CRATON

Mining and Exploration (Pty) Ltd

Climate Change Baseline Risk Assessment Report

18 January 2024

Prepared By

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Conversion Table

To:		TJ	Gcal	Mtoe	Mtce	MBtu	GWh
From:	**Multiply by:**						
Tera joule	**TJ**	1	2.39E+02	2.39E-05	3.41E-05	9.48E+02	2.78E-01
Giga calorie	**Gcal**	4.19E-03	1	1.0E-06	1.43E-07	3.97E+00	1.16E-03
Mega tonne oil equivalent	**Mtoe**	4.19E+04	1.0E+08	1	1.43E+00	3.97E+07	1.16E+04
Mega tonne coal equivalent	**Mtce**	2.93E+04	7.0E+06	7.00E-01	1	2.78E+07	8.14E+03
Million british thermal units	**MBtu**	1.06E-03	2.52E-01	2.52E-08	3.60E-08	1	2.93E-04
Giga watt hours	**GWh**	3.60E+00	8.60E+02	8.60E-05	1.23E-4	3.41E+03	1

Measure	Equivalent
1 Troy Ounce	= 31.10 grams
1 Hectare	= 10,000 square metres
1 Square Kilometre	= 100 hectares
1 Giga-joule	= 277.78 kWh

[1] Craton Mining & Exploration (Pty) Ltd.'s Omitiomire Mine

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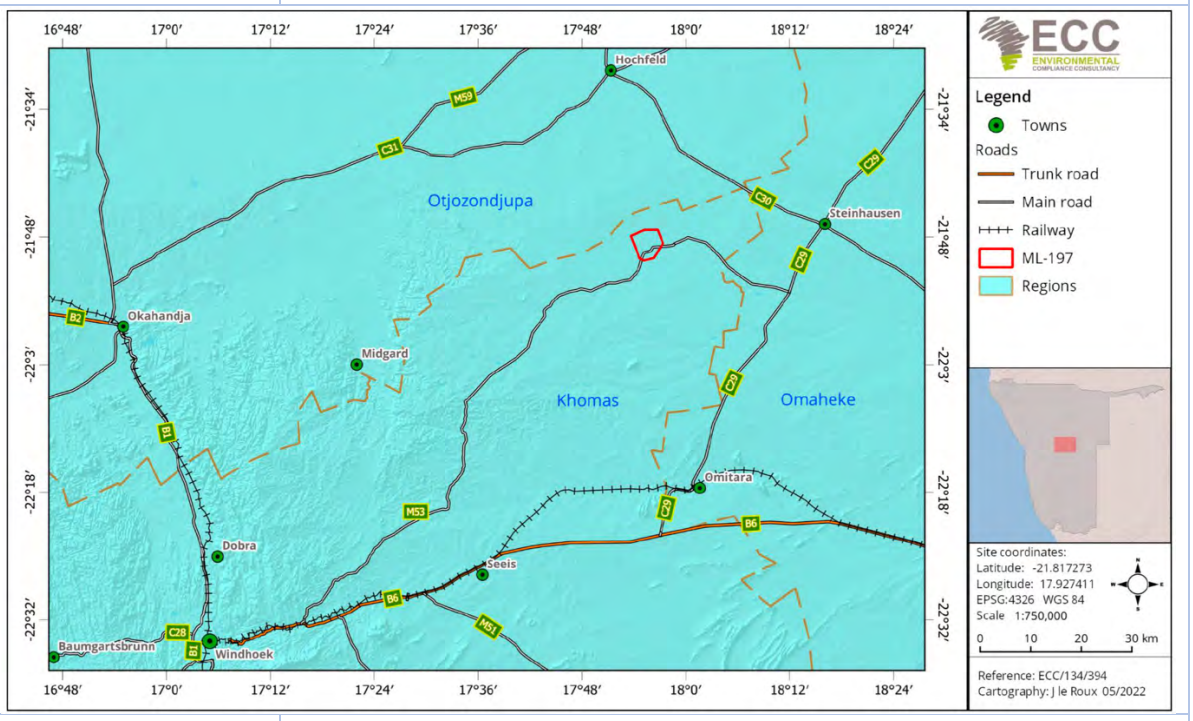
Project Summary

Project Name	**Omitiomire Copper Project (the "Project")**
Location (s)	The Project is located on farm Omitiomire on ML 197 in the Khomas Region of Namibia.

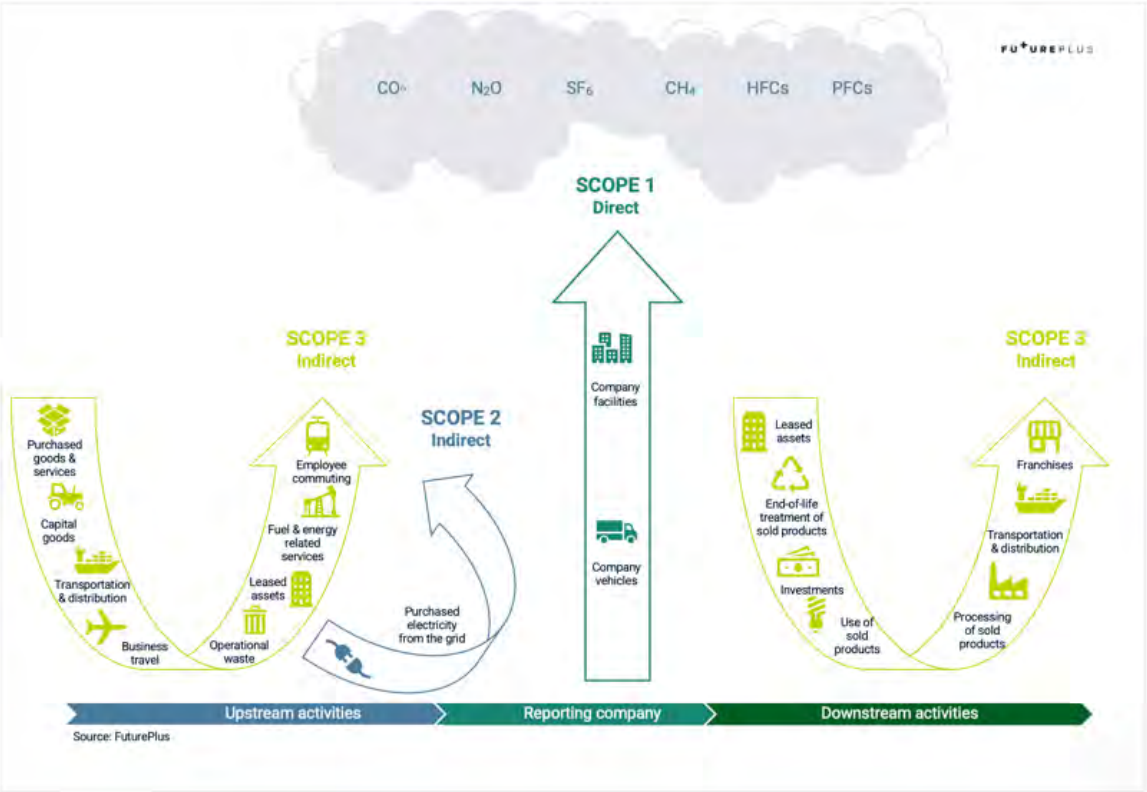


Project **Owner / Developer**	The Omitiomire Project (the "Project") is located in Namibia and is owned by Craton Mining and Exploration (Pty) Ltd ("Craton") (Environmental Compliance Consultancy, 2023).
Project Contact	Mr. Mike Stuart mstuart@omicomining.com
Project Summary	Craton Mining and Exploration (Pty) Ltd holds the mining licence 197 (ML 197) over farm Omitiomire, located 140 km northeast of Windhoek (by road) and approximately 39 km south of Hochfeld, in the Khomas Region of Namibia. **Exploration undertaken since 2007 has resulted in a mineral resource of approximately 105.5 million tonnes at 0.59% Copper (Cu).** Most of the deposit is in the form of copper sulphides, specifically chalcocite, containing high proportions of copper and low proportions of iron. The copper sulphides have been oxidised near the surface to approximately 40 m, and at a depth next to major fractures and fault lines. The oxidised copper ores, mainly malachite, make up approximately 10% of the total mineralisation.

Executive Summary

This section of this Report provides a concise overview of the key findings, risks, and recommended actions, intended to summarize for those who may not have a need to read the entire report. It is a given that leading practice at all times is required to guide the process of emissions reporting and this report is no exception.

Reporting as explained by the Global Reporting Initiative (GRI)[2] sends a signal that an organization "is dedicated to being open and honest with its stakeholders". The Task Force on Climate-related Financial Disclosures (TCFD) has a more directed approach and seeks "to improve and increase reporting of climate-related financial information".



Regardless, the Report seeks to adhere to the (GHG Protocol) to provide ***Relevance, Completeness, Transparency, Accuracy and Consistency***. As this is the "baseline" Report, it is further expected that experiential learning will lead to improvements and greater accuracy in the years to come.

Similarly, the mining industry is unique in all aspects related to emissions even in the same commodity and reporting aspects of the mines will also differ leading to a difficulty in accurate

[2] https://www.globalreporting.org/about-gri/

reporting benchmarking. Regardless, this Report does however utilise reporting of others to give rationality to its findings.

Climate Scenario Analysis

Exploring different climate scenarios and their potential impact on the organization to understand uncertainties and improve decision-making is essential. The hypothetical baseline year for Omitiomire is unknown at this time but as no full-fledged operation is in place at the time of writing this report, 2024 has been assigned for this report.

This creates a known uncertainty which is expected to be resolved once an investment or DFS decision has been made. The climate scenario analysis in this report is qualitative and the World Bank's Namibia Climate Risk report forms the basis (The World Bank Group, 2021), where the Representative Concentration Pathways (RCPs) scenarios is formed, as was the basis of the Intergovernmental Panel on Climate Change's (IPCC) analysis of the state of climate change globally.

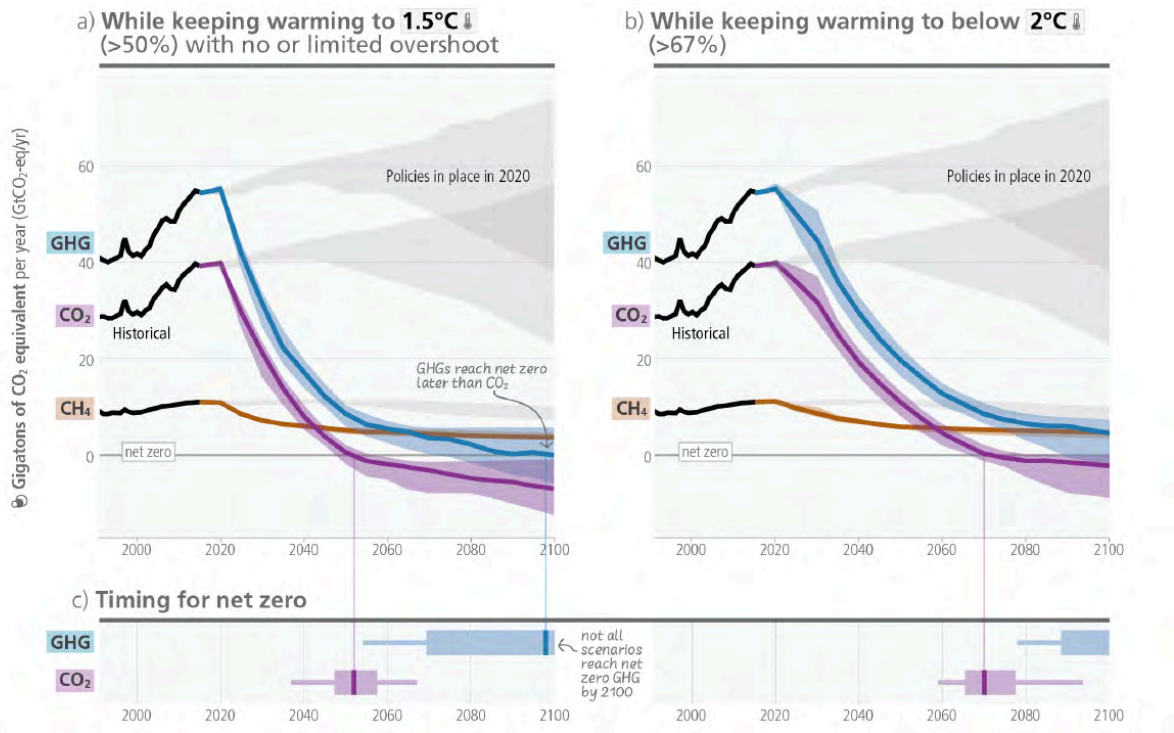


Figure 1 Global modelled pathways (limit warming to 1.5 deg. C)

Representative Concentration Pathways (RCPs)

A common set of reference years and time periods are adopted for assessing climate change and its impacts and risks: the reference period 1850–1900 approximates pre-industrial global surface temperature, and three future reference periods cover the near-term (2021–2040), mid-term (2041–2060) and long-term (2081–2100).

RCP 2.6

The RCP 2.6 scenario envisions a low-emission future characterized by ambitious measures, including a reduction in the use of oil, enhanced energy efficiency leading to low energy intensity, global population stabilization at or below 9 billion by the year 2100, and the implementation of various interventions.

In line with this vision, it is imperative for the Omitiomire project to, at the very least, examine and prioritize the following key areas:

1. **Solar Photovoltaic Electricity Generation**: Incorporating the generation of electricity through solar photovoltaic (PV) systems is an essential component of a sustainable energy strategy. By embracing solar photovoltaics, the Omitiomire project can reduce its carbon footprint and contribute to the realization of a low-emission future.

2. **Energy-Efficient Air Conditioning**: Energy-efficient air conditioning solutions are pivotal in minimizing energy consumption and, consequently, greenhouse gas emissions.

   Implementing advanced and environmentally friendly air conditioning technologies can significantly enhance energy efficiency within the project, aligning it with the goals of RCP 2.6.

3. **Electric Vehicles (EVs)**: The adoption of electric vehicles, including Light-Duty Vehicles (LDVs), buses, and cars, is a crucial step toward reducing the dependence on fossil fuels and mitigating the carbon footprint associated with transportation.

   By considering electric vehicles as part of the Omitiomire project, it not only promotes sustainable mobility but also aligns with the RCP 2.6 vision of transitioning away from oil-based transportation systems.

Incorporating these elements into the Omitiomire project will contribute to its alignment with **the RCP 2.6 scenario** and support the pursuit of a low-emission future characterized by reduced oil usage, heightened energy efficiency, and a sustainable global population. This strategic approach underscores the commitment to environmental responsibility and the mitigation of climate change.

Data Findings

The impact of various activities on greenhouse gas (GHG) emissions in Omitiomire's mining operations is a critical consideration in today's business environment, as there is a growing emphasis on sustainability and reducing carbon footprints. GHG emissions in mining are primarily associated with energy consumption, transportation, and various chemical processes. The emissions calculated in this Report are derived from data provided by the Client or assumed from best information available.

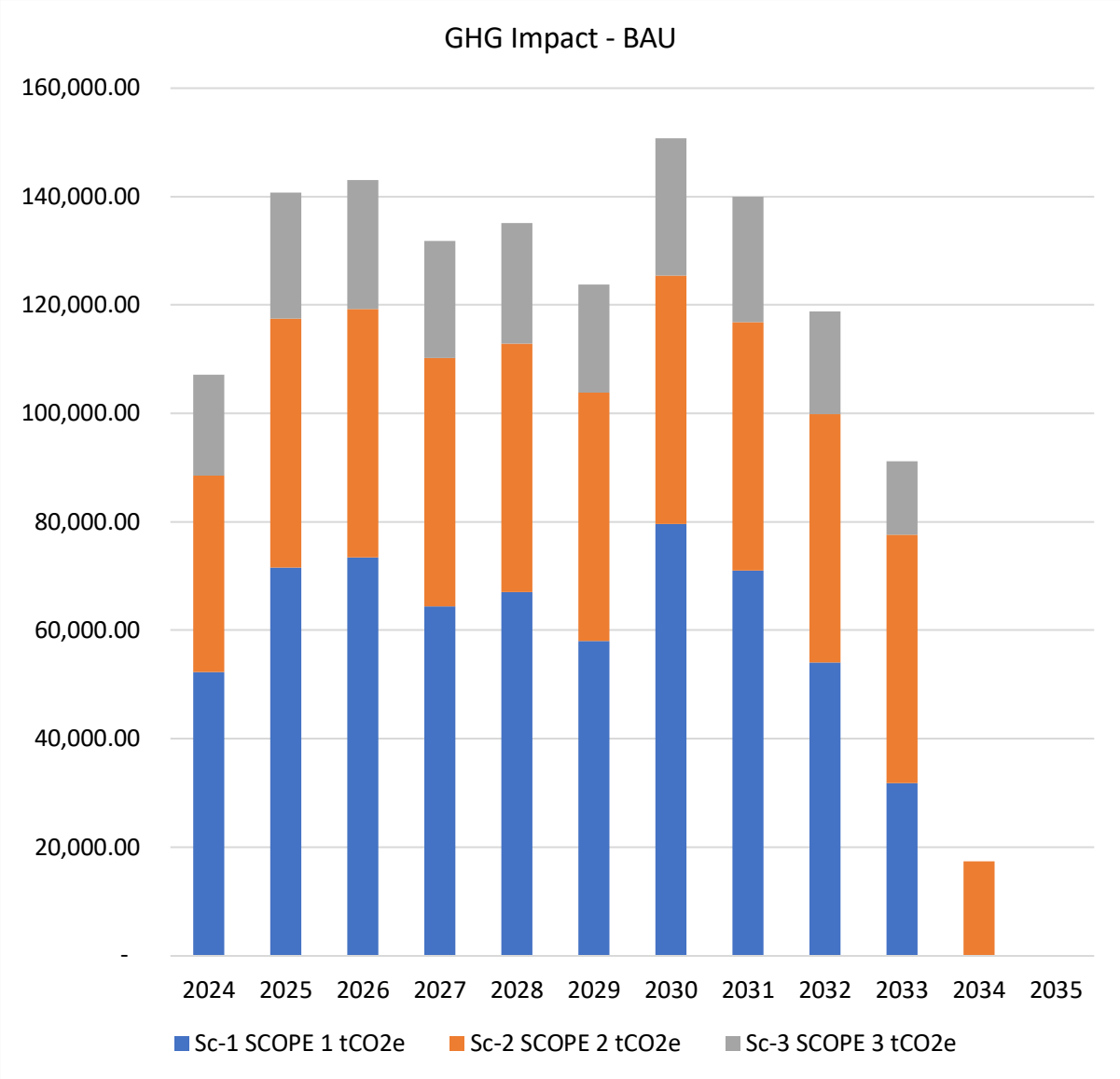


Figure 2 GHG Impact (BAU) over life of Mine (Year on Year)

The overall picture seen is one where emissions exceed the *100,000 tCO_2e* in any one year of operation for triggering reporting as per leading practice such as the *Equator Principles* guidelines at a maximum value currently estimated at **150,725 tCO_2e for a peak in 2030 (assumed as Year 7)**. This is part of the total Life of Mine (LOM) value assumed at **1,299,919 tCO_2e[3].**

Scope 1 stands out as the most impactful, (*most notably in 2030 or Year 7*) and it is so because of the high vehicle activity in the actual mined areas. This provides an opportunity to look at mitigation of this through various strategies. Although this opportunity exists with Scope 1, care must be taken not to see the approach as singular but as more targeted in the various sub-categories. Another point on the overall emissions profile is that Scope 3 is captured but these values are in their "infancy" and will increase dramatically once better data becomes available.

[3] Note this value includes Scope 3 emissions and will increase once better data is available for this category of emissions.

Planned Mitigation Action – Scope 2

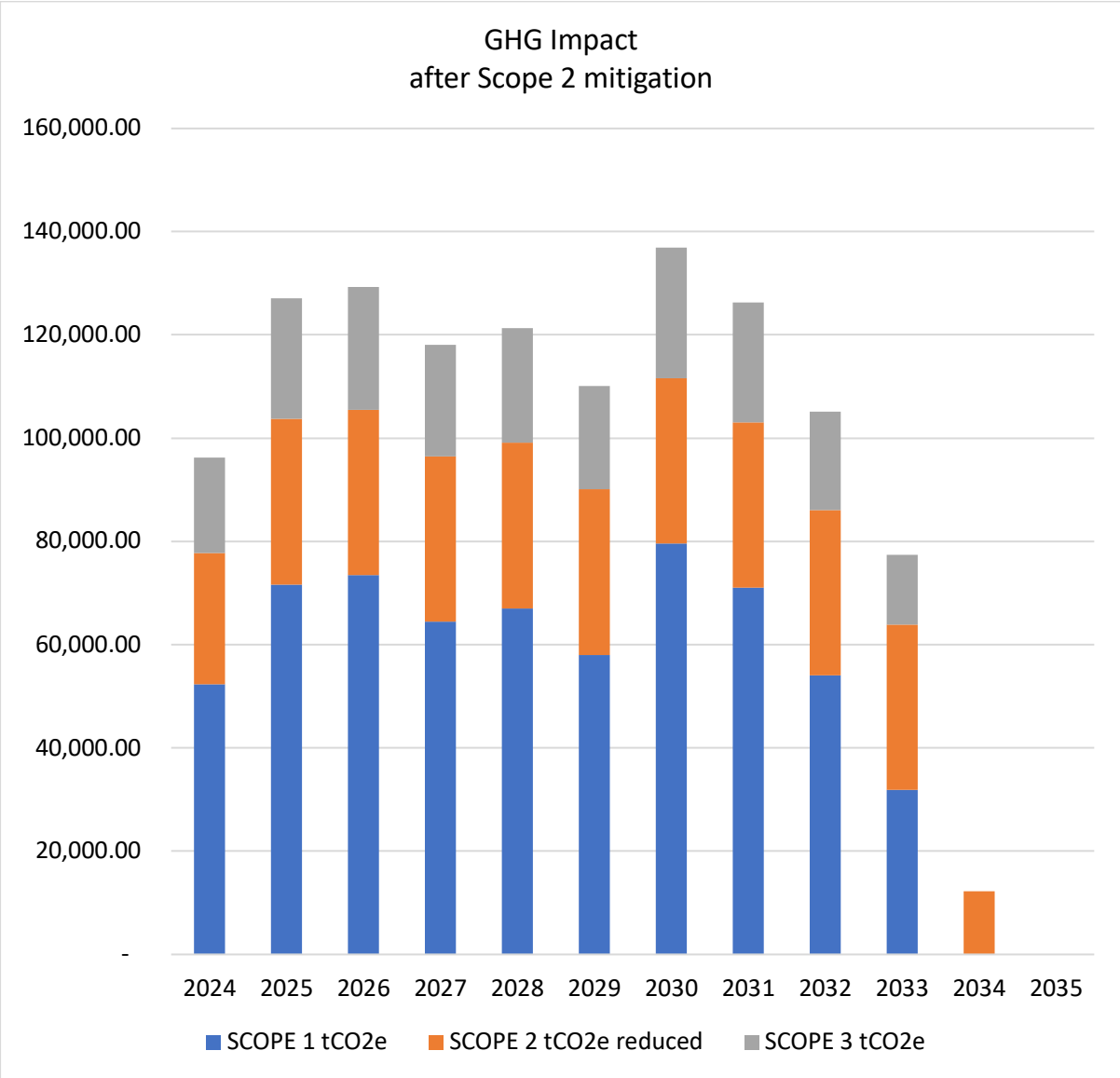


Figure 3 GHG Impact (Scope 2 mitigation) over life of Mine (Year on Year)

As noted, mitigation action can be implemented with commercially available alternatives. Craton has already indicated in its planning that it has intention to utilize solar photovoltaic generation as part of its electricity supply profile. This has been estimated to be 30% of electricity demand and when analysed results in significant **Scope 2 reductions** and an overall drop from **1,299,919 tCO2e (LOM) to 1,160,088 tCO2e (LOM).**

Individual Scoped Analysis

SCOPE 1 emissions

Scope 1 emissions have contributed to the overall with up to **79,598 tCO2e** in 2030 (Year 7)[4], then falling off based on planned mine activity. As it is made up of fuel consumption, then the use of alternative energy gives rise to various opportunities to help mitigate the impact.

