EXTRACTIVES & MINERALS PROCESSING SECTOR

COAL OPERATIONS

Sustainability Accounting Standard

Sustainable Industry Classification System® (SICS®) EM-CO

Prepared by the Sustainability Accounting Standards Board

October 2018

INDUSTRY STANDARD | VERSION 2018-10
COAL OPERATIONS
Sustainability Accounting Standard

About SASB
The SASB Foundation was founded in 2011 as a not-for-profit, independent standards-setting organization. The SASB Foundation’s mission is to establish and maintain industry-specific standards that assist companies in disclosing financially material, decision-useful sustainability information to investors.

The SASB Foundation operates in a governance structure similar to the structure adopted by other internationally recognized bodies that set standards for disclosure to investors, including the Financial Accounting Standards Board (FASB) and the International Accounting Standards Board (IASB). This structure includes a board of directors (“the Foundation Board”) and a standards-setting board (“the Standards Board” or “the SASB”). The Standards Board develops, issues, and maintains the SASB standards. The Foundation Board oversees the strategy, finances and operations of the entire organization, and appoints the members of the Standards Board.

The Foundation Board is not involved in setting standards, but is responsible for overseeing the Standards Board’s compliance with the organization’s due process requirements. As set out in the SASB Rules of Procedure, the SASB’s standards-setting activities are transparent and follow careful due process, including extensive consultation with companies, investors, and relevant experts.

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INTRODUCTION

Purpose of SASB Standards

The SASB’s use of the term “sustainability” refers to corporate activities that maintain or enhance the ability of the company to create value over the long term. Sustainability accounting reflects the governance and management of a company’s environmental and social impacts arising from production of goods and services, as well as its governance and management of the environmental and social capitals necessary to create long-term value. The SASB also refers to sustainability as “ESG” (environmental, social, and governance), though traditional corporate governance issues such as board composition are not included within the scope of the SASB’s standards-setting activities.

SASB standards are designed to identify a minimum set of sustainability issues most likely to impact the operating performance or financial condition of the typical company in an industry, regardless of location. SASB standards are designed to enable communications on corporate performance on industry-level sustainability issues in a cost-effective and decision-useful manner using existing disclosure and reporting mechanisms.

Businesses can use the SASB standards to better identify, manage, and communicate to investors sustainability information that is financially material. Use of the standards can benefit businesses by improving transparency, risk management, and performance. SASB standards can help investors by encouraging reporting that is comparable, consistent, and financially material, thereby enabling investors to make better investment and voting decisions.

Overview of SASB Standards

The SASB has developed a set of 77 industry-specific sustainability accounting standards (“SASB standards” or “industry standards”), categorized pursuant to SASB’s Sustainable Industry Classification System® (SICS®). Each SASB standard describes the industry that is the subject of the standard, including any assumptions about the predominant business model and industry segments that are included. SASB standards include:

1. Disclosure topics – A minimum set of industry-specific disclosure topics reasonably likely to constitute material information, and a brief description of how management or mismanagement of each topic may affect value creation.

2. Accounting metrics – A set of quantitative and/or qualitative accounting metrics intended to measure performance on each topic.

3. Technical protocols – Each accounting metric is accompanied by a technical protocol that provides guidance on definitions, scope, implementation, compilation, and presentation, all of which are intended to constitute suitable criteria for third-party assurance.

4. Activity metrics – A set of metrics that quantify the scale of a company’s business and are intended for use in conjunction with accounting metrics to normalize data and facilitate comparison.
Furthermore, the SASB Standards Application Guidance establishes guidance applicable to the use of all industry standards and is considered part of the standards. Unless otherwise specified in the technical protocols contained in the industry standards, the guidance in the SASB Standards Application Guidance applies to the definitions, scope, implementation, compilation, and presentation of the metrics in the industry standards.

The SASB Conceptual Framework sets out the basic concepts, principles, definitions, and objectives that guide the Standards Board in its approach to setting standards for sustainability accounting. The SASB Rules of Procedure is focused on the governance processes and practices for standards setting.

