

RESPONSIBLY MEETING
GLOBAL DEMAND FOR

QUALITY- OF-LIFE MINERALS

2021 CLIMATE STRATEGY REPORT



WE RECOGNISE KENMARE HAS THE ABILITY AND RESPONSIBILITY TO PLAY A ROLE IN ADDRESSING CLIMATE CHANGE, ALONGSIDE GOVERNMENTS AND INVESTORS.

This Climate Strategy Report represents Kenmare's inaugural reporting in alignment with the recommendations of the Task Force on Climate-related Financial Disclosures (TCFD).

For more information visit:
www.kenmareresources.com



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AT A GLANCE

Net zero ambition set

Kenmare's Board has set an ambition to achieve Net Zero (Scope 1 and 2) by 2040

 Read more about **net zero** on pages 8–9.

Climate-risk governance strengthened

Kenmare's Board has strengthened its governance of climate-risk by establishing a Climate Policy

 Read more about the **strengthened governance** on page 3.

Scenario analysis undertaken

We stress-tested our business against different temperature scenarios, in line with TCFD recommendations.

 Read more about **testing** on pages 13 and 16.

\$18 million invested in emissions reduction technology

Kenmare has invested in a Rotary Uninterruptable Power Supply (RUPS) project, which will strengthen the stability of energy supply and reduce emissions

 Read more about **investments** on pages 5 and 9.

20% emissions intensity reduction

Kenmare's emissions intensity reduced to 0.057 tCO₂e per tonne of finished product in 2021 (2020: 0.071 tCO₂e)

 Read more about **CO₂ reduction** on page 5.

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READ OUR 2021 SUSTAINABILITY REPORT

Find out about more our record year for safety and other sustainability targets.

OVERVIEW

"Kenmare's Board has strengthened its oversight of climate-related risks in 2021"

ELAINE DORWARD-KING
CHAIR, SUSTAINABILITY COMMITTEE

Kenmare accepts the scientific findings of the Intergovernmental Panel on Climate Change (IPCC); supports the goals of the Paris Agreement; and acknowledges that business has a role to play in addressing climate change. In line with this position, we have set the ambition to achieve Net Zero by 2040 (Scope 1 & 2) and we will work to reduce emissions operations as quickly as possible and offset emissions that are hard to abate. We will also work to effectively manage climate risks; capitalise on opportunities associated with the transition to the low carbon economy; and help make our operations and host communities more resilient to the future impacts of extreme weather events.

Kenmare has experienced several extreme weather events since the Moma Mine began operations in 2007. Such

events pose risks to the safety of our staff and contractors; physical damage to our operational assets; and to our ability



THIS REPORT SHOULD BE READ IN CONJUNCTION WITH KENMARE'S SUSTAINABILITY REPORT AND ANNUAL REPORT AND ACCOUNTS

CLIMATE CHANGE IN MOZAMBIQUE

Climate change presents a significant risk to Kenmare's only country of operation, Mozambique. The country has been hit by several devastating cyclones in recent years. Mozambique has been identified as being one of the most affected countries in the world by extreme weather events, scoring in the top five countries affected over the period 2000-2019 (Global Climate Risk Index 2021).

to mine and ship product to customers. Conversely, the transition to the low-carbon economy also presents Kenmare with several opportunities. Our low carbon operations position us well to market our products to climate-conscious customers; a focus on increasing energy efficiency will reduce operational costs; and a small but growing use of our titanium minerals products in low carbon technologies may lead to some increased demand for our products.

Kenmare supports the aims of the TCFD and believes businesses should communicate the risks and opportunities that climate change presents. The TCFD framework improves the disclosure of consistent, comparable, reliable, and clear climate-related information so management and investors can make better capital allocation decisions in support of the transition to a low-carbon economy.

CLIMATE GOVERNANCE

Kenmare's Board and Board Committees have the following roles in managing and mitigating climate risk:

BOARD OF DIRECTORS

Sets corporate vision and oversees the development of strategy for key sustainability issues, including climate change. Delegates authority on sustainability issues to the Sustainability Committee, including overseeing the implementation of both the Climate Policy and Energy and Climate Strategy. In 2021, the Board was updated on Kenmare's decarbonisation options and signed off the Company's Climate Policy, which included an ambition to achieve Net Zero by 2040 (Scope 1 and 2)

SUSTAINABILITY COMMITTEE

Provides challenge and considers climate-related factors in the Company's overall management of sustainability.

In 2021, the Committee oversaw a refresh of the Energy and Climate Strategy and definition of short, mid and long-term climate targets. The Committee also reviewed and endorsed the Climate Policy, defining Kenmare's corporate ambition and objectives.

AUDIT AND RISK COMMITTEE

Provides robust assessment of emerging and principal risks, including climate-risks.

Ensures there is a process for evaluating the financial impact of scenario analysis and ensures it is appropriately and transparently reflected in our financial disclosures.

NOMINATION COMMITTEE

Ensures the Board has access to the relevant skills and capabilities to assess, address and report on Kenmare's exposure to climate change and the transition to a low carbon economy.

REMUNERATION COMMITTEE

Ensures the Executive Team and Site Leadership Team are incentivised to make progress against sustainability KPI's, including decarbonisation and climate-risk management goals.

In 2021, the Committee approved an Executive scorecard where sustainability KPIs have a weighting of 25%. Of the seven sustainability KPIs, two are related to climate risk management.

EXECUTIVE COMMITTEE

Kenmare's Managing Director has ultimate responsibility for Kenmare's preparedness for driving our risk mitigation strategy. Extreme Weather was designated a Principal Risk in 2009 and the Executive Committee is collectively responsible for managing climate-related risks and opportunities and the implementation of mitigation programmes, ensuring the Company has the necessary financial resources and people with the required skills to achieve its climate-related objectives.

Kenmare's Financial Director oversees the process of evaluating the financial impact of scenario analysis on our business and ensures it is appropriately and transparently reflected in our financial disclosures. The Financial Director then recommends those disclosures to the Audit and Risk Committee.


Kenmare's COO is accountable for ensuring our physical preparedness for potential extreme weather events is effectively managed.

Kenmare's Head of Sustainability is responsible for providing guidance to the Executive Committee and co-ordinating the Company's overall response to climate change.