[4] Based on 2024 being Year 1

The **LOM Scope 1** value set at **623,498 tCO_2e.**

SCOPE 2 emissions

Scope 2 emissions, peaking across Year's 2 - 10 (2025 - 2033) at **45,821 tCO_2e** and understandably so because of the high use of electricity in the production processes. Scope 2 emissions are a critical aspect of a company's greenhouse gas (GHG) emissions profile, particularly for Omitiomire with energy-intensive operations.

The **LOM Scope 2** value set at **466,102 tCO_2e.**

As the emission intensity of power purchased from NamPower is not controlled by Omitiomire, it is prudent for a renewable energy supply to be considered. The use of solar energy globally is mature and with the necessary regulations already in place in Namibia, the consideration should be placed high on the agenda for mitigation.

SCOPE 2 reduced emissions profile

Scope 2 emissions, peaking across Year's 2 - 10 (2025 - 2033) at **45,821 tCO_2e** are reduced to **32,075 tCO_2e** with mitigation from the solar PV inputs and these values drop the **LOM Scope 2** value to **326,272 tCO_2e.**

SCOPE 3 emissions

Scope 3 emissions have a significant impact on mine GHG emissions, and understanding, measuring, and addressing them is a critical aspect of a mining company's sustainability strategy.

What is clear is that the emissions calculated **peaking in 2026 at 23,779 tCO2e**, comes from fuel (Diesel) use amounting to 77 percent of the Scope 3 current total in 2026.

The **LOM Scope 3** value set at **210,319 tCO_2e.**

It is expected when Scope 3 reporting for Omitiomire matures, that Scope 3 will be around 75 percent of overall emissions over the LOM. However as this is the penultimate report, extra care has been taken on the items reported at this stage.

Recommendations

It is essential for a copper mine in Namibia, or any mining operation globally, to conduct a thorough climate risk assessment, implement adaptation strategies, and develop a clear sustainability and transition plan to mitigate these risks. Collaborating with local governments, communities, and industry stakeholders is also crucial to address these challenges effectively.

It is recommended that Omitiomire follow changes closely as climate change regulation is dynamic globally and there are various imminent changes on the way as indicated by the Ministry of Environment, Forestry and Tourism.

Figure 4 Komatsu 730e (Courtesy Komatsu www.komatsu.com)

By understanding the emissions sources and their contributions, Omitiomire can develop targeted strategies to mitigate these emissions. *For example*, consider introducing one Komatsu Electric drive mining **truck 730E-10** as a substitute to the **Komatsu 1500** mining truck. This would allow for learning and climate mitigation at the same time[5].

The following is suggested in light of the example above:

Short-term (Year 0-2)

a) **Energy Efficiency Improvements**: Implement energy efficiency measures in mining processes and equipment. Implement energy-efficient technologies, such as LED lighting and variable frequency drives, to reduce electricity consumption.

b) **Waste Reduction**: Minimize waste through better ore selection and processing techniques. Reducing waste can lead to decreased energy consumption and emissions.

c) **Alternative Energy Sources**: Consider immediate adoption of renewable energy sources such as solar power for on-site energy generation. *It is noted her that this is already planned.*

d) **Vehicle Transition** – testing phase: Transition mining vehicle fleets from diesel-powered to electric or hydrogen-powered vehicles, which have lower carbon emissions. Thus, optimize logistics and replace diesel-powered vehicles with electric or hybrid alternatives for short-distance transportation within the mine site. For mine trucks, this can be a "testing phase" while for LDV's, this can be a concerted step change.

[5] This is an exemplar suggestion only.

e) **Community Engagement**: Collaborate with local communities and stakeholders to develop long-term sustainable mining practices that align with environmental and social goals, thus minimizing the overall impact of mining.

Medium-term (Year 2 - 8)

a) **Vehicle Fleet Transition**: Transition mining vehicle fleets from diesel-powered to electric or hydrogen-powered vehicles, which have lower carbon emissions.
b) **Supply Chain Assessment**: Conduct a comprehensive assessment of the GHG emissions associated with the entire supply chain, identifying areas for optimization and emission reduction.
c) **Carbon Neutrality Commitment**: Set a long-term goal of achieving carbon neutrality and invest in projects to offset emissions through carbon credit programs.

Long-term (Year 8 -LOM)

a) **Mine Closure Planning:** Develop comprehensive mine closure plans that include reclamation and reforestation efforts, which can help offset carbon emissions associated with mining activities.

Further Actions

The ICMM position as an industry body should be headed and note that this report is a "baseline" document to be refined annually, highlighting areas of change. As result, the following is required:

a) Establish ongoing surveillance of existing databases to promptly detect and integrate any updates or modifications.
b) Continue to research sources for emission factors and incorporate them into future reporting.
c) Foster proactive collaboration with others to collectively centralized emission factors to support the entire mining value chain. A key starting point would be the Namibian Chamber of Mines.

1 Introduction

1.1 Purpose and scope of the report

RDJ Consulting Services CC (Namibia) has been appointed by *Environmental Compliance Consultancy CC (Namibia)* to carry out a high-level Climate Change analysis on the proposed ***Craton Mining and Exploration (Pty) Ltd***. led Omitiomire Copper Project.

Craton Mining and Exploration (Pty) Ltd. describes itself as a strategic partnership creating a mining organisation with "extensive industry experience" that will "advance the Omitiomire Project in a sustainable fashion"[6].

This Climate Change Report for ***Craton Mining and Exploration (Pty) Ltd***. is based on plans and other assumptions. This allows for us to create a picture of the anticipated Climate Change impacts that can occur based on the Life of Mine (LOM) activities.

It is widely indicated by others that mining activities can have significant environmental impacts, including the areas of interest to this report related to greenhouse gas emissions, deforestation, habitat destruction, and water pollution. As part of the Environmental Impact Assessment (EIA) process, interactions with Interested and Affected Parties (I&AP) indicate a curiosity of what the greenhouse gas impact will be from the project (Environmental Compliance Consultancy, 2023)

To address these challenges, many countries incorporate climate change goals into their national policies and regulations related to the mining sector. These goals typically aim to mitigate the sector's environmental impact, promote sustainable practices, and reduce carbon emissions.

Namibia is a signatory to various UN conventions and protocols that allow for mainstreaming the United Nations Framework Convention on Climate Change (UNFCCC), the United Nations Convention on Biological Diversity (UNCBD), and United Nations Convention to Combat Desertification (UNCCD).

Namibia is a non-Annex 1 Party to the Paris Agreement. It was ratified on 21 September 2016, with the ratification of the Kyoto Protocol being 4th September 2003. As a result, Namibia is obligated to submit reports *including the National inventory of anthropogenic greenhouse gas emissions by sources and sinks* etc (Ruppel & Ruppel-Schlichting, 2022).

Climate Change is understood by this Report to be the:

"Impact of human activity, creating the build-up of greenhouse gases in the atmosphere alters the radiative balance of the atmosphere. The net effect is to warm the Earth's surface and the

[6] https://www.omicomining.com/about-us/

lower atmosphere because greenhouse gases absorb some of the Earth's outgoing heat radiation and reradiate it back towards the surface".

(United Nations Framework Convention on Climate Change, 2011).

The Intergovernmental Panel on Climate Change (IPCC) demonstrates in its reports, that it is possible to limit global warming to 1.5 degrees Celsius with **rapid and deep emissions reductions** across all sectors of the global economy. It has given us many feasible, effective and low-cost mitigation and adaptation options to scale up across sectors and countries.

Simon Stiell, UN Climate Change Executive Secretary

Craton Mining and Exploration (Pty) Ltd. has identified sustainability in regard to Environmental, Social and Governance (ESG) obligations as both a legal and moral obligation.

1.1.1 The Chamber of Mines (Namibia)[7]

Namibia has a vibrant mining industry and as a result has an active Chamber of Mines (Chamber). The Chamber identifies sustainable development as a "social licence" to any activities related to mining.

The Chamber has carried out "offsets" such as the electrification of various villages as part of corporate social responsible actions. However, the impact of these actions in terms of climate change is still to be determined.

The Project owners, *Craton Mining and Exploration (Pty) Ltd*. is a member of the Chamber and so it is imperative that this Report highlights the relationship and obligation for a sustainably developed mine.

1.1.2 International Expectations

The copper industry is mature and of international importance. The need for sustainable development and reducing carbon emissions on the environment is a parallel demand on copper. The need for standard alignment is thus paramount and setting baselines for target setting as well as analysis is now par for the evaluation of progress towards the United Nations, Sustainable Development Goals.

1.2 Country Climate Information

Several reports on Namibia indicate the fact that the country is naturally arid and has several biodiversity hotspots and rainfall ranging between 250 mm – 600 mm per year, with mean temperatures between 16 deg Celcius – 22 deg Celcius (Ministry of Environment & Tourism, 2012)[8].

The Köppen-Geiger climate classification system provides a broad overview of climate types based on general patterns. Local variations, microclimates, and other factors may influence the specific characteristics of a region within a given climate classification. Namibia is one of

[7] https://chamberofmines.org.na/

[8] Actual site data provided through others will be commented on under ***Site Specific Climate***.

the regions with a BWh climate (that covers the Erongo region). "BWh" represents a hot desert climate.

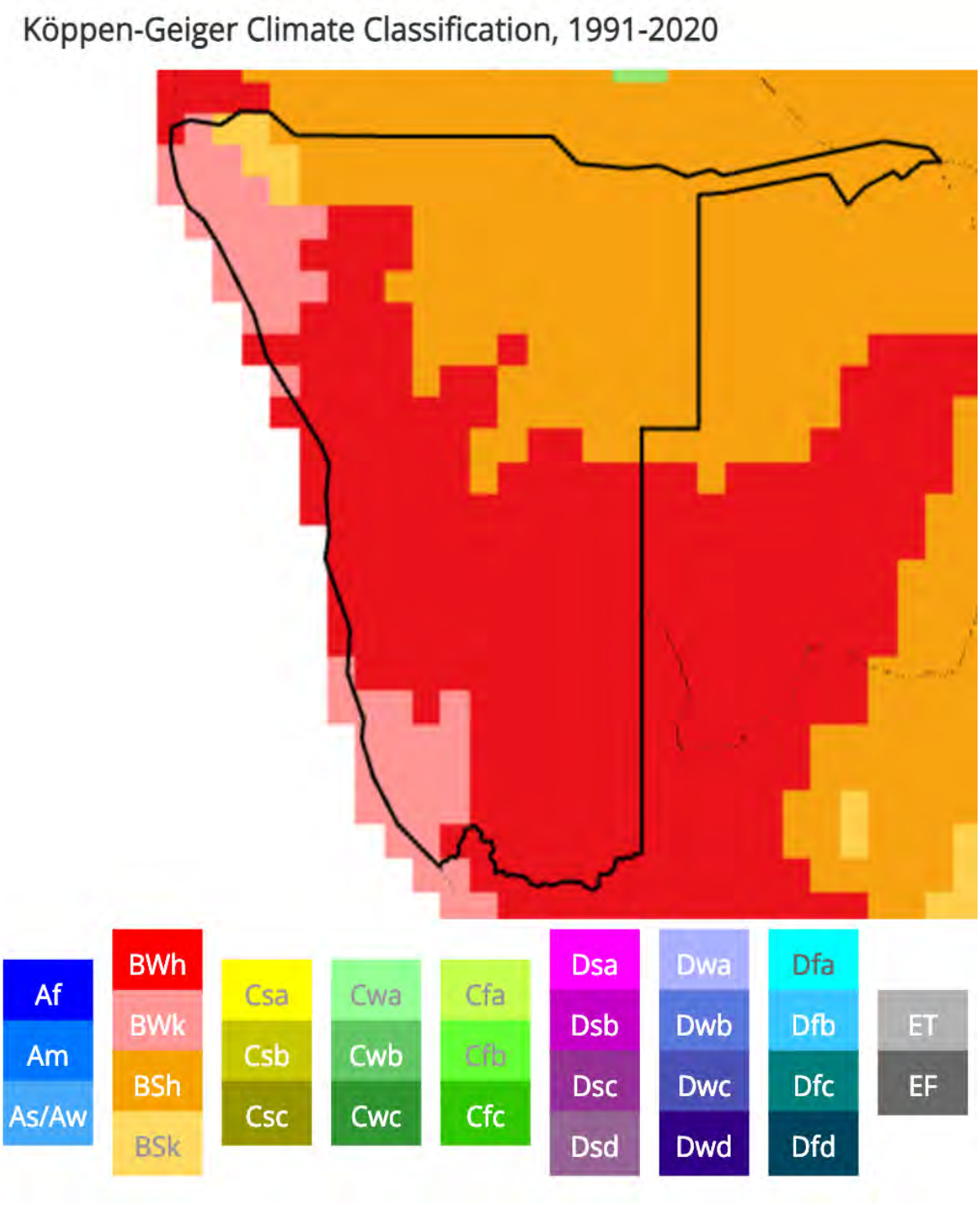


Figure 5 Köppen-Geiger Climate Classification, 1991-2020 (Courtesy: World Bank Knowledge portal)

The "B" stands for dry climates, while the "Wh" indicates a hot desert subtype. This climate classification is characterized by extremely high temperatures and very low annual precipitation.

It is important to note two areas of relevance to Omitiomire that[9]:

The classification system helps in assessing the availability of water resources in different regions. In mining, water is a critical resource used for various processes, including ore processing, dust suppression, and cooling machinery. Understanding the climate classification of an area can assist mining companies in determining the adequacy of water resources and planning water management strategies.

High Temperatures: BWh climates are typically associated with scorching temperatures, particularly during the summer months. These regions experience long periods of intense heat, often with daily temperatures exceeding 38°C (100°F).

Low Precipitation: BWh climates are extremely arid, with very limited rainfall throughout the year. Annual precipitation is generally low, often falling below 250 millimeters (10 inches), and sometimes significantly less.

**Climate scenario analysis will be examined further in this report.

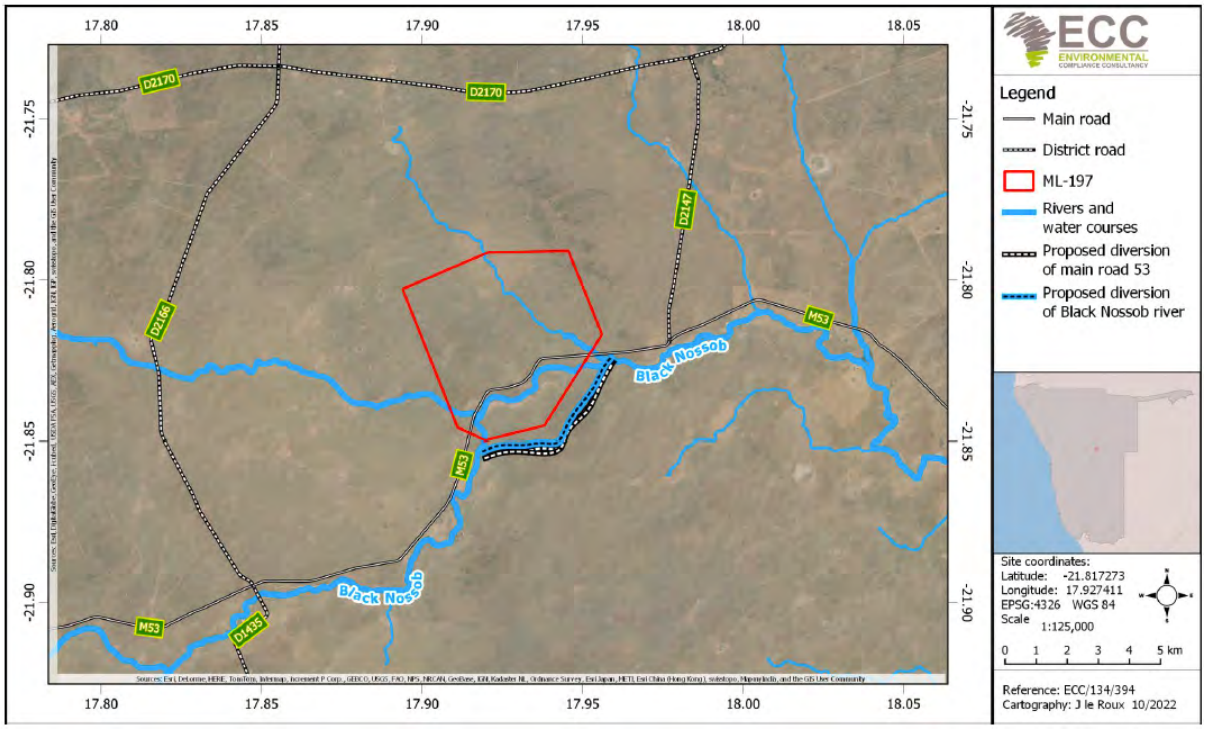


Figure 6 Mine Area map (Courtesy ECC/Craton)[10]

[9] Kottek, M., Grieser, J., Beck, C., Rudolf, B., & Rubel, F. (2006). World Map of the Köppen-Geiger climate classification updated. Meteorologische Zeitschrift, 15(3), 259-263.
[10] (Environmental Compliance Consultancy, 2023)

1.3 Client Information

The Client is identified as:

Mr. Mike Stuart
Technical contact person
Craton Mining and Exploration (Pty) Ltd
P.O. Box 90128, Windhoek, Namibia
mstuart@omicomining.com

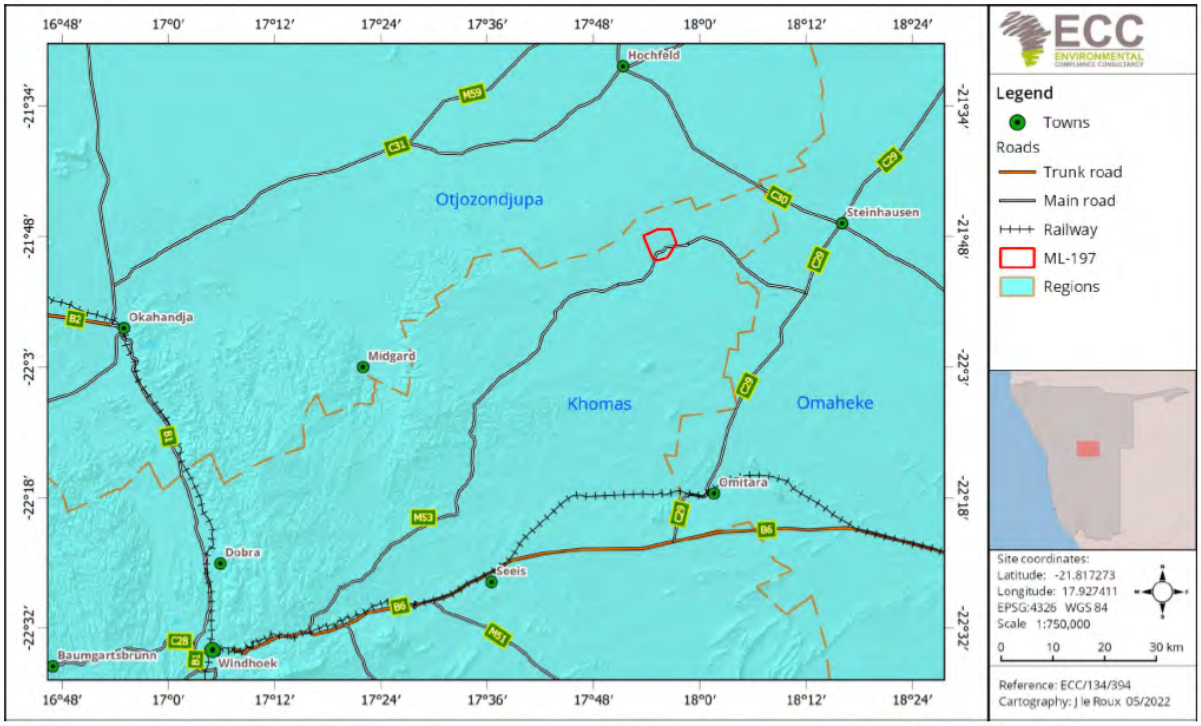


Figure 7 Mine Locality map (Courtesy ECC/Craton)[11]

1.4 Background of the organization

This section is an extract of Omitiomire Copper Project information as found from the latest Omico Mining Corporation website and other public sources as follows:

Omico Mining Corp (Omico) is a Namibian copper exploration and development company which holds the Mining Licence (ML197) also referred to as **Craton Mining and Exploration Pty Ltd.**

Omico Mining Corporation is jointly owned by International Base Metals Limited (IBML) (46.3%) and Greenstone (53.7% through an earn-in agreement on completion of the BFS) and is the majority shareholder in **Craton Mining and Exploration Pty Ltd.,** the Namibian company which holds the mining licence. A 5% interest in Craton is held by a Namibian incorporated ESG trust and the project is managed by Omico Mining Corporation.