Use of the Standards

SASB standards are intended for use in communications to investors regarding sustainability issues that are likely to impact corporate ability to create value over the long term. Use of SASB standards is voluntary. A company determines which standard(s) is relevant to the company, which disclosure topics are financially material to its business, and which associated metrics to report, taking relevant legal requirements into account1. In general, a company would use the SASB standard specific to its primary industry as identified in SICs®. However, companies with substantial business in multiple SICs® industries can consider reporting on these additional SASB industry standards.

It is up to a company to determine the means by which it reports SASB information to investors. One benefit of using SASB standards may be achieving regulatory compliance in some markets. Other investor communications using SASB information could be sustainability reports, integrated reports, websites, or annual reports to shareholders. There is no guarantee that SASB standards address all financially material sustainability risks or opportunities unique to a company's business model.

Industry Description

The Coal Operations industry includes companies that mine coal and those that manufacture coal products. Mining activity covers both underground and surface mining, and thermal and metallurgical coal.

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1 Legal Note: SASB standards are not intended to, and indeed cannot, replace any legal or regulatory requirements that may be applicable to a reporting entity's operations.
## SUSTAINABILITY DISCLOSURE TOPICS & ACCOUNTING METRICS

### Table 1. Sustainability Disclosure Topics & Accounting Metrics

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<th>ACCOUNTING METRIC</th>
<th>CATEGORY</th>
<th>UNIT OF MEASURE</th>
<th>CODE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Greenhouse Gas Emissions</td>
<td>Gross global Scope 1 emissions, percentage covered under emissions-limiting regulations</td>
<td>Quantitative</td>
<td>Metric tons (t), CO₂-e, Percentage (%)</td>
<td>EM-CO-110a.1</td>
</tr>
<tr>
<td></td>
<td>Discussion of long-term and short-term strategy or plan to manage Scope 1 emissions, emissions reduction targets, and an analysis of performance against those targets</td>
<td>Discussion and Analysis</td>
<td>n/a</td>
<td>EM-CO-110a.2</td>
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<tr>
<td>Water Management</td>
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<tr>
<td></td>
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<td>Quantitative</td>
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<tr>
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<tr>
<td></td>
<td>Percentage of mine sites where acid rock drainage is: (1) predicted to actively mitigate, and (3) under active remediation</td>
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<tr>
<td></td>
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<td>Quantitative</td>
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<td>EM-CO-160a.3</td>
</tr>
<tr>
<td>Rights of Indigenous Peoples</td>
<td>Percentage of (1) proved and (2) probable reserves in or near indigenous land</td>
<td>Quantitative</td>
<td>Percentage (%)</td>
<td>EM-CO-210a.1</td>
</tr>
<tr>
<td></td>
<td>Discussion of engagement processes and due diligence practices with respect to the management of indigenous rights</td>
<td>Discussion and Analysis</td>
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<td>EM-CO-210a.2</td>
</tr>
<tr>
<td>Community Relations</td>
<td>Discussion of process to manage risks and opportunities associated with community rights and interests</td>
<td>Discussion and Analysis</td>
<td>n/a</td>
<td>EM-CO-210b.1</td>
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<tr>
<td></td>
<td>Number and duration of non-technical delays</td>
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<td>Quantitative</td>
<td>Percentage (%)</td>
<td>EM-CO-310a.1</td>
</tr>
<tr>
<td></td>
<td>Number and duration of strikes and lockouts</td>
<td>Quantitative</td>
<td>Number, Days</td>
<td>EM-CO-310a.2</td>
</tr>
<tr>
<td>TOPIC</td>
<td>ACCOUNTING METRIC</td>
<td>CATEGORY</td>
<td>UNIT OF MEASURE</td>
<td>CODE</td>
</tr>
<tr>
<td>------------------------------</td>
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<tr>
<td>Workforce Health &amp; Safety</td>
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<td>EM-CO-320a.1</td>
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<tr>
<td></td>
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<tr>
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<td>EM-CO-420a.1</td>
</tr>
<tr>
<td></td>
<td>Estimated carbon dioxide emissions embedded in proven coal reserves</td>
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<td>Metric tons (t) CO₂-e</td>
<td>EM-CO-420a.2</td>
</tr>
<tr>
<td></td>
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<td>Discussion and Analysis</td>
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<td>EM-CO-420a.3</td>
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</tbody>
</table>

