therefore, OEMs should consider directly sourcing their rare earths from these mines, or ensure that the magnets they purchase are constructed using these minerals. Lynas produces minerals certifications for exactly this

purpose. Both the Australian and US supply chains offer direct competition to the Chinese suppliers which is invaluable. Over time, as demand for the Australia and US operations increases, the power that the Chinese producers have over the market will likely diminish. Furthermore, as this competition increases, OEMs purchasing from Chinese producers can use their strong business relationships to encourage improvements in human rights risk mitigation practices, environmental protection and access to remedy, to work to clean up the industry. Finally, by improving the traceability and transparency in the supply chain, companies from the EU, US, UK or Australia get an added benefit as they are able to preempt the impacts from future regulation of the rare earth supply chain. By sourcing from companies operating outside of China, impact from future mandatory due diligence regulations would be minimal.

1.2 Promoting a Circular Economy

Currently, severe human rights risks and impacts have been uncovered in the wind energy supply chain, and a large number have come from the primary mining and processing of the rare earth elements used in permanent magnets. The mining and the processing in China impacts workers, local communities and the environment in severe and ongoing ways. However, research shows that through recycling, the demand for primary minerals can be offset by up to 70% by 2060, and that "*recycling and recovering rare earth metals could limit the social and environmental costs of destructive mining*" (Klinger, 2018).

This research paper showed that there is currently a very low recycling rate of these minerals, at approx <1%, placing significant demands on primary mining. There are several challenges to the recycling of rare earth elements, with Anne-Marie Sylvestre stating that "*the biggest problem for the recycling is the collection of the goods*". Currently, issues also surround the availability of the minerals, as wide-scale decommissioning of turbines has not been seen yet. This is likely to be seen first in Europe, in 10-15 years, as many offshore farms reach the end of their lifetime. However, in Europe specifically, there are currently very few facilities or service providers that can demagnetize the magnets, break down the minerals and recycle them. Patrick Nadoll and Roland Gauss from EIT Minerals go into depth with the challenges of recycling in their interview. They described that "*if you don't have the industry to make neodymium iron boron [magnets]… you're not able to recycle it*," currently a significant gap in European knowledge and production. They described that to become better at recycling rare earth elements, there needs to be a significant increase in the knowledge surrounding the entire supply chain, with backing from the EU desperately needed to advance the knowledge and address this challenge.

However, as there is a very high potential recycling rate of minerals, at approx 95%, the widespread recycling of minerals can be a practical solution to mitigate the human rights risks identified. An interview with Jonas Jensen from Siemens Gamesa provided some very practical and promising results. As he stated, the company has been undertaking a pilot project to test the recyclability of their rare earth permanent magnets. He described that so far, there has been successful recycling of approx 95% of the rare earth elements, with the entire process taking place in Europe. Jonas also stated the benefits of such a project: "*what's really nice about the recycling part is that you avoid 95% of the environmental impacts, with all the mining and all the separation, which is the dirty part of the value chain.*" Given the success of this first project, it will likely become a practical solution for the industry at large as more and more turbines are decommissioned.

It is clear that, although there is currently a low rate of recycling, the potential exists to increase this rate exponentially, and has been practically demonstrated by Siemens Gamesa. Therefore, to develop a supply chain outside of China, and reduce the dependence on the Chinese mining and processing of primary rare earths and the human rights risks associated, OEMs need to begin testing methods to recycle the permanent magnets from their direct drive turbines now, so that wide-scale recycling is a viable option by the time wide-scale decommissioning begins. Furthermore, as Michael Rohwer states, "*I would like to see the customers [helping] accelerate this transformation [and] take circular economies seriously*," meaning the project developers that purchase from OEMs need to start cooperating and encouraging their suppliers to prioritise pilot projects of this nature. These projects can be further incentivised through grant schemes on a national government or potentially EU level, and through collaborations with research institutions. Therefore, both governments and universities need to begin prioritising such projects in their agendas.

2. Improve due diligence

The first recommendation outlines suggestions for how a supply chain outside of China could be developed. However, companies should not rely on new rare earth supply chains, nor hope that the social and environmental issues will be solved for them. In fact, there are many actions that companies and other actors, including NGOs and civil society, can take to mitigate their human rights risks and to fill in the governance gap on social and environmental standards in China. This following section outlines four recommendations that aim to involve a number of stakeholders, and align company practices with HRDD expectations, in order to live up to the UNGPs and to close governance gaps. Firstly, leverage can be increased through multistakeholder initiatives. Secondly, certification systems can be used as an element of due diligence to benchmark human rights standards in mining. Thirdly, by shifting from audits to cooperative assessment, companies can take a stakeholder approach to HRDD. Finally, stakeholders can encourage companies to embed human rights in their corporate culture and encourage the human rights agenda.