GENERAL MANAGER AND SITE LEADERSHIP TEAM

Kenmare's General Manager has day-to-day responsibility for ensuring risk indicators are actively monitored and mitigating actions are appropriately deployed and escalated. The General Manager is supported by his leadership team, including the Operations Manager, Head of Health, Safety, Environment and Security, and Head of Mine Planning.

STRATEGY AND TARGETS



In 2021, Kenmare worked to implement several GHG emissions reduction initiatives. Over 70 energy efficiency initiatives were identified in total, and several were selected for further study and implementation. These included improvements to the Mineral Separation Plant (MSP) belt filters to reduce feed moisture content and associated energy consumption used to dry the minerals; a review of the MSP dryers; implementation of an energy management system; and improved controls on heavy mobile equipment (HME) fuel consumption.

The Rotary Uninterruptible Power Supply (RUPS) project, which began commissioning in Q1 2022, will deliver the most significant sustained reduction in diesel consumption and associated emissions. RUPS will stabilise the supply of electricity and will also deliver a 12% reduction in GHG emissions associated with diesel consumption by 2024. This is due to the RUPS diesel engines operating only infrequently and for short periods compared to the current practice of supplying the MSP with diesel generated power during the summer months.

Looking ahead to the medium term, energy consumption is expected to rise as we progress mining the Nataka ore zone, anticipated to begin in 2025. There are several variables associated with the future emissions profile of Nataka, namely the mining method (hydro-sluice or dozer trap, for example) and the energy source. The higher levels of slimes in this ore body and greater distances from the MSP will create higher energy demand for the mine. If economically feasible, we will use low-carbon energy sources and mining methods. These options are currently being investigated as part of the Nataka prefeasibility study, due to be completed in 2022. Kenmare's carbon emissions and long-term ambition to achieve Net Zero by 2040 (Scope 1 and 2) will be a key consideration in these decisions.

GHG emissions

Kenmare's Scope 1 and 2 emissions for 2021 were 70,437 tCO₂e, which represented an 18% increase (2020: 59,521 tCO₂e) largely due to increased diesel consumption associated with higher production and additional reporting of fugitive emissions associated with refrigerant and air conditioning gases.

Diesel consumption was 9% higher in 2021 at 24 million litres of diesel (2020: 22 million litres of diesel) largely due to higher consumption by the Mineral Separation Plant delivering a 46% increase in final products. Carbon intensity, at 0.057 tCO₂e (Scope 1 and 2) per tonne of mined product reduced by 20%, demonstrating some efficiencies in the emissions intensity of our operations.

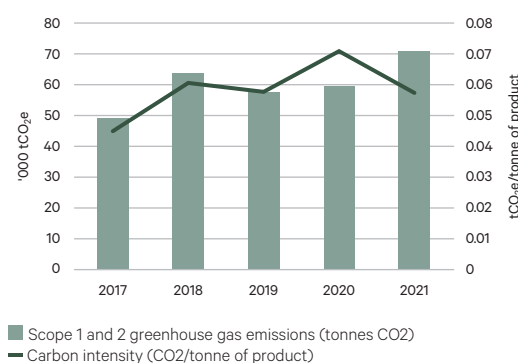
We have begun accounting for our Scope 3 emissions and currently report against the six categories of: Purchased Goods and Services, Business travel, Employee Commuting, Upstream and Downstream transportation, and Waste disposal. The most significant category of Scope 3 emissions will be from the processing of our products downstream, which we will begin measuring in 2022.

In 2021, our Scope 3 emissions were 104,203 tCO₂e, which compared to 76,903 tCO₂e in 2020. The increase was due to higher emissions from upstream and downstream transportation as a result of increased volumes of product shipped. Kenmare reports its GHG emissions in line with the GHG Protocol.

During 2021, Kenmare matured its reporting processes and made several further inclusions into the scope of its reporting. Additional sources of Scope 1 emissions included fugitive emissions from refrigerant gases. Kenmare cannot yet report on waste from its owned and operated landfill site as landfill and recycling protocols are being improved. Furthermore, Kenmare's emissions data relating to land clearance have been temporarily removed, as we work to align our reporting from this emissions source with new GHG Protocol guidance from the WRI and WBCSD.

Kenmare improved its scoring by CDP, a global disclosure platform for companies to manage their environmental impacts, from a D in 2020 to a C in 2021. The score of C means the company has achieved 'awareness' level, demonstrating knowledge of impacts on, and of, climate issues. The improving score reflects the steady progress in the Company's approach to accounting for and managing climate risk and GHG emissions.

Scope 1 and 2 emissions (absolute and intensity)



LIMITED ASSURANCE OF EMISSIONS

Kenmare sought limited assurance from ERM CVS on its 2021 emissions for:

- Total Scope 1 GHG Emissions (tCO₂e)
- Total Scope 2 GHG Emissions (market-based method) (tCO₂e)
- Scope 3 GHG emissions (tCO₂e)
 - Category 5 – Waste generated in operations
 - Category 6 – Business Travel
 - Category 7 – Employee commuting
 - Category 9 – Downstream transportation and distribution
- Energy usage (MWh)
- Emissions intensity tCO₂e/tonne of excavated ore

70+

ENERGY EFFICIENCY
INITIATIVES IDENTIFIED

12%

EMISSIONS REDUCTION
TARGET BY 2024 SET

C

2021 CDP SCORE IMPROVED
FROM D TO C

For the full detail on emissions and energy data, including data reviewed by ERM-CVS please go to our [Sustainability Fact Book](#).

STRATEGY AND TARGETS CONTINUED

We set out our first Climate Strategy in 2020, which was further developed in 2021 and aligned with the recommendations on the Task Force on Climate-related Financial Disclosures.

This strategy was developed with oversight from the Board, who ensures the Executive Committee is accountable for decarbonisation and climate risk mitigation via appropriate Sustainability/ESG targets for purposes of remuneration. The overview below provides a high-level summary of the three key pillars of Kenmare's Climate strategy.

We have tested the resilience of our strategy under different climate scenarios.

See Risk management section for more detail on our approach to scenario analysis on pages 12–18.

PARIS AGREEMENT

At the Conference of the Parties (COP) 21 hosted in Paris in 2015, nearly 200 governments agreed to strengthen the global response to the threat of climate change by “holding the increase in the global average temperature to well below 2°C above pre-industrial levels and to pursue efforts to limit the temperature increase to 1.5°C”. In order to achieve those targets, countries submit “Nationally Determined Contributions” which define their country-specific efforts to reduce national emissions and adapt to the impacts of climate change.



