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Climate Resilient Transition Plans in the Metals and Mining Sector (Core)

PRESENTED BY
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Table of Contents

03 List of Contributors

04 Introduction

06 Metals & Mining

07 Ambition

09 Action

12 Accountability

15 Maturity Journey

16 Decoding where to start

17 Conclusion

List of Contributors

The authors comprise key contributors to Metals & Mining TPT guidance and ISO 14090 climate adaptation guidance, and so can provide deep subject matter expertise in climate change transition and adaptation. All authors have extensive experience in navigating the complex and dynamic challenges that entities globally face both today and tomorrow.

In partnership, Satarla bring deep expertise in risk management, sustainability, and operations, especially across metals and mining, while Climate Sense brings adaptive climate risk management, monitoring-evaluation-learning, and capability assessment methods that can be embedded into mining clients' existing risk, planning, and governance processes.

Climate Sense is a consultancy enabling clients to strengthen climate change adaptive decision making at organisational and system (e.g. sector, supply chain) levels. It protects long term interests through the decisions made today; managing risk, ensuring compliance, increasing competitiveness, strengthening returns on investment, reducing social and environmental impacts, getting the most from stakeholder engagement and enhancing license to trade through strategic monitoring evaluation and learning.

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Satarla is a consultancy of experts that bridges sustainability and risk management through consulting, training, research, and effective communication, with deep expertise and experience within the metals and mining sector. Satarla has a passion for enabling more responsible exploration, extraction, and use of raw materials, and lead on the drafting of the TPT Metals & Mining Sector Reporting Guidance.

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Introduction

Climate risk is business risk. Climate resilience can be a competitive advantage. Due to climate change, the operating environment is rapidly changing, imposing new risks and opportunities¹ on businesses, sectors, and global markets. The World Economic Forum's (WEF) Global Risks Reports consistently rank environmental risks — especially climate-related ones — among the most severe long-term threats to global stability, ahead of many economic or geopolitical risks. It emphasises adaptation and resilience to climate change as critical — encouraging investment in infrastructure, workforce health, supply-chain robustness and risk management practices. The case for integrating climate adaptation into risk frameworks, development and growth strategy is clear. Opportunities will benefit those already acting. Positions will be strengthened as the maturity of action develops.

Entities need to ensure they are resilient to a changing climate through adaptation and a low-carbon economy through transition planning. Both are distinct but interdependent. Transition planning focuses on how a business will evolve and thrive in a low-carbon economy, typically addressing transition risks². Adaptation planning ensures it can withstand and thrive amidst intensifying physical risks. Both approaches must work in tandem to de-risk a business, benefit its value chain, comply with regulations, and future-proof value.

Transition plans should include identified short-term actions and controls for implementation, as well as strategic long-term initiatives, particularly recognising the decisions being taken today that determine long term vulnerabilities to climate impacts not yet experienced. To address the gap in guidance for transition plans (as called for by the TCFD in 2015) and set the “gold standard”, the Transition Plan Taskforce (TPT) was launched by the UK government in 2022 (see Figure 1). Its endorsement by the IFRS ensures relevance to and alignment with an international framework now and in the future.



Figure 1: The principles, disclosure elements, and disclosure sub-elements which make up the framework of TPT recommendations. Source: TPT Disclosure Framework, Transition Plan Taskforce (October 2023).

¹ “Risks and opportunities” are the terminology used in this paper to be in line with IFRS guidance and terminology, though it is noted that in risk management, a risk itself can be a threat or an opportunity. By contrast, the IPCC uses a specific framework to define risk from climate change as arising from the interaction of hazards (e.g., drought, heavy precipitation), exposure (to hazards), and vulnerability (a function of sensitivity and adaptive capacity). See the Glossary section for more detail.

² as per the TCFD recommendations.

Adaptation plans should include numerous pathways to resilience that enable entities to thrive in a range of possible futures and amidst uncertainty. They should distinguish between hazards and risks. This paper introduces an approach to reducing vulnerability, and therefore risk, as well as enhancing opportunity, through building adaptive capability. This iterative, threshold-driven approach—centred on monitoring, learning, and course-correction—is what adaptive climate risk management looks like in practice. Building capability typically looks like progressing an entity from business-as-usual to practicing adaptive climate risk management. A "mature" entity may have the capability to e.g., embed adaptation into core planning, enterprise risk management, and capital allocation processes; actively use adaptation pathways, thresholds, and triggers to guide decisions over the life of assets; systematically feed data from operations, monitoring systems, and past events is systematically back into strategy and design; and, have in place governance structures that explicitly recognise uncertainty and resource adaptive capability as a strategic asset. In this way, an entity is able to develop climate resilient transition plans.

