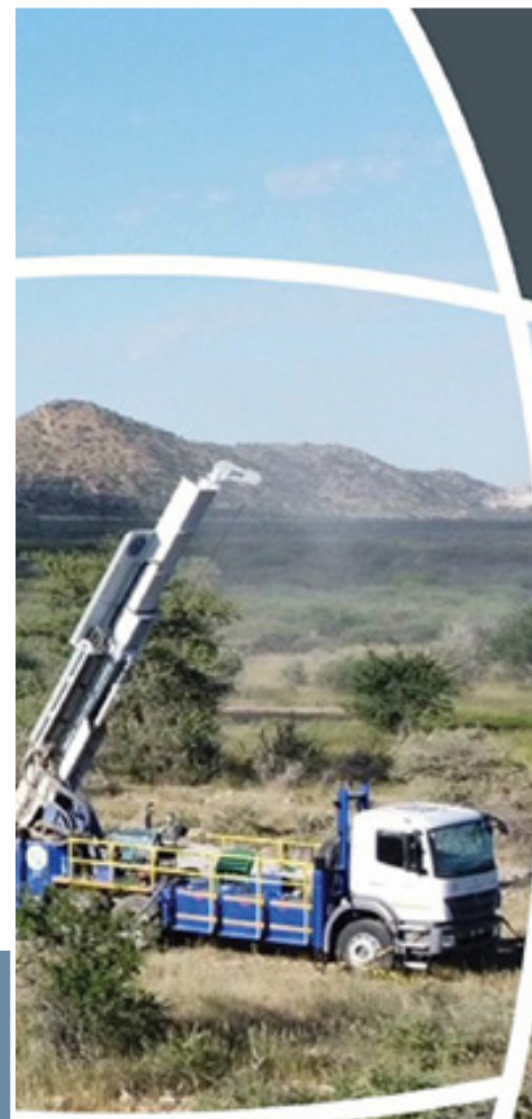




OSINO RESOURCES 2023 REPORT

CLIMATE CHANGE



TWIN HILLS Gold Mine
Namibia

Disclaimer

This **Climate Change Report** contains selected information and examples where applicable to support the understanding of the requirements in, and implementation of, *the Equator Principles* and transparency around the climate-related risks guided by the *Task Force on Climate-related Financial Disclosures (TCFD)*.

The Report does not establish any new principles or requirements, nor does it create any rights in, or liability to, any person, public or private. The information and examples are provided without guarantee of any kind, either express or implied, including, without limitation, guarantees as to fitness for a specific purpose, non-infringement, accuracy or completeness.

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Be Reminded, No Assurance is Provided.

See 3.6.3 Assurance.

Statement of Independence

RDJ Consulting Services CC is an independent entity and has no relationship whatsoever with Osino Resources. We specialise in energy and sustainability consulting and have prepared this Climate Change Report.

Acknowledgments

We would like to thank Osino Resources for their diligent contribution during the development of this Climate Change Report.

A special thanks to:

- | | |
|------------------------|-------------------|
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Key Terms and Measure

Terms	Meaning
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.
Carbon dioxide equivalent emission	The amount of carbon dioxide (CO₂) 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 a number of ways to compute such equivalent emissions and choose appropriate time horizons. Most typically, the CO₂-equivalent emission is obtained by multiplying the emission of a GHG by its global warming potential (GWP) for a 100-year time horizon.
Emissions	Metric tonnes (t)
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.
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)
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.



Terms	Meaning
Global warming potential	Global Warming Potentials (GWP) are calculated as the ratio of the radiative forcing of one kilogramme greenhouse gas emitted to the atmosphere to that from one kilogramme CO ₂ over a period of time (e.g., 100 years).
Good Practice	"<i>Good practice</i>" 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. <i>Good Practice</i> 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
Hectare	Land area measure
Kilometre	Length (km)
kilowatt-hour	Energy unit used primarily with electricity (kWh)
Litre	Liquid measure of volume
LOM	Life of Mine
Mass	Gravitational Weight (kg)
Metre	Length (m)
Square Kilometre	Area measure
Troy Ounce	Gold Measure



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



Project Summary

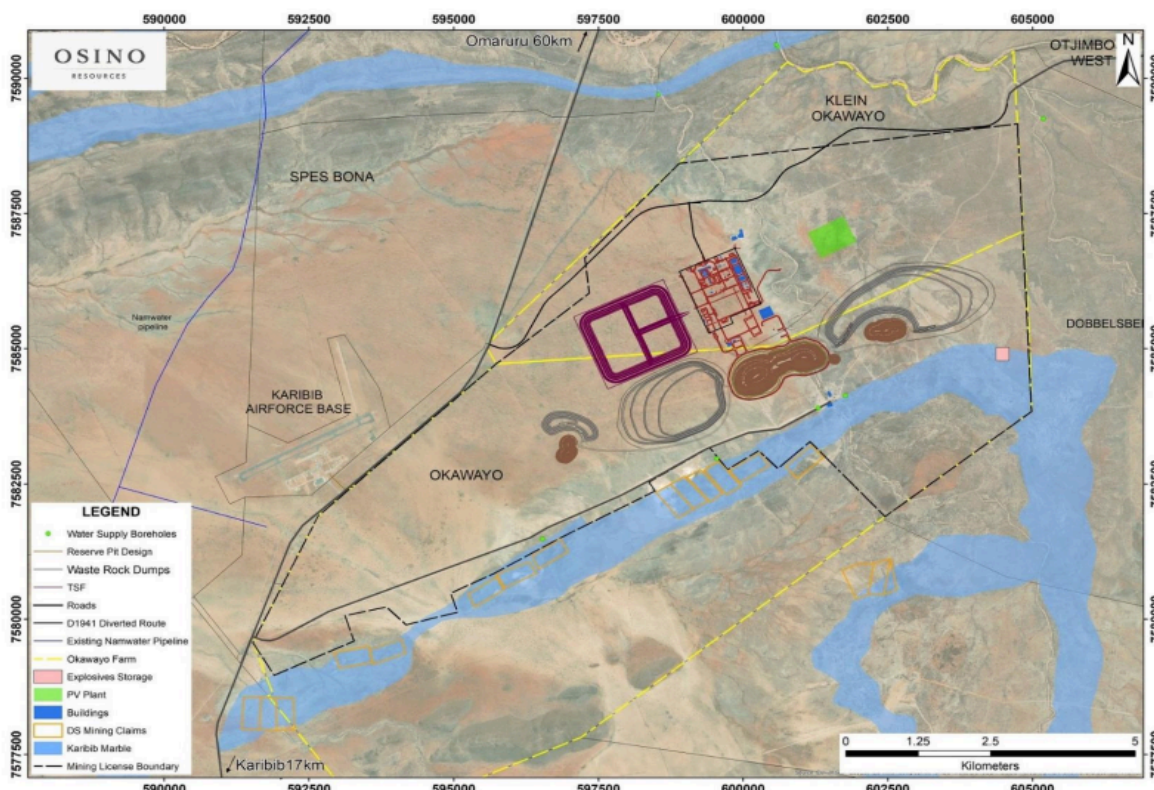


Figure 1 Preliminary Site Layout (Courtesy OSINO PFS)

Project Name	The Twin Hills Gold Project (the “Project”)
Location (s)	The Project is comprised of 14 exclusive prospecting licenses (“EPLs”) granted by the government of Namibia, which are held over a combined area of 153,658 ha in and around the regional towns and settlements of Usakos, Karibib, Omaruru, and Wilhelmstal in the Erongo Region of Namibia (Lycopodium Minerals Canada Ltd, 2022)
Project Owner / Developer	The Twin Hills Gold Project (the “Project”) is located in central Namibia and is owned by Osino Resources Corp. (“Osino”) through a number of its local subsidiary companies. (Lycopodium Minerals Canada Ltd, 2022).
Project Contact	+264
Project Summary	Twin Hills was discovered by Osino in 2019 and includes 14 of the Company’s exclusive prospecting licences (EPLs) comprising an area of approximately 1,540 km ² . It is an orogenic-style, sedimentary-hosted, structurally controlled gold project contemplated as an open pit. The resource is contained in three distinct deposits – Bulge, Twin Hills Central (THC) and Clouds – over a strike length of six kilometres. The project is currently in the growth and de-risking phase and is being fast-tracked to production.

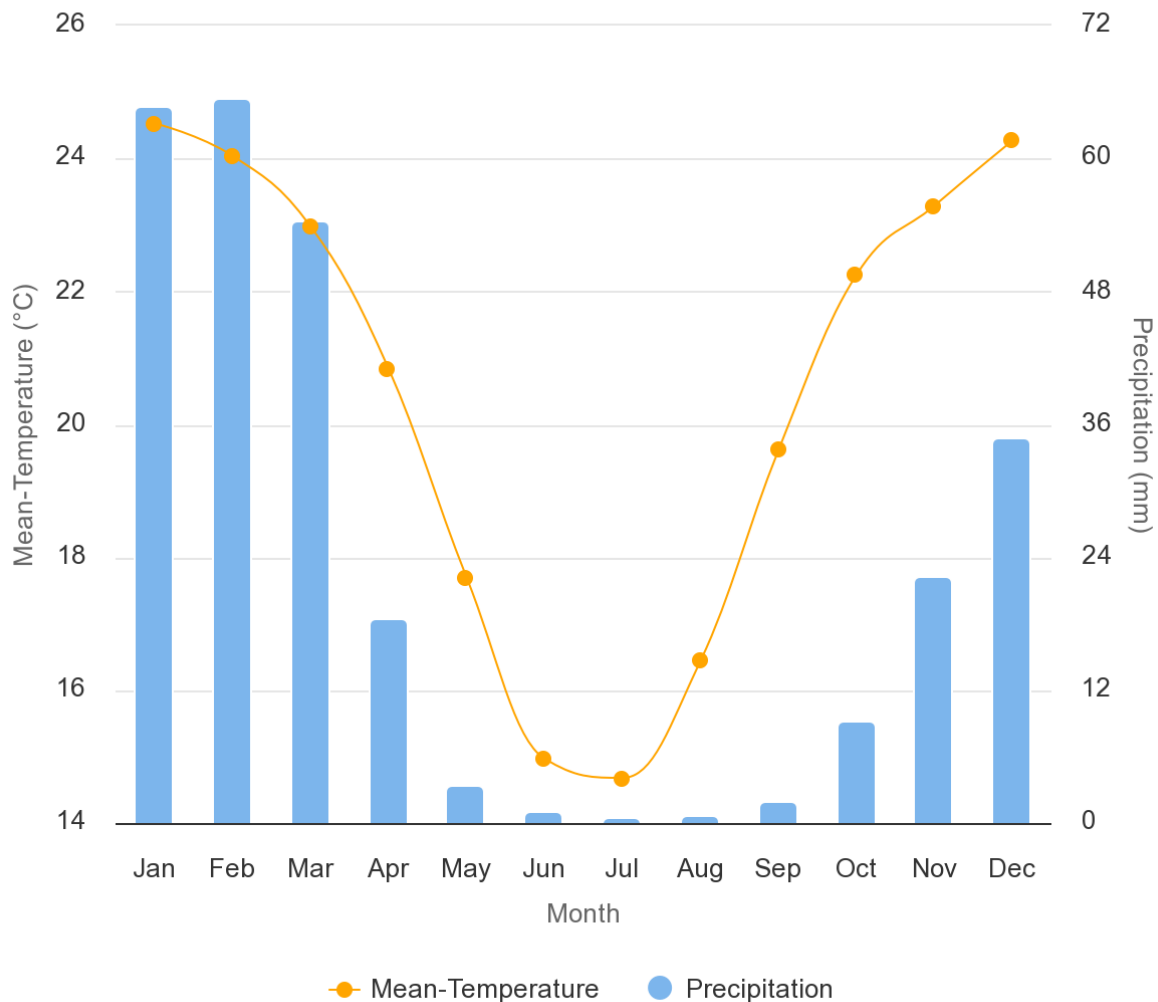


Executive Summary

This report (the Climate Change report) presents a futuristic assessment of the Twin Hills Project to be fully developed by Osino Resources. This document, (the Climate Change report), is the culmination of a predictive assessment of emissions once Twin Hills is in full operation and based on the suggested Life of Mine in the Pre-Feasibility and other reports (Lycopodium Minerals Canada Ltd, 2022) provided by Osino Resources.

Namibia's climate vulnerability, proneness to prolonged periods of drought, desertification, land and water resource degradation, and loss of biodiversity pose a risk to the economy. It is the driest country in Sub-Saharan Africa and severe drought conditions experienced in 2019 constrained agricultural output and led to a sharp decline in harvests.

Monthly Climatology of Mean-Temperature and Precipitation in Namibia from 1991-2020



Highcharts.com

Figure 2 Monthly Climatology 1991 - 2020 (Courtesy: World Bank Climate Change Knowledge Portal)

The reduction in precipitation also affected the broader economy through lower electricity and water generation, with repercussions on industrial production. While Namibia enjoyed



good rains in 2021, severe drought is a persistent threat to economic performance and for the welfare of farmers. Mendelsohn et. al. points out however that Namibia's arid climate thus was a clear indication of its abundant sunlight resource. This fits well with alternative energy sources such as solar power considered by Osino.

Namibia is actively engaged in international efforts to address climate change and environmental conservation. The country is a signatory to key United Nations conventions and protocols, including the United Nations Framework Convention on Climate Change (UNFCCC), the United Nations Convention on Biological Diversity (UNCBD), and the United Nations Convention to Combat Desertification (UNCCD). Namibia is a non-Annex 1 Party to the Paris Agreement, having ratified it in September 2016, and it ratified the Kyoto Protocol in September 2003.

Climate change therefore will affect the mining and plant operations of Twin Hills and surrounding communities through the disruption of supply chains within and external to the mine, as well as the availability of water and possibly energy sources because of the anticipated extreme weather events such as prolonged droughts and erratic heavy rainfall, severe winds accompanied by extreme temperature fluctuations.

Threats can also result from the ever-increasing, well-intentioned policies and regulations aimed at stemming climate-related impacts. These could take the form of increased carbon taxes, stringent water regulations, the impact of new technologies, and possibly even investor perception.

