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# TPT Aligned Supplement: Toward Adaptive Climate Risk Management

PRESENTED BY  
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# 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

This TPT Aligned Supplement examines how entities progressively build the adaptive capabilities required to manage physical climate risks in practice, moving from treating adaptation and resilience as peripheral considerations to embedding adaptive climate risk management across the organisation. The supplement is structured around **five distinct but interdependent maturity journeys**, each of which describes how intent, execution, collaboration, measurement, and accountability evolve as adaptation becomes more systematic and decision-relevant. Taken together, they describe **how entities put an adaptive management cycle into practice** using monitoring, evaluation and learning to update pathways, thresholds and decisions over time.

The white paper asserts that "mature" adaptive capabilities are key to successful climate risk assessment, adaptation planning, and adaptive capacity building — and therefore climate resilient transition planning. It focuses on adaptive capability as a critical sub-set of adaptive capacity: whilst adaptive capacity reflects the underlying resources, priorities, and systems that shape an entity's potential to respond to climate risk, **adaptive capability** captures the **concrete skills, evidence, decision rights, and implementation authority** that determine whether timely and proportionate adaptation action actually occurs.

These five maturity journeys recognise that **entities may sit at different levels across sites, functions, or value-chain stages**, and that progress is rarely linear. They are therefore designed to support **self-assessment, internal dialogue, and prioritisation of capacity-building efforts**, rather than serving as a compliance checklist.

This technical supplement aligns explicitly with the Transition Plan Taskforce framework (Figure 1), with each journey reflecting progressively stronger capability across the TPT disclosure principles of Ambition (Foundations), Action (Implementation Strategy and Engagement Strategy), and Accountability (Metrics & Targets and Governance). As entities mature across all five elements, they strengthen not only their internal resilience but also their ability to demonstrate credible, decision-useful progress under TCFD (Task Force on Climate-related Financial Disclosures)-aligned and ISSB-aligned reporting, including IFRS S2 Climate-related Disclosures.

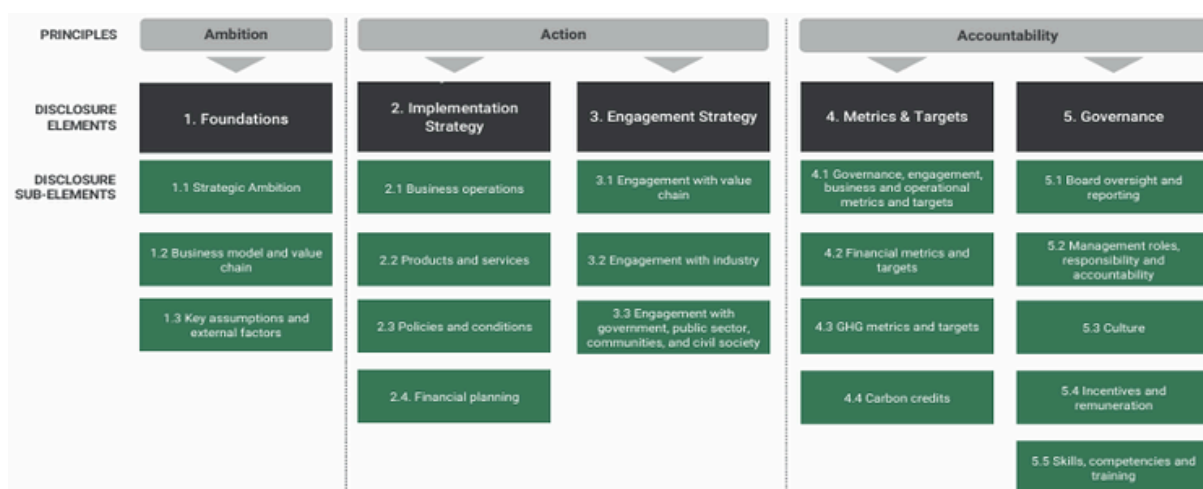


Figure 1: The principles, disclosure elements, and disclosure sub-elements which make up the framework of TPT recommendations. Source: TPT Disclosure Framework, Transition Plan Taskforce (October 2023).

# How to Use This Supplement

This supplement outlines the maturity journey that any entity could take.

To ensure that the examples presented in the next section 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”. For each TPT principle — Ambition, Action, and Accountability — this profile is examined against what an entity may do and/or consider at different stages of its adaptation maturity.

This approach provides a practical basis for capability assessment and for prioritising where to build adaptive capacity first, in consideration of what the entity may:

- already have or be doing (“Baseline”),
- be doing or considering in its first steps in moving forward on a journey to maturity, with respect to adaptive capabilities (“Starting Out”),
- extend its actions and considerations to as it becomes adapted (“Taking Ownership”); and,
- do and/or consider when it becomes adaptive (Practicing Adaptive Climate Risk Management”).



# Maturity Journey

## Ambition

In the TPT framework, the principle of “Ambition” is designed to ensure that entities set clear, strategic and forward-looking climate transition objectives that go beyond compliance.

### 1. Foundations

'Foundations' 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

##### An entity may already have or be doing the following:

- Assessing future physical conditions and environmental impacts in relevant permits, plans, and reports using the IPCC scenarios (which, depending on the relevant stage, may include: PEA, PFS, Feasibility studies, CRIRSCO aligned reports, EIAs, etc).
- Engaging with stakeholders in a meaningful manner on a broad range of topics that may not explicitly cover climate change, but discuss shared value and assess options for collaboration.
- Responding to weather-related incidents at sites as they arise, without a formalised structure to anticipate long-term risks or opportunities.

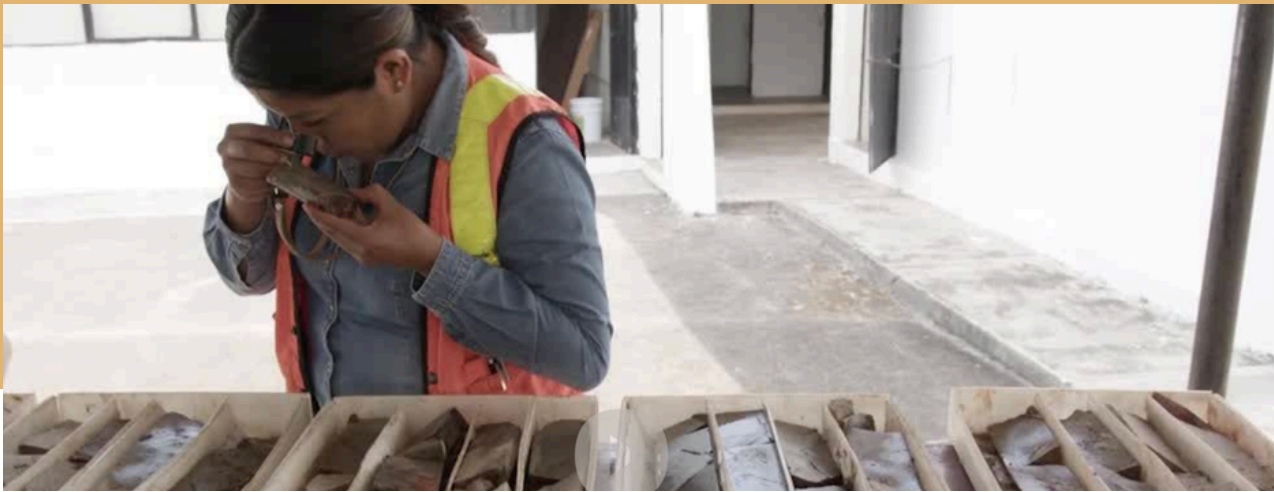
**As first steps moving forward on a journey to adaptation,** an entity may be doing or considering the following:

- Discussing climate change risk management at the senior management and Board level in line with TCFD recommendations. However, conversations explicitly mentioning climate change risk management do not take place outside of these settings.