[11] ECC Report No: ECC-134-394-REP (Scoping Report)

1.4.1 Governance Structure

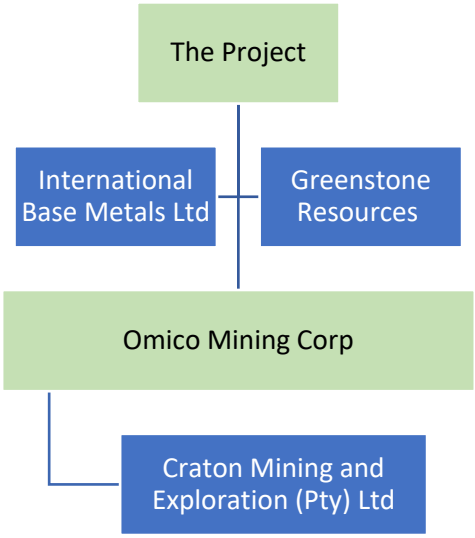


Figure 8 Governance Structure

1.4.2 Role of the Board

The role of the board of directors with respect to climate change, especially under the Equator Principles, is pivotal in ensuring environmental sustainability, responsible business practices, and compliance with internationally recognized environmental and social standards.

The board of Omico's Namibian subsidiary, Craton Mining and Exploration Ltd. has three independent board members (Independent Directors) who are seasoned good governance advocates, providing competent oversight and guidance to the executive management. All three bring a wealth of experience to the group and reflect Namibian national and regional interests. They work closely with Omico Mining Corp., the manager of the project, to ensure that this is reflected in the Company's ongoing work and community engagement.

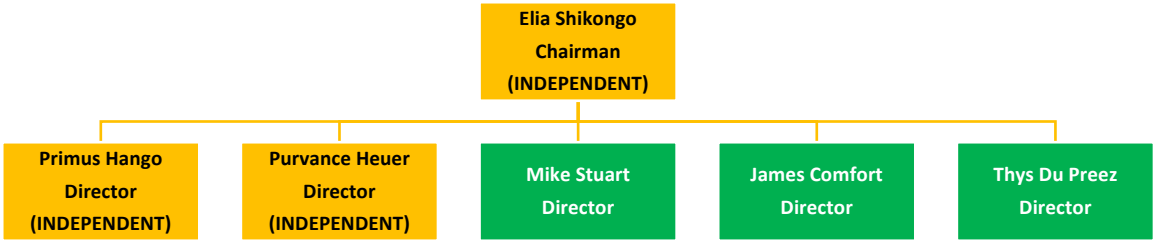


Figure 9 Craton Mining Board

All three local representatives are independent and don't provide services to any group company beyond the time contributed as board members (Independent Directors).

The key responsibilities of the board of directors in this context:

- Policy Formulation: The board is responsible for setting and approving environmental and social policies that guide the company's actions regarding climate change mitigation, adaptation, and sustainability.

- Risk Assessment: The board should oversee a robust environmental and social risk assessment process to identify potential climate-related risks and impacts associated with the company's mining operations.
- Strategic Planning: The board plays a crucial role in integrating climate change considerations into the company's long-term strategic planning.
- Due Diligence: Before embarking on new mining projects, the board must ensure thorough due diligence in assessing the environmental and social risks.
- Stakeholder Engagement: The board should oversee a comprehensive stakeholder engagement process, which involves actively consulting with local communities, environmental groups, and other relevant stakeholders to address concerns and gather input on climate change and sustainability issues.
- Monitoring and Reporting: Boards must establish effective monitoring and reporting mechanisms to track the company's performance in managing climate risks and adhering to the Equator Principles. They should ensure that key performance indicators (KPIs) are in place to measure progress.
- Compliance and Accountability: Boards are responsible for ensuring that the company adheres to all relevant regulations and commitments, including those of the Equator Principles. ***They must hold management accountable for their performance in mitigating environmental and social risks.***
- Transparency: The board should promote transparency and disclosure of climate-related information to stakeholders, investors, and the public, in line with global standards such as the Task Force on Climate-related Financial Disclosures (TCFD).
- Continuous Improvement: Boards should foster a culture of continuous improvement and innovation in environmental and social risk management. They should be open to adopting best practices and evolving their strategies to address emerging climate challenges.

By taking these responsibilities seriously, boards can help mining companies meet their environmental and social obligations and contribute to a more sustainable and resilient future.

1.4.3 Role of Management

As with the board, once management is notified of its operational impact and risks to business operations it can take steps to mitigate climate change (Kolk & Pinske, 2005).

The role of management in a mining company operating under the Equator Principles is to ensure that environmental and social considerations, particularly those related to climate change, are integrated into every aspect of the project lifecycle. This includes assessment, mitigation, adaptation, stakeholder engagement, compliance, and reporting.

1.5 Background of the project

1.5.1 Project Geography

The Omitiomire Copper Project is located 120km northeast of Windhoek in central Namibia, in a semi-arid savannah environment, with the wet season running from December to March.

Figure 10 Omitiomire overview map.

The licence area is mainly used for cattle farming and game hunting and is easily accessible.

1.5.2 Project Status

As of October 2023, mining and processing costings are to be incorporated into the bankable feasibility financial model. This means that this report is still a theoretical exercise.

1.6 Sector impact on the economy

The mining sector in Namibia plays a crucial role in the country's economy, contributing significantly to its GDP, employment, and export revenues. Namibia is rich in mineral resources, with a history of mining dating back several decades.

According to the Namibian Chamber of Mines (CoM)[12], Namibia has more than 15 000 direct mine employees for some 25 mines. Further, the metal ores sector to show a growth of 12.1 percent in 2023 and a further 3,4 percent in 2024 as per the Bank of Namibia[13]. The sector contributed about 12% of GDP in 2023.

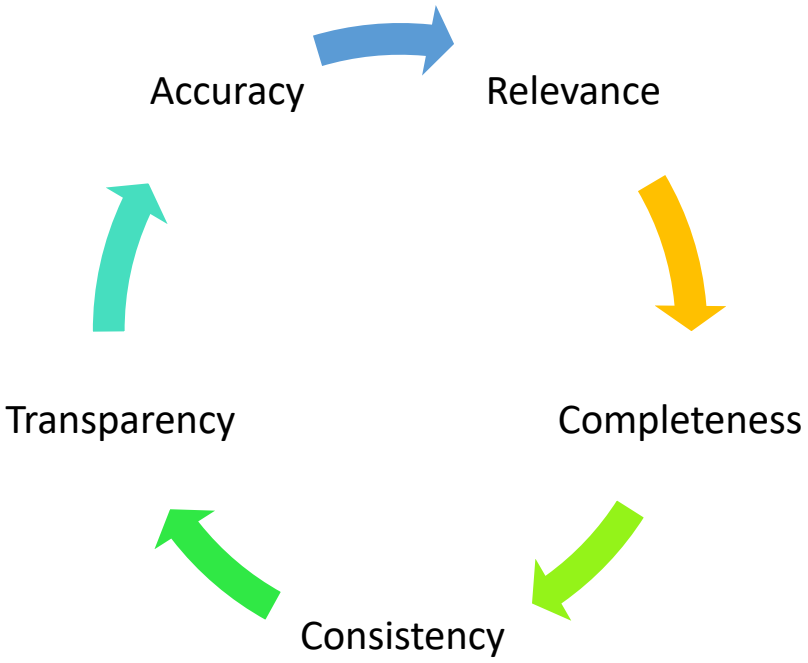
[12] https://chamberofmines.org.na/
[13] https://www.bon.com.na/CMSTemplates/Bon/Files/bon.com.na/99/99b9f46e-d010-4064-9314-a5f9f7a92078.pdf

2 Methodology

A description of the methods used to conduct the risk assessment, including data sources, models.

The methodology leading to a baseline and benchmarking, used consists of:

- Defining Organizational Boundaries
- Using data provided by Craton Mining and Exploration Pty Ltd.
- Third-party data sets and sources of laws, policies, strategies, plans, emission standards, and other sources such as sector reports.
- Climate change specific impacts, trends, and vulnerabilities were taken from National Communications to the UNFCCC, IPCC Sixth Assessment Report, and other relevant sources or databases.



This is in line with other leading practice[14] on climate change reporting and standardization processes. One such is the Climate Registry (The Climate Registry, 2023) which through its General Reporting Protocol (GRP)[15] GHG accounting and reporting principles expects an organization to give reports that are "faithful, true and fair" which have:

- Relevance
- Completeness
- Consistency

[14] Previously referred to as "best practice".
[15] https://theclimateregistry.org/wp-content/uploads/2022/11/General-Reporting-ProtocolV3.pdf

- Transparency
- Accuracy

Utilizing TCFD guidelines, the developed disclosure is based on relevant information fields (Task Force on Climate-related Financial Disclosures, 2021):

- That is complete in nature.
- That is clear, balanced, and understandable.
- That is timely.
- That is verifiable and objective.

In reality, this means that all steps must be taken to use metrics that can be monitored and updated annually with reference to a known baseline. In essence, a trend will be noted from the utilized historical and current data to create predicted pathways.

Measures to be utilized stem from geographic factors, global standards, data sets, and client information aligned with 100-year GWP values from the IPCC[16] (2013).

- Carbon Dioxide (CO_2),
- Methane (CH_4),
- Nitrous Oxide (N_2O),

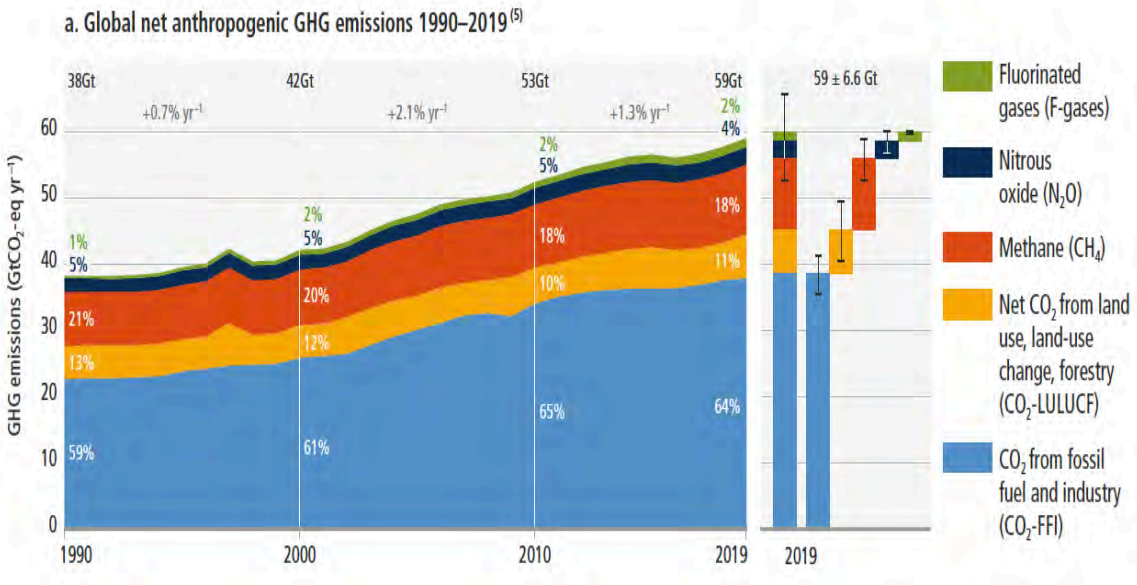


Figure 11 Global net anthropogenic GHG emissions 1990–2019 (IPCC AR6 Report) (2022)

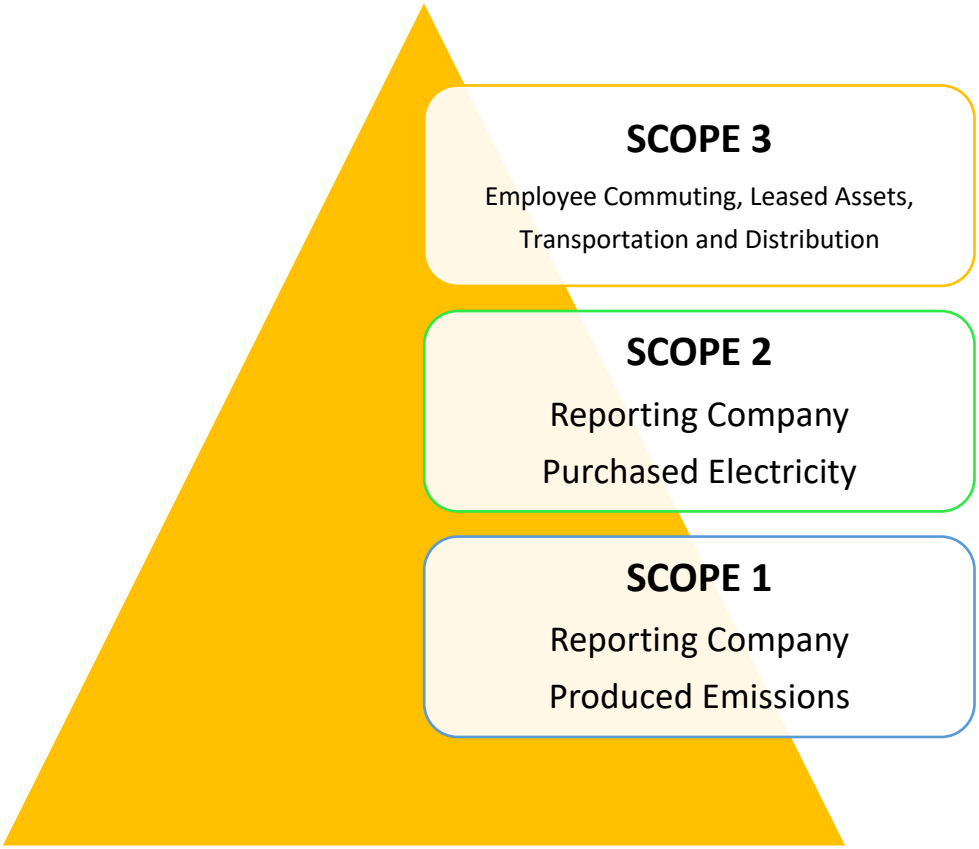
Although impacting, the following has not been accounted for at this time due to the absence of relevant and reliable data.

[16] Climate Change 2013: The Physical Science Basis.

- Hydrofluorocarbons (HFCs),
- Perfluorocarbons (PFCs),
- Sulphur Hexafluoride (SF_6), and
- Nitrogen Trifluoride (NF_3)

The IPCC AR6 notes clearly that contributions of the service sectors (transport, buildings, industry) are split into direct (demand-side) as well as indirect (supply-side) CO2 emissions reductions.

- **Direct emissions** represent demand-side emissions due to the fuel use in the respective demand sector.
- **Indirect emissions** represent upstream emissions due to industrial processes and energy conversion, transmission and distribution.



Direct GHG emissions come from sources owned or controlled by the organization. For example, emissions from combustion in owned or controlled boilers, furnaces, vehicles, or emergency generators, and emissions from chemical production in owned or controlled process equipment are scope 1 emissions (GHG Protocol, 2004) (IPCC, 2006).

Scope 1 emissions refer to a category of greenhouse gas emissions associated with direct sources of emissions that are owned or controlled by an organization. These emissions are a fundamental component of an organization's carbon footprint and typically originate from

activities such as the combustion of fossil fuels, on-site industrial processes, and emissions from vehicles or equipment owned and operated by the organization. In the context of the Greenhouse Gas Protocol, a widely recognized international standard for greenhouse gas accounting, *Scope 1 emissions are those for which an organization has operational control and are reported in the organization's carbon inventory*.

Scope 2 emissions account for the GHG from generation facilities providing purchased electricity consumed by the organization. These emissions are not produced directly on-site but are a consequence of purchased energy sources. Purchased electricity is electricity purchased or otherwise brought into the organizational boundary of the organization. Scope 2 emissions physically occur at the facility where electricity is generated.

Scope 3 emissions are a consequence of the activities of the organisation but come from sources not owned or controlled by the organization. Scope 3 is an optional reporting category that allows for the treatment of all other indirect emissions.

In practice, addressing Scope 3 emissions can be challenging due to the need to engage with various stakeholders throughout the value chain. Some examples of scope 3 activities are extraction and production of purchased materials, transportation of purchased fuels and employee commuter travel.

The estimates of Scope 1 and 2 emissions in this Report are based on current IPCC Guidelines (Intergovernmental Panel on Climate Change, 2022) and other sources to represent the best efforts to capture Craton's Omitiomire emissions[17]. Scope 3 will be developed over time and so initial indications in this report are to be built upon in future reports.

2.1 Climate Scenario Analysis

Climate scenario analysis is a methodology that assesses the impacts of climate change on sectors, organizations, and systems. It involves creating scenarios to explore future climate-related factors and their effects. These scenarios help decision-makers understand risks and opportunities, inform planning and policy, and simulate consequences on variables like growth, resources, and financial performance.

The analysis considers physical, and transitional risks, enabling organizations to identify strategies for adaptation and mitigation. Climate scenario analysis is a crucial tool for businesses, policymakers, and stakeholders to address climate change challenges and promote sustainability and resilience.

2.1.1 Global Warming Potential (GWP)

Table 1 Global Warming Potential (GWP 100) extract from IPCC AR5 (Chapter 8)

[17] Note: Emissions per MWh should be used with caution due to [known] data quality problems relating to electricity efficiencies for some countries.

	Lifetime (years)		GWP_{20}	GWP_{100}	GTP_{20}	GTP_{100}
CH_4[b]	12.4[a]	No cc fb	84	28	67	4
		With cc fb	86	34	70	11
HFC-134a	13.4	No cc fb	3710	1300	3050	201
		With cc fb	3790	1550	3170	530
CFC-11	45.0	No cc fb	6900	4660	6890	2340
		With cc fb	7020	5350	7080	3490
N_2O	121.0[a]	No cc fb	264	265	277	234
		With cc fb	268	298	284	297
CF_4	50,000.0	No cc fb	4880	6630	5270	8040
		With cc fb	4950	7350	5400	9560

Notes:
Uncertainties related to the climate–carbon feedback are large, comparable in magnitude to the strength of the feedback for a single gas.
[a] Perturbation lifetime is used in the calculation of metrics.
[b] These values do not include CO_2 from methane oxidation. Values for fossil methane are higher by 1 and 2 for the 20 and 100 year metrics, respectively (Table 8.A.1).

2.1.2 Climate Projections

Utilising information from the Coupled Model Inter-comparison Projects (CMIP)[18] that in earnest is the data used for IPCC Assessment Reports. The latest IPCC Assessment Reports utilise CMIP6 which this report relies on for direction.

Various scenarios are then derived and are as follows:

- **SSP1-1.9** is the most optimistic scenario and global emissions are cut to net-zero around 2050. This is the only scenario that aligns with the Paris Accord of keeping global warming to 1.5°C by the end of the century.
- **SSP1-2.6** supports increasing sustainability with global emissions cut severely but reach net-zero after 2050.
- **SSP2-4.5** presents a 'middle of the road' scenario in which emissions remain around current levels, before starting to fall around mid-century, but do not reach net-zero by 2100.
- **SSP3-7.0** presents a pathway in which countries are increasingly competitive and emissions continue to climb, roughly doubling from current levels by 2100.
- **SSP5-8.5** presents a future based on an intensified exploitation of fossil fuel resources where global markets are increasingly integrated leading to innovations and technological progress.

[18] In CMIP6, future climate scenarios are presented through five SSPs: SSP1-1.9, SSP1-2.6, SSP2-4.5, SSP3-7.0, and SSP5-8.5, which present different societal development pathways The total radiative forcing level by 2100. (the cumulative measure of GHG emissions from all sources) is presented at the end of each pathway (i.e., -1.9, -2.6, -4.5, 7.0, 8.5, etc.). https://climateknowledgeportal.worldbank.org/country/namibia/climate-data-projections

2.2 Collected Data/Information

2.2.1 Boundary

It is leading practice to set the boundary for the data to be collected. This requires an understanding of where a reporting company defines its upstream or downstream interactions for accuracy. The boundary used in this report is ***OPERATIONAL CONTROL***.

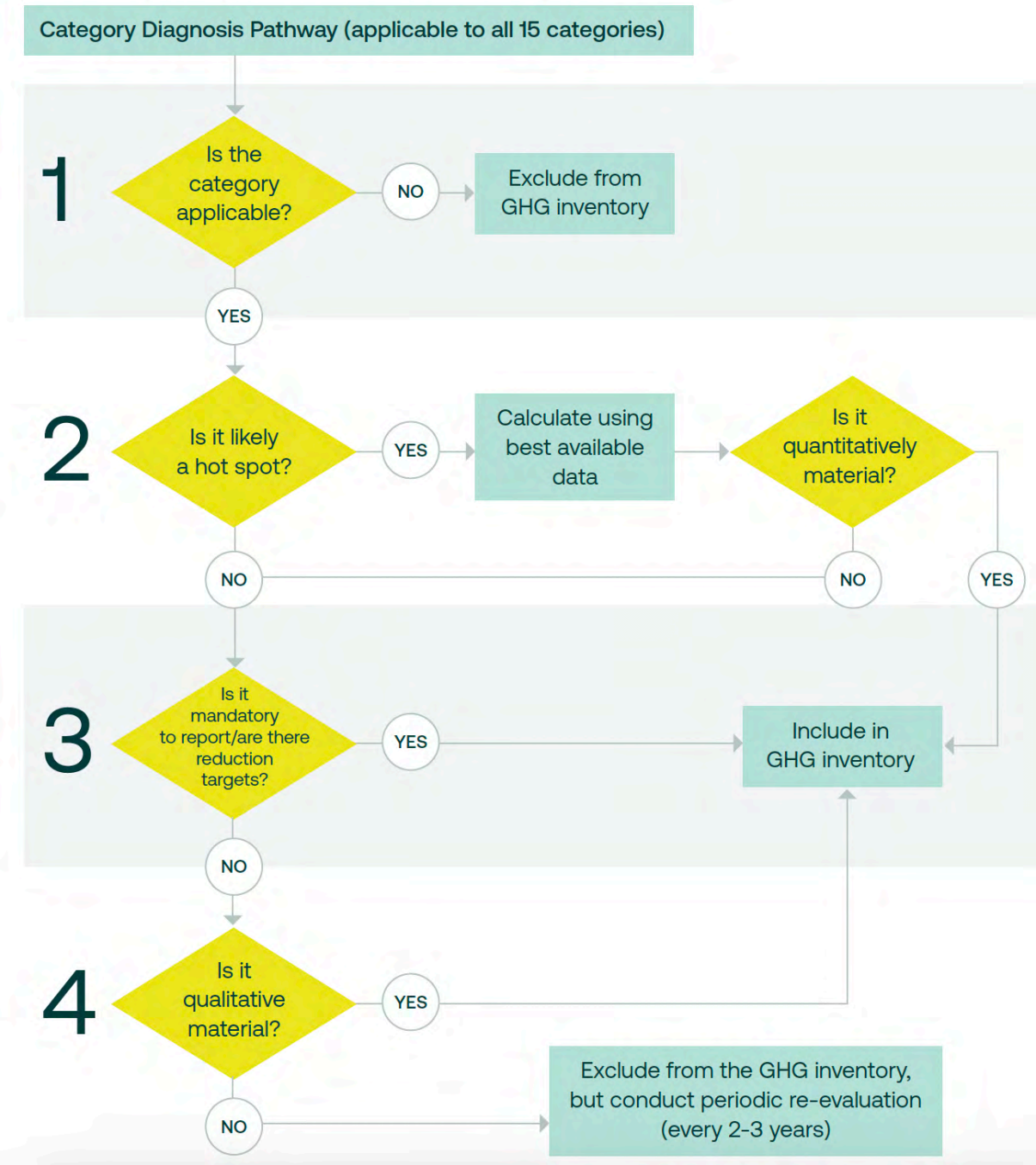


Figure 12 Category Diagnosis Pathways

2.2.2 Materiality

This is the determination of emissions suitability for report immediate needs. This means that reliable information should be available for the emissions accounting exercise or at best, good assumptions.