If considered in tandem, both transition and adaptation planning enable comprehensive and effective climate risk management. Starting with integration in mind can result in aligned capital investment, better access to climate-aligned finance, reduced capital expenditure and operating costs, synergistic governance and performance metrics, and improved stakeholder confidence. Climate resilient transition plans provide a key opportunity to evolve risk management from the design and implementation of controls within an entity's sphere of influence, to a broader strategy of developing adaptation pathways that account for an entity's capabilities in building lasting resilience in a dynamic operating context.



Metals & Mining

Mining operations frequently occur in already climatically sensitive, water-stressed, or remote environments, with equally vulnerable supply chains. They often face hazards that may change over time, with impacts which may evolve over operating lifetimes to encompass some which have not been seen before.

Ensuring climate-related risks and opportunities are identified and managed over near, medium, or long term is key to the success of projects. Transition planning is especially relevant to the Metals & Mining sector, where projects often span several decades and are owned and operated by different entities at different stages. The mining sector also faces urgent adaptation needs based on a high current and future level of risk and opportunity associated with climate change (the potential for a perceived significant shortfall in adaptation measures and pathways in place relative to the scale and dynamism of these risks) and the presence of co-benefits to further action in the next five years over and above what is already planned

Their exposure is shaped by the location of deposits, while their vulnerability is a function of physical sensitivity to risks and the ability to apply the new capabilities required to understand and address these developing risks to the operations themselves, the supply chain, the site's local stakeholders, and entity-level stakeholders (including investors). Turning this vulnerability into resilience requires converting identified risks into specific, sequenced adaptation actions, designing for resilience from project outset and adapting management as new climate information emerges.

The mining sector cannot afford not to adapt – or to adapt in a manner that worsens vulnerability and/or carbon emissions (i.e., maladaptation). Adaptation and resilience investments in mining may also have a broader scope and impact, improving the overall capacity of the mining company's ecosystem (such as assets, workers, supply chains, and surrounding communities) and enabling them to manage operational disruptions, protect critical supply chains, safeguard ecosystem services, and sustain both planning returns and social acceptance amid increasingly volatile climatic and regulatory conditions.

TPT Framework

Throughout the following sections, we utilise the framework of the TPT (Figure 1), exploring the intent of each Disclosure Element and how adaptation planning and action can be embedded for strategic resilience.



Ambition

In the TPT framework, the principle of “Ambition” is designed to ensure that entities set clear, strategic, forward-looking climate transition objectives that go beyond compliance. By considering wider impacts and interdependencies of their transition strategies, entities are encouraged to drive meaningful change at sector and economy-wide levels, establishing a credible ambition is fundamental to the overall integrity and effectiveness of a transition plan.

1. Foundations

“Foundations” establishes the starting point for credible transition planning by requiring entities to disclose their overarching objectives or ambitions for managing climate-related risks and opportunities. It describes the strategic direction, operational scope, and context for a transition to a low-carbon, climate-resilient entity.

How do adaptation and resilience come in?

The core objective of adaptation planning is to manage risks and opportunities related to physical climate impacts that have either not yet been experienced but are likely to occur over a project’s life, or are currently considered rare and will become increasingly the norm. The key risk is that, if inadequately addressed, plans may be needlessly and expensively knocked off course, both operationally and strategically, from the short- through to long-term. Getting to grips with this involves an informed, flexible, and proactive approach to strengthening climate resilience across an entity’s assets, operations, supply chains, and the communities in which it operates, to better withstand and adapt to the increasing frequency and severity of climate-related disruptions.

Maturity Journey for Foundations

The Foundations maturity journey describes how entities move from incidental consideration of physical climate risks toward the deliberate design of strategic intent, assumptions, and decision frameworks that make climate-resilient action possible. At this stage, the emphasis is on establishing clarity of ambition, scope, and governance expectations so that subsequent implementation, metrics, and accountability mechanisms are coherent and adaptation-ready.

Tangible Tools and Tips for Foundations

The following practical actions can help entities translate climate ambition into tangible steps across governance, strategy, and risk management - no matter their size or stage.