2.1 Increase Leverage Through Multi-stakeholder Initiatives

As highlighted throughout the second research question and the analysis of global governance, international governance and normative institutions have little leverage over the Chinese authorities to improve human rights risks. As Bastiaan Vader stated "[human rights is] one of the things that is perhaps almost the hardest to have some leverage on". Nonetheless, as written in the UNGPs, the OEMs should use the leverage they have to mitigate the adverse human rights they contribute towards, no matter how crucial the supplier is (UN Guiding Principle 19, 21-22). This paper takes the HRDD framework perspective, that OEMs must "demonstrate a willingness and effort to mitigate the impact and accept consequences for it, be it reputational, financial or legal" (ibid.).

Contrasting to the country-perspective, the interviewees have suggested that business to business relationships in the private sector may be different. Though leverage might be too strong a word, the interviewees hinted that Western companies may be able to cooperate with Chinese counterparts to improve standards. As Chaojun Li described, the leverage of the wind energy companies over their suppliers is contingent on how dependent rare earth suppliers are on these relationships. In the rare earth industry, an individual company's leverage is minimal, as Chinese suppliers often do not rely on only one client and demand for the minerals is high. However, as the wind industry consumes a vast proportion of global rare earth supplies, this implies that collective action in the renewable energy industry can greatly increase leverage and be invaluable to mitigating human rights risks (Joel Frijhoff; Chaojun Li; Michel Rohwer, Joseph Wilde; Gilbert Rukschcio; Kayla Green, interviews). Indeed, as noted by Sophie Kwitzera, Roberta Pinamonti and Kenneth Riis Jensen, through industry association, companies can assist one another to identify human rights risks and share sustainable management practices. This way, wind energy companies can "spend more efforts on improving the value chain and less on finding the same issues" (Jonas Jensen, interview). Moreover, "[being part of MSIs] becomes less of a competitive disadvantage for you as a company to spend the money on it" (Joseph Wilde, interview). These industry associations can then be used to address and mitigate the human rights risks that exist in supply chains.

To ensure industry associations are legitimate and beneficial, global governance theory argues that there is a need for the regulatory standard setting (RSS) schemes to be adopted by all stakeholders. On their own, governments, CSOs and the private sector may have limited knowledge or experience, but as Bastiaan Vader highlighted, contributions from a diverse group of actors and stakeholders can bring strengthened supply chain transparency. For example, NGOs have much broader expertise on human rights than wind energy companies, and they push for adherence to normative frameworks. Vader commented on this, agreeing that without NGOs participating in multi-stakeholder initiatives, "*the ambition [of wind energy companies] would be more modest.*" The benefits of industry initiatives are not limited to the rare earth supply chain, and in fact generalisable across almost all industries with globally diverse supply chains. A number of interviewees gave the example of the Fire and Safety Accord industrial agreement signed after the collapse of Rana Plaza in Bangladesh (Clean Clothes, n.d.). Here, the cooperation of over 200 multinational companies proved to be significant in improving the human rights standards across the industry (Kenneth Riis Jensen; Bastiaan Vader, interview).

In the context of this research project, a wind energy industry association backed by many wind energy companies, NGO and CSOs and even governments would increase leverage. especially compared to a single company initiative, collectively pool knowledge of human rights risks, and would help advance mitigation techniques. Therefore, the researchers recommend that wind energy companies join an industry initiative to mitigate their risks, specifically in the rare earth supply chain. One example of a recently founded MSI is the Rare Earth Industry Association (REIA). REIA aims to bring all relevant stakeholders together to increase transparency in the global rare earth industry, strengthen the knowledge of the risks and connect members through an international forum (REIA, 2019). Moreover, REIA is strongly focused on improving sustainability and developing a rare earth circular economy, also relevant to the first recommendations (Nabeel Mancheri, interview). Wind energy companies should join such initiatives to improve their knowledge and traceability, as well as to bring their expertise to the table while gaining better knowledge from other stakeholders. NGOs should also join these initiatives to drive the agenda forward and avoid lackluster initiatives. Finally, research institutions should also consider joining such MSIs to ensure that the most current, and academically robust knowledge is being drawn upon for the solutions.

Nonetheless, there are some limits to the effectiveness of MSIs. As Kenneth Riis Jensen stated, "*they're a more long term*" solution for a company and Joel Frijhoff added that although MSIs can help *"increase leverage (...) they have nothing to do with the impact on the site.*" Indeed, many industry initiatives focus on company practices, instead of addressing the root

cause of the issues. As Benjamin Sprecher noted, companies cannot just "leave it out to the industry association (...) but [they should] actually go to these regions and try to put some effort into making things better." Effective change must happen on the ground to address the needs of rightsholders. However, there's a cost for these companies to initiative such activities, and Sprecher comments that the only reason companies are going to spend money on it is from the marketing or public affairs budget. Therefore, "the most efficient way to manage your public affairs is to go back to the certification scheme. That's why certification schemes are the ones that always pop up."