2.2.3 Client impacting data

The efforts will then be made to identify clearly what data is used to determine or input to the emission levels of each Scope reported.

Designation	Specifics	Reference / Quantity	Scope Impact
Site	Mining Licence 197	ML 197	Not Applicable
Life of Mine	minimum	11 years	Not Applicable
Life of Mine	inferred	15 years	Not Applicable
Operation	per annum	24 hours/ 365 days	Not Applicable
Resource	Copper	Cu	Not Applicable
Copper	81 million tonnes	0.60% Cu[19]	Not Applicable
Copper	25 ktpa to 30 ktpa[20]	Cu Cathode Production[21]	Not Applicable
Workforce	Construction	700 persons	700 persons
Workforce	Operations	600 to 800 persons	Scope 1 / Scope 3
Workforce	General and administrative (G&A)	23 persons	Scope 3
Workforce	Mining (Non-G&A)	56 persons	Scope 1 / Scope 3
Power	NamPower[22]	20 MW	Scope 2
Water	NamWater[23]	255m^3/hr	Scope 3
Waste	Transported to Windhoek[24]	quantities unknown	Scope 3

Mine/Plant Components[25]:

- Offices
- Control Room
- Warehouses
- Workshops;
- Open-pit mines;
- Heap leach pads;
- Process plant;

[19] Canadian Institute of Mining, Metallurgy and Petroleum (CIM) Best Practice Guidelines
[20] https://www.omicomining.com/wp-content/uploads/2022/09/2023-Q1-Omico-Corporate-Presentation-FINAL.pdf [page 5]
[21] https://www.omicomining.com/about-us/
[22] REV 01, ECC Report No: ECC-134-394-REP.
[23] REV 01, ECC Report No: ECC-134-394-REP.
[24] To be determined
[25] Scope 1 – 2 impacting facilities

- Water management infrastructure;
- Support services and facilities - communications structures
- Accommodation - canteen facilities;
- Accommodation - recreation facilities;

Equipment:

- Drillers (Diesel)
- Track Dozers (Diesel)
- Loaders/Shovels (Diesel)
- Haulers (Diesel)
  100 tonne/ 150 tonne
- Crushers
- LDV – Trucks
- LDV – Busses
- LDV – Pickups (Bakkies)
- Pumps
- Air Conditioning
- Lighting

2.3 Assumptions and exclusions

2.3.1 Plant Operation

As per the diagram, we assume operations will be as indicated.

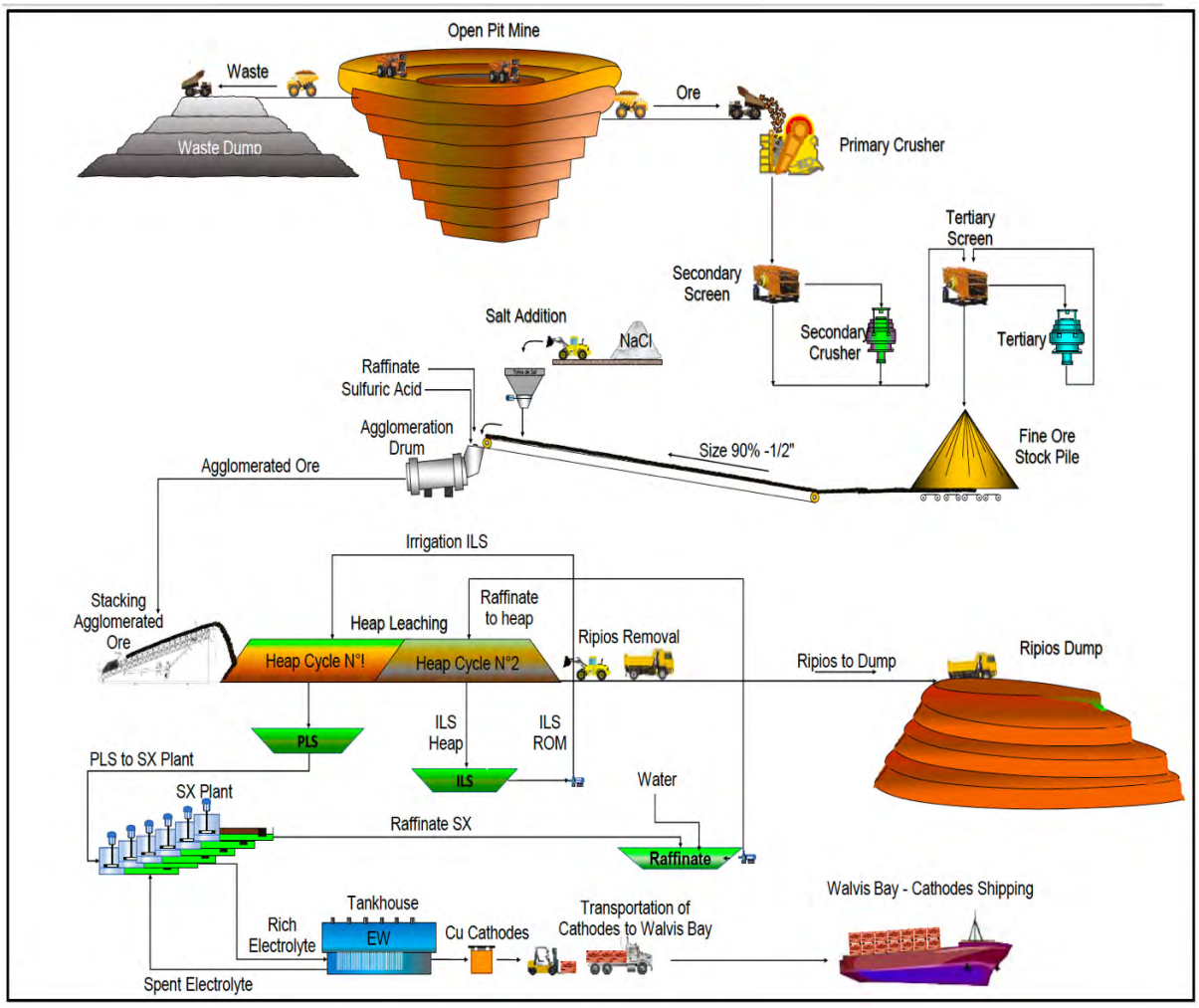


Figure 13 Ore steps[26]

[26] REV 01, ECC Report No: ECC-134-394-REP.

2.3.2 Copper Cathode Production

The Project is stated to produce copper cathodes at a 99.99 % purity level. Annual Cathode production is:

Table 2 Production Parameters

Mining Summary		
	Units	Value
Average Annual Mining Rate (Ore)	Mt	5.6
Average Annual Mining Rate (Waste)	Mt	26.8
Average Annual Mining Rate (Total)	Mt	32.5
Strip Ratio (waste:ore)		4.8
LOM	Years	11
Annual Cathode Production	tpa	25,000 to 30,000

2.3.3 Off-plant trucking

The use of off-site trucking to provide a variety of supplies is accounted for under the following principles (Zutari Namibia (Pty) Ltd., 2023 (August)):

- The mine is scheduled to operate ***365 days per year***. The mine will operate on a two 12-hour shift, 1 week (7 days) on and 1 week (7 days) off cycle for each year.
- Transport Route 1 is ***491km long***, 349km sealed and 142km gravel.
- 15 (32 tonne) trucks a day for 20 days/month

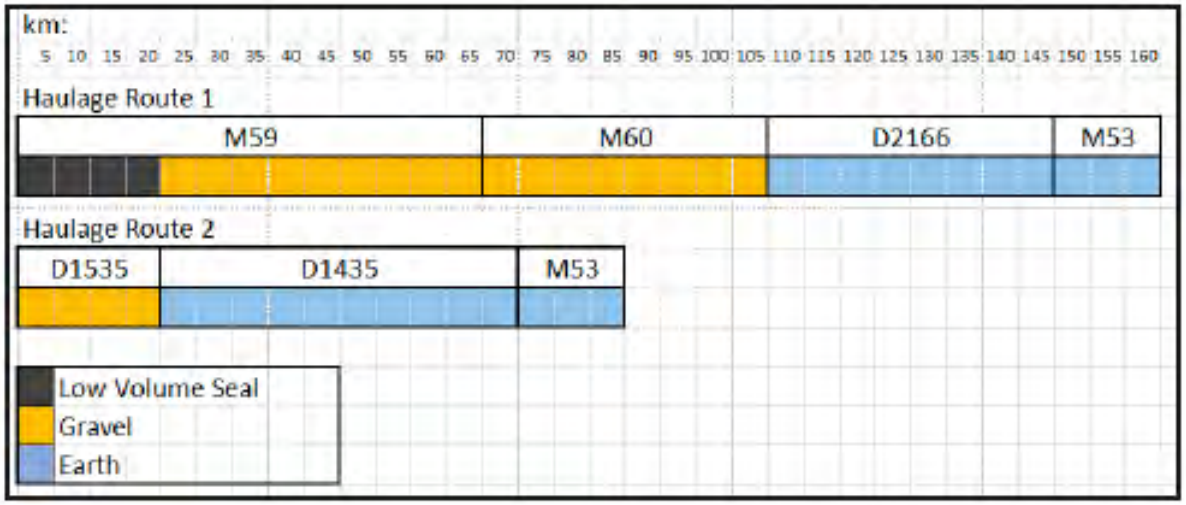


Figure 14 Analysis of Haul Distance not on B-routes[27]

This has led us to make further assumptions re fuel use by examining the most popular trucks available for the studied transport duty such as:

[27] (Zutari Namibia (Pty) Ltd., 2023 (August))

Table 3 Off-site trucking fuel consumption ratings /100 km

	Euro	/100km	Reference
Scania p410	6	25.14 L	https://www.scania.com/content/dam/scanianoe/market/master/products-and-services/trucks/fuel-efficiency/Green-Truck-EN.pdf
DAF CF 450	6	21.26 L	https://www.daf.com/en/news-and-media/news-articles/global/2023/12-05-2023-new-generation-daf-xf-450-crowned-green-truck-2023
MB Actros 1851	6	25.75 L	https://www.scania.com/content/dam/scanianoe/market/master/products-and-services/trucks/fuel-efficiency/Green-Truck-EN.pdf
Volvo FH 500 I-Save	6	26.79 L	https://www.scania.com/content/dam/scanianoe/market/master/products-and-services/trucks/fuel-efficiency/Green-Truck-EN.pdf
AVERAGE		24.735 L	

Figure 15 DAF CF 450 8x4 32 Tipper fitted with a Fruehauf Muck-Away Tipper body.

2.3.4 Off-plant transportation

As no report was provided to us on off-site non-company vehicle use, it is important to note that in the absence of accurate information for staff movement to and from the site, this is not included or assessed at this time.

2.3.5 Water Use

Leading practice shows that water use related emissions are calculated using metered or estimated water consumption and wastewater volume data and assigned to Scope 3.

It is our understanding that water use in now revised and planned to be 255m^3/hr and this report will focus on this unless advised otherwise. For water use on site and using localised water sources (Environmental Compliance Consultancy, 2023), all pumping will be included in site electricity usage.

2.3.6 Electricity – Site Use (Scope 2)

The Project will use electricity (Environmental Compliance Consultancy, 2023) to be primarily acquired from the local utility (NamPower) and so the national grid factors will apply. The demand profile will be assumed to be:

- Electrolysis – to produce copper cathodes (99.99 % Copper)
- Used for water pumping.
- Lighting
- Cooling and air conditioning
- Powering equipment inclusive of communications (ICT).

There is the possibility that some or all the electricity demand could be met by diesel generation through the life of mine. In addition, a renewable energy source could be incorporated into the energy mix to reduce GHG impact over the LOM.

Project Area Description	UOM	Year 1	Year 2 - 10	Year 11
Design Load Power Demand	kW	24,148	24,148	24,148
Design Load Apparent Power Demand	kVA	30,299	30,299	30,299
Design Energy Consumption	kWh/a	102,184	129,075	49,105

Figure 16 Craton Energy/Power Estimate (Electrical)

The energy use is (Environmental Compliance Consultancy, 2023, p. 52) noted as follows:

Power to the processing operations will be supplied via a NamPower grid connection, supplemented by solar power on site once acquired. The operation will have diesel power generation as backup for the electro-winning plant for power loss mitigation. ……. The NamPower grid connection will require a new line from the Auas substation to site.

Figure 17 Copper Refining Techniques

2.3.7 Electricity – Grid Emissions Factor

A "grid emission factor" or GEF refers to a CO_2 emission factor (tCO_2/MWh) which will be associated with each unit of electricity provided by an electricity system. It is a parameter to help determine the baseline emissions for projects and in the case of GHG impact analysis, the amounts of emissions created or avoided.

It is well known that Namibia imports at times, upwards of 70% such as in 2018 and 2019, of its electricity demand needs, annually equating to some 2.8 GWh (2,800,000 MWh). Most of this imported energy is derived either from South Africa, Zimbabwe or from Zambia. South Africa, the dominant power system in Southern Africa, being reliant on coal, has a grid emission factor (GEF) of 1.04 (tCO_2/MWh)[28] for the period 1 April 2021 to 31 March 2022 and improvements to 1.01 (tCO_2/MWh) for 1 April 2022 to 31 March 2023.

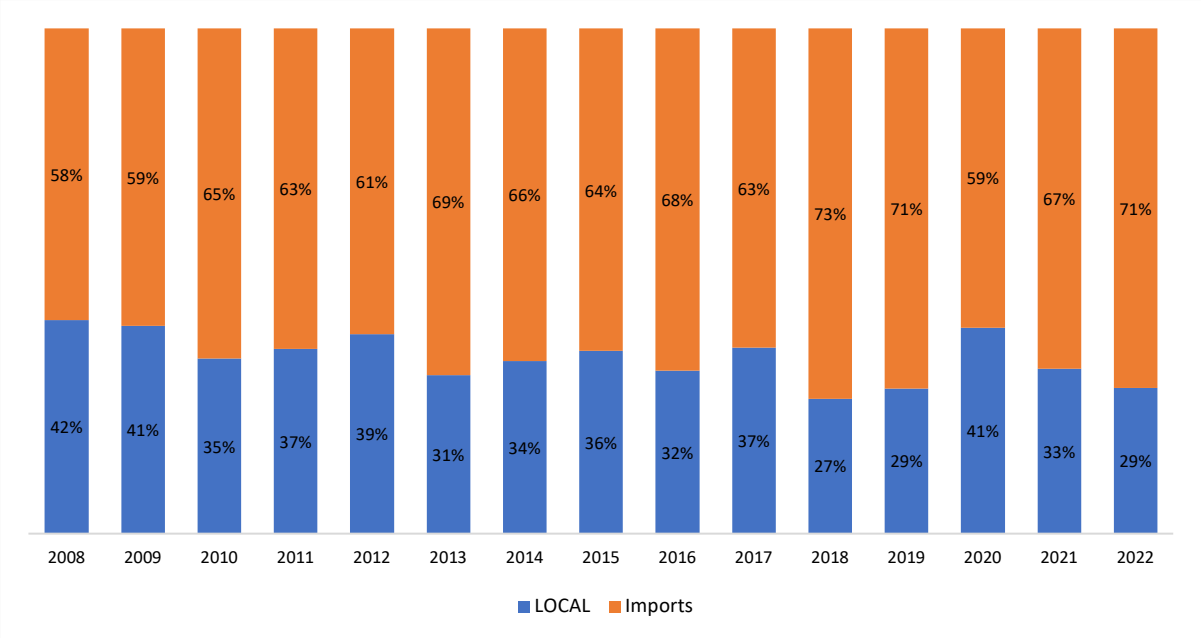


Figure 18 Namibian Grid Local vs Import ratios

[28] Factor 1 (Integrated Report, 2022) page 153
https://www.eskom.co.za/wp-content/uploads/2022/12/2022_integrated_report.pdf

For projects in Namibia however, the issue of its grid emission factor (GEF) is thus a point of contention. Resultant therefore is that various authors are using different GEF for GHG assessments of projects. Namibia Power Corporation Pty. Ltd. (NamPower) has advised that the Namibian grid is to be assess using the UNFCCC Harmonized IFI Default Grid Factors[29].

While we have our reservations, we have therefore used the grid emissions factor noted by NamPower and it is taken as 0.3550 tCO_2/MWh[30].

2.3.8 Fuel – Scope 3 matters

The upstream impact of fuel is a major consideration for mining operations. Sadly, in Namibia as currently (October 2023) a non-oil producing nation, the true upstream emissions are not reported. As a result, the international oil market[31] that caters for Namibia is used at this time as a "guide" benchmark.

2.4 Emissions Scope

2.4.1 Scope Understanding

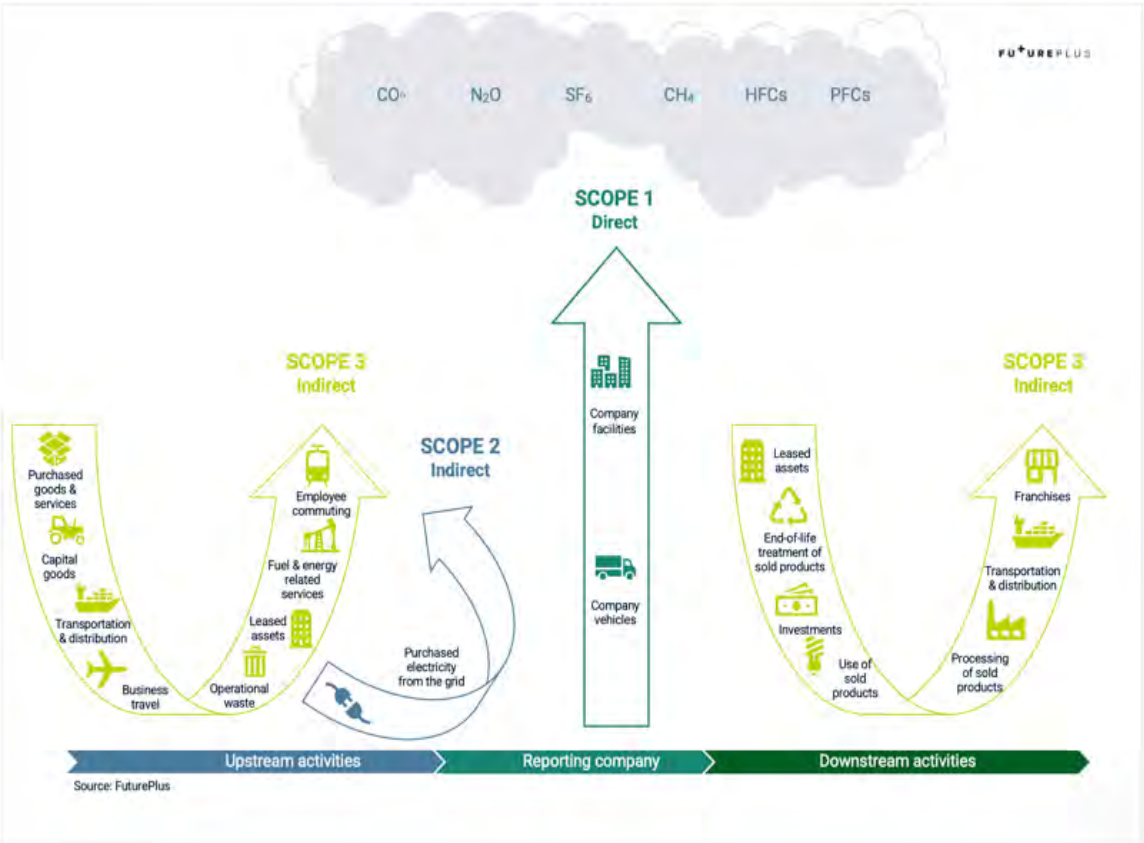


Figure 19 Scope Diagram: Scopes 1 - 3 (FuturePlus)

[29] https://unfccc.int/climate-action/sectoral-engagement/ifis-harmonization-of-standards-for-ghg-accounting/ifi-twg-list-of-methodologies.
[30] UNFCCC Harmonized IFI Default Grid Factors 2021 v3.2
[31] https://reports.shell.com/annual-report/2022/

2.4.1.1 Emissions data: SCOPE 1

Scope 1 emissions are emissions under the DIRECT control of the company responsible for them. Effective management of Scope 1 emissions is a critical component of an organization's overall sustainability and climate change mitigation strategy, as it allows for the identification of emission reduction opportunities and the tracking of progress towards emission reduction goals.

2.4.1.2 Emissions data: SCOPE 2

Organizations have a growing responsibility to account for their Scope 2 emissions as part of their broader sustainability and environmental management strategies. Accurate measurement and reporting of Scope 2 emissions are essential for demonstrating a commitment to environmental stewardship, transparency, and meeting regulatory and stakeholder expectations.

2.4.1.3 Emissions data: SCOPE 3

Scope 3 emissions are increasingly recognized as a significant aspect of a company's overall carbon footprint and managing them is vital for a comprehensive approach to greenhouse gas emissions reduction.