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<table>
<thead>
<tr>
<th>ACTIVITY METRIC</th>
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<th>UNIT OF MEASURE</th>
<th>CODE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Production of thermal coal</td>
<td>Quantitative</td>
<td>Million metric tons (Mt)</td>
<td>EM-CO-000.A</td>
</tr>
<tr>
<td>Production of metallurgical coal</td>
<td>Quantitative</td>
<td>Million metric tons (Mt)</td>
<td>EM-CO-000.B</td>
</tr>
</tbody>
</table>

2 Note to EM-CO-310a.2 – Disclosure shall include the number, duration, and reason for the stoppage.
3 Note to EM-CO-000.B – The scope includes pulverized coal injection.
Greenhouse Gas Emissions

Topic Summary
Coal operations are energy intensive and generate significant direct greenhouse gas (GHG) emissions, including carbon dioxide from fuel use and methane released from coal beds during mining and post-mining activities. Regulatory efforts to reduce GHG emissions in response to the risks posed by climate change may result in higher operating and capital expenditures based on the magnitude of their direct emissions. Operational efficiencies can be achieved through the cost-effective reduction of GHG emissions. Such efficiencies can mitigate the potential financial impact of increased fuel costs from regulations that seek to limit—or put a price on—GHG emissions.

Accounting Metrics

EM-CO-110a.1. Gross global Scope 1 emissions, percentage covered under emissions-limiting regulations

1 The entity shall disclose its gross global Scope 1 greenhouse gas (GHG) emissions to the atmosphere of the seven GHGs covered under the Kyoto Protocol—carbon dioxide (CO$_2$), methane (CH$_4$), nitrous oxide (N$_2$O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), sulfur hexafluoride (SF$_6$), and nitrogen trifluoride (NF$_3$).

1.1 Emissions of all GHGs shall be consolidated and disclosed in metric tons of carbon dioxide equivalent (CO$_2$-e), and calculated in accordance with published 100-year time horizon global warming potential (GWP) values. To date, the preferred source for GWP values is the Intergovernmental Panel on Climate Change (IPCC) Fifth Assessment Report (2014).

1.2 Gross emissions are GHGs emitted into the atmosphere before accounting for offsets, credits, or other similar mechanisms that have reduced or compensated for emissions.


2.1 These emissions include direct emissions of GHGs from stationary or mobile sources; these sources include but are not limited to: equipment at mine sites, mine mouth electric generating facilities, coal seam methane emissions, production and processing facilities, storage facilities, office buildings, and transportation (marine, road, and rail).

2.2 Acceptable calculation methodologies include those that conform to the GHG Protocol as the base reference, but provide additional guidance, such as industry- or region-specific guidance. Examples include, but are not limited to:
2.2.1 GHG Reporting Guidance for the Aerospace Industry provided by International Aerospace Environmental Group (IAEG)

2.2.2 Greenhouse Gas Inventory Guidance: Direct Emissions from Stationary Combustion Sources provided by the U.S. Environmental Protection Agency (EPA)

2.2.3 India GHG Inventory Program

2.2.4 ISO 14064-1

2.2.5 Petroleum Industry Guidelines for reporting GHG emissions, 2nd edition, 2011, published by IPIECA

2.2.6 Protocol for the quantification of greenhouse gas emissions from waste management activities published by Entreprises pour l’Environnement (EpE)

2.3 GHG emissions data shall be consolidated and disclosed according to the approach with which the entity consolidates its financial reporting data, which is generally aligned with the “financial control” approach defined by the GHG Protocol, and the approach provided by the Climate Disclosure Standards Board (CDSB) that is described in REQ-07, “Organisational boundary,” of the CDSB Framework for reporting environmental information, natural capital and associated business impacts (April 2018).

3 The entity shall disclose the percentage of its gross global Scope 1 GHG emissions that are covered under an emissions-limiting regulation or program that is intended to directly limit or reduce emissions, such as cap-and-trade schemes, carbon tax/fee systems, and other emissions control (e.g., command-and-control approach) and permit-based mechanisms.

3.1 Examples of emissions-limiting regulations include, but are not limited to:

3.1.1 California Cap-and-Trade (California Global Warming Solutions Act)

3.1.2 European Union Emissions Trading Scheme (EU ETS)

3.1.3 Quebec Cap-and-Trade (Draft Bill 42 of 2009)

3.2 The percentage shall be calculated as the total amount of gross global Scope 1 GHG emissions (CO$_2$-e) that are covered under emissions-limiting regulations divided by the total amount of gross global Scope 1 GHG emissions (CO$_2$-e).