- Identify key information and decisions
- Ensure continuous adaptation updates
- Allocate roles, responsibilities and resources
- Consider strategic alignment.
- Right-size your ambition
- Use international standards to inform and guide.
- Undertake a capability assessment.
- Create local partnerships.
- Engage diverse opinions in climate change risk assessments.
- Define and align on organisational boundaries for risk assessment.
- Use a holistic risk identification (enterprise risk management) scope.
- Define risk appetite, thresholds, and triggers.
- Prioritise risks using approaches which best suit the entity, e.g., impact-action mapping.
- Carefully select scenarios and use them to stress-test.
- Centralise all assumptions in a single list.
- Prioritise dual-benefit actions, pairing Net Zero with resilience.
- Integrate decision making and financial planning.
- Assess cross-functional governance and any gaps.





Action

The “Action” principle of the TPT Framework and “continuous improvement” principle underlying ISO14090 focus on how entities will deliver their ambitions. This requires entities to move beyond intention, instead demonstrating how climate risks and opportunities will be actively managed – the most important part of climate risk management. This includes how a plan will be implemented and how external engagement will ensure action is inclusive, credible, and effective. Collectively, these components bridge ambition and actual impact, making this a defining element of a low carbon, climate-resilient transition plan.

2. Implementation strategy

The “Implementation Strategy” disclosure element focuses on how entities can integrate their climate considerations into systems, processes, and decisions that shape real-world outcomes. Moving from ambition to delivery requires more than one-off actions; it involves fully embedding climate resilience into policies, plans, delivery capability and investments to remain “adaptive”. To ensure robust, lasting resilience, entities consider climate resilient transition planning when operational and financial decisions are made. Making adaptation part of “business as usual” will allow entities to better respond to evolving climate risks, support long-term value creation, and reduce vulnerability.

How do adaptation and resilience come in?

Adaptation becomes actionable when entities identify and prioritise measures that are climate-smart, cost-effective, timely, fit for early or iterative implementation, with the capability to deliver. Adaptation actions should be embedded into core business systems such as planning and decision cycles, operational risk processes, and standard capex programmes, rather than treated as standalone efforts. Operationalising this adaptive management approach requires entities to use pathways, triggers and evidence to guide iterative decisions over asset lifetimes. Embedding adaptation also means integrating into strategic plans, operational procedures (including operations and maintenance), enterprise risk management, risk registers, and investment decisions. A robust low-carbon, climate-resilient transition plan incorporates uncertainty, tipping points and decision thresholds, as well as capability gaps into strategic planning, enabling more informed and adaptive decision-making in the face of evolving climate risks.

Flexibility and agility are essential attributes of resilience that should be intentionally cultivated across the entity. This approach embeds resilience into the core of transition planning, ensuring that entities remain responsive and adaptive as climate conditions and associated risks continue to shift.

Maturity Journey for Implementation Strategy

The Implementation Strategy maturity journey describes how entities translate foundational intent into execution, moving from ad hoc, compliance-driven responses toward the systematic use of pathways, triggers, data, and decision cycles to manage climate risk in practice. The emphasis is on operationalisation, iteration, and learning as uncertainty increases.

Tangible Tools and Tips for Implementation Strategy

The following practical actions can help entities ensure that their implementation strategies are appropriate, flexible, and well timed:

- Use an Adaptation Pathway Assessment.
- Embed a range of prioritisation tools.
- Action findings of exercises.
- Identify proactive and reactive controls with Risk Bowties.
- Refer to previously used scenarios and thresholds.
- Develop an adaptive capacity development plan.
- Develop adaptive investment plan.
- Update mechanisms at an appropriate pace.
- Use simple action-planning tools and cross-functional workshops to guide implementation across teams.
- Consider and prioritise community value.
- Complete an Adaptation Plan.



3. Engagement strategy

It is rare that an entity is completely in control of its resilience to climate change risk. To varying degrees, it is normal for resilience to depend upon decisions made by others that are outside their control. It is equally true that an entity's adaptation decisions can have consequences beyond their own operations. Some important resilience measures are not under the control of a single entity and require a combined effort. This is one key difference between adaptation and decarbonisation. The "Engagement Strategy" disclosure element under the "Action" principle highlights the importance of working with a range of stakeholders to ensure that all relevant actors understand, support, and contribute to climate-resilient transition planning.

How do adaptation and resilience come in?

