Carbon Footprint in Mining Training Course

Professional Development Training Course Outline

Category	General Training	**Duration**	5 Days
Base Fee	$1,500 USD	**Delivery Mode**	Online / On-site Hybrid

Course Introduction

The global mining sector stands at a critical crossroads, where operational viability is irrevocably linked to environmental stewardship. Carbon Footprint In Mining Training Course is engineered to equip industry professionals with the technical acumen and strategic foresight required to navigate this transition. By addressing the unique challenges of Scope 1, Scope 2, and Scope 3 emissions within extraction and processing operations, participants will learn to balance the rising global demand for critical minerals with the urgent necessity of net-zero mining operations.

To thrive in this low-carbon economy, mining enterprises must transition from reactive compliance to proactive innovation. This course delves into high-impact strategies, including mine electrification, the integration of renewable energy microgrids, and the deployment of advanced carbon capture, utilization, and storage (CCUS) technologies. Through an analytical lens, attendees will master greenhouse gas (GHG) accounting protocols tailored specifically for complex mining lifecycles, from initial excavation to final closure. By embedding sustainability into the blueprint of operational excellence, organizations can de-risk their assets, attract ESG-focused capital, and pioneer the future of sustainable resource extraction.

Programme Curriculum

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Course Duration

5 Days

Course Objectives

1. Master GHG Accounting.
2. Accelerate Asset Electrification.
3. Optimize Renewable Microgrids.
4. Navigate Carbon Pricing & Markets.
5. Implement Circular Mining Practices.
6. Drive Energy Efficiency.
7. Lead ESG Compliance & Reporting.
8. Evaluate CCUS Technologies.
9. De-carbonize the Supply Chain.
10. Conduct Lifecycle Assessments (LCA
11. Manage Climate Risk & Resilience.
12. Deploy Clean Refining Technologies.
13. Foster a Culture of Sustainability

Target Audience

1. Mining Executives & C-Suite Officers (CEO, COO, Chief Sustainability Officers)
2. Mine Managers & Operational Directors
3. Sustainability, ESG, and Environmental Engineers
4. Energy Management Specialists & Infrastructure Engineers
5. Procurement, Supply Chain, and Logistics Managers
6. Investment Analysts, ESG Investors, and Mining Consultants
7. Government Regulators & Policy Makers in the natural resources sector
8. Metallurgical Chemists & Process Engineers

Course Modules

Module 1: Foundations of Carbon Accounting in Mining

- Introduction to the GHG Protocol and mining-specific emission boundaries.
- Quantifying Scope 1 and Scope 2 emissions.
- Methodologies for mapping complex Scope 3 emissions (downstream processing and shipping).
- Data collection frameworks: Utilizing IoT sensors and ERP integration for real-time tracking.
- Establishing a defensible emissions baseline and setting Science Based Targets (SBTi).
- *Case Study:* **Anglo American's** implementation of data-driven carbon accounting across global operations to build an emissions baseline.

Module 2: Fleet Electrification and Low-Carbon Mobility

- The economics and logistics of replacing diesel haul trucks with Battery Electric Vehicles
- Evaluating trolley-assist systems and fast-charging infrastructure in deep open-pit and underground mines.
- Hydrogen fuel cell alternatives for heavy-duty, long-haul mining applications.
- Optimizing mine design to minimize haulage energy.
- Lifecycle analysis of battery supply chains and recycling strategies for mining machinery.
- *Case Study:* **BHP and Rio Tinto's** collaborative trials of ultra-class battery-electric haul trucks in the Pilbara region.

Module 3: Renewable Energy Integration & Grid Decarbonization

- Designing off-grid hybrid power systems.
- Navigating Power Purchase Agreements (PPAs) for grid-connected mining operations.
- Managing grid stability, peak shaving, and load shedding using smart software.
- The role of green hydrogen and synthetic fuels in replacing baseload diesel generators.
- Evaluating thermal energy storage for deep underground mine heating and cooling.
- *Case Study:* **Gold Fields' Agnew Gold Mine** in Australia achieving up to 85% renewable energy penetration via a wind/solar/battery microgrid.

Module 4: Energy Efficiency and Process Optimization

- Implementing Ventilation on Demand (VoD) systems in underground mining to curb power draws.
- Advanced comminution technologies: Reducing energy consumption in crushing and grinding circuits.
- Deploying AI and machine learning for predictive energy optimization in processing plants.
- Waste heat recovery systems from smelters, generators, and compressors.
- High-efficiency separation and flotation techniques to process lower-grade ores with less power.
- *Case Study:* **Newmont's** deployment of advanced process control and machine learning to optimize grinding mill energy throughput.