- Acknowledging climate risks in corporate reporting (however overall climate risk management may be fragmented and adaptation not embedded systematically across operations). Site-level integration may exist, but be limited and reactive.
- Within any strategic approach to climate change, focusing primarily on mitigation and alignment with broader market expectations around the low-carbon transition.
- Using sources such as NGFS (Network for Greening the Financial System) reference scenarios within scenario analysis to support climate-related risk assessments and disclosures, though its focus remains nearer-term, oriented around securing sufficient investment to continue current operations (which may include exploration and development activities, or expanding current operations).
- Giving leadership attention to climate change, but concentrated almost exclusively on emissions reductions, permitting, and upcoming development, operational, or closure milestones (if relevant).
- Conducting vulnerability and risk assessments, although these may not yet be systematic. Assessments are qualitative, conducted in isolation at some sites and so may not be comparable across jurisdictions. Adaptive capacity of sites (e.g., water availability in Africa, extreme storm exposure in North America, or heat stress in Australia) is not captured in a standardized framework.
- Engaging with stakeholders regarding climate-related risk, although this occurs largely through compliance processes.
- In larger entities, setting internal thresholds to identify high-risk sites based on exposure to current and historic physical climate hazards (such as flooding of pit operations, water scarcity affecting processing plants, or heat stress on equipment). These thresholds are determined centrally by corporate teams and remain confidential, limiting transparency for site managers. At this stage, climate risk is managed primarily through head-office decision-making, with limited input from mine sites or regional operations.

**As an entity matures**, it may extend actions and considerations to include the following:

- Integrating TCFD guidance to expand the scope of strategy to consider future physical climate risks that have not yet been experienced, and that may become material over the lifetime of a project, even where its assets are currently pre-operational with only minimal infrastructure though this is likely to be reactive or in response to investor questions.
- Building on public-domain scenarios (e.g., NGFS, World Bank, IPCC), tailoring them to site level locations.
- Producing forward-looking climate analysis when requested by buyers, JV partners, or investors, often as part of due diligence or valuation exercises (though not systematically embedded in strategy or business materials, e.g., investor presentation packs).



- Adoption of ISO 14091 principles, conducting vulnerability and risk assessments consistently across geographies, creating comparable outputs, e.g., assessing water stress in African operations using the same risk criteria as for tailings dam safety in South America or heat stress thresholds in Australia.
- Defining exposure, sensitivity, and adaptive capacity for each site. Risk matrices and qualitative-quantitative tools provide structured prioritisation of climate hazards. Outputs include identifying thresholds that may trigger adaptation, e.g., maximum tolerable rainfall before open-pit flooding, or workforce health and safety thresholds for heat.
- Cross-site collaboration through e.g. scenario analysis workshops. To move beyond a top-down model, the entity may consider site-level workshops and regional knowledge-sharing hubs that would allow mine managers to contribute directly to decision-making and share lessons across operations.
- Setting adaptation objectives linked to mine planning (e.g., water security, asset integrity, tailings resilience), integrating adaptation into exploration feasibility studies, and applying basic adaptation pathways analysis for operational planning. Short-term adaptation actions may be tracked, and feedback mechanisms (such as lessons from near-closure sites) begin to loop into earlier project phases.
- Feeding of operational data such as rainfall levels affecting tailings stability, water usage rates at processing plants, extreme heat impact on worker health, electrical systems of machine operation, or supply chain disruptions from extreme weather an entity-wide sustainability dashboard. This can enable the entity to financially quantify risk exposure and prioritise adaptive measures more efficiently. For instance, drought-prone sites may find that investments in water recycling systems or upgraded cooling systems for electric circuit cabinets are financially justified as a resilience measure, while sites exposed to storms may prioritise improving drainage of haul road infrastructure or earthworks. However, slow approval processes (especially in larger entities) may delay implementation of adaptive measures.
- Mapping hazards to identify business units most exposed to climate impacts, alongside detailed assessments of climate risks to critical assets such as open pits, processing facilities, and logistics routes. These processes reflect a shift toward empowering local decision-making while maintaining corporate oversight.

**A mature entity** likely does and/or considers the following:

- Treats physical climate risk as a core element of its long-term strategy and a competitive differentiator, systematically conducting downscaled climate risk analyses for all sites, whether exploration, development, JV/construction, or operational, and integrating these into business planning and investor disclosures. Both free/public datasets and commercial, value-added products (offering e.g., compound hazard risk ratings, financial metrics such as Climate Value at Risk, residual risk management capability assessments) are leveraged. Site-specific profiles capture all material hazards, from current exposure through potential risks extending up to e.g., 20+ years post-closure.
- Include threshold implications for business-as-usual practices in analyses of climate risk (e.g., how haulage operations may be disrupted by 1-in-100 rainfall events or how modular reactors could be impacted by high heat), and propose adaptive responses. Insights allow the entity to communicate adaptation pathways and operational resilience strategies directly to investors and potential buyers, positioning itself as a trusted, advanced partner.
- Embed the full ISO14090 adaptation management cycle in activities. Governance structures ensure Board and senior leadership oversight, with climate adaptation and mitigation treated as distinct but integrated strategic priorities. Roles and responsibilities for adaptation planning are defined across the organisation, allowing site-level risk data to feed centrally into enterprise strategy. Strategic alignment ensures resilience planning is incorporated into new asset design, procurement, and early-stage JV negotiations.
- Undertake systematic, quantitative vulnerability and impact assessments (a combination of potential physical risk, current capability to manage the risk, and the residual risk posed by unmanaged risk) across the portfolio. These define site-level thresholds, model likely risks under multiple climate futures, and translate them into financial and operational implications. Outputs include climate-adjusted financial valuations, adaptive investment payback metrics, adaptive capability gap analysis and development planning at central and localised levels, and clear prioritisation of interventions. These analyses are incorporated into investment readiness, capital planning, and disclosure commitments under TCFD and IFRS S2.
- Embeds climate risk and adaptation strategy across the mine life cycle and aligned with TCFD, ISSB and ISO frameworks. The entity integrates scenario analysis into strategy at corporate and site levels, assessing multiple possible climate futures (including extremes), and aligning investment decisions accordingly. Scenario planning uses science-based forecasts to assess risks across multiple futures, and thresholds analysis or similar for uncertainty management planning —from gradual increases in temperature affecting worker health and productivity, to extreme events disrupting supply chains and ore transport.