Mining activities are known to have significant environmental impacts, including greenhouse gas emissions, deforestation, habitat destruction, and water pollution. This report emphasizes the importance of addressing these challenges and integrating climate change goals into mining company policies. Such goals aim to mitigate environmental impacts, promote sustainable practices, and reduce carbon emissions.

Common climate change policy goals and measures for the mining sector include sustainable mining practices, energy efficiency, water management, community engagement, and resilience actions. Companies strive to reduce their carbon footprint by integrating renewable energy sources into their operations. Setting emissions reduction targets and implementing carbon pricing and trading mechanisms are also key strategies.

The analysis and comparison in this report focus on the mining sector in Namibia, with relevant extensions to other contexts as applicable. By adopting these climate change-directed policies and measures, mining companies in Namibia and beyond can work towards minimizing their environmental impact and contribute to sustainable development.

Climate Scenario Analysis

Understanding and addressing physical and transitional risks associated with climate change are essential for ensuring business continuity, protecting asset value, improving operational efficiency, complying with regulations, building investor and stakeholder confidence, and maintaining a positive reputation and social license to operate in the mining industry.



While all scenarios used in this report will not be a direct result of Twin Hills decisions, the role of Twin Hills can be inferred and extrapolated. Likewise, implications of climate change impacts on Twin Hills are assumed and inferred. The reader is again reminded that the inferences are drawn from the high-level analysis of others¹ detailed within the main report.

Highlights here are that the associated impacts of temperature affect not only Twin Hills operations directly but will impact the health of Twin Hills workers, contractors and surrounding communities. Thus, *“the warmer the air, the much more moisture it “can” carry, and therefore if rain were to form, much more water could be tapped into”* (The World Bank Group, 2022). As an extension to this, levels of rainfall will vary and thus climate impact will be a driver of this variation. Based on the research of others, the chances of flooding in the Erongo region will increase by 20% in the coming 10 years². This has an impact on Twin Hills future operations during the life of mine (LOM).

Data Findings

The total emissions (still to be verified on operational data) is estimated at **2.8 million tCO₂e** over the Life of Mine (LOM) and average annual emissions of **203,786 tCO₂e per annum** when Scope 1 and Scope 2 emissions are taken into account.

tCO2e						
Units	Pre-strip	Y1	Y2	Y3	Y4	Y5
S1 / S2	11,117	223,601	235,400	239,844	240,675	241,199
Y6	Y7	Y8	Y9	Y10		
240,978	240,190	243,163	239,608	236,161		
Y11	Y12	Y13	LOM			
221,554	207,720	4,089	2,825,300			

Figure 3 Estimated emissions per annum (LOM) - tCO₂e

The findings result (based on Scope 1 and Scope 2) in an emissions intensity (average) of:

- Equals 0.019 tCO₂e per g per annum. (LOM)
- Equals 0.00061 tCO₂e per oz³ per annum. (LOM)

On the request of Osino Resources, Scope 3 and 4 emissions are not included in this report but are recommended to be incorporated once Twin Hills begins operations.

Recommendations

Governments, investors, and society are exerting pressure on the mining sector to lower its emissions, with mining accounting for approximately 4 to 7 percent of global greenhouse gas

¹ <https://climateknowledgeportal.worldbank.org/country/namibia/extremes>

² <https://www.thinkhazard.org/en/report/2138-namibia-erongo/FL>

³ Troy Oz = 31.10 g



(GHG) emissions⁴. This means that a proactive approach to climate matters is in Osino's best interest for a variety of reasons.

The following high-level recommended climate related actions are put forward for Osino's consideration, understanding that this in part is a predictive process. As a Result, at the point of an investment consideration, **a review must be carried out**. These will result in transition actions that are sustainability linked and spread over short-, medium- and long-term frameworks to allow for reconsideration as needed or technological changes.

1.1 Short-term Year 0 - 5

Focus	Action
Energy efficiency	- Employ advanced asset management strategies combining real-time operational data with predictive analytics - Use of unmanned drones to survey sites and operations - Employ energy-efficient technologies and advanced processes
Electricity	- Transition to lower-carbon electricity source <i>Develop own on- or near-site renewable energy generation assets - Solar PV plant</i> - Purchase of renewable electricity <i>Independent Power Provision (offtake)</i> <i>Sign up to a power-purchase agreement for supply of renewable electricity with a renewable energy supplier</i> - Use solar PV instead of diesel generators where possible - Use solar hot-water heating - Use solar water pumping where feasible
Transport	- Decarbonize mine transport <i>LDV - using battery-electric or fuel-cell vehicles powered by zero-carbon electricity</i> <i>LDV - using hybrid vehicles powered by zero-carbon electricity</i> - Mining Truck transport <i>Explore the use of electric mine trucks (haul)</i>
Air Conditioning	Utilise propane refrigerants

⁴ <https://www.mckinsey.com/capabilities/sustainability/our-insights/climate-risk-and-decarbonization-what-every-mining-ceo-needs-to-know>



1.2 Medium-term Year 6 - 10

<i>Focus</i>	<i>Action</i>
<i>Water</i>	Consider exploring Desalinated water supplies through NamWater
<i>Transport</i>	If mature, consider utilizing hydrogen powered haul trucks

1.3 Long-term Year 11 - 14

<i>Focus</i>	<i>Action</i>
<i>Energy</i>	Explore Carbon storage / Carbon capture if mature and feasible
<i>Transport</i>	Explore biofuel LDV's

1.4 Further Actions

It is recommended that Osino Resources develop metrics to monitor progress of goals and activities. Further, that a central data collection aggregator is set up that aligns with the datasets provided for in this report so that future reporting will build on the current assumptions made herein.



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2 Introduction

This document, (the Climate Change report), is the culmination of a predictive assessment of emissions once the **Twin Hills Project** is in full operation and based on the suggested *Life of Mine* in the Pre-Feasibility and other reports (Lycopodium Minerals Canada Ltd, 2022) provided by Osino Resources.

This Report is designed to capture the climate change scenarios around the Osino Resources operation at Twin Hills. The high-level Climate Change analysis was conducted at this point by a desktop review as the plant is still to be built. In doing so however, the Report supports Osino's approach to meeting *43-101 Standards of Disclosure for Mineral Projects*⁵ and the Task Force on Climate-related Financial Disclosure (TCFD) as a complement to other Reports pertaining to the Twin Hills Project.

2.1 Rationale for Reporting

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. 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).

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 Osino Resources led Twin Hills Gold Project. Osino Resources Corporation describes itself as a leading gold exploration and development company, listed on Canada's Toronto Venture Stock Exchange (TSXV:OSI) (Osino Resources Corporation, 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 lower atmosphere because greenhouse gases absorb some of the Earth's outgoing heat radiation and reradiate it back towards the surface".

⁵ NI 43-101 Standards of Disclosure for Mineral Projects, Form 43-101F1 Technical Report and Related Consequential Amendments <https://mrmr.cim.org/media/1017/national-instrument-43-101.pdf>



(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

In the Twin-Hills PFS Report (Lycopodium Minerals Canada Ltd, 2022), Osino Resources has identified Climate Change as a risk and thus needs to better understand the potential risk to its operations. This will allow Osino to determine reasonable strategies to mitigate or adapt to the pending climate-related risks. Several leading practices and international standards set the tone for this work such but not limited to:

- Principle 2 of The Equator Principles
- International Finance Corporation (IFC) Principles
- the Task Force on Climate-related Financial Disclosure (TCFD)
- The World Gold Council

2.1.1 Principle 2 of The Equator Principles

requires an alternatives analysis to be conducted when there is an “expectation” that CO₂e emissions will exceed 100,000 tonnes of CO₂e 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 Twin Hills seeing periods in excess of 100,000 tonnes of CO₂e per annum, an alternatives analysis will be required. ***This is outside of the current scope of this commissioning.***

2.1.2 IFC Principle,

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 CO₂-equivalent annually,⁶ the client will quantify direct emissions from the facilities owned or controlled within the physical project boundary,⁷ as well as indirect

⁶ 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

⁷ 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.



emissions associated with the off-site production of energy⁸ used by the project. Quantification of GHG emissions will be conducted by the client annually in accordance with internationally recognized methodologies and good practice⁹. (International Finance Corporation, 2012)

2.1.3 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. With a "forward-looking" approach, TCFD focuses on awareness raising and transparency. Principles, therefore, surround *being clear, balanced, and understandable to reliable, verifiable, and objective* (Task Force on Climate-related Financial Disclosures, 2021).

In relation to this specific sector, **The World Gold Council** seeks to provide a platform for "responsible gold mining" inclusive of decarbonization, net zero approaches, and ultimately societal progress (World Gold Council, 2023).

2.2 Country Climate Impact 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)

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 the regions with a BWh climate (that covers the Erongo region). "BWh" represents a hot desert climate. 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 Twin Hills that¹⁰:

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.

⁸ Refers to the off-site generation by others of electricity, and heating and cooling energy used in the project.

⁹ Estimation methodologies are provided by the Intergovernmental Panel on Climate Change, various international organizations, and relevant host country agencies.

¹⁰ 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.



Köppen-Geiger Climate Classification, 1991-2020

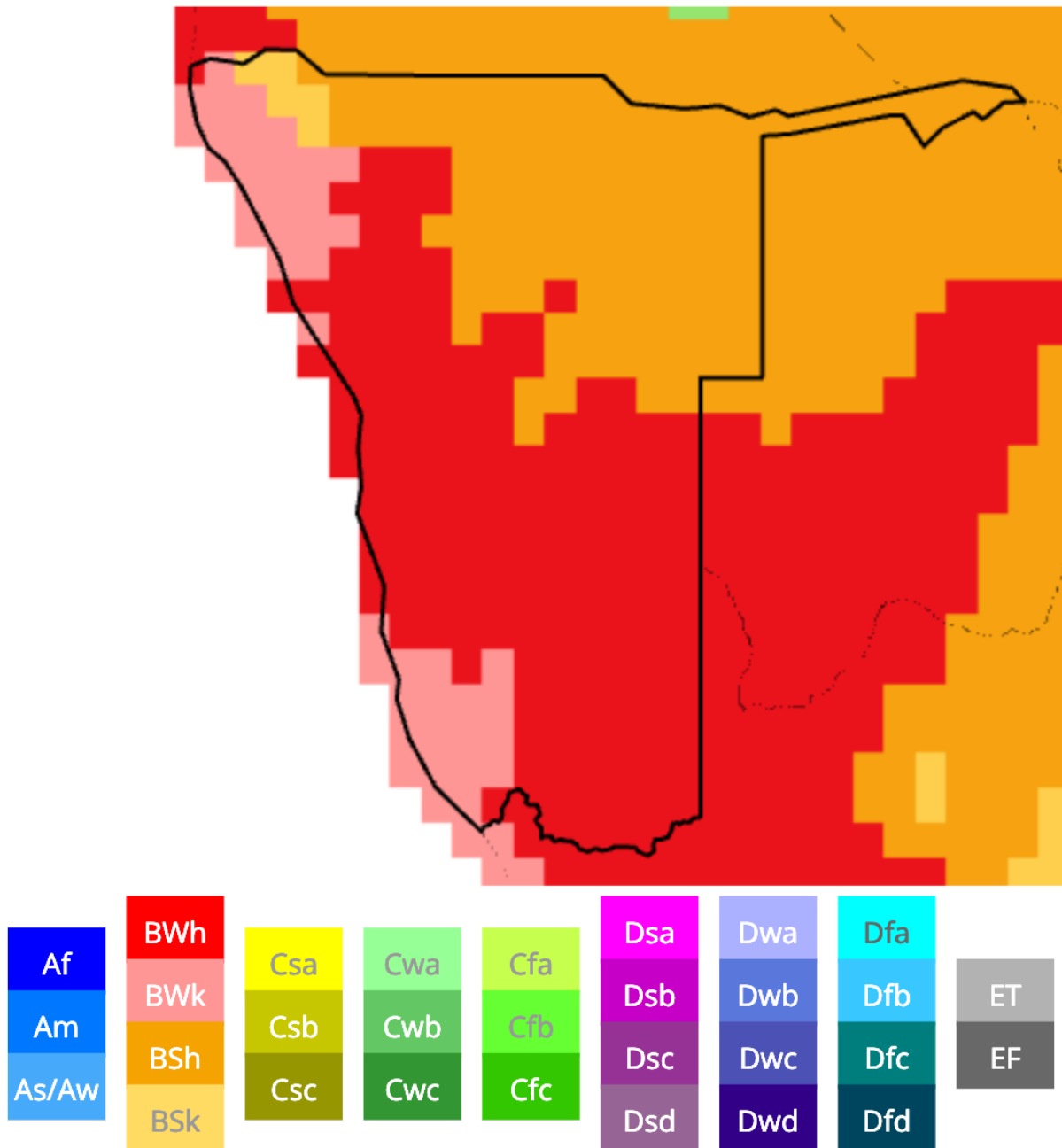


Figure 4 Köppen-Geiger Climate Classification, 1991-2020 (Courtesy: World Bank Knowledge portal)

Climate scenario analysis will examine this further in this report.

2.3 Client Information

The Client is identified as:

Osino Resources Corporation described as a leading gold exploration and development company, listed on Canada's Toronto Venture Stock Exchange (TSXV:OSI) (Osino Resources Corporation, 2022). The Twin Hills Gold Project (the "Project") is located in central Namibia



and is owned by Osino Resources Corp. (“Osino”) through a number of its local subsidiary companies. (Lycopodium Minerals Canada Ltd, 2022).

Osino Resources Corporation states its Strategic Vision:

“To become Namibia’s most respected and responsible gold mining company”

2.3.1 Governance Structure

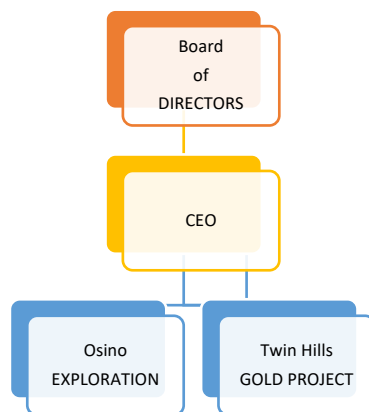


Figure 5 Osino Sustainability Governance Structure (Osino Resources Corporation, 2022)

2.3.2 Roles of the Board

TCFD guidance suggests that the Board provide general oversight. This is because climate change governance matters need to be mainstreamed for effectiveness.