Together, entities and their stakeholders can explore climate impacts and adaptation opportunities; form relationships and build a shared understanding; use expert knowledge and existing data likely beyond an entity's in-house expertise; identify and estimate thresholds where action is needed; identify actions that could be implemented; and develop high-level adaptation pathways.

Adaptation and resilience are embedded in a mining company's engagement strategy by collaborating early and inclusively with all stakeholders. Sharing climate data, local insights, and ecosystem knowledge builds trust and ensures that adaptation plans reflect real-world needs and priorities. By making engagement an ongoing, iterative process, entities can co-develop effective resilience measures, align efforts across operations and supply chains, and maintain social acceptance in the face of a changing climate and economy. Adaptation is an iterative process that is most effective when stakeholders share a common understanding and shared interest.

Maturity Journey for Engagement Strategy

The engagement maturity journey shows how organisations evolve from transactional, compliance-focused engagement toward sustained collaboration that recognises resilience as a shared challenge across communities, supply chains, infrastructure, and authorities.

Tangible Tools and Tips for Engagement Strategy

The following actions can help entities ensure that engagement strategies are effective and enable productive, two-way dialogue which is essential to a balanced adaptation plan:

- Use existing processes to help map stakeholders across the value chain, wider enabling environment, and domain of impact of adaptation measures.
- Engage vulnerable points in the stakeholder system to find ways to increase resilience.
- Update the scope and process of engagement.
- Put in place the roles, responsibilities and resources to deliver the more mature scope and processes.
- Run cross-functional workshops and continually communicate.
- Embed adaptation into shared value.
- Collaborate on infrastructure planning.
- Build mutually beneficial capacity through exchanges.



Accountability

Without accountability, there can be less incentive for an entity to carry out their ambitions and actions; and when they are carried out, it may be with lacking cohesion. Accountability ensures that climate ambitions translate into real outcomes. The "Accountability" principle engenders the structure needed to track progress, respond to change, and maintain alignment between strategy and day-to-day decision-making.

4. Metrics and targets

Metrics and targets are critical for tracking key performance indicators (KPIs) and ensuring continuous improvement. While indicators are what an entity assesses (i.e., qualitative or quantitative variables that help assess changes, progress, or status), metrics are the means by which an entity measures an indicator (i.e., specific, measurable data points or units used to quantify an indicator). Targets represent where an entity wants to get to (i.e., explicit goals established for an indicator or metric that define the desired level of performance or achievement). Targets are typically time-bound, whether quantitative or qualitative. The aim is to ensure alignment with strategic climate ambitions while holding entities accountable for meaningful progress and transparency in their climate-resilient transition plans.

How do adaptation and resilience come in?

Adaptation indicators should signal changes in progress or status in vulnerability and/or adaptive capability at the site, entity, or value chain level. As a result, adaptation metrics should help measure improvements needed to implement adaptation pathways or to pivot with new information or unexpected developments. They support disclosures on the performance of course-correction processes to ensure action is guided by lessons learned and continuous improvement occurs, in addition to supporting smarter, transparent, and responsible decision-making.

This disclosure sub-element focuses on meaningful metrics and targets to measure, manage, and communicate progress toward an entity's climate resilient transition objectives. This requires establishing feedback loops between monitoring systems, operational data, and strategic review—enabling entities to test assumptions, learn what works, and adjust thresholds and pathways accordingly.

Maturity Journey for Metrics and Targets

The metrics and targets maturity journey explains how entities progress from compliance-focused indicators toward decision-relevant measures that track vulnerability, adaptive capability, and progress against climate-adapted transition objectives.

Tangible Tools and Tips for Metrics and Targets

The following actions can help entities embed accountability in the most appropriate, measured, and flexible manner:

- Monitor progress.
- Work towards financial integration.
- Balance transition and adaptation.
- Ensure transition is resilient and adaptive to the changing climate.
- Use evidence-based target setting.
- Embed adaptation in mainstream accountability.
- Consider short-term measurability, long-term relevance.
- Use an adaptation pathways approach.
- Stress test performance.
- Define decision thresholds.
- Consider qualitative or semi-quantitative data.
- Increase transparency in external communication.
- Carry out a credit and offset assessment.



5. Governance

Governance considers who holds the entity accountable for delivering on its transition and adaptation objectives. It includes the role of the board and senior leadership, and the systems in place to monitor progress and drive action. For adaptation, strong governance means clearly defined responsibilities, cross-functional coordination and integration of climate resilience into enterprise-wide risk management and decision-making processes.

