

# THE EXTRACTIVES SECTOR & THE TRANSITION TO A LOW CARBON ECONOMY IN AFRICA

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# Acronyms and Abbreviations

AfCFTA	Africa Continental Free Trade Area
AfDB	African Development Bank
AI	Artificial Intelligence
ASM	Artisanal and Small-Scale Mining
DRC	Democratic Republic of Congo
EITI	Extractive Industries Transparency Initiative
EU	European Union
FINTECH	Financial Technology
GBV	Gender-based violence
GDP	Gross Domestic Product
GHG	Greenhouse gas emissions
ICTs	Information and Communications Technologies
IEA	International Energy Agency
IMF	International Monetary Fund
IOL	International Labour Organisation
IoT	Internet of Things
LEDs	Light-emitting diodes
LNG	Liquefied Natural Gas
MW	Megawatt
NDCs	Nationally Determined Contributions
PPE	Personal Protective Equipment
PV	Photovoltaic System
RECs	Regional Economic Communities
REIPPPP	Renewable Energy Independent Power Projects Procurement Programme
SDGs	Sustainable Development Goals
UN	United Nations
UNDP	United Nations Environment Programme
UNEP	United Nations Environmental Programme
US	United States of America
WEF	World Economic Forum

# Executive Summary



Africa is vulnerable to the impacts of climate change despite only contributing around 3% to global greenhouse gas emissions (International Energy Agency (IEA), 2022). Many African countries are experiencing extreme weather events ranging from droughts, tropical storms to extreme floods that are damaging ecosystems and biodiversity, infrastructure and economies. Climate change is having a significant negative impact on the African continent, resulting in reduced food productivity and lower economic growth, thus leading to mass migration and instability in the continent (IEA, 2022).

African countries have committed to meet international agreements such as the United Nations (UN) Sustainable Development Goals (SDGs) and the Paris Agreement of 2015, which advocate for limiting global warming to below 2°C. Despite this commitment, many African countries face a major challenge due to high dependence on the extractives

sector, a major contributor to global greenhouse gas emissions. However, the extractives sector remains a key economic driver of many African economies. For instance, in 2019 minerals and fossil fuels accounted for over a third of exports from at least 60% of African countries (Signé and Johnson, 2021). In countries such as Nigeria and Angola, oil and gas account for about 75% and 65% of government revenues, respectively (Siyobi, 2021).

Despite its importance in Africa's economic development, the extractives sector in Africa has been mired by several challenges. But the sector still has immense potential to drive growth, support sustainable development, create jobs and reduce poverty on the continent (United Nations, 2021). The demand for critical minerals, such as lithium, cobalt and copper which will play a key role in driving the just energy transition and the uptake of low carbon technologies is expected to rise (Siyobi, 2021). Despite the importance of the extractive sector in Africa's development, it is still mired by inefficiencies. These inefficiencies include the well-established comparative advantage of the Global North in mineral production, and more recently China, and technological deficiencies (Taylor, 2019). They also include weak local markets for mineral products, which reflect Africa's overall low level of industrialization amongst others (Mukarakate, 2021). This has been visible in countries such as the Democratic Republic of Congo (DRC), which has abundant vital minerals such as cobalt and copper, but has failed to lift the country's population out of poverty, with wealth from extractives sector benefiting few individuals. These minerals are critical to the electrification of energy and transport and are utilized in low-carbon technologies varying from electrical vehicle batteries to solar panels and wind turbines (United Nations Environment Programme (UNEP), 2022).

## Purpose of the report

The purpose of this report unpacks the impact of the transition to a low carbon economy, on the extractives sector in Africa, bearing in mind its significance to the continent's development agenda. The report highlights key trends in the extractive sector at the continental level, with specific case studies from five Southern Africa countries, namely the Democratic Republic of Congo (DRC), Mozambique, South Africa, Zambia and Zimbabwe. These countries are key in understanding the role of the extractives sector in the transition, for multiple reasons. Most of them possess critical minerals, such as Lithium, Graphite and Copper which will be required for development low carbon transition technologies. However, these countries have not benefitted from these resources, and are also exposed to the severe impact of climate change. Lack of effective natural resources governance, inadequate capacity and unsustainable mining practices, have all contributed to a challenging environment for the extractives sector. These countries therefore form a microcosm of the contemporary challenges faced by Africa's extractives sector, which justified their selection.

A qualitative research approach was used to gather insights into the extractives sector in relation to climate change and a just transition at the global, continental and national level. The approaches used included an extensive literature review of key policy documents and strategies on the extractives sector in relation to a just transition. Key documents such as the Nationally Determined Contributions (NDCs), Paris Agreement, Net-Zero targets, and Sustainable Development Goals (SDGs) were reviewed to provide a succinct understanding of the relationship between the extractives sector and the just transition in Africa and in the selected country case studies.

## What does the transition to a low carbon economy mean for Africa?

Unemployment is a significant challenge, currently facing African countries. Unemployment was made worse by the COVID-19 pandemic which hit the region the hardest, reversing some of the progress in poverty reduction which was achieved in recent decades. To make matters worse the African Development Bank (AfDB, 2021) estimates that more than 30.4 million Africans fell into extreme poverty in 2020 during the peak of the pandemic, while another 38.7 million may have also fallen into the poverty trap in 2021 (International Labour Organisation (ILO), 2022). High unemployment and extreme poverty in Africa are made worse by the fact that the majority of jobs in Africa are in the informal sector and dominated by the vulnerable population such as the youth and women. According to IOL informal jobs account for 70 percent of employment in the agriculture and extractive industries sectors, which contribute the most to African countries' gross domestic product (GDP), with 9 out of 10 these informal workers being women and young people (UNDP, 2022).

### **I. A just transition is important for Africa especially considering civil society and youth activists which are increasingly calling for justice and bold climate action due to the vulnerabilities that the population currently faces.**

Adopting a just transition pathway will likely be beneficial to the African continent in terms of the creation of green decent jobs, creating social protection measures for those that will likely be impacted by the transition, especially those that are working in the informal sector and fossil fuel intensive industries amid the

continued and planned disinvestment in the industry. Although a just transition is crucial for building a climate-resilient and integrated sustainable energy sector for Africa, it will require substantial investments to be achieved. According to the AfDB (2023) between \$2.6 trillion and \$2.8 trillion is needed by 2030 to implement Africa's climate commitments as expressed in countries' recently submitted NDCs. Key stakeholders such as policy makers, industry stakeholders, civil society and international community will play a critical role in order for Africa to fully navigate the future of extractives sector, especially with regards to the extraction of critical minerals in Africa (Cloete et al, 2023) and in selected country case studies. Achieving a net zero in the extractives sector in Africa

Significant investments in the decarbonization of energy systems are needed to avoid exceeding the Paris Agreement's proposed global temperature rise, and to achieve the UN SDGs. Many low-carbon sustainable development technologies in the energy sector, such as wind, solar, batteries, Light-emitting diodes (LEDs), nuclear power, etc., deliver energy services through methods that are more metal intensive than the fossil fuel approaches (Hodgkinson and Smith, 2021). Although they are metal intensive, the low-carbon technologies only account to about 6% of emissions generated by fossil fuel technologies (Hund et al, 2020). More importantly, these key technologies have become sufficiently cost effective over the past years, and the trend is expected to continue, making them more attractive. The extraction and deployment of metals used in low-carbon technologies is expected to rise in the future, and in Africa, this will occur in tandem with climate change challenges and mining of other minerals like gold. Thus, the extractives

industries, especially in Africa need to increase their resilience and reduce GHG emissions, in line with the Paris commitments.

### Improving the mining processes and energy efficiency

Reducing energy consumption in mining processes reduces Greenhouse Gas (GHG) emissions. Different mining processes can be assessed using the Cost Benefit Analysis method, to show their financial business case and the longer term sustainability benefits. Technologies currently being used and developed to improve mining processes in the extractive sector include: (i) use of the Internet of Things (IoT) to enhance operational efficiency and reduce environmental impacts of the business; (ii) use of drones to survey sites and operations, reducing use of overhead transportation and (iii) the upgrading of energy efficient technologies such as LEDs.

### Decarbonizing electricity

In many parts of the world, renewable sources of electricity (solar, wind, hydro) have been proven to be having lower lifetime costs than the conventional ones or grid electricity. In addition, there has also been growth in investment and deployment of energy storage technologies (batteries) due to their cost effectiveness. These cost reductions will move the economics of electricity generation in favour of renewables and storage. Since there is a business case for the replacement of high carbon power technologies, e.g. diesel with renewables, mining companies can consider moving to the former to perform their onsite operations.

### Decarbonizing transportation

In the extractives sector, the use of heavy hauling trucks constitutes the larger part



of the mining companies' energy costs and GHG emissions. As in the generation of renewable energy, the growth in the market of electric vehicles (internationally) has been accompanied by rapid cost reductions in the same. Between 2010 and 2018 the price of lithium batteries fell by approximately 85% and prices are forecast to continue to fall by 8-10% per year until 2030 (World Gold Council, 2019). Thus, over the next few years, electric cars are going to become more cost effective or cheaper than the diesel powered ones. As a result of such developments, mining companies will be able to use electric vehicles and low-carbon transport technologies such as fuel cell powered vehicles.

### Use of mini-grids

In Southern Africa, the mining sector is one of the most important energy consumers. Its energy demand is set to increase in the coming years due to its increased importance in supplying the raw materials necessary for the global transition to clean energy sources. Historically, many mines in Southern Africa have been connected to the national grids, and have in the past been victims to power outages. As a result, they have resorted to on-site diesel or heavy fuel oil powered "mini-grids" for self-consumption and back up to load-shedding. Presently, some mines are committing to considering more innovative and sustainable sources of energy to power their operations. For example, Bushveld Minerals, a mine in South Africa, is developing a mini grid project which consists of solar PV and battery generation (Marleny, 2020). This project, set to deliver up to 1MW of power reflects the potential economic viability of both renewable energy and energy storage technologies in the region.

### Focus on new economies

As a result of climate change and the current global geopolitics that are affecting food and energy prices, accompanied by the need to recover from the COVID-19 pandemic, African countries need to diversify their economies. According to UN (2022) diversification of African economies is the only viable solution that will help them prosper in the global economy and survive the vulnerabilities and economic uncertainties exacerbated by commodity price volatility. The new economy refers to a shift from the dependence on commodity and manufacturing based-economy to the economy that is technology driven in order to create new products and services that are in market demand. However, currently majority of African countries have struggled to diversify their economies.

Due to the growth in digital technologies such as Financial Technology (FinTech), and Information and Communications Technologies (ICTs) African countries can also upgrade their existing products technologically, improving quality and productivity. For example, in the agricultural sector in Zambia Malambo et al (2023) argue that due to majority of smallholder farmers having access to mobile phone and already accepting mobile payments, therefore the uptake of the ICTs in the sector can be able to drive growth and inclusion. Malambo et al (2023;18) further argues that "technology such as AI, machine learning (ML) analytics, and connected sensors could foster increase in yields, improve the efficiency of water and other inputs, and build sustainability and resilience across crop cultivation and animal husbandry". In 2022, investments in African FinTech companies increased from \$0.5 billion to \$ 2 billion (UN, 2022). However, only South Africa, out of the five nations examined in this

paper, has been able to diversify its economy by capitalizing on the growth and opportunities provided by digital technologies.

## **II. Investments required for supporting the clean energy transition in Africa**

As the world embarks on a journey of achieving the net-zero targets by 2050-2060, significant financial investments will be needed. In total between \$2.6 trillion and \$2.8 trillion is needed by 2030 to implement Africa's climate ambitions as expressed in NDCs submitted by African countries by April 2023 (AfDB, 2023). Despite the need for more investments in Africa, Africa's energy investment between the period of 2026-2030 will still only be around 5% of the global total in the IEA's Net Zero Emissions by 2050 Scenario (IEA, 2022). Between 2019-2020 only \$29.5 billion of climate finance was mobilized by African countries, with private finance accounting for \$4.2 billion, while public finance accounted for \$25.3 billion, making these investments the lowest proportion among the world's regions (AfDB, 2023). There are various obstacles hindering African countries from mobilizing the necessary funding to support the low carbon development trajectory. These include the absence of clear and robust green growth policies and long-term strategies in many African countries which in turn increase their investment risk profile and deter private sector from investing in green growth sectors (AfDB, 2023).

## **III. The risk of stranded assets**

Stranded assets are natural resources, or minerals that have suffered or will suffer from unexpected premature write-downs, devaluation or conversion to liabilities even

before their exploration, causing a potential market failure (AfDB, 2019). As the world seeks to achieve the Paris Agreement goals and clean energy transition some mineral resources are at risk of being stranded, these include minerals such as oil, gas and coal that have huge negative impact on the environment and contribute largely to climate change and inequality. In 2017, the IEA cautioned that oil and gas assets worth around \$1.3 trillion could be left stranded by 2050, depending on whether the fossil fuels sector adapts to greener policies (AfDB, 2019). Considering the fact that the majority of African economies are dependent on natural resources such as coal, gas and oil, the risk of stranded assets present a major policy challenge.

Between 1996 and 2012 at least 63 low and middle income countries experienced an increase in their dependence on extractive resources, and most of these countries were in Africa (Roe and Dodd, 2017). In addition, all the countries that are studied in this research are highly dependent on the extractives sector for their economy and employment. For instance, in South Africa, about 80% of the energy needed to drive the country's economy and sustain the population is derived from coal, while in Zimbabwe the extractives sector accounts for around 12% of the country's economy. The threat of stranded assets in the extractives sector is significant in Africa (Siyobi, 2021). When mining operations are discontinued or a mine is exhausted that can cause severe distress to local communities, possibly even economic and social collapse throughout an entire region (World Bank, 2008). This therefore will require African countries to adapt to greener policies in the extractives sector, such as decarbonizing transportation, improving mining processes and energy efficiency in the sector.

#### IV. Country Specific Case Studies on the role of the extractives sector and the transition to a low carbon development

##### Democratic Republic of Congo (DRC)

**Socio-economic context:** DRC is one of the poorest countries in the world, despite being endowed with rich mineral resources which are critical for a just transition. In 2022, around 60 million of its population lived on less than \$2.15 per day. However, the country's GDP is high. In 2023, it is expected to grow by 8% (African Development Bank, 2023). The country's economic growth is driven by the extractives sector which contributes around 98% to the country's exports and 30% to the country's GDP (AfDB, 2023).

**Risk of stranded assets:** DRC is the world's largest producer of cobalt and one of the largest producers of copper (EITI, 2022). It supplies more than 60% of global cobalt which is critical to fuelling the global cleaner revolution and achieve the global promise of a decarbonized future. DRC's investments are mainly on cobalt and copper, thus there are minimum risks of stranded assets. However, this is likely to change if the country continues with its exploration of oil and gas. Currently there are three major oil companies conducting extractives operation in the DRC.

**Governance Challenges:** A particular area of concern in the DRC is government transparency, which is significantly lacking. This led to corruption, and as a result the wealth gained from natural resource extraction has not benefited citizens of the country (Democratic Republic of the Congo 1993-2003: UN Mapping Report, n.d.). This corruption pervades across sectors but is particularly prevalent in mining.

Mining has even played a significant role in financing armed groups (Pattison, 2022).

**Impact of extractives sector and policy response:** The massive exploitation of resources in the DRC has profound negative consequences, such as the destruction of critical ecosystems, pollution and human rights violations. Some policies and initiatives have been developed to address these challenges. For example, Mutoshi mine, a pilot project developed with the aim of improving the working conditions of ASM, eliminate child labour in the extractives sector, integrate women in ASM amongst other things.

##### Zambia

**Socio-economic context:** The country is considered as one of the world's youngest countries by median age (World Bank, 2023). Despite being a resource-rich it is among countries with the highest poverty rate in the world. More than 300, 000 of the country's 20 million population make their living directly or indirectly from fishing (AfDB, 2023). As of 2021, unemployment in Zambia stood at 13.8% (Zambia Statistics Agency, 2023). Services sector, industry sector and agriculture remain the key contributors to the country's economy, and they also contribute the largest revenue to the country's GDP.

**Risk of stranded assets:** Zambia's diverse mineral resources such as copper and cobalt are critical for the just transition, and create a unique opportunity for Zambia to stimulate economic growth and generate job opportunities, while also addressing inequality challenges and poverty. Currently, there is no risk of stranded assets in Zambia since its focus is mainly on copper mining.

**Governance challenges:** Most of the governance challenges in Zambia are attributed to corruption and bribery in the extractives sector, mostly for mining licences. However, since Zambia started to implement the EITI in 2009, there has been a reduction in corruption, and the Zambia EITI has played a significant role in strengthening government systems along the value chain of the extractives sector value chain, while at the same time making information easily available for all the stakeholders (Kangamungazi, 2020).

**Impact of extractives sector and policy response:** A major concern in Zambia is the lack of environmental and social protection of the local communities. This challenge is prevalent across the extractives industries in the Southern Africa region. Success of Zambia's extractives sector will depend on its ability to develop strong policies, enhanced mineral governance, developing enabling infrastructure, and increased transparency.

### Zimbabwe

**Socio-economic context:** Zimbabwe remains one of the poorest countries in the world. In 2022, the country's extreme poverty rate was an estimated 44% (AfDB, 2023). The country's GDP growth went down from 8.5% in 2021 to 3.0% in 2022 (AfDB, 2023). This was largely due to external shocks such as the COVID-19 pandemic, including floods and drought that was experienced in the country which largely affected the country's agricultural output. Unemployment rate was 7.90 % in 2022.

**Risk of stranded assets:** The country's lithium potential places it in a good position to become one of global players in mining of the lithium to support the world's just transition efforts. However, the country needs to stop investing

in mineral resources such as coal which are at risk of becoming stranded assets as the world transition to low carbon development. And more recently there has been extensive exploration of oil and gas in the country, thus placing the country at risk of having stranded assets as the world moves towards a cleaner economy.

**Governance challenges:** Overall, the extractives sector in Zimbabwe has always been confronted with the challenge of poor governance. Also Zimbabwe's extractives sector has often been accused of lacking transparency and accountability making it difficult to understand whether the sector truly contributes to sustainable socio-economic and environmental development. For the year 2022, Zimbabwe had a low Corruption Perception Index of 23, which implies very high levels of perceived corruption in the public sector (ZELA & AIEL, 2023).

**Impact of extractives sector and policy response:** The extractives sector in Zimbabwe has been often associated with negative social impacts such as the displacements of local communities with inadequate compensations, unfair labour practices, including negative social and environmental impacts on local communities. The global demand for lithium has generated a series of policy responses in Zimbabwe. Some of these include the banning of the export of lithium bearing ores, and the amendment of the Mines and Minerals Act to recognise lithium as a strategic mineral (ZELA & AIEL, 2023).

### Mozambique

**Socio-economic context:** Mozambique has one of the fastest growing economies in Sub-Saharan Africa region. The country's GDP growth rose from 2.3% in 2021 to 3.8% in 2022

(AfDB, 2023). Despite the continued growth in the country's GDP, Mozambique remains one of the least developed and poorest countries in the world (World Bank, 2023). Job creation, poverty reduction and human capital accumulation remain limited in the country, while most of the wealth in the country is only benefiting a few individuals. More than 60% of the country's 33 million people live in poverty (World Bank, 2023).

**Risk of stranded assets:** There is a high risk of stranded assets in Mozambique. The extractives sector, particularly the recently discovered oil and gas sector, has proved promising in the Mozambican economy with potential to contribute to economic growth and job creation (CIP, 2020). The continued investments in LNG in Mozambique put the country at risk, because oil and gas will likely become stranded assets in the future if the world is to meet its climate targets. However, Mozambique continues to focus on mobilizing substantial investments to support and grow its LNG.

**Governance challenges:** Since 2017, Mozambique has been confronted by conflicts in the northern province of Cabo Delgado. The root cause of this insurgency in the oil and gas rich northern province of Cabo Delgado is not clearly known. However, many analysts and commentators have argued that the main cause of this conflict is the result of poor governance in the country which has led to poverty, inequality and frustrations of young people, lack of socio-economic opportunities and marginalization of the people in the northern province of Cabo Delgado in Mozambique.

**Impact of extractives sector and policy response:** The country is confronted by several challenges that are hampering the country's ambitions of becoming the major exporter of

LNG. The country is currently grappling with military insurgency in parts of the gas-rich province of Cabo-Delgado (World Bank, 2023). This has threatened the economic potential of the lucrative investments in the country, particularly the Cabo-Delgado region where an estimated 4,000 people have been killed, while around 1 million people have been displaced (World Bank, 2023).

### South Africa

**Socio-economic context:** South Africa is considered as one of the most unequal countries in the world, while unemployment and poverty remain persistent challenges. An estimated 30% of the country's population is living in extreme poverty, while unemployment rate was an estimated 32.7% in 2022 (AfDB, 2023). The country's GDP dropped from 4.9% in 2021 to 2.0 percent in 2022 (AfDB, 2023). The huge drop in the country's GDP was attributed to flooding and looting in KwaZulu Natal (2022), consistent power cuts (referred to as loadshedding), coupled with the geopolitics such as the Russia's invasion of Ukraine in 2022 (AfDB, 2023).