Decarbonising our operations

Sourcing clean energy

We continue to invest in clean sources of electricity, building on our early investment in a 170km power line to connect to Mozambique's hydro-electric power, providing over 90% of our electricity requirements

Low-carbon technologies

We actively review and research technological developments and will invest in low-carbon technologies, as and when they become commercially viable

Energy efficiency

We drive energy efficiency in our operations, through new technology, equipment, and work practices, and by developing an Energy Management System in accordance with ISO-50001

Carbon offsetting

We are investigating opportunities to support carbon offsetting as part of our progressive rehabilitation programme, aligning with our goals to improve food security and biodiversity

ENERGY AND CLIMATE STRATEGY



Governance, risk management and transparency

Risk management

We embed management of climate change risks in our strategy and our decision-making on capital allocation, including:

- Regularly stress-testing our business and operations to ensure their resilience to different climate scenarios
- Increasing the resilience of our operations to physical climate risks and the responsiveness of our business strategy to evolving climate-related transition risks and opportunities

Transparent reporting

- We provide robust climate governance and transparently report against climate risks and targets to improve our climate resilience and reduce our impact through decarbonisation



Aligning with and supporting government climate goals

Aligning with government policy

Kenmare will also work to align with the relevant elements of the Government of Mozambique's plan to implement the Paris goals, within our area of operation, which includes but is not limited to:

- increasing the capacity of local communities to prepare for and respond to climate risks
- increasing the resilience of farming techniques to support food security
- increasing the adaptive capacity of vulnerable groups
- protecting biodiversity reducing soil degradation and promoting local tree planting

DECARBONISING OPERATIONS

Sourcing clean energy

Kenmare has a low carbon footprint relative to other mineral sands miners, because of our hydro-electric sourced power supply from the Cahora Bassa Dam (CBD) in the west of the country.

Kenmare invested significant capital expenditure in 2004-2007 to run overhead power cables 170km from Moma to Nampula, where the nearest substation is located, enabling us to access hydroelectric power from CBD. This clean energy source represented over 90% of Kenmare's overall electrical energy consumption in 2021.

The consequence of starting from a relatively low carbon base line is that further decarbonisation is more challenging. Kenmare's most material source of emissions is the consumption of diesel which is burned in the driers and re-heaters in the Mineral Separation Plant (MSP) as minerals are processed, and the heavy mobile equipment (HME) that excavate and transport minerals. In 2021 our operations burned 24.2 million litres of diesel. Displacement of this diesel is the key focus of Kenmare's decarbonisation strategy.

Potential new technologies

In 2021, Kenmare undertook an extensive review of decarbonisation options in partnership with third-party expertise, evaluating the Levelised Cost of Carbon of various technologies including renewables and battery storage, hydrogen, and thermal heat storage, among others. All these technologies, while potentially feasible today, would have a significantly negative Net Present Value to the business.

There remain several more economically feasible options that we continue to investigate, which include replacing diesel with biofuels and the electrification of our driers and re-heaters. Both options present numerous challenges. Securing a supply of biofuel that is competitive to diesel is a key challenge and we are exploring options with potential partners to establish biofuel crops within Mozambique, as well as options to import it.

The alternate solution of electrifying our driers and re-heaters first needs to be proven as technically feasible. If it is, the additional electricity demand may push the load on the network beyond its capacity limits and therefore may require investment in a second overhead electricity line to the mine from Nampula or Angoche. Kenmare will continue to explore these and other options to find an economically feasible solution to displace diesel.

OUR

Energy efficiency

Kenmare has identified over 70 potential energy efficiency projects, which could incrementally reduce emissions. The most material relates to the RUPS project that comprises a set of four kinetic energy storage units operating through a flywheel with the ability to deliver reactive power in the event of a mains power dip. In the event of a power outage, one or more diesel engines will start and provide seamless power supply for the duration of the outage and will automatically switch supply back to the grid when grid power has been restored. RUPS will provide stability of supply of electricity during the summer months when the electricity transmission network becomes unstable due to frequent lightning strikes on the transmission network during the summer rains. It will also deliver a 12% reduction in GHG emissions associated with diesel consumption by 2024 as the diesel engines will only operate infrequently and for short periods compared to the current practice of supplying the MSP with diesel-generated power for four of the summer months. The project, which is NPV positive, required an estimated capital investment of \$18m. RUPS began commissioning in Q1 2022.

Further energy efficiency opportunities that Kenmare will pursue in 2022 include:

- Reducing diesel consumption of our HME, through monitoring and improved controls
- Reducing moisture in the product as it moves through the MSP belt filters, requiring less heat to dry the product later in the process, reducing diesel consumption
- Increasing fuel efficiency on the ilmenite dryers through performance reviews to identify opportunities on maintenance, controls, and operating parameters
- Replacement of one of the dry mines with a hydrosluicing (hydro powered) operation.

ENERGY EFFICIENCY DRIVE

Kenmare seeks to continuously drive energy efficiency and in particular a reduction in diesel consumption in our operations, introducing new technology, equipment, and work practices. In 2022, Kenmare will hire an Energy Efficiency Engineer who will develop an Energy Management System in accordance with ISO-50001 and will be responsible for identifying and delivering ongoing improvements.