- Plans with the expectation that unforeseeable climate impacts can take place, requiring continuing horizon scanning and innovative capability to address unforeseen impacts. The objective is to remain “adaptive” to new information and experience, recognising that there is not an “adapted” end state.
- Fully embeds climate adaptation into business strategy, guiding both near-term operations and long-term investment. Adaptation is managed through a structured cycle, with defined leadership, resources, and governance. Corporate committees guide strategy, but site-level resilience “champions” ensure action on the ground, irrespective of the stage of the mining lifecycle. Adaptation plans are routinely reviewed and adjusted, ensuring continuous improvement. Forward-looking planning incorporates adaptation into asset design and procurement, ensuring new mines are “climate-ready.”
- Clearly communicates quantitative adaptation targets (e.g., percentage of assets assessed and adapted, strategic and site-level resilience KPIs), aligning with both enterprise-level disclosures and TCFD requirements. Site targets are harmonised to avoid misalignment across jurisdictions. Importantly, learnings from late-life mines feed into exploration and feasibility projects, ensuring resilience considerations are embedded from the earliest stages of the mine life cycle.
- Uses adaptation pathways to plan capital investments for mines with long lifespans, ensuring assets remain resilient (so far as is possible) under shifting climate conditions. Resilience investment decisions are tied to core business objectives: securing water resources for ore processing, designing energy supply resilience (e.g., hybrid renewable-diesel systems in remote sites with operating thresholds that accommodate possible impacts that may emerge over their operating life), or hardening and/or improving the drainage transport infrastructure critical for moving ore to market. “Lock-in” analysis is applied to prevent future maladaptation, such as investing in water-intensive processing technology at sites likely to face long-term scarcity, or electrical or operating assets that will not operate in the temperatures which may occur over their operating life.
- Formalises organisational commitment through a resilience governance structure, such as a cross-functional climate adaptation working group reporting to the executive committee. Staff expertise, geoscience data, engineering tools, and financial resources are mobilised to manage risk systematically.

## 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.

- **Engage diverse opinions in climate change risk assessments.** These can be carried out through interactive workshops to engage a full diversity of business lines, roles, and functions, identifying and prioritising climate-related risks and opportunities. This can foster entity wide buy-in to resilience and adaptation efforts, and emphasise links that demonstrate climate risk is business strategy risk.
- **Define and align on organisational boundaries for risk assessment.** Align all roles on the scope for the risk assessment, using tools such as the Extended Enterprise to identify core activities, inputs, outputs and external influences that could be impacted by climate change risks and opportunities.
- **Use a holistic risk identification (enterprise risk management) scope.** Extend risk identification beyond immediate climate hazards and include broader systemic or business-related risks that affect exposure. This can be achieved through risk network activities, where the interrelationships between risks and opportunities are mapped, highlighting central nodes and potentially compounding risks.
- **Define risk appetite, thresholds, and triggers.** Define risk tolerance levels for climate change risks and apply them to set clear prioritisation criteria and decision triggers. This can be especially useful in ensuring climate related risks are not consistently treated as individual weather events but recognised as medium- and long-term risks where appropriate, helping to ensure that action is taken when needed and most impactful.
- **Establish decision points that reflect risk tolerance values,** e.g., “when the temperature reaches x, we shall carry out action y”. Each action should be linked to decision triggers informed by climate risk assessments and unhooked from climate projections and dates (e.g., 2035). This approach allows adaptation to be implemented at the pace that climate change unfolds and enables entities to work with confidence amidst uncertainty, exploring a diversity of responses and opportunities.
- **Prioritise risks using approaches which best suit the entity,** e.g., impact-action mapping. While likelihood may be considered essential in understanding physical hazards, other tools such as impact-action mapping can help to navigate difficult conversations regarding how likely climate change events may be. Climate change is an emotive topic, and scientific models vary in their likelihood values for certain events. As a result, conversations surrounding likelihood are a common sticking point that hampers cross-functional buy-in when designing resilience and adaptation programmes.



- **Carefully select scenarios and use them to stress-test.** Use decision-relevant scenarios that include both physical and transition risks, such as those presented by NGFS, which can better support integrated planning. Apply at least two contrasting scenarios to test key decisions. A worst-case climate change scenario can help to better consider extreme weather events (tail risks) and possible long term climatic conditions.
- **Centralise all assumptions in a single list.** Assumptions made are likely to extend beyond climatic variables to include those regarding material demand, global economic trends, international political events, etc. To ensure that the full list of assumptions underpinning climate risk assessments is visible to the entire enterprise and all decision makers and actors thereafter, a single assumptions list should be stored and updated following any revision to the risk assessment. Identify and challenge which key climate-related assumptions are driving decisions, such as climate projections, material demand, and input costs, and where they may break down.
- **Assess cross-functional governance and any gaps.** Incorporate adaptation considerations across operations, finance, and governance - not only within sustainability teams.
- **Allocate roles, responsibilities and resources.** Mainstream leadership and governance to underpin delivery of this ambition, and ensure those with allocated responsibilities have the competence, capacity, and authority to deliver the ambition.
- **Integrate decision making and financial planning.** Ensure adaptation priorities, not just emissions targets, are reflected in KPIs and remuneration, decision making and investment governance, financial forecasting and planning, and capital allocation. This can be especially challenging in joint ventures, but ensuring both parties are aligned can ensure better adoption of key adaptive measures.
- **Consider strategic alignment.** Ensure adaptation, transition planning, and net zero goals are embedded in decision making, business strategy, budgeting, and financial planning, including alignment with joint venture partners.
- **Prioritise dual-benefit actions, pairing Net Zero with resilience.** Prioritise resilience strategies that include physical risk preparedness, emission reduction targets, and social value outcomes. For instance, land management at sites can provide natural barriers to some physical risks, while also providing a means to offset emissions.
- **Residual risks.** For risks that cannot be fully and completely managed through proactive adaptation, consider: enhanced adaptive capability, reactive controls and risk transfer (e.g., comprehensive insurance) to ensure that, should an event occur, its effects are tolerable and within our defined objectives and thresholds.

- **Ensure continuous adaptation updates.** Make sure that adaptation practices are updated based on experience and foresight, applying competent expertise and drawing on science-based evidence.
- **Right-size your ambition.** Set resilience goals that reflect and are aligned with your entity's context, size, decision lives, maturity, ambitions, and risk profile, applying competent expertise and drawing on science-based evidence.
- **Use international standards to inform and guide.** Leverage well-established standards and frameworks to support internal efforts, even if full compliance is not a goal. For instance, ISO14090 principles can help to define adaptation objectives, while practices outlined in ISO14091 can assist with vulnerability assessments.
- **Undertake an adaptation capability assessment** to understand current strengths and gaps in governance, data, skills, and decision processes, so that adaptation pathways and investments are paced to what the organisation can actually deliver and improve over time.
- **Create local partnerships.** Where relevant, establish mutual benefit agreements or co-created compacts to ensure that adaptation actions can support local ecosystem resilience. Efforts can and should be aligned to local, regional, national, or international programmes and targets.



# Action

The “Action” principle of the TPT Framework and “continuous improvement” principle underlying ISO14090 focus on how entities will deliver their ambitions.