**Risk of stranded assets:** Coal which provides around 70% of South Africa's electricity is increasing becoming at risk of becoming stranded asset. South Africa is currently the fifth largest producer of coal in the world, the country produces an average of 224 million tonnes of marketable coal annually, and 25% of the country's coal production is exported internationally (Eskom, 2021). Despite committing to a just transition, presently it is high unlikely that South Africa will manage to completely abandon coal in the next coming decade, this is due to the low uptake of alternatives such as renewables. The risk of stranded assets in South Africa remains a

key policy issue due to the country's economy dependency on coal.

**Governance challenges:** The Mineral and Petroleum Resources Development Act (MPRDA) (2002) is the main legislation governing the extractives sector in South Africa and was endorsed to give effect to the constitutional provisions in South Africa (Igbayiloye and Bradlow, 2021). This was also meant to ensure good governance in South Africa's extractives sector. Despite existing policies which seek to ensure effective measures in the extractives sector, there have been reported cases of irregularities and corruption in the extractives sector in South Africa. MPRDA has also often been accused of ignoring spatial planning and designation of sensitive, vulnerable and important areas when granting mining rights (Centre for Environmental Rights, 2016).

**Impact of the extractives sector and policy response:** The extractives sector in South Africa has both negative and positive impacts on the population and the environment. The extractives sector value chain is one of the largest employers in the country, while its contribution to the country's GDP is substantial. The sector has also managed to attract several foreign direct investments in the country. On the other hand, the extractives sector in South Africa has led to many deaths as a result of health issues, while displacements have also been reported. The South African government has developed several policies that seek to guide and improve the extractives sector, and manage the country's just transition ambition, such as the Mineral and Petroleum Resources Development Act (2002) and Energy Transition Framework and the Just Energy Transition Investment Plan (JET IP).

## V. Emerging trends in the extraction of critical minerals

Based on this review, it's clear that the extractives sector in Africa will continue to play a critical role in driving the continent's development agenda. Africa is faced with systemic challenges of poverty, disease, and unemployment. Yet with a growing population, comprised of 70% of youth under the age of 30 years, Africa needs to industrialise in order to create sustainable jobs for its youthful population. However, the continent also needs to take into consideration the global trends of transitioning into a low carbon development, to ensure that sustainability is effectively embedded in its development aspirations.

The review has shown that Africa has made significant strides towards achieving a low carbon trajectory, while at the same time acknowledging the role that the extractives sector needs to play in achieving the continent's development agenda. In the following section, a synthesis of key emerging trends on the continent in relation to the transition to a low carbon economy are outlined.

- Africa's pathway to a low carbon development. Although African countries have committed to the Paris Agreement, fossil fuels continue to be subsidized in several African countries, making it challenging to encourage a transition away from a carbon intensive pathway (Adeniran and Onyekwena, 2020). However, this reliance on fossil fuels can lead to intense economic instability, as GDPs can become dependent on fossil fuel exports.

- Despite the growth in global renewable energy installation, African countries still lag behind compared to other countries. In 2022, only 9% of all energy generated from Africa was derived from renewable energy sources, with majority of it generated from hydropower (WEF, 2022).
  - Several policies at the country level have been developed in order to guide Africa's renewable energy pathway. For instance, South Africa has developed the REIPPPP which seeks to drive the uptake of renewable energy transition.
  - At the continental level, policies such as Africa Mining Vision, Africa Agenda 2063 and the recently approved Africa green stimulus programme (2021) (developed to help Africa build-back better after the impact of the COVID-19 pandemic) are some of the major policies that seek to ensure that Africa achieves a just transition, especially in the extractives sector which is the backbone of many African economies.
  - Despite holding around 30% of the world's critical minerals that are important for low carbon development, African countries have not really positioned themselves, this may be attributed to lack of finance, lack of capacity and inadequate infrastructure.
  - Each country's response to the increased demand for fossil fuels will be unique depending on a complex myriad of factors including their GDP and its breakdown by sector, the state of socio-economic equality in the country, natural resources available within its borders, and more.
- **Governance challenges in relation to the mining of critical minerals in Africa**  
 There are various governance challenges confronting African countries when it comes to the extraction of precious minerals. For instance, cobalt mining in the DRC which is dominated by artisanal and small-scale mining (ASM) has been criticised for its human rights violations resulting from its weak governance (corruption), ethnic conflicts, child labour, fatal accidents, low wages, violent clashes between artisanal miners and government and private security personnel of large mining firms (Council on Foreign Relations, 2020). In general, there is a policy gap between existing policies and the need for governance frameworks to successfully manage the demand for critical minerals, and situations where there is a lack of enforcement or implementation of existing policies. Other major concerns related to governance include the following: -
    - There is very limited amount of its critical mineral resources which are processed in the continent, with China being the dominant player in the processing and refining of these critical minerals (Marais, 2022). This lack of local beneficiation is disempowering, due to the limited local value creation, as a result African countries cannot meet their obligations to their citizens.
    - The African continent is also at risk of becoming locked in as a supplier of critical minerals to the West, as the US and Europe are increasingly seeking to compete with China in securing critical mineral supplies from Africa and elsewhere (Marais, 2022).

- While many tools—such as the Africa Mining Vision, the EU Transparency Directive, and the EU Accounting Directive—have sought to address corruption, they have not levelled the playing field or provided comprehensive regulation that would ensure a more symbiotic relationship (Mostert et al., 2019).
- Much of the world's critical minerals like cobalt, lithium, nickel, etc are mined in countries that rank poorly in transparency, e.g. DRC and Zimbabwe. For example, for the year 2022, Zimbabwe had a low Corruption Perception Index, of 23, which implies very high levels of perceived corruption in the public sector.
- The socio-economic impacts of stranded assets on Africa

Stranded assets are multi-dimensional, impacting: Physical assets, Labourers without work, Debt, equity, and other financial assets. While African countries and Africa as a whole will likely see minimal financial damage and an overall growth in GDP, countries like South Africa could see a drop in GDP as almost 70% of their fossil fuel reserves could be stranded (Watts et al, 2021).

- When mining operations are discontinued or a mine is exhausted that can cause severe distress to local communities, possibly even economic and social collapse throughout an entire region (World Bank, 2008). For example, as South Africa seeks to transition to clean energy, millions of jobs connected to the coal value chain will be lost, while some jobs have already been lost. The closing of mines in some regions in Africa has also opened an opportunity

for illegal mining activities, where illegal miners have been reported to be terrorizing surrounding communities.

- **Policy response to biodiversity protection due to threats from the extractives sector**

There is undoubtedly quality of life benefits associated with a diverse, beautiful, plentiful natural landscape in Africa. These can be difficult to quantify and are not necessarily reflected in a country's economic success. However, the tourism and wildlife industries in Southern African countries can account for large percentages of countries GDP.

The policymakers in Africa are working with development partners to protect biodiversity. For example, the World Bank has been financing biodiversity conservation across Africa. The bank has invested about \$360 million in around 50 projects that are being implemented across Africa (World Bank, 2019).

African policymakers are also developing policies that will lead to a new economic development path that is founded on natural capital accounting and environmental restoration.

The continent's development agenda, Africa Agenda 2063, which aims for a place where "Africa's unique natural endowments, its environment and ecosystems, including its wildlife and wild lands, are healthy, valued, and protected, with climate resilient economies and communities," guides the protection of biodiversity in Africa (King, 2020).



- **The impacts of extractives on communities, land, and women's rights**

Changes to land tenure, whether voluntary or involuntary, have multidimensional impacts that disproportionately impact vulnerable communities, children, and women. As such, it is important to adopt procedures of free, prior, and informed consent (FPIC), demonstrating “consent rather than consultation” with any community being displaced due to an extractives project—in particular: indigenous communities, pastoral communities, and women (Lowery & Vhugen, 2016).

Women are not only less directly involved in opportunities, but they face disproportionately high impacts from resettlement and land loss, as well as the negative environmental impacts associated with extractives and mining (Transforming Extractive Industries for Sustainable Development, 2021).

As a result of the extractives sector many people across Africa have been displaced, while some have been forced to leave their land without any compensation or alternative place to live. For example, in Mozambique the discovery of gas has led to military insurgency in parts of the gas-rich province of Cabo-Delgado (World Bank, 2023). This has threatened the economic potential of the lucrative investments in the country, particularly the Cabo-Delgado region where an estimated 4, 000 people have been killed, while around 1 million people have been displaced (World Bank, 2023).

## VI. Key recommendations

To unlock the potential of African countries to benefit from the just transition and the increased demand for precious mineral resources, this report highlights 4 key measures which need to be undertaken among others.

- **Understand investment needs:**

Urgent investments are required for the extractives to modernise and acquire technologies and innovations that will make the extractives sector in Africa more competitive and efficient. The shoring demand for precious minerals poses a major challenge, as the mining sector at current production levels will not be able to meet demand for the energy transition. It's projected that to meet net zero requirements in 2050, the production of Copper, Aluminium and Nickel must double.

From a research perspective, there is a need to understand the investment needs of the extractive sector in Africa, including the quantum and financing mechanisms. For example, could climate finance be harnessed as a source of investments for sector, despite the fact that mining critical minerals still poses major environmental and social-economic challenges?

Overall its estimated that \$1.2 trillion will be needed by 2050 to harness critical minerals for the energy transition. A significant portion of that investment will need to flow to Africa, considering that that the continent accounts for 30% of critical minerals globally. However, many African countries have struggled to

mobilise investments for their extractor sector, partly because of the perceived risks and the fact that these are fragile states, with weak governance systems.

- **Sustainable sourcing:** Mining critical minerals presents both an opportunity, but could also result in major environmental and social challenges. These challenges include habitat destruction, water pollution and human rights abuses such as the use of child labour. In order to ensure that these challenges are overcome, the sector needs to adopt sustainable practices, which prioritise habitat restoration through the implementation of mechanisms such as traceability to mainstream sustainable sourcing. The application of environmental standards in mining will ensure that pollution, water management and human rights abuses are minimised. In Africa this would result in a dramatic shift in the extractives sector, which has been plagued by unsustainable mining practices for decades. The main recommendation here is therefore to undertake more research and advocacy to promote transparency in the extractive sector, by ensuring that mining companies adhere to established environmental stewardship practices in their operations, and recognise human rights and labour laws.
- **Stranded assets:** The risk of stranded assets in the extractives sector is high in Africa, as investors divest from fossil fuels. Even though this divestment will not affect critical minerals, many African countries are dependent on mineral resources, whose demand will plummet as a result of the transition. It's therefore

recommended that more work needs to be done to understand the potential risk of stranded assets, and its impact on the extractives sector and more broadly on the continent's development agenda. There is a need to undertake rigorous analysis of the socio-economic risks that African countries will face as a result of stranded assets of fossil fuels, and how they can be mitigated.

- **Women empowerment:** Women play a major role in the extractive sector in Africa, even though their contribution is often undervalued. Women participation is important for sustainability in the extractives sector value chains and the communities where such activities are located. Studies have shown that when women are empowered, they reinvest in their families, education and the community at large. However, the extractives sector has been plagued by a history of exclusion, where local communities are not accorded opportunities for effective participation. Women do not only face gender bias in decision-making in their communities, but are often exposed to health and safety risks, and gender-based violence. There are emerging good practices, which the extractives sector need to implement to empower women in the sector. Such practices include, protecting women and community land rights, revenue share mechanisms, transparency and accountability among others. These good practices need to be mainstreamed by the sector, advocating for these measures need to be prioritized to ensure that the role women play in the sector is recognised.

# 1. Introduction



## 1.1. Background

Africa is vulnerable to the impacts of climate change despite only contributing around 3% to global greenhouse gas emissions (International Energy Agency (IEA), 2022). Many African countries are experiencing extreme weather events ranging from droughts, tropical storms to extreme floods that are damaging ecosystems and biodiversity, infrastructure and economies. More recently (March 2023), Tropical Storm Freddy caused a massive devastation in Malawi, which resulted to the death of over 400 people and a displacement of over 350 000 people, while also damaging 75, 000 hectares of cropland, affecting hundreds of farmers that were about to harvest their crops for the year (United Nations, (UN) 2023). These extreme events have resulted in reduced food production and lower economic growth, thus leading to mass migration and instability on the continent (IEA, 2022).

In order to address the impact of climate change, most African countries have signed up to global

agreements such as the Paris Climate Agreement of 2015, and the UN Sustainable Development Goals (SDGs). However, many African countries face a major challenge due to high dependence on the extractives sector which is major contributor to global greenhouse gas emissions. In 2019 minerals and fossil fuels accounted for over a third of exports from at least 60% of African countries (Signé and Johnson, 2021). In countries such as Nigeria and Angola oil and gas accounts for about 75% and 65% of government revenues respectively (Siyobi, 2021). The extractives sector, will thus remain a major contributor to the continent's development agenda, however African countries would need to ensure that the sector is more sustainable to reduce its carbon footprint.

There is a lot of discourse on how Africa could embark on a low carbon development trajectory, but very limited action in practice. For instance, gas and oil exploration continues unabated in many countries, including Tanzania, Namibia, South Africa, Uganda, Mozambique among others. This is despite the calls for a just energy transition and evidence of how oil extraction has caused major environmental degradation and disruption to livelihoods in vulnerable African communities. For example, in the Niger Delta of Nigeria, oil extraction destroyed the livelihoods of farmers and fishermen, increasing their vulnerability to the impact of climate change.

It's critical globally to pursue and manage the exploitation of the mineral resources in a manner that is sustainable, protects local communities and reduces greenhouse gas emissions. This is even more important for Africa, because the continent still needs to industrialise in order to achieve its development agenda, and lift millions out of poverty while building their adaptive capacity to climate change.

However, the extractives sector in Africa has been mired by several challenges, but the sector still has immense potential to drive growth, support sustainable development, create jobs and reduce

poverty in the continent (United Nations, 2021). The demand for critical mineral energy materials, such as lithium, cobalt and copper which will play a critical role in driving the just energy transition and the uptake of low carbon technologies is expected to rise (Siyobi, 2021). Despite the importance of the extractives sector on Africa's development, it is still mired by inefficiencies. These inefficiencies include the well-established comparative advantage of the Global North in mineral production, and more recently China, and technological deficiencies (Taylor, 2019). They also include weak local markets for mineral products, which reflect Africa's overall low level of industrialization amongst others (Mukarakate, 2021). This has been visible in countries such as the Democratic Republic of Congo (DRC) which has abundant vital minerals such as cobalt and copper, but the country has failed to capitalize on its rich minerals resources by uplifting majority of the population out of poverty. These minerals are critical to the electrification of energy and transport and are utilized in low carbon technologies, varying from electrical vehicle batteries to solar panels and wind turbines (UNDP, 2022). However, the country's population remains one of the poorest in the world. In the DRC for example, the majority of men, women and children have been exploited and abducted by militia groups, often forced to work, beaten and assaulted, and put to work under threat of violence and underpaid if they are paid at all (Haider, 2017).

The challenges faced by the extractives sector which comprise of financial, economic, governance, social and environmental concerns, have led to the so-called resource curse or paradox of (United Nations, 2021). This therefore presents a significant challenge for African countries on how, they can improve the exploitation and extraction of mineral resources to make them sustainable and just. There is also a need to ensure that the rights of all the people are protected, especially those that work in the extractives sector or are located in close proximity with the extractives sectors' operations.

There is also the threat of stranded assets in the extractives sector in Africa (Siyobi, 2021). When mining operations are discontinued or a mine is exhausted that can cause severe distress to local communities, possibly even economic and social collapse throughout an entire region (Ackerman et al, 2018). This has been evident in the coal mining sector and gold mining sector in South Africa, where many jobs connected to the extractives sector value chain have been lost or are at the risk of being lost due to the country's just energy transition. Abandoning coal mines and other mines in South Africa and other parts of African regions has also opened an opportunity for illegal mining activities, where illegal miners have been reported to be terrorizing surrounding communities. Although renewable energy technologies are expected to grow in the near future as a result of development in technology and decreasing prices, fossil fuels are expected to continue dominating the energy sector way past 2030 (Addison et al, 2018).

As a result of the increasing demand for precious minerals such as lithium, cobalt and copper which will play a critical role in driving the just energy transition, African countries are in a position to restructure their extractives sector to fully benefit from the just transition. This present an opportunity for African countries such as DRC, South Africa, Zambia, Mozambique and Zimbabwe as they possess some of the largest reserves of extractives minerals such as coltan, copper, cobalt and platinum which will contribute to the uptake of low carbon technologies.

Figure 1: Energy consumption by country, 2022  
(Source: Ritchie et al, 2022 adapted from World Bank)

## 1.2. Purpose of the report

The purpose of this report unpacks the impact of the transition to a low carbon economy, on the extractives sector in Africa, bearing in mind it's significance to the continent's development agenda. The report

highlights key trends in the extractive sector at the continental level, with specific case studies from five Southern Africa countries, namely the Democratic Republic of Congo (DRC), Mozambique, South Africa, Zambia and Zimbabwe. These countries are key in understanding the role of the extractives sector in the transition, for multiple reasons. Most of them possess critical minerals, such as Lithium, Graphite and Copper which will be required for development low carbon transition technologies. However, these countries have not benefitted from these resources, and are also exposed to the severe impact of climate change. Lack of effective natural resources governance, inadequate capacity and unsustainable mining practices, have all contributed to a challenging environment for the extractives sector. These countries therefore form a microcosm of the contemporary challenges faced by Africa's extractives sector, which justified their selection.

### 1.3. Research objectives and questions

The main objective of this report was to understand the impact of the transition to a low carbon economy on the extractives sector in Southern Africa. This was done in order to understand how the Africa could benefit from the increasing demand for critical minerals which are required for the energy transition, of which Africa holds more than 30% of these minerals. This is important, as Africa is well endowed with natural resources, but they have resulted in the social economic transformation of the continent, as its still plugged with systemic poverty and underdevelopment.

To achieve the research objective, the following research questions were posed:

- How is Africa preparing to transition to a low carbon development trajectory?
- What are the governance challenges being

faced especially around the extraction of critical minerals needed for low carbon technology?

- What are the socio-economic impacts of stranded assets on Africa?
- How are policy makers tackling the issue of destruction of the biodiversity because of the extractives sector?
- What are the impacts of extractives on communities, land, and women rights?

### 1.4. Structure of the report

The main focus of this report was to provide a review and analysis of the importance of extractives sector in achieving the just energy transition in Africa, with a select country case studies in southern Africa. This was done in order to provide insights on how investments in the extractives sector will be impacted by the global ambitions of achieving the net-zero targets by 2050, taking into consideration the current global geopolitics. The report is structured into five main parts, closely aligned with the objectives of the study.

The first part of the report provides a global perspectives of the key trends in the transition to a low carbon economy, highlighting the importance of decarbonisation, the growth in renewable energies and increasing demand for precious minerals.

The second part of the report, assess the implications of the drive towards a low carbon economy on Africa, with a specific focus on the opportunities and challenges that it presents for the continent.

The third section, focuses on country specific case studies, reviewing key trends in 5 southern Africa countries in relation to the extractives sector in those countries.

In part four & part five, the report highlights key social, environmental and governance challenges, which the Africa faces including the risk of stranded assets, the importance of women rights and the effective management of biodiversity.

The final part six of the report is a synthesis of key emerging trends in the extractives sector in Africa, as it positions itself to drive Africa's development agenda, while recognising the need for a low carbon development.

### 1.5. Methodology

A qualitative research approach was used to gather insights into the extractives sector in relation to climate change and a just transition at the global, continental and national level. The approaches used included extensive literature review of key policy documents and strategies on the extractives sector in relation to a just transition. Key documents such as Nationally Determined Contributions (NDCs), Paris Climate Agreement, Net-Zero targets, and SDGs were reviewed in order to provide a succinct understanding of the relationship between the extractives sector and the just transition.

In order to understand Africa's position on the transition to a low carbon economy, a continent wide policy review and analysis was conducted with the specific focus on African Union (AU) and Regional Economic Communities (RECs). Policy documents on climate, trade, extractives sector, energy

transition and the just transitions were analysed to provide insights into the sector. The specific policy frameworks which were reviewed, included programmes such as the Africa Agenda 2063, Africa Continental Free Trade Area (AfCFTA), Africa Mining Vision and the more recent Africa Green Stimulus Programme (2021) which have been criticized for being silent on the importance of the linkages between minerals, climate action and green recovery (Mukarakate, 2021).