2.2 Certification Schemes

Throughout interviews, the researchers received mixed responses regarding the effectiveness of certification schemes. Although many interviewees highlighted that certification schemes usually do not bring about needed change, some experts pointed to the fact that if done correctly, they can play a significant role in the traceability of rare earth elements, with three main benefits. Firstly, some experts explained that certifications can play a significant role in their supply chains. Indeed, certification can be extremely useful when using it as a collaborative tool for tracing raw minerals from the mining site to the end product. One example of this traceability method can be seen with the recently-established CERA standard. This standard aims to use blockchain to analyse the raw materials and provide an "*all-encompassing standard for the certification of mineral resources [that] does not yet exist*" (CERA, 2019).

Secondly, similar to MSIs, certifications can "cross-recognise the already existing standards that are presented during the audit process to reduce the amount of work for the customer" (Lukas Förster, interviews). The result of this analysis can provide companies with baseline data to understand their current human rights risks (Lukas Förster, interviews). As such, they can provide a minimum standard that mining companies can benchmark themselves against, and strive to live up to. This, in turn, gives credibility to those mines living up to decent standards, as currently, "there's not actually many mines that are certified" (Elsa Dominish, interview).

However, during the interviews, there were also numerous interviewees that did not believe certification schemes brought value, describing that the schemes usually do not bring about the necessary change. As Joseph Wilde stated "*in general, I'm very critical of certification schemes because we've done a lot of research (...)* And there are always big, big problems with them." Some of the specific issues that the interviewees had was the lack of accountability

in some of the schemes, highlighting that the for-profit business model has driven loyalty to the paying customer and not the rights-holders, workers, local communities or indigenous populations. Benjamin Sprecher also argued that the "*track and trace is, unfortunately, a very naive approach*" that allows companies to purchase a piece of paper and push their responsibility for human rights risk mitigation onto another party.

Due to the benefits and drawbacks, certification schemes should not be relied upon for the entirety of a company's due diligence measures. These schemes result in many loopholes, with severe impacts on the rightsholders. However, in the context of this research project, certification schemes can be drawn upon as an element of human rights due diligence, which can be beneficial. Currently, not many mines are certified, and mineral certification schemes could be useful to collect baseline data for current standards in rare earth mining, and the standards required for certification could be used as a benchmark for human rights standards in the Chinese and international rare earth industry. Therefore, this paper recommends that, if possible, OEMs should source from certified mining sites and producers. This recommendation is not only specific to the rare earth products they source, but to all metals and minerals that OEMs source. If sourcing from certified mines is not possible. OEMs should take a SSCM perspective to put pressure and create expectations for mining operators to seek certifications, or benchmark their standards with certification standards. Particularly, as Western companies feel more pressure and stakeholder encouragement to improve human rights practices in their supply chain, mining companies may see certifications as a business opportunity to attract customers, rather than a hindrance to their business.

2.3 From Audits to Cooperative Assessments

To further improve human rights risk mitigation, wind energy companies should critically assess their current individual approach to due diligence. Of the tactics available for due diligence methods, this paper recommends that companies change their current approach from audits to ongoing assessments. As highlighted in the second research question, current auditing practices rarely make a long-lasting change, as companies often spend only 1-2 days doing site assessments and rarely uncover the real issue occurring in their supply chain. Therefore, cooperation with suppliers is key. Here, Chaojun Li noted that "sometimes it's not because suppliers don't want to do it correctly, but they simply didn't think of it or didn't learn how to do it properly." As currently none of the companies interviewed are undertaking audits or assessment in their rare earth supply chain, this recommendation is therefore very generalisable. The researchers have in fact taken suggestions and input from many different stages of other supply chains to devise a recommendation for improving the future assessments of rare earth suppliers.

This paper therefore recommends that companies take a strong approach to sustainable supply chain management and "move towards assessment and capacity building" as opposed to audits. As Joel Frijhoff stated, assessments differ as they "make a movie rather than a snapshot of how a [supplier] is doing" and can better help companies engage with the rightsholders, local stakeholders and CSOs on an ongoing and collaborative basis. Through engagement, assessments can help companies understand the full scope of the issues. In particular, they can highlight the intertwining nature of human rights risks, and that risks generally cannot be assigned to a single actor for mitigation, but instead must be tackled collaboratively. Thus, assessments represent a more "inclusive process rather than pointing your finger towards the mining companies that this needs to be done" (Joel Frijhoff, interview).

In practice, wind energy companies need to ensure that if and when they are able to conduct assessments in the rare earth supply chain, suppliers must be visited multiple times over a longer period of time. This way, companies can both get a better understanding of the initial standard of human rights risks, including some of the less transparent issues, and support their suppliers in implementing long-term improvement strategies. These ongoing visits also move the assessment from primarily happening on paper, to happening in reality, and involving the people impacted by the human rights risks. Joel Frijhoff explains that in his experience, many auditors spend a lot of their time "deep [diving] into all the documentation" where they could be spent more time in actually building relationships.