## 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.

### 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. This prioritisation can be informed by capability assessments that clarify current adaptive capacity, governance readiness, and data system maturity, ensuring adaptation pathways are fit for delivery and iteratively mature. 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. 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. By setting clear thresholds that reflect entity values and risk tolerance, entities can establish triggers for action and key decisions, or at least be prompted to discuss and explore these in greater depth. 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

**An entity may already have or be doing** the following:

- Addressing climate risk through compliance-driven sustainability reporting and mitigation goals (e.g., emissions reduction targets, rather than adaptation or resilience).

**As first steps** moving forward on a journey to adaptation, an entity may be doing or considering the following:

- Acknowledging weather events as potential risks to operations. There may be a high-level policy statement at corporate level. Senior level discussions may refer to changed climate risks. Site level risk management activities include mapping broad categories of current and future risks such as flooding in open pits, heat stress on processing facilities, and water scarcity affecting operations. Broader climate risks may only be considered explicitly only in post-incident reviews or in response to regulatory requirements, rather than as part of forward-looking planning.
- Convening workshops, mainly to foster dialogue across business lines and build a common understanding of climate risks, but these engagements are not yet systematically linked to decision-making. While risks are identified, there is only limited capability to translate them into concrete adaptation actions or decision triggers.
- Defining roles, responsibilities, and processes for risk identification, assessment, and response.
- Engaging stakeholders around climate risk specifically may occur, but it is likely ad hoc and compliance-oriented, with little awareness of systemic threats.

**As an entity matures**, it may extend actions and considerations to include the following:

- Evolve enterprise risk management processes to integrate climate into business continuity and crisis management planning. For example, short-term climate-related risks such as supply chain disruption due to flooding or workforce health and safety during heatwaves are now embedded in adaptive pathways for resilience.
- Beginning to structure and integrate climate change risk management with the broader sustainability and business continuity framework. Leadership encourages action that makes current systems more efficient at managing current and future climate risks. Site-specific adaptation pathways that include climate-hazard triggers are supported by financial quantification of key risks. Triggers and adaptation pathways may be developed using the expert judgement of internal specialists and existing advisors, possibly with external facilitation of the process.

- Integrate climate risk management into the corporate Sustainability Strategy in a coherent manner comparable to ISO14090, with attention to avoiding “maladaptation”, ensuring climate vulnerable actions do not undermine e.g., water security for local communities or social development objectives. Regular workshops and retrospective analysis at closure-phase mines create a structured flow of lessons learned, embedding continuous improvement into risk management across the portfolio. These practices start to form a structured monitoring, evaluation and learning loop, where insights from incidents, pilots and closure projects are routinely fed back into design standards, pathways and thresholds.
- Explicitly defining risk thresholds within assessments, estimate likelihood and consequences, and integrate site vulnerability and adaptive capability into prioritisation. Impact–feasibility analyses (a feature of ISO 14091 risk prioritisation) are used to design adaptation pathways that balance technical feasibility with financial and operational constraints. Risk matrices are increasingly used to prioritise climate hazards and evaluate system-level threats across the mining value chain.
- Proactive exploration of physical risk scenarios, though adaptation planning remains exploratory and investor-driven and uses global or regional climate projections (e.g., NGFS “Current Policies, Hot House World” and IPCC scenarios) to identify potential thresholds that could trigger adaptation measures, e.g., extreme rainfall scenarios that could make access roads impassable, or high-heat futures limiting field crew safety during summer drilling seasons. However, the usefulness is constrained as most are not downscaled to the site level, may miss material hazards, and generally exclude “tail risks” (low-probability, high-consequence events). Solutions are focused on risks with a high probability of occurring. Climate uncertainties are not effectively addressed.
- At vulnerable sites, installation of sensors and data collection technology to monitor key hazards such as rainfall intensity, groundwater availability, and temperature thresholds. Triggers derived from these data streams may be defined to activate specific adaptation measures, e.g., activating water reuse systems when rainfall falls below a predefined threshold, improving cooling capacity in electrics cabinets, or escalating tailings inspections during high-rainfall events.
- Introduce vulnerability assessments in a limited capacity, providing first-pass qualitative overviews (e.g., flooding susceptibility, wildfire proximity). These analyses begin to flag thresholds and interdependencies but remain episodic, and may lack a structured link to corporate decision-making.
- Corporate and site level adaptation champions (or “change agents”) are given formal roles.
- Roles and responsibilities for managing climate risks within these boundaries are identified and given appropriate authority and resources to manage these risks in this way.

**A mature entity** likely does and/or considers the following:

- Institutionalises and embeds climate risk management into both enterprise-level governance and site-level operational planning, fully aligned with e.g., TCFD, ISO 14090, and ISO 14091. Adaptation pathways are actively used across all operations with increasing levels of quantitative analysis, continuously refined with new data, and explicitly incorporated into decision-making throughout mine planning, operations, and closure.
- Undertakes proactive and data-driven risk identification, monitoring, and management (e.g., site monitoring stations and real-time data dashboards) continuously throughout the mine life cycle.
- Systematically shares information collected from sensors with external stakeholders - including communities, regulators, and infrastructure partners - reflecting a recognition of the interdependencies between mining operations and local adaptive capacity. In some instances, monitoring data are co-collected and co-governed with stakeholders, strengthening trust, transparency, and regional resilience.
- Uses downscaled climate projections at the site level to assess acute (e.g., extreme rainfall, wildfire, storm events) and chronic (e.g., heat stress, water scarcity, permafrost thaw) risks. These assessments inform quantitative adaptation pathways analysis, screening prospective sites for climate exposure early in development to ensure resilience is factored into feasibility studies, permitting, and eventual construction planning. Risks to specific project components such as living quarters, haul roads, power supply infrastructure are explicitly identified, and thresholds that would necessitate action are defined.
- Uses desktop climate risk analyses as a cost-effective first-pass tool to produce hazard maps and generate financial metrics such as Climate Value at Risk (CVaR). These outputs are familiar to financiers and insurers, enabling entity to “speak the same language” as lenders, equity partners, and underwriters, thus supporting capital raising. While not a substitute for site-verified engineering assessments, these analyses strengthen both the credibility of prospectuses and early design resilience.
- Embeds vulnerability and impact assessments into core decision-making, with systematic quantification of supplier climate risks (e.g., vulnerability and impact assessments, Scope 3 questionnaires and due diligence processes). Site-specific vulnerability and impact assessments are standardised and systematic, producing comparable outputs across regions. All material hazards are analysed with time horizons extending through operations and up to 20 years post-closure, identifying thresholds that inform both local operational decisions and enterprise risk prioritisation. Feedback loops ensure that risk prioritisations are updated as hazards, vulnerabilities, and adaptive capacities evolve. Assessments consider the climate change uncertainties that need to be managed.