How do adaptation and resilience come in?

Whether or not adaptation and resilience efforts are successful is reliant on the effectiveness of governance frameworks. The responsibilities for making adaptation-related decisions and implementing actions should be explicit, inclusive of making clear the options available to decision makers and operatives when implementing adaptive actions. To ensure that potential impacts of adaptation and resilience actions are maximised, and are not inhibited by other elements of business strategy, all decisions within the entity should be climate informed, i.e. other elements of business strategy are not developed or actioned without climate being considered and the trade-off implications for adaption and resilience actions.

Maturity Journey for Governance

The governance maturity journey describes how accountability, authority, and escalation mechanisms evolve to ensure adaptation and resilience are embedded in decision-making, not treated as discretionary or peripheral.

Tangible Tools and Tips for Governance

The following actions can help hold entities to account for delivering on their transition and adaptation objectives:

- Ensure board oversight covers both decarbonisation and adaptation.
- Leadership demonstrates clear support
- Ensure effective progress and action against plans
- Appoint climate champions across the business to drive adaptation and transition integration.
- Encourage staff to raise uncomfortable issues
- Create speak up mechanisms.
- Provide weather vs climate clarity.
- Regularly review operational objectives and external influences





Maturity Journey

The metals and mining value chain is complex. Project stages span from mineral exploration through project development, extraction, comminution, processing, and use of materials. While larger entities may have projects and divisions that span several value chain stages and minerals, the majority of the sector is composed of thousands of smaller (“junior”) entities which often specialise in a particular value chain stage and / or mineral. Projects are commonly progressed through sales from one specialist entity to another.

It is important to note that the importance of adaptation and ease at which it can be implemented is not influenced by where an entity or project sits along the value chain. All entities require and can implement and integrate adaptation efforts. However, entities may differ in their level of maturity in doing so.

While aspects of a typical maturity journey have been outlined in this document, the technical supplements to this white paper describe in detail the maturity journey that any entity could take. To ensure that the examples presented are relevant to a diverse range of entities within the sector, a composite profile was developed to act as both an “everyperson” and a “strawperson”.

In the TPT Aligned Technical Supplement, TPT principles (i.e., ambition, action, and accountability) are examined against what an entity may:

- already have or be doing,
- be doing or considering in its first steps in moving forward on a journey to maturity, with respect to adaptive capabilities,
- extend its actions and considerations to as it becomes adapted; and,
- do and/or consider when it becomes adaptive.

In the IFRS Aligned Technical Supplement, a coherent narrative of an entity's maturity journey is described in alignment with the four pillars (i.e., “strategy”, “risk management”, “metrics and targets”, and “governance”), as well as “engagement”. As a facet of TPT guidance, “engagement” has been included as a separate theme throughout this technical supplement for multiple reasons. Not only does this help bridge the gap between the two frameworks, but it also reflects the particular importance of stakeholder communication within the Metals and Mining sector.

Decoding where to start

Knowing when and how to begin integrating adaptation can be difficult. Not all action is urgent, although some can be. Adaptation requires windows of agency. It may be viewed as something to address down the line, for instance once a mining project becomes operational, or once the site has been exposed to a physical risk, however reactionary measures are often more expensive than proactive actions. In reality, the earliest stages of a project offer the greatest flexibility to act (Figure 2); exploration and feasibility are when companies make foundational decisions with long term consequences. Designing for resilience from the outset can reduce lifetime costs, limit future retrofitting and avoid locking in exposure to climate hazards. This ultimately ensures a project's longevity, irrespective of what the future climate looks like and delivers more sound resilience.