ICMM Guidance has also classified mining companies and so the Omitiomire project falls under the classification as "Base Metals". It thus sees the Value Chain Attributes (International Council on Mining and Metals , 2023) as:

a) *Companies whose main commodities are primary non-ferrous metals such as copper, aluminium, lead, nickel, tin and zinc as well as related metal alloys – may or may not include iron.*
b) *Energy-intensive requirements for transformation prior to onward selling, leading to high Category 3 emissions as an extension of Scope 1 and 2 emissions, and may also include high Category 1 emissions considering the demand for consumables (eg sulphuric acid) and other inputs into chemical processes.*

2.4.2 Emission factors

Source[32]	tCO2e/L[33]	tCO2e/km
Fuel Oil / Diesel – consumed (SCOPE 1)	0.002677	
Fuel Oil / Diesel – upstream (SCOPE 3)[34]	0.000663	
Natural gas	0.001800	
Liquid Petroleum Gas (LPG)	0.002100	
Car – Petrol (less than 1.4L engine)		0.1208

[32] (Department for Energy Security & Net Zero (UK), 2023)
[33] Global Warming Potential (GWP) values as per (Intergovernmental Panel on Climate Change, 2022)
[34] Although a supplier is not designated, A major supplier is used as Namibian Fuel Industry Supplier average. https://fourleafdigital.shell.com/webapps/climate_ambition/downloads/shell-emissions-explainer.pdf

Car – Petrol (1.4L – 2.0L engine)		0.1555
Car – Petrol (greater than 2.0L engine)		0.2489
Car – Diesel (less than 1.7L engine)		0.1113
Car – Diesel (1.7L – 2.0L engine)		0.1361
Car – Diesel (greater than 2.0L engine)		0.1704
Water – Upstream (Scope 3)	0.0000025	

2.4.3 Limitations

The following limitations associated with this assessment methodology occurs in part because assessment guidance has not been developed in Namibia. However, using international leading practice, guidance and professional judgment give credence to the conclusions drawn.

2.4.3.1 Emissions Source Categories

For effective reporting, leading practice of the TCFD and ICMM recommend that a minimum baseline be achieved. This report therefore takes this into account and identifies the high-level categories covered for completeness.

Category	***Baseline Calculation Method***	***Rationale***	**Used in this Report**
1. Purchased Goods and Services	*Key emission sources: at least Industry-Average* *Non-key emission sources: at least Spend-based.*	*Key suppliers can be engaged on emissions reductions, and conversations require more accurate calculations*	Electricity and Water only
3. Fuel- and Energy Related	*Key emission sources: at least Industry-Average* *Non-Key emission sources: at least Spend-based.*		Yes
4. Upstream Transport	*Key emission sources: Industry-Average, or fuel based* *Non-Key emission sources: Spend-based.*		Yes
7. Employee Commuting	*Extrapolated (after first calculation)*	*Low business risk and low emissions, with a corresponding low effort in quantifying emissions for the purpose of completeness and transparency.*	Assumed

2.4.3.2 Scope 3 limitations

While it is accepted that Scope 3 are those emissions not "directly" related to a company's operations, the value chain however is a consequence of the business. As they (emissions) are not a result of direct control, then a difficulty in classification, records and measurement exist[35].

Therefore, as noted by the International Council on Mining and Metals (ICMM)[36], the "*Accounting and reporting the Scope 3 emissions of any company is inherently complex*" and so care has been taken not to create expectations of emissions that are literally "guessed".

In particular, there is no emissions data available for Namibian fuel suppliers and so following ICMM and GRI guidelines, the Scope 1 and Scope 2 emissions are used as an Industry average to guide Scope 3 reporting.

3 Impacting Legislation

An overview of the projected climate change scenarios and regional legislative impacts relevant to the organization or project.

3.1 Local

Legislation	Impact
Constitution of the Republic of Namibia (1990)	Maintenance of ecosystems, essential ecological processes and biological diversity of Namibia, and the utilisation of living, natural resources on a sustainable basis for the benefit of all Namibians, both present, and future."
Environmental Management Act, 2007 (Act No. 7 of 2007)	*promotes sustainable management of the environment and the use of natural resources. The Act requires certain activities to obtain an environmental clearance certificate prior to Project development.*
National Climate Change Policy (2011)	*The National Climate Change Policy provides the overarching framework for addressing climate change in Namibia. It outlines strategies for adaptation and mitigation and sets the groundwork for future legislation.*
Climate Change Bill (Draft)	*Namibia has been working on a Climate Change Bill, which was in draft. The bill aims to provide a comprehensive legal framework for climate change mitigation and adaptation in the country.*

[35] https://www.icmm.com/en-gb/guidance/environmental-stewardship/2023/scope-3-emissions-accounting-and-reporting
[36] https://www.icmm.com/en-gb/guidance/environmental-stewardship/2023/scope-3-emissions-accounting-and-reporting

Water Resources Management Act (2013)	*Namibia faces water scarcity challenges exacerbated by climate change. This act provides for the management and protection of water resources and plays a role in climate adaptation efforts.*
Modified Single Buyer framework	*is a specialized electricity procurement and distribution model implemented by the Namibian government to facilitate the efficient and sustainable development of the country's electricity sector.* *This framework is primarily designed to optimize the procurement of electricity generated from* ***renewable energy sources****, enhance transparency, attract investment, and ensure a reliable and cost-effective supply of electricity to consumers and industries.*

3.2 International Guidelines

3.2.1 United Nations Framework Convention on Climate Change (UNFCCC), 1992

The objective of the convention is to reduce and stabilize greenhouse gases at an atmosphere level to reduce impacts on climate systems, allow ecosystems time to adapt to these changes and reduce food shortages so that economies can develop in sustainable manners.

3.2.2 Principle 2 of The Equator Principles

Under the Equator Principles, an *Environmental and Social Assessment* is required. While Namibia is not a designated country under Equator Principles, leading practice in both project financing and mining sectors require an "*Appropriate Assessment*".

The assessment is to be supported by an alternatives analysis to be conducted when there is an "expectation" that CO_2e emissions will exceed 100,000 tonnes of CO_2e (tCO_2e) per annum during any stage of the Project (The Equator Principles Association, 2020). This will include both Scope 1 and Scope 2.

An Alternatives Analysis is defined as a systematic process that involves evaluating and comparing different options or alternatives to address a specific problem, decision, or project. It is a methodical approach used to assess the pros and cons of various alternatives and make informed choices based on objective criteria and analysis.

The purpose of an Alternatives Analysis is to identify and evaluate different potential solutions or courses of action to achieve a desired outcome or objective. This will mean that the Project seeing periods in excess of 100,000 tonnes of CO_2e per annum, an alternatives analysis will be required. ***This is outside the terms of the current scope of this commissioning.***

3.2.3 International Finance Corporation (IFC) Principle

The IFC started their Performance Standards in 2006 and have since updated so that projects with "significant emissions" so that projects that are expected to or currently produce more

than 100,000 tonnes of CO_2-equivalent annually,[37] the client will quantify direct emissions from the facilities owned or controlled within the physical project boundary,[38] as well as indirect emissions associated with the off-site production of energy[39] used by the project.

Figure 20 IFC Project Risk Categorization

Quantification of GHG emissions will be conducted by the client annually in accordance with internationally recognized methodologies and good practice[40]. (International Finance Corporation, 2012).

IFC notes further that businesses pose varying risks dependent on operation type and location. This has resulted since 2012 in the following categories:

3.2.4 The Task Force on Climate-related Financial Disclosure (TCFD)

The Task Force on Climate-related Financial Disclosure (TCFD) takes a different approach to understanding a company's long-term climate-related risks and the opportunities to adapt, mitigate or achieve positive cross-impact[41]. With a "forward-looking" approach, TCFD focuses on awareness raising and transparency. Principles, therefore, surround *being clear, balanced,*

[37] The quantification of emissions should consider all significant sources of greenhouse gas emissions, including non-energy related sources such as methane and nitrous oxide, among others. https://www.dfc.gov/sites/default/files/2019-08/world_resources_institute_1.pdf

[38] Project-induced changes in soil carbon content or above ground biomass, and project-induced decay of organic matter may contribute to direct emissions sources and shall be included in this emissions quantification where such emissions are expected to be significant.

[39] Refers to the off-site generation by others of electricity, and heating and cooling energy used in the project.

[40] Estimation methodologies are provided by the Intergovernmental Panel on Climate Change, various international organizations, and relevant host country agencies.

[41] The Financial Stability Board (FSB) created the Task Force on Climate-related Financial Disclosures (TCFD) in 2015 to improve and increase reporting of climate-related financial information. The TCFD, https://www.fsb-tcfd.org/ has fulfilled its remit and disbanded.

and understandable to reliable, verifiable, and objective (Task Force on Climate-related Financial Disclosures, 2021).

TCFD is however voluntary and allows each reporting entity to "self-determine" the definition of materiality and thus categories to be reported on. An overriding consideration would therefore be any legal obligation either from the country of registration, customer needs or country of operation.

3.2.5 The International Council on Mining and Metals (ICMM)

The International Council on Mining and Metals (ICMM) starts from the point that "Climate change is real". As an entity, it is thus providing guidance founded on support to the mining sector and leading practice such as the Task Force on Climate-Related Financial Disclosures (TCFD) framework for benchmarking and voluntary standards (International Council on Mining and Metals , 2023).

3.2.6 The International Copper Association (ICA)

The objective of the association is that copper demand must be met responsibly. It has the *Copper—Pathway to Net Zero* to showcase how innovative mining practices can contribute to sustainable development, reduce carbon emissions and diminish the impact of mining activities on the environment[42].

The ICA also promotes *The Copper Mark[43] is the leading assurance framework to promote responsible practices across the copper, molybdenum, nickel and zinc value chains*.

4 Climate Projections

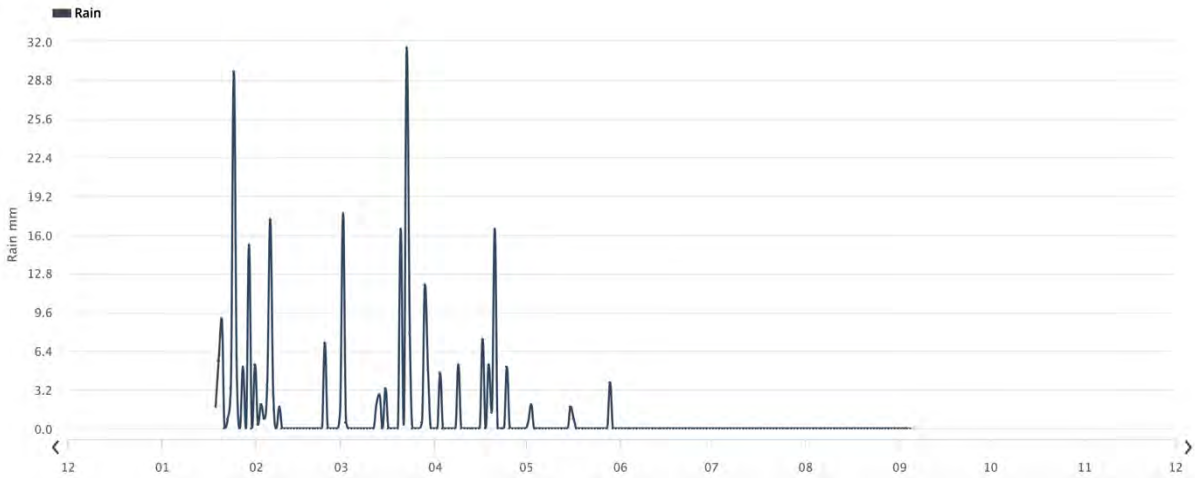
An overview of the projected climate change scenarios and regional impacts relevant to the organization or project.

4.1 Site Specific Climate Impact Information

With specific reference to the site in question, the following is adapted from the modelling done by the World Bank's Climate Change Knowledge Portal[44]:

[42] https://copperalliance.org/sustainable-copper/
[43] https://coppermark.org/
[44] https://climateknowledgeportal.worldbank.org/country/namibia/climate-data-projections

4.1.1 Rainfall



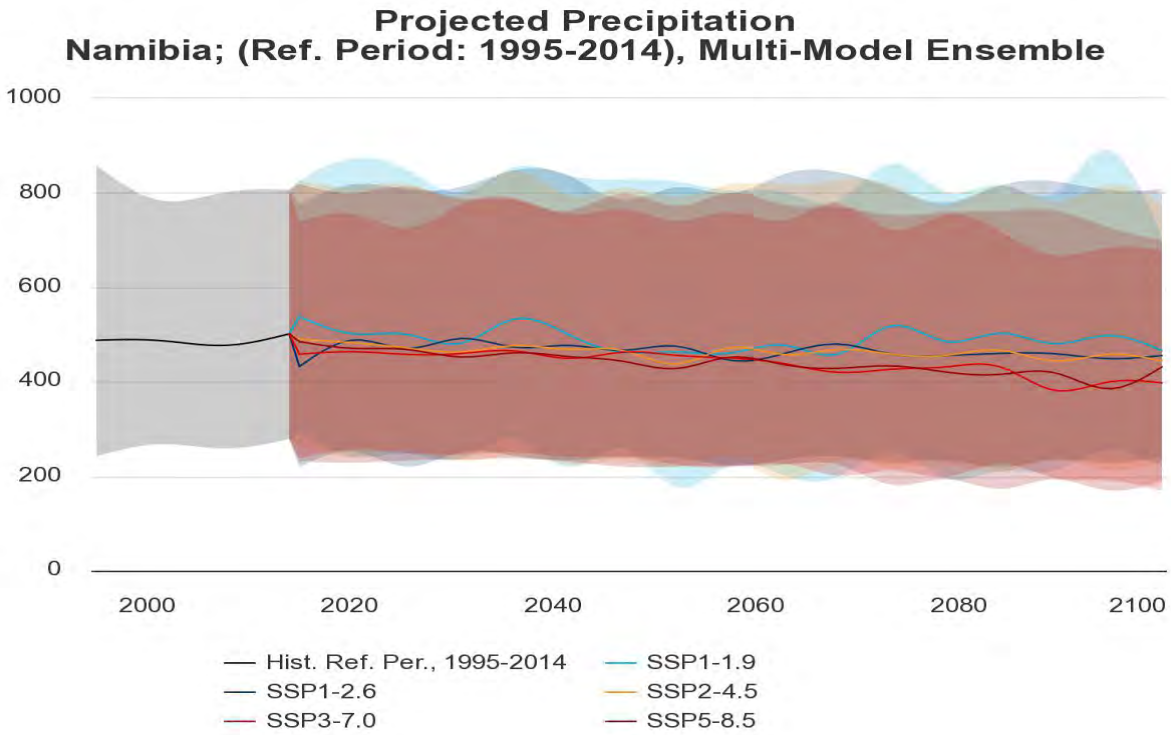
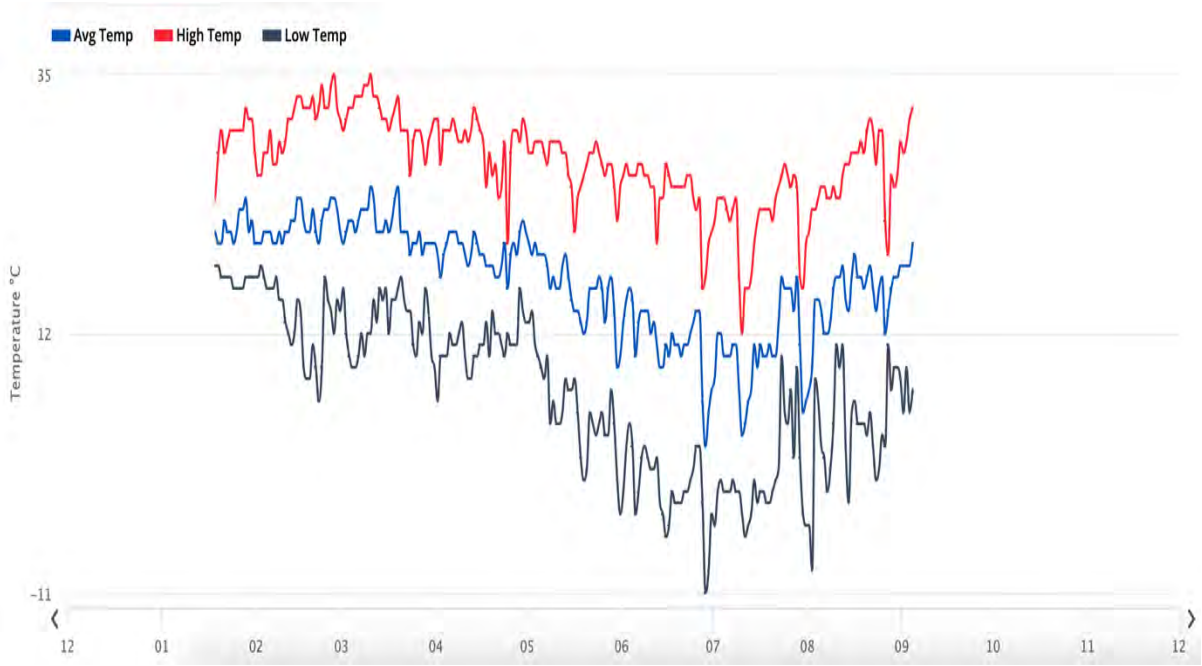


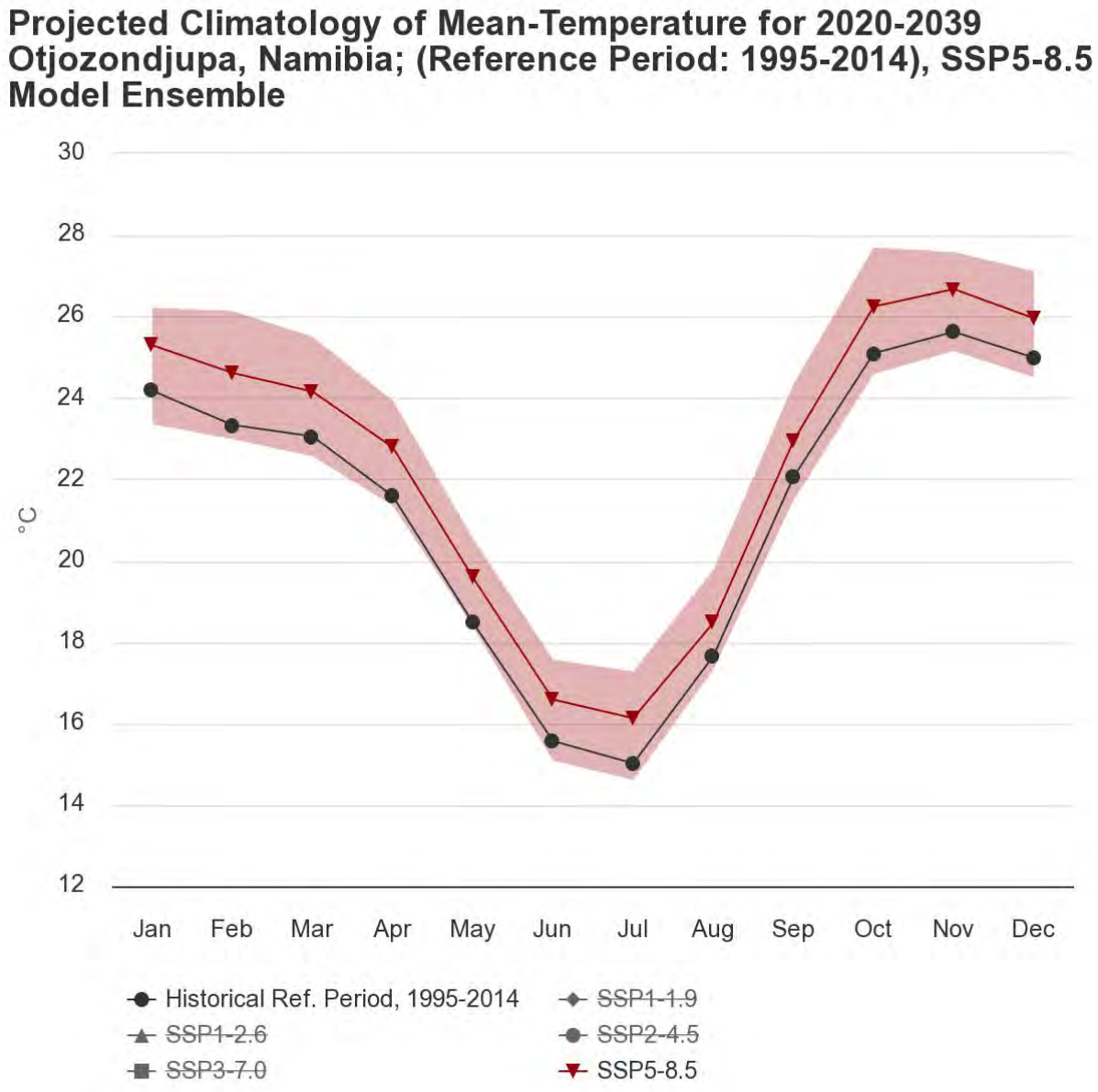
Figure 21 rainfall expectations 2000 – 2100

Under SSP references, rainfall is expected to vary between 230 mm – 870 mm (2023) and 230 mm – 848 mm (2040) under optimistic energy transition pathways. This is a clear indication of the rainfall challenges ahead. In a more pessimistic scenario, the upper limit will fall to 760 mm.

4.1.2 Temperature



Temperature although not a singular indicator for climate change impacts, it is well noted that as ambient temperature increases, the erratic nature of weather patterns increase. Namibian temperatures in the Omitiomire area are projected to swing between 0.81 deg C and 1.28 deg C above norm between 2020 and 2039 in a business-as-usual approach that sees increased fossil fuel dependency and exploration.



5 Scenario Analysis

Exploring different climate scenarios and their potential impact on the organization to understand uncertainties and improve decision-making. The hypothetical baseline year for Omitiomire is unknown but as no full-fledged operation is in place at the time of writing this report, 2024 has been assigned.

This creates a known uncertainty which is expected to be resolved once an investment or DFS decision has been made. The climate scenario analysis in this report is qualitative and the World Bank's Namibia Climate Risk report forms the basis (The World Bank Group, 2021), where the Representative Concentration Pathways (RCPs) scenarios was formed, as was the basis of the Intergovernmental Panel on Climate Change's (IPCC) analysis of the state of climate change globally.