Several policy documents, peer reviewed papers, and grey literature reports were reviewed to provide insights and analyses for this report. The literature review was conducted in order to gain an understanding and provide an analysis, knowledge gaps, current policy debates around the linkages between natural mineral resources, climate action and green recovery. To conduct literature review, the desktop was undertaken to identify key publications relevant for the study. Key publications were identified through search and selection process using key words such as "governance challenges in the extractives sector", "extractives sector and governance challenges", "challenges in extracting minerals needed for low carbon technology", socio-economic impact of stranded assets", "impact of the transition on jobs and livelihoods", "impact of the just transition on the extractives sector", "land policies", "women in the extractives sector" "mining and mineral policies" and so on. Once the search and selection all the data gathered was reviewed and analysed to inform the results of the report.

## 2. Global trends in the transition to a low carbon economy



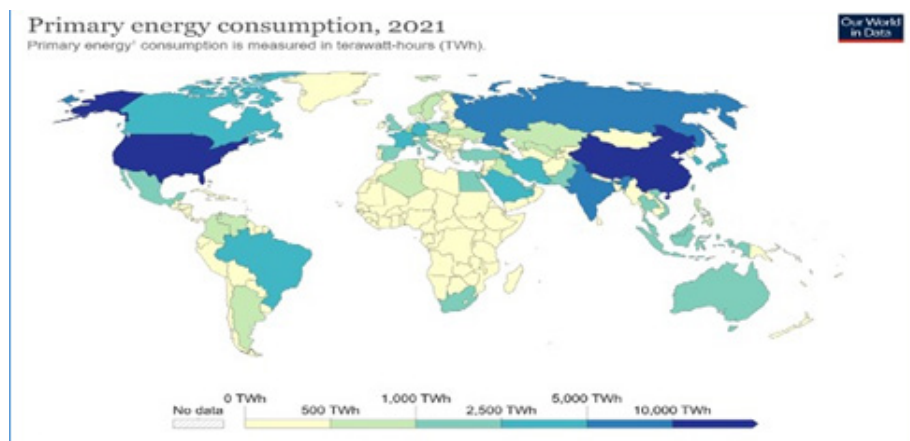
The global population is growing rapidly, and projected to reach 9.8 billion by 2050 according to the United Nations. The growing population rate coupled with rapid sector growth, increasing wealth, including increasing demand for energy in developing countries is resulting in increased demand for energy. Currently, oil, coal and gas account for most of the global energy consumption that is mainly used

for electricity, transport and heating.

Although there is an increasing demand for energy in developing countries, energy access remains very low, especially in Africa and Asia, where an estimated 770 million people live without access to electricity (International Energy Agency (IEA), 2022). Figure 1 shows global consumption of energy by country in 2021. The global demand for industrial products is projected to grow significantly by 2050. Therefore, the decarbonisation of industries will be critical to the global energy transition (World Economic Forum, 2022). Five industries are responsible for 80% of industrial emissions, these include cement and concrete, iron and steel, oil and gas, chemical and coal mining. This therefore makes the global energy transition pivotal to climate change mitigation efforts, if the world is to limit global warming to below 1.5°C, which is compatible with the low carbon future.

### 2.1. Increased recognition of the need for decarbonisation

Due to the threats posed by climate change and its impacts on the environment and societies, countries across the globe have acknowledged the need for decarbonisation. Despite this acknowledgment, current policies do not lend much optimism to limiting



**Figure 1:** The IEA pathway to net zero CO<sub>2</sub> by 2050. (Source Reeler et al, 2022 adapted from IEA, 2021, p.20).

global warming to net zero by 2050. For instance, according to Climate Action Tracker initiative even under all 2030 nationally determined contributions (NDCs) targets, the world would only be able emit

roughly twice as many greenhouse gases (GHGs) in 2030 as required to stay on a 1.5°C compatible pathway (UNDP, 2023).

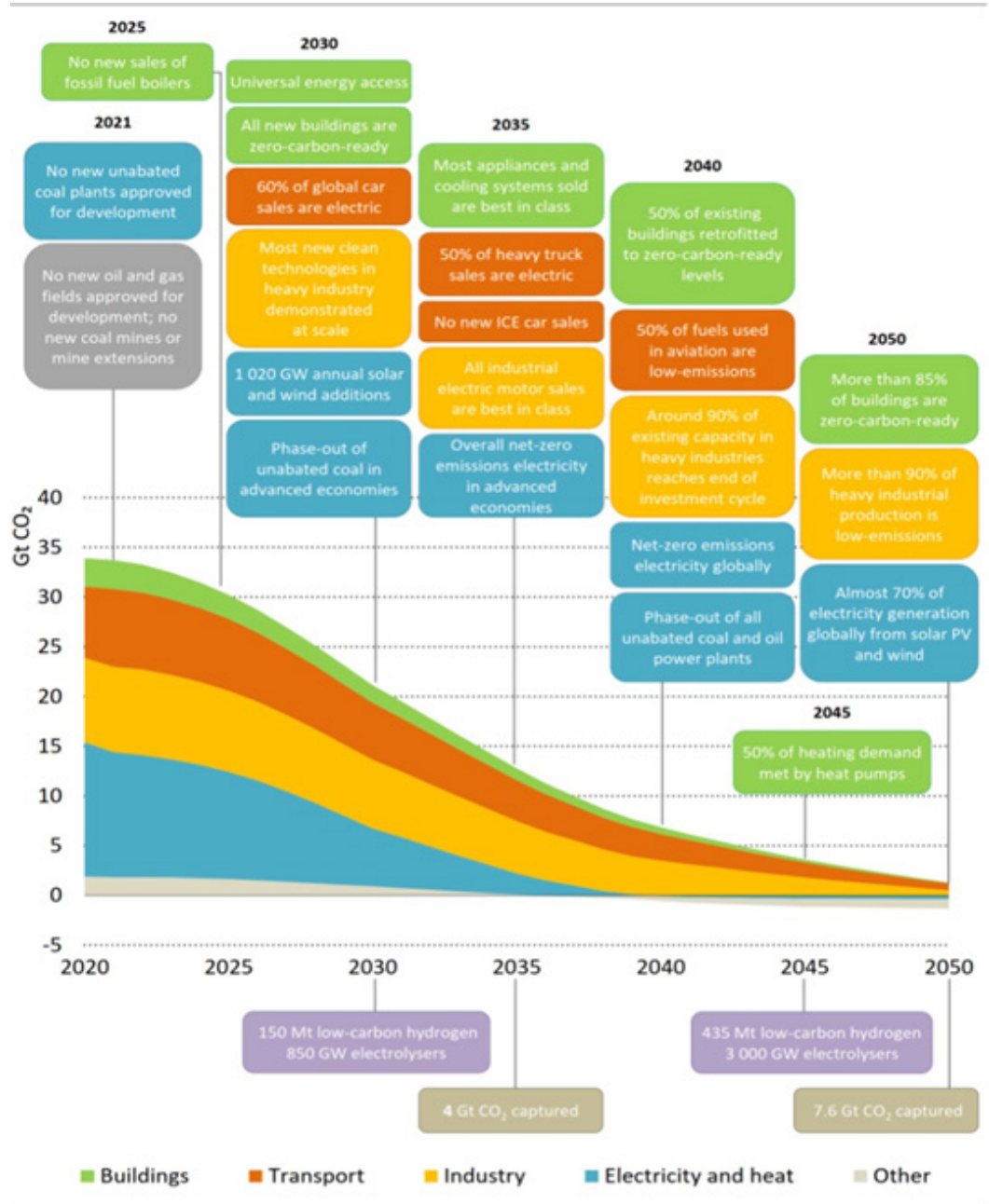


Figure 2: The IEA pathway to net zero CO2 by 2050. (Source Reeler et al, 2022 adapted from IEA, 2021, p.20).

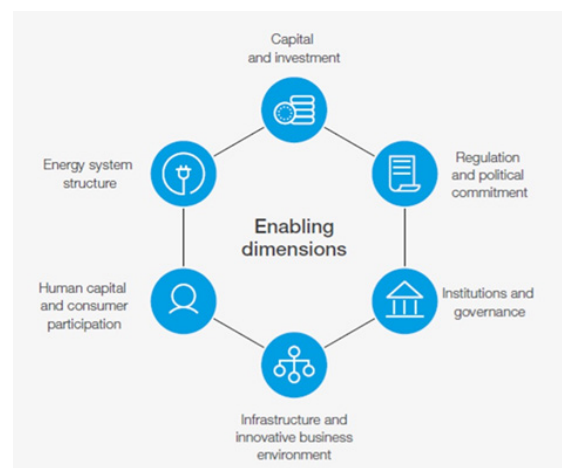


Globally several countries have made commitments to achieve net-zero targets. These include the two biggest emitters in the world; China and the United States of America. Although many countries have committed to cutting their emissions in half by 2030 and reach net-zero by 2050 or 2060 in the case of countries such as China and Australia, currently only Bhutan and Suriname have managed to achieve carbon neutrality and are actually carbon negative. Some countries have signed their net-zero plans into law, while others are still under proposed policy legislation, others under discussion and so on. Currently only a few countries seem set to achieve cutting their emissions in half by 2030 as shown in figure 2, and majority of the countries that have pledged will likely miss their targets as they are still far from halving their emissions by 2030.

The current challenge with achieving net-zero by 2050 is that the net-zero emissions are not committed to over specific time frame (Reeler et al (2021), countries have set their own time frameworks. For instance, some countries have made commitments for before 2050, while others have made commitments for beyond 2050 (Reeler et al, 2021). The difference in setting up timelines will definitely affect the accomplishment of the net-zero by 2050. Countries have made commitments to achieving the net-zero in the coming decades to the pledges made (WEF, 2022). However, any likelihood of achieving the net-zero by 2050 will rely on a major reduction in the use of fossil fuels (FF), the burning of which accounts for about 85 percent of human-caused annual CO<sub>2</sub> emissions (Jansen, 2023).

According to UNEP (2022), instead of reducing their emissions by 2030, the majority of countries will likely increase them. It further argues that the current national plans for 193 Parties to the Paris Agreement taken together would lead to a sizable increase of almost 11% in global greenhouse gas emissions by 2030 (UNEP, 2022). Fossil fuels such as coal, oil and gas are by far the largest contributor to global

climate change, accounting for over 75% of global greenhouse gas emissions and nearly 90 per cent of all carbon dioxide emissions (United Nations, 2023). Such arguments indicate that despite setting up policies and initiatives to achieve the net zero target the reality of achieving them remains very complicated and difficult. However, it is important to acknowledge that nations, cities and businesses have vowed to achieve net-zero emissions in the coming decades (WEF, 2022). In 2021, around 70 countries accounting for more than 80 % of the global greenhouse gas emissions, and about 90 % of the global GDP put net-zero commitments in place, including more than 5, 000 global companies as part of the United Nations' Race to Zero campaign (McKinsey Global Institute, 2022).



**Figure 3: Enabling conditions for achieving a just transition and reaching the net zero targets (Source: WEF, 2022).**

The Paris Agreement, a legally binding international treaty on climate change under the UNFCCC which was signed by 196 Parties at the UN Climate Change Conference (COP21) in 2015 also forms one of the critical initiatives for decarbonisation. Under the Paris Agreement Parties agreed to develop National Determined Contributions (NDCs) and Long Term Strategies. The NDCs seek to help countries communicate actions they will adopt to

reduce their greenhouse gas emissions in efforts to reach the Paris Agreement, while the Long-Term Strategies seek to place the NDCs into the context of countries' long-term planning and development priorities, providing a vision and direction for future development (United Nations Climate Change, n.d). At the continental level, policies such as Africa Mining Vision, Africa Agenda 2063 and the recently approved Africa green stimulus programme (2021) (developed to help Africa build-back better after the impact of the COVID-19 pandemic) are some of the major policies that seek to ensure that Africa achieves a just transition, especially in the extractives sector which is the backbone of many African economies.

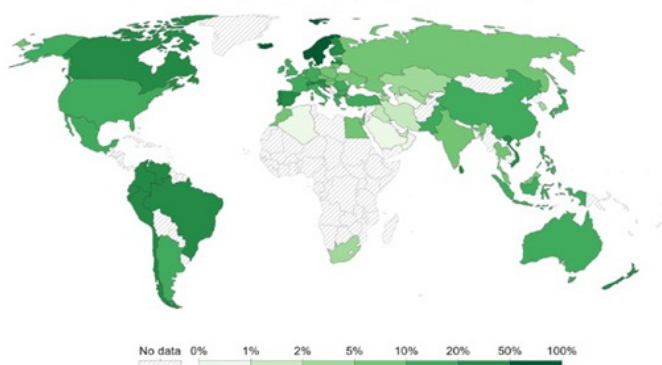
## 2.2. Growth in renewables

Globally the demand for renewable energy is growing at a rapid pace. The growth and demand for renewable energy has surpassed the growth and demand for coal, oil and gas. In 2027 electricity from wind and solar PV is expected to double and provide almost 20% of the global power generation (IEA, 2022a). In 2021, global renewable energy capacity installations amounted to 290 gigawatts (GW). However, despite this visible growth, renewable growth remains well below the 960 GW that is needed annually by 2030 if the world is to meet the net-zero target of 2050 (WEF, 2022). The leading country in

global renewable energy growth is China, followed by the European Union, USA and India, which all have shown leadership in implementing existing policies and regulatory and market reforms, while also introducing new policies more quickly than expected in reaction to the energy crisis. For instance, in 2021 China accounted for 46% of global renewable energy capacity (IEA, 2022). The growth in renewable energy generation is led by solar, followed by wind energy. Solar accounted for 60% of the increase of global renewable capacity in 2022, taking the global total renewable energy capacity to more than 300 GW (WEF, 2022).

Despite the growth in global renewable energy installation, African countries still lag behind compared to other countries. This is depicted in figure 4 above, which shows that only South Africa has between 5-10 % of its energy that is derived from renewables in all the 5 countries that are studied in this paper. For instance, in 2022, only 9% of all energy generated from Africa was derived from renewable sources, with the majority of it generated from hydropower (WEF, 2022). The report by PricewaterhouseCoopers does however indicate that progress is being made in this area. From 2019 to 2020 alone, solar and wind capacity increased by 13 percent and 11 percent, respectively, while hydropower increased by 25 percent (WEF, 2022). Although Africa continues to show a slow pace in renewables installation, the continent is home to 60% of the best solar resources globally, however, only 1 % of the total capacity is installed (IEA, 2022).

North African countries such as Egypt, Tunisia, Morocco are the leaders of renewable energy installation in Africa. However, there is also hope for other countries such as South Africa that have developed policies such as the Renewable Independent Power Producer Programme (REIPPPP) which seek to ensure the growth of renewable energy in the country, to reduce the dependence on coal powered energy. Despite these efforts, challenges still exist in Africa. For instance, in South



Source: Our World in Data based on BP Statistical Review of World Energy (2022) OurWorldInData.org/energy - CC BY  
 Note: Primary energy is calculated using the 'substitution method', which accounts for the energy production inefficiencies of fossil fuels.

**Figure 4:** Share of primary energy from renewable sources, 2021 Source: <https://ourworldindata.org/renewable-energy>

Africa there is a strong pushback for the just energy transition from various labour unions, including some government officials that view the transition as the propaganda of the West and argue that it will lead to more job losses than job gains.

Despite the challenges confronting renewable energy growth, renewables continue to be a priority for many countries. Renewable energy has a great potential to reduce energy prices and lessen the

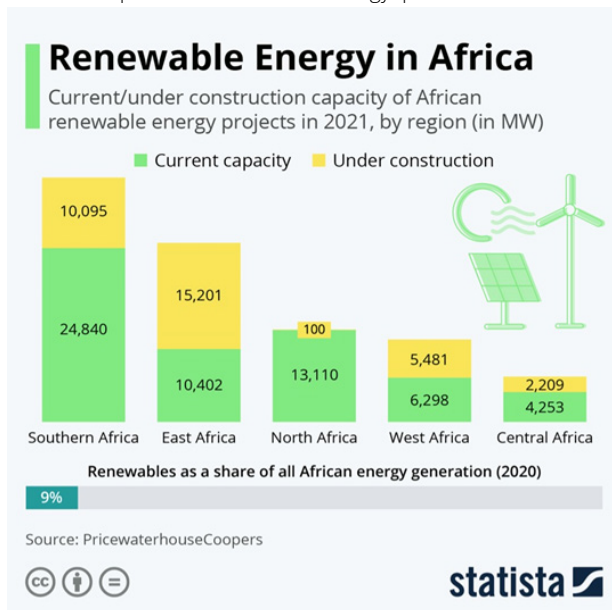


Figure 5: Renewable Energy in Africa (Source: PriceWaterhouseCoopers)

dependence on fossil fuels in the short and long term (IEA, 2022). The invasion of Ukraine by Russia has also led to the push for renewable energy sources in Europe, as Russia closed its gas supply in Europe leading to increasing energy prices and shortage of energy. Although the cost of new solar and wind installations has increased in recent years, reversing a decade-long cost reduction trend, gas, oil and coal prices have increased more making renewable energy a better alternative (IEA, 2022). However, in order to realise the potential of renewable energy sources new policies need to be implemented rapidly across the globe. This is more important for African

countries where more than 600 million people do not have electricity access.

### 2.3. Increasing demand for precious minerals and its implications on Africa

The push for clean energy transition has led to an increased demand for critical minerals that are crucial for supporting clean energy transition. These minerals are required for key technologies that are critical for realising a low carbon future which include renewable energy (wind, solar), energy storage (batteries, including some technologies and transmission modes which necessary for the clean energy transition, covering power, transportation, buildings, sector and land use management (Arrobas et al, 2017). The required precious minerals for realising a low carbon future by 2050 include aluminium, copper, lead, lithium, manganese,

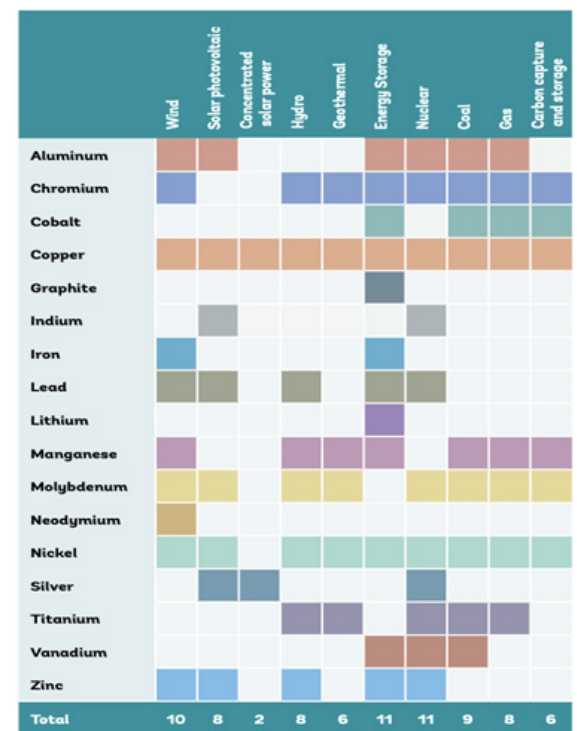


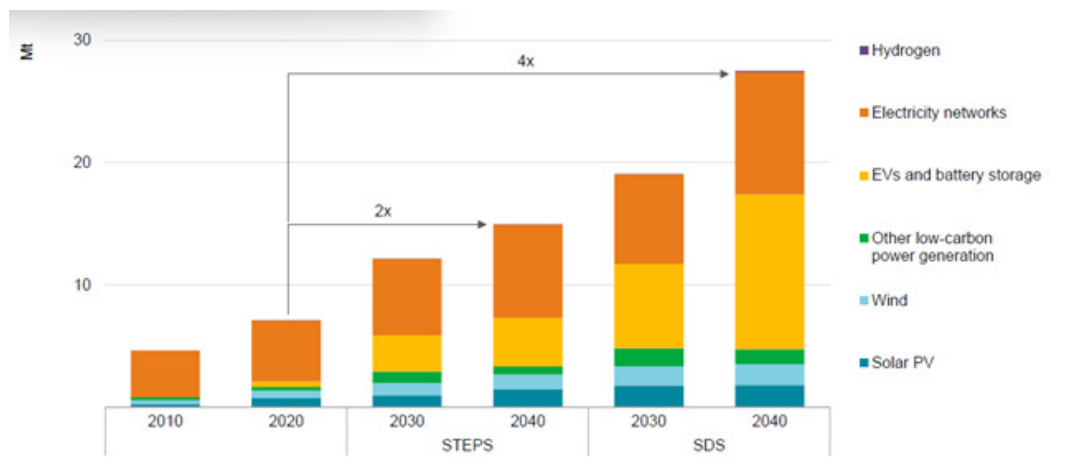
Figure 6: Mapping of minerals with low carbon technologies (Hund et al., 2020)

nickel, silver, steel, and zinc and rare earth minerals such as indium, molybdenum, and neodymium amongst others (Arrobas et al, 2017; Marais, 2022). Investments in critical minerals rose from 20% in 2021 to 30% in 2022 (IEA, 2023). Figure 6 shows a mapping of these minerals with relevant low carbon technologies

Clean energy transition will be mineral intensive, with the demand for precious minerals such as graphite, cobalt and lithium expected to increase by 500% by the year 2050 (Toledano et al, 2021). The African continent is a major source of the aforementioned minerals. The continent has around 30% of the minerals reserves which are critical for achieving the

growth and sustainable development (Hund et al., 2020). Figure 7 depicts the growth in global demand for precious minerals in order to drive clean energy technologies between 2010-2040. Fossil fuels such as coal will fierce competition from the growth of precious minerals, as a result of phase-out policies and the rise of renewables (IEA, 2022). This is already being witnessed in South Africa, where the country has already put plans in place to phase-out most of its coal fired powered stations in favour of renewables.