- Implements the full adaptation management cycle, including the expectation that unanticipated climate impacts will occur, retaining the capability to horizon scan for these events and innovate to address them when unfamiliar events occur, with monitoring and evaluation results explicitly driving the revision of thresholds, triggers and adaptation investments across the portfolio. Defined leadership roles ensure accountability for adaptation across board, corporate, and project levels. Governance structures integrate physical climate risk into investment decision-making, JV negotiations, and due diligence processes.
- Explicitly integrates adaptation planning into long-term value creation. Financial quantification tools such as Cost Avoidance Estimates, Climate-Adjusted Returns, and Adaptation Payback Periods are developed and used, though robust cost-benefit calculations remain complex given the assumptions required for sites not yet in production, impacts that have not yet been experienced and the uncertainties about the scenarios that will unfold. Adaptive learning cycles ensure that new knowledge from site-level, supply chain and sector experience as well as community collaboration feeds directly back into corporate strategy to maintain flexibility against long-term uncertainties.
- Reviews lessons learnt from operations after disruptive climate events and at the end of the life of mine or in remediation; and, integrates lessons learnt into acquisition policies within the entity and within the work of the exploration department. These learnings provide the basis for high resolution cost-benefit calculations for future projects. Outputs from these cost-benefit analyses and learning resources are used internally to both design future assets as well as incorporated into value chain and community development initiatives, ensuring that partnership entities remain resilient to climate change.

### **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:

- **Identify proactive and reactive controls with Risk Bowties.** Update as maturity develops and different information is valued, also as learning and new information reveal fresh insights. There is no silver bullet for any individual risk, so using tools to identify a suite of complementary proactive and reactive controls that compensate for each other's weaknesses can help ensure risk management is effectively implemented.
- **Use simple action-planning tools and cross-functional workshops to guide implementation across teams.** Make sure that strategies are integrated and aligned with overall goals, and are proportionate to the maturity of practice being developed at that point.
- **Consider and prioritise community value.** Where relevant, design products, services, or infrastructure that also deliver resilience benefits to local communities.

- **Refer to previously used scenarios and thresholds.** Choosing decision-useful scenarios (e.g., NGFS, IPCC, bespoke) with a clear set of assumptions makes the scenarios more useful later down the line, especially when trying to understand tipping points.
- **Use an Adaptation Pathway Assessment.** Using a dated map of “low-regret → flex → transform” actions, each linked to a climate or business trigger (e.g., rainfall > 200 mm in 24 hours), can ensure that actions are rolled out at an appropriate pace. It can also help to understand the thresholds at which current practice is no longer able to deliver on objectives and ensure an enabling environment for adaptation is retained through near-term decisions.
- **Embed a range of prioritisation tools.** In addition to the adaptation hierarchy (low-regret -> flexible -> transformative), other tools can be utilised to e.g., rank actions by the effort required (time, £) and the potential impact of the action. Simple tools such as Kanban boards can be repurposed to help prioritisation as well as sequence and track actions.
- **Action findings of exercises.** Mainstream the governance frameworks, priorities, capability and competence to action the findings of all of the exercises carried out.
- **Develop an adaptive capacity development plan.** Use the insights and actions generated from establishing a baseline, setting targets and creating a roadmap.
- **Complete an Adaptation Plan.** This can help identify and define what actions are needed across the entity to manage climate-related risks and opportunities. Key components include:
  - strategic direction and goals,
  - the outcomes of entity-wide vulnerability and risk assessments,
  - consideration of which climate thresholds trigger which climate resilience continuity plans,
  - consideration of tipping points in chronic risks that escalate risk prioritisation and action,
  - integration of adaptation into core strategies, risk registers and operational procedures, and capability building to enable the right decisions at the right time.
- **Develop a resilience investments plan.** Developing a robust investment plan allows entities to set out how adaptation measures will be financed and delivered through specific details of investments and financing. Key components include:
  - a prioritised list of activities and projects,
  - financial risk assessments of climate risks and opportunities,
  - cost-benefit assessments,
  - budgets and financial mechanisms, and
  - resource mobilisation plans.
- **Update mechanisms at an appropriate pace.** Set clear processes to revise plans as new technologies or norms emerge, keeping implementation current and effective. Identify and address any capacity gaps to operating at the required adaptive maturity through these and any other required measures.



### 3. Engagement Strategy

The “Engagement Strategy” disclosure element under Action highlights the importance of working with a range of stakeholders to ensure that all relevant actors understand, support, and contribute to climate-adapted climate transitioning.

#### How do adaptation and resilience come in?

For an entity to identify and interrogate a full breadth of risks and opportunities, engagement with a broad and diverse set of stakeholders is helpful. 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. Engagement can also clarify who else to involve and highlight areas requiring further investigation.

Adaptation and resilience are embedded in a mining company's engagement strategy by collaborating early and inclusively with stakeholders including local communities, governments, utility and infrastructure operators, supply chain partners, sector partners and subject matter experts. 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 key stakeholders share a common understanding and shared interest. Workshops that provide 'safe spaces' for discussing vulnerability with key stakeholders are effective and efficient. However carried out, meaningful engagement ensures that key adaptation processes including vulnerability and adaptive capability assessments, adaptation actions, and prioritisation are all reflective of on-the-ground realities and the views and needs of affected groups.

#### Maturity Journey for Engagement Strategy

**An entity may already have or be doing** the following:

- Community engagement teams placed in regular contact with local stakeholders to build early social acceptance and maintain open dialogue. Stakeholder engagement may cover a broad range of topics, but those specific to climate change may take place primarily as part of environmental approvals, license-to-operate obligations, or after disruptive weather-related events.



**As first steps** moving forward on a journey to adaptation, an entity may be doing or considering the following:

- More structured engagement on climate change. During stakeholder interactions, discussions extend to short-term physical climate risks that directly impact operations, such as flood risks during drilling seasons or extreme heat affecting workforce safety, however the focus may predominantly remain on the entity's environmental impacts on the community (e.g., water use, land disturbance) rather than how the community and the entity might both face climate risks.
- Systematic stakeholder mapping to understand vulnerabilities, exposures, and adaptive capacities to climate change that has already occurred may have started.
- Introducing elements of the adaptation management cycle. Roles and responsibilities for engagement are clarified, e.g., assigning climate and community specialists to oversee site-level engagement and feed insights into corporate strategy. Governance mechanisms, such as site workshops and structured feedback loops, begin to emerge, though they remain primarily site-driven rather than enterprise-wide.
- Communicate limited elements of its climate strategy and share some lessons learned internally or with sector peers. However, these activities are still predominantly seen as potentially exposing past performance shortcomings rather than contributing to collective resilience.
- A high-level public policy position on climate change risk may be issued.

**As an entity matures**, it may extend actions and considerations to include the following:

- Expanded engagement to include adaptation planning. Stakeholder mapping processes may be consistent with ISO 14091 principles, to identify vulnerable groups, local infrastructure exposure, systemic interdependencies related to site level and supply chain risks. The mapping process captures interdependencies such as municipal water demand, regional power network vulnerabilities, and sensitivity of agricultural supply chains, helping ensure that adaptation plans reflect the wider system of which the mine is a part. Insights include, for example, identifying whether local roads used for exploration also represent community lifelines, or if shared water sources may become contested during drought conditions.