2.3.3 Roles of the Management

Day-to-day operations fall in the purview of the Management. They will carry out the Board decisions. Here, the actions needed can be effected to mainstream climate change understanding throughout the mine.

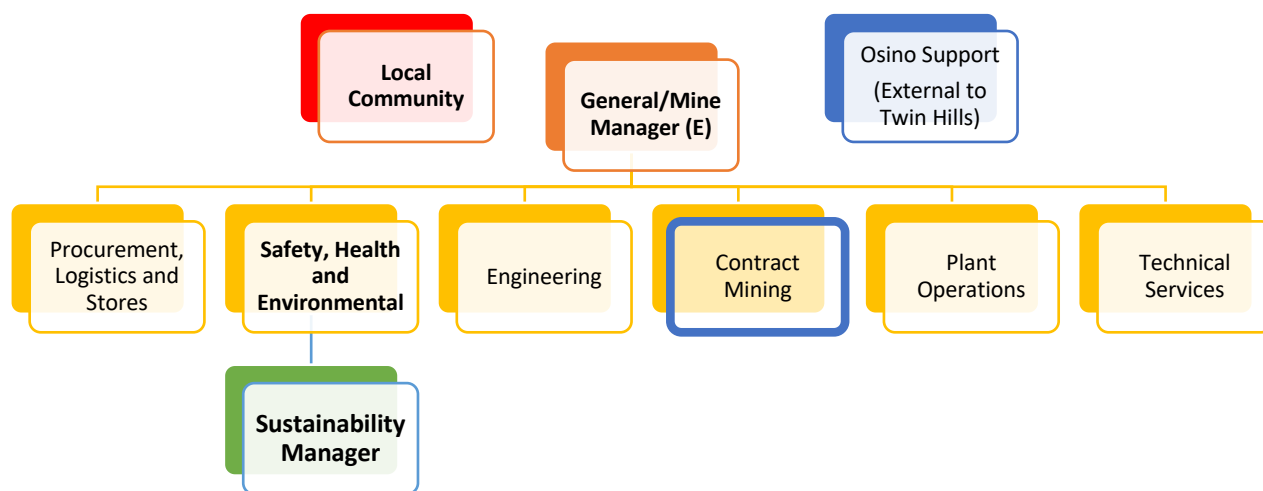


Figure 6 Ring-fenced Twin Hills organogram



2.3.4 Project Geography¹¹

The Project is comprised of 14¹² exclusive prospecting licenses (“EPLs”)¹³ granted by the government of Namibia, which are held over a combined area of 153,658 ha in and around the regional towns and settlements of Usakos, Karibib, Omaruru, and Wilhelmstal in the Erongo Region of Namibia (Lycopodium Minerals Canada Ltd, 2022) stated by Osino Resources Corporation to be 1,540 km² from an area of 6,700 km² (Osino Resources Corporation, 2022).

2.4 Osino timeline

Osino has actively and systematically explored the Project since 2016 (Lycopodium Minerals Canada Ltd, 2022). This Report focuses on the start-up phase of active production within the life of mine (LOM) covering 14 years.

¹¹ This is as presented in the pre-feasibility study (Lycopodium Minerals Canada Ltd, 2022) and confirmed from local knowledge and sources.

¹² Listed as 14 in the 2021 Report (Osino Resources Corporation, 2022)

¹³ See 2.3

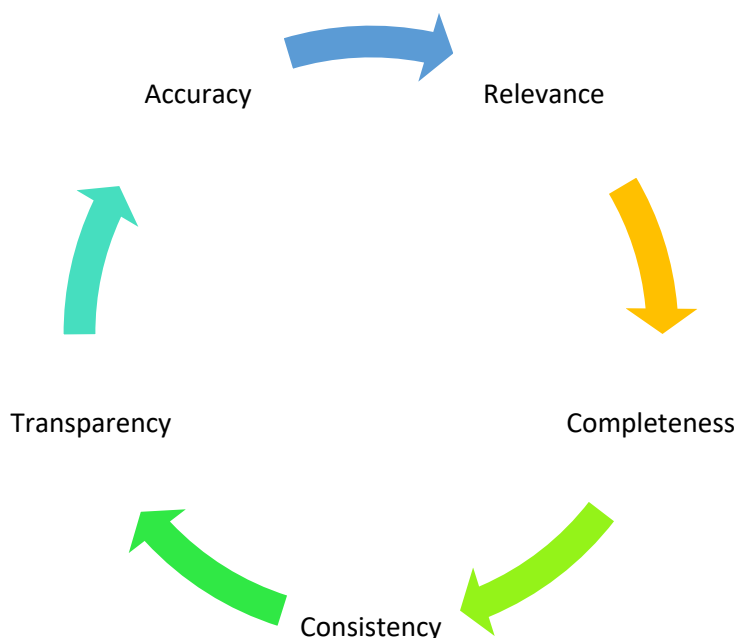


3 Methodology

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.

This is in line with other leading practice¹⁴ on climate change reporting and standardization processes. One such is the Climate Registry (The Climate Registry, 2023) which through its General Reporting Protocol (GRP) GHG accounting and reporting principles expects an organization to give reports that are “faithful, true and fair” which have:



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 IPCC¹⁵ (2013).

¹⁴ Previously referred to as “best practice”.

¹⁵ Climate Change 2013: The Physical Science Basis.



- Carbon Dioxide (CO₂),
- Methane (CH₄),
- Nitrous Oxide (N₂O),

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

- Hydrofluorocarbons (HFCs),
- Perfluorocarbons (PFCs),
- Sulphur Hexafluoride (SF₆), and
- Nitrogen Trifluoride (NF₃)

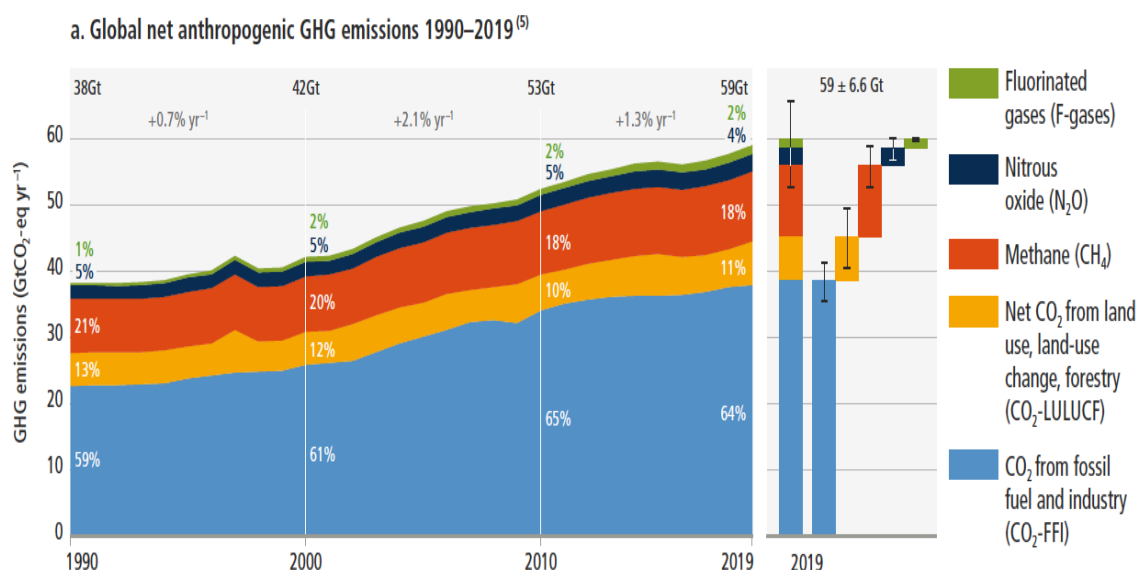


Figure 7 Global net anthropogenic GHG emissions 1990–2019 (IPCC AR6 Report) (2022)

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.

The matter of SCOPE, is one that is linked to “good business” practice and as outlined via the

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**.



Scope 2 emissions account for the GHG from generation facilities providing purchased electricity consumed by the organization. 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. Some examples of scope 3 activities are extraction and production of purchased materials, transportation of purchased fuels and employee commuter travel.

The estimates of 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 Osino's emissions picture¹⁶.

3.1 Global Warming Potential (GWP)

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

	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 ₂ O	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 CO₂ 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).

3.2 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.

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 RCP scenarios that

¹⁶ Note: Emissions per kWh should be used with caution due to [known] data quality problems relating to electricity efficiencies for some countries.



formed as was the basis of the Intergovernmental Panel on Climate Change's (IPCC) analysis of the state of climate change globally.

3.3 Electricity – Southern Africa Power Pool

STATUS OF DECARBONISATION

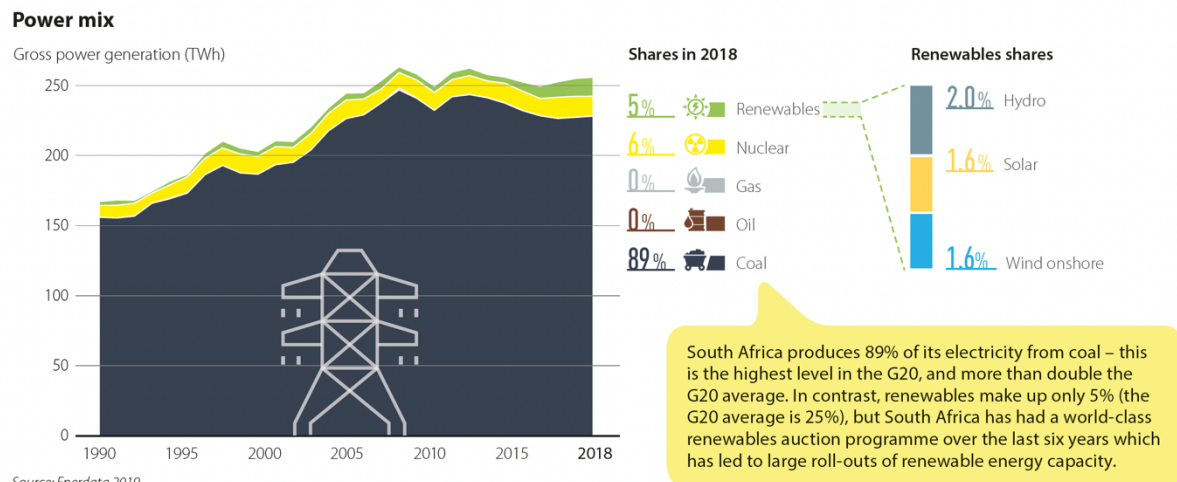


Figure 8 Decarbonisation of South Africa (2018)

It is well known that Namibia imports upwards of 70% 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 or from Zambia.

For projects in Namibia, 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 project assessments of projects ranging from 1.0262 (tCO₂/MWh) down to 0.928 (tCO₂/MWh) as indicated by the South Africa's 2019 Climate Report on "energy transition".

We have therefore erred on the side of caution using the grid emissions factor noted by the Institute for Global Environmental Strategies (2022) and is taken as 0.9958 tCO₂/MWh.

3.4 Inclusions & Assumptions

This report includes an analysis of data sets and information that focuses on the Project area known as "Twin Hills" for 5 Mtpa. Included in the calculations is the satellite office in Karibib. To support this analysis, the team conducted desk research drawing from primary and secondary literature sources. In addition, the team requested clarity on matters to validate the assumptions with the Client.

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

- Defining Organisational Boundaries
- Using data provided by Osino Resources
- 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.

Table 2 Emission Factor table

Source of Emission	Emission Factor tCO ₂ e/unit	Source
Air – Domestic /kilometre	0.17147	Greenhouse Gas Protocol ¹⁷
Air – Short Haul /kilometre	0.097	Greenhouse Gas Protocol
Electricity - SAPP	0.9958	Global Environmental Strategies
Oil Product - Diesel Oil	0.002676492	Greenhouse Gas Protocol
Oil Product - Liquified Petroleum Gases	0.001667002	Greenhouse Gas Protocol
Oil Product - Motor Gasoline	0.0022717926	Greenhouse Gas Protocol

It is worthwhile noting:

- The Organisational Boundaries are surrounded by the Twin Hills site and the satellite Karibib office.
- All numbers presented are rounded as required for the best possible high-level understanding.
- The Metric / SI system is used for consistency with approximate U.S measures where appropriate for reader understanding and comparatives.
- Gold measures converted from one Troy Ounce to the equivalent of 31.10 gram¹⁸.
- All gold produced assumed transported onwards per annum.
- Grid emissions factor¹⁹ (Institute for Global Environmental Strategies, 2022) is taken as Grid Emission Factor refers to CO₂ emission factor (tCO₂e/MWh)²⁰ 1.0262 tCO₂e/MWh. The value of 0.9958 tCO₂e/MWh assigned to the operating margin.
- Assumed all vehicles and equipment considered are recent editions being post-2018 models.

¹⁷ https://ghgprotocol.org/sites/default/files/Emission_Factors_from_Cross_Sector_Tools_March_2017.xlsx

¹⁸ Royal Mint www.royalmint.com/ 31.10 grams, Bullion Vault <https://www.bullionvault.com/> 31.10347 grams and www.gold.org 31.10323 grams.

¹⁹ Taken from Institute for Global Environmental Strategies (2022)

²⁰ CDM Standardized baseline: "Grid emission factor for the Southern African power pool version 01.0" (ASB0001)



- The diesel consumption for plant mobile equipment is based on industry-standard vehicle consumption rates and estimated equipment utilisation. (Lycopodium Minerals Canada Ltd, 2022)
- Diesel usage for carbon treatment for plant stationary equipment has been calculated from equipment anticipated running times and vendor data. (Lycopodium Minerals Canada Ltd, 2022).