Carbon offsetting

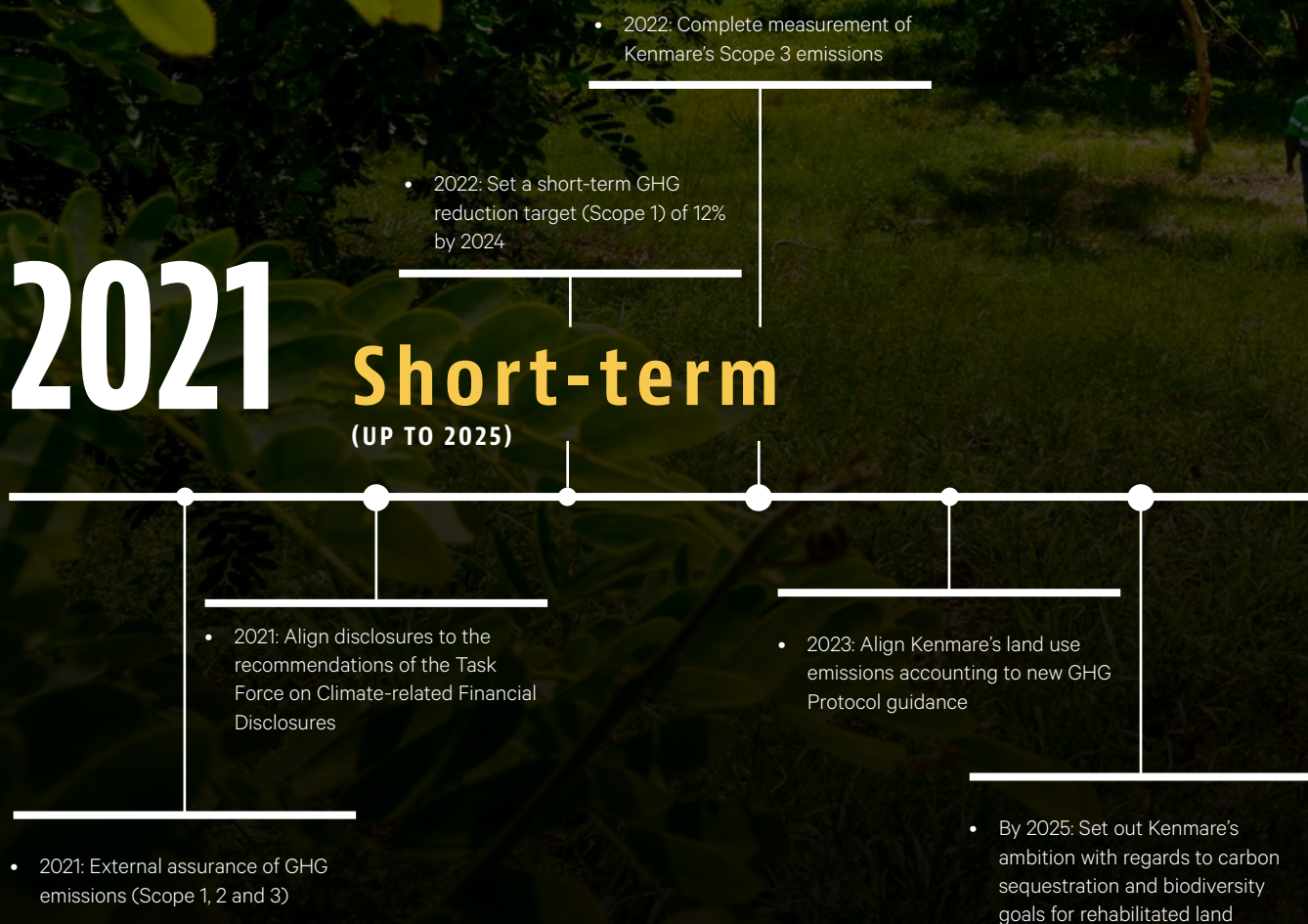
Whilst Kenmare intends to decarbonise its operations by investing in NPV positive or neutral low-carbon technologies, we recognise that there is likely to be a portion of hard-to-abate emissions that we will have to offset to achieve our ambition of Net Zero by 2040.

Additionally, our progressive land rehabilitation programme represents an opportunity for offset projects. Kenmare rehabilitates as much as 200 Hectares of land each year as the mine paths progress. Rehabilitation involves spreading of topsoil removed in the land clearance process, and then planting a variety of vegetation, before the area is transferred back to local communities. Depending on what vegetation was on the land before it was mined, Kenmare plants a combination of native trees and commercial forestry species, such as casuarinas, which improve soil fertility by fixing atmospheric nitrogen, provide a good source of wood for local community use, and grow well in the sandy coastal soils surrounding the Moma Mine.

In 2021, in collaboration with local communities and Mozambique's Institute of Agricultural research (IIAM), Kenmare also experimented with several small agro-forestry trials, where trees and shrubs are grown around crops, improving soil structure and health. We plan to scale these trials in 2022. Our rehabilitation programme therefore presents potential options for carbon credit projects, which can also offer other sustainability benefits, including food security and livelihood opportunities for local communities and biodiversity conservation.

TARGETS 2021-2050

Kenmare has set the following targets as part of our refreshed Energy and Climate Strategy. We commit to transparently reporting progress against these targets on an annual basis.





- By 2025: identify technologies that could displace diesel consumption in our key operational equipment



- Demonstrate Kenmare has influenced the decarbonisation of its supply and value chain (Scope 3 emissions) to the extent possible

- Identify technologies to displace all other sources of diesel consumption (HME, Light vehicles)

- Achieve Net Zero ambition by 2040 (Scope 1 and 2)

Medium-term
(2026-2035)

Long-term
(2036-2050)

- Implement technologies to displace diesel consumption in our key operational equipment (MSP)



- Begin execution of Rehab vision on carbon sequestration and biodiversity
- Map opportunities for carbon reduction in the supply chain/ value chain

2050

RISK MANAGEMENT

In response to experiencing extreme weather events over the last 14 years, Kenmare has developed strong risk management and mitigation plans to help minimise adverse impacts associated with future potential events.

Kenmare measures weather conditions at the mine site daily and reviews additional meteorological reports from the weather station on Reunion Island, in the Indian Ocean, west of Mauritius that tracks cyclones and significant weather patterns.



For further information about our approach to risk management, go to page 64 in the [Annual Report](#)

Kenmare's risk assessment process is based on a co-ordinated, group-wide approach to the identification and evaluation of risks and the manner in which they are monitored and managed. This process begins with a bottom-up approach involving managers from the mine's departmental areas who, through a programme of workshops, regularly perform a detailed risk reviews to update departmental risk registers.

In assessing the potential impact and likelihood of each risk identified, management considers the existing key controls and evaluates the risks in terms of potential residual impact.

A standard risk scoring matrix is used to ensure consistency in reporting across all areas. Departmental risk registers are consolidated into a Group Risk Register. The Executive Committee provides input to ensure that there is a top-down and review mechanism of the key risks facing the Company. This includes consideration and assessment of any newly identified emerging risks. The principal risks and their mitigations are submitted to the Audit and Risk Committee and Board for review and approval. As part of this review and approval process the Audit and Risk Committee provides a robust assessment of the emerging and principal risks faced by the Company. This is achieved by offering alternative viewpoints and challenging risk scoring assumptions as appropriate. Kenmare's risk assessment process has identified severe weather events related to climate change as a principal risk since 2009.