Although there are high expectations that the transition to a low carbon future will raise the demand for precious minerals, creating opportunities for low and middle-income economies to build more



**Figure 7: Total mineral demand for clean energy technologies by scenario 2010-2040 (Source: International Energy Agency, 2022).**

low carbon future set out in the Paris agreement (Marais, 2022). For example, Africa accounts for 40% of global reserves of cobalt, manganese and platinum which are essential for batteries and hydrogen technologies (IEA, 2022). For example, the DRC produces about 70% of the world's cobalt, while Zambia is also a major producer of copper, with countries such as South Africa, Mozambique and Zimbabwe having significant reserves and deposits of platinum, manganese, graphite and lithium respectively (Marais, 2022). These minerals will create new export markets for African countries if they are well managed, and contribute to economic

diversified economies remains a key challenge (United Nations, 2021). Africa is already battling to ensure that its population benefits from the exploitation of these minerals. For instance, cobalt mining in the DRC which is dominated by artisanal and small-scale mining (ASM) has been criticised for its human rights violations resulting from its weak governance (corruption), ethnic conflicts, child labour, fatal accidents, low wages, violent clashes between artisanal miners and government and

private security personnel of large mining firms (Council on Foreign Relations, 2020).

Another concern confronting African countries is that a very limited amount of its critical minerals are resources are processed in the continent, with China being the dominant player in the processing and refining of these critical minerals (Marais, 2022). Inadequate infrastructure to process critical minerals disadvantages countries such as the DRC, because they have to import final products needed for a low carbon development at exorbitant prices despite having the natural mineral resources. For example, according to the United Nations, despite mineral resource extraction playing a dominant role in economies of around 81 countries, which is a quarter of the global GDP, nearly 70 % of these countries' population live in extreme poverty (UN, 2021).

The increasing demand for minerals such as copper and nickel also have the potential to increase annual greenhouse gas emissions associated with their production (World Bank, 2022). This has been the case in countries such as Zambia, where EITI acknowledges that as the copper production increases the country is also confronted with increasing energy demand needed to sustain copper mining activities (EITI, 2022). The African continent is also at risk of becoming locked in as a supplier of critical minerals to the West, as the US and Europe are increasingly seeking to compete with China in securing critical mineral supplies from Africa and elsewhere (Marais, 2022).

#### **2.4. The impact of current global geopolitics on the just energy transition**

The just transition is prone to global geopolitics. The geopolitics comes in more prominently in the just transition because countries and communities do not live in isolation (Amis and Mapanje, 2022). This was

visible when the Russian Federation invaded Ukraine in February 2022. The war in Ukraine disrupted energy markets, causing significant concerns for people, communities, companies and economies around the world (World Economic Forum, 2022). The major consequences were mostly felt in Europe. When Russia decided to cut off its supply to Europe, energy prices skyrocketed, leaving many European countries to seek alternative energy sources.

Africa was one of the places that became an alternative energy source supply. This significantly interrupted the energy transition ambitions of African countries, as the demand for fossil fuels in most European countries increased some of the African countries had to increase their fossil fuels production (mostly coal) in order to meet the energy demand of the European countries. Even today the war in Ukraine continues to have a major impact on the global scale. The war in Ukraine has heightened uncertainty around the world and could further aggravate food insecurity and living costs more especially in low and middle income countries (African Development Bank, 2023).

In addition to the threat of climate change, which persists to threaten lives, livelihoods and economic activities across the globe, the current status of geopolitics continues to be a threat to a low carbon future, set up in the Paris Agreement. Overall the geopolitics illustrate that the clean energy transition is not isolated to the impacts of major environmental, economic and geopolitical events, and that the trade-offs between energy affordability, security and sustainability all form part of global geopolitics (WEF, 2022). Faced with the geopolitical uncertainty, governments have the challenge of undertaking measures to address energy affordability challenges from the supply side. As part of these measures some countries have resorted to increasing coal-based power or securing coal supply from other countries (WEF, 2022).

## 3. How is Africa preparing to transition to a low carbon economy?



### 3.1. Achieving a net zero in the extractives sector in Africa

Significant investments in the decarbonization of energy systems are needed to avoid exceeding the Paris Agreement's proposed global temperature rise, and to achieve the UN SDGs. Many low-carbon sustainable development technologies in the energy sector, such as wind, solar, batteries, LEDs, nuclear power, etc., deliver energy services through methods that are more metal intensive than the fossil fuel approaches (Hodgkinson and Smith, 2021). Although they are metal intensive, the low-carbon technologies only account to about 6% of emissions generated by fossil fuel technologies (Hund et al., 2020). More importantly, these key technologies have become sufficiently cost effective over the past years, and the trend is expected to continue, making them more attractive.

The extraction and deployment of metals used in low-carbon technologies is expected to rise in the future, and in Africa, this will occur in tandem with

climate change challenges and mining of other minerals like gold. Thus, the extractives industries, especially in Africa need to increase their resilience and reduce GHG emissions, in line with the Paris commitments. The emission intensity of mineral production operations, e.g., gold mining, vary depending on factors such as location, type or grade of ore, the processes used in extraction, etc. Much of the GHG emissions, however, come from electricity and fuel combustion used in powering vehicles and machines to generate electricity on the mine. Ways through which the extractive sector can reduce emissions include:

#### 3.1.1. Improving the mining processes and energy efficiency

Reducing energy consumption in mining processes reduces GHG emissions. Different mining processes can be assessed using the Cost Benefit Analysis method, to show their financial business case and the longer term sustainability benefits. Technologies currently being used and developed to improve mining processes in the extractive sector include: (i) use of the Internet of Things (IoT) to enhance operational efficiency and reduce environmental impacts of the business; (ii) use of drones to survey sites and operations, reducing use of overhead transportation and (iii) the upgrading of energy efficient technologies such as LEDs.

#### 3.1.2. Decarbonizing electricity

In many parts of the world, renewable sources of electricity (solar, wind, hydro) have been proven to be having lower lifetime costs than the conventional ones or grid electricity. In addition, there has also been growth in investment and deployment of energy storage technologies (batteries) due to their cost effectiveness. These cost reductions will move the economics of electricity generation in favour of renewables and storage. Since there is a business case for the replacement of high carbon power

technologies, e.g. diesel with renewables, mining companies can consider moving to the former to perform their onsite operations. For example, where diesel is used to generate electricity, there can be use of renewables; and where diesel is used to power engines in the mills, it can be replaced by electric motors powered by renewables or other zero carbon sources, engines in the mills, it can be replaced by electric motors powered by renewables or other zero carbon sources.

### 3.1.3. Decarbonizing transportation

In the extractives sector, the use of heavy hauling trucks constitutes the larger part of the mining companies' energy costs and GHG emissions. As in the generation of renewable energy, the growth in the market of electric vehicles (internationally) has been accompanied by rapid cost reductions in the same. Between 2010 and 2018 the price of lithium batteries fell by approximately 85% and prices are forecast to continue to fall by 8-10% per year until 2030 (World Gold Council, 2019). Thus, over the next few years, electric cars are going to become more cost effective or cheaper than the diesel powered ones. As a result of such developments, mining companies will be able to use electric vehicles and low-carbon transport technologies such as fuel cell powered vehicles.

### 3.1.4. Transition towards renewable energy

In Southern Africa, the mining sector is one of the most important energy consumers. Its energy demand is set to increase in the coming years due to its increased importance in supplying the raw materials necessary for the global transition to clean energy sources. Historically, many mines in Southern Africa have been connected to the national grids, and have in the past been victims to power outages. As a result, they have resorted to on-site diesel or heavy

fuel oil powered "mini-grids" for self-consumption and back up to load-shedding. Presently, some mines are committing to considering more innovative and sustainable sources of energy to power their operations. For example, Bushveld Minerals, a mine in South Africa, is developing a mini grid project which consists of solar PV and battery generation. This project, set to deliver up to 1MW of power reflects the potential economic viability of both renewable energy and energy storage technologies in the region (Marleny, 2020). These technologies make mines more attractive to regulators, investors and other stakeholders as they are more bankable, and climate-smarter than fossil fuelled projects (World Gold Council, 2019).

### 3.2. Opportunities for job creation in the transition

Unemployment poses a significant challenge in Africa, made worse by the COVID-19 pandemic which hit the region the hardest, reversing some of the progress in poverty reduction which was achieved in recent decades. The African Development Bank (2021), estimates that more than 30.4 million Africans fell into extreme poverty in 2020 during the peak of the pandemic, while another 38.7 million may have also fallen into the poverty trap in 2021 (ILO, 2022). High unemployment and extreme poverty in Africa are made worse by the fact that the majority of jobs in Africa are in the informal sector and dominated by the vulnerable population such as the youth and women. According to ILO, informal jobs account for 70 percent of employment in the agriculture and extractive industries sectors, which contribute the most to African countries' gross domestic product (GDP), with 9 out of 10 these informal workers being women and young people (UNDP, 2022). This makes women and youth more vulnerable to the impacts of climate change and unexpected pandemics such as the COVID-19 because they do not have social protection.

In 2020, the unemployment impact of the pandemic is estimated to have amounted to a deficit of 15 million jobs in Africa, mostly affecting the youth and women (ILO, 2022). Considering the impacts of climate change, where millions of people in the Horn of Africa for instance suffer famine and high-water stress, and up to 700 million Africans are expected to be displaced by 2030. Hence a just transition is important especially considering civil society and youth activists who are increasingly calling for justice and bold climate action due to the vulnerabilities that the African population currently faces. Adopting a just transition pathway will likely be beneficial to the African continent in terms of the creation of green decent jobs, creating social protection measures for those that will likely be impacted by the transition, especially those that are working in the informal sector.

Some benefits of the transition are already being felt in some African countries. For instance, South Africa's REIPPPP has already created more jobs for the vulnerable members of society such as women and the youth. At the same time local communities have benefited from socio-economic programmes which are aligned with South Africa's REIPPPP which uses a private sector bidding process for renewable energy contracts where bids are required to comply with legal requirements, including the Black Economic Empowerment Laws and Labour Standards (UNDP, 2022). Although a just transition is crucial for building a climate-resilient and integrated sustainable energy sector for Africa, it will require substantial investments to be achieved. According to the AfDB (2023) between \$2.6 trillion and \$2.8 trillion is needed by 2030 to implement Africa's climate commitments as expressed in countries' recently submitted NDCs.

As things currently stand, Africa still lags behind in terms of implementing a just transition. Africa has particularly underperformed on the promotion of green economic opportunities, such as green trade,

green innovation, and green investment (AfDB, 2023). This therefore means that the continent is yet to benefit from the opportunities that are presented by the just transition. Despite lagging behind in terms of implementation of the just transition, Africa is endowed with mineral resources which are critical for driving the just transition. For example, countries such as the DRC, Zambia, Zimbabwe etc have rich energy and mineral resources, such as lithium, graphite, cobalt, nickel, copper, and rare earth minerals which provide new market opportunities for the green transition (UNDP, 2022). However, currently the actual contribution of these mineral resources to sustainable development has been mired by financial, economic, governance, social and environmental concerns, leading to the so-called resource curse or paradox of plenty (United Nations, 2021).

African countries need to position themselves as the key players in the green energy transition technologies due to the critical minerals that they possess. However, African countries have largely played a role of being raw material exporters which has disadvantaged themselves in truly benefiting from their own mineral resources and participating in the mineral resources value chains. For example, Africa has been predominantly a minerals exporter, with limited refining or linkages to domestic sector, hence African countries must seize the rising demand for critical minerals to be key players and strengthen their position in green technology value chains (Marais, 2022).

### 3.3. Scaling up green industrialization in Africa

Green industrialization has been identified as the only viable solution to Africa's underdevelopment, inequality, unemployment and poverty challenges. Green industrialization offers significant opportunities for African countries, ranging from job creation to



keeping down its greenhouse gas emissions, while also protecting biodiversity and the continent's ecological systems. Green industrialization will also place Africa as a destination for foreign direct investments as many countries, especially developed countries are pouring investments in low carbon development. Several African countries already have green policies that seek to increase the uptake of renewable energy in line with the SDGs of 2030 and the net zero targets of 2050. For this green industrialization to be achieved in Africa, all African countries need to set up their own green policies, with a specific focus on key critical value chains such as agriculture, energy extractives, manufacturing, transport and water (United Nations Economic Commission for Africa (2016) However, the United Nations Economic Commission for Africa (2016) cautions that it may be hard to convince some African countries who are highly dependent on fossil fuels, where natural gas and oil exports accounts for around 90% of their total exports and accounts for a significant portion of the national budget. Although there are calls for green industrialization, in countries such as Mozambique exploration and extraction of liquefied natural gas (LNG) is on the rise. As a result, the country is expected to become a major LNG exporter in the near future as a result of the discovery of over 180 trillion cubic feet (TCF) of natural gas reserves in the Rovuma basin in the north of the country (International Trade Administration, 2022). Elsewhere in countries such as South Africa and Zimbabwe, exploration of oil and gas reserves continues with the hope of exploiting these mineral resources. Also, while South Africa has put policies and strategies for transitioning to a low carbon economy resistance exists from the labour unions, and some government officials such as the current Minister Mineral Resources and Energy, who argues that transitioning to renewables will not solve the current energy crisis facing South Africa, therefore South Africa is not in a position to completely abandon its coal dependency.

### 3.4. Focus on new economies

As a result of climate change and the current global geopolitics that are affecting food prices and energy prices, accompanied by the need to recover from the COVID-19 pandemic, African countries need to diversify their economies. According to United Nations (2022) diversification of African economies is the only viable solution that will help them prosper in the global economy and survive the vulnerabilities and economic uncertainties exacerbated by commodity price volatility. The new economy refers to a shift from the dependence on commodity and manufacturing based-economy to the economy that is technology driven in order to create new products and services that are in market demand. However, currently majority of African countries have struggled to diversify their economies. For example, commodities account for more than 60% of total merchandise exports in 45 of the 54 African countries, this therefore makes them highly vulnerable to global commodity shocks (United Nations, 2022).

Due to the growth in digital technologies such as Financial Technology (FinTech), and Information and Communications Technologies (ICTs) African countries can also upgrade their existing products technologically, improving quality and productivity. For example, in the agricultural sector in Zambia Malambo et al (2023) argue that due to majority of smallholder farmers having access to mobile phone and already accepting mobile payments, therefore the uptake of the ICTs in the sector can be able to drive growth and inclusion. Malambo et al (2023;18) further argues that "technology such as AI, machine learning (ML) analytics, and connected sensors could foster increase in yields, improve the efficiency of water and other inputs, and build sustainability and resilience across crop cultivation and animal husbandry".

The correct policies must be put in place, though, to create a favourable atmosphere that will allow digital technologies to operate more effectively (Malambo et al, 2023). In order to improve inclusive access to innovative financing and other digital technologies, notably for small and medium-sized businesses, African nations should therefore create enabling policies and strategies (UN, 2022). FinTech companies are already expanding in Africa, which is encouraging greater innovation and investment opportunities. For instance, in 2022, investments in African FinTech companies increased from \$0.5 billion to \$ 2 billion (UN, 2022). However, only South Africa, out of the five nations examined in this paper, has been able to diversify its economy by capitalizing on the growth and opportunities provided by digital technologies.

### 3.5. Investments required for supporting the clean energy transition in Africa

As the world embarks on a journey of achieving the net-zero targets by 2050-2060 significant financial investments will be needed. This presents a challenge for African countries, because they have been struggling with mobilizing funding in order to support their just transition efforts. Although advanced economies continue to attract significant capital to fund clean energy infrastructure, developing and emerging countries are struggling to attract both foreign and domestic private investments necessary for the financing of large energy projects and infrastructure (WEF, 2022).

In total between \$2.6 trillion and \$2.8 trillion is needed by 2030 to implement Africa's climate ambitions as expressed in NDCs submitted by African countries by April 2023 (AfDB, 2023). Despite the need for more investments in Africa, Africa's energy investment between the period of 2026-2030 will still only be around 5% of the global total in the IEA's Net Zero Emissions by 2050 Scenario (IEA, 2022). Between 2019- 2020 only \$29.5 billion of

climate finance was mobilized by African countries, with private finance accounting for \$4.2 billion, while public finance accounted for \$25.3 billion, making these investments the lowest proportion among the world's regions (AfDB, 2023).

There are various obstacles hindering African countries from mobilizing the necessary funding to support the low carbon development trajectory. These include the absence of clear and robust green growth policies and long-term strategies in many African countries which in turn increase their investment risk profile and deter private sector from investing in green growth sectors (AfDB, 2023). AfDB (2023) states that currently only 7 African countries have long-term strategies, while only 18 of the 54 African countries have put in place policies and regulations that are specifically designed to attract private participation in green growth projects. In Africa due to low technical, human, and institutional capacity in managing critical phases of climate and green growth project cycles, few projects get past the feasibility or planning stage (AfDB, 2023).

In recent years technical and financial support to developing countries, leveraging a mix of public and private investment instruments, such as grants, concessional finance and market based capital has increased in order to help them get their transition plans on track (WEF, 2022). For example, The African Development Bank (AfDB) in 2022 worked on a critical minerals strategy, a theme that was also prominent at the 2022 African Forum on Mining, hosted in October 2022 by the African Union in Addis Ababa, Ethiopia (Marais, 2022). This was to help build capacity, skills and provide technical support to African countries in their efforts to integrate climate change into their development goals.

On the other hand, many African governments have put in place the necessary policy enablers to attract private investors to support the clean energy transition (WEF, 2022). However, for the countries

studied in this research, so far only South Africa has demonstrated its ability to attract private funding for supporting its just transition plans. This has been evident in the country's REIPPPP which has managed to attract over R200 billion in private finance to finance the country's renewable energy transition, and most recently through the \$8.5 billion mobilized under the Just Energy Transition Partnership (JET-P) during COP 26. Despite some success stories, many challenges for attracting investments for the clean energy transition, such as necessary skills bases,

ensuring reliable and adequate electricity supply and improving and developing policies necessary for the just transition. There is also an opportunity for African start-ups to capitalize on the increasing demand for critical minerals, as many venture capitalists are backing start-ups with new processes to break into critical mineral supply chains (IEA, 2023). For instance, in 2022 venture capital funding for technology entrepreneurs and critical minerals start-ups managed to raise a record amounts of equity amounting to USD 1.6 billion (IEA, 2023).

## 4. What are the risks of stranded assets on Africa?



Stranded assets are natural resources, or minerals that have suffered or will suffer from unexpected premature write-downs, devaluation or conversion to liabilities even before their exploration, causing a potential market failure (AfDB, 2019). As the world seeks to achieve the Paris Agreement goals and clean energy transition some mineral resources are at risk of being stranded, these include minerals such as oil, gas and coal that have huge negative impact on the environment and contribute largely to climate change and inequality. In 2017, the International Energy Agency cautioned that oil and gas assets worth around \$1.3 trillion could be left stranded by 2050, depending on whether the fossil fuels sector adapts to greener policies (AfDB, 2019). Considering the fact that the majority of African economies are dependent on natural resources such as coal, gas and oil, the risk of stranded assets present a major policy challenge. Despite oil and gas being at risk of being stranded assets, several African countries such as Zimbabwe, Mozambique etc continue with the exploration of gas and oil as means of contributing to socio-economic development.

Debates remain about the rights of African countries to pursue carbon-intensive development given their low emissions in comparison with the rest of the world. However, a global shift toward renewable energy and cleaner technologies will lead to changing trends in energy production and use that will impact the long-term economic feasibility of these projects regardless of their perceived deservedness. While coal-fired power plants do face perhaps the most drastic lifetime reduction (retiring one to three decades sooner than historically predicted) (Fofrich et al, 2020), other factors such as government regulations, demand changes, and legal action can cause a variety of stranded assets across many sectors (Matikainen and Soubeyran, 2022).