- Conducting qualitative vulnerability and impact assessments with internal and existing advisory specialists - possibly facilitated by specialist external advisors - and community input, which provides both local climate knowledge and social context. Vulnerability and impact assessments explicitly include external stakeholders, capturing not only risks to entity assets but also the adaptive capacity limitations of surrounding communities and infrastructure, e.g., assessing whether a local town's reservoir or drainage network has the capacity to withstand projected extreme rainfall may inform both mine adaptation plans and risk-sharing dialogues. However, these assessments may not be standardised across the portfolio, limiting the comparability and ability to inform enterprise risk management.
- The formalisation of engagement within the adaptation management cycle. Leadership roles are clarified, with site sustainability managers or designated "climate champions" responsible for convening workshops and coordinating with municipal authorities. Governance structures emerge, ensuring that post-workshop outcomes feed back into site-level adaptation planning. Importantly, climate adaptation is intentionally integrated with a Sustainability Strategy, ensuring that adaptation actions complement broader goals such as supply chain resilience and community development, rather than generating unintended negative trade-offs (e.g., water security investment benefiting mines but reducing supply for local communities).
- Larger entities may make attempts to share lessons learned across its portfolio and with industry peers, but this process may be constrained by reputational sensitivities, especially when past responses to climate impacts are seen as insufficient.

**A mature entity likely does and/or considers the following:**

- Embeds engagement as a strategic function of its adaptation and resilience planning, fully aligned with TPT's expectations and guided by ISO 14090 and 14091 frameworks. Engagement becomes continuous, proactive, and genuinely collaborative, supporting both corporate resilience and community resilience.
- To close internal knowledge gaps, the entity systematically captures lessons learned and success stories from both its own late-stage development assets and peer organisations. These insights are integrated into the design and implementation of adaption pathways, ensuring projects are climate-resilient not just technically but socially.
- Standardises vulnerability and impact assessments co-developed with municipal authorities, community leaders, and in some cases, Indigenous groups. Assessments highlight shared risks such as drought, flooding, or wildfire, that affect both assets and surrounding communities, feeding directly into adaptation planning.



- Fully operationalises the adaptation management cycle for engagement. Governance structures define clear leadership roles at both the site and corporate levels for stakeholder engagement. Adaptive capability requirements and gaps are understood and communicated, along with prioritised and resourced plans for addressing them. Resources are systematically allocated to supply chain and community engagement within adaptation budgets, embedding it as a formal component of climate risk governance.
- Demonstrates that supply chain, community and climate engagement is integral to corporate value creation. Engagement is no longer a marginal activity but a reputational and financial differentiator, building credibility climate risks are responsibly managed across the entire mine life cycle, even if in the exploration phase.
- Larger entities with multiple operations may become a key partner in collaborative infrastructure and resilience planning efforts. This includes joint applications with governments for funding regional resilience projects and co-developing adaptation plans that serve both mining operations, supply chains and surrounding communities. By integrating engagement into long-term adaptation pathways, an entity not only strengthens its own operational resilience but also contributes to wider regional resilience outcomes, reinforcing its credibility, social license, and ability to operate sustainably in vulnerable regions.

### 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.** Using the adaptation pathways process to identify key stakeholders whose input can be vital to affected adaptation pathways approaches or using information already collected for Scope 3 emissions mapping can streamline approaches. The Extended Enterprise activity can be adapted and used to identify value chain partners associated with the relevant inputs, outputs, and external influences that an entity's core activities depend on.
- **Engage vulnerable points in the stakeholder system to find ways to increase resilience.** Develop procurement protocols which encourage and support climate resilience for climate vulnerable goods and services.
- **Update the scope and process of engagement.** This may be done as adaptive capacity development reveals engagement to be positive.
- **Put in place the roles, responsibilities and resources to deliver the more mature scope and processes.**



- **Revisit and update stakeholder engagement plans.** Value chain mapping and broader stakeholder mapping activities, whether carried out using an Interest vs Influence Matrix or other tool, should be updated and revisited throughout the planning and implementation cycles of adaptation.
- **Run cross-functional workshops and continually communicate.** Workshops (particularly threshold identification through adaptation pathways assessment), group interviews, or even townhalls with key partners can help to collect insights that align priorities. Share selected findings from vulnerability, climate-risk and adaptation pathways assessments with community partners, local authorities, and civil society. This two-way communication builds trust, enhances transparency and accountability, and provides useful data that can supplement public resources or even inform other adaptation efforts. It can also build the appetite for mutually beneficial collaboration where required.
- **Embed adaptation into shared value.** Where working with stakeholders on co-created compacts or projects aiming to build and enhance shared value, consider integrating adaptation measures as standard.
- **Collaborate on infrastructure planning.** Pool resources with governments, peers, supply chain partners and communities to deliver resilient regional infrastructure. Provide regular updates on adaptation plans and progress to support coordination and alignment.
- **Build mutually beneficial capacity through exchanges.** Use placements, visits, or role exchanges to build mutual understanding and strengthen adaptation capabilities across an entity or between different parties. This could extend to and include working with academic institutions on focused research projects, learning from other local mining companies where shared actions would provide shared benefits, and encouraging subject matter experts to take opportunities to learn in different settings.

# Accountability

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

The aim of Metrics and Targets 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 are often those which 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 tend to be those which help to measure improvements needed in adaptive capabilities to implement pathways or 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.

### Maturity Journey for Metric and Targets

**An entity may already have or be doing** the following:

- Compliance-oriented data collection, where metrics are centred on environmental impact disclosures for investors. Qualitative indicators may be primarily used to assess climate risk, with limited attention paid to quantify site-level vulnerability or adaptive capability.
- A qualitative understanding of which activities and value chain members are responsible for the largest generation of GHG emissions.

**As first steps** moving forward on a journey to adaptation, an entity may be doing or considering the following:

- Robustly calculating all Scope 1 and 2 GHG emissions, utilising methodologies in alignment with the Greenhouse Gas Protocol.
- Identifying and calculating key or 'low hanging fruit' Scope 3 emissions activities and categories. Calculation of Scope 3 emissions is likely to be predominantly conducted using spend based methodologies.



- Consolidating pump- and flow-meter level water consumption and withdrawal data to generate site-level water metrics to measure broader impact of the entity in addition to fulfilment of permitting requirements.
- Convening cross-functional working groups to identify potential “next-generation” metrics. However, governance bodies remain cautious about overburdening teams with data-tracking demands. Leadership recognises the need for more transformational metrics but may lack the structures to cascade them into operational practice or align them with corporate adaptation goals. At this point, metrics reflect a foundational awareness of climate risks, but not yet a systematic framework capable of guiding adaptation planning or informing investor confidence.
- Considering adaptation-related metrics alongside environmental performance metrics, though they remain limited in scope and not yet systematically disclosed, e.g.:
  - number of assets screened under climate scenarios;
  - % of sites with dry-season water stress triggers defined;
  - qualitative-quantitative rankings of site adaptive capacity.
- Limited and inconsistent quantification of exposure, sensitivity, and adaptive capacity at each site. Without a standardised risk baseline, metrics may lack comparability across global operations. Where they are applied, vulnerability assessments are likely piloted at a desktop level but not yet field-validated, producing “first-pass” quantified results that build investor awareness of risk but stop short of technical rigour.
- Quantifying the potential financial consequences of adaptation-related risks where useful to investors or partners but still treating the practice as supplementary to its main business goals of exploration and permitting.
- Structuring metric-setting and tracking; however this is predominantly led by the Sustainability team with some involvement from the Finance team as opposed to entire enterprise-wide engagement. Some internal targets are established to provide some level of accountability for investors and regulators. These targets are often intentionally high-level, such as establishing a target percentage of assets to undergo climate risk assessments within a given timeframe, so that variability in site-specific constraints does not impede overall progress.