Scenario analysis

In 2021, our risk management was supplemented with an in-depth analysis of our climate-related risks and opportunities. This analysis involved testing the resilience of our overall strategy and operations against alternative temperature-warming scenarios. We also updated our climate strategy, which resulted in the development of a new Climate Policy and ambition to become Net Zero by 2040 (Scope 1 and 2).

Kenmare assessed the resilience of its strategy and operations against physical and transition risks using two different temperature scenarios: a business-as-usual case, aligned to the planet's current rate of warming; and an accelerated decarbonisation pathway, aligned to the goals of the Paris Agreement. Additionally, Kenmare has looked at two time horizons, 2030 and 2050, for each scenario.

Physical risk scenario analysis

For Kenmare's physical risk analysis, we considered the impact of these two temperature scenarios on eight locations, which have the potential to adversely impact our operations, namely: 1) the Moma Mine; 2) the Moma air strip; 3) the jetty from which our product is transferred to transshipment vessels; 4) a location 10km offshore where our product is transferred from the transshipment vessels to cargo ships; 5) Nampula, our regional office; 6) Maputo, our main country office in Mozambique; 7) the Cahora Bassa Dam, the source of our hydroelectric energy; and 8) Johannesburg, a major hub from which some staff, suppliers, visitors and goods are transported to the mine.

The climate models predicting changes in weather patterns made available by the IPCC are only available at a 100km grid resolution and therefore are not specific to each of the Moma locations mentioned above. Nevertheless, we wanted to consider the potential impact of different weather events within the specific operational context of key infrastructure at the mine.

Kenmare also conducted a high-level qualitative financial assessment of the impact of three physical risks on its business, which were deemed either highest probability or had the potential for the greatest impact, or both. These three higher priority physical risks assessed the impact of:

- extreme heat on personnel working outdoors
- storm surges on transshipment vessel operations
- cyclones on site personnel and operations



Physical risk key takeaways

- Cyclones and tropical storms present the most severe climate risk to Kenmare's operations at the mine. Our weather monitoring and regular emergency response exercises, as well as financial mitigation controls, including insurance cover, demonstrate we mitigate against this risk as far as is possible.
- While drought conditions are not expected to present a threat to our operations, given projected increased temperatures, we model rates of evaporation at our mining ponds and will explore opportunities to minimise our operational water use, including introducing water re-use targets, to avoid unnecessary strain on available water sources.

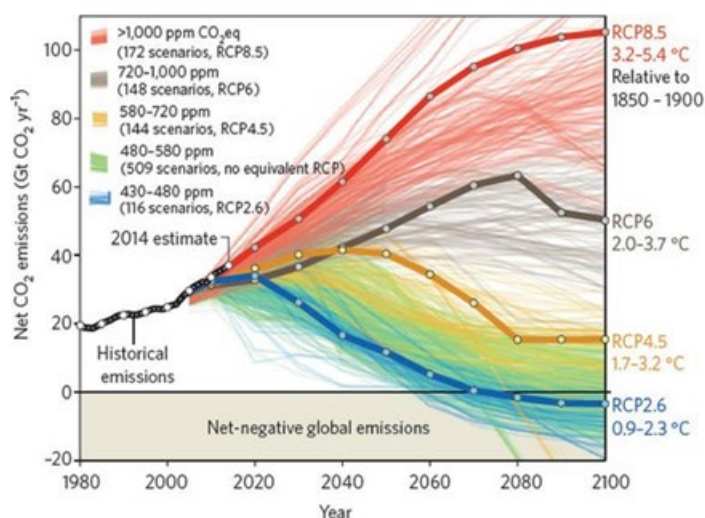
SCENARIOS FOR PHYSICAL RISK ANALYSIS

For analysis of physical risk, we assessed two of the International Panel on Climate Change (IPCC)'s Representative Concentration Pathways (RCPs):

- RCP 4.5 = low carbon scenario, and a pathway which assumes the implementation of future emissions management and mitigation policies, most closely aligned with the commitments made under the Paris Agreement of 1.7-3.2°C by 2100
- RCP 8.5 = 'business-as-usual' scenario aligned to average warming of 3.2-5.4°C by 2100

The graph below describes different climate futures and their respective increase in global temperatures, dependent on the volume of greenhouse gases emitted in the years to come.

IPCC temperature pathways






RISK MANAGEMENT CONTINUED

The table below sets out the findings of the physical risk assessment. It should be noted that the risk rating allocated to each risk is an evaluation before mitigating actions have been taken into account, and therefore we believe each of the risks are significantly lowered because of our controls. We have considered the potential financial impacts for the higher priority physical risks, but not the lower priority risks.