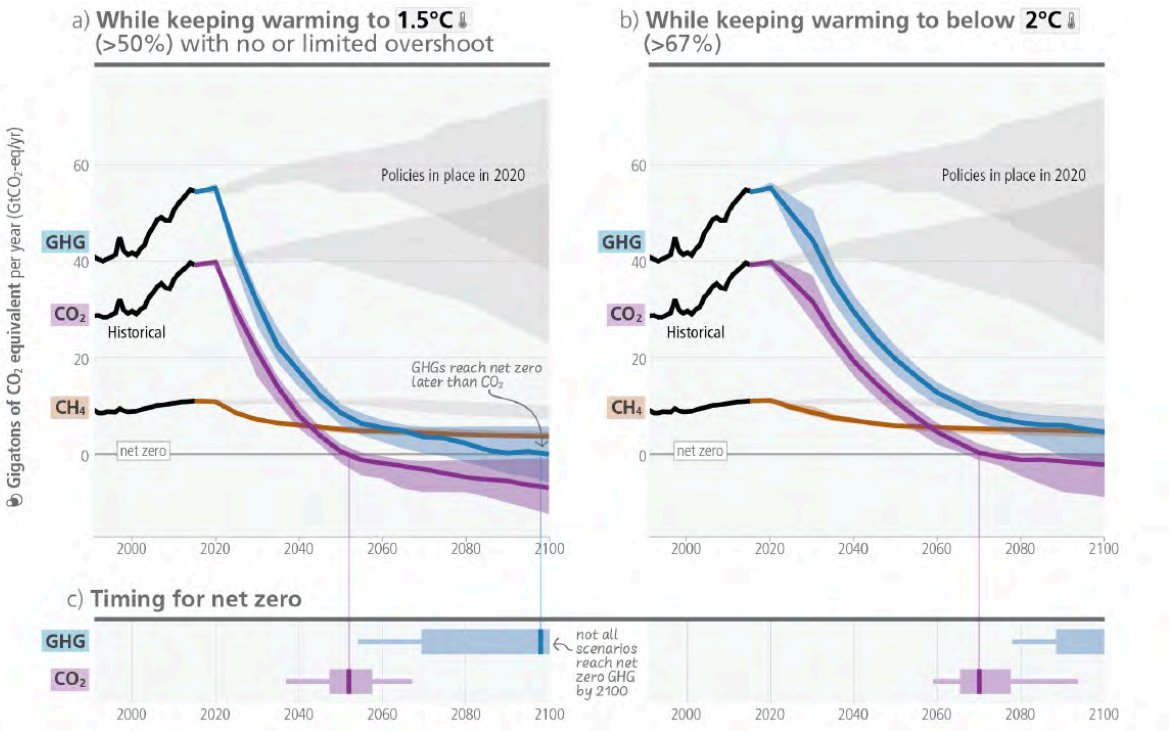


Figure 22 Global modelled pathways (limit warming to 1.5 deg. C)

5.1 Representative Concentration Pathways (RCPs)

A common set of reference years and time periods are adopted for assessing climate change and its impacts and risks: the reference period 1850–1900 approximates pre-industrial global surface temperature, and three future reference periods cover the near-term (2021–2040), mid-term (2041–2060) and long-term (2081–2100).

5.1.1 RCP 2.6

The RCP 2.6 scenario envisions a low-emission future characterized by ambitious measures, including a reduction in the use of oil, enhanced energy efficiency leading to low energy intensity, global population stabilization at or below 9 billion by the year 2100, and the implementation of various interventions.

In line with this vision, it is imperative for the Omitiomire project to, at the very least, examine and prioritize the following key areas:

1. Solar Photovoltaic Electricity Generation: Incorporating the generation of electricity through solar photovoltaic (PV) systems is an essential component of a sustainable energy strategy. Solar PV technology harnesses energy from the sun, which is abundant and renewable. By embracing solar photovoltaics, the Omitiomire project can reduce its carbon footprint and contribute to the realization of a low-emission future.

2. Energy-Efficient Air Conditioning: Energy-efficient air conditioning solutions are pivotal in minimizing energy consumption and, consequently, greenhouse gas emissions. Implementing advanced and environmentally friendly air conditioning technologies can significantly enhance energy efficiency within the project, aligning it with the goals of RCP 2.6.

3. Electric Vehicles (EVs): The adoption of electric vehicles, including Light-Duty Vehicles (LDVs), buses, and cars, is a crucial step toward reducing the dependence on fossil fuels and mitigating the carbon footprint associated with transportation. By considering electric vehicles as part of the Omitiomire project, it not only promotes sustainable mobility but also aligns with the RCP 2.6 vision of transitioning away from oil-based transportation systems.

Incorporating these elements into the Omitiomire project will contribute to its alignment with the RCP 2.6 scenario and support the pursuit of a low-emission future characterized by reduced oil usage, heightened energy efficiency, and a sustainable global population. This strategic approach underscores the commitment to environmental responsibility and the mitigation of climate change.

5.1.2 RCP 4.5

The RCP 4.5 scenario envisions a future characterized by medium-level greenhouse gas emissions, driven by moderate climate policy ambitions, reduced reliance on oil, and enhanced energy efficiency, among other interventions (Riahi et al., 2007).

To align with this scenario, the Omitiomire project must, at a minimum, consider the following key elements:

1. Solar Photovoltaic Electricity Generation: A fundamental aspect of the RCP 4.5 scenario involves an increased reliance on renewable energy sources, particularly solar photovoltaics, for electricity generation. Incorporating solar photovoltaic systems into the Omitiomire project's energy portfolio will contribute to a lower carbon footprint and align with the goals of the RCP 4.5 scenario (van Vuuren et al., 2011).

2. Energy-Efficient Air Conditioning: Achieving energy efficiency is a core element of the RCP 4.5 scenario. The Omitiomire project should prioritize the implementation of energy-efficient air conditioning systems to minimize energy consumption and reduce greenhouse gas emissions, aligning with the scenario's objectives (Riahi et al., 2007).

3. Electric Vehicles (EVs): The adoption of electric vehicles, including Light-Duty Vehicles (LDVs), buses, and cars, is instrumental in reducing reliance on oil and mitigating emissions in the RCP 4.5 scenario (Kriegler et al., 2014). Integrating EVs into the project's transportation infrastructure is crucial to meet the medium-ambition climate policies outlined in RCP 4.5.

By incorporating solar photovoltaic electricity generation, energy-efficient air conditioning, and electric vehicles, the project can contribute to the realization of these goals and demonstrate a commitment to a sustainable and environmentally responsible approach.

5.1.3 RCP 6.0

RCP 6.0 envisions a scenario characterized by a continuation of business-as-usual practices, accompanied by modest efforts to reduce emissions. This scenario entails a significant reliance on fossil fuels, particularly oil, along with some initiatives aimed at improving energy efficiency

and implementing other interventions. As a result of these measures, carbon dioxide (CO2) emissions are projected to peak in the year 2060, reaching a level equivalent to 75% of the emissions recorded in 2020. Subsequently, emissions are expected to gradually decline, but they will remain 25% higher than the 2020 baseline level.

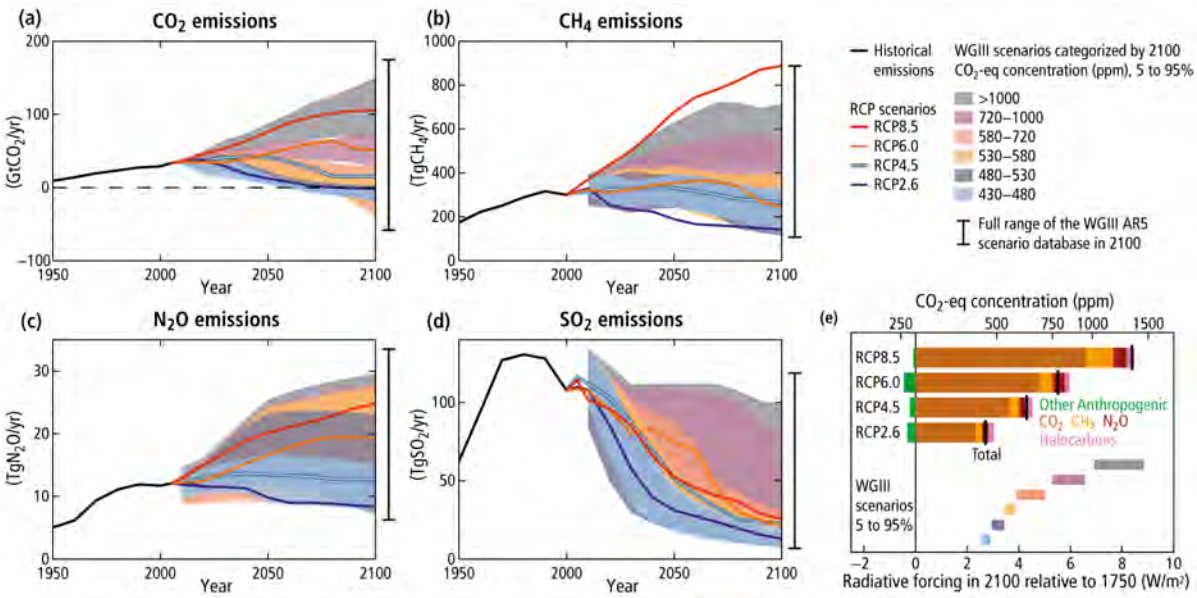


Figure 23 5.1 Representative Concentration Pathways

In alignment with the RCP 6.0 scenario, the Omitiomire project is required to adhere to a specific set of guidelines. Notably, the project must employ currently available equipment and services commonly found in the market. This approach is intended to mirror the business-as-usual perspective outlined in RCP 6.0, where existing technologies and services represent the status quo. By utilizing these conventional tools and services, the Omitiomire project aims to replicate the conditions and emissions patterns associated with business as usual, as prescribed by the scenario.

5.1.4 RCP 8.5

RCP 8.5 sees business as usual with high emissions output, high usage of oil, some energy efficiency, and other interventions that see CO_2 emissions peak in 2100 at 300% of 2020's levels. Population is expected to be 12 billion and no further climate change policy changes.

To support this, the Omitiomire project needs to use only current market equipment and services thus being business as usual.

5.2 Emissions Findings

The emissions calculated in this section of the Report is derived from data provided by the Client or assumed from best information available.

The overall picture is one where emissions exceed the 100,000 tCO_2e for triggering reporting as per Equator Principles guidelines.

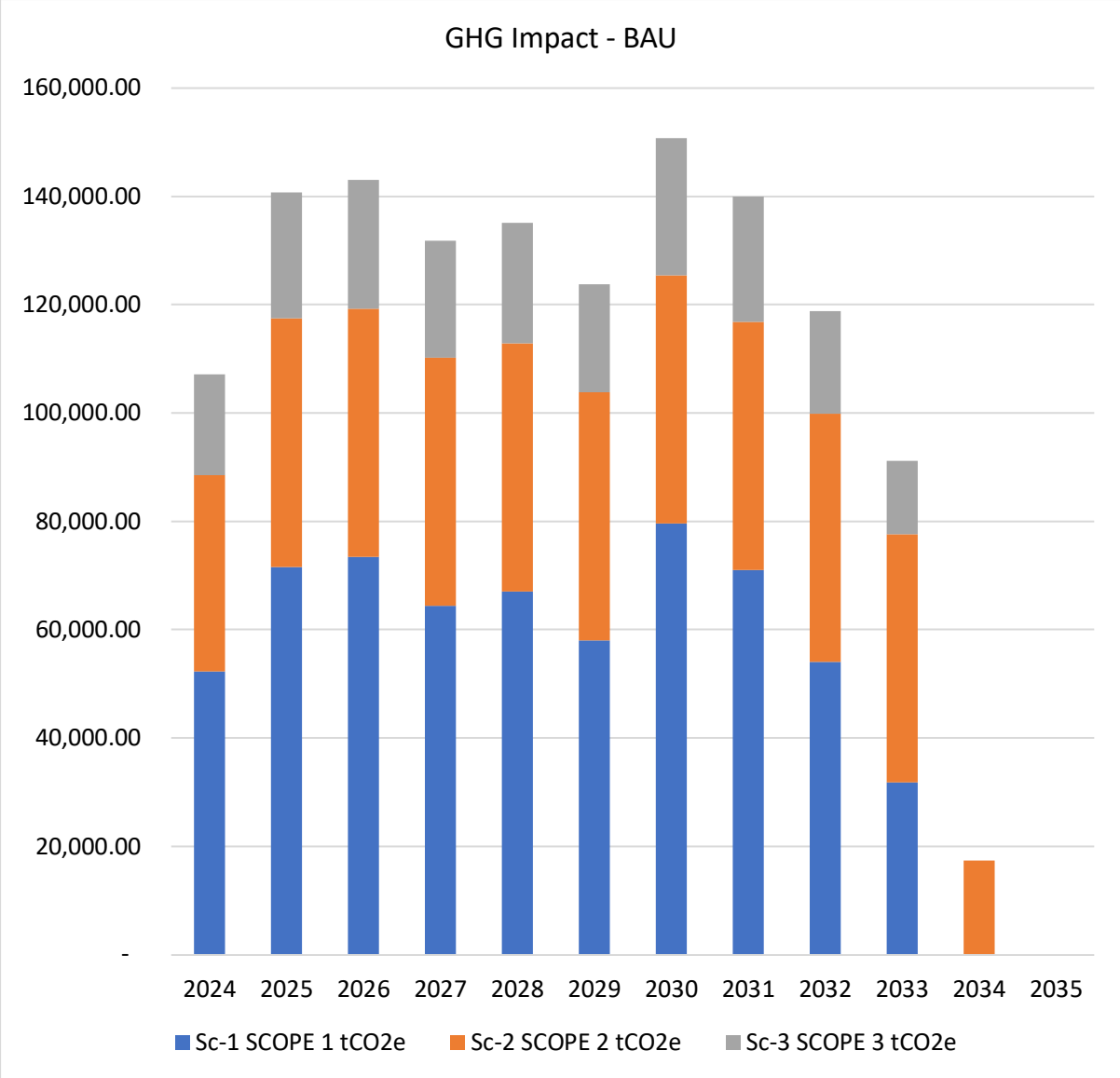


Figure 24 GHG Impact (BAU) over life of Mine (Year on Year)

The overall picture seen is one where emissions exceed the *100,000 tCO_2e* in any one year of operation for triggering reporting as per leading practice such as the *Equator Principles* guidelines at a maximum value currently estimated at **150,725 tCO_2e for a peak in 2030 (assumed as Year 7)**. This is part of the total Life of Mine (LOM) value assumed at **1,299,919 tCO_2e[45].**

Scope 1 stands out as the most impactful, (*most notably in 2030 or Year 7*) and it is so because of the high vehicle activity in the actual mined areas. This provides an opportunity to look at mitigation of this through various strategies. Although this opportunity exists with Scope 1, care must be taken not to see the approach as singular but as more targeted in the various sub-categories. Another point on the overall emissions profile is that Scope 3 is captured but these values are in their "infancy" and will increase dramatically once better data becomes available.

[45] Note this value includes Scope 3 emissions and will increase once better data is available for this category of emissions.

Planned Mitigation Action – Scope 2

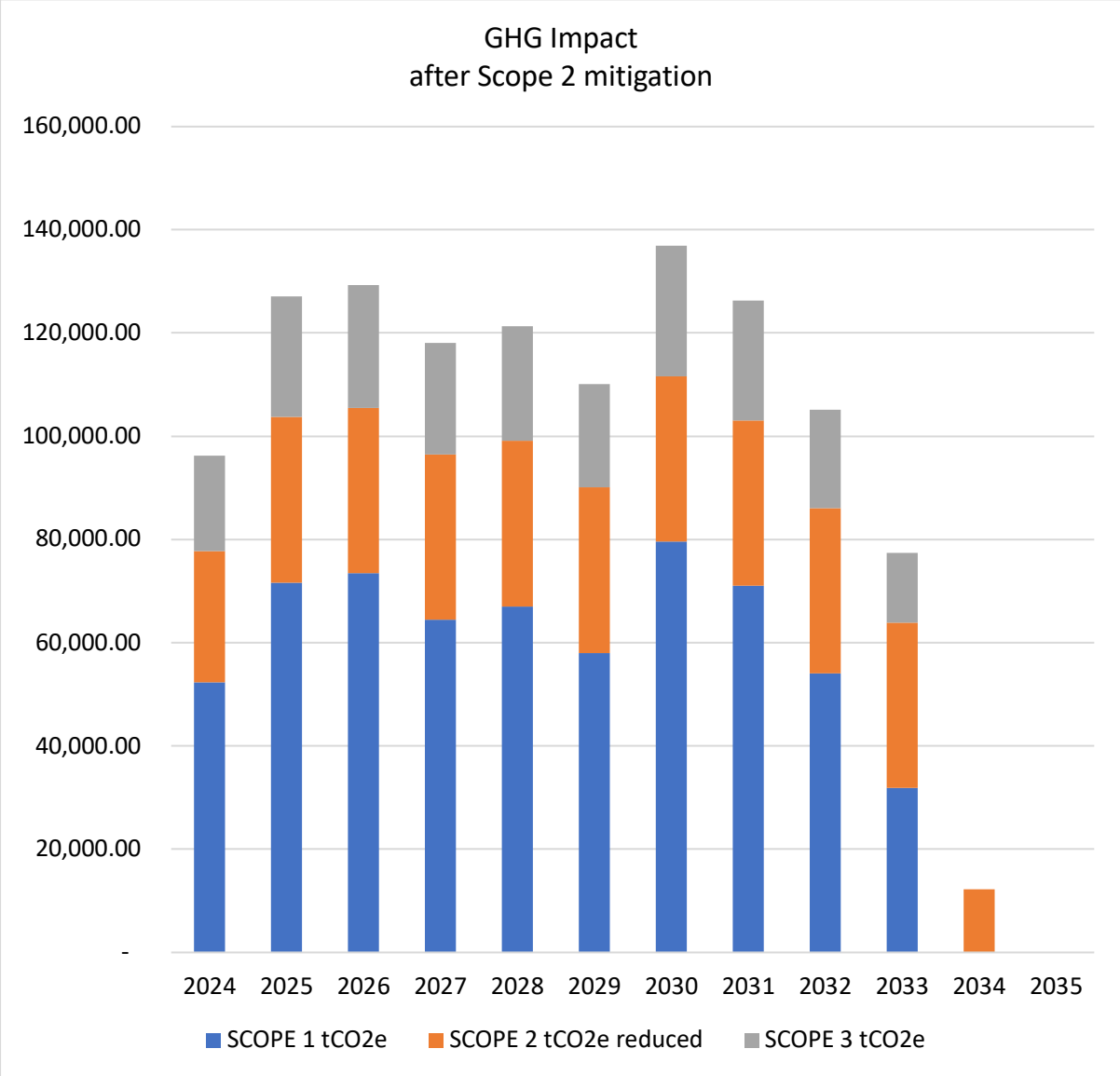


Figure 25 GHG Impact (Scope 2 mitigation) over life of Mine (Year on Year)

As noted, mitigation action can be implemented with commercially available alternatives. Craton has already indicated in its planning that it has intention to utilize solar photovoltaic generation as part of its electricity supply profile. This has been estimated to be 30% of electricity demand and when analysed results in significant **Scope 2 reductions** and an overall drop from **1,299,919 tCO2e (LOM) to 1,160,088 tCO2e (LOM).**

5.3 Individual Scoped Analysis

5.3.1 SCOPE 1 emissions

Scope 1 emissions have contributed to the overall with up to **79,598 tCO2e** in 2030 (Year 7)[46], then falling off based on planned mining activity. As it is made up of fuel consumption, then the use of alternative energy gives rise to various opportunities to help mitigate the impact.

[46] Based on 2024 being Year 1

The **LOM Scope 1** value set at **623,498 tCO_2e.**

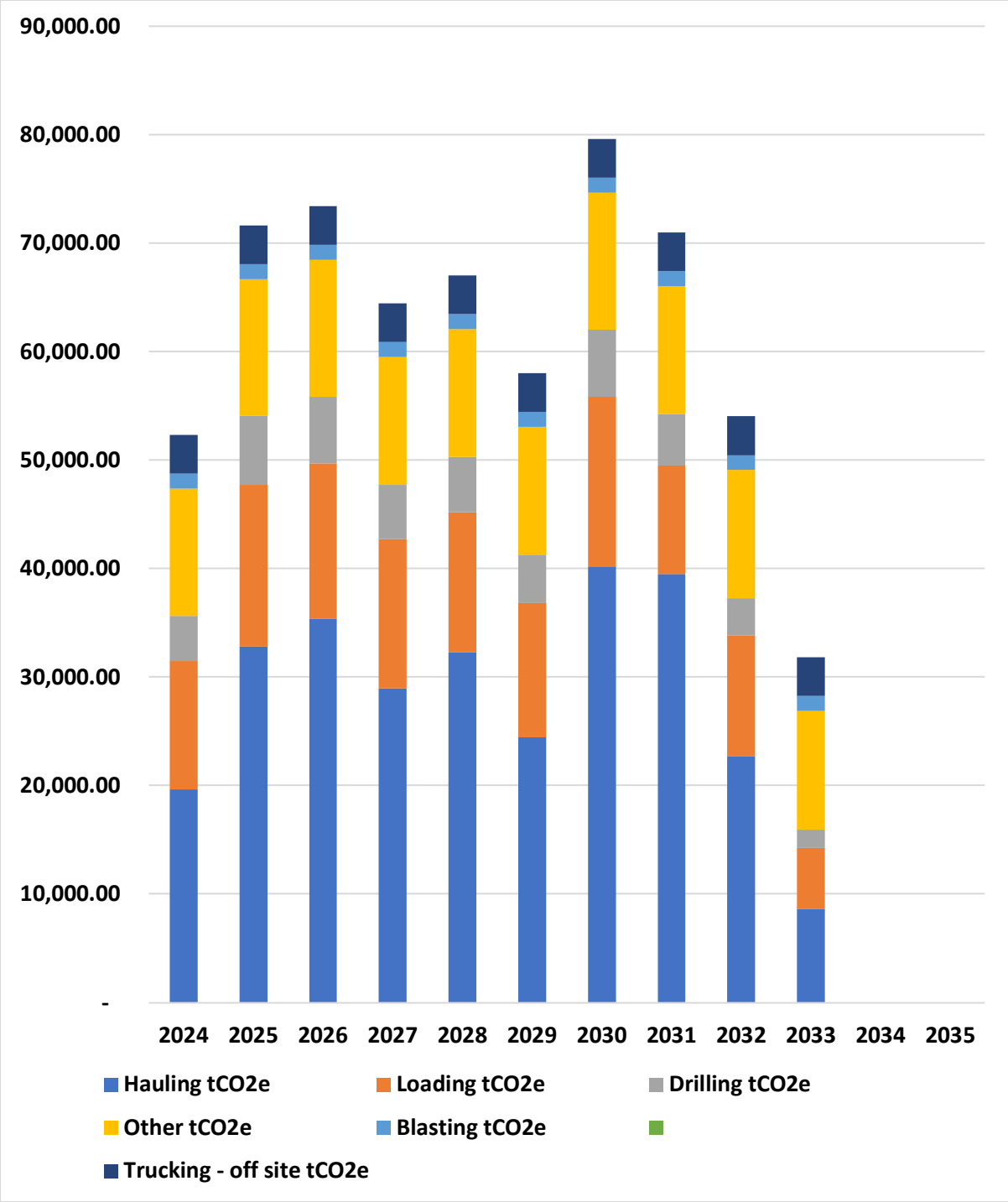


Figure 26 Scope 1 -emissions

5.3.2 SCOPE 2 emissions

Scope 2 emissions, peaking across Year's 2 - 10 (2025 - 2033) at **45,821 tCO_2e** and understandably so because of the high use of electricity in the production processes. Scope 2 emissions are a critical aspect of a company's greenhouse gas (GHG) emissions profile, particularly for Omitiomire with energy-intensive operations.