2.4 Embed Human Rights Due Diligence

Long term engagement with suppliers requires dedication of resources by wind energy companies. Companies will not partake in them unless they believe in the value of transparency and human rights risk mitigation. Currently, companies are still only partly adopting a human rights due diligence approach, which undermines their effectiveness when trying to mitigate human rights risks. As such, in line with the UNGPs' HRDD framework, this paper recommends that, as a first step, companies must review their position on responsible business conduct in general, and ensure that that human rights approach is integrated into company policies and cascaded into its culture. As Kayla Green suggested, companies must become more aware of the problems they contribute to through their supply chains and to think "a little bit more holistically". Joseph Wilde developed this discussion by arguing that "the importance that's placed on social and environmental standards [must be] anchored in the company.". As a second step, companies must evaluate how they currently identify adverse impacts through their supply chains and business relationship (OECD, 2018). Here, Joseph

Wilde noted that "the due diligence in terms of knowing where your minerals are coming from, is an important first step in identifying what [the human rights risks] are" and in particular, that companies "shouldn't be signing any contracts with suppliers to purchase things if the supplier is not committed to providing transparency about where it gets its materials and to uphold standards."

As a next step, companies must communicate their efforts and be transparent about where their minerals and services are coming from, the risks that they have identified and how they are tracking results and ensuring remediation. By being transparent, particularly in terms of knowledge gaps, companies can crowdsource information, expertise and knowledge that may help them tackle some of the barriers that currently prevent them from fully identifying and mitigate their risks. In this way, external stakeholders can help guide companies in the right direction to improve their practices (Anne-Marie Sylvestre, interview). As such, this paper recommends that wind energy companies effectively communicate their efforts to all stakeholders and are transparent about their operations and the issues they are facing. Here, interviewees highlighted that ESG ratings, including EcoVadis, can be beneficial in communicating performance to stakeholders (Kenneth Riis Jensen; Gilbert Rukschcio, interviews). Moreover, external stakeholders, including customers, NGOs, and CSOs, can further help guide companies in the right direction to improve their practice.

However, working in opaque supply chains in China presents additional challenges to ensuring transparency as accurate data and information is often extremely difficult to obtain. To overcome this, wind energy companies must "*work hard, do more due diligence*." as they are generally unable to rely on open sources of information from the state-owned companies and the government, which will inevitably require them to "*send more people there to look for yourself*" (Joseph Wilde, interview). If suppliers are unwilling to live up to the ethical normative due diligence as expected, it should be seen as a red flag for companies. Such an approach will naturally take more time and money, but as Joseph Wilde put it "*I would definitely classify it as a challenge, but not one that can't be overcome*." Anne-Marie Sylvestre agreed, saying that most socially and environmentally-friendly mining processes come with a higher price tag. Therefore, it is imperative that companies stop focusing on price first, and embedded respect for human rights throughout the organisational culture, so every employee views respect for human rights as their duty and not only as a competitive advantage.

Nonetheless, despite the above recommendation few companies have fully embraced their corporate responsibility in the past decade. Even though external stakeholders such as customers, NGOs and CSOs play a key role in pressuring the private sector to embed

voluntary normative frameworks and undertake human rights based approach to their operations, it is unlikely that meaningful and effective change will happen to improve the rights of rightsholders on the ground. The final set of recommendations aims to tackle this issue.

3. Regulate the Industry

All the recommendations above have been regarding voluntary measures that companies and other stakeholders can undertake to mitigate their human rights risks. However, as interviewees have hinted at, voluntary measures can often be ineffective, and lead to changes on paper, though little meaningful change in reality. In fact, interviewees with significant experience in the human rights field have been stating that regulation is the only way to effectively bring about change in human rights practices in the supply chain. As Joseph Wilde stated, "I've been in this field for 20 years and I would say the only way to do it is through a law. I mean, I've looked at all kinds of voluntary systems and schemes and management... I looked at the way the Chinese try it. I looked at the way that South Africans strike, the Americans, everybody... The only thing that works is to make them pay. Make them do it. Send them to jail if they don't do it." Kayla Green, Bastiaan Vader, Charlotte Aagaard, Kenneth Riis Jensen and Sophie Kwizera all echoed similar sentiments. Therefore, in answering the final part of the second research question, this thesis suggests two ways that regulation and government action can be used to address and mitigate human rights risks in the supply chain. Both of the following recommendations are designed to address the lack of pressure and incentives from external stakeholders, as seen in the application of SSCM theory. By setting hard regulations and incentive schemes, companies are more likely to perform better due diligence and implement SSCM practices throughout their operations and together with their suppliers.