3.2.1 For emissions that are subject to multiple emissions-limiting regulations, the entity shall not account for those emissions more than once.

3.3 The scope of emissions-limiting regulations excludes emissions covered under voluntary emissions-limiting regulations (e.g., voluntary trading systems), as well as reporting-based regulations [e.g., the U.S. Environmental Protection Agency (EPA) GHG Reporting Program].
4 The entity may discuss any change in its emissions from the previous reporting period, including whether the change was due to emissions reductions, divestment, acquisition, mergers, changes in output, and/or changes in calculation methodology.

5 In the case that current reporting of GHG emissions to the CDP or other entity (e.g., a national regulatory disclosure program) differs in terms of the scope and consolidation approach used, the entity may disclose those emissions. However, primary disclosure shall be according to the guidelines described above.

6 The entity may discuss the calculation methodology for its emissions disclosure, such as if data are from continuous emissions monitoring systems (CEMS), engineering calculations, or mass balance calculations.

**EM-CO-110a.2. Discussion of long-term and short-term strategy or plan to manage Scope 1 emissions, emissions reduction targets, and an analysis of performance against those targets**

1 The entity shall discuss its long-term and short-term strategy or plan to manage its Scope 1 greenhouse gas (GHG) emissions.


1.2 The scope of GHG emissions includes the seven GHGs covered under the Kyoto Protocol—carbon dioxide (CO₂), methane (CH₄), nitrous oxide (N₂O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), sulfur hexafluoride (SF₆), and nitrogen trifluoride (NF₃).

2 The entity shall discuss its emission reduction target(s) and analyze its performance against the target(s), including the following, where relevant:

2.1 The scope of the emission reduction target (e.g., the percentage of total emissions to which the target is applicable);

2.2 Whether the target is absolute- or intensity-based, and the metric denominator, if it is an intensity-based target;

2.3 The percentage reduction against the base year, with the base year representing the first year against which emissions are evaluated toward the achievement of the target;

2.4 The timelines for the reduction activity, including the start year, the target year, and the base year;

2.5 The mechanism(s) for achieving the target; and
2.6 Any circumstances in which the target or base year emissions have been, or may be, recalculated retrospectively or the target or base year has been reset.

3 The entity shall discuss the activities and investments required to achieve the plans and/or targets, and any risks or limiting factors that might affect achievement of the plans and/or targets.

4 The entity shall discuss the scope of its strategies, plans, and/or reduction targets, such as whether they pertain differently to different business units, geographies, or emissions sources.

5 The entity shall discuss whether its strategies, plans, and/or reduction targets are related to, or associated with, emissions-limiting and/or emissions reporting-based programs or regulations (e.g., the EU Emissions Trading Scheme, Quebec Cap-and-Trade System, California Cap-and-Trade Program), including regional, national, international, or sectoral programs.

6 Disclosure of strategies, plans, and/or reduction targets shall be limited to activities that were ongoing (active) or reached completion during the reporting period.
Water Management

Topic Summary
Coal operations have an impact on both the quality and quantity of local water resources. Coal operations are water intensive. The use of water in coal washing to remove sulfur, in cooling drilling equipment, and in transporting coal in slurry pipelines can impact resources. The severity of these risks can vary depending on the region's water availability and the regulatory environment. Reducing water use and contamination could also create operational efficiencies for companies and lower their operating costs. Wastewater treatment and discharge is often regulated by national or local agencies. Violating limits on selenium, sulfate, and dissolved solids could affect coal operations companies through significant penalties, compliance costs, delays in production, or higher costs related to mine closure.

Accounting Metrics

EM-CO-140a.1. (1) Total fresh water withdrawn, (2) percentage recycled, (3) percentage in regions with High or Extremely High Baseline Water Stress

1 The entity shall disclose the amount of water, in thousands of cubic meters, that was withdrawn from freshwater sources:

1.1 Fresh water may be defined according to the local statutes and regulations where the entity operates. Where there is no regulatory definition, fresh water shall be considered to be water that has less than 1000 parts per million of dissolved solids per the U.S. Geological Survey.