HIGHER PRIORITY PHYSICAL RISK

	Potential risks	Controls in place	Potential financial impacts	Risk rating
Extreme heat Our operations are in Nampula province, which has a mean temperature of 23-28°C depending on the seasonality. However, the maximum 'felt' temperature, taking into account humidity and ambient temperatures over the last 40 years at the mine was 44°C ¹ . The predicted maximum temperature increase under both temperature scenarios ranges between 1.2 and 1.7°C by 2030. The greatest increases are forecast in the business-as-usual temperature scenario under the 2050-time horizon at Cahora Bassa Dam and Johannesburg where temperatures are projected to rise by 2.6 and 2.8°C respectively.	<ul style="list-style-type: none"> Challenging working conditions for site personnel may require more breaks, reduction in worker productivity, and increased costs for the cooling of the work environment The Company may receive fines or legal action related to heat-related illness in workers Greater levels of evaporation from ponds impacting our availability of water for operations 	<ul style="list-style-type: none"> Inclusion of temperature checks in health and safety procedures and resulting measures to avoid heat stress: water breaks, longer breaks in air-conditioned units, investment in shaded areas and increased cooling Monitoring tools to track evaporation rates; increased focused on water reporting and modelling; increased water re-use 	<ul style="list-style-type: none"> Increased capital expenditure may be required to ensure the health and safety of our people Reduced productivity may result in adverse impacts to revenues, increased operating costs and project schedule delays 	
Storm surges Kenmare owns and operates two transshipment vessels, which transport our products to a deep-water transshipment point 10 km offshore, where they self-discharge into customer bulk carrier vessels, before the products are transported to multiple destinations around the world. Seasonal impacts of weather on operations and shipping have, in recent years, reduced operating times of the transshipment vessels by between 20-30%. The Moma Mine is in a storm prone area, however, forecasts suggest minimal increase in intensity in all scenarios. Although storm activity in recent years has shown an increase in unfavourable conditions, there is a lack of evidence to link this recent increase with an increase in future storm activity.	<ul style="list-style-type: none"> Shipping operations adversely impacted, with time lost during heavy swells and strong winds Delayed shipment of product can lead to demurrage penalties and loss of confidence from customers and investors 	<ul style="list-style-type: none"> Established storm anchorage in protected harbour at Angoche Upgraded maintenance programme to ensure both transshipment vessels' engines are equipped to handle rougher seas Increased excavator productivity transferring mineral sands to the customer tankers Increased product storage capacity to ensure production does not have to stop if bad weather conditions hamper shipments Real-time information on meteorological and oceanological conditions to determine safe shipping conditions 	<ul style="list-style-type: none"> Disruptions to our transport and distribution network may result in unforeseen shipping delays resulting in adverse impacts to revenue and reputational damage Operating costs may be adversely impacted because of increased shipping and demurrage costs Increased capital expenditure may be required to provide assets with increased protection from storm damage 	

RISK LIKELIHOOD AND CONSEQUENCE


-  Minor probability and consequence
-  Medium probability and consequence
-  Major probability and consequence

- 1 National Oceanic & Atmospheric Administration (NOAA)
- 2 International Best Track Archive for Climate Stewardship
- 3 American Meteorological Society
- 4 Data sources included HydroRivers, IPCC, ESRI, Merit EDM, PREP Data and NOAA GPCP

HIGHER PRIORITY PHYSICAL RISK

Cyclones


Mozambique has been hit by several devastating cyclones in recent years and the Moma Mine was in the path of Cyclone Jokwe in 2008. This risk presents the most material risk to Kenmare, both in terms of projected increase in risk and potential financial impact. The highest windspeeds recorded within 100km of the mine since 1960 is 106 knots², a category 3 cyclone. This windspeed is projected to increase between 5-9%³ between 2030-2050 and in line with the respective temperature scenarios.

Potential risks	Controls in place	Potential financial impacts	Risk rating
<ul style="list-style-type: none"> Injury to personnel and communities Damage to plant and equipment Overhead transmission lines being downed between suspension poles / structures Flights potentially will be affected more frequently 	<ul style="list-style-type: none"> Designated cyclone-proofed buildings at the mine Mine and associated infrastructure designed to appropriate cyclone rating Daily weather/cyclone monitoring from a weather station Cyclone readiness plan Disaster management programme Insurance cover Adequate stocks of materials and supplies on site 	<ul style="list-style-type: none"> Operating costs may be adversely impacted by the additional need for repairs and maintenance because of cyclonic wind damage. In addition, the business may experience rising insurance premiums Increased capital expenditure may be required to provide assets with increased protection from cyclone damage. 	

LOWER PRIORITY PHYSICAL RISK


Flooding

In analysing the risk flooding presents to our assets, data on fluvial, coastal, and pluvial flooding were considered⁴. Under the business-as-usual scenario, there is predicted to be an immaterial increase in maximum daily and 5-day rainfall for the mine sites: however, there are forecast to be more pronounced increases for Maputo and the Cahora Bassa Dam by 2050.

Potential risks	Controls in place	Risk rating
<ul style="list-style-type: none"> Damaged roads impacting our supply chain, and availability of spare equipment, food and medicine Flood events risking damage to overhead lines Tailings Storage Facility (TSF) stability is compromised, resulting in breaching of a berm(s) Malaria instances increase in line with increased standing water 	<ul style="list-style-type: none"> Maintaining stocks of critical equipment Backup generator to provide alternative power Daily geotechnical checks on TSF stability and independent third party monitoring and assurance Anti-malaria awareness programmes for staff and community 	

Water stress and drought

Using the World Resources Institute Aqueduct™ tool, all water extracted for the Moma operation is identified as being in an area of low baseline water stress, and this is not set to increase under any timescale or temperature scenario. However, we think it more likely that a combination of our growing operational requirements for water and local population growth and social influx may put pressure on available water resources. Maputo is set to see an increase of water stress and drought by 2.8 times under all timescales and temperature scenarios.

Potential risks	Controls in place	Risk rating
<ul style="list-style-type: none"> Operations may be impacted through lack of raw water resources Rehabilitation process is hampered, and land cannot be handed back to communities 	<ul style="list-style-type: none"> Increasing water re-use Introducing rainwater collection Ensuring Local Authorities / communities introduce water payment mechanisms 	

RISK MANAGEMENT CONTINUED

Transition risk scenario analysis

Transition risks are those that companies face as the world transitions to a low-carbon economy. Kenmare assessed the impact of policy and legal; technological; market; and reputational transition risks. Additionally, we evaluated opportunities relating to products and markets.

IEA POTENTIAL SCENARIOS: WORLD ENERGY OUTLOOK 2020

SCENARIOS FOR TRANSITION RISK ANALYSIS

Kenmare used two scenarios from the International Energy Agency (IEA) World Energy Outlook 2020 to evaluate transition risk by. These were:

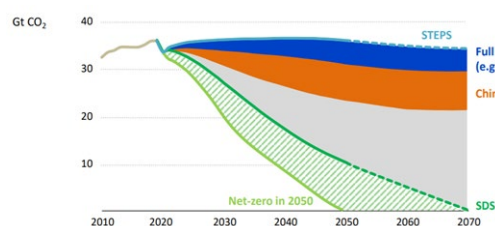
Stated Policies Scenario (STEPS) – Business-as-usual scenario:

A pathway that takes account of announced climate-related policies, but without material decarbonisation. Continued development of renewable energy and other clean/ low carbon energy sources is forecast, but fossil fuels remain prominent. The base case scenario global climate warming range is between 2.5°C and 3.3°C.