3.1 Strengthened EU Regulation on Mandatory Due Diligence

The soft regulatory instruments in the form of the UNGPs and OECD Guidelines have generally been ineffective at mitigating wide-spread human rights risks. Therefore, in recent years, national governments have been targeting the private sector to ensure they take responsibility for the impacts that their supply chains have. Inspired by the normative guidelines, these regulations have generally targeted increasing transparency in the supply chain through mandatory due diligence practices, and changed the trend of human rights risk mitigation from voluntary to required practices. However, the laws that have been implemented have generally been on a national scale and somewhat fragmented. The most notable national human rights regulation consist of the Dutch Child Labour Law, the French Loi De Vigilance, the UK and Australian Modern Slavery Acts, and the US Dodd Franks Act (ECCJ, 2018). Each of these laws aims at increasing transparency in the supply chain and requiring companies to report. However, civil society and human rights NGOs have criticised them for the many loopholes and the limited approach they take. Anna Cavazzini drew upon the benefits and disadvantages of national regulations and how they can be used to encourage EU-wide regulation. She stated that "I would personally say none of the three solutions, UK, France, Netherlands, is really perfect." However, "I think it's good that we have the precedent of [these countries]" and that "it's really, really interesting to look at all of those and then learn from that and have even more effective legislation on European level." Taking this perspective, the benefits of the national regulations should be drawn upon at the EU level. As Bastiaan Vader stated, "I know that [the EU] are really closely looking at the Dutch covenant initiative. And if this would be a possible way of cooperation. [it] could be upscaled to a European level." The researchers have specifically focused on the EU, as it is a region with a higher proportion of wind energy companies, and it currently has the highest appetite for such regulations. Furthermore, this recommendation is not specific to the rare earth supply chain, and in fact, should be generalised and extended to all green-transition minerals and metals.

In 2021, the EU wide Conflict Mineral Regulation will enter into force, which requires companies to undertake due diligence in line with the OECD Guidelines. However, the regulation already has significant criticism and flaws, and can benefit from the strengths of the national regulations to create a more effective method of mitigating human rights in the supply chain of green-transition minerals. Specifically, this regulation should cover due diligence of the supply chain for more minerals, and not be limited to the previously-determined 'conflict minerals' i.e. 3TGs. This research paper demonstrated the severity of human rights risks in the rare earth supply chain, and as such, these elements need to be regulated in the same way as conflict minerals to require companies to undertake thorough due diligence. In this way, the EU Regulation could draw on the more encompassing nature of the French Loi De Vigilance, that requires companies to perform human rights due diligence across all their operations.

To bring this recommendation into fruition, the EU regulations should also take inspiration from the Dutch Covenant, specifically its multi-stakeholder approach. The EU should be working together with national regulators, especially from countries with existing human rights regulations, to adapt the 2021 Conflict Mineral Regulation to become more encompassing. Furthermore, this goal requires support from other actors, specifically civil society. Research institutions, including universities, and normative human rights organisations and NGOs must be involved here to raise awareness. They must also be involved in knowledge sharing, to ensure all stakeholders understand the severity of the impacts, where the impacts occur, which companies are involved, and which minerals they are connected to. It is also important for customers to be aware of these impacts. These customers include the government departments setting tenders for new wind farms, and also the general public.

3.2 Due Diligence Requirements in Wind Farm Tenders

In connection with the previous recommendation, regulations and incentive schemes need to be implemented to shift human rights risk mitigation from voluntary to mandatory or incentivised action. As a stepping stone to mandatory due diligence, governments can incentivise wind energy companies to perform high quality due diligence in their mineral supply chain. Here, the recommendation is able to draw upon the 'business case' for human rights and the implementation of a triple bottom line perspective of value. Though some human rights experts are not in favour promoting the business case, with Kayla Green stating that "in general, we actually try to avoid using terms like business case for human rights because we take the very hardline, UNGPs standpoint that a company's role is that it absolutely must live up to these standards, and absolutely must recognise that human rights impacts of its own businesses and outside of it." Joseph Wilde further commented that "I've never been that much of a fan of you know, making the business case." This paper agrees that human rights due diligence should be performed and that companies should be living up to the UNGPs at all times, without looking for the financial gain. However, the paper recognises the reality that businesses operate in and the challenges that sustainability or responsible sourcing teams face internally in promoting the human rights agenda. Consequently, making the business case for human rights can be used in further incentivising top management in undertaking more extensive due diligence, and can assist in implementing a triple bottom line perspective of value.

This paper recommends that national governments include categories in wind farm tenders relating to mandatory due diligence in the mineral and metal supply chain. If the tenders award points for a higher level of human rights due diligence, top management in wind energy companies may be more likely to be incentivised. If this criteria is successfully integrated into tenders, and the OEMs provide higher levels of due diligence for the turbines they sell, this can reinforce the human rights risk mitigation. Both Bastiaan Vader and Jonas Jensen describe the potential for a system like this. Similar criteria for the improved protection of

biodiversity in the wind farms' zone became a standard part of European wind farm tenders. As a result, there has been an industry-wide trend to improve the protection of biodiversity. Therefore, the outcome of this recommendation can further support the adoption of effective human rights due diligence and mitigate human rights risks in the rare earth supply.