1.2 Water obtained from a water utility in compliance with U.S. National Primary Drinking Water Regulations can be assumed to meet the definition of fresh water.

2 The entity shall disclose the percentage of water recycled as the volume, in thousands of cubic meters, recycled divided by the volume of water withdrawn.

2.1 Any volume of water reused multiple times shall be counted as recycled each time it is recycled and reused.

3 The entity shall analyze all of its operations for water risks and identify activities that withdraw and consume water in locations with High (40–80%) or Extremely High (>80%) Baseline Water Stress as classified by the World Resources Institute’s (WRI) Water Risk Atlas tool, Aqueduct.

4 The entity shall disclose its water withdrawn in locations with High or Extremely High Baseline Water Stress as a percentage of the total water withdrawn.

5 The entity shall disclose its water consumed in locations with High or Extremely High Baseline Water Stress as a percentage of the total water consumed.
EM-CO-140a.2. Number of incidents of non-compliance associated with water quality permits, standards, and regulations

1 The entity shall disclose the total number of instances of non-compliance, including violations of a technology-based standard and exceedances of quantity and/or quality-based standards.

2 The scope of disclosure includes incidents governed by national, state, and local statutory permits and regulations, including, but not limited to, the discharge of a hazardous substance, violation of pretreatment requirements, or total maximum daily load (TMDL) exceedances.

2.1 Typical parameters of concern include selenium, total dissolved solids (TDS), sulfate, total suspended solids (TSS), and pH.

3 The scope of disclosure shall only include incidents of non-compliance that resulted in a formal enforcement action(s).

3.1 Formal enforcement actions are defined as governmental recognized actions that address a violation or threatened violation of water quantity and/or quality laws, regulations, policies, or orders, and can result in administrative penalty orders, administrative orders, and judicial actions, among others. For example, the U.S. Environmental Protection Agency (EPA) provides guidance on the scope of formal enforcement actions in, Informal and Formal Actions, Summary Guidance and Portrayal on EPA Websites.

4 Violations shall be disclosed, regardless of their measurement methodology or frequency. These include violations for:

4.1 Continuous discharges, limitations, standards, and prohibitions that are generally expressed as maximum daily, weekly average, and monthly averages

4.2 Non-continuous discharges and limitations that are generally expressed in terms of frequency, total mass, maximum rate of discharge, and mass or concentration of specified pollutants
Waste Management

Topic Summary
Handling of solid rock and clay waste, process refuse, and liquid coal waste containing hazardous substances like mercury, arsenic, and cadmium poses operational and regulatory challenges for coal operations companies. Coal slurry or tailings ponds can present a significant threat if the impoundments burst, collapse, or leak, leading to destruction of lives, property, and ecosystems, with associated financial impacts that may include regulatory penalties, compensation payments, and remediation or compliance obligations. Permitting of mining operations may be affected, lowering a company’s revenue or requiring additional expenditures prior to approval. Companies’ ability to lower the number and size of tailings ponds and ensure the structural integrity of impoundments can help minimize such impacts.

Accounting Metrics

EM-CO-150a.1. Number of tailings impoundments, broken down by MSHA hazard potential

1 The entity shall disclose the number of tailings impoundments according to the following U.S. Mine Safety and Health Administration (MSHA) hazard potential classification:

1.1 High hazard potential
1.2 Significant hazard potential
1.3 Low hazard potential

2 For locations under the auspices of the MSHA, the hazard potential shall be determined by Mine Safety and Health enforcement personnel (metal and nonmetal) during regular (E01) inspections through verification that the mine operator has appropriately classified the dam or by assigning a hazard classification if the existing one does not appear reasonable or if no classification has been assigned.

3 For locations not under the auspices of the MSHA, hazard potential shall be determined by a third party following MSHA Procedure Instruction Letter No. 113-IV-01 guidance.

4 High hazard potential impoundments are dams, regardless of their condition or size, whose failure will probably cause loss of life.

4.1 These facilities are generally located in populated areas or where dwellings are found in the flood plain, and failure can reasonably be expected to cause loss of life, serious damage to homes, industrial and commercial buildings, and damage to important utilities, highways, or railroads.
5 Significant hazard potential impoundments are dams, regardless of their condition or size, whose failure would result in no probable loss of life but would disrupt important utilities or cause significant economic loss or significant environmental damage.