Sustainable Development Scenario (SDS) - Low carbon scenario:

A pathway towards reducing global CO₂ emissions and achieving other, non-climate, sustainable development goals. Global demand for fossil fuels declines in this scenario, and the world embraces clean technology as an alternative. Implied climate warming is 1.65°C to 'just above' 2°C.

IEA potential scenarios: world energy outlook 2020



As with physical risks, Kenmare conducted a high-level qualitative financial assessment of the impact of three transition risks and opportunities on its business, which were deemed either highest probability or had the potential for the greatest impact (positive or negative), or both.

These three higher priority transition risks and opportunities assessed the impact of:

- Demand for lower carbon/environmental footprint products
- Investor pressure to commit to Net Zero
- Energy transition impacting titanium metal demand




This analysis is reflected in the table opposite. In our 2022 reporting, we will work to enhance the financial analysis relating to these risks.

Transition risk and opportunity key takeaways




- The transition risk and opportunity scenario analysis indicate our strategy, operations and products are resilient to a transition to a lower carbon economy, even in an accelerated decarbonisation pathway. Kenmare's low carbon footprint and intention to further decarbonise in line with our ambition to achieve Net Zero by 2040 will minimise risk of potential carbon taxes, and align with stakeholders, in particular investors' expectations on decarbonisation. Additionally, there are opportunities to competitively position our product with customers on Kenmare's strong environmental credentials, including our low carbon operations.
- Titanium metal represents a small proportion (4-5%) of the total market for Kenmare's products, however, demand for titanium metal in aircraft frames and engines, medical items and other equipment is growing. In addition, Rare Earth Elements (REEs) are essential for permanent magnets in wind turbines and Electric Vehicle motors. In a low carbon scenario, the projected growth for these metals is 60% for Titanium metal and 80% for REE relative to the base case.



HIGHER PRIORITY TRANSITION RISK / OPPORTUNITY

	Kenmare response	Potential financial impact	Risk rating
Risk: investor pressure to commit to net zero Investor pressure on Kenmare to lower emissions could lead to an accelerated investment into low carbon technologies, potentially impacting capital and operating expenditure. Several of Kenmare's institutional investors recognise the need to play their role in decarbonising, to set the world on a path to limit warming to 1.5-2°C and have set ambitious goals to reduce emissions associated with their investment portfolios in the medium and long-term, which will cascade down to their portfolio companies.	In 2021, Kenmare commissioned a third-party specialist to analyse the Levelised Cost of Carbon Abatement (LCCA) of different low carbon technologies and policies, to compare the associated LCCA of solar, wind and battery storage, hydrogen, Liquified Natural Gas, thermal heat storage and other low carbon technologies. The key finding of this analysis was that these technologies currently have a Net Present Value (NPV) that is negative and would involve a significant capital outlay for the business. We continue to research options that are more economically viable.	We have engaged and continue to engage our investors and broader stakeholder groups on climate change and currently there is no expectation Kenmare should invest in decarbonisation projects that have a negative NPV.	
Opportunity: energy transition impacting titanium metal demand By 2030, the IEA predicts titanium metal demand increase by 60-80% through the increased deployment of geothermal, advanced bioenergy and nuclear energy, Solar PV ⁵ to support the energy transition. Demand for Rare Earth Elements contained in our mineral sands product is also expected to grow to supply crucial parts for wind turbines and EV motors.	Current demand for titanium metals is 4-5% of the global demand for titanium feed stocks, representing a small proportion of the total market for Kenmare's products. Kenmare will continue to track data and trends on this modest but interesting growth potential, to determine our longer-term strategic response.	This trend represents a moderate financial opportunity, providing some potential upside to Kenmare's cash flow through additional revenues.	
Opportunity: demand for lower carbon/environmental footprint products TiO ₂ enhances the durability and sustainability of construction products and buildings through its resistance to heat, ultraviolet degradation and weathering. With lower maintenance requirements, raw material consumption and waste production are reduced. In plastics, TiO ₂ pigment helps to protect and extend product lifetime, reducing plastic waste. TiO ₂ in paint also has a high refractive capability, reflecting the infrared rays of the sun. TiO ₂ paints applied to the surfaces of buildings and cool roofs can therefore help to reduce heat build-up and avoid air conditioning requirements. Separately, customers are starting to ask for the carbon footprint of the products that Kenmare produces as they look to assess and then reduce their Scope 3 emissions.	In a low carbon scenario, the projected growth for these metals is 60% for Titanium metal and 80% for REE relative to the base case; however this is from a very low demand baseline.	This trend represents a moderate financial opportunity, providing a potential upside to Kenmare's cash flow through additional revenues. Kenmare's current low carbon intensity, and ambitions to decarbonise further, will position our products competitively with climate-conscious customers.	

RISK LIKELIHOOD AND CONSEQUENCE

-  Minor probability and consequence
-  Medium probability and consequence
-  Major probability and consequence






OPPORTUNITY LIKELIHOOD AND IMPACT

-  Low probability and opportunity




⁵ Research shows Hematene, known for its photocatalytic properties, is more efficient when paired with TiO₂, which allows for easier extraction of electrical charges generated from the photocatalytic activity.