Chapter 8: Implications

The implications of this research signify the contribution of the thesis and highlight how the findings can be applied to future policy decisions, research and corporate practice in the rare earth sector, as well other industries. Although this research is centered around the human rights risks in the rare earths supply chain in China, some findings can be generalised and repurposed in other sectors. For instance, in answering the first research question, the human rights risks linked to rare earth mining and processing are analogous to the risks posed by traditional open-pit mining throughout China. These risks include significant exposure to toxic chemicals and radioactive waste from rare earth mining and processing, health and safety of workers, lack of collective bargaining, forced labour, abuse of human rights defenders and risks posed for local communities. Along with these risks, effective access to remedy in connection with the mining of any commodity in China is almost non-existent. However, the thesis avoids over-generalisation by scoping the analysis within the critical realist approach. As such, it is not possible to generalise the underlying mechanisms that encroach on human rights mitigation in the rare earth industry in China, as the political, social and economic setting is highly unique. For example, due to the consolidation of the rare earth industry, price manipulation, high demand, knowledge control and controlled economic practices by the government, wind energy companies from a European or American background are positioned with little leverage. As such, the Chinese industry does not necessarily reflect the social and environmental standards in the limited rare earth industry outside of China. The recommendations, therefore, reflect both the generalisable and non-generalisable nature where appropriate.

There are a number of valuable and widely applicable implications of this research. Firstly, in the scope of the Chinese rare earth industry, little academic research has been conducted and this paper further reveals the extraordinary lack of transparency that exists when conducting procurement operations in China. The result is decreased accessibility, especially for foreign companies. Secondly, this paper has emphasised the need for increased recycling

rates in the global metal market, thus limiting the global reliance on the mining and production of new metals and minerals. The study of Siemens Gamesa demonstrates that this is already technically viable in 2020. Thirdly, this paper comes with a number of recommendations on how wind-energy companies can mitigate their human rights risks by embedding a stakeholder approach to their due diligence. This approach is gaining popularity and as such, these recommendations have been developed to be transferable across the mining industry, and potentially into other commodities. Here, the practical recommendations presented extend into corporate culture, to encourage top-management to develop a vested interest in human rights protection, regardless of the social, political and economic circumstances that exist in supplier' countries. Indeed, this paper suggests that due diligence can be, and should be, adopted by companies across all industries, where human rights is embedded into contracts, tenders and business partnerships. In a similar light, the paper argues that there is a need for mandatory human rights due diligence and other binding regulations that would push private companies to fully trace their materials and services, relevant for the whole business and human rights field.

Finally, perhaps the most important finding of this paper is that it's extremely difficult for companies to avoid human rights violations when operating in highly opague supply chains. Here, a complex question presents itself. In order to fulfill their corporate duty to respect human rights, how can companies ensure full transparency and traceability of their supply chains when working in a country that tightly controls any data, jails journalists and prevents any negative information from surfacing? To improve data collection in this way would put people at risk of legal violations or imprisonment. Therefore, the implications of these recommendations extend beyond just China and into some African countries, Russia and Latin America, where single-party regimes control a large part of trade, industry and the media. When operating in these intransparent supply chains, it becomes increasingly hard to uphold human rights. After all, transparency is the best accountability tool. As Chinese dominance in the rare earth industry illustrates, companies who are unable to secure alternative sourcing channels lose their leverage and are unable to influence human rights standards. As such, this paper worked to understand the circumstances where the private sector had little leverage, but must still take responsibility for human rights violations along its supply chain. Through practical recommendations, this thesis shows how industry associations and cooperative company actions, together with appropriate assessments of suppliers, can serve as a tool for mitigating human rights risks.

Chapter 9: Conclusion

The primary objective of this thesis was to understand how wind energy companies can live up to their duty to identify, prevent, mitigate and account for the human rights risks present in their supply chain. Specifically, the thesis looked at the rare earth supply chain to identify the salient human rights risks, including where they were present and recognise those that were most severely impacted. It was essential to uncover the mechanisms perpetuating these risks in order to provide tailored recommendations for mitigation.

To answer the two research questions, the thesis applied a rigorous academic approach. The overall framing of the paper was conducted using a critical realist philosophy of science and employed extensive document analysis. The authors established a broad but relevant perspective by conducting 30 in-depth interviews with experts, in order to get as close to the truth as possible. Four different theoretical approaches have been taken to further analyse the issue.

Using interviews and document analysis, the thesis answered the first research question: 'What are the salient human rights risks associated with the rare earth supply chain in China?' A significant range of salient human rights risks were uncovered in the mining and processing of rare earth elements and in the waste management. The most severe and common risks identified were associated with environmental rights, labour rights and local communities rights.