3.5 Exclusions & Assumptions

- Gold sales are not taken into account over the life of the mine and all operations only the assumed production levels.
- Water evaporation was not taken into account due in part to unreliable data.
- Grid emissions intensity of the South African grid will be reduced by approximately 18% by 2030 from 2019 levels (World Gold Council, 2023). Due to unreliability, however, this factor is not taken into account.
- Overall emissions reduction needed for the 1.5°C target by 2030 needs to be around -46% (World Gold Council, 2023) and for 2°C target will require -27%. Point for noting only.
- Waste material data is known to be unreliable in terms of estimating and therefore it has been excluded. (Arup and De Montfort University, 2012)
- In the absence of accurate data, staff air travel and hotel or other accommodation is excluded. This is an area for monitoring going forward.

3.6 Conversion and Variance exempla

3.6.1 Grid emission factor considerations

It is well known that Namibia imports upwards of 70% 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 or from Zambia.

For projects in Namibia, the issue of its grid emission factor (GEF) is thus a point of contention. The result, therefore, is that various authors are using different GEF for project assessments of projects ranging from 1.0262 (tCO₂/MWh) down to 0.928 (tCO₂e/MWh) as indicated by South Africa's 2019 Climate Report on "energy transition".

We have therefore erred on the side of caution using the grid emissions factor noted by the Institute for Global Environmental Strategies (2022) which is taken as 0.9958 tCO₂e/MWh.

3.6.2 Solar Power Assumption²¹

- 70 000 MWh annually
- based on roughly 30 MW installed and
- 8-12 hours of sunlight obviously varies seasonally and day to day.
- This is about 37% of the total site requirement.

Also assume degradation of 0.5%/annum of the plant over time (IRENA and IEA-PVPS, 2016).

3.6.3 Assurance

²¹ As per email 2 May 2023 (See Annex)



It must be noted that NO assurance is given in the data or conclusions drawn in this report as the provided were not subjected to an audit, review, or compilation engagement by us and we do not express an opinion, a conclusion, nor provide any assurance on them due to:

- No primary data being used
- Data provided by third-parties
- Data provided relies on extrapolation and estimation
- Data provided not provided with audit or review statement of assurance

Appropriate measures must be formulated and applied to address the following potential key risks:

- (i) Public administrators such as Mine Inspectors and Ministry Officials, may face challenges in their roles due to issues like inadequate training, low pay, and weak regulations (National Planning Commission, 2021). As a result, it is likely that they may not prioritize or adequately focus on managing and collecting climate change data for projects.
- (ii) The result will therefore be officials that should act as checkpoints for Osino and the country at large, not having the ability to make informed decisions, track progress, and implement appropriate measures to address climate change impacts effectively.



4 Policy and Regulatory Impactors

Climate Change is a risk that will vary depending on the country, business location, and management outlook. Namibia is recognized as being vulnerable to the impacts of climate change (Ministry of Environment & Tourism, 2012).

Globally, legislative changes are being rolled out at a fast pace. The result of this is the need for not only more and more reporting but the need for awareness of cross-impacting laws and regulations. Some common climate change directed policy goals and measures related to the mining sector in the context of climate change include:

1. **Sustainable Mining Practices:** Encouraging or mandating the adoption of environmentally friendly mining techniques and technologies, such as reducing water consumption, minimizing energy use, and promoting responsible waste management.
2. **Renewable Energy Integration:** Encouraging or requiring mining companies to transition from fossil fuel-based energy sources to renewable energy sources, such as solar or wind power, to reduce greenhouse gas emissions associated with mining operations. This can involve installing solar panels or wind turbines on-site to generate clean energy and reduce reliance on fossil fuels. Renewable energy integration can contribute to long-term cost savings.
3. **Emissions Reduction Targets:** This can involve setting emissions reduction targets or promoting energy efficiency measures. This includes optimizing transportation and logistics, minimizing waste generation, and exploring emission reduction technologies. Carbon offset projects can also be considered to mitigate the emissions that cannot be avoided.
4. **Carbon Pricing and Trading Schemes:** Implementing mechanisms such as carbon pricing or emissions trading schemes to incentivize mining companies to reduce their carbon footprint.

The following national laws and policies were consulted to seek alignment and understanding to inform the analysis:

National Laws and Policies	Relevance	Area of Relevance
Biennial Update Report (BUR)	Climate Change issues	Noted a lack of good wastewater data nationally from the industrial sector, thus a focal area of government. Recycling target set at 70%.
Environmental Management Act, No. 7 of 2007	Impact assessment	Requirements for EIA
Modified Single Buyer Policy (MSB)	Electricity	Production of electricity options. MSB restricts purchase to 30% of demand annually.



National Laws and Policies	Relevance	Area of Relevance
National Climate Change Policy (NCCP)	Climate Change issues	Suggests that the climate change risk of warming up to 2deg Celcius, extreme weather and droughts in the next 50 years is highly likely.
National Climate Change Strategy and Action Plan (NCCSAP)	Climate Change issues	Decrease in underground water quality and quantity (Erongo Region). Strategic aim to have reduction of GHG emissions from mining (and other sectors). Gives ambitions to set GHG targets.
Nationally Determined Contributions (NDCs)	Climate Change issues	MITIGATION: Reduction of GHG emissions in energy and transport sectors. ADAPTATION: Improve water demand management Data management barriers and issues.
National inventory report	Climate Change issues	Provides records of GHGs up to 2015. Shows GHG emissions in the mining and quarrying sectors are growing
Minerals (Prospecting and Mining) Act, No.33 of 1992	Water Energy Infrastructure	Obligations to protect water sources. General obligations for mining practices.
Namibia Water Corporation Act 12 of 1997	bulk water provider	Notes that mines must consider principles established in the Water Supply and Sanitation Policy which ranks human consumption higher than industrial processes. (Ministry of Agriculture, Water and Forestry , 2008)
Water Act, No.54 of 1956	Water	Allows for ministerial condition impositions. This is a “regulatory risk”.
Water Resources Management Act 11 of 2013	Effluent Wastewater	Abstraction levels
Water Supply and Sanitation Sector Policy, 2008	water supply for mines	Mining companies should develop their own water supply schemes or should provide the capital for the construction and development of WSS infrastructure to mines provided that the government or the service provider only contributes to the expenditure if other consumers benefit from such infrastructure



5 Metrics and Impacts

Although this report is focused on identifying the Osino GHG emissions through its “LOM”, it is important to draw industry and peer alignment for leading practice. The World Gold Council notes that 95% of emissions are linked to “power and fuel” use. They also note that electricity is the largest of the two emission classes (World Gold Council, 2023)²². This justifies our focus.

Following TCFD Guidelines (Task Force on Climate-related Financial Disclosures, 2021), provides indicator points to²³:

5.1 Intensity

Once more, we are reminded that gold mining is energy intensive. Intensity is a metric that can help determine a baseline or performance measure. It can definitely be used to rationalize performance levels, particularly for investor understanding of gains or losses in efficiency at a specific point in time.

As a consequence, Energy Intensity is understood to be the “Ratio of total energy inputs to total gold production” Carbon Intensity is a similar measure and for climate change is the most relevant as a consequence of renewable energy input from solar and wind distorting the Energy intensity measure. This point is especially relevant for the “Scope” measures where an energy-only approach would yield no variance.

This report sees the Carbon Intensity for Twin Hills as:

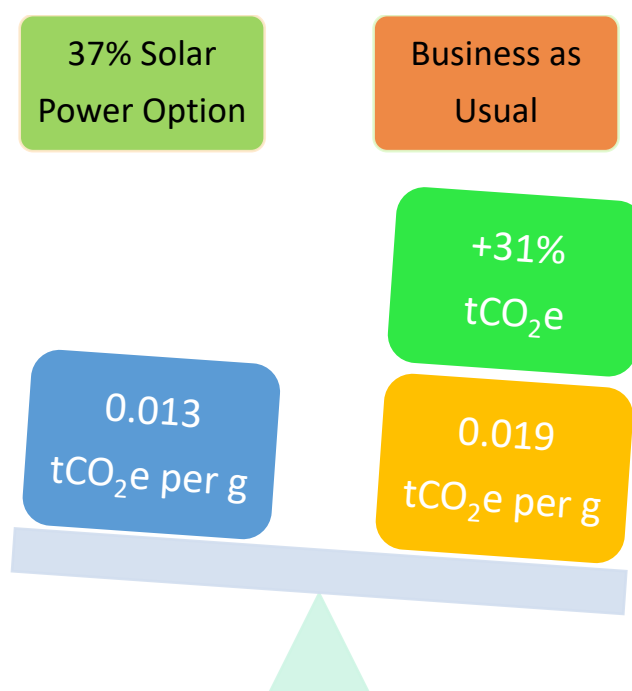


Figure 9 Twin Hills Carbon Intensity

²² Based on 158 mines located in 31 countries.

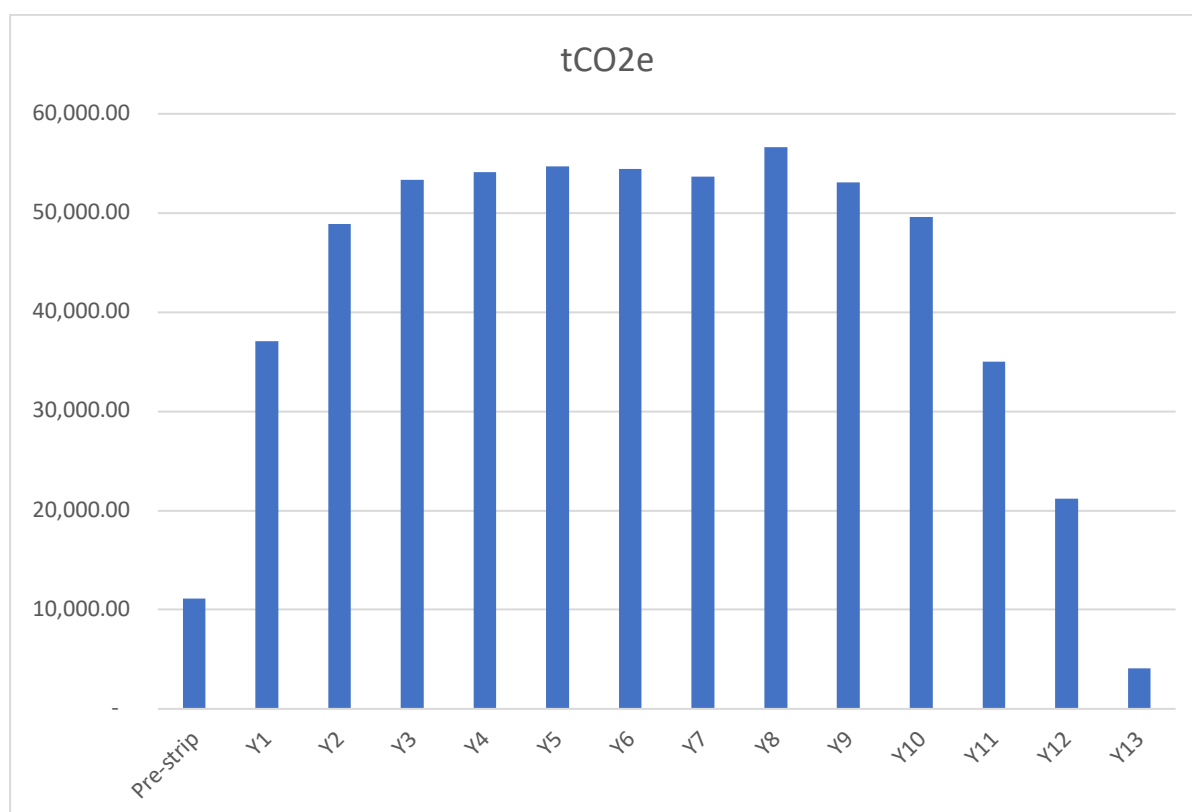
²³ <https://www.fsb-tcf.org/publications/final-recommendations-report/>



These findings are in line with the findings and intensities by other gold producers in Namibia such as B2 Gold (B2 Gold Namibia, 2021) which saw 0.66 tCO₂e/oz in comparison to Osino predicted at 0.61 tCO₂e/oz (0.019 tCO₂e/g) at LOM average. It is therefore obvious that an increase in renewable energy sources such as solar and wind will drive the Carbon Intensity of Twin Hills lower. This will be a question for Osino to consider going forward.

5.2 Scope 1

Scope 1 emissions in this section are those direct emissions from Osino's activities or those under its direct control. This is important as in this report, the mining contractor is included based on fuel use data provided and the fact that the contractor is deemed "under OSINO" control.



Scope 1 will peak around Year 8 amounting to 54,669.52 tCO₂e. The range of emission activities covered here includes:

1A MINE PIT - mining

- Drilling
- Secondary actions
- Tertiary actions
- 1B MINE PIT - transport Hauling
- 1B MINE PIT - transport Loading

1C PROCESSING PLANT

- Process plant Elution
- Process Plant Carbon Regeneration



- process Plant Carbon Furnace
- Plant Equipment (Cranes, FEL, Forklifts, etc.)