Module 5: Carbon Mineralization and CCUS in Mining

- The science of passive and accelerated carbonation of ultramafic mine tailings.
- Engineering frameworks for injecting CO-2 into reactive tailing streams for permanent storage.
- Evaluating the commercial value of carbonated tailings as sustainable building aggregates.
- Direct Air Capture (DAC) integration options at remote, land-rich mining leases.
- Regulatory approvals, safety protocols, and long-term liability of on-site carbon storage.
- *Case Study:* **De Beers' Project Minera**, investigating the potential of diamond mine tailings to trap and store atmospheric CO_2.

Module 6: Scope 3 Mitigation & Green Supply Chains

- Engaging with suppliers to source low-carbon explosives.
- Collaborating with steel mills and smelters to reduce downstream processing footprints.
- Optimizing inbound and outbound logistics via green rail, biofuel-powered shipping, and route optimization.
- Procurement frameworks: Incorporating carbon pricing into vendor bidding and selection processes.
- Tracing commodity carbon intensity using blockchain and digital product passports.
- *Case Study:* **Boliden's** launch of "Low-Carbon Copper" and "Green Zinc," tracking supply chain footprints to command a market premium.

Module 7: Carbon Economics, Policy, and Sustainable Finance

- Navigating the impact of the Carbon Border Adjustment Mechanism (CBAM) on global metal trading.
- Designing internal carbon pricing mechanisms to de-risk capital expenditure (CapEx) decisions.
- Leveraging voluntary and compliance carbon credit markets for project financing.
- Securing green bonds, sustainability-linked loans, and ESG-driven venture capital.
- Financial modeling of decarbonization initiatives: Balancing upfront CapEx against carbon tax penalties.
- *Case Study:* **Glencore's** utilization of internal carbon pricing models to evaluate the long-term viability of its global asset portfolio.

Module 8: Climate Risk, Reporting, and Strategic Roadmapping

- Conducting climate scenario analysis aligned with TCFD/ISSB.
- Developing a step-by-step corporate net-zero roadmap tailored to asset lifecycles.
- Best practices for transparently reporting emissions to indices like CDP, DJSI, and GRI.
- Managing stakeholder relations, local community expectations, and "greenwashing" legal risks.
- Designing mine closure plans that incorporate post-mining land use for carbon sequestration or solar farms.
- *Case Study:* **Vale's** strategic implementation of its $4-6 billion commitment to hit absolute Scope 1 and 2 emission reductions by 2030.

Training Methodology

- Interactive lectures and presentations.
- Group discussions and brainstorming sessions.
- Hands-on exercises using real-world datasets.
- Role-playing and scenario-based simulations.
- Analysis of case studies to bridge theory and practice.
- Peer-to-peer learning and networking.
- Expert-led Q&A sessions.
- Continuous feedback and personalized guidance.

Register as a group from 3 participants for a Discount

Send us an email: info@fineskilltrainingcenter.org or call *+254769199797*

Certification

Upon successful completion of this training, participants will be issued with a globally- recognized certificate.

Tailor-Made Course

We also offer tailor-made courses based on your needs.

Key Notes

a. The participant must be conversant with English.

b. Upon completion of training the participant will be issued with an Authorized Training Certificate

c. Course duration is flexible and the contents can be modified to fit any number of days.

d. The course fee includes facilitation training materials, 2 coffee breaks, buffet lunch and A Certificate upon successful completion of Training.

e. One-year post-training support Consultation and Coaching provided after the course.

f. Payment should be done at least a week before commence of the training, to Fineskill Training Center account, as indicated in the invoice so as to enable us prepare better for you.

Upcoming Scheduled Sessions

Start Date	End Date	Location	Price
23 Nov 2026	27 Nov 2026	Online	$1,000
23 Nov 2026	27 Nov 2026	Physical	$1,500
23 Nov 2026	27 Nov 2026	Physical	$3,000
23 Nov 2026	27 Nov 2026	Physical	$3,000
23 Nov 2026	27 Nov 2026	Physical	$6,000
23 Nov 2026	27 Nov 2026	Physical	$4,500
23 Nov 2026	27 Nov 2026	Physical	$6,000
23 Nov 2026	27 Nov 2026	Physical	$6,000

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