**As an entity matures**, it may extend actions and considerations to include the following:

- Enhancing value chain data collection to calculate Scope 3 emissions for all relevant categories, primarily using primary data collected from the value chain partner as opposed to spend based methodologies providing actionable decarbonisation insights.

- Generation of an adaptation management cycle to define how metrics are collected and reviewed over time, clarifying who learns what from which metrics, and how that learning will inform revisiting assumptions, pathways, and capability development plans. Leadership creates oversight mechanisms to integrate climate-related metrics into business performance reviews and cross-functional discussions, creating feedback loops. Corporate governance begins to assign roles for climate metrics reporting, embedding some responsibility within sustainability and finance teams. However, there is still limited accountability across the wider organisation, and site managers remain only lightly engaged.
- Incrementally adding quantitative metrics by using desktop tools such as the Capacity and Adaptation Decision Explorer (CaDD Explorer) to evaluate adaptive capability and generate numerical indicators of site vulnerability. This marks an important step toward operationalising ISO 14090 principles, as it introduces consistency to how risk exposure, sensitivity, and adaptive capability are assessed across projects globally.
- Enterprise-led and structured metric-setting and tracking; establishing SMART (Specific, Measurable, Achievable, Relevant, and Time-bound) targets centrally to provide accountability for investors and regulators.
- Informing enterprise metrics through site-level structured ISO 14091-based assessments. Vulnerability and impact assessments produce comparable and standardised data points, such as:
  - % of tailings storage facilities exposed to extreme rainfall under climate scenarios,
  - water dependency ratios of processing plants, and
  - adaptive capability ratings for workforce operations under high-heat conditions.
- Focusing on metrics associated with climate change impacts with a “high” likelihood of occurring e.g. 1:100 probability, in line with common thresholds of insurance premium review.
- Embedding elements of the adaptation management cycle into enterprise-wide governance structures may include assigning roles for data collection and monitoring at site and corporate levels. For example, local sustainability managers may be responsible for conducting vulnerability assessments, while central finance and sustainability teams compile results into enterprise-level dashboards. Feedback loops are introduced, whereby lessons learned from sites nearing closure (e.g., unanticipated water scarcity costs) are reflected in feasibility assessments for projects under development.
- Broadening metrics beyond compliance or operational performance, climate-related indicators are integrated with other sustainability targets, ensuring that climate adaptation planning does not undermine social or environmental goals. Post-assessment reviews are used to refine targets, reducing the risk of misaligned or “knee jerk” adaptation investments.



- Using decision trees and action-planning tools such as Rapid Adaptation Pathways Assessment (RAPA) charts and impact-feasibility matrices to guide prioritisation of adaptation measures. Adaptation thresholds and implementation triggers are explicitly identified, with feasibility analyses used to determine the most effective and practical interventions.
- Integrating post-workshop feedback into monitoring and evaluation processes may help to refine targets for climate resilience. At this stage, adaptation metrics may include tracking the number of adaptation measures implemented within a given timeframe, budget utilisation for resilience projects, or identification of assets most exposed to climate thresholds (e.g., tailings facilities under extreme rainfall stress).

**A mature entity likely does and/or considers the following:**

- A highly integrated and data-driven approach to metrics and targets in line with TCFD, ISSB, ISO 14090, and ISO 14091 including regular monitoring, review, and disclosure cycles. This framework includes:
  - Resilience KPIs, such as “% of exploration assets with future climate hazards mapped against thresholds” or “% of pre-feasibility studies incorporating climate-adjusted capital planning.”
  - Recognition of thresholds and adaptation choices up to high case scenarios, such as RCP8.5 or SSP5-8.5, for all key hazards.
  - Recognition of uncertainties that need to be managed and capabilities to innovate to respond to unanticipated climate impacts.
  - Financial resilience metrics, such as Climate Value at Risk, Climate Risk-Adjusted Returns, or Cost Avoidance Estimates tied to adaptive investments.
  - Learning and improvement indicators, track progress in embedding adaptation into decision-making, so that adaptation performance is judged not only on completed actions, but on how effectively the organisation is learning to manage evolving climate risk.
- Adaptation metrics and targets are embedded into operational and financial decision making, as well as corporate disclosures and investor-facing due diligence.
- Vulnerability and impact assessments become standardised and quantitative, covering all relevant hazards (e.g., flooding, wildfire, drought, extreme heat) and projecting risks across the full asset lifecycle, including post-closure. Thresholds and action triggers are linked directly to targets.

- Governance structures oversee the entire adaptation management cycle, ensuring responsibility for adaptation metrics is assigned at site, supply chain and corporate levels. Training budgets are established to build adaptive capability, including eLearning programs to upskill staff in capturing, interpreting, and applying climate risk metrics. Resources are strategically allocated to capacity building where metrics show the greatest gaps.
- Deploys bespoke eLearning modules at sites to train employees on the role of climate metrics in business resilience, ensuring broad organisational literacy.
- Establishes continuous monitoring systems (e.g., water sensors, heat stress modelling) which produce real-time data that feed into automated risk dashboards, linking operational adaptation thresholds to corporate strategy updates.
- Explicitly incorporates climate-adjusted performance metrics into the entity's financial planning, calculated by central corporate finance teams and validated through site input. These may include:
  - Climate Adjusted Returns for prospective sites under multiple scenarios, without adaptation.
  - Cost Avoidance Estimates of adaptive investments.
  - Climate Risk-Adjusted Payback Periods for adaptive capital projects.
  - Climate Adjusted Site Value based on varying levels of resilience investment.
  - Capex Resilience Share, identifying the proportion of total capital expenditures invested in adaptive measures.
  - Opex Allocations for Resilience, estimating the share of annual budgets reserved for adaptation needs.
- Produces quantitative benchmarks, in comprehensive vulnerability and impact assessments, used to refine and validate adaptation KPIs. Metrics systematically capture exposure, sensitivity, and adaptive capability at both asset and community levels, enabling side-by-side comparison of risks across the entity's global portfolio.

### Tangible Tools and Tips for Metrics and Targets

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

- **Balance transition and adaptation.** Track both mitigation (e.g., GHG emissions, carbon credits) and adaptation outcomes (e.g., slope stabilisation, ecosystem resilience). Set targets that cover and, if possible, integrate transition and adaptation, ensuring objectives reinforce rather than undermine each other. Where needed, start with prioritising metrics that support business continuity (rather than investor engagement).
- **Consider short-term measurability, long-term relevance.** Choose indicators that can be measured in the short-term but link to long-term outcomes, enabling tracking of adaptive capability and course correction, e.g., the evolution of impacts and adaptive capability, instigation of monitoring, and evaluation for corrective actions.
- **Use evidence-based target setting.** Try to avoid “fad” targets, even when others in the industry are aligning to them. Ensure commitments are realistic, time-bound, and fully embedded into strategy and operations.