1E GENERAL ADMINISTRATION buildings

- Air conditioning - fugitive emissions

1F GENERAL ADMINISTRATION transport

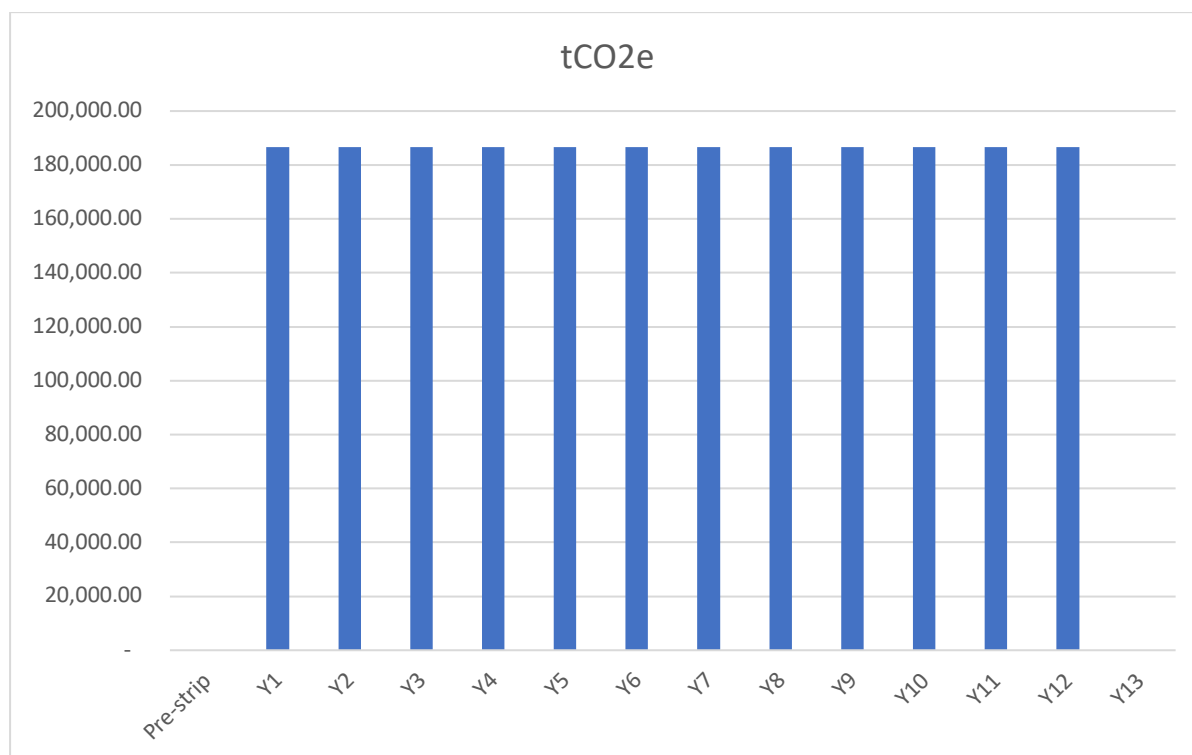
- Fleet LDV's and Busses

Highlight of this section indicates that the Mine Pit area is the largest Scope 1 contributor which should come as no surprise due in part to the intensive energy demand for drilling, hauling, and loading. Hauling accounts for some 71% of the Mine Pit transportation and therefore will offer the best opportunity for emissions savings through the LOM.

Mine Pit transport generally accounts for 70% all emissions in the Mine Pit and so warrants focus for savings. Areas for action are included further.

5.3 Scope 2

This Scope 2 section covers indirect emissions from the generation of purchased electricity, steam, heating and cooling consumed by the reporting Osino (Twin Hills).



Scope 2 will peak around Year 1 amounting to 186,529.27 tCO₂e if BAU remains but is expected to be 116,705.48 tCO₂e with the integration of solar power on site. The range of emission activities covered here includes:

2A PROCESSING PLANT

- Primary crusher area MCC
- Secondary crusher Area MCC



- Tertiary Crusher Area MCC
- Milling Area MCC
- CIL Area MCC
- Services, Elution & Thickening Area MCC
- Ball Mill & Cyclone Pumps
- Oxygen Plant MCC
- Workshop and washbay Minisubstation
- Stores and changehouse Minisubstation

2B WATER PUMPING - processing plant

- Water Services Area MCC Northern Overhead Line Circuit

2B WATER PUMPING - onsite

- Southern Overhead Line Circuit

2C MINE PIT - mining

- Mine Contractors Mini substation

2D PROCESSING PLANT

- Tailings & Reagents Area MCC
- Tailings Handling Area MCC
- 11KV Switchgear - Tailings Vacuum Pumps
- Tailings Handling Conveying System

2E GENERAL ADMINISTRATION

- Offices Mini substation

2F ELECTRICITY LOADING SUPPORT (VARs)

- Power Factor Correction Bank #1 (1.4 Mv/Ar)

2F ELECTRICITY LOADING SUPPORT (VARs)

- Power Factor Correction Bank #2 (2.8 Mv/Ar)

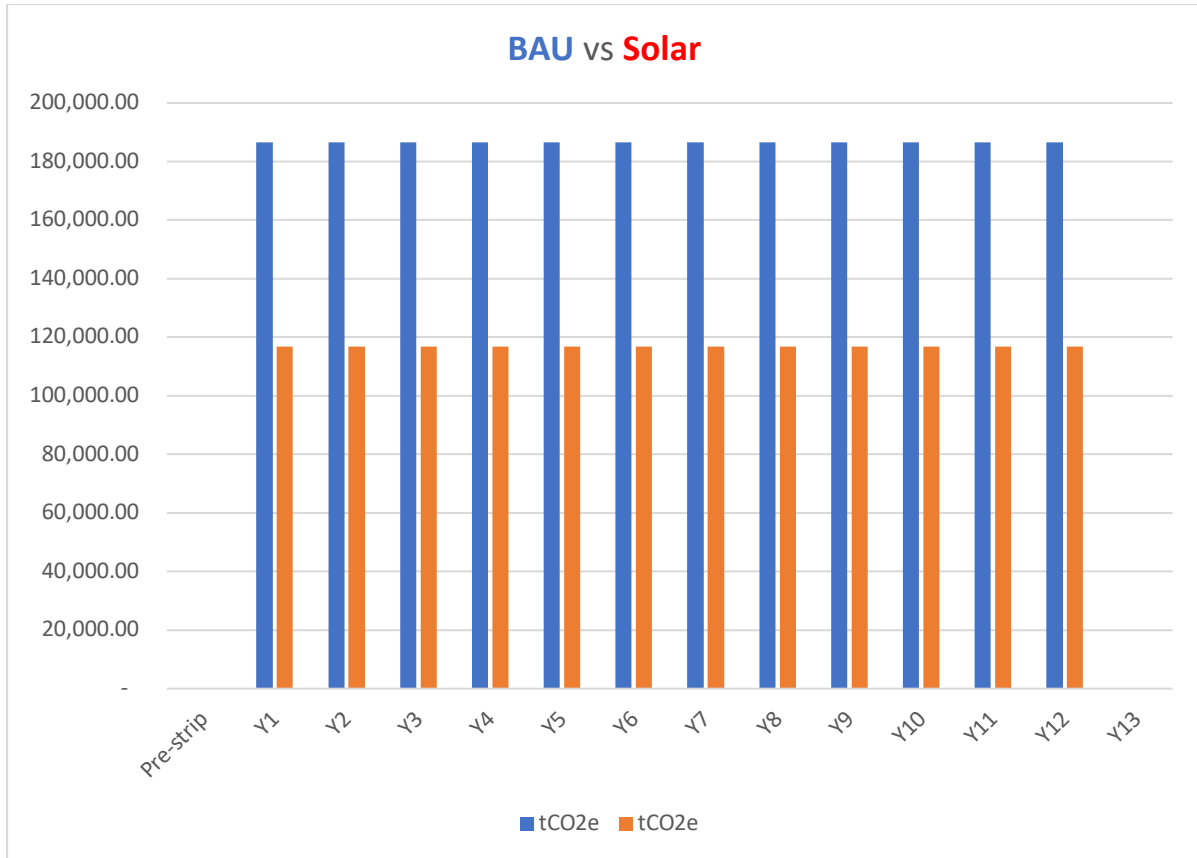
As per the Pre-Feasibility Study Report (Lycopodium Minerals Canada Ltd, 2022), and email guidance from Osino, we have created two Scope 2 outputs for

- (i) Business as Usual (BAU) that has no solar power integrated and
- (ii) renewable energy (solar power) output to show the impact.

The highlight of the Scope 2 emissions, indicates that overall Plant Operations are the largest contributor based on its electricity needs, accounting for 87% of electricity demand and peak at 142,796.72 tCO₂e per annum of the overall emissions accounted for of 186,529.27 tCO₂e per annum.

A key consumer of electrical power is the Processing Plant which consumes under Business as Usual (BAU) 77% of the demanded energy over the Life of Mine.





The availability of cost-reflective and efficient solar power to help mitigate this is even more apparent as an option resulting in the overall reduction of consumed energy emissions by 37%. Thus, the benefits of solar power integration will be impactful on emissions creating effective mitigation and should be pursued. Areas for action are included further.

5.4 Scope 3

Scope 3 emissions are not evaluated at this time but are recommended to be included in future iterations.



6 Climate Scenario Analysis

While all scenarios here will not be a direct result of Twin Hills decisions, the role of Twin Hills can be inferred and extrapolated. Likewise, implications of climate change impacts on Twin Hills are assumed and inferred. The reader is again reminded that the inferences are drawn from the high-level analysis of others²⁴.

6.1 Temperature

This is an important factor for consideration primarily due to the associated impacts that affect not only Twin Hills operations directly but will impact the health of the workforce. Research has shown that “warmer temperatures are especially important for precipitation because the Clausius-Clapeyron-Relationship dictates that for every 1°C of increased air temperature, that air’s potential to carry moisture increases by 7%. Thus, **the warmer the air, the much more moisture it “can” carry**, and therefore if rain were to form, much more water could be tapped into” (The World Bank Group, 2022).

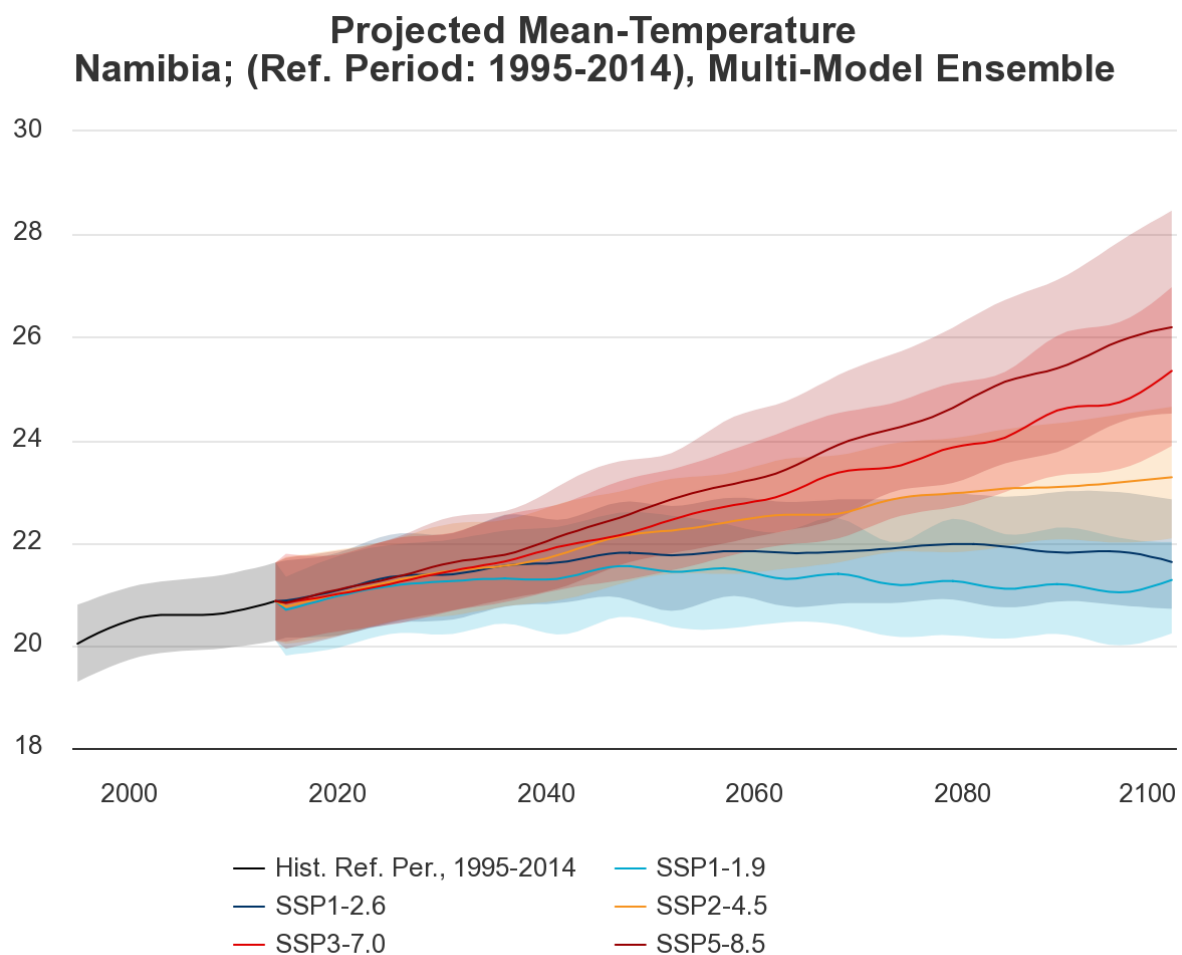


Figure 10 Namibia: Projected Mean Temperature (2000 - 2100)

²⁴ <https://climateknowledgeportal.worldbank.org/country/namibia/extremes>



Consequence of this is as mean temperature increases, the probability for increased flash flooding increases. Namibia has recorded extreme flooding this year (2023) in and outside of its rainy season (identified in the next section: Precipitation) with damages recorded in Ohangwenha, Omusati and Karas regions.