5.1 These facilities are generally located in predominantly rural areas, but could be in populated areas with significant infrastructure, where failure could damage isolated homes, main highways, and minor railroads, or disrupt the use of service of public utilities.

6 Low hazard potential impoundments are dams whose failure would not be expected to cause loss of life, disrupt important utilities, or cause significant economic loss or significant environmental damage.

6.1 These facilities are usually located in rural or agricultural areas where losses are limited principally to the owner's property or where failure would cause only slight damage to farm buildings, forest and agricultural land, and minor roads.

6.2 The scope includes only dams that either: (1) Equal or exceed 25 feet in height and can or do store a volume of more than 15 acre-feet, or (2) Exceed six feet in height and can or do store 50 or more acre-feet.

7 Hazard potential classification depends solely on the consequences of failure of the dam and not on the condition of the dam.

8 Hazard potential classification can change over time.
Biodiversity Impacts

Topic Summary
Coal operations can have a range of impacts on biodiversity. Surface mining and mountaintop removal can alter the landscape, removing vegetation and wildlife habitats. Acid mine drainage is particularly significant: it is highly acidic water, rich in heavy metals, formed when surface and shallow subsurface water comes into contact with coal mining overburden, and can have harmful effects on humans, animals, and plants. Biodiversity impacts of coal operations can affect the valuation of reserves and create operational risks. The environmental characteristics of the land where reserves are located could increase extraction costs as a result of increasing awareness and protection of ecosystems. Companies could also face regulatory or reputational barriers to accessing reserves in ecologically sensitive areas, such as the designation of areas where reserves are located as protected areas. Coal operations companies face regulatory risks related to reclamation after a mine is decommissioned, per applicable regulatory requirements to restore mined property according to a prior, approved reclamation plan. Material costs may arise from removing or covering refuse piles, fulfilling water treatment obligations, and dismantling infrastructure at the end of life. Furthermore, ongoing coal operations are subject to laws protecting endangered species. Companies that have an effective environmental management plan for different stages of the project lifecycle may minimize their compliance costs and legal liabilities, face less resistance in developing new mines, avert delays in project completion, and avoid difficulties in obtaining permits and accessing reserves.

Accounting Metrics

EM-CO-160a.1. Description of environmental management policies and practices for active sites
1. The entity shall describe its environmental management plan(s) implemented at active sites, including, where relevant:
   1.1 Lifecycle stages to which the plan(s) apply, such as: pre-bid (when the entity is considering acquisition of a site), exploration and appraisal, site development, production, and during closure, decommissioning, and restoration
   1.2 The topics addressed by the plan(s), such as: ecological and biodiversity impacts, waste generation, noise impacts, emissions to air, discharges to water, natural resource consumption, and hazardous chemical usage
   1.3 The underlying references for its plan(s), including whether they are codes, guidelines, standards, or regulations; whether they were developed by the entity, an industry organization, a third-party organization (e.g., a non-governmental organization), a governmental agency, or some combination of these groups
2 Where relevant, the entity shall describe specific policies and practices that apply to areas with protected conservation status and/or areas of critical habitat, which are defined by the International Finance Corporation (IFC) Performance Standard 6 as:

2.1 Areas with high biodiversity value, including (i) habitat of significant importance to Critically Endangered and/or Endangered species; (ii) habitat of significant importance to endemic and/or restricted-range species; (iii) habitat supporting globally significant concentrations of migratory species and/or congregatory species; (iv) highly threatened and/or unique ecosystems; and/or (v) areas associated with key evolutionary processes.

3 If the management policies and practices do not apply to all of the entity’s sites or operations, it shall indicate the percentage of sites to which they were applied.