Countries like South Africa and Mozambique that have multiple recent or new investments happening in fossil fuel sectors are potentially more at risk of having many stranded assets, as opposed to countries like Zambia which may benefit from having fewer of these investments taking place. The United Nations suggests that all coal-fired power plants need to be phased out by 2040, and oil and gas should follow close behind, being phased out by 2050 (2021). This accelerated timeline will be a challenge for countries in Southern Africa and elsewhere that depend largely on fossil fuels not only for their exports, but for their own energy production. Some examples of potential stranded asset projects include:

- Gas-condensate exploration in the Cabora Bassa Basin, Zimbabwe
- Exploration of LNG reserves in the Cabo Delgado province, Mozambique
- Tendering of gas blocks in Lake Kivu, Democratic Republic of the Congo

Between 1996 and 2012 at least 63 low and middle income countries experienced an increase in their dependence on extractive resources, and most of these countries were in Africa (Roe and Dodd, 2017).

In addition, all the countries that are studied in this research are highly dependent on the extractives sector for their economy and employment. For instance, in South Africa, about 80% of the energy needed to drive the country's economy and sustain the population is derived from coal, while in Zimbabwe the extractives sector accounts for around 12% of the country's economy. The threat of stranded assets in the extractives sector is significant in Africa (Siyobi, 2021). When mining operations are discontinued or a mine is exhausted that can cause severe distress to local communities, possibly even economic and social collapse throughout an entire region (World Bank, 2008).

This has been evident in the coal mining sector and gold mining sector in South Africa, where many jobs connected to the extractives sector value chain have been lost. As South Africa seeks to transition to clean energy, millions of jobs connected to the coal value chain will be lost, while some jobs have already been lost. The closing of mines in some regions in Africa has also opened an opportunity for illegal mining activities, where illegal miners have been reported to be terrorizing surrounding communities. Although renewable energy technologies are expected to grow in the near future as a result of development in technology and decreasing prices, fossil fuels are expected to continue dominating the energy sector way past 2030 (Addison, 2018). This is most likely to be the case in many African countries that have seen less investments in clean energy technologies in recent years.

Despite its importance for economic development, the extractives sector in Africa is mired by financial, economic, governance, social and environmental concerns, "leading to the so-called resource curse or paradox of plenty" (United Nations, 2021). This therefore present a significant challenge for African countries on how can they improve the exploitation and extraction of mineral resources to make them sustainable and just, while also ensuring that the

rights of all the people are protected, especially those that work in the extractives sector or are located in close proximity with the extractives sectors' operations. This would further minimize the risk of stranded assets.

Countries can begin to assess some of their potential risk for stranded assets by examining the contributions that fossil fuels and coal-intensive resources make to their economy. For example, Table 1 shows the percentage of merchandise exports that come from fuel exports, as well as the percentage of each country's GDP that is dependent on coal. Countries with higher percentages, such as Mozambique and South Africa, must consider how they will minimize the economic and social impacts of the impending renewable energy transition. On the other hand, a high percentage of renewable energy use for electricity generation can signal a strength with regard to the energy transition.

#### 4.1. World Bank Data

**Table 1: The percentage of merchandise exports that come from fuel exports (Source: World Bank Data)**

Year	Fuel Exports (% of merchandise exports)		Coal Rents (% of GDP)	Percentage of Electricity Generation from Renewable Energy (2021)
	2021	2022	2021	2021
<b>Mozambique</b>	43.1	50.9	3.8	99.73
<b>South Africa</b>	8.7	14.3	2.4	81.4
<b>Zambia</b>	1.5	N/A	0.2	7.57
<b>Zimbabwe</b>	1.6	N/A	0.3	92.21
<b>Democratic Republic of the Congo</b>	0	N/A	0	55.04

There will be between \$11 and \$30 trillion in stranded fossil fuel assets (Watts et al, 2021). While African countries and Africa as a whole will likely see

minimal financial damage and an overall growth in GDP within these projections, countries like South Africa could see a drop in GDP as almost 70% of their fossil fuel reserves could be stranded (Watts et al, 2021). As such, concerns about stranded assets are highly dependent on individual countries.

#### 4.2. Managing the risks of stranded assets in Africa

Managing stranded assets will be a key challenge for many African countries, as abandoning or doubling down on exploiting fossil fuels will likely have a negative impact on their economies. It is important to note that African countries need a managed transition towards cleaner technologies as they contribute less to global carbon emissions and still need to develop.

- A managed transition that recognizes the difficulties of moving to cleaner technologies in the near future given limited resources and capacities would be necessary to enable the transition and avoid the risk of African economies being negatively impacted by the stranded assets.
- Financial institutions must play a significant part in educating the public, preparing markets for the effects of stranded assets, and discouraging investment in possible assets that could become stranded in the future.
- To prevent being negatively impacted by the risk of stranded assets African countries that hugely rely on fossil fuels for exports and economic growth need to ensure that economic diversification is enabled and accelerated through fossil fuel revenues
- African countries must be given the flexibility to negotiate the use of the mineral resources at their disposal in order to accelerate socio-economic growth and pursue low-carbon development at the same time (United Nations University, 2019).
- Industrialised nations must offer significant financial and technical support to the fossil fuel-rich African nations in order for Africa to manage the transition to a low-carbon development. Doing so will help to ensure that these nations find alternative development pathways that will prevent economic collapse in the event that mineral resources like oil, gas, and coal are abandoned.

## 5. Governance challenges in the extraction of critical minerals in Africa



Due to the rapid growth in the demand for precious metals in the energy transition, as well as the unique challenges faced by many Southern African countries, there are some particular governance challenges that impact the extractives sector in the region. These include a lack of effective policy implementation (or a lack of policy formulation altogether) and an overconcentration and dependence on the extractives sector. This can cause instability that can stem from many issues including a lack of logistical or regulatory preparedness. Additionally, the speed at which the sector is developing puts workforces in a position where they are undertrained and do not have the capacity to effectively conduct their work, which can be exacerbated by a lack of nationwide robust infrastructure. Lastly, regional and international cooperation is extremely important in the extractives sector, which depends on resource management that cannot be neatly bound by national boundaries. Policy frameworks such as the AfCFTA which was developed to create better regional coordination and to make trading easy between African countries, could further strengthen Africa's bargaining power when it comes to the extraction of precious minerals,

especially amidst the current geopolitical situation (Muller, 2023).

### 5.1. Lack of effective policy implementation

While there are many governance challenges surrounding the extractives sector, perhaps the most prominent is a lack of effective policy implementation. There are situations where there is a gap between active policies and policies needed to successfully manage the demand for critical minerals, and situations where there is a lack of enforcement or implementation of existing policies.

These policy concerns are both national and international. When examining the extractives trade between Europe and Africa, there is a historic inequity, wherein Europe holds the dominant financial position. While many tools—such as the Africa Mining Vision, the EU Transparency Directive, and the EU Accounting Directive—have sought to address corruption, they have not levelled the playing field or provided comprehensive regulation that would ensure a more symbiotic relationship (Mostert et al., 2019). On the other hand, implementation of policies in Africa is hindered by international power relations in the extractives sector, which has long existed in Africa, dating back to colonial period, in addition to this competition between African states and dominance of few big companies (mostly from outside Africa) have also made it challenging for African countries to implement their policies (Muller, 2023).

One measure that examines the governance of extractives is the Extractives Industries Transparency Initiative (EITI) which compares countries to a consistent standard and scores them from 0-100. This “scorecard” considers components such as “outcomes and impact,” “stakeholder engagement,” and “transparency” (EITI, 2023). However, because countries voluntarily become members of EITI, some

countries do not have a scorecard (including South Africa and Zimbabwe).

**Table 2: Implementation of the 2019 EITI Standard**

Country	Score achieved in Implementing the 2019 EITI Standard
The Democratic Republic of the Congo	85.5 (as of October 2022)
Mozambique	82.5 (as of June 2023)
South Africa	Not a member
Zambia	90 (as of December 2021)
Zimbabwe	Not a member

### 5.2. Need for diversification, over concentration

Fossil fuels continue to be subsidized in several African countries, making it challenging to encourage a transition away from them (Adeniran and Onyekwena, 2020). However, this reliance on fossil fuels can lead to intense economic instability, as GDPs can become dependent on fossil fuel exports. Many countries (for example, the DRC) have an enormous volume of extractives available that have an enormous associated value, which can lead to mediocre or lacking efforts to diversify the economy. However, this leaves the country's economy very vulnerable, particularly due to the price volatility and economic shocks associated with critical minerals and precious metals (United Nations, 2021). Another example is Zimbabwe, a potential leader in the production and export of lithium. The country granted most of its lithium mining and export rights to Chinese companies (ZELA & AIEL, 2023). This undermines market competition, and may in the long term lead to undervaluation of the minerals. The country needs to work with a diverse range of investors from other countries.

Dependency on hydropower could result in the need for either increased/sustained coal energy production or increased cooperative governance arrangements in the face of a drying climate.

### 5.3. Lack of capacity and underdeveloped infrastructure hindering sustainability

The push for a renewable energy transition has led to a rapid global increase in the demand for critical minerals. However, this sometimes outpaces the development of the appropriate infrastructure and regulation required to support such industrialization. The speed at which the extractives sector is expanding poses unique governance challenges. For example, when there is not effective transportation infrastructure available in a host country and the government is not willing to construct such infrastructure, an external extractive country is more likely to build this infrastructure solely for their exclusive use. This limits the integration of the extractives sector with the local economy, and limits the benefits provided to local citizens (Limpitlaw and Johnson, 2021). In Zimbabwe, for example, revenues from minerals are not always allocated in ways that support infrastructural development or economic growth in the towns or districts where mining activities are taking place. Some African countries face challenges in meeting the human and technical capacity required for green energy production, ranging from manufacturing, operation and maintenance to research and development (Adeniran and Onyekwena, 2020). In general, African governments need to strengthen their ability to foster long-term planning and capability for action in ways that operationalize governmental institutions and aid in the quick detection of error and spread of success (Cloete et al, 2023b).



#### 5.4. Corruption

Much of the world's critical minerals like cobalt, lithium, nickel, etc are mined in countries that rank poorly in transparency, e.g. DRC and Zimbabwe. For example, for the year 2022, Zimbabwe had a low Corruption Perception Index, of 23, which implies very high levels of perceived corruption in the public sector. Corruption arises in different stages of the mining process, including licensing and revenue collection. A research that was done by ZELA and AIEL (2023) in Zimbabwe, found that presently there is lack of transparency with regards to the licensing of lithium mining in the country. All contracts signed between the Government of Zimbabwe and investors from China are not accessible to the public. Moreover, due to corruption and selfish gains, governments and government officials may lack the political will to formalize the artisanal and small scale mining (ASM) sector (which is dominates the mining of minerals in many African countries). Zvarivadza (2017) noted that in the DRC, issues such as corruption, bribery, fraud, and theft have led to the widespread of informal ASM in Katanga, a province in the south-eastern part of the country. There is need to improve transparency and public participation to enhance governance issues around the mining of critical minerals in Southern Africa. Overall it is estimated that there is a yearly loss of \$140 billion to corruption in as whole, money that could be better spend in addressing electricity challenges confronting majority of African countries (Adekoyai, 2020). Regional and international cooperation

The extractive sector poses unique challenges to governments across different countries. For example, countries that rely heavily on resources like coal for export may not be able to realistically move away entirely from coal by 2030, as is advocated by the United Nations (Tena, 2022). The real conditions of each country must be considered

for there to be true, sustainable change. However, this can also create challenges with regional and international cooperation. At the continental level more cooperation is required in order for Africa to fully benefit from the extraction of critical minerals. However, currently there are significant challenges in achieving cooperation among all countries in the region regarding the production and utilisation of critical minerals (Cloete et al, 2023). However, this cooperation can be achieved by implementing anticipatory governance procedures that create forums for ongoing interaction, discussion, and cooperative decision-making that take into account each country's unique needs and objectives (Cloete et al, 2023). Policies such as the African Continental Free Trade Area Agreement (AfCFTA) amongst others, aim to address the lack of coordination and trade between African countries.

This will be more critical since many renewable energy sources require cross-boundary cooperation and planning, as resources like hydropower rely on water sources that are strained with many necessary uses. There are already power pools within the African continent that have a combined capacity of 33.8 gigawatts (as of 2020), but this has not been enough to meet the energy deficit (Adeniran and Onyekwena, 2020). For example, the Southern Africa Power Pool (SAPP) includes Angola, Botswana, Democratic Republic of the Congo, Eswatini, Lesotho, Mozambique, Malawi, Namibia, South Africa, Tanzania, Zambia, and Zimbabwe (Southern African Power Pool (SAPP), n.d.). This region faces many unique challenges. For example, many countries use and face challenges from intermittent renewables like wind and solar that disrupt regular power grid operation. Because of this, and the historically low emissions from the region overall, flexibility will be required in combining additional power generation capacity (e.g. from gas engines) with expanding affordable renewables (Modau n.d.).

## 6. How are policy makers addressing biodiversity loss due to extractives sector?



Biodiversity is undeniably important. When biodiversity is damaged, the economic and political realms of countries can be damaged as a result. Biodiversity increases food security, and stimulates innovation. In countries like South Africa, approximately R14.4 billion can be attributed to the wildlife economy, and R31 billion of money from tourism can be directly contributed to biodiversity (Benefits of Biodiversity Sector, n.d). As we can see in countries like Zambia, national parks and other environmentally preserved areas provide direct benefits to their neighbouring communities, and have wider spread positive impacts on the rest of the country (Protecting Biodiversity to Improve, 2022).

There is undoubtedly quality of life benefits associated with a diverse, beautiful, plentiful natural landscape. These can be difficult to quantify and are not necessarily reflected in a country's economic success. However, the tourism and wildlife industries in Southern African countries can account for large percentages of countries GDP.

The benefits of protecting the diversity of landscapes, ecosystems, and species go beyond preserving the natural beauty of the environment and include positive impacts on the economy and citizens of a country. Additionally, biodiversity looks at more than simply the number of species present in an area—we must also consider the diversity of ecosystems/landscapes, and the survival of the species that are present in the face of any changes to their environment. Over half of the global GDP (44 trillion USD) is dependent on natural resources and, therefore, faces risks when confronted with declining conditions (Half of World's GDP, 2020).

There are many regions in Africa—particularly within Mozambique, Zambia, Zimbabwe, the Democratic Republic of the Congo, and other parts of East Africa—that remain “pristine” environmentally speaking, with more than 97% of their biodiversity still intact. These regions risk being encroached upon as mines rapidly spread, despite their critical importance to conserving biodiversity. For example, in Mozambique, South Africa, and the DRC there are mines present in intact biodiversity areas and/or in biodiversity hotspots, positioning them to do significant damage to the biodiversity of these countries.

### 6.1. Key concerns of the impact of mining on biodiversity

Studies have shown that there are many ways that mining can impact the natural environment, including those identified here that are of particular concern:

- Ø Deforestation for timber or to clear space for other extractive operations can certainly contribute to habitat loss and direct loss of animal and plant species. This applies to industrialization relating to fossil fuel and “green” projects alike. As the demand for critical minerals grows quickly and exponentially, developments are

sometimes outpacing regulation, risking infringing on ecologically sensitive regions that lack the resilience to handle this kind of disruption.

- Ø Localized pollution of a habitat caused by mining technologies can cause sometimes irreparable damage to an area. Furthermore, because some of the speed of technological advancement, sometimes the exact pollutants or long term impact is not known when mining begins.
- Ø Industrial development can be associated with mining, as an increase in jobs or infrastructure can cause surrounding areas to become more developed. While these developments can have very positive humanitarian impacts, they lead to the destruction of more surrounding ecosystems, causing more stress to the local biodiversity.
- Ø Waste discharge and water pollution can increase as waste product from mines increases. This discharge can cause animal and plant death not only within the immediate radius of the mine, but along the path of any nearby waterway.
- Ø Ecological infrastructure can be significantly impacted by mines. This infrastructure (such as healthy catchments and wetlands) serves vital functions to neighboring communities, such as preventing floods and preserving water quality (Zimbabwe: Biodiversity, n.d.).
- Ø A lack of accurate recordkeeping can make tracking and controlling biodiversity loss challenging, like in the DRC which is one of the most biodiverse countries in the world (“Democratic Republic of Congo,” n.d.).
- Ø Global supply chain development and its associated infrastructure and carbon emissions may have unique impacts on

biodiversity, but more long-term and scientific research is required.

Beyond protecting biodiversity, protecting and preserving land has intrinsic economic and social impacts. Land must be acquired to access the physical resource itself, create supporting infrastructure around the access point, create transport to processing facilities, and to house processing facilities. This does not even consider the development that may be associated as surrounding communities grow as a result of the development. Within all of this land, the likelihood that a community could be displaced or land tenure could be impacted is significant. It is important to note that this relates to both formal (legal, defined) land rights and informal/customary rights (socially recognized), and both categories should be considered and respected (Lowery & Vhugen, 2016).

Changes to land tenure, whether voluntary or involuntary, have multidimensional impacts that disproportionately impact vulnerable communities, children, and women. As such, it is important to adopt procedures of free, prior, and informed consent (FPIC), demonstrating “consent rather than consultation” with any community being displaced due to an extractives project—in particular: indigenous communities, pastoral communities, and women (Lowery & Vhugen, 2016).

Climate change is expected to compound water scarcity in Southern Africa, one of the seven water-stressed mining hotspots in the world. This situation will be exacerbated by the mining of critical metals, which is expected to increase. In the mining and processing critical minerals like lithium, for example, substantial amounts of water are required for pumping, treating, heating and cooling operations. According to IRENA (2023), approximately 50% of lithium and copper extraction occurs in highly arid or water-stressed areas. Given that the mining processes have a substantial water requirement;

this could create conflicts regarding the utilization of water resources in the communities. For example, in Zimbabwe, lithium extraction has been reported to consume millions of gallons of water (ZELA & AIEL, 2023), putting pressure on the scarce water resources in the mining areas.

Research in the extractives sector has shown that through the mining of critical metals or other metals,

there can be a release of the mineral substances or chemicals into the atmosphere, water or soil, resulting in environmental pollution. The released chemicals often enter human systems, causing serious health impacts. For example, a biomonitoring study of cobalt mining that was done in the DRC revealed that there were significant concentrations of cobalt in the urine of children.

# 7. What are the impact of extractives on communities, land and women rights?



## 7.1. Labour and Human Rights

One main social challenge associated with mining is that of poor labour conditions in the sector. In many countries, especially in Africa, there is lack of adequate social protection and labour laws to govern the exploitation of human capital in the mining sector. This often leads to low wages and poor or sub-standard working conditions for the employees. There are concerns that the extraction of transition minerals could contribute further to labour exploitation and violation of human rights (IRENA, 2023). The widespread practice of ASM further exacerbates threats to labour conditions in countries like Zimbabwe and the DRC. In these countries, ASM is dominant especially in the extraction of minerals such as cobalt and lithium. As shown in the Figure 10 DRC, Zimbabwe and Tanzania are among the top ten countries by number of people engaged in ASM worldwide. For a just and sustainable energy transition, there is need to address the challenges that come with ASM in these countries. For instance, cobalt mining in the DRC has been widely criticised

for exploiting child labour (Sharma, 2021; Fleming 2018). Fleming (2018) argued that in the DRC, children as young as 10 are employed in cobalt mining, and they involved in arduous activities such as digging underground and washing the extracted cobalt in rivers. In Zimbabwe, children help their parents in carrying lithium ore and carrying out other household chores. In addition to this, in one of the lithium mining projects in Zimbabwe, the mining was done by ASM at a local school (ZELA & AIEL, 2023), disrupting children’s rights to a safe and clean environment for learning.

## 7.2. Bolstering the role of women participation in the extractives sector

The extractives sector is dominated by men, and has historically been vulnerable to gender bias and systemic discrimination throughout its value chain. Although the extractives sector’s operations typically create job opportunities for communities, traditionally the sector involves heavy manual labour, which is typically dominated and suitable for men, as a result women are disadvantaged or excluded from economic opportunities of working in the extractives sector due to such biases (Eftimie et al, 2009). At the same time, women in the extractives sector face poor working conditions and are often subjected to abuse. For instance, a research conducted by the

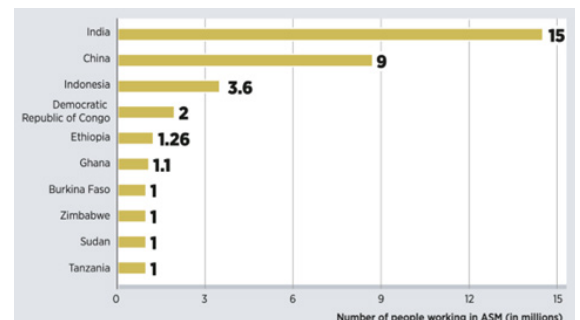


Figure 8: Top 10 countries by number of people engaged in ASM (in millions) Source: IRENA (2023)

World Bank in Papua New Guinea found that women in the extractives sector were often subjected to sexual abuse and gender based violence (Eftimie et al, 2009). Generally, the challenges facing women in the extractives sector are often amplified by the lack of policies and regulatory frameworks that are aimed at identifying and protecting the rights of women and ensuring equal representation and access across the extractives value chain (EITI, 2019).