6.2 Precipitation

Projected Climatology of Precipitation for 2020-2039 Erongo, Namibia; (Reference Period: 1995-2014), SSP2-4.5, Multi Ensemble

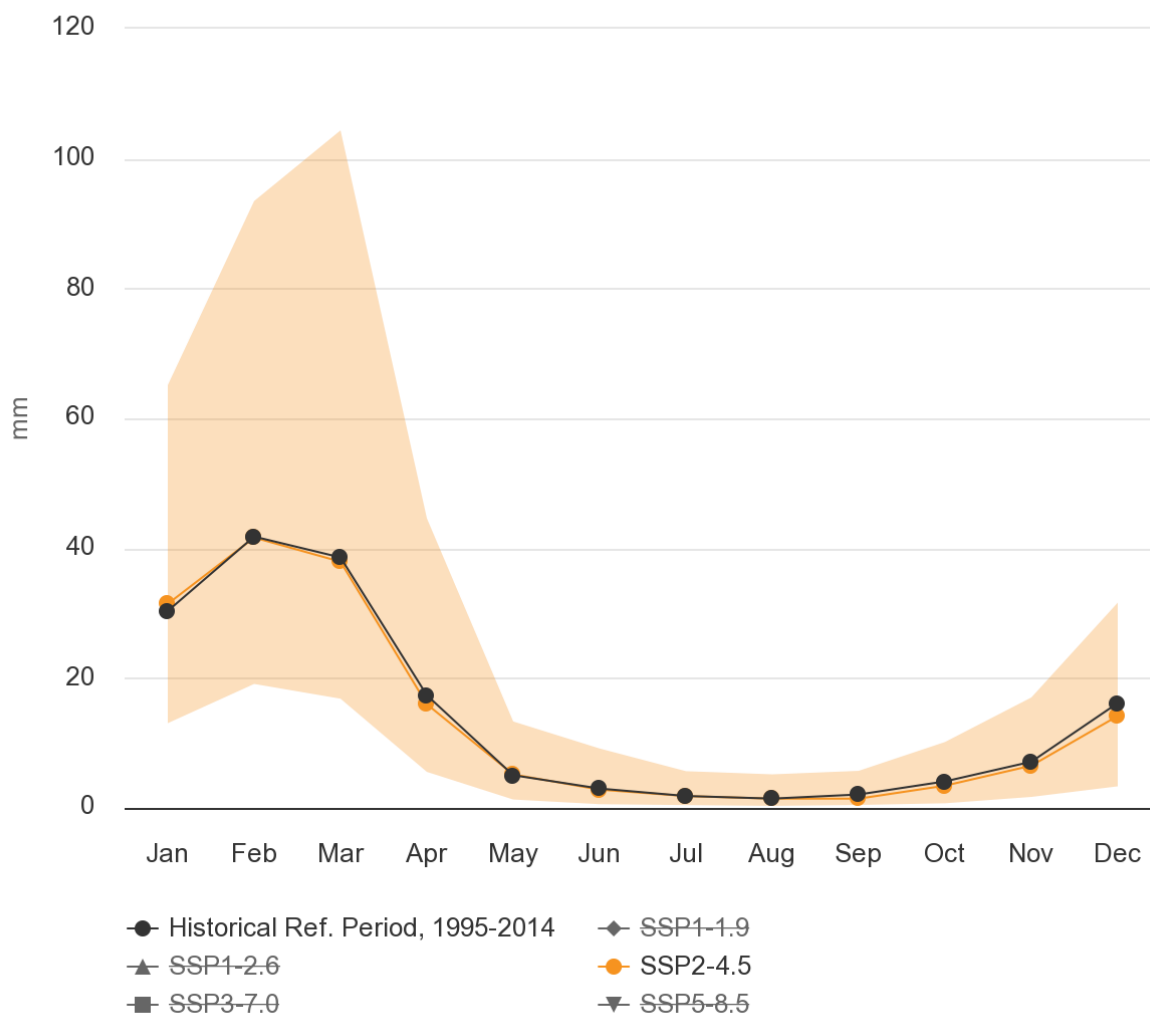


Figure 11 Namibia: Projected Precipitation (2020 - 2039)

As indicated above, levels of rainfall will vary and thus climate impact will be a driver of this variation. Based on the research of others, the chances of flooding in the Erongo region will increase by 20% in the coming 10 years²⁵. This has an impact on Twin Hills future operations during the life of mine (LOM).

²⁵ <https://www.thinkhazard.org/en/report/2138-namibia-erongo/FL>



Projected Precipitation Namibia; (Ref. Period: 1995-2014), Multi-Model Ensemble

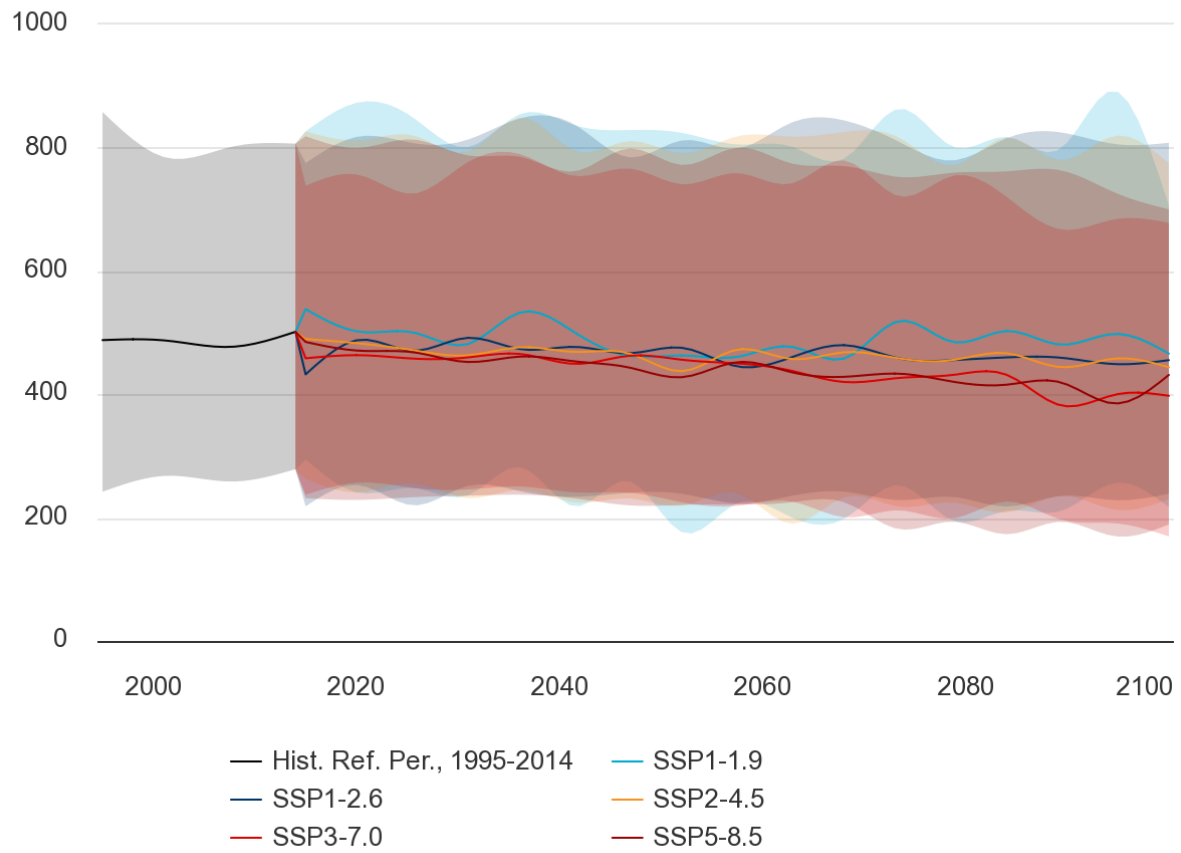


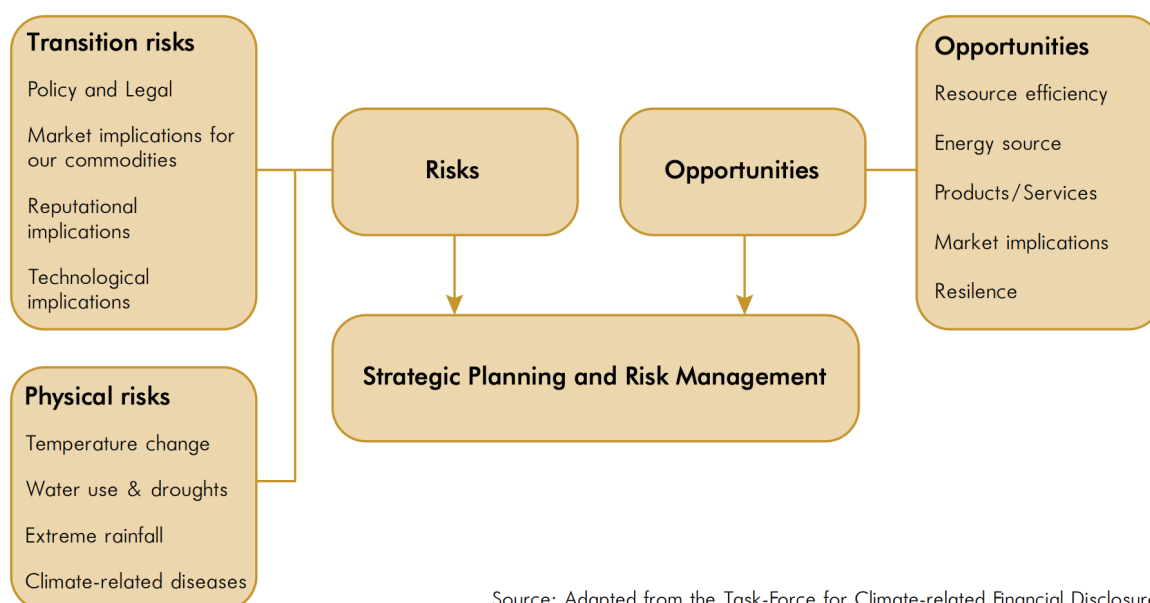
Figure 12 Namibia: Projected Precipitation (2000 - 2100)



7 Risk ID and Action Plan (Suggestive)

This section of the report places Osino Resources' Twin Hills mining operation climate change objectives in a realistic setting versus national objectives.

The IPCC (Intergovernmental Panel on Climate Change, 2022) notes that risk is key to their assessments. Risk is defined by the IPCC as *“The potential for adverse consequences for human or ecological systems, recognising the diversity of values and objectives associated with such systems. In the context of climate change, risks can arise from potential impacts of climate change as well as human responses to climate change. Relevant adverse consequences include those on lives, livelihoods, health and well-being, economic, social and cultural assets and investments, infrastructure, services (including ecosystem services), ecosystems and species.”*



Source: Adapted from the Task-Force for Climate-related Financial Disclosures

Figure 13 TCFD Strategy Plan

In the context of climate change impacts, risks result from dynamic interactions between climate-related hazards with the exposure and vulnerability of the affected human or ecological system to the hazards. Hazards, exposure and vulnerability may each be subject to uncertainty in terms of magnitude and likelihood of occurrence, and each may change over time and space due to socio-economic changes and human decision-making.”

As Namibia is dependent on its natural resources (Ministry of Environment & Tourism, 1995), Namibia has committed to combining an approach that incorporates both environmental awareness raising and promoting action thus creating “two fronts” to combat climate change.

It is well understood that there are three (3) strategy classes of action that can be undertaken such as **mitigation, adaptation, and resilience**. Each will be considered due to its unique nature and impact.



7.1.1 Mitigation

Mitigation seeks to reduce the release of harmful greenhouse gases (emissions) through sustainable energy utilization. The World Gold Council sees emission reductions coming from decarbonized grids, renewable energy used in fuel/power switches and energy-efficient actions (World Gold Council, 2023).

Namibia is expected to see an 11.6% reduction in energy emissions versus *business as usual* approach by 2030 (Ministry of Environment, Forestry and Tourism, 2021) resulting in some 2.8 MtCO_{2e}. The next major area for reduction is expected to be in the Industrial Processes and Product Use (IPPU) and Refrigeration and Air Conditioning (RAC) sector, leading to a 0.6% or 0.134 MtCO_{2e}.

Own production via renewable energy is now both a technical and policy driven reality and one of the key progressive features of the Namibian energy sector is the creation of the Modified Single Buyer (MSB). Modification of the previous Single Buyer model is now legislated and the MSB is now in force. The MSB will allow electricity consumers and Independent Power Producers (IPPs) to transact with each other directly for the supply of electricity. NamPower is responsible for the ring-fenced operation of the Modified Single Buyer.

Further mitigation actions for Twin hills can be carried through by having energy efficient equipment, and fuel switching which can result in significant GHG savings and even zero emissions in directed actions.

7.2

Adaptation seeks to address the challenges and risks posed by changing climatic conditions and their impacts on mining operations. In that respect, it is expected that mining industry standards aim to ensure the sector's resilience, sustainability, and ability to navigate the challenges posed by climate change while minimizing negative impacts on both the environment and local communities.

Namibia therefore expects actions to take place that will *promote efficient water harvesting techniques, recycling and re-use of water, promote the use of desalination technologies to increase water supply, promote and encourage integrated water resources management* (Ministry of Environment, Forestry and Tourism, 2021). There are other actions but the aforementioned directly relate to Twin Hills mine operations.

Adaptation at Twin Hills will focus on water savings and flood prevention. Flood prevention measures can be also adapted for water reservoirs.

7.3 Risk Factors

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:

7.4 Physical Risks

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.

Physical climate change risks may manifest across the whole production system (including Osino's suppliers and customers), both within and outside Osino's control. Extreme weather and environmental events can affect assets by impacting the safety and health of operating teams and production.

General Risks Noted:

- 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
- Reduced water supplies, impacting mining schedules and impacting local community goodwill
- Flooding affecting employee safety
- Food security affected by extreme droughts
- Heavy rain impact on tailing dams

Addressing physical risks can improve operational efficiency. For instance, implementing measures to reduce water usage or increase energy efficiency can help mining companies adapt to water and energy constraints resulting from climate change. By optimizing resource management and mitigating physical risks, mining operations can become more efficient, reduce costs, and enhance sustainability.

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.



Risks Noted:

- Mines can constitute a serious pollution threat in karst and other secondary aquifers if not properly managed and controlled.
- Water from other sources such as desalination are needed to build up the alluvial reserves in the Kuiseb to recover after many years of mining of the resource. Action will be required to support the Omaruru Delta alluvial aquifer.