4 The entity shall disclose the degree to which its policies and practices are aligned with the International Finance Corporation’s (IFC) Performance Standards on Environmental and Social Sustainability, January 1, 2012, including specifically:

4.1 Performance Standard 1 — Assessment and Management of Environmental and Social Risks and Impacts

4.2 Performance Standard 3 — Resource Efficiency and Pollution Prevention

4.3 Performance Standard 4 — Community Health, Safety, and Security

4.4 Performance Standard 6 — Biodiversity Conservation and Sustainable Management of Living Natural Resources

5 Additional relevant references may include:


EM-CO-160a.2. Percentage of mine sites where acid rock drainage is: (1) predicted to occur, (2) actively mitigated, and (3) under treatment or remediation

1 The entity shall disclose the percentage of its mine sites, by annual production output from mines in metric tons, where acid-generating seepage into surrounding surface water and/or groundwater is: (1) predicted to occur, (2) actively mitigated, and (3) under treatment or remediation.

2 Acid rock drainage (ARD) is predicted to occur if, based on computer simulations, chemical evaluations, and/or acid-base accounting, it is biochemically likely that ARD could form at the mine site.
ARD is considered to be actively mitigated if the entity is preventing the formation of ARD through methods that include, but are not limited to: storing or covering sulfite-bearing minerals to prevent oxidation, flood prevention and mine sealing, mixing of acid-buffering materials with acid-producing materials, or chemical treatment of sulfide wastes (e.g., organic chemicals designed to kill sulfide-oxidizing bacteria).

ARD is considered under treatment or remediation if the acidic water discharged from the mine area is captured and undergoes a wastewater treatment process (active or passive).

ARD may also be referred to as acid-generating seepage or acid mine drainage.

**EM-CO-160a.3. Percentage of (1) proved and (2) probable reserves in or near sites with protected conservation status or endangered species habitat**

1. The entity shall disclose the percentage of proved reserves, in metric tons, in sites with protected conservation status or in areas of endangered species habitat.

   1.1 The percentage of proved reserves shall be calculated as the amount of proved reserves located in areas either with protected conservation status or in areas of endangered species habitat divided by the total amount of proved reserves.

2. The entity shall disclose the percentage of probable reserves, in metric tons, in sites with protected conservation status or in areas of endangered species habitat.

   2.1 The percentage of probable reserves shall be calculated as the amount of probable reserves located in areas either with protected conservation status or in areas of endangered species habitat divided by the total amount of probable reserves.

3. Reserves are considered to be in areas of protected conservation status if they are located within:

   3.1 International Union for Conservation of Nature (IUCN) Protected Areas (categories I-VI)

   3.2 Ramsar Wetlands of International Importance

   3.3 UNESCO World Heritage Sites

   3.4 Biosphere Reserves recognized within the framework of UNESCO’s Man and the Biosphere (MAB) Programme

   3.5 Natura 2000 sites

   3.6 Sites that meet the IUCN’s definition of a protected area: “A protected area is a clearly defined geographical space, recognized, dedicated and managed, through legal or other effective means, to achieve the long term conservation of nature with associated ecosystem services and cultural values”

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3.6.1 These sites may be listed in the World Database of Protected Areas (WDPA) and mapped on ProtectedPlanet.

4 Reserves are considered to be in endangered species habitat if they are in or near areas where IUCN Red List of Threatened Species classified as Critically Endangered (CR) or Endangered (EN) are extant.

4.1 A species is considered extant in an area if it is a resident present during breeding or non-breeding season, or if it makes use of the area for passage.

4.1.1 For the purposes of disclosure, “passage” is defined as all areas of land or water that a migratory species inhabits, stays in temporarily, or crosses or overflies at any time on its normal migration route.

5 For the purposes of this disclosure, “near” is defined as within 5 kilometers (km) of the boundary of an area of protected conservation status or an endangered species habitat to the location of the entity’s proven and probable reserves.

6 Reserves are defined by the U.S. Securities and Exchange Commission (SEC) Industry Guide 7, Description of Property by Issuers Engaged or to Be Engaged in Significant Mining Operations:

6.1 Reserves, as that part of a mineral deposit which could be economically and legally extracted or produced at the time of the reserve determination.

6.2 Proved reserves, as reserves for which (a) quantity is computed from dimensions revealed in outcrops, trenches, workings, or drill holes; grade and/or quality are computed from the results of detailed sampling, and (b) the sites for inspection, sampling, and measurement are spaced so closely and the geographic character is so well defined that size, shape, depth, and mineral content of reserves are well established.