Firstly, the environmental risks identified in the mining, processing and waste management of the rare earth supply chain were some of the most researched and explicit. The toxic pollution and acidification of soil, groundwater reserves, and geological areas impacted biodiversity habitats, livestock and crops throughout mining regions. Secondly, the most salient labour rights issues included unsafe and hazardous working conditions. These had a potential impact on labour rights, with a severe lack of safety equipment and training, which led to accidents and the risks of disabilities, illnesses and fatalities. There was also a high risk of forced labour and the exploitation of migrant workers. These risks were widespread throughout rare earth mining and processing in China, and the lack of an effective labour union limited the right to collective bargaining and freedom of association. Finally, the most significant risks to local communities rights has been the negative impact on health and land use changes. Due to the risk of dust and toxic waterway pollution, rare earth mining, processing and waste management have been linked to chronic and fatal illnesses, and negative impacts on the land
used by local communities surrounding rare earth operations. This has resulted in the loss of livelihood from contaminated farming, especially as rare earth mining and processing has generally occurred in rural locations with limited access to remedy.

Over the recent years, as these risks have gained media attention in both China and internationally, the Chinese authorities have announced their intention to improve environmental and social impacts from the industry. However, this thesis was not able to conclude whether these measures have been effective so far, due to the inherent lack of transparency in China. Nonetheless, several barriers that undermine the mitigation of human rights risk in the Chinese rare earth supply chain were identified.

The findings from the first research question, evidence from interviews, as well as the theoretical perspectives, helped to understand the full scope of human rights risks, posing the second research question; *Using empirical evidence and theoretical perspectives, what is hindering the mitigation of identified human rights risks, and how can they be addressed?* The thesis answered this research question by applying critical realism and the three levels of reality. The paper argues that the empirical layer of reality represents the negative impacts on human rights, the actual layer represents the risks that are posed by the Chinese rare earth supply chain and the real layer represents the mechanisms that hinder the human rights risks mitigation. Here, the factors on the real level must be assessed in order to provide tailored recommendations for wind energy companies. Specifically, these underlying factors were two-folded; the country-level issues and the company level-issues.

Firstly, in the country-level context, it was found that Chinese culture presented a barrier in addressing human rights risks. In fact, the evidence showed that the Chinese government prioritised economic development over human rights protection. Furthermore, the nature of the rare earth industry itself proved to be an unique factor in mitigating human rights risk. Due to the near monopoly China held over the global supply chain, and government controlled prices, production outside of China has been disinceventised. This Chinese control over the industry means that the authorities have maintained their grip on rare earth supply, competition has been unable to survive due to low prices, and the protection of human rights was hindered.

The Chinese control over the rare earth industry has global implications. Other countries and producers do not want to compete with the low social and environmental standards seen in China, and thus alternative supply chains are not available. Furthermore, along with this control of the rare earth supply chain, Chinese authorities have made an active effort to control the dissemination of knowledge vital to the industry. This lack of competition and the inability

to establish an alternative supply is an important barrier to human rights risk mitigation. The Chinese producers feel little pressure to improve their practices, as they do not need to compete with international standards. This issue is further cascaded as wind energy companies and governmental institutions have been unable to exercise leverage over China, nor push for better conditions, as all actors rely heavily on this supply.

Secondly, regarding company-level issues, the paper uncovered four significant obstacles to human rights mitigation. It is clear that wind energy companies' due diligence practices are not adequate to match the risks evident in their supply chain. Here, the researchers have identified that the 'inherently good fallacy' surrounding renewable energy persists. The impacts stemming from this fallacy are heightened due to the lack of regulations that would require companies to trace the sources of minerals used in downstream products. This is demonstrated by the lack of pressure that companies feel to improve the traceability of their supply chains and address human rights risk. Consequently, poor due diligence practices and lack of legal requirements hinders the mitigation of human rights risks.

Another factor that hinders the mitigation of human rights risks from the company perspective is a differing perspective of value. Instead of taking a triple bottom line perspective of value, companies seem to be more concerned with traditional metrics, such as price, delivery time and quality of products. This generally has not left room for a significant consideration of the human rights risks associated with suppliers. The drive to cut costs has also been reflected in how companies approach risk mitigation by using audits and certifications. The paper found that these methods are flawed and therefore ineffective at mitigating human rights risks.

Here, the thesis used the perspective of stakeholder theory coupled with the human rights due diligence framework, as well as global value chain governance, global governance and sustainable supply chain management to uncover the mechanisms that enable negative human rights impacts. Stakeholder theory and human rights due diligence framework assisted the researchers in understanding the perceived importance of stakeholders within the rare earth supply chain. Global value chain governance was used to identify the asymmetric power relationships between the wind energy companies and rare earth suppliers. Next, global governance guided the analysis of the motivation behind the governance of the rare earth supply chain, and helped in understanding the role that hybrid regulatory standard-setting schemes and MSIs can take to address the externalities evident. Finally, the sustainable supply chain management theory enabled in-depth analyses of the triple bottom line approach to value creation and the lack of external pressure wind energy companies face. By analysing the empirical evidence with the theories, a number of barriers and obstacles were clearly seen,

hindering the effective human rights risk mitigation. As such, this paper needed to answer the second part of the second research question, specifically how these human rights risks can be addressed. As such, the researchers have concluded the chapter with three major recommendations to directly address the hindrances and more effectively mitigate human rights risks.