Despite these challenges, women are involved with mining, albeit at a lower but increasing rate when compared with their male counterparts (Women and the Mine of the Future: Global Report, 2023). Even when women are drawn to mining and want to be involved or get an entry level position, they leave mining at higher rates, potentially due to the many challenges they face in this sector (McKinsey & Company, 2021). Women are not only less directly involved in opportunities, but they face disproportionately high impacts from resettlement and land loss, as well as the negative environmental impacts associated with extractives and mining (Transforming Extractive Industries for Sustainable Development, 2021). Due to the significantly limited access to land tenure that women have in many parts of the world, they are particularly at risk when both renewable and non-renewable energy sources require significant land acquisitions. On a practical level, working conditions in mining jobs are not conducive to women's employment or designed to meet women's needs. This ranges from PPE and parental leave to sexist attitudes and a lack of access to vocational training. Furthermore, access to maternity leave, breastfeeding breaks, or other supports for working mothers can be extremely limited (Women and the Mine of the Future, 2023). Not only does this have obvious impacts regarding

equality and equity, but studies show that there are financial and operational benefits to having gender diversity in the workplace (Mackenzie, 2019).

Also, there is a general perception that women participation in the extractives sector is low in Africa, however, in the artisanal and small scale mining (ASM) women play a significant role. For instance, African Minerals Development Centre (2015) estimates that the ASM workforce comprises of between 40-50% of women. It is therefore critical for African governments to improve the working conditions in the ASM to make women safer and include them in decision making and other processes, this would ensure that they are able to fully benefit from the extractives sector. Despite having specific and unique roles in ASM, women face unique health and safety risks compared to men in the sector (Eftimie et al, 2009). These therefore requires African governments to develop and put in place strategies and policies to ensure that initiatives to upscale ASM in Africa are transformative in the lives of vulnerable women and girls in the extractives sector (African Minerals Development Centre, 2015). To achieve gender equality in the extractives sector in Africa, governments need to better dimensions of the sector, including providing support to mainstream gender dimension issues into mining policy and regulations (Eftimie et al, 2009).

Currently, the African governments are confronted with a challenge of creating opportunities for women in the extractives sector, especially the majority that is involved in ASM. In order to address these challenges, African governments would need acknowledge the role of women in ASM and their operations into national, regional and global value chains, with emphasis being placed on women empowerment,

provision of training and capacity building (African Minerals Development Centre, 2015). Such actions would ensure that there is a gender-balance in the whole extractives sector, which has the potential to empower women economically, thus resulting in stronger economies across the continent (EITI, 2019). However, to achieve gender balance in the extractives sector, women need to be consulted and

engaged in decision making in the sector as well as provided a platform to contribute to the development of gender-responsive and inclusive strategies in the sector (EITI, 2019). There is also a strong need to mainstream cleaner production mechanisms in the sector in order to align the sector with the just transition pathway, and make the extractives sector safer and working conditions conducive for women.

## 8. Case studies on the role of the extractives sector in the transition low carbon development



### 8.1. Introduction

The previous sections have looked at the relationship between the extractives sector and the just transition, from the global and continental level. In this section we delve into 5 key focus countries which include the Democratic Republic of Congo (DRC), Zimbabwe, Zambia, Mozambique and South Africa which are selected as case study countries for this report. In these countries we highlight their socio-economic context, risk of stranded assets by looking at key mineral resources that are being prioritized in each country and whether these pose any risk for the country to exploit available precious mineral resources which are critical for clean energy technologies. We also look at whether each country has strong governance in order to ensure that critical mineral resources are exploited in a manner that will benefit all the country's population, and lastly we delve on the impact of the extractives sector on the

population and the environment, while also providing a brief highlight of what is being done in each country to improve the extractives sector and achieve the just transition targets.

### 8.2. Democratic Republic of Congo

#### 8.2.1. Socio economic context

The Democratic Republic of Congo is one of the poorest countries in the world, despite being well endowed with natural resources. According to the World Bank (2023), around 62% of, which is roughly around 60 million people in the DRC lived on less than \$2.15 a day in 2022. Despite high poverty rates, unemployment, high rates of gender-based violence (GBV) and discrimination, high rates of child labour, DRC has one of the highest GDP in Sub-Saharan Africa. In 2023, the country's GDP is projected to grow 8% and decrease to 7.2% in 2024 (AfDB, 2023a). The key economic sectors in the DRC include mining, agriculture, fishing and manufacturing. The country's agricultural sector accounts for over 40% of the country's GDP and employs 70% of DRC's population and is also the primary source of income for the



Figure 9: Map Showing location of key mineral deposits in the DRC.



majority of the country's population (World Bank, 2021).

The country's economic growth is driven by the extractives sector which is projected to grow by at least 12% between 2023 and 2024, and contributes around 98% of the country's exports (AfDB, 2023). Overall the extractives sector contributes around 30% to the country's GDP, making it a vital sector of the country's economy. The extractives sector has created over 370, 000 jobs in the DRC, with more than 1,875, 000 of the country's population dependent on the extractives sector (University of Cape Town, 2019). If managed well the country's extractives sector has the potential to drive the just transition, mobilize climate finance and lift majority of the country's population out of poverty. Similar to most countries, the DRC is vulnerable to the impacts of climate change. The country is prone to natural disasters such as floods, landslides which exacerbate fragility by deteriorating infrastructure and living conditions in a country already facing high poverty and significant infrastructure gaps (International Monetary Fund (IMF), 2022).

**8.2.2. Risk of stranded assets**

The DRC is endowed with exceptional natural resources, including minerals such as cobalt and copper, hydropower potential, significant arable land, and immense biodiversity, which are critical for the clean energy transition (World Bank, 2021). The DRC is the world's largest producer of cobalt and one of the largest producers of copper (EITI, 2022). The country supplies more than 60% of global cobalt which is key to fuelling the global vehicle revolution and achieve the global promise of a decarbonized future. At present cobalt is one of the world's most sought after mineral and a major and key ingredient in the batteries that power most EVs. Despite being a key source of production for cobalt, DRC is facing significant challenges that could potential decrease the exports of cobalt in the country. For instance, over the years DRC has failed to attract adequate investments to improve its cobalt mining, while other challenges such as human rights violations and poor labour practices in the extractives sector have been a major concern for many companies and countries. For example, companies such as Apple, Google and several other manufactures have exited the DRC

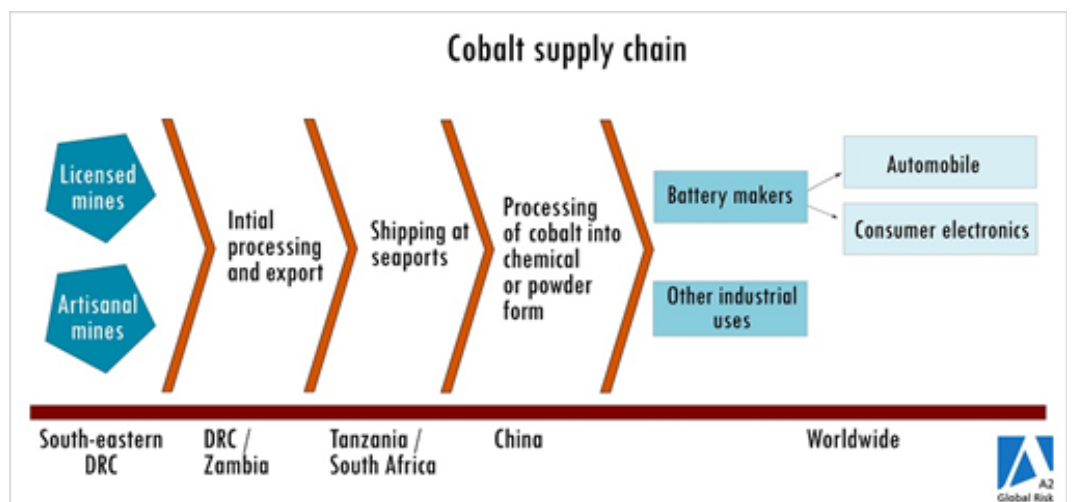


Figure 10: <https://copperbeltkatangamining.com/what-investors-should-know-about-cobalt-supply-chains/>

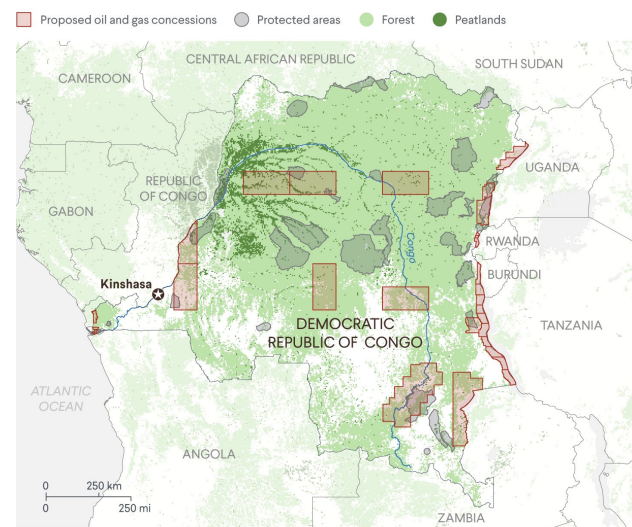
market, bowing to international pressure as a result of child labour practices, human rights violations and exploitation of the workforce in the extractives sector (Financial Times, 2020).

In addition to human rights violations in the country's extractives sector, the future of cobalt mining in the DRC is also threatened by the growth of Indonesian cobalt mining sector, which has helped drive prices of cobalt down from \$40 per pound in April 2022 to about \$15 (Financial Times, 2023). On the other hand, Chinese domination over operational control of many DRC cobalt mines has left many carmakers seeking alternative supply sources or attempting to change the chemistry of batteries to reduce cobalt usage (Financial Times, 2023). The dominance of Chinese companies in the extractives sector in the DRC, has also forced the United States of America and the European Union to develop the Inflation Reduction Act and Critical Raw Materials Act respectively, in efforts to reduce their reliance on China for raw materials for EVs and to foster supplies domestically or from friend countries (Financial Times, 2023). All these issues will have an impact on the DRC's cobalt production. However, as the pressure mounts the success and the critical contribution of the country's extractives sector will depend on how the government respond to these challenges. Figure 10 below depicts the cobalt supply chain from production in DRC to finished goods globally.

Currently, there is not much risk of stranded assets in the DRC, since much of the country's focus is on investments on cobalt and copper which are currently in demand for energy transition. However, there is a potential for stranded assets in the DRC, if the country continues with its exploration of oil and gas. Currently, there are three major oil companies that are conducting extractives operations in the DRC, these include Anglo-French firm Perenco, French

Oil Company Total and DRC parastatal SONAHYDROC (International Trade Administration, 2022). There are currently three major oil companies conducting extractive operations in the DRC; Anglo-French firm Perenco extracts offshore oil from the Atlantic Ocean off the coast of Muanda in Kongo Central; French Oil Company Total, and DRC parastatal SONAHYDROC, which are conducting exploratory and preliminary extractive operations in the Eastern DRC. The government of the DRC is currently auctioning licensing rights for a number of oil and gas blocks, opening up parts of the world's second-largest rain forest to exploitation (Council on Foreign Relations, 2022). If the country continues to pursue oil and gas exploration in the Congo basin, which is one of the largest rainforest on earth, and consist of Virunga national park, which is critical for endangered gorilla habitats (The Guardian, 2022), there is high risk of oil and gas becoming stranded asset in the future, as the world pursue a just energy transition. Figure 11 shows where the proposed drilling for oil and gas reserves in the DRC are located.

#### DRC's Oil Blocks Include Sensitive Environmental Areas



Note: Forest indicates areas with at least 50 percent tree cover.

Sources: DRC Ministry of Hydrocarbons via Congo/peat; World Database on Protected Areas via Global Forest Watch; Sexton et al. via NASA Land-Cover and Land-Use Change Program; Gumbrecht et al. via Global Forest Watch.

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**Figure 11:** <https://www.cfr.org/article/democratic-republic-congo-drc-auction-rain-forest-oil-gas>

### 8.2.3. Governance challenges

A particular area of concern in the DRC is government transparency, which is significantly lacking. This led to corruption, and as a result the wealth gained from natural resource extraction has not benefited citizens of the country (Democratic Republic of the Congo 1993-2003: UN Mapping Report, n.d.). This corruption pervades across sectors but is particularly prevalent in mining. Mining has even played a significant role in financing armed groups (Pattison, 2022). The mine certification project includes many potentially unnecessary roadblocks and bottlenecks which encourage bribery and coercion to move projects through. This challenge of choosing between a lengthy (or truly never ending) process of certification vs. engaging in illegal bribery, along with a desire for resources to be sourced “conflict-free,” drives some foreign investors out of the DRC and to their more politically stable neighbors (Alusala, 2017). This pervasive corruption also significantly limits the investment and tax distribution throughout the country, with insufficient capacity and economic viability across many of the provinces outside of Kinshasa (Yeboua, 2023). In addition to rampant corruption in the DRC, the government has often been accused and criticised for its failure to put in place adequate labour inspection system, to protect and remove children from the worst forms of child labour and protect the human rights of the workers in the extractives sector (Amnesty International, 2016).

The lack of robust infrastructure also limits the country's ability to achieve inclusive and sustainable economic growth. The government's previous target of giving 60% of the country access to electricity, is sadly out of reach, whereas several education-related indicators have improved. However, the education completion rate is very low, particularly for women (Yeboua, 2023). While the conflict that has wracked the country since 1990s remain a key stumbling block on improving the lives of the

country's population. Over the past few years, the armed conflict between various rebel groups and in some instance government forces has displaced millions of people in the country, while also causing deaths of millions of the country's population. The country's weak governance, as a result of the afore-mentioned issues has also led to high deforestation and forest degradation in the country, whereby most of the country's forest is cleared for subsistence agriculture, fuelwood (which provide 90% of the country's energy needs and infrastructure development (roads and urban infrastructure) (World Bank, 2021). The deforestation in the country can also be attributed to the expansion of the extractives sector. Overall weak governance associated with limited institutional capacity and mechanisms to reduce or limit deforestation and enforce regulations and policies in the DRC remain key challenges (World Bank, 2021). At the same time, the workforce in the extractives sector remain exposed to exploitation and human rights abuse, due to the country's Mining Code and Regulations containing limited guidance on health and safety and contains very few provisions to protect the workforce and enforce miners' labour rights (Amnesty International, 2016). Impact of extractives sector and policy response

The massive exploitation of resources in the DRC has profound negative consequences, such as the destruction of critical ecosystems, pollution and human rights violations. For instance, as a results of its precious minerals, the DRC is one of the most countries that are mostly affected by land grabs for mining purposes. There are reports of companies from abroad that buy or lease land that has been previously used for small-scale farming, or used communally, thus displacing thousands of local communities. As a result, since the early 2000s, deals for the purchase or use of use of more than 9 million hectares of land have been closed in the country, affecting approximately 4 percent of its landmass (Copper Belt Katanga Mining, 2022). Human rights violations are common throughout

the entire local value chain of the extractives sector in the DRC. In 2014, it was reported by UNICEF that there were approximately 40,000 young boys and girls working in the extractives sector in the DRC, with majority of them involved in cobalt mining (Amnesty International, 2016). While at the same time, there have been reported cases of health problems associated with the extractives sector. For example, a research by Amnesty International (2016) revealed that people working in the extractives sector complained about respiratory problems, and pains as a result of carrying heavy loads and physically demanding nature of the extractives sector.

Several policies and initiatives have been undertaken in the DRC in order to improve the extractives sector. For example, the Mutoshi mine, which is a pilot project developed in 2018 is aimed at improving the working conditions of ASM and eliminate child labour in the extractives sector, the project also aims at formalization process, by fully integrating women in ASM, and this is deemed a key factor in reducing labour issues and improve site safety standards in Mutoshi mine (Baumann-Pauly, 2023). Some of the policy initiatives aimed at improving the extractives sector in the DRC include Cobalt Action Partnership which seeks to promote engagement of companies towards sustainable and inclusive cobalt value chains, while simultaneously improving the safety and working conditions of miners, promote gender equality, address corruption in the extractives sector and human rights violations, mitigate negative environmental impacts of the extractives sector amongst other key objectives of the Cobalt Action Partnership (UNICEF, 2020). In addition, the country recently developed The National Adaptation to Climate Change Plan (2022-2026) which seeks to develop public-private partnership in efforts to mobilize private finance to support the country's development plans.

## 8.3. Zimbabwe

### 8.3.1. Socio economic context

Zimbabwe remains one of the poorest countries in the world. In 2022, the country's extreme poverty rate was an estimated 44% (AfDB, 2023). The country's GDP growth went down from 8.5% in 2021 to 3.0% in 2022 (AfDB, 2023). This was largely due to external shocks such as the COVID-19 pandemic, including floods and drought that was experienced in the country which largely affected the country's agricultural output. Unemployment rate was 7.90% in 2022, majority of the country's population live below poverty line due to majority of the employed earning less than the international poverty line of \$2.15 per day. As a result of the persistent high inflation, high dependence on low productive agriculture, slow structural transformation, and climate shocks such as drought and floods, coupled with external shocks such as the COVID-19 pandemic and the recent war in Ukraine the country's poverty rate remains high, while the country is also vulnerable to climate change (World Bank, 2023).

To make matters worse, the country's debt is very high. In 2022, debt stood at \$17.5 billion, which is 66% of the country's GDP (AfDB, 2023). The country's high unsustainable debt and arrears to international lenders limit the Zimbabwe's growth potential (World Bank, 2023). Due to being one of the small emitters by global standards and being one of the most vulnerable countries to climate change, Zimbabwe's NDCs focus more on adaptation rather than mitigation. In its submitted NDCs, Zimbabwe seeks to support its National Development Strategy (NDS1), 2021-2025, which aims to increase the country's GDP growth rate to above 5%, create around 760,000 formal jobs, increase agriculture production, increase electricity and coal supply to resurgent iron and steel sectors under business as usual (BAU) scenario (Government of Zimbabwe, 2022).

### 8.3.2. Risk of stranded assets

The extractives sector is a pillar of Zimbabwe's economy. The sector accounts for about 12 % of the country's GDP, dominated by natural resource minerals such as platinum group metals (PGM), chrome, gold, coal, and diamonds etc. (International Trade Administration, 2022). The country also has a large reserve of lithium which will play a critical role in the clean energy transition. The country's lithium deposits are considered to be the largest in Africa, and the country is expected to be one of the leading and largest lithium exporters in the world in the near future due to the increasing global demand for rechargeable batteries (International Trade Administration, 2022).

The country's lithium potential places the country in a good position to become one of global players in mining of the lithium to support the world's just transition efforts. However, the country need to stop investing in mineral resources such as coal which are at risk of becoming stranded assets as the world transition to low carbon development. After months of exploration in the North of Zimbabwe's capital, Harare, Australian owned oil and gas firm Invictus Energy announced in early 2023, that it discovered the presence of light oil and gas condensate. This therefore means that Zimbabwe is interested in pursuing oil and gas, meaning that the country is likely to face challenges in the future as oil and gas will become stranded assets, as the world transition to clean energy.

### 8.3.3. Governance challenges

Since Zimbabwe's independence in 1980, the country has faced civil unrest, widely condemned general elections, and military interventions ("Zimbabwe," 2023). On top of this, some of the challenges facing Zimbabwe's economy include managing multiple exchange rates and their instability; unsustainable debt levels; slowing GDP growth; and misallocation

of the country's resources (Zimbabwe: Overview, n.d.). The poor conditions of the economy in the country continue to impact things like their telecommunication systems, and economic potential was further damaged by COVID-19 and reliance on natural resources ("Zimbabwe," 2023).

Overall, the extractives sector in Zimbabwe has always been confronted with the challenge of poor governance. Also Zimbabwe's extractives sector has often been accused of lacking transparency and accountability making it difficult to understand whether the sector truly contributes to sustainable socio-economic and environmental development. For the year 2022, Zimbabwe had a low Corruption Perception Index of 23, which implies very high levels of perceived corruption in the public sector (ZELA & AIEL, 2023). For instance, Gong and van Staden (2021) argue that in the Hwange Expansion Project which is central to Zimbabwe's energy plans there were no comprehensive environmental impact assessments that were made publicly available. Furthermore, the researchers were forced to rely on outdated data such as government reports on previous similar projects and highly critical reports produced by civil society groups and journalists about the project expansion and related previous projects (Gong and van Staden, 2021). For Zimbabwe to capitalize on its abundant mineral resources significant changes are needed. These will include measures to increase transparency in the extractives sector, strengthening of property rights to protect communities, reduction and controlling high rampant corruption in the country, including liberalizing the foreign exchange markets (AfDB, 2023).