The **LOM Scope 2** value set at **466,102 tCO_2e.**

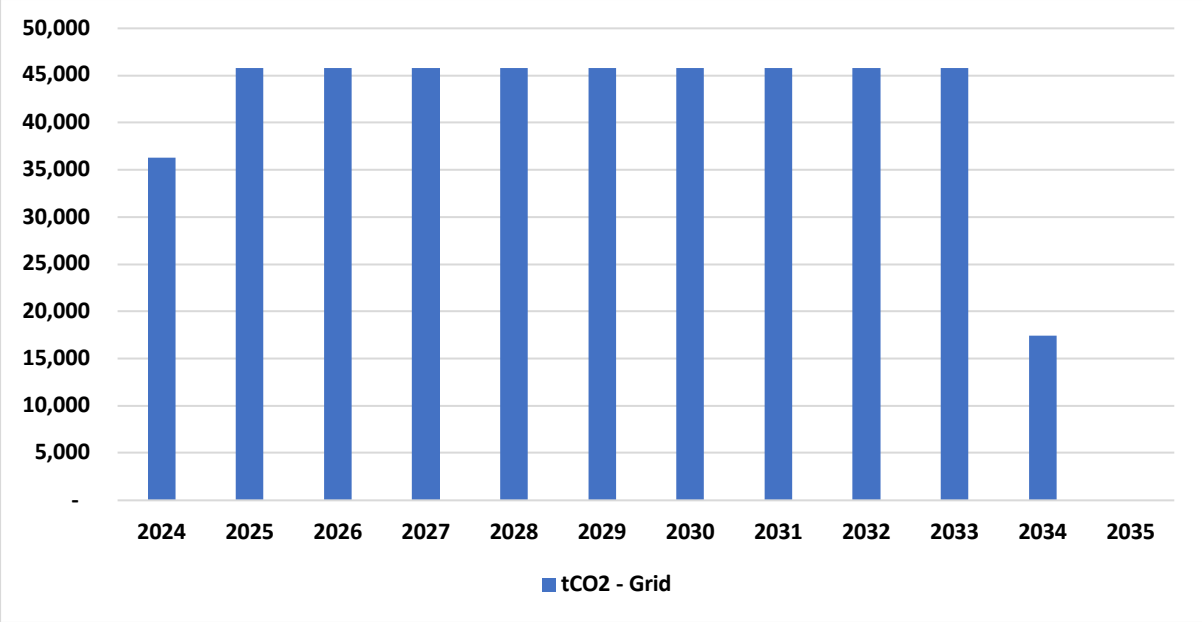


Figure 27 Scope 2 – Business as Usual (Grid only)

As the emission intensity of power purchased from NamPower is not controlled by Omitiomire, it is prudent for a renewable energy supply to be considered. The use of solar energy globally is mature and with the necessary regulations already in place in Namibia, the consideration should be placed high on the agenda for mitigation.

5.3.3 SCOPE 2 reduced emissions profile

Scope 2 emissions, peaking across Year's 2 - 10 (2025 - 2033) at **45,821 tCO_2e** are reduced to **32,075 tCO_2e** with mitigation from the solar PV inputs and these values drop the **LOM Scope 2** value to **326,272 tCO_2e.**

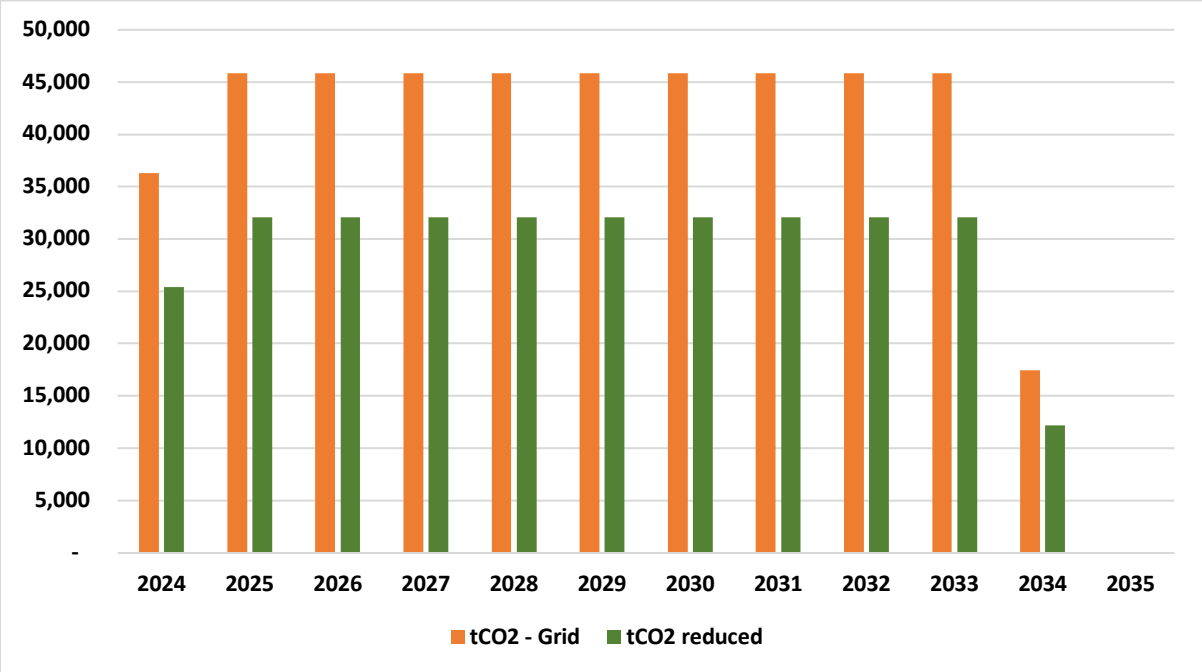


Figure 28 Scope 2 - Mitigated supply profile

5.3.4 SCOPE 3 emissions

Scope 3 emissions have a significant impact on mine GHG emissions, and understanding, measuring, and addressing them is a critical aspect of a mining company's sustainability strategy.

What is clear is that the emissions calculated **peaking in 2026 at 23,779 tCO2e**, comes from fuel (Diesel) use amounting to 77 percent of the Scope 3 current total in 2026.

The **LOM Scope 3** value set at **210,319 tCO_2e.**

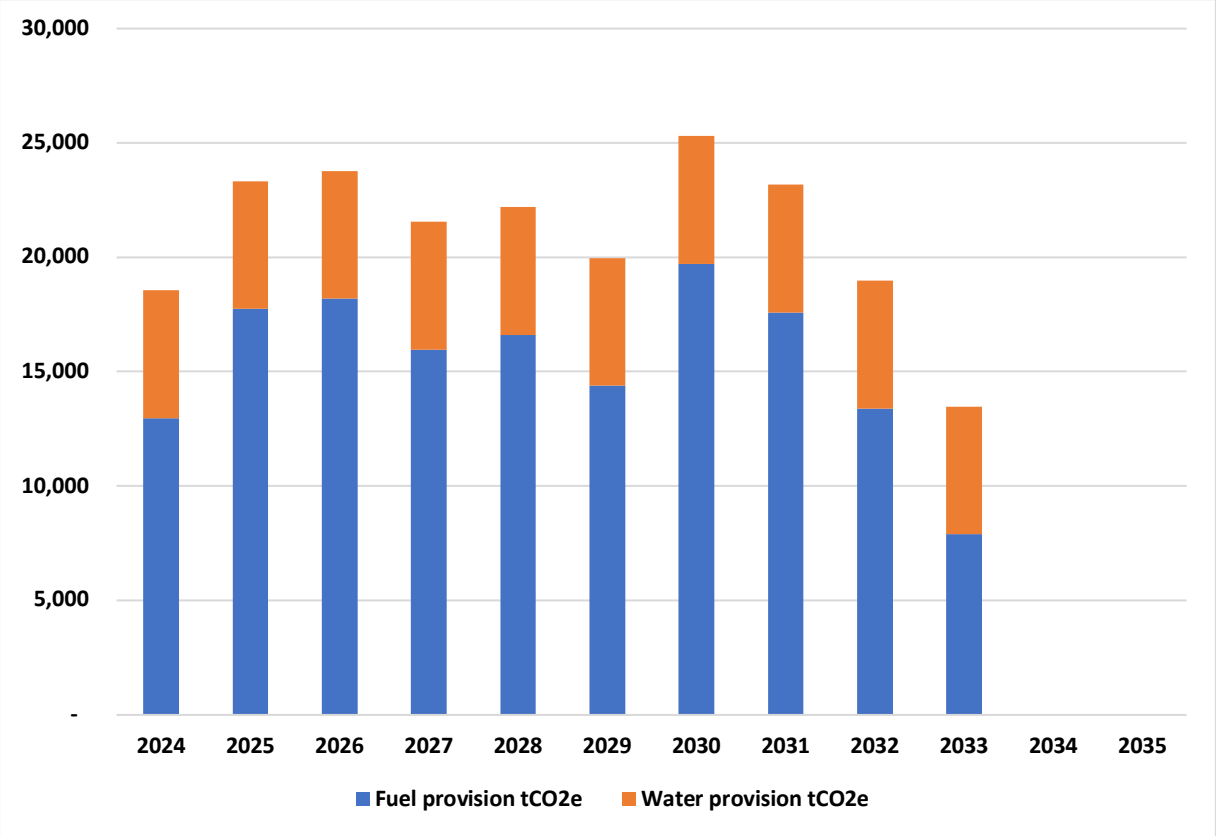


Figure 29 Scope 3 emissions

It is expected when Scope 3 reporting for Omitiomire matures, that Scope 3 will be around 75 percent of overall emissions over the LOM. However as this is the penultimate report, extra care has been taken on the items reported at this stage.

6 Risk Identification

Identification of climate change-related risks and opportunities, which may include physical risks (e.g., extreme weather events, sea-level rise, temperature changes), transitional risks (e.g., policy and regulatory changes, market shifts), and reputational risks (e.g., public perception of the company's climate actions).

Physical and transitional risks are important considerations in the context of climate change for several reasons:

- Business Continuity:
- Operational Efficiency:
- Regulatory Compliance:
- Investor and Stakeholder Confidence:
- Reputation and Social License:

6.1 Physical

Physical risks have direct financial consequences for organisations where those risks are realised, as well as up-front insurance and investment related costs and downstream effects for users of relevant goods and services. Physical risks are associated with the direct impacts of climate change, such as extreme weather events (e.g., hurricanes, floods, wildfires), sea-level rise, and changing precipitation patterns.

These risks can disrupt mining operations, damage infrastructure, and lead to production interruptions, supply chain disruptions, and financial losses such as:.

- Damage to infrastructure
- Disruption of the power supply
- Disruption or damage to transportation equipment or routes by heavy rains
- Drought reducing water supplies and the increasing risk of fires.
- Drought-affected areas will probably increase, and extreme precipitation events, which are likely to increase in frequency and intensity, will augment flood risk. (United Nations Framework Convention on Climate Change, 2011)
- People are projected to be exposed to increased water stress. (United Nations Framework Convention on Climate Change, 2011)
- Reduced water supplies, impacting mining schedules and impacting local community goodwill.
- Flooding affecting employee safety.
- Food security affected by extreme droughts.

6.1.1 Risks Noted:

6.1.1.1 Rising Temperatures:

- **Risk:** Increasing temperatures can affect equipment performance and worker health, particularly in regions with already high temperatures.
- **Consequences:** Higher temperatures can reduce equipment efficiency, increase energy consumption, and create unsafe working conditions for mine personnel, potentially resulting in decreased productivity and higher costs.
- **Mitigation:** use of renewable energies such as solar photovoltaics, increase energy efficiency and electric mining equipment.

6.1.1.2 Flooding:

- **Risk:**Susceptible to extreme weather such as flooding.
- **Consequences:**The damage to mining infrastructure, disrupt operations and create safety hazards, impact schedules and ultimately profitability.
- **Mitigation:** implementing measures to reduce water usage, invest in flood barriers and elevated structures.

It must be noted that based on specialist studies, we note that there is little danger of flooding of the modified mining site infrastructure from the river even during extreme flood events.

Omitiomire GW-SW Final Dec 2017

6.1.1.3 Droughts and Water Scarcity:

- **Risk:** Climate change can lead to reduced water availability, affecting mining processes that require water, such as mineral processing.
- **Consequences:** Water scarcity can disrupt production, lead to higher costs for water procurement, and trigger regulatory and community concerns, impacting a mine's social license to operate.
- **Mitigation:** implementing measures to reduce water usage.

6.1.1.4 Wildfire Risks:

- **Risk:** Mines located in areas prone to wildfires face increased risks due to hotter and drier conditions.
- **Consequences:** Wildfires can pose a direct threat to mine sites, causing damage to infrastructure, potential evacuations, and disruptions in operations. These events can damage mining infrastructure, disrupt operations, and lead to safety hazards, impacting production schedules and profitability.
- **Mitigation:** clearing of native vegetation using a variety of methods such as *Strip Burning"* or *"Strip-heading"* which is the controlled burning of a designated strip of land to remove fuel that would have supported a wildfire. Further to this, there is need to setup a trained fire management team with a responsible lead. It is also advisable to liaise with local communities both for local knowledge understanding and resource sharing.

Other measures include optimizing resource management and becoming generally more efficient, to reduce costs, and enhance sustainability. Addressing physical risks can improve operational efficiency.

6.1.2 Specific Risks Noted[47]:

- The Black Nossob River diversion

[47] ECC Report No: ECC-134-394-REP (Scoping Report): concerns raised by stakeholders.

It is noted in the ESMP that the land clearing activities by mechanical methods would result in erosion issues, especially with the proposed redirection of Black Nossob River. This will be exacerbated with extreme flooding.

- Water use
  The ESMP noted that risks emanate from a change in the water table and water quality which will be impacted from a climate change perspective by both drought and floods.
- Road and transport corridors
  Wear and tear of existing road surfaces will be more intense after heavy rainfall, resulting in higher operations and maintenance costs. In extreme cases can result in stoppages and delays for indeterminate periods.

With climate change impacts, more frequent and intense flooding can result in damage to mine infrastructure, power plant, power lines and transport equipment or routes. Increased temperatures could lead to more "bush/veld" fires. Similarly, droughts will reduce water availability and add stress to water sources. This can lead to conflict with local communities.

The Integrated Water Resources Management (IWRM) (Ministry of Agriculture, Water and Forestry, 2010) states that due to the dry climate and unpredictable rainfall, water resources challenges in Namibia can only be addressed through a high degree of efficient water resources management.

The long-term objective of the IWRM Plan for Namibia is to enable the country to achieve a sustainable water resource management regime contributing to social equity, economic efficiency, and environmental sustainability in the country.

6.2 Transitional risks

Transitional risks typically refer to risks associated with transition to a low carbon economy, which can entail extensive policy, legal, technology, and market changes to address mitigation and adaptation requirements related to climate change. Depending on the nature, speed, and focus of these changes, transition risks may pose varying levels of financial and reputational risk to organisations.

Transitional risks, if realised, can result in stranded assets, loss of markets, reduced returns on investment, and financial penalties, as well as adverse outcomes for governance and reputation. A key issue is the stranding of assets that may not provide the expected financial returns and may end up as large financial liabilities.

Some key transition risks will be:

- Variable carbon pricing
- Stricter environmental regulations

- Compulsory emissions trading
- Higher than expected carbon taxes.
- Shift in government policy regarding the Modified Single Buyer[48] policy by reducing the portion of solar energy that a customer can produce or other conditions.
- Poor performance of renewable energy technologies especially due to erratic weather patterns brought about by climate change.
- Low or poor operational performance of alternative energy vehicles resulting in a return to fossil-fueled vehicles or expensive repairs/replacement.
- Financial risks due to difficulty to attract investment.
- Other policy changes not planned for.

To mitigate to these and other transitional risks, Omitiomire should consider the following strategies:

1. **Energy Efficiency**: Improve energy efficiency in operations to reduce emissions and operational costs.

2. **Adoption of Clean Technologies**: Invest in clean energy solutions, such as renewable energy sources and electric mining equipment. Failure to invest in appropriate technology can result in operational inefficiencies.

3. **Carbon Management**: Develop comprehensive carbon management strategies to monitor and reduce emissions.

4. **Regulatory Compliance**: Stay informed about evolving climate-related regulations and adapt operations to ensure compliance.

5. **Stakeholder Engagement**: Engage with local communities, governments, and investors to build trust and secure the social license to operate.

6. **Sustainable Workforce Development**: Invest in workforce training and development to ensure a skilled labor force capable of implementing sustainable mining practices.

It is imperative to note the fluidity of the challenge complicated by shareholders, customers, and the public who are increasingly becoming concerned about the environmental and social impacts of business operations. A failure to adopt sustainable practices and reduce carbon emissions may result in reputational damage and a loss of trust from key stakeholders.

[48] means the modified single buyer established under the Modified Single Buyer Market Structure, adopted by the Government of the Republic of Namibia, in April 2019.

7 Recommendations

Recommendations for ongoing monitoring and periodic review of climate change risks and responses.

7.1 Short-term (Year 0-2)

f) **Energy Efficiency Improvements**: Implement energy efficiency measures in mining processes and equipment. Implement energy-efficient technologies, such as LED lighting and variable frequency drives, to reduce electricity consumption.

g) **Waste Reduction**: Minimize waste through better ore selection and processing techniques. Reducing waste can lead to decreased energy consumption and emissions.

h) **Alternative Energy Sources**: Consider immediate adoption of renewable energy sources such as solar power for on-site energy generation. *It is noted her that this is already planned.*

i) **Vehicle Transition** – testing phase: Transition mining vehicle fleets from diesel-powered to electric or hydrogen-powered vehicles, which have lower carbon emissions. Thus, Optimize logistics and replace diesel-powered vehicles with electric or hybrid alternatives for short-distance transportation within the mine site. For mine trucks, this can be a "testing phase" while for LDV's, this can be a concerted step change.

j) **Community Engagement**: Collaborate with local communities and stakeholders to develop long-term sustainable mining practices that align with environmental and social goals, thus minimizing the overall impact of mining.

7.2 Medium-term (Year 2 - 8)

d) **Vehicle Fleet Transition**: Transition mining vehicle fleets from diesel-powered to electric or hydrogen-powered vehicles, which have lower carbon emissions.

e) **Supply Chain Assessment**: Conduct a comprehensive assessment of the GHG emissions associated with the entire supply chain, identifying areas for optimization and emission reduction.

f) **Carbon Neutrality Commitment**: Set a long-term goal of achieving carbon neutrality and invest in projects to offset emissions through carbon credit programs.

7.3 Long-term (Year 8 -LOM)

b) **Mine Closure Planning:** Develop comprehensive mine closure plans that include reclamation and reforestation efforts, which can help offset carbon emissions associated with mining activities.

7.4 Further Actions

The ICMM position as an industry body should be headed and note that this report is a "baseline" document to be refined annually, highlighting areas of change. As result, the following is required:

d) Establish ongoing surveillance of existing databases to promptly detect and integrate any updates or modifications.
e) Continue to research sources for emission factors and incorporate them into future reporting.
f) Foster proactive collaboration with others to collectively centralized emission factors to support the entire mining value chain. A key starting point would be the Namibian Chamber of Mines.

The adoption of **recycling practices** is imperative for various applications, including cooling water, condensates, rainwater, and excess process water utilized for tasks such as washing, dust control, and gas scrubbing, particularly in scenarios where water quality is not a primary concern.

Furthermore, the enforcement of stringent **good housekeeping** practices is paramount in the pursuit of minimizing operational losses and curtailing fugitive emissions. These objectives can be effectively achieved through the utilization of enclosed structures, covered or enclosed conveyors and transfer points, and the deployment of dust collection equipment. Additionally, the establishment of paved yards and the directed routing of runoff water to settling ponds serve as crucial measures to control environmental impact. Regular sweeping of these yards, coupled with the practice of indoor storage and other raw materials, substantially contributes to the reduction of materials losses and associated emissions.

This multi-faceted approach ensures the sustainable and responsible management of resources and emissions within operations.

7.4.1 Electricity Decarbonization

Harnessing **solar power for decarbonization** is a prudent choice for mining operations seeking to reduce their carbon footprint and achieve sustainability goals.

This is achieved by incorporating hybrid solar systems that can be seamlessly integrated with existing power sources, such as the national grid or backup generators. This can ensure uninterrupted power supply during cloudy days or peak energy demands.

It is also recommended to look at energy storage solutions, like lithium-ion batteries, to store excess energy for use during non-sunlight hours. This will help stabilize energy supply and reduce reliance on traditional power sources.

7.4.2 Energy Efficiency

Energy efficiency measures, such as the implementation of **waste heat recovery systems** for process gases, should be actively employed in order to curtail fuel consumption and mitigate the associated environmental emissions.

7.4.3 Alternative Fuels

Namibia still does not have a “alternative fuel” market and so this will be revisited in the future.

Point to note is that renewable energy power sources as electricity is not included under this section.

7.4.4 Equipment Electrification

Electrification of mining activities is an emerging trend driven by the need for increased efficiency, reduced environmental impact, and improved safety in the mining industry. This transformation involves the **replacement of traditional diesel-powered equipment with electric alternatives**, thereby reducing greenhouse gas emissions, operational costs, and noise pollution.

Advances in battery technology and electric drivetrains have made it even more feasible to electrify various aspects of mining operations, from haul trucks to drilling equipment.