The Plan also stresses the need for the use of unconventional water resources to alleviate water supply deficiencies that include (GRN, 2010a):

- Desalination of seawater
- Re-use of water to water parks, grounds
- Recycling of water used in industrial and mining processes
- Reclamation of water from wastewater effluent
- Artificial recharge enhancement of aquifers
- Mixing of potable water and brackish water to improve quality
- Water demand management through the conservation of water by reducing unit consumption and wastage

The following water-related risks to the mining operation have been identified by others and must be noted here for concurrence:

Flooding:

- this risk will increase as rainfall/precipitation becomes more intense and frequent due to the erratic nature and patterns created by climate change.
- 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)

Water Shortages:

- As noted by others, desalination systems may not come online in time to cover shortages created by climate change and also unplanned disruptions created by increased demand by others on the local water supply. (Knight Piesold, 2021)
- People are projected to be exposed to increased water stress. (United Nations Framework Convention on Climate Change, 2011)

7.4.1 Transition risks

Transition 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.

Transition 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
- Higher than expected carbon taxes
- Shift in government policy regarding the Modified Single Buyer²⁶ policy by reducing the portion of solar energy that a customer can produce.
- Poor performance of renewable energy technologies.
- Low or poor operational performance of alternative energy vehicles resulting in a return to fossil-fueled vehicles or expensive repairs/replacement.
- Other policy changes not planned for.

7.4.2 Load Shedding

Although neither a direct Physical risk nor a Transitional risk, it is important that the potential of load shedding during the LOM is a climate change risk for Osino. Thus, the notation by NamPower of:

- High level of hydro resources used in Namibia's local energy mix accounting for up to 90% and the impact of drought reducing hydro annual output by some 40% based on historical records.
- The reliance of Namibia on imports is currently indicated to be 71%, and power shortages in importing countries such as South Africa and Zambia are a clear risk. Zambia also has a high reliance on hydro resources that suffer the same impact of droughts resulting in loadshedding for upwards of 12 hours per day.
- NamPower has issued a notice to start disconnecting large areas (distributors)²⁷ and this could affect water provision from local authorities and NamWater..

This latter bullet point is highlighted here as a potential third-party risk for reference.

²⁶ 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.

²⁷ **NAMPOWER DEBT COLLECTION PLAN**
<https://www.nampower.com.na/public/docs/communications/Media%20Release/NamPower%20Debt%20Collection%20Plan.pdf>



7.5 Opportunities:

As outlined in the graphic, several opportunities exist with the reality that some will not be appropriate for Twin Hills due to their commercial immaturity.

7.5.1 Short-term Year 0 - 5

Energy Efficiency	Solar Power (Electricity)	Solar Power (Off-grid mini-grid)	Electric Vehicles (Cars/Trucks)	Air Conditioning (Propane -R290)
Risk content High energy consumption in gold production operations	Risk content High diesel/fuel combustion to generate electricity on-site	Risk content Lack of energy buffer for large fluctuations in power needs	Risk content Mine logistic/transportation	Risk content High- global warming potential (GWP) refrigerants
Risk Implications - Increase Twin Hill project production cost - Increase GHGs emissions from Twin Hill Project purchased electricity, diesel/fuel combustion used in vehicles and machines or to generate electricity on-site, production and transportation of fossil fuels used by the gold industry	Risk Implications - Conventional and diesel electricity generation will have higher lifetime cost - Produce large amounts of GHGs emissions	Risk Implications - Twin Hill Project will suffer energy supply shortages - Disruptions of Twin Hills Project's operations	Risk Implications High GHGs emissions from burning diesels/petrol in trucks and cars used for Twin Hills Project logistics	Risk Implications - Direct emissions due to the use of refrigerants with high-GWP within the mine - Lack of safety standards for the safe handling of low-GWP/flammable refrigerants
Mitigating Actions - Employ advanced asset management strategies combining real-time operational data with predictive analytics - Use of unmanned drones to survey sites and operations - Employ energy-efficient technologies and advanced processes	Mitigating Actions - Transition to lower-carbon electricity source - Purchase of renewable electricity - Sign up to a power-purchase agreement for supply of renewable electricity with a renewable energy supplier - Develop own on- or near-site renewable energy generation assets	Mitigating Actions Have a self-sufficient energy (solar powered) mini-grid to improve reliability, avoid high grid connection costs, hedging uncertain and increasing grid electricity costs	Mitigating Actions Decarbonize mine transport by using battery-electric or fuel cell vehicles powered by zero-carbon electricity	Mitigating Actions - Use the refrigerant propane (R290), which has a very low GWP (3) in a single split air conditioning with a cooling capacity below 7 kW - Use a Refrigeration and Air Conditioning (RAC) appliance that conform to international best practice standards

Figure 14 Decarbonization Potential short-term (Technology Maturity)²⁸

7.5.2 Medium-term Year 6 - 10

Water Security – Desalinated Water (NarmWater)	Fossil fuels use – Hydrogen Vehicle (Haul Truck)	Solar Power (Off-grid for pumping)
Risk content - Extreme weather events such as floods or drought - High energy consumption	Risk content - High emissions in underground mining from ventilation and cooling. - High carbon emissions from fuel-based mining trucks in operation	Risk content Limitation in water supply from centralized systems
Risk Implications - Destruction of mine property and production loss leading to shutdown of operations - Insufficient water to continue processing or mining in cases of drought - Drowning (fatalities) in case of flooding - Increase GHG from gold production	Risk Implications - Increased risk of heat-related illness increases among workers - decrease in work performance - High carbon footprint of the mine	Risk Implications - As the population increases, the pressure on the unique supply source increases and leads to water conflict with other operations - Disputes with <u>communities</u> base on Community discontentment and anti-mining sentiment caused by water pollution can lead to disputes.
Mitigating Actions - Develop an alternative water supply system such as desalination to allow mining operation continuance during drought - For flooding, develop hydrological and flood modelling plans - Design of flood protection measures	Mitigating Actions - Replacing diesel fuel in hauling vehicles with green hydrogen to reduce emissions. This action can contribute 30% to 80% of a mine's emissions footprint. - GH2 brings about the removal of diesel particulates, the reduction of ventilation load requirements in underground mining, and lowering carbon emissions in downstream processing operations.	Mitigating Actions - Implementing large-scale solar water pumping eliminates this possibility and creates and independence of supply for mining operations - Considering water off-grid water pumping drives economies of scale that reduce operation costs significantly and offer productive uses of solar energy

²⁸ Items in **RED** are listed only for discussion purposes.



Figure 15 Decarbonization Potential medium-term (Technology Maturity)²⁹

7.5.3 Long-term Year 11 - 14

Water Security – Desalinated Water (NamWater)	Biofuel Vehicles (LDV's)	Electric Vehicle (Haul Truck)
Risk content • Extreme weather events such as floods or drought • High energy consumption • High water stress on the central water supply	Risk content • High diesel consumption • LDV are responsible for high emissions of acetaldehyde	Risk content • Haul trucks produce 78–97 percent of total dust emissions • Increased GHG from use of fossil fuels in vehicles • Increasing fuel prices
Risk Implications • Destruction of mine property and production loss leading to shutdown of operations • Insufficient water to continue processing or mining in cases of drought • Drowning (fatalities) in case of flooding • Increase GHG from gold production	Risk Implications • High cost of oil • dependency on oil imports	Risk Implications • airborne respirable dust emissions from haul trucks • Continued increase in budget for fuel slows down profitability
Mitigating Actions • Develop an alternative water supply system such as desalination to allow mining operation continuance during drought • For flooding, develop hydrological and flood modelling plans • Design of flood protection measures • Adopt good stewardship methods to relieve pressure on water supply	Mitigating Actions • Encourage use of biofuels or blended combination for LDV's • Use of biofuels and LDV's reduces dependency on oil imports and oil price	Mitigating Actions • Converting vehicles/trucks to run on electricity will reduce carbon emissions and save on fuel costs • converting mining trucks to run on electricity alone and save money.

Figure 16 Decarbonization Potential long-term (Technology Maturity)³⁰

7.6 Other Options:

Activity	Current Energy Source	Future Energy Source	Action Term
Carbon Pricing / Carbon markets	Not Applicable	Not Applicable	Short term
Recycling of plastic waste	Not Applicable	Not Applicable	Short term
Recycling of e- waste	Not Applicable	Not Applicable	Short term

There are other potential options, but these need further exploration and are only suggested for consideration through methods such as Carbon Markets and Carbon capture. Carbon

²⁹ Items in **RED** are listed only for discussion purposes.

³⁰ Items in **RED** are listed only for discussion purposes.



markets are an immediate benefit in terms of selling of certificates to offset renewable energy investment costs. In general, there are notably two types of Carbon Markets³¹ such as:

Compliance markets are created as a result of any national, regional and/or international policy or regulatory requirement.

Voluntary carbon markets – national and international – refer to the issuance, buying and selling of carbon credits, on a voluntary basis.

The commitments by the government of Namibia in its Nationally Determined Contribution (Ministry of Environment, Forestry and Tourism, 2021) indicates that carbon markets are one of the tools considered to finance climate actions. The United Nations (UNDP, 2023) notes however that there is widespread concern about the functioning and running of carbon markets. This will therefore require Osino to consider the matter fully before utilizing carbon credits.

³¹ <https://climatepromise.undp.org/news-and-stories/what-are-carbon-markets-and-why-are-they-important>



8 Recommendations

The following high-level recommended climate related actions are put forward for Osino's consideration, understanding that this in part is a predictive process. As a Result, at the point of an investment consideration, **a review must be carried out**.

We strongly believe the following measures will assist with climate impact reduction through the life of mine allowing for:



These will result in transition actions that are sustainability linked and spread over short-, medium- and long-term frameworks to allow for reconsideration as needed or technological changes.

8.1 Short-term Year 0 - 5

Focus	Action
Energy efficiency	- Employ advanced asset management strategies combining real-time operational data with predictive analytics - Use of unmanned drones to survey sites and operations - Employ energy-efficient technologies and advanced processes
Electricity	- Transition to lower-carbon electricity source <i>Develop own on- or near-site renewable energy generation assets - Solar PV plant</i> - Purchase of renewable electricity <i>Independent Power Provision (offtake)</i> <i>Sign up to a power-purchase agreement for supply of renewable electricity with a renewable energy supplier</i>



	• Use solar PV instead of diesel generators where possible • Use solar hot-water heating • Use solar water pumping where feasible
<i>Transport</i>	• Decarbonize mine transport <i>LDV - using battery-electric or fuel-cell vehicles powered by zero-carbon electricity</i> <i>LDV - using hybrid vehicles powered by zero-carbon electricity</i> • Mining Truck transport <i>Explore the use of electric mine trucks (haul)</i>
<i>Air Conditioning</i>	• Utilise propane refrigerants

8.2 Medium-term Year 6 - 10

<i>Focus</i>	<i>Action</i>
<i>Water</i>	• Consider exploring Desalinated water supplies through NamWater
<i>Transport</i>	• If mature, consider utilizing hydrogen powered haul trucks

8.3 Long-term Year 11 - 14

<i>Focus</i>	<i>Action</i>
<i>Energy</i>	• Explore Carbon storage / Carbon capture if mature and feasible
<i>Transport</i>	• Explore biofuel LDV's

8.4 Further Actions

It is recommended that Osino Resources develop metrics to monitor progress of goals and activities. Further, that a central data collection aggregator is set up that aligns with the datasets provided for in this report so that future reporting will build on the current assumptions made herein.



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10 Annexures

10.1 Scope Diagram

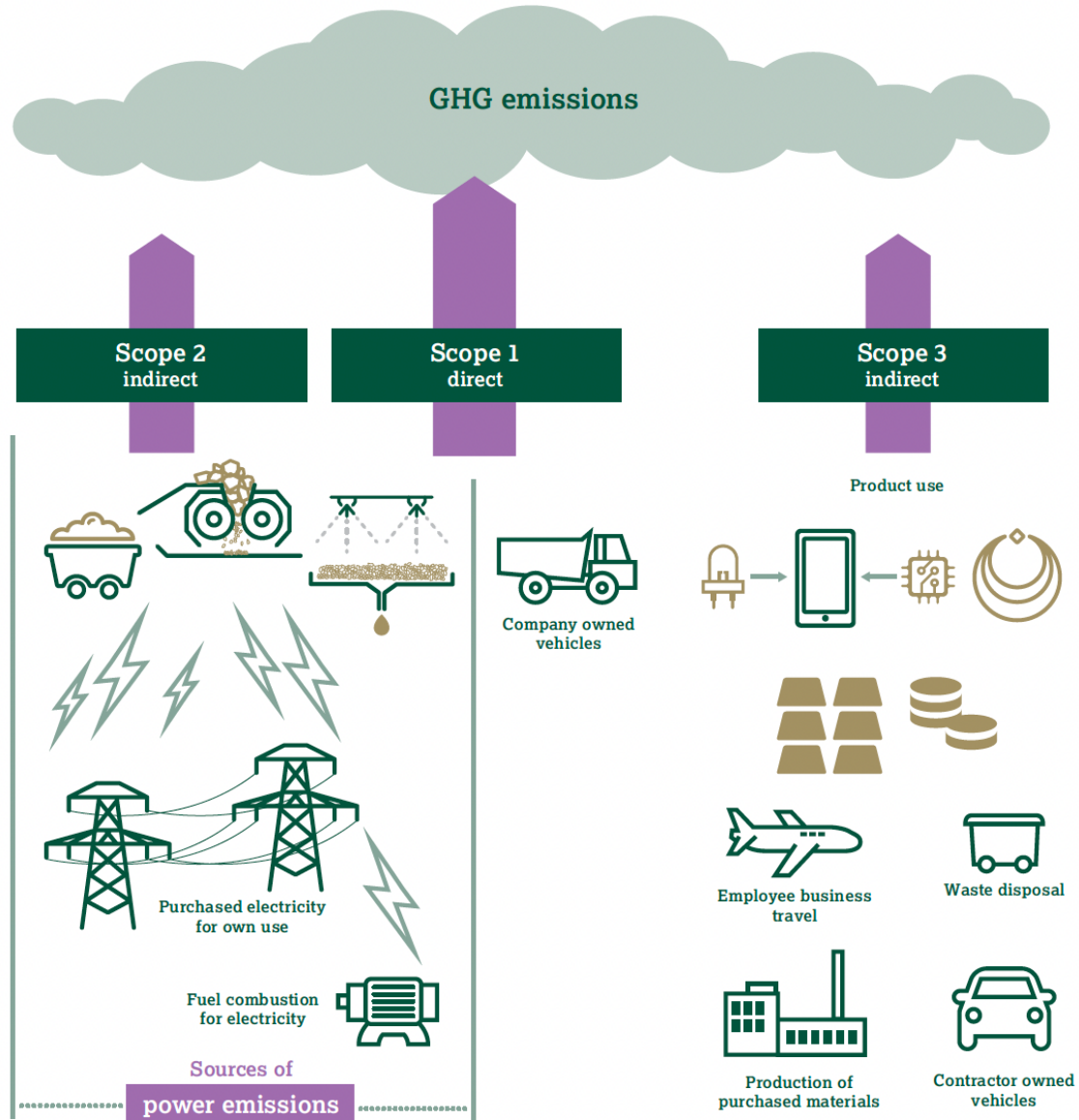


Figure 17 Gold Mining emissions pathways (World Gold Council, 2023)



10.2 RCP Scenarios

The RCP scenarios form the basis of the Intergovernmental Panel on Climate Change's (IPCC) analysis of the state of climate change. The IPCC produces assessment reports, the latest of these reports being AR5, that detail the findings of these analyses.