- **Stress test performance.** Use scenarios, basic climate risk checklists, external toolkits, and cost avoidance estimates (e.g., benchmarking against recent local events or use simple in-house calculations) to help justify specific, near-term adaptation investments that can materially reduce operational risks or downtime. Develop the scope of the stress testing to align with increasingly mature adaptive practice.
- **Define decision thresholds.** Define the climate, operational, or business thresholds that would trigger adaptive investment to sustain performance under different scenarios. Ensure that budgets are set up in advance to reflect the possibility of this occurring and have mechanisms in place which enable smooth utilisation of the required funding.
- **Consider qualitative or semi-quantitative data.** If needed, especially at project or site level, use qualitative or semi-quantitative data where detailed analytics or modelling is not feasible. This can be generated with appropriate expert support through:
  - local climate scenario workshops with community partners to estimate the stress-cost ratio.
  - applying “rule-of-thumb” calculators or industry benchmarks for cost avoidance.
- **Increase transparency in external communication.** Communicate targets clearly to external stakeholders, highlighting both decarbonisation progress and resilience dividends.
- **Embed adaptation in mainstream accountability.** Place KPI’s for delivery with core functions including finance and operations, not just sustainability. Integrate CAPEX/OPEX resilience allocations into existing budgeting processes e.g., annual or project-level capital plans (rather than a stand-alone report). Ensure that those with roles and responsibility for adaptation have the authority and resources to implement effective adaptive action.
- **Monitor progress.** Ensuring progress is monitored against the adaptive capacity development plan, the adaptation pathways plan, etc. Ensure plans are then improved based on new learning and information, and monitoring, evaluation, and learning processes are effectively guiding adaptive practice, and are improved as new lessons and information indicates is appropriate.
- **Work towards financial integration.** Use climate-adjusted financial metrics such as climate adjusted returns, Capex Resilience Share, and OPEX Allocations to resilience.
- **Use an adaptation pathways approach.** This can help understand what future impacts need to be managed, and how to retain a suitable adaptive enabling environment through the decisions being made in the near term. Specifically, this method enables companies to identify when operations are no longer meeting financial or non-financial goals due to climate shifts and to select cost-effective measures at those thresholds.
- **Carry out a credit and offset assessment.** Carry out assessment of proposed carbon or nature credit purchases to investigate additional benefits related to other aspects of sustainability e.g. shared value, ecosystem services support, biodiversity. Assess potential credit purchases for their resilience to climate change impacts and if their mode of operation embeds adaptation.

## 6. Governance

Governance considers who holds the entity accountable for delivering on its transition and adaptation objectives.

### 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 risks - and the trade-off implications for adaptation and resilience actions - being considered.

### Maturity Journey for Governance

**An entity may already have or be doing** the following:

- Governance and accountability structures which primarily focus on meeting permitting and disclosure obligations.
- Climate-related risks may be discussed as standing-agenda items in Board and senior management level meetings. However, discussion may be limited and focused primarily on yearly risk reviews rather than adaptation efforts.
- Acknowledging, 'weather-related' risks (physical acute risks) at site level in routine operational practices, such as worker safety briefings at the beginning of shifts, but adaptation is likely not yet embedded in corporate governance structures. Conversations around such risks are reactive, typically triggered by recent weather events or safety concerns, rather than guided by a systematic strategy or long-term planning framework.



**As first steps** moving forward on a journey to adaptation, an entity may be doing or considering the following:

- Assigning explicit responsibilities to senior management and members of the C-suite. A public policy statement on climate change risks is likely to be made. This represents a step-change from informal standing discussion to a structured governance approach, although the focus is on compliance and managing current risk. Clear decision-making authority may be allocated at both site and corporate levels to specific individuals. Organisational governance structures may still focus on reaction to shocks such as drought, flooding, and extreme heat in addition to emissions management.
- Cross-functional leadership demonstrate a conceptual, though still limited, understanding of climate adaptation. Some monitoring and review commitments for climate related risks and opportunities may be defined. Implementation focuses on climate changes that have already happened.
- Embedding speak-up mechanisms at site level, such as formally integrating climate and weather risk discussions into safety moments at the start of shifts. Champions at site level facilitate awareness of climate risks, support early vulnerability assessments, and advocate for resilience integration into development activities.
- Board level overviews of basic vulnerability and impact assessments to enhance understanding of systemic exposures, such as water scarcity, flooding events, or supply chain delays that would compromise compliance requirements. Also at Board level, adaptation planning and adaptive capability assessments are integrated into financial considerations. However, focus is on key assets, with little weighting given to high-risk but smaller-scale sites.

**As an entity matures**, it may extend actions and considerations to include the following:

- Integrating governance systems, with clear site-level influence on corporate governance.
- Using feedback loops to inform corporate decision-making, reflecting on lessons learnt from older operations, including closure-, remediation- or reclamation-phase assets, informing governance decisions for new investments and exploration projects.
- Integration of structured quantitative vulnerability and impact assessments to support decision-making focused on nuanced site-level adaptive capability differences. There may also be significant reliance on expert assessment by internal specialists and existing advisors, possibly facilitated by external adaptation specialists.
- Holding more space for proactive climate adaptation considerations (having freed up resource allocation usually designated for reactive crisis considerations).

**A mature entity likely does and/or considers** the following:

- Integrates governance between both corporate and site levels with clear communication and escalation channels across all levels of the entity, ensuring shared accountability.
- Proactively embeds climate risks and adaptation into organisational decision-making, backed by formal and defined structures such as a board-level climate adaptation committee or integrated sustainability committee, and dedicated cross-functional expert panels.
- Produces enterprise-level risk dashboards, site-level, supply chain and community vulnerability assessments inform Board discussions, ensuring decisions are made using the systematic outputs of e.g., ISO 14091-compliant risk assessments.
- Extending governance frameworks to acquisitions, where climate risks are assessed within due diligence exercises to anticipate potential vulnerabilities in new projects.
- Formally recognises 'champions' within governance structures and climate adaptation, explicitly including this in their roles and responsibilities.
- Provides distinct budget allocations for adaptation governance, ensuring resources are directed to areas where expertise and capacity gaps are identified.

### **Tangible Tools and Tips for Governance**

- **Ensure board oversight covers both decarbonisation and adaptation** i.e., clarify when climate change is a standing agenda item with both elements listed as sub-items on the agenda.
- **Leadership demonstrates clear support.** This is important for adaptive action and continuous improvement, enabling increasing maturity of action and mainstreaming of adaptive practice.
- **Ensure effective progress and action against plans**, including against the adaptive capacity (maturity) development and adaptation pathways plans, helping ensure that near term decisions do not lock in maladaptive outcomes.
- **Appoint climate champions across the business to drive adaptation and transition integration.** Champions should regularly raise resilience and adaptation considerations in discussions to ensure that all decisions made consider climate change.
- **Encourage staff to raise uncomfortable issues.** Building a culture of openness helps to ensure that emerging risks are discussed and recognised rather than dismissed.
- **Create speak up mechanisms.** Create safe channels for staff to challenge assumptions and highlight overlooked risks, ensuring uncomfortable truths reach decision-makers.
- **Provide weather vs climate clarity.** Differentiate short-term weather events from long-term climate risks so both are recognised and escalated appropriately, recognising that failing to engage in the short-term can enhance potential impacts of chronic climate risks.
- **Regularly review operational objectives and external influences** e.g., regional and sector risks, opportunities, and news to refresh governance context, ensuring oversight remains relevant.