7.5 Climate Change Regulation

Namibia's approach to climate change regulation is closely aligned with international commitments, including the Sustainable Development Goals (SDGs) and the Paris Agreement. The government is actively engaged in addressing climate change and works in collaboration with international organizations and partners to secure financing, technical assistance, and capacity-building support to meet its climate-related objectives.

It is recommended that Omitiomire follow changes closely as climate change regulation is dynamic globally and there are various imminent changes on the way as indicated by the Ministry of Environment, Forestry and Tourism.

7.6 Technological advancement

Namibia has established a regulatory framework and implemented technological advancements to address climate change effectively. Some other advances for consideration are:

- Use of continuous casting machines for cathode production to avoid the need for mold release agents.
- Closed-loop electrolysis plants will contribute to prevention of pollution.

7.7 Carbon Credits

In discussion with the Ministry of Environment, Forestry and Tourism who are the custodians for environmental matters in Namibia on behalf of the Government, it is stated that carbon credits are being actively pursued.

While this report is not geared to give such volumes, it is important that the opportunity to trade credits as and when they become available from areas such as onsite or purchased renewable energy or other such activity leading to carbon credits.

7.8 Monitoring and Review

Ongoing monitoring and periodic review of climate change risks and responses are critical for businesses to adapt and thrive in an increasingly volatile and environmentally conscious world.

1. Develop a comprehensive framework that outlines your organization's approach to climate change risk management.
2. Perform regular climate risk assessments to identify potential vulnerabilities and threats to your business. These assessments should include both physical and transitional risks, such as extreme weather events, regulatory changes, and shifts in consumer preferences.
3. Incorporate climate risk considerations into your strategic planning process. Align your business objectives with climate risk assessments and develop adaptation and mitigation strategies that address identified risks and opportunities.
4. Actively engage with key stakeholders, including customers, investors, employees, and suppliers, to gather input and build support for your climate change response efforts.

8 Annexures

Supporting data, charts, maps, and additional information that underpin the analysis.

8.1 Namibia Emissions Trends[49]

Year	Total emissions	AFOLU removals	Net removals	Per capita emission (t)	GDP emissions index (Year 1990 = 100)
1990	19,692	-90,021	-70,329	13.7	100
1991	19,775	-91,794	-72,019	13.3	92.8
1992	19,495	-93,706	-74,211	12.8	85.4
1993	19,072	-95,488	-76,417	12.3	83.7
1994	18,921	-97,288	-78,367	11.9	77.4
1995	18,791	-99,105	-80,314	11.6	73.8
1996	18,482	-100,940	-82,458	11.2	70.3
1997	18,490	-102,793	-84,303	11	67.5
1998	18,547	-104,845	-86,298	10.8	65.6
1999	18,609	-106,748	-88,140	10.6	63.6
2000	18,787	-108,809	-90,022	10.5	62.1
2001	19,222	-109,091	-89,869	10.5	62.8
2002	18,462	-113,365	-94,903	9.9	57.5
2003	18,834	-113,824	-94,990	10	56.3
2004	18,618	-115,598	-96,980	9.8	49.6
2005	19,030	-113,368	-94,338	9.8	49.4
2006	20,098	-109,749	-89,651	10.2	48.7
2007	20,596	-106,971	-86,375	10.3	47.4
2008	19,294	-115,558	-96,264	9.6	42.9
2009	21,423	-103,774	-82,351	10.5	48.2
2010	20,589	-107,920	-87,331	9.9	43.6
2011	22,581	-106,002	-83,421	10.7	45.2
2012	23,424	-105,021	-81,598	10.9	44.7
2013	19,750	-122,901	-103,151	9	35.7
2014	21,147	-120,007	-98,859	9.4	35.9
2015	21,089	-122,078	-100,989	9.2	34.3
2016	21,260	-126,688	-105,428	9.1	34.6

[49] Extract from (Government of Namibia, 2021)

8.1.1 Scope 2 Demand table

Project Area Description	UOM	Year 1	Year 2 - 10	Year 11
Design Load Power Demand	kW	24,148	24,148	24,148
Design Load Apparent Power Demand	kVA	30,299	30,299	30,299
Design Energy Consumption	kWh/a	102,184	129,075	49,105

8.1.2 Namibia Grid Emission Tables

In terms of this report, the *Harmonized **IFI** Default Grid Factors 2021 v3.2*[50] for Namibia and its Grid Network is taken **as 0.3550 tCO_2/MWh** as advised by NamPower[51].

It is important to note the following guidance statement:

For the purpose of promoting greater harmonization, the IFI Technical Working Group (IFI TWG) on GHG accounting maintains a common dataset containing Default Emissions Factor (DEF) of the country's electricity grid including in-country interconnected grids.

The DEFs apply to electricity generation in a country and currently do not consider the impact of interconnections with neighbouring countries[52]*.*

The common dataset containing DEFs is constructed using a Combined Margin (CM) for the grid that is comprised of an Operating Margin (OM) and a Build Margin (BM)[53]*.*

[50] https://unfccc.int/climate-action/sectoral-engagement/ifis-harmonization-of-standards-for-ghg-accounting/ifi-twg-list-of-methodologies

[51] Via e-mail, January 2024

[52] IFI TWG is undertaking further work to develop harmonized approaches for interconnection with neighbouring countries.

[53] The methodologies and databases listed above are developed and solely owned by the Technical Working Group of the International Financial Institutions (IFI TWG). Any comments and queries related to these products should be addressed to the IFI TWG and sent to IFITWG-Coordinator IFITWG-Coordinator@unfccc.int

8.1.3 Omitiomire Scope Data Tables – Business as usual

Scope Detail	Unit	2024	2025	2026	2027	2028
SCOPE 1	tCO2e	52,337	71,641	73,438	64,462	67,059
SCOPE 2	tCO2	36,275	45,822	45,822	45,822	45,822
SCOPE 3	tCO2e	18,551	23,334	23,779	21,555	22,199
		107,163	**140,796**	**143,038**	**131,839**	**135,080**

Scope Detail	Unit	2029	2030	2031	2032	2033
SCOPE 1	tCO2e	58,046	79,598	71,007	54,053	31,857
SCOPE 2	tCO2	45,822	45,822	45,822	45,822	45,822
SCOPE 3	tCO2e	19,966	25,305	23,177	18,976	13,477
		123,834	**150,725**	**140,006**	**118,850**	**91,155**

Scope Detail	Unit	2034	2035	2036	2037	2038
SCOPE 1	tCO2e	-	-	-	-	-
SCOPE 2	tCO2	17,432	-	-	-	-
SCOPE 3	tCO2e	-	-	-	-	-
		17,432	**0**	**0**	**0**	**0**

8.1.4 Omitiomire Scope Data Tables – Scope 2 mitigation included

Scope Detail	Unit	2024	2025	2026	2027	2028
SCOPE 1	tCO2e	52,337	71,641	73,438	64,462	67,059
SCOPE 2	tCO2	25,392	32,075	32,075	32,075	32,075
SCOPE 3	tCO2e	18,551	23,334	23,779	21,555	22,199
		96,280	**127,050**	**129,292**	**118,093**	**121,333**

Scope Detail	Unit	2029	2030	2031	2032	2033
SCOPE 1	tCO2e	58,046	79,598	71,007	54,053	31,857
SCOPE 2	tCO2	32,075	32,075	32,075	32,075	32,075
SCOPE 3	tCO2e	19,966	25,305	23,177	18,976	13,477
		110,087	**136,979**	**126,259**	**105,104**	**77,409**

Scope Detail	Unit	2034	2035	2036	2037	2038
SCOPE 1	tCO2e	-	-	-	-	-
SCOPE 2	tCO2	12,203	-	-	-	-
SCOPE 3	tCO2e	-	-	-	-	-
		12,203	**0**	**0**	**0**	**0**

8.1.5 Emissions Source Categories – Full List

Category	Baseline Calculation Method	Rationale	Used in this Report
1. Purchased Goods and Services	*Key emission sources: at least Industry-Average* *Non-key emission sources: at least Spend-based*	*Key suppliers can be engaged on emissions reductions, and conversations require more accurate calculations*	Electricity and Water only
2. Capital Goods	*Key emission sources: Industry-Average* *Non-Key emission sources: Spend-based*		No
3. Fuel- and Energy Related	*Key emission sources: at least Industry-Average* *Non-Key emission sources: at least Spend-based*		Yes
4. Upstream Transport	*Key emission sources: Industry-Average, or fuel based.* *Non-Key emission sources: Spend-based*		Yes
5. Waste	*Spend Based or extrapolated*	*Low business risk and low emissions, with a corresponding low effort in quantifying emissions for the purpose of completeness and transparency*	No
6. Business Travel	*Extrapolated (after first calculation)*		No
7. Employee Commuting	*Extrapolated (after first calculation)*		Assumed
8. Downstream Leased Assets	*Extrapolated (after first calculation)*		No
9. Downstream Transport	*Distance-based*	*Transport to key customers is likely to cover more product volume and should be considered separately from non-key customers.* *Known key customers can be engaged on emissions reductions in their processing, and conversations require more accurate calculations*	No
10. Processing of Sold Products	*Key emission sources: Site-specific for integrated customers, otherwise at least Industry-Average* *Non-Key emission sources: Industry-Average*		No
11. Use of Sold Products	*Site-specific for integrated customers. At least, Industry-Average* *Non-Key customers: Industry-Average*		No
12. End-of-Life Treatment of Products	*Extrapolated (after first calculation)*	*Low business risk and low emissions, with a corresponding low effort in quantifying emissions for the purpose of completeness and transparency*	No
13. Downstream Leased Assets	*Extrapolated (after first calculation) if/where applicable*		No
14. Franchises	*Extrapolated (after first calculation) if/where applicable*		No
15. Investments	*Investment-specific approach as the sum of Scopes 1 and 2 multiplied by the share of equity (and Scope 3 where relevant as outlined in Appendix 3, Category 15).*	*Requires alignment between partners and can represent high emissions, and the recommended method attempts to accommodate both*	No

8.2 ICMM Emissions Heat Map

Scope 3 Category	Precious Metals	Bulk	Base	Diversified	Considerations
1. Purchased Goods & Services	High	Mid	Mid to High	Mid to High	Supplier risks more relevant than contribution to total emissions
2. Capital Goods	Mid	Mid	Mid	Mid	Spend and corresponding emissions can be variable YoY
3. Fuel & Energy-related	High	Mid	Mid to High	Mid to High	Key-supplier spend category in terms of value and strategic risk
4. Upstream Transport	Mid	Mid	Mid	Mid	Transport is a key emissions driver globally
5. Waste management	Mid-Low	Mid-Low	Mid-Low	Mid-Low	Low contribution but can carry risks
6. Business Travel	Low	Low	Low	Low	Low contribution and risk
7. Employee Commuting	Low	Low	Low	Low	Low contribution and risk
8. Upstream Leased Assets	Low	Low	Low to Mid	Low	N/A for many companies
9. Downstream Transport	Mid	Mid	Mid	Mid	Transport is a key emissions driver globally
10. Processing of Sold Products	Mid	High	Mid-to high	Mid to High	Customer-side emissions are a key driver for 2 of 3 groups of companies
11. Use of Sold Products	Low	High	High	Mid to High	Applicable to miners of fossil fuels and iron ore
12. End of Life Treatment of Products	Low	Low	Low	Low	Low contribution and risk
13. Downstream Leased assets	Low	Low	Low	Low	N/A for many companies
14. Franchises	Low	Low	Low	Low	N/A for many companies
15. Investments	Mid	Mid	Mid	Mid	Many mines are JVs

Legend:

High	Typically significantly greater than 5% of total Scope 3 emissions
Mid	Typically around 5%, both below and above the threshold, or low emissions in strategically relevant areas of the value chain with associated climate risks
Low	Typically lower than 5% of total Scope 3 emissions

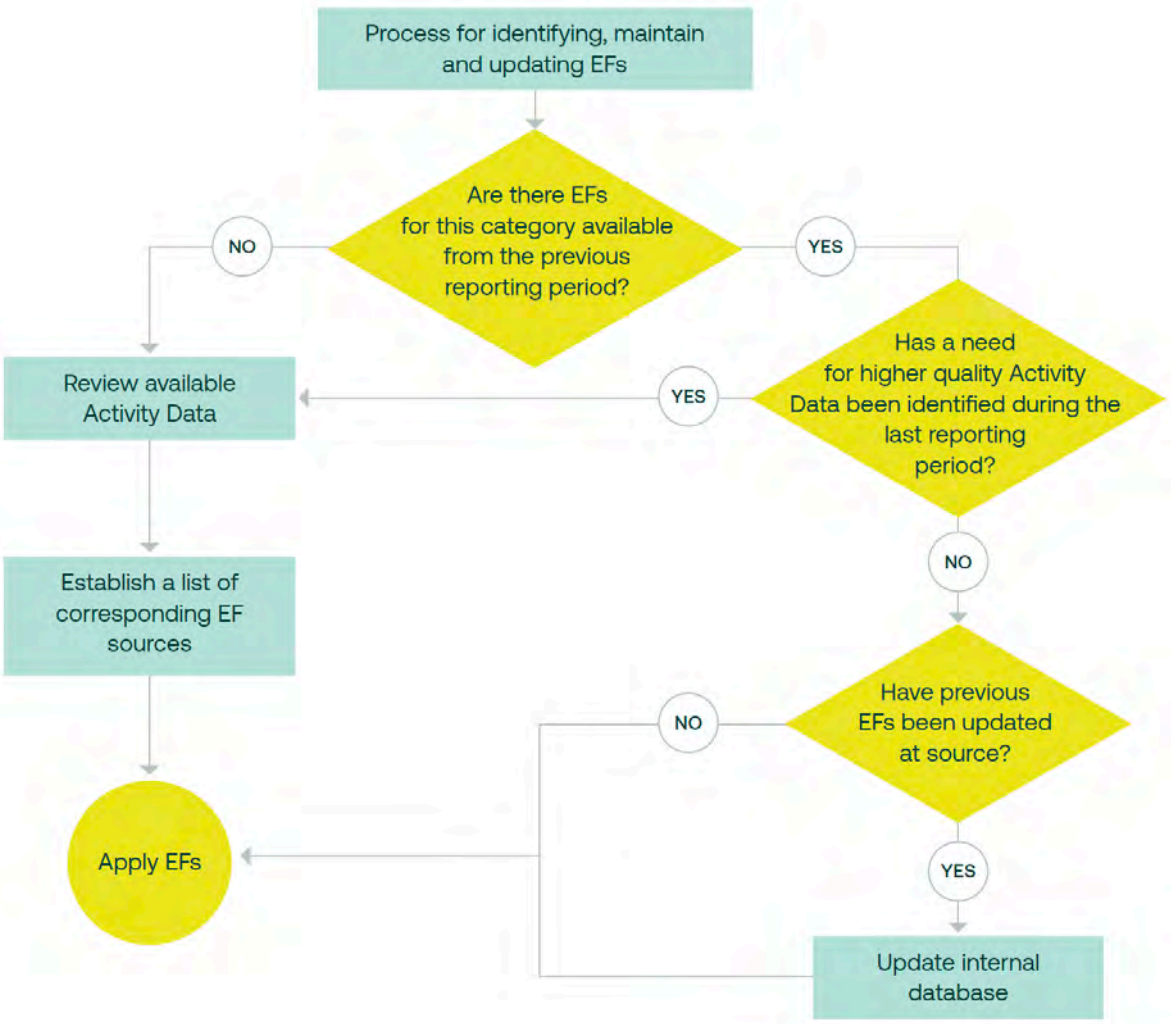
Source: ENGIE Impact research. The table is a reference for materiality levels, categories may have different outcomes for the same type of companies. This Table is indicative, and it may vary depending on the commodity and vertical integration of processes (International Council on Mining and Metals , 2023).

8.3 Reporting Consistency Guidelines

Type	Internal Levers (Direct Influence)	External Levers (Indirect Influence)
Activity Data	— **Divisions providing data:** collaborate to move beyond financial data (lowest level of data quality) as applicable - Engage with supply chain and sales divisions to better capture unit data of products purchased or sold - Engage based on a gap analysis of current versus required data	— **Collaborate** with key suppliers/customers who make a material contribution to Scope 3 emissions with the objective of moving towards primary or hybrid reporting methods — **Suppliers/customers:** Query their emissions accounting and reporting, and their ability to allocate emissions to customers/suppliers. — Source sustainability reports for mature customers and suppliers for data in selected cases where aggregate global data is deemed sufficiently accurate (eg where products and production are uniform)
Emissions Factors	— *Follow the below Figure 10 to ensure that EFs remain applicable and up to date*	— **Available private databases:** invest into licenses for databases with high quality EFs — **Industry associations:** consider them as a source for specific EFs otherwise not found in private databases — **Academic partnerships:** explore and contribute to academic partnerships working on relevant EFs

Figure 30 ICMM Scope 3 Guidelines for Reporting Consistency

Table 4 Process for management of Emissions Factors and Activity Data



Extract Source: ICMM. (International Council on Mining and Metals , 2023).

8.4 Definitions and Abbreviations

Terms	Meaning[54]
Accuracy	A relative measure of the exactness of an emission or removal estimate. Estimates should be accurate in the sense that they are systematically neither over nor under true emissions or removals, so far as can be judged.
Activity	A practice or ensemble of practices that take place on a delineated area over a given period of time.
Business as Usual (BAU)	A practice or ensemble of practices that take place on a delineated area over a given period of time.
Carbon dioxide equivalent emission **(CO2e)**	The amount of carbon dioxide (CO_2) emission that would cause the same integrated radiative forcing or temperature change, over a given time horizon, as an emitted amount of a greenhouse gas (GHG) or a mixture of GHGs. There are several ways to compute such equivalent emissions and choose appropriate time horizons. Most typically, the CO_2-equivalent emission is obtained by multiplying the emission of a GHG by its global warming potential (GWP) for a 100-year time horizon.
Emissions	The release of greenhouse gases and/or their precursors into the atmosphere over a specified area and period of time. (UNFCCC Article 1.4) ***In this report defined using Metric tonnes of CO_2 equivalent (tCO_2e)***
Emission factor	A coefficient that quantifies the emissions or removals of a gas per unit activity. Emission factors are often based on a sample of measurement data, averaged to develop a representative rate of emission for a given activity level under a given set of operating conditions.
Environmental, Social and Governance (ESG)	Environmental, Social and Governance framework.
Environmental, Social Management Plan (ESMP)	Environmental, Social and Management Plan.
Expert judgement	A carefully considered, well-documented qualitative or quantitative judgement made in the absence of unequivocal observational evidence by a person or persons who have a demonstrable expertise in the given field.
Gigajoule	Energy unit (GJ)

[54] Extract from IPCC guidelines https://www.ipcc.ch/site/assets/uploads/2019/12/19R_V0_02_Glossary.pdf

Terms	Meaning[54]
Fugitive Emissions (oil and natural gas systems)	The intentional or unintentional release of greenhouse gases that occur during the exploration, processing, and delivery of fossil fuels to the point of final use. This excludes greenhouse gas emissions from fuel combustion for the production of useful heat or power. It encompasses venting, flaring, and leaks.
Global warming potential	Global Warming Potentials (GWP) are calculated as the ratio of the radiative forcing of one kilogram greenhouse gas emitted to the atmosphere to that from one kilogramme CO2 over a period of time (e.g., 100 years).
Good Practice	"*Good practice*" is a key concept for inventory compilers to follow in preparing national greenhouse gas inventories. ……. Certain terms in the definition have been updated based on feedback from the statistics community, such that this definition can be also understood as "a set of procedures intended to ensure that greenhouse gas inventories are accurate in the sense that they are systematically neither over- nor underestimates so far as can be judged, and that they are precise so far as practicable" in the context of refinement of Chapter 3 of Volume 1. *Good Practice* covers choice of estimation methods appropriate to national circumstances, quality assurance and quality control at the national level, quantification of uncertainties and data archiving and reporting to promote transparency.
Greenhouse gas	Greenhouse gases are gases in Earth's atmosphere that trap heat. They let sunlight pass through the atmosphere, but they prevent the heat that the sunlight brings from leaving the atmosphere.
Grid emission factor[55] **(GEF)**	The List of Grid Emission Factors aims to provide information to be utilized for research and analysis regarding emissions from electricity generation. A "grid emission factor" refers to a CO_2 emission factor (tCO_2/MWh) which will be associated with each unit of electricity provided by an electricity system. It is a parameter to determine the baseline emissions for *CDM* projects in the renewable energy sector (hydro, wind, solar PV, and geothermal power, etc.) and waste heat/gas recovery sector.
Hectare	Land area measure
Kilometre	Length (km)
kilowatt-hour	Energy unit used primarily with electricity (kWh)
Liter	Liquid measure of volume
LOM	Life of Mine

[55] https://www.iges.or.jp/en/pub/list-grid-emission-factor/en

Terms	Meaning[54]
Mass	Gravitational Weight (kg)
Metre	Length (m)
Scope 1 emissions	refer to a category of greenhouse gas emissions associated with direct sources of emissions that are owned or controlled by an organization. These emissions are a fundamental component of an organization's carbon footprint and typically originate from activities such as the combustion of fossil fuels, on-site industrial processes, and emissions from vehicles or equipment owned and operated by the organization. In the context of the Greenhouse Gas Protocol, a widely recognized international standard for greenhouse gas accounting, *Scope 1 emissions are those for which an organization has operational control and are reported in the organization's carbon inventory*.
Scope 2 emissions	refer to greenhouse gas emissions associated with a company's activities. It specifically pertains to indirect emissions, which result from the generation of electricity, heating, and cooling consumed by the organization. *These emissions are not produced directly on-site but are a consequence of purchased energy sources.*
Scope 3 emissions	refer to indirect emissions that result from activities related to an organization but occur from sources not owned or controlled by the organization. These emissions encompass a wide range of sources, including the entire value chain of an organization, such as suppliers, customers, transportation, and the end-of-life treatment of products. The Greenhouse Gas Protocol's Scope 3 framework classifies these emissions into 15 different categories, such as purchased goods and services, transportation and distribution, and use of sold products, among others.

Terms	Meaning[54]
Square Kilometre	Area measure **Scope 1 emissions** refer to a category of greenhouse gas emissions associated with direct sources of emissions that are owned or controlled by an organization. These emissions are a fundamental component of an organization's carbon footprint and typically originate from activities such as the combustion of fossil fuels, on-site industrial processes, and emissions from vehicles or equipment owned and operated by the organization. In the context of the Greenhouse Gas Protocol, a widely recognized international standard for greenhouse gas accounting, *Scope 1 emissions are those for which an organization has operational control and are reported in the organization's carbon inventory*.
Troy Ounce	Gold Measure

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