Climate change and its impact on mining project planning

Climate change is playing an increasingly important role in the decision making processes of mining projects. Even as early as the pre-feasibility stages, its impact on factors such as water management and social licence needs to be considered.

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Water management, for example, is becoming more complex as rainfall patterns in many areas start to change in frequency and intensity, says Philippa Burmeister, principal scientist at SRK Consulting.

“This affects mines’ management of their surface water and groundwater resources, as well as biodiversit and wetland management. It has implications for infrastructure design, as it raises the risk of flooding, wat insecurity and environmental damage.”

Water balance

For example, water balance is a key aspect of tailings dam design. Here, historical rainfall data is a crucial part of the information necessary to ensure dams’ safe operation in the long term.

“As rainfall variability and intensity change, the historical data becomes less reliable in guiding design parameters. Operations generally are more likely to be disrupted due to severe weather events like floods droughts. For instance, heavier storm events may increase water volumes seeping into mine workings, requiring more pumping capacity," she says.

Social licence

Climate change is also likely to affect the livelihood resilience of mining communities. “As temperatures ar rainfall patterns change, traditional forms of livelihood could be threatened, making communities more reli on the mines for income and corporate social investment. The way that a mine engages with their stakeholders and supports communities is therefore critical, as it is vital to maintaining its social licence to operate," says Ashleigh Maritz, senior environmental scientist at SRK Consulting.

An important outcome of climate change is likely to be scarcity of precious resources like water – which

could set mines in direct competition with local communities. Rising average temperatures in some region may also lead to the geographic spread of communicable diseases like malaria – which may affect employees and surrounding communities.

Impacts on public infrastructure will also have a knock-on effect for mines. More frequent flooding or droug will change municipalities' planning and investment in water supply or stormwater facilities. This may disadvantage the mines or affect mines' social license to operate.

"This will demand not just a technical solution but careful relationship building, so that platforms are create for collaborative and long-term answers with buy-in from all stakeholders," she says.

Risk and compliance

Mining companies are increasingly cognisant of climate change risk. Industry standards are evolving – eve in advance of national standards or requirements. "With financial institutions also seeing the potential risks their investments posed by climate change, they are increasingly stipulating that climate change issues are addressed in planning studies for mining projects," says Burmeister.

Solutions to effectively address the varied risks that accompany climate change need to be integrated. In other words, technical input must be coordinated across a range of professional disciplines. It is crucial tha climate change impacts be mainstreamed into various technical disciplines if it is to be effectively addressed.

"Climate change must be considered by all disciplines in the project team. This includes expertise in vario facets of engineering, as well as in the natural and social sciences," she says.

A range of quantitative and qualitative methods are available to investigate a mining project's exposure to climate change risk. These include measuring the project's greenhouse gas emissions as part of its environmental impact assessment, and applying climate change models to identify specific project risks posed by predicted changes in climatic conditions.

Innovating for sustainability

The science of climate change modelling is relatively young, and requires an adaptive and dynamic approach – while leveraging off partnerships to develop and apply the power of predictive modelling.

"This assists us in pioneering strategies and tools to manage climate change risks, from initial mine desig and operational technical inputs through to social transitioning and mine closure. While monitoring is being undertaken extensively at most mine sites, the interpretation of the data is critical to identifying trends that could prevent undesirable events," Maritz says.

Digital and data

A key concern has been developing a better data processing and analysis capacity for the considerable mine data that is already available. This helps guide decision-making around climate change and the risks poses.

"We recently established a dedicated data services unit that works closely with the climate change team to leverage and evolve the latest digital technologies. For instance, as part of an innovation project, the team

developing an interactive mining map of South Africa; this provides a coordinated source of geo-located data on various aspects and stages of mining," she says.

Developing site-specific climate change-related rainfall models for mining companies will also better inform their project and operational planning.