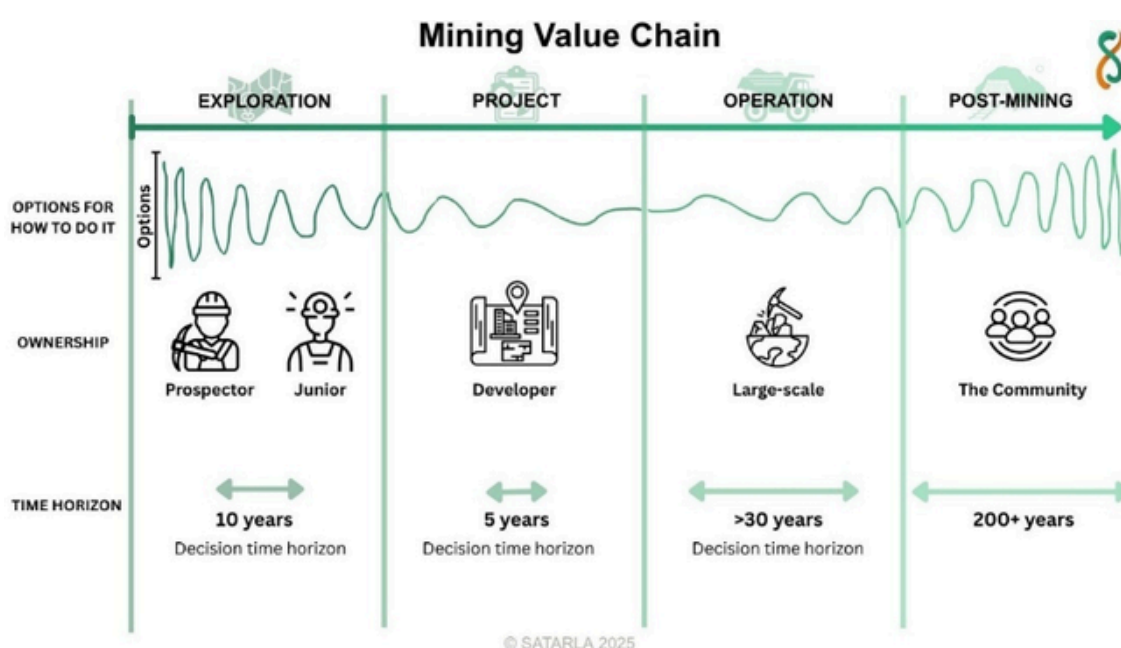


Figure 2. Decisions around infrastructure, materials, location and engagement are still open - making the outset of a project the most practical and cost-effective point to embed climate resilience.

Notwithstanding, adaptation is highly relevant throughout the entire lifecycle of a mine and there is great value in engaging ongoing projects and integrating adaptation into all stages of the mining value chain. Within development and operational projects co-benefits can include increased social return on investment and local community acceptance of projects, managing threats of project disruption. This is particularly emphasised through the development of resilient regional infrastructure and the integration of adaptation into not only 'site' activities but all of those that the entity undertakes.

Looking ahead, adaptation can support post-mining land use and local economic transitions. For example, improving energy security for surrounding communities could offer co-benefits during operational and closure phases of a mine. Long-lived structures like tailings storage facilities (TSF), waste rock piles, and water management systems are frequently left in place indefinitely and definitively require adaptation planning to ensure structural integrity under changing climatic conditions and meet future regulatory and community expectations.

Adaptation is not a one-time decision; it is a continuous process. Starting early enables proactive planning and continuing through the lifecycle ensures that no stage is left exposed.

Conclusion

Climate risk is now widely recognised as business risk, and adaptation is the essential response to this reality. While emissions reduction remains critical, it is no longer sufficient on its own. The mining sector, with its long project lifecycles and exposure to physical climate hazards, must integrate adaptation into its strategic planning to ensure operational continuity, regulatory compliance, and long-term value creation. This suite of documents aims to outline how adaptation can be embedded into transition planning using the Transition Plan Taskforce (TPT) framework, offering practical tools, case studies, and guidance tailored to the metals and mining sector.

Adaptation is not just about responding to hazards; it is about understanding the real risks and vulnerability and building internal capacity to act. By shifting focus from external threats to internal strengths, mining companies can proactively design resilience strategies that are context-specific and inclusive. This includes assessing adaptive capability, identifying decision thresholds, and developing adaptation pathways that guide timely and cost-effective action. The paper emphasises that adaptation should be embedded into business-as-usual processes, from procurement and operations to financial planning and governance.

Integrated transition plans that combine adaptation and decarbonisation offer a comprehensive approach to climate risk management. These plans enable entities to align capital investment, improve access to climate-aligned finance, and build stakeholder confidence.

Ultimately, adaptation is a continuous process that must be embedded throughout the lifecycle of mining projects, from exploration to closure and beyond. This white paper provides a replicable framework for integrating adaptation into transition planning, helping mining companies move from intention to impact. By starting now, even amidst uncertainty, entities can future-proof their operations, support community resilience, and contribute meaningfully to a low-carbon, climate-resilient economy.