1: Develop a supply chain outside of China

In order to develop competition against the Chinese supply monopoly, and to increase leverage of the private sector and improve human rights standards, the supply chain outside of China needs to be developed. This paper recommends that investors, governments and companies support the development of new rare earth mines outside of China, such as those established in Australia and the US, to develop viable competition. Secondly, as wide-scale decommissioning of wind turbines will become apparent over the next decade in Europe, a circular economy must be established by companies. The recycling and reuse rates of rare earth elements must be increased and demand for primary material, that cause the majority of the human rights risks, can be reduced. Here, MSI and industry associations play a role in supporting these initiatives.

2: Improve due diligence

Companies must address the significant gaps in their due diligence practices. Through multistakeholder initiatives, companies can increase their leverage over Chinese suppliers and the companies can implement more sustainable supply chain management practices. Secondly, certifications schemes should be used in conjunction with other elements of due diligence practices, and should not be relied on to fully mitigate risks. Thirdly, by shifting from audits to ongoing and cooperative assessments, companies can support and cooperate with suppliers to increase transparency and mitigate human rights risks. Finally, stakeholder engagement and pressure on companies by the customers and CSOs can help embed human rights and a triple bottom line perspective of value in companies operations, to drive better due diligence practices.

3: Regulate the industry

Despite other recommendations and practical solutions to reduce negative externalities in the rare earth supply chain, many stakeholders believe that regulation is the only true way to mitigate human rights risks. As such, it is concluded that governments, particularly the EU, need to adopt binding regulation that would require companies to undertake mandatory human rights due diligence. As a stepping stone to this, the government can also incentivise human

rights priorities by including categories in wind farm tenders that award points to companies that can demonstrate the tracing of minerals and human rights assessments.

Further Research and Reflections

Despite the robust methodological and theoretical approach, some weaknesses are present. Firstly, by taking the critical realists stance, it was necessary to employ several theories to understand the phenomenon and get to the truth as closely as possible. However, such an approach undermined the ability to apply one or two theories in great depth, resulting in only the main points of each theory being applied. Although this may result in broader and more critical discussion, it is unlikely that the findings would differ significantly. Secondly, the thesis focused on the negative externalities of the rare earth supply chain in China, bypassing the many positive contributions the development of this industry brought to the local economy and citizens. In the same light, wind energy companies were criticised for their poor due diligence, although it must be noted that several improvements have been made in recent years and all interviewees representing the private sector took human rights issues extremely seriously.

Finally, although the recommendations were mainly based on the empirical evidence from the interviews and further strengthened by theory, there are significant challenges to undertaking them, as in many cases, best practice does not necessarily constitute the most feasible practice. Here, similar studies could be performed hand-in-hand with companies to understand external and internal barriers and how they can be overcome to fully integrate human rights into companies' values and operations. Moreover, such studies could best address the ever-present challenge of tracing minerals and metals in today's global and complex supply chains. For example, the study on the role of new technologies for traceability schemes would be an interesting topic to look into. Further research should also explore the current shift seen from short term to longer term business strategies and longer term perspectives of value. These studies could examine the potential benefit of this changing mindset on human rights as companies begin to invest more in circular economy technologies and practices. Here, studies like this could also examine how companies can integrate human rights risks perspective into life cycle assessments. Lastly, an interesting topic of analysis could be the impact of the COVID-19 pandemic on the disruption of the rare earths supply chains.

To conclude, perhaps the greatest contribution of this thesis is the analysis of the root causes of human rights risks in the Chinese rare earth supply chain. Rather than merely presenting traditional due diligence that can tick boxes and satisfy shareholder wishes, this paper proposes tailored recommendations to mitigate the true causes of these issues. The solutions proposed focus on the rightsholders and aim to equip companies with practical ways to realise effective change. Due to the global nature of supply chains, achieving traceability is fundamentally challenging, though not impossible. In the same way, human rights risk mitigation is a complex issue that requires a range of actors, tactics and perceptions to tackle it. The challenges are further heightened when supply chains are based in highly opaque systems and authoritarian contexts, as those in China. However, with due care, the rights of all stakeholder can be protected and upheld.

Reflecting on the findings, it is clear that rare earth supply chains present an extremely unique and interesting topic of analysis, as few commodities exist in a similar context. When first scoping the project, the researchers initially believed that any human rights risks identified would most likely be mitigated through traditional due diligence measures. However, as the findings began to materialise, it became clear that the unique nature of the rare earth supply chain in China meant traditional risk-mitigation strategies would not be effective. Instead, the researchers needed to bring a new perspective to the challenge, to ensure the protection and promotion of human rights. After all, the need to switch to renewable energy in a truly sustainable manner has never been more critical.

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