



Sustainability Virtual Forum: Workshop Outcomes

At the GMG Sustainability Virtual Forum, participants responded to the following questions regarding sustainability efforts in mining, including recommendations for integrating sustainable practices into mining operations, opportunities for collaboration within and outside of the mining industry, and current work being done for sustainability and potential gaps in this work. These outcomes will be used to guide future collaboration on what might be included in potential future GMG initiatives for this area.

What are the top priorities/next steps for integrating sustainable practices into mining operations?	
Indicators and Targets	<ul style="list-style-type: none"> - Establish executive KPIs tied to sustainability and specific targets - Identify top sustainability priorities and add to metrics and goals, as well as identifying teams responsible for achieving these goals - Develop financial incentives - Ensure leading indicator metrics focus on designing out risks, hazards, and exposures - Include sustainability metrics in business case and measure for value delivery in solutions
Commitments and Actions	<ul style="list-style-type: none"> - Define commitments and communicate throughout the business - Pursue new legislation - Include sustainability in 2021/22 budgets and beyond - Make short term use of carbon offsets - Lobby for the specification of lowest carbon options in public tenders - Sustainability principles included in design of new products - Awareness of your company's energy use, cost, and emissions - Reduce Scope 3 emissions through supplier selection - Improve risk management assessments and procedures - Increase payback period and add inputted carbon tax to energy project economic evaluation process
Innovation, Technology and Equipment	<ul style="list-style-type: none"> - Leverage smart sensors to understand every aspect of the supply chain - Electrification of fleet vehicles and handheld tools (reducing diesel consumption) - Support transition to autonomous operations - Increase efficiency in equipment and in operations - Greener processing options including use of impacted water - Prestress host rock to minimize energy needed in traditional grinding circuit - Thinking ahead for long term solutions - Pilot projects to test ideas and promote results
Engagement and Culture	<ul style="list-style-type: none"> - Develop culture of sustainability (similar to a culture of safety) and celebrate champions of sustainability - Engage with all stakeholders (workforce, community, suppliers, customers, shareholders, governments, etc.) about sustainability goals - Include leaders of all ages especially as younger generations have a greater awareness of climate change - Solutions should enable buy in at all levels of mining operations - Partnership with communities in which mine operates - Integrate sustainability throughout business rather than a separate team - Increased public outreach about sustainable efforts to reshape perception of mining
Data Gathering and Information Sharing	<ul style="list-style-type: none"> - Combine impact analysis on both the mine and surrounding environment - Display connection between sustainability and return on investment - Share best practices and educate about available sustainable solutions - Establish levels of understanding about sustainability within organization
Tailings and Water Management	<ul style="list-style-type: none"> - More tailings reduction through altered processing / sorting, etc. - Zero liquid discharge (removal of tailings ponds) - Stabilize existing tailings facilities - Remove lawyers from tailings innovation - Water management (supply, contamination, flooding risks, etc.)

What are potential collaboration opportunities throughout the industry/with other sectors?	
Other Sectors and Industries	<ul style="list-style-type: none"> - Seek help outside of mining (e.g., Association of Energy Engineers' Certified Energy Managers) to evaluate energy opportunities - Manufacturing industry, including OEMs - Construction industry, integrate sustainability targets into process - Pure renewable energy providers; oil and gas/energy sector can drive development in renewable fuel sources - Forestry, technology, agriculture, chemicals sector also relevant
Guiding Innovation	<ul style="list-style-type: none"> - Share successes across the industry, drive new ideas to mining, discuss challenges, integrate with community goals and resilience - Build relationships with universities, research institutes, and mining hubs - Understand buyer's expectations for sustainability - Data analytics – access AI specialists for data driven evaluation and optimization - Develop alternative best practices and unit operations for process development
Focus Areas	<ul style="list-style-type: none"> - Research and development, establish prototype mine pilot programs, technology trials, proof of concept - Collaboration between open pit, underground, and transit on electric vehicle design - Regenerative agriculture as a mine end of life rehabilitation strategy - Other focus areas include: AI, big data, and low carbon initiatives

What is the current work being done for sustainability in mining and where are the gaps?	
Work in Progress	<ul style="list-style-type: none"> - Green energy (battery storage, solar energy), and energy efficiency/reduction through optimization (example: ventilation on demand) - Tracking energy consumptions and using analytics to reduce emissions - Use of AI to improve equipment reliability and reduce fuel burn - Greater emphasis on social aspects, including human health (sustainable products/consumables) - Focus on SDGs helping companies to establish terms and improve responsiveness - Other areas of work include recycling, remediation of water and land, and electrification
Organizations	<ul style="list-style-type: none"> - Battery Alliance - Global Mineral Professional Alliance (GMPA) Global Action on Tailings - Development Partnership Institute (DPI) - European Commission - International Council on Mining and Metals (ICMM) - European Union – Horizon 2020 and Horizon Europe - Canadian Institute of Mining, Metallurgy, and Petroleum (CIM) - Environmental and Social Responsibility Society (ESRS) - Canadian Mining Innovation Council (CMIC) - UN Sustainable Development Goals (SDGs) as guiding strategy
Gaps and Opportunities	<p>Gaps:</p> <ul style="list-style-type: none"> - More collaboration needed - Listen and address societal concerns as well as publicly disclosing relevant information - Focusing solely on regulatory compliance - Heterogeneous value chain makes it hard to scale solutions - Common metrics - Backup energy plans and energy storage <p>Opportunities:</p> <ul style="list-style-type: none"> - Inclusion and diversity - Remote monitoring - Investment in nanotechnology (i.e. filtration) - Integration of solar technology to meet electricity and process heating demands for mineral processing - Potential of establishing an organization in mining to coordinate sustainability goals and initiatives - Develop dust management protocols to facilitate co-location of concentrating solar and heavy industry - Dry stack tailings and ore sorting earlier to reduce processing volumes and energy consumption