### 8.3.4. Impact of extractives sector and policy response

Although the country is endowed with mineral resources, over the years the extractives sector in Zimbabwe has been often associated with negative social impacts such as the displacements of local

communities with inadequate compensations, unfair labour practices, including negative social and environmental impacts on local communities. The mining of lithium in some districts of the country has been reported to be destroying ecosystems, threatening agricultural livelihoods and disrupting nearby communities (ZELA & AIEL, 2023).

In Zimbabwe, land, agriculture, and mining have been linked since the 1800s as they collectively supplied the main exports and supported the majority of economic development in Rhodesia (Mberi et al., 2022). Mining provides many development opportunities by providing linkages with other sectors, but this must be supported by effective policies to ensure the benefits are felt within the country. This includes re-examining economic sanctions, direct tax contributions, and loan provisions (Mberi et al., 2022).

The global demand for lithium has generated a series of policy responses in Zimbabwe. Some of these include the banning of the export of lithium bearing ores, and the amendment of the Mines and Minerals Act to recognise lithium as a strategic mineral (ZELA & AIEL, 2023). In addition, there has also been an influx of investors and projects in the lithium sector. Lithium is mined by artisanal, small scale and large scale miners. Among the large scale miners, China has acquired the largest portfolio of the mining projects in the country. Beyond the mining stage, the country has no other engagement in the battery supply chain (Goodenough et al., 2021).

To achieve economic growth and achieve its climate change targets in transitioning to green and inclusive growth Zimbabwe is developing the National Climate Change Fund and Climate Finance Facility to mobilize private sector finance through new funding mechanisms such as blended finance and results based approaches (AfDB, 2023). Currently, there is a gap in the country's climate finance. Currently the country receives around \$90 million per year for its

climate actions, leaving a financing gap of \$440- 500 million a year (AfDB, 2023).

## 8.4. Zambia

### 8.4.1. Socio economic context

Zambia is a resource-rich country. The country is also considered as one of the world's youngest countries by median age (World Bank, 2023). Despite being a resource-rich country the country is among countries with the highest poverty rate in the world. More than 300, 000 of the country's 20 million population make their living directly or indirectly from fishing (AfDB, 2023). As of 2021, unemployment in Zambia stood at 13.8% (Zambia Statistics Agency, 2023). In 2015, the World Bank stated that more than 61% of the country's population earned less than the international poverty line of \$2.15 per day, compared to 41% across the Sub-Saharan Africa region, while three-quarters of the poor in Zambia live in rural areas (World Bank, 2023). Of the country's total population, more than 50% live below the poverty line (AfDB, 2023). As of 2021, in order to address the challenge of poverty and unemployment in the country, the Zambian government has shifted its focus to supporting entrepreneurship. This was demonstrated through the setting up of the Ministry of Small Medium Enterprises Development (MSME) in 2021 in efforts to encourage the growth and development of cooperatives, small and medium firms in order to produce jobs and wealth throughout the nation. The services sector, sector and agriculture remain the key contributors to the country's economy, and they also contribute the largest revenue to the country's GDP

The AfDB projects that Zambia's GDP will grow to 4.0% in 2023 and 4.2% in 2024, boosted by the continued growth and recovery of the country's mining sector, services, manufacturing, and coupled with higher global copper prices (AfDB, 2023). Despite the expected continued GDP growth, the country remains trapped in huge debts. Zambia has debt

which is above 104% of its GDP (AfDB, 2023). This makes it difficult for the country to grow its economy as it is expected to pay off its debts. To ease the debt burden of the country, in 2023 the Official Creditors' Committee under the G20 Common Framework signed an agreement to provide debt relief to Zambia (World Bank, 2023a). Despite facing some challenges, the country's GDP is expected to grow significantly due to the increasing demand of copper from countries such as China, commencement of fertilizer production, completion of reforms to agricultural policies, business regulations, and bolstering of the country's energy sector which is expected to fiscal sustainability and promote private sector-led growth (World Bank, 2023). If the country can capitalize on the anticipated price boom of the precious minerals by increasing production of transition minerals it stands a good chance of addressing its existing systematic challenges such as poverty, unemployment, huge debts and inequality

**8.4.2. Risk of stranded assets**

Copper and cobalt are essential for the switch from fossil fuels to renewable energy in order to reach a low carbon future, and Zambia has significant quantities of both. The country contains around 6% of the world's copper reserves, and the metal accounts for up to 80% of the country's exports earnings (The Conversation, 2023). Zambia's diverse mineral resources, including precious minerals that are critical for the just transition, create a unique opportunity for Zambia to stimulate economic growth and generate job opportunities, while also addressing inequality challenges. The extractives sector has been critical for Zambia's economy. The sector contributes around 10-12 % of the country's GDP and over 70% of the country's export earnings, while contributing 26- 31 % of domestic revenue generation and around 2% of the country's total employment (Banda, 2022). Although the country is endowed with several mineral resources, over the past years much focus on the country's extractives

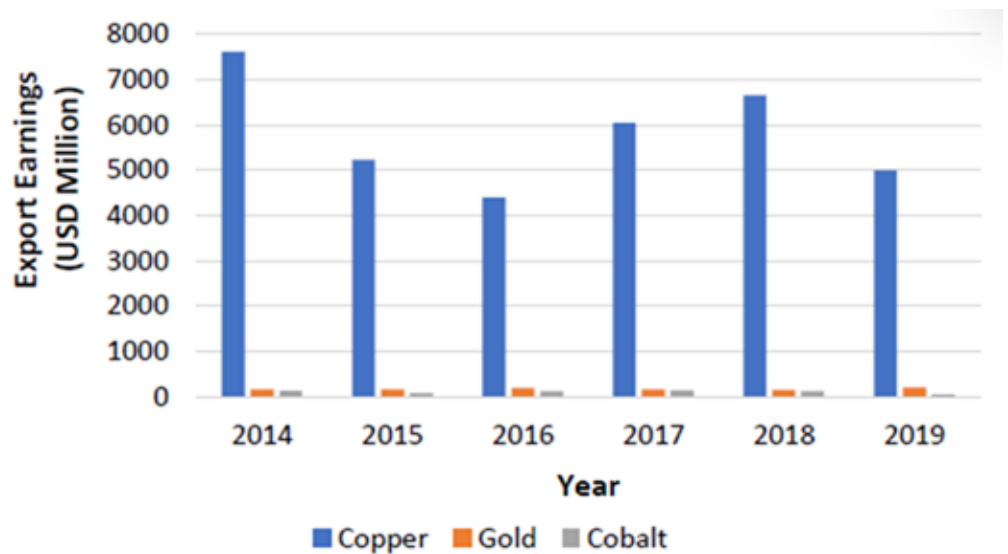


Figure 12: Export earnings of copper, gold and cobalt (Source: Banda, 2022, extracted from Oxfam, 2021)

sector has been mainly on copper mining, while minimal attention has been provided to other critical mineral resources. Figure 9 below depicts export earnings of copper, gold and cobalt in Zambia between 2014-2019.

Figure 13 provides a list of key critical minerals that are important in achieving net-zero targets and in which technologies will these critical minerals play a significant role in. The global demand for copper is rising rapidly and is expected to increase threefold by 2040, owing to its role in driving global clean energy transition (Center on Global Energy, 2023). The abundance of copper in Zambia offers the country with a unique opportunity to stimulate its economic growth and create jobs for the country's population, whilst also addressing socio-economic inequalities in the country. However, it is important that Zambia reduces its dependency on copper mining, and focus some of the country's investments on critical minerals such as cobalt, nickel, platinum amongst others, which will also play a critical role in driving clean energy technologies and decarbonisation.

### 8.4.3. Governance challenges

Similar to most of the Southern African countries, Zambia is also confronted with the challenge of poor governance in its extractives sector. Most of the governance challenges in Zambia are attributed to corruption and bribery in the extractives sector, mostly for mining licences. However, since Zambia started to implement the EITI in 2009, there has been a reduction in corruption, and the Zambia EITI has played a significant role in strengthening government systems along the value chain of the extractives sector value chain, while at the same time making information easily available for all the stakeholders (Kangamungazi, 2020).

Despite enjoying political stability over the past years, the country's policies have not really succeeded in ensuring that all the country's population equally benefits from the country's natural mineral resources. Currently the Zambian government need to improve its institutional capacity, systems of governance, accountability and transparency to ensure effective enforcement and regulations in the extractives

	Copper	Cobalt	Nickel	Lithium	REEs	Chromium	Zinc	PGMs	Aluminium*
Solar PV	●	○	○	○	○	○	○	○	●
Wind	●	○	●	○	●	●	●	○	●
Hydro	●	○	○	○	○	●	●	○	●
CSP	●	○	●	○	○	●	●	○	●
Bioenergy	●	○	○	○	○	○	●	○	●
Geothermal	○	○	●	○	○	●	○	○	○
Nuclear	○	○	○	○	○	○	○	○	○
Electricity networks	●	○	○	○	○	○	○	○	●
EVs and battery storage	●	●	●	●	●	○	○	○	●
Hydrogen	○	○	●	○	●	○	○	●	●

Notes: Shading indicates the relative importance of minerals for a particular clean energy technology (● = high, ● = moderate, ○ = low), which are discussed in their respective sections in this chapter. CSP = concentrating solar power; PGM = platinum group metals.

Figure 13: Critical mineral needs for clean energy technologies (Source: International Energy Agency, 2022).



sector. A study conducted by the World Bank (2016) found that there were lack of policy implementation incoherencies in Zambia's extractives sector, thus leading to weaknesses in the sector. These weaknesses included (World Bank, 2016):

- Poor handling of environment and social impacts of mining'
- Challenges with human rights violations associated with the sector.
- Ineffective development planning as it relates to mining.
- Issues concerning land access and women rights.
- Challenges with providing compensation and resettlement of local communities impacted by the extractives sector.
- The absence of revenue sharing between national and local government

The poor enforcement of policies and regulation in the extractives sector in Zambia is manly attributed to several factors such as political interference, weak legislation, inadequate financial and technical capacity by law and government enforcement agents, including rampant corruption in the country (Zambia Alliance of Women, 2018).

#### 8.4.4. Impacts of the extractives sector and policy responses

A major concern in Zambia is the lack of environmental and social protection of the local communities. This challenge is prevalent across the extractives industries in the Southern Africa region. There are also concerns about holding international companies responsible for their action due to the fear of losing foreign direct investment (FDI). For instance, a potential concern regarding the extractives sector in Zambia is the potential for environmental liability claims to be brought against international parent

companies, which could drive investment out of the country. In 2019, the English Supreme Court ruled in Vedanta Resources PLC and another v. Lungowe and others [2019] UKSC 20 confirming "the right of Zambian citizens to proceed in the English courts with claims relating to alleged toxic emissions from the Nchanga Copper Mine" (Tout & Gilfedder, 2019). The alleged pollutants in this case came from a copper mine, and Zambian citizens claimed that they polluted their water source (Bigby & Thomson, 2019). This case could potentially have implications for other Zambian mines moving forward, particularly those which depend on foreign investment.

Despite the aforementioned challenges, the extractives sector in Zambia has immense potential to leverage on the anticipated commodity price boom and energy transition. However, the country's success will depend on developing strong policies, enhanced mineral governance, developing enabling infrastructure, and increased transparency. Meeting these prerequisites will be critical for mobilizing the necessary financial and technical support that is needed for ensuring that the country maximizes its benefits from its rich-critical minerals and the anticipated commodity price boom of the precious minerals. However, significant investment is also needed in Zambia, in order for the country to fully exploit its critical mineral resources in a sustainable manner.

Currently the country requires an estimated \$50 billion of climate finance by 2030 if it is to achieve its transition efforts (AfDB, 2023). This finance is expected to be mobilized through climate finance mechanisms such as the Global Climate Fund and other climate-related bilateral, multilateral, and domestic financing (AfDB, 2023). However, the country has taken some significant steps to ensure that it benefits from the clean energy transition. These include the \$65. 6 million Zambia Mining and Environmental Remediation and Improvement Project (ZMERIP) funded by the World Bank in 2020

to reduce environmental health risks in critical polluted mining areas (World Bank, 2020). And more recently Zambia has partnered with the United States of America USA, the USA has made commitment to help Zambia develop supply chain for EV batteries, meaning that the country can build in local supply chain and not just rely on being the exporter of precious minerals (US Department of State, 2023).

## 8.5. Mozambique

### 8.5.1. Socio-economic context

Mozambique has one of the fastest growing economies in Sub-Saharan Africa region. The country's GDP growth rose from 2.3% in 2021 to 3.8% in 2022 (AfDB, 2023). The country's GDP is expected to rise to 4.8% in 2023 and a further 8.3 % in 2024, as a result of the extractives sector and the recovery of the agricultural sector which play a major role in the country's economy (AfDB, 2023). However, despite the continued growth in the country's GDP, Mozambique remains one of the least developed and poorest countries in the world (World Bank, 2023). Job creation, poverty reduction and human capital accumulation remain limited in the country, while most of the wealth in the country is only benefiting a few individuals. More than 60% of the country's 33 million people live in poverty, and around two-thirds of the total population live and work in extreme conditions in rural areas, while more than 1 million people were displaced by the conflict in Cabo Delgado (World Bank, 2023).

In addition to high poverty rates, unemployment and instability in Cabo Delgado, Mozambique is one of the countries that are most vulnerable to climate change. According to the Climate Vulnerability Index ranking Mozambique ranks number 156 in countries that are mostly vulnerable to the impacts of climate change, this is despite the country only contributing 0,21 % share of the global GHG emissions which is one of the lowest in the world (UNDP, 2021). As part

of its just energy transition ambitions, Mozambique is focused on mobilizing investments for both fossil fuels and renewable energy sources. The country hopes to increase energy access to 100 % by 2030. However, this seems unlikely to be achieved. For instance, in 2021, only 40% of the country's population had access to electricity (36% on grid and 4% off grid) (AfDB, 2021). Similar to most countries that are the signatory to the Paris Agreement, Mozambique is committed to reducing its emissions by 76.5 MtCO<sub>2</sub>eq between 2020 and 2030 (AfDB, 2021).

### 8.5.2. The risk of stranded assets

Mozambique is endowed with abundant natural resources, including mineral wealth, the recently discovered offshore natural gas, and arable land, water, and energy resources (World Bank, 2023). The extractives sector, particularly the recently discovered oil and gas sector, has proved promising in the Mozambican economy with potential to contribute to economic growth and job creation (CIP, 2020). Despite being committed to a just transition, Mozambique has emphasized that the just transition should not interfere with its ambitions of oil and gas extraction in order to improve the livelihoods of the country's population. Generally, this idea of pursuing fossil fuels, while at the same time committing to a just transition make Mozambique's just transition commitments questionable. As a result of the strong government stance on supporting oil and gas extraction, in recent years' significant investments in the country have gone towards Liquefied Natural Gas (LNG).

Huge new gas finds have led to expectations that these industries will contribute very significantly to the country's future economic development and structural change (Roe, 2018). For instance, projected LNG investments of US\$ 55 billion in 2021, equivalent to four times the size of the country's GDP, constitute the largest foreign direct investment

in Africa (AfDB, 2021). The continued investments in LNG in Mozambique put the country at risk, because oil and gas will likely become stranded assets in future if the world is to meet its climate targets. However, Mozambique continues to focus on mobilizing substantial investments to support and grow its LNG, and the country is moving ahead with plans to develop oil and gas sector to contribute to the country's economy.

Currently one offshore project, with an investment of \$7 billion has started production, while some larger projects, worth more than \$50 billion of investment are only expected to start operating between 2026-2028 (World Bank, 2023). However, once the start growing, LNG exports are expected to increase the country's exports by \$10- \$14 billion, making the country one of the global energy players in the long term (AfDB, 2021). Due to the country's investments in LNG, Mozambique is likely to face the challenge of stranded assets in future as the global demand for oil and gas is expected to decrease rapidly as the result of transition to clean energy technologies. Currently Mozambique has not developed any regulations that permit the country to attract investment and incentivize the exploration and development of critical minerals in the country, the country's main position has been on driving the growth of LNG and other fossil fuel minerals such as coal.

### 8.5.3. Governance challenges

Since 2017, Mozambique has been confronted by conflicts in the northern province of Cabo Delgado. The root cause of this insurgency in the oil and gas rich northern province of Cabo Delgado is not clearly known. However, many analysts and commentators have argued that the main cause of this conflict is the result of poor governance in the country which has led to poverty, inequality and frustrations of young people, lack of socio-economic opportunities and marginalization of the people in the northern province of Cabo Delgado in Mozambique. Such incidents

highlight poor governance because once not all the population is not satisfied with government services there is likely to be conflicts and resentments.

The discovery of LNG in northern province of Cabo Delgado and approval of extraction in 2017 exacerbated political and economic insecurities in Cabo Delgado as there were claims that local communities were being excluded from employment opportunities or only a few number of local population was being considered (Sokota, 2020). Such issues reflect poor governance in the extractives industry, simple because the government is supposed to be ensuring that the mining companies are abiding by the country's Mining Laws. The country's Mining Law was revised in 2014 in order to improve the extractives sector in Mozambique, especially regarding the licence regime (Clifford Chance, 2014). However, the country's extractives sector governance remains confronted by several challenges ranging from uncertainties concerning the rules and regulations governing the sector, while a number of provisions with the sector remain difficult to navigate by investors (Clifford Chance, 2014).

### 8.5.4. Impact of extractives sector and policy response

Although investments are pouring in in the LNG sector, the country is confronted by several challenges that are hampering the country's ambitions of becoming the major exporter of LNG. The country is currently grappling with military insurgency in parts of the gas-rich province of Cabo-Delgado (World Bank, 2023). This has threatened the economic potential of the lucrative investments in the country, particularly the Cabo-Delgado region where an estimated 4,000 people have been killed, while around 1 million people have been displaced (World Bank, 2023). Furthermore, the instability in Cabo Delgado has significantly impacted the expected outcomes from investments in the LNG sector. In addition to instability in the northern province of Cabo Delgado,

the government of Mozambique is struggling with how to formalize the ASM in the country, whereby a lot of cases of human rights abuse and sexual violations since ASM is not monitored. There is an estimated 150,000 men and women across the country mining a range of minerals on ASM and around 60, 000 of these miners are mining gold (Hilson et al, 2021), however they remain vulnerable to socio-economic impacts such as violations, health issues and exploitation due to not being protected.

Mining in Mozambique, especially coal mining has also managed to uplift the livelihoods of the country's population. For example, the extractives sector has led to an increase in consumption and a decline in poverty, because of workers moving out of agriculture into higher-paid jobs in the mining and service sectors, while mines have also managed to provide basic services such as drinking water, electricity, health services and education (Egger et al, 2021). However, these positive socio-contribution, in some parts of the country are overshadowed by negative impacts such as the relocation of local communities, air and water pollution which have been one of the main negative impacts of mining in Mozambique over the years

## 8.6. South Africa

### 8.6.1. Socio economic context

South Africa is considered as one of the most unequal countries in the world, while unemployment and poverty remain persistent challenges. An estimated 30% of the country's population is living in extreme poverty, while unemployment rate was an estimated 32.7% in 2022 (AfDB, 2023). The country's GDP dropped from 4.9% in 2021 to 2.0 percent in 2022 (AfDB, 2023). The huge drop in the country's GDP was attributed to flooding and looting in KwaZulu Natal (2022), consistent power cuts (referred to as loadshedding), coupled with the geopolitics such as the Russia's invasion of

Ukraine in 2022 (AfDB, 2023). To address its current challenges, South Africa has fully embraced the just transition. This has been evident in the country's REIPPPP which seeks to mobilize private sector investment in order to support its climate actions. Despite committing to decarbonisation, South Africa remains locked in an energy intensive economy. South Africa's energy sector is dominated by fossil fuels comprising of mainly extracted domestic coal which is supported by imported oil. Coal accounts for almost 70% of the primary energy and generate almost 90% of electricity in South Africa (Department of Energy, 2019). The dependency on coal presents a significant challenge for South Africa because of its contribution to climate change and air pollution which have detrimental impacts on the health of the population and environment. As the result of this high dependency on coal for energy, South Africa is in the top 20 of the world's highest emitters, with the energy sector being the highest emitter domestically (OECD, 2020)

### 8.6.2. Governance challenges

The Mineral and Petroleum Resources Development Act (MPRDA) (2002) is the main legislation governing the extractives sector in South Africa and was endorsed to give effect to the constitutional provisions in South Africa (Igbayiloye and Bradlow, 2021). This was also meant to ensure good governance in South Africa's extractives sector. To ensure good governance in the extractives sector, the MPRDA specifically states that any person or company who engages in any mining-related activity must notify and consult with the owner or occupier of a mining area (Igbayiloye and Bradlow, 2021).