RISK MANAGEMENT CONTINUED

LOWER PRIORITY TRANSITION RISK / OPPORTUNITY

	Kenmare response	Risk rating
<p>Risk: carbon pricing</p> <p>A 2021 World Bank report⁶ finds that the majority of carbon prices on national or regional trading schemes or taxes remain far below the \$40-80/tCO₂ range recommended to have been achieved by 2020 to meet the 'well below 2°C' temperature goal of the Paris Agreement. The World Bank states prices need to increase to \$50-100 per tonne CO₂ by 2030 to limit global temperatures, as set out in the Paris Agreement. IEA WEO (2020) forecasts a cost of carbon of \$125 per tonne CO₂ under the low carbon scenario for some developing countries by 2040. Kenmare's most material source of emissions is from diesel which we import, which is not currently subject to a carbon tax.</p>	<p>According to the World Bank, South Africa is the only country in Africa with a carbon tax. South Africa's carbon tax currently values carbon at \$9 per tonne CO₂. While there is potential for the African Union to introduce a carbon tax or a cap and trade scheme over time, there are currently no formal negotiations to get this in place. Currently, we see the risk of increased costs associated with diesel to be a more likely driver of additional operating expenditure in the short and medium term than carbon pricing mechanisms. Nevertheless, Kenmare's efforts to decarbonise will help mitigate the overall impact of any future carbon tax.</p>	
<p>Risk: Carbon Border Adjustment Mechanism (CBAM)</p> <p>In 2021, the European Trading Scheme valued carbon at ~€60 per tonne CO₂ which would represent the carbon tax chargeable on products imported by the EU under CBAM. CBAM is currently applicable to cement, iron and steel, aluminium, fertilizers, and electricity and therefore Kenmare's European customers, importing mineral sands, are currently except from this tax. Over the long-term there is potential for both the European CBAM to expand to other products and for a CBAM to be adopted by other countries wishing to both decarbonise and protect the competitiveness of their domestic products.</p>	<p>The diversity of Kenmare's customer base and progress against our decarbonisation goals will help mitigate this risk.</p>	
<p>Risk: mandates on and regulation of existing products and services</p> <p>The International Maritime Organisation has set targets to reduce emissions from the shipping industry by 50% by 2040. While this could lead to an increase in cost of operations by switching to lower carbon fuels and retrofitting vessels, this is a risk that will impact all industries that ship product to customers globally and will not specifically target Kenmare.</p>	<p>We intend to be a fast follower of any technologies that enable substitution of diesel in our transshipment vessels and chartered cargo ships transporting product, but we anticipate this is one of the applications that will take longer to decarbonise.</p>	
<p>Risk: Mozambique policy on deforestation</p> <p>Emissions from land use represents Mozambique's largest source of emissions and its National REDD+⁷ Strategy 2016 aims to reduce deforestation. Kenmare's mining concession, except for the Icuria forest that we are actively working to conserve, is not forested. Nevertheless, restrictions on deforestation in the future could translate into higher costs to clear areas by removing trees for mining.</p>	<p>It is our long-term goal to work with communities and local authorities to increase, on a net basis relative to pre-mining conditions, the quantity of trees and vegetation on the land we progressively rehabilitate, whilst working towards co-benefits of food security and protection of biodiversity.</p>	
<p>Risk: sector stigmatisation leading to negative stakeholder sentiment</p> <p>Stigmatisation of the extractives sector as an unsustainable business activity could lead to increased capital costs, higher insurance premiums, and an inability to secure top talent.</p>	<p>We believe that Kenmare's strong health and safety track record, responsible environmental practices and commitment to socio-economic progress, through the work of its not-for-profit association, KMAD, combined with its Net Zero ambition makes a compelling value proposition for investors and employees.</p>	

RISK LIKELIHOOD AND CONSEQUENCE

-  Minor probability and consequence
-  Medium probability and consequence
-  Major probability and consequence

OPPORTUNITY LIKELIHOOD AND IMPACT

-  Low probability and opportunity

⁶ State & Trends of Carbon Pricing 2021, World Bank report

⁷ Reducing Emissions from Deforestation and forest Degradation

PHYSICAL AND TRANSITION METRICS

Metrics reviewed as part of scenario analysis:

PHYSICAL METRICS/DATA SOURCES

Extreme heat	<ul style="list-style-type: none"> National Oceanic and Atmospheric Administration (NOAA) Heat Index Predicted change in Average Max Seasonal Temp: Intergovernmental Panel on Climate Change (IPCC)
Tropical cyclones and storm surges	<ul style="list-style-type: none"> Highest windspeed - International Best Track Archive for Climate Stewardship (IBTrACS) Increase in maximum sustained windspeed - American Meteorological Society (AMS)
Flooding	<ul style="list-style-type: none"> Change in maximum rainfall (5 days) – IPCC Global Mean Sea Level Rise - Multi-Error-Removed Improved-Terrain Digital Elevation Model (Merit DEM) PREP Data Maximum 1 day precipitation – NOAA Global Precipitation Climatology Project (GPCP) Change in maximum rainfall 1 day – IPCC
Water Stress and Drought	<ul style="list-style-type: none"> Drought Risk - World Resources Institute Change in Annual Count of Consecutive days <1mm precipitation - IPCC

TRANSITION METRICS/DATA SOURCES

Investor pressure on Net Zero	<ul style="list-style-type: none"> Analyst reports Direct investor engagement Peer reviews Sustainability benchmarks Levelised Cost of Carbon Abatement on potential low-carbon technologies
Energy transition impacting titanium demand	<ul style="list-style-type: none"> Compound Average Annual Growth Rate for different sectors for decarbonisation – IEA CO₂ emissions per capita – IEA
Demand for lower carbon/environmental footprint products	<ul style="list-style-type: none"> Titanium Dioxide Manufacturers Association (TDMA)
Carbon pricing	<ul style="list-style-type: none"> World Bank and International Energy Agency (IEA)
EU Carbon Border Adjustment Mechanism	<ul style="list-style-type: none"> Regulation and EU Emissions Trading Scheme carbon prices
Mandates on reducing Shipping Fuel emissions intensity	<ul style="list-style-type: none"> International Maritime Organisation (IMO)
Stigmatisation of mining sector	<ul style="list-style-type: none"> Media, analyst reports

TCFD DISCLOSURE INDEX

AREA OF FOCUS		PAGE REFERENCE
GOVERNANCE	a) Describe the Board's oversight of climate-related risks and opportunities b) Describe management's role in assessing and managing climate-related risks and opportunities	3 3
STRATEGY	a) Describe the climate-related risks and opportunities the organisation has identified over the short, medium, and long-term b) Describe the impact of climate-related risks and opportunities on the organisation's businesses, strategy, and financial planning c) Describe the resilience of the organisation's strategy, taking into consideration different climate-related scenarios, including a 2 °C or lower scenario	12-18 6-9, 14-15, 17 13, 16
RISK MANAGEMENT	a) Describe the organisation's processes for identifying and assessing climate-related risks b) Describe the organisation's processes for managing climate-related risks c) Describe how processes for identifying, assessing and managing climate-related risks are integrated into the organisation's overall risk management	12 14-15, 17-18 12
METRICS AND TARGETS	a) Disclose the metrics used by the organisation to assess climate-related risks and opportunities in line with its strategy and risk management process b) Disclose Scope 1, 2 and if appropriate Scope 3 greenhouse gas (GHG) emissions and the related risks c) Describe the targets used by the organisation to manage climate-related risks and opportunities and performance against targets	19 5 10-11

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