The RCP scenarios represent different measures of atmospheric greenhouse gas concentration trajectories for the long-term future.

- RCP 2.6 – this represents the best-case scenario. This pathway would likely cap global warming at 2°C by the year 2100, however there is some skepticism surrounding how achievable this scenario is;
- RCP 4.5 – this represents a scenario where global warming reaches between 2 and 3°C by 2100;
- RCP 6.0 – acting as a stepping stone between RCP 4.5 and the highest carbon scenario (RCP 8.5), RCP 6.0 would result in higher global warming than RCP 4.5. This scenario is rarely referenced compared to the others; and,
- RCP 8.5 – the highest carbon scenario, RCP 8.5 would see global warming greatly surpass the 2°C limit imposed by the Paris Agreement. It would likely result in catastrophic and irreversible changes to the planet.

10.3 Water Assumptions – Provision / Combined Cycle³²

Type	CO ₂ emission factor for water (COMBINED)	Source
Provision - General water	3.7 kg CO ₂ /m ³	Environment Agency of Japan
Provision - Desalinated	8.2 kg CO ₂ /m ³	University of Florida, Treehugger, US EPA
Provision - Recycled	3.2 kg CO ₂ /m ³	University of Florida, Treehugger, US EPA
Provision - Surface	0.07 kg CO ₂ /m ³	University of Florida, Treehugger, US EPA
Desalinated - Combined	15.1 kg CO ₂ /m ³	University of Florida, Treehugger, US EPA
Recycled - Combined	10.1 kg CO ₂ /m ³	University of Florida, Treehugger, US EPA
Surface - Combined	6.9 kg CO ₂ /m ³	University of Florida, Treehugger, US EPA

³² <https://wint.ai/wp-content/uploads/2022/02/White-paper-Carbon-Impact-of-Water-Consumption-Final.pdf>



10.4 Osino References

References contained here are used where required for extrapolative purposes and are derived from Osino provided resources:

Activity	Base Reference	Source
Crushing and milling	17.1 kWh / tonne	(Lycopodium Minerals Canada Ltd, 2022)
Leach Test (Cyanide addition)	1 kg / tonne	(Lycopodium Minerals Canada Ltd, 2022)
Gold Recovery (average)	92%	(Lycopodium Minerals Canada Ltd, 2022)
Gold production (LOM)	2,830 000 troy ounces	(Osino Resources Corporation, 2022)
Gold production per annum	200 000 troy ounces per annum	(Lycopodium Minerals Canada Ltd, 2022)
Gold per tonne of mineralized ore	0.3 grammes / tonne	(Lycopodium Minerals Canada Ltd, 2022)
Life of Mine	14 years	
Life of Mine (Pit)	11 years	
Life of Mine (Production)	13 years	
Production Time	7 884 hours/annum (10% down time)	(Knight Piesold, 2022)
Mineralized AU ore rate	5 Mt/annum	
Power supply (External)	?16 MW ?22 MW after increase	Osino via email – 13 Apr 2023 (Steve Burks)
Power supply (Solar)	?20 MW (30% share)	Osino via email – 13 Apr 2023 (Steve Burks)
Tailings	61 Mt (assumed LOM total)	

Activity	Base Reference	Source
MINING Loading – Summative	3,089,510 Litres Diesel Consumption (Average per annum)	Osino via email – 13 Apr 2023 (Steve Burks)
MINING Hauling – Summative	7,464,656 Litres Diesel Consumption (Average per annum)	Osino via email – 13 Apr 2023 (Steve Burks)
MINING Drilling – Summative	1,809,239 Litres Diesel Consumption (Average per annum)	Osino via email – 13 Apr 2023 (Steve Burks)
MINING Secondary – Summative	2,299,824 Litres Diesel Consumption (Average per annum)	Osino via email – 13 Apr 2023 (Steve Burks)
MINING Tertiary – Summative	459,964 Litres Diesel Consumption (Average per annum)	Osino via email – 13 Apr 2023 (Steve Burks)



Activity	Base Reference	Source
PROCESS Plant Elution – Summative	38,690 Litres Diesel Consumption (Average per annum)	Osino via email – 13 Apr 2023 (Steve Burks)
PROCESS Plant carbon Regeneration – Summative	49,640 Litres Diesel Consumption (Average per annum)	Osino via email – 13 Apr 2023 (Steve Burks)
PROCESS Plant carbon furnace – Summative	0 Litres Diesel Consumption (Average per annum)	Osino via email – 13 Apr 2023 (Steve Burks)
PROCESS Plant Equipment (Cranes, FEL, Forklifts, etc.) – Summative	308,644 Litres Diesel Consumption (Average per annum)	Osino via email – 13 Apr 2023 (Steve Burks)
PROCESS Plant Fleet (LDV's and Busses) – Summative	233,235 Litres Diesel Consumption (Average per annum)	Osino via email – 13 Apr 2023 (Steve Burks)
Water Supply / usage rate	1.8 Mm ³ /annum (0.52 Mm ³ /annum from Public Water ³³ supply)	(Lycopodium Minerals Canada Ltd, 2022) (Knight Piesold, 2022)
Transfer of bore bars	Sent via Air to Johannesburg (Rand Refinery)	Osino via email – 21 Apr 2023 (Charles Loots)

³³ Stated as from NamWater



10.5 Solar PV Plants

From: Steve Burks <sburks@osinoresources.com>

Sent: Monday, May 1, 2023 9:34 AM

To: Heye Daun <hdaun@osinoresources.com>

Cc: Charles Creasy <cceasy@osinoresources.com>

Subject: May 1 FW: NA Osino: Main proposal matrix

Hi Heye,

No action needed, the attachment is a work in progress by Suntrace and is just for information at this stage.

Status of the renewable power offers is as follows:

- 8 IPP/PPA offers received for solar power plants, 2 of which include possible wind power extensions.
- Several of the companies submitting offers have implemented solar PV plants of at least the size we are looking for.
- If the plant is dedicated only to Twin Hills, estimated cost is US 6 cents/kWh on average on a take or pay basis, with no initial capital payments by Osino.
- We should be able to produce around 70 000 MWh annually based on roughly 30 MW installed and 8-12 hours of sunlight obviously varying seasonally and day to day. This is about 37% of the total site requirement. We will therefore not be able to include more than this percentage in the DFS Opex estimate of power costs. Suntrace have noted that this is already a higher percentage than most locations would be able to support.
- This tariff seems to include all operating and maintenance costs as well as capital cost for earthworks and civils, security fences, internal roads and control centre building in addition to the capex for the solar installation.
- Osino will still need to include a small amount of capital for site bush clearing and for the transmission line to the main site substation.
- It looks as if the tariff for supplementary wind power would only be about US 9 c/kWh which is still less than the current NamPower tariff. A lot of investigation and additional development time will be needed to add 25 000 MWh of wind power, though.
- The tariffs are all based on current 2023 costs and a 13 year operating life. We can probably expect the differential between these costs and the NamPower tariff to widen, and of course the capital repayment contribution of the tariffs will reduce if the life of operation is increased.
- Clarification questions have been sent out to all 8 bidders and the evaluation of the base case offers will be completed by mid May as soon as we have these supplementary responses. The intention is to short list to 2-3 companies.



- Several companies have included alternative offers including excess power to be sold into the grid, or with a buy out option for Osino. These will also be evaluated by our team in the next few weeks.

Regards

Steve

Steve Burks

Osino Twin Hills Project Director - Feasibility Study

sburks@osinoresources.com

Mobile Number +27 82 377 9608



10.6 Definitions - Others³⁴

Term	Meaning
Carbon Dioxide	A greenhouse gas (CO ₂)
Carbon Dioxide Equivalent	A carbon dioxide equivalent or CO ₂ equivalent, abbreviated as CO ₂ -eq is a metric measure used to compare the emissions from various greenhouse gases on the basis of their global-warming potential (GWP), by converting amounts of other gases to the equivalent amount of carbon dioxide with the same global warming
Climate Change	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 lower atmosphere because greenhouse gases absorb some of the Earth's outgoing heat radiation and reradiate it back towards the surface
Emission Factor -	An emissions factor is a representative value that attempts to relate the quantity of a pollutant released to the atmosphere with an activity associated with the release of that pollutant.
Energy Intensity	Ratio of total energy inputs to total gold production
ESG	environmental, social, and governance. It refers to a set of non-financial factors used to measure a company's impact on its employees, customers, and society as a whole.
GHG	Greenhouse gas
GHG Intensity	Ratio of total GHG emissions to total gold production
ICMM	International Council on Mining and Metals ICMM recognises the importance of providing climate-related disclosure in order for stakeholders to measure and respond to climate change risks and opportunities. This includes transparency around the climate-related risks the Task Force on Climate-related Financial Disclosures (TCFD) has brought. https://www.icmm.com/en-gb/our-work/environmental-resilience/climate-change/mitigate-ghg-emissions
IPCC	The Intergovernmental Panel on Climate Change

³⁴ https://www.ipcc.ch/site/assets/uploads/2019/06/19R_V0_02_Glossary_advance.pdf



Term	Meaning
Modified Single Buyer (MSB)	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; MSB are rules as laid out under section 3(4) of the Electricity Act, 2007 (Act No. 4 of 2007), and with the approval of the Minister of Mines and Energy, the Electricity Control Board has made regarding to the modified single buyer market in the electricity industry as Gazetted and set out in the Schedule No. 736 which govern the operation and management of the modified single buyer market. The MSB model allows independent power producers to generate and sell electricity output directly to regional electricity distributors, large industrial and mining companies, including municipalities, compared with the single buyer model where electricity output can only be sold to NamPower. (Fitch Ratings definition)
Nitrous Oxide	A greenhouse gas (NO ₂)
Nitrous Oxide	A greenhouse gas (NO ₂)
PPA	Power Purchase Agreement
Renewable Energy	In this report, refers to solar energy sources.
Scope 1	Scope 1 greenhouse gas emissions are direct emissions from operations that are owned or controlled by OSINO Resources
Scope 2	Scope 2 greenhouse gas emissions are indirect emissions from the generation of purchased or acquired electricity, steam, heat or cooling that is consumed by operations that are owned or controlled by OSINO Resources
Scope 3	Scope 3 greenhouse gas emissions are all other indirect emissions (not included in Scope 2) that occur in OSINO Resources value chain. An optional reporting category for an organisation's indirect GHG emissions which are a consequence of the organisations activities but occur from sources not owned or controlled by the organisation.
TCFD	Task Force on Climate-related Financial Disclosures https://www.fsb-tcfd.org/
Waste Intensity	Ratio of total waste produced use to total gold production.
Water Intensity	Ratio of total water use to total gold production



10.7 Client Request: Scope

The consultant's scope of work (proposed to Osino Resources)

The climate assessment will assist the Project in adhering to goals set out in the country's National Climate Change Policy (NCCP), National Climate Change Strategy and Action Plan (NCCSAP) and achieving nationally set emission reduction targets set out in the Nationally Determined Contributions (NDCs) and Biennial Update Report (BUR) to the United Nations Framework Convention on Climate Change (UNFCCC). Furthermore, the proposed assessment process will comply with the requirements encapsulated in IFC Performance Standard 3 (PS 3) and Equator Principles 4 (ep 4).

The method for the climate assessment will include:

- Conducting climate-related scenario analysis, including selecting relevant scenarios and identifying key inputs and parameters. *I get that some general high-level physical and transition risks have been identified. Are these scenarios? And what are the selected relevant scenarios and key inputs and parameters?*
- Estimating Scope 1, 2 and 3 GHG emissions, including challenges with data collection across the value chain. Scope 1 and 2 done. This implies that a lot more work would be done on upstream and down stream Scope 3 emissions, but I get that that is a mammoth task that probably should not be included in this scope of work. What would be useful though is an indication of what you think are the most significant Scope 3 emission we should be aware of and what we can realistically manage.
- Assessing the impacts the Project may have on the receiving biophysical and socio-economic environment due to current and project climate scenarios. *I think this is mentioned in the report, but maybe clarify where.*
- Assess the impacts of the following factors including but not limited to: I think mostly done. But would be useful to have an action list / plan for concrete next steps to take.
 - International markets;
 - National and international policies and Carbon pricing policies
 - Estimate and assess the amount and extent of assets or business activities vulnerable to transition risks.
 - Estimate and assess the amount and extent of assets or business activities vulnerable to physical risks.
 - Use a standard scenario to assess the resilience of the strategies to climate change and make recommendations for improvement.
 - Recommend a process for identifying, assessing, and managing climate-related risks and integrating such risks into existing processes.
 - Recommend ways in which the Project can best mitigate and adapt to climate-related risks

One key question, that thought probably needs to be posed to NamPower: when will the utility enable customers to purchase renewable energy via the grid? This would of course be the easiest step in reduce our Scope 2 emissions further.



10.8 Model Outputs and Tables

10.8.1 See SCOPE 1 Attachments

10.8.2 See SCOPE 2 Attachments



OSINO RESOURCES 2023 REPORT CLIMATE CHANGE