Despite existing policies which seeks to ensure effective measures in the extractives sector, there have been reported cases of irregularities and corruption in the extractives sector in South Africa. For example, a research conducted by Professor Leonard from University of South Africa

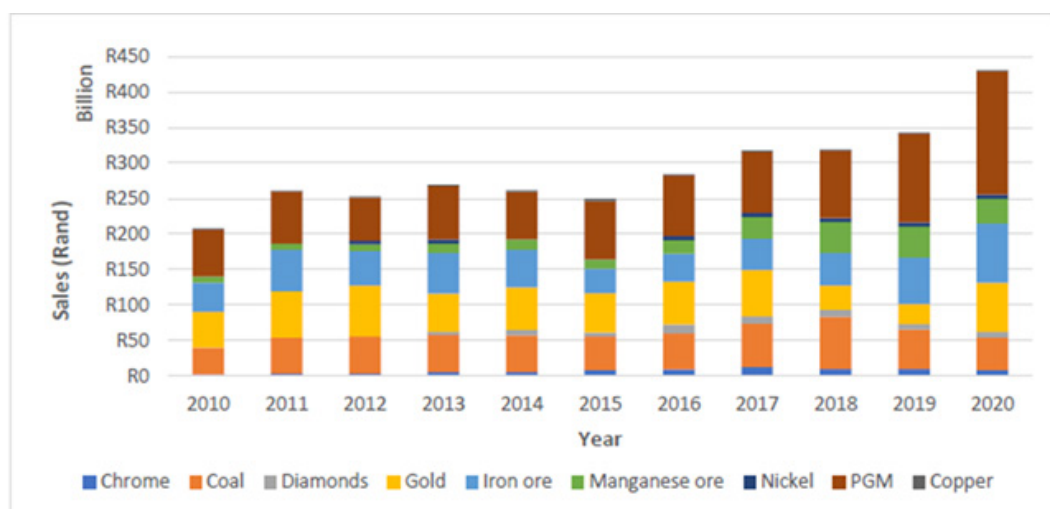
in Dullstroom, Mpumalanga and St. Lucia, KwaZulu-Natal found that corruption, poor governance and lax compliance were still rife in the extractives sector. He highlighted that these were due to mining corporations often employing government officials to get mining licenses approved, political connections which also enabled corruption between mining companies and government and mining companies paying off community leaders to intimidate local communities who were against mining operations in the communities (IOL, 2019).

The Department of Mineral Resources and Energy, which oversees the extractives sector in the country has also been often accused of ignoring spatial planning and designation of sensitive, vulnerable and important areas when granting mining rights (Centre for Environmental Rights, 2016). This therefore means that in some cases, mining rights are granted without inspecting the cumulative impacts of mining on water resources, biodiversity, air quality, food security and health or well-being of the affected communities despite the consideration of these factors being required by South Africa’s MPRDA (Centre for

Environmental Rights, 2016). Such issues reflect poor implementation of policy in the extractives sector by the government officials. Poor governance and poorly regulated mining policy in South Africa result to socio-economic and environmental impact for local communities such as air and water pollution, destruction of arable land, biodiversity loss, violation of human rights (Centre for Environmental Rights et al, 2016).

**8.6.3. Risk of stranded assets**

Coal which provides around 70% of South Africa’s electricity is increasing becoming at risk of becoming stranded asset. Although the country has developed policies and plans to reduce its dependency on coal, presently it is high unlikely that South Africa will manage to completely abandon coal in the next coming decade, this is due to the low uptake of alternatives such as renewables. South Africa is currently the fifth largest producer of coal in the world, the country produces an average of 224 million tonnes of marketable coal annually, and 25% of the country’s coal production is exported internationally



**Figure 14:** Export mineral sales in South Africa’s mining industry 2010 to 2020 (Source: Council for Scientific and Industrial Research (CSIR), 2022, extracted from MCSA, 2021)

(Eskom, 2021). As a result of the current Russia invasion of Ukraine, South Africa’s coal exports to

Europe increased by 720% in the first quarter of 2022 (Reuters, 2022). The risk of stranded assets in South Africa remains a key policy issue due to the country's economy dependency on coal. Furthermore, the country's monopoly energy supplier, remains at risk due to South Africa's transition pathway, Eskom faces a R14, 5 billion of transition risks from increased coal costs and a further R58 billion or more in stranded assets if the national government forces it to close some of its coal-fired power stations earlier (Venter, 2020). Stranded assets in South Africa do not only pose a risk to the country's economy but the workforce, more than 93 000 people were employed in the coal mining industry in 2021, while around 458, 954 were employed in the extractives sector (Cowling, 2022). These numbers signify the importance of the extractives sector in employment and South Africa's economy, thus meaning that if coal becomes stranded asset the country is likely to face major challenges in terms of employment.

The just transition in South Africa will also lead to stranded communities where there will be massive job losses in the short term. Especially in provinces such as Mpumalanga where significant coal mining operations take place, Mpumalanga will experience challenges due to the labour force dependency on coal mining. The country may be particularly at risk in terms of stranded assets, due to the economy being "[inextricably] dependent on coal as both a cheap fuel and revenue source" (Rempel, 2023). The country is also one of the main investors in fossil fuels. For instance, the largest institutional investor into coal, oil, and gas companies combined is the Government Employees Pension Fund (Balendran & Ganswindt, 2023). South Africans face potential transition risks of more than 120 billion USD, which is largely dependent on events and policies outside of its control. However, these risks will not be shared equally, and planned investment decisions and incentives within the control of the South African government are set to exacerbate these risks (Matthew Huxham et al, 2019).

Although there is high risk potential of the stranded assets in South Africa, the country also has an opportunity to capitalize on the global just energy transition and efforts to decarbonize the world's economies by being a key critical mineral producer of critical minerals needed to drive clean energy technologies. South Africa hold more than one key critical minerals important for a just energy transition, these include minerals such as copper, cobalt, nickel and Platinum Group Metals (PGM) amongst others. Figure 14 shows export minerals sales of key minerals that are exported in South Africa. South Africa is the largest producer of PGMs in the world. In addition, critical minerals such as PGMs require a more concerted focus in South Africa because of their key role in clean energy technologies. PGMs are critical in both green hydrogen and fuel cells, PGMs are used in electrolyzers to separate water into hydrogen and oxygen, and in fuel cells to generate electricity from the hydrogen, with both playing key decarbonisation roles (Engineering News, 2022).

Despite committing to a just transition, the current energy crisis will make it even more difficult for the country to transition away from coal. Considering the high levels of unemployment in the country, any transition plans that do not include significant job creation is guaranteed to fail. This is especially so, because South Africa has very strong Labour Unions, who will derail any plans to shift away from fossil fuels.

#### **8.6.4. Impact of the extractives sector and policy response**

The extractives sector in South Africa has both negative and positive impacts on the population and the environment. The extractives sector value chain is one of the largest employers in the country, while its contribution to the country's GDP is substantial. The sector has also managed to attract several foreign direct investments in the country. However, despite its positive contribution in the country the sector is

often associated with negatives socio-economic and environmental impacts. For instance, the Marikana massacre which took place in 2012 was a direct social impact of the extractives sector. The workers in Marikana Platinum mine felt like they were not paid fairly by the mine, hence they decided to strike for better payment. However, this strike led to the death of 34 miners and several security guards at the mine. Such social unrest occurs simple because workers and in some instance local communities feel that they are not truly benefiting from resources being extracted from their land, hence such social unrest leads to strikes, protests and various forms of social unrests.

On the other hand, the extractives sector in South Africa has led to many death as a result of health issues, while displacements have also been reported. For example, it is estimated that due to the air pollution caused by coal mining in South Africa, 2 239 deaths occur every year, resulting from lung cancer, ischaemic heart disease, chronic obstructive pulmonary disease, strokes and a lower respiratory infection (Igbayiloyel and Bradlow, 2021). A classic case of nearly displacement of local communities is the case of Xolobeni Mine Sands Project, a proposed titanim-rich sands mining by Australian Company, Minerals Commodities Limited (MRC) (Igbayiloyel and Bradlow, 2021). However, due to strong South Africa's constitution and mining legislation including the pushback from some of Xolobeni residents the mine has not started its operations despite the Department of Mineral Resources and Energy granting the licence to the company to start its operations. But this has brought tensions amongst the local communities as some are against these operations while some see them as an opportunity for local economic development in their communities. At the same time the extractives sector is the biggest source of acid mine drainage in South Africa, the closing of mines result to acid water and heavy metals leak into the environment (Centre for Environmental Rights et al, 2016).

To address some of the challenges associated with the extractives sector, the South African government has developed several policies that seek to guide and improve the extractives sector, and manage the country's just transition ambitions. The country's extractives sector is guided by the Mineral and Petroleum Resources Development Act (2002) which protects the workers and settlements of communities surrounding mines. The act seeks to ensure that the rights of the communities are not violated as a result of mining operations in their land. And more recently, in 2018 the Mining Charter was revised stating that mining companies that do not comply with South Africa's mining rights and constitution could be penalized for non-compliance.

In terms of the just transition South Africa has been in the forefront of advocating for a fair and just transition. This has been evident in policy documents that have been developed in the country. The country's National Development Plan (NDP) which views the just transition as a core to shifting the country's development pathway to increased sustainability, fostering climate resilient and low GHG emissions development, while also providing a better life for all South Africans. South Africa was one of the first countries to include the phrase "just transition" in its first National Determined Contributions (NDCs). Over the past decade, a number of planning and policy documents have been created to specifically link the green economy to just transitions (CIF, 2020). In South Africa the just transition has been over the past few years a dominant policy push that aims to link climate issues with the broader economy.

Policy initiatives like the National Strategy for Sustainable Development (2011) and the White Paper on the National Climate Change Response (2011), the National Development Plan, including the recently developed Just Energy Transition Framework and the Just Energy Transition Investment Plan (JET IP) have been since developed to push a just transition narrative. Despite these efforts, the country has not

fully committed to a net zero pathway, however, these existing policy documents specify that South Africa commits to ultimately moving towards a goal of net zero carbon emissions by 2050 (Reeler et al, 2022). As a result of sound policies, South Africa was among the top 5 climate finance recipients in Africa between 2019/20 receiving a total of 40% of the total climate finance received by African countries. In the last decade South Africa has taken measures to restructure the energy sector by moving toward renewable and cleaner energy sources (AfDB, 2023). The country's just transition ambitions were boosted

by the Just Energy Transition Partnership (JET-P), which was announced at COP26. Under this partnership, developed nations such as France, Germany, the United Kingdom, the United States of America, and the European Union agreed to channel \$8.5 billion to support South Africa's just transition efforts (Connolly, 2022). With a strong emphasis on green innovations in electric vehicles and green hydrogen, the goal of this partnership is to promote the use of renewable energy technologies and accelerate South Africa's transition from coal to renewables.



## 9. Synthesis: Emerging trends in the extraction of critical minerals



The extractives sector in Africa will continue to play a critical role in driving the continent's development agenda. Africa is faced with systemic challenges of poverty, disease, and unemployment. Yet with a growing population, comprised of 70% of youth under the age of 30 years, Africa needs to industrialise in order to create sustainable jobs for its youthful population. However, the continent also needs to take cognisance of the global trends of transitioning into a low carbon development, to ensure that sustainability is effectively embedded in its development aspirations.

The review has shown that, Africa has made significant strides towards achieving a low carbon trajectory, while at the same time acknowledging the role that the extractives sector needs to play in achieving the continent's development agenda. In the following section, a synthesis of key emerging trends on the continent in relation to the transition to a low carbon economy are outlined.

### 9.1. Africa's pathway to a low carbon

#### development

Although African countries have committed to the Paris Agreement, fossil fuels continue to be subsidized in several African countries, making it challenging to encourage a transition away from them a carbon intensive pathway (Adeniran and Onyekwena, 2020). However, this reliance on fossil fuels can lead to intense economic instability, as GDPs can become dependent on fossil fuel exports.

- Despite the growth in global renewable energy installation, African countries still lag behind compared to other countries. In 2022, only 9% of all energy generated from Africa was derived from renewable energy sources, with majority of it generated from hydropower (WEF, 2022).
- Several policies at the country level have been developed in order to guide Africa's renewable energy pathway. For instance, South Africa has developed the REIPPPP which seeks to drive the uptake of renewable energy transition.
- At the continental level, policies such as Africa Mining Vision, Africa Agenda 2063 and the recently approved Africa green stimulus programme (2021) (developed to help Africa build-back better after the impact of the COVID-19 pandemic) are some of the major policies that seek to ensure that Africa achieves a just transition, especially in the extractives sector which is the backbone of many African economies.
- Despite holding around 30% of the world's critical minerals that are important for low carbon development, African countries have not really positioned themselves, this may be attributed to lack of finance, lack of capacity and inadequate infrastructure.
- Each country's response to the increased demand for fossil fuels will be unique

depending on a complex myriad of factors including their GDP and its breakdown by sector, the state of socio-economic equality in the country, natural resources available within its borders, and more

### 9.2. Governance challenges in relation to the mining of critical minerals in Africa

There are various governance challenges confronting African countries when it comes to the extraction of precious minerals. For instance, cobalt mining in the DRC which is dominated by artisanal and small-scale mining (ASM) has been criticised for its human rights violations resulting from its weak governance (corruption), ethnic conflicts, child labour, fatal accidents, low wages, violent clashes between artisanal miners and government and private security personnel of large mining firms (Council on Foreign Relations, 2020). In general, there is a policy gap between existing policies and the need for governance frameworks to successfully manage the demand for critical minerals, and situations where there is a lack of enforcement or implementation of existing policies. Other major concerns related to governance include the following: -

- There is very limited amount of its critical mineral resources which are processed in the continent, with China being the dominant player in the processing and refining of these critical minerals (Mariais, 2022). This lack of local beneficiation is disempowering, due to the limited local value creation, as a result African countries cannot meet their obligations to their citizens.
- The African continent is also at risk of becoming locked in as a supplier of critical minerals to the West, as the US and Europe are increasingly seeking to compete with

China in securing critical mineral supplies from Africa and elsewhere (Marais, 2022).

- While many tools—such as the Africa Mining Vision, the EU Transparency Directive, and the EU Accounting Directive—have sought to address corruption, they have not levelled the playing field or provided comprehensive regulation that would ensure a more symbiotic relationship (Mostert et al., 2019).
- Much of the world's critical minerals like cobalt, lithium, nickel, etc are mined in countries that rank poorly in transparency, e.g. DRC and Zimbabwe. For example, for the year 2022, Zimbabwe had a low Corruption Perception Index, of 23, which implies very high levels of perceived corruption in the public sector.

### 9.3. The socio-economic impacts of stranded assets on Africa

Stranded assets are multi-dimensional, impacting: Physical assets, Laborers without work, Debt, equity, and other financial assets. While African countries and Africa as a whole will likely see minimal financial damage and an overall growth in GDP, countries like South Africa could see a drop in GDP as almost 70% of their fossil fuel reserves could be stranded (Watts et al, 2021).

When mining operations are discontinued or a mine is exhausted that can cause severe distress to local communities, possibly even economic and social collapse throughout an entire region (World Bank, 2008). For example, as South Africa seeks to transition to clean energy, millions of jobs connected to the coal value chain will be lost, while some jobs have already been lost. The closing of mines in some regions in Africa has also opened an opportunity for illegal mining activities, where illegal miners have been reported to be terrorizing surrounding communities.

#### 9.4. Policy response to biodiversity protection due to threats from the extractives sector

There is undoubtedly quality of life benefits associated with a diverse, beautiful, plentiful natural landscape in Africa. These can be difficult to quantify and are not necessarily reflected in a country's economic success. However, the tourism and wildlife industries in Southern African countries can account for large percentages of countries' GDP.

The policymakers in Africa are working with development partners to protect biodiversity. For example, the World Bank has been financing biodiversity conservation across Africa. The bank has invested about \$360 million in around 50 projects that are being implemented across Africa (World Bank, 2019).

African policymakers are also developing policies that will lead to a new economic development path that is founded on natural capital accounting and environmental restoration.

The continent's development agenda, Africa Agenda 2063, which aims for a place where "Africa's unique natural endowments, its environment and ecosystems, including its wildlife and wild lands, are healthy, valued, and protected, with climate resilient economies and communities," guides the protection of biodiversity in Africa (King, 2020).

#### 9.5. The impacts of extractives on communities, land, and women's rights

Changes to land tenure, whether voluntary or involuntary, have multidimensional impacts that disproportionately impact vulnerable communities, children, and women. As such, it is important to adopt procedures of free, prior, and informed consent (FPIC), demonstrating "consent rather than consultation" with any community being displaced due to an extractives project—in particular: indigenous communities, pastoral communities, and women (Lowery & Vhugen, 2016).

Women are not only less directly involved in opportunities, but they face disproportionately high impacts from resettlement and land loss, as well as the negative environmental impacts associated with extractives and mining (Transforming Extractive Industries for Sustainable Development, 2021).

As a result of the extractives sector many people across Africa have been displaced, while some have been forced to leave their land without any compensation or alternative place to live. For example, in Mozambique the discovery of gas in Cabo Delgado has led to military insurgency in parts of the gas-rich province of Cabo-Delgado (World Bank, 2023). This has threatened the economic potential of the lucrative investments in the country, particularly the Cabo-Delgado region where an estimated 4,000 people have been killed, while around 1 million people have been displaced (World Bank, 2023).

## 10. Conclusion and Recommendations



This review has outlined how African countries, particularly the case study countries which are currently faced by several challenges can effectively benefit from the increasing demand for precious minerals, as the world transitions to a low carbon economy. Although the demand for critical minerals, presents an excellent opportunity, there are major challenges which majority of African countries are currently battling with, ranging from high levels of corruption in the extractives sector, inadequate distribution of wealth gained from the extractives sector, including the lack of innovation and technology as majority of mining takes place in a small-scale artisanal mining where workers are often exploited and underpaid. Despite these current challenges there are still several opportunities for African countries to fully maximize the benefit of the increased demand for previous minerals, especially with the current state of global geopolitics, where every country is trying to find a source of the precious minerals in order to meet their global commitment to net-zero targets of 2050.

To unlock the potential of African countries to benefit from the just transition and the increased demand for precious mineral resources, this report highlights 4 key measures which need to be undertaken among others.

- I. Understand investment needs: Urgent investments are required for the extractives to modernise and acquire technologies and innovations that will make the extractives sector in Africa more competitive and efficient. The shoring demand for precious minerals poses a major challenge, as the mining sector at current production levels will not be able to meet demand for the energy transition. It's projected that to meet net zero requirements in 2050, the production of Copper, Aluminium and Nickel must double.

From a research perspective, there is a need to understand the investment needs of the extractive sector in Africa, including the quantum and financing mechanisms. For example, could climate finance be harnessed as a source of investments for sector, despite the fact that mining critical minerals still poses major environmental and social-economic challenges?

Overall its estimated that \$1.2 trillion will be needed by 2050 to harness critical minerals for the energy transition. A significant portion of that investment will need to flow to Africa, considering that that the continent accounts for 30% of critical minerals globally. However, many African countries have struggled to mobilise investments for their extractor sector, partly because of the perceived risks and the fact that these are fragile states, with weak governance systems.

- II. Sustainable sourcing: Mining critical minerals presents both an opportunity, but could also result in major environmental and social challenges. These challenges include habitat destruction, water pollution and human rights abuses such as the use of child labour. In order to ensure that these challenges are overcome, the sector needs to adopt sustainable practices, which prioritise habitat restoration through the implementation of mechanisms such as traceability to mainstream sustainable sourcing. The application of environmental standards in mining will ensure that pollution, water management and human rights abuses are minimised. In Africa this would result in a dramatic shift in the extractives sector, which has been plagued by unsustainable mining practices for decades. The main recommendation here is therefore to undertake more research and advocacy to promote transparency in the extractive sector, by ensuring that mining companies adhere to established environmental stewardship practices in their operations, and recognise human rights and labour laws.
- III. Stranded assets: The risk of stranded assets in the extractives sector is high in Africa, as investors divest from fossil fuels. Even though this divestment will not affect critical minerals, many African countries are dependent on mineral resources, whose demand will plummet as a result of the transition. It is therefore recommended that more work needs to be done to understand the potential risk of stranded assets, and its impact on the extractives sector and more broadly on the continent's development agenda. There is a need to undertake rigorous analysis of the socio-economic risks that African countries will face as a result of stranded assets of fossil fuels, and how they can be mitigated.
- IV. Women empowerment: Women play a major role in the extractive sector in Africa, even though their contribution is often undervalued. Women participation is important for sustainability in the extractives sector value chains and the communities where such activities are located. Studies have shown that when women are empowered, they reinvest in their families, education and the community at large. However, the extractives sector has been plagued by a history of exclusion, where local communities are not accorded opportunities for effective participation. Women do not only face gender bias in decision-making in their communities, but are often exposed to health and safety risks, and gender based violence. There are emerging good practices, which the extractives sector need to implement to empower women in the sector. Such practices include, protecting women and community land rights, revenue share mechanisms, transparency and accountability among others. These good practices need to be mainstreamed by the sector, advocating for these measures need to be prioritized to ensure that the role women play in the sector is recognised.

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