6.3 Probable reserves are reserves for which quantity and grade and/or quality are computed from information similar to that used for proved (measured) reserves, but the sites for inspection, sampling, and measurement are farther apart or are otherwise less adequately spaced. The degree of assurance, although lower than that for proved (measured) reserves, is high enough to assume continuity between points of observation.

7 The entity may separately identify reserves in areas with additional ecological, biodiversity, or conservation designations such as those listed by the A-Z Guide of Areas of Biodiversity Importance prepared by the United Nations Environment Programme’s World Conservation Monitoring Centre (UNEP-WCMC).

8 The entity may discuss reserves that are located in protected areas or endangered species habitats but present low risk to biodiversity or ecosystem services. The entity may provide similar discussion for reserves located in areas with no official designation of high biodiversity value but that present high biodiversity or ecosystem services risks.
Rights of Indigenous Peoples

Topic Summary
Companies in the Coal Operations industry can operate and hold assets in areas occupied by indigenous peoples. Companies perceived as contributing to human rights violations or failing to account for indigenous peoples’ rights may be affected due to protests, riots, or suspension of permits. They could face substantial costs related to compensation or settlement payments, and write-downs in the value of their reserves in such areas. In the absence of country laws to address such cases, several international instruments have emerged to provide guidelines for companies. These instruments include obtaining the free, prior, and informed consent of indigenous peoples for decisions that affect them. With greater awareness, several countries are also beginning to implement specific laws protecting indigenous peoples’ rights, creating increasing regulatory risk for companies. Furthermore, indigenous peoples are often vulnerable sections of the population, with limited capacity to defend their unique rights and interests.

Accounting Metrics

EM-CO-210a.1. Percentage of (1) proved and (2) probable reserves in or near indigenous land

1 The entity shall disclose the percentage of proved reserves that are located in or near areas that are considered to be indigenous peoples’ land.

1.1 The percentage of proved reserves shall be calculated as the amount of proved reserves located in or near indigenous land divided by the total amount of proved reserves.

2 The entity shall disclose the percentage of probable reserves that are located in or near areas that are considered to be indigenous peoples’ land.

2.1 The percentage of probable reserves shall be calculated as the amount of probable reserves located in or near indigenous land divided by the total amount of probable reserves.

3 Indigenous lands are considered those occupied by people who self-identify as indigenous per Article 33 of the United Nations Declaration on the Rights of Indigenous Peoples and the International Labour Organization Convention No. 169, and likely have one or more of the following characteristics based on the working definition of “Indigenous Peoples” adopted by the United Nations:

3.1 Historical continuity with pre-colonial and/or pre-settler societies

3.2 Strong link to territories and surrounding natural resources

3.3 Distinct social, economic, or political systems
3.4 Distinct language, culture, and beliefs

3.5 Form non-dominant groups of society

3.6 Resolve to maintain and reproduce ancestral environments and systems as distinctive peoples and communities

4 For the purposes of this disclosure, “near” is defined as within 5 kilometers of the recognized boundary of an area considered to be indigenous land to the location of the entity’s proven and probable reserves.

5 Reserves shall be calculated in metric tons and are defined by the U.S. Securities and Exchange Commission (SEC) Industry Guide 7, Description of Property by Issuers Engaged or to Be Engaged in Significant Mining Operations:

5.1 Reserves, as that part of a mineral deposit that could be economically and legally extracted or produced at the time of the reserve determination

5.2 Proved reserves, as reserves for which (a) quantity is computed from dimensions revealed in outcrops, trenches, workings, or drill holes; grade and/or quality are computed from the results of detailed sampling and (b) the sites for inspection, sampling, and measurement are spaced so closely and the geographic character is so well defined that size, shape, depth, and mineral content of reserves are well established

5.3 Probable reserves are reserves for which quantity and grade and/or quality are computed from information similar to that used for proven (measured) reserves, but the sites for inspection, sampling, and measurement are farther apart or are otherwise less adequately spaced. The degree of assurance, although lower than that for proven (measured) reserves, is high enough to assume continuity between points of observation.

EM-CO-210a.2. Discussion of engagement processes and due diligence practices with respect to the management of indigenous rights

1 The entity shall describe its due diligence practices and procedures with respect to indigenous rights of communities in which it operates or intends to operate, which include, but are not limited to:

1.1 Upholding ILO Convention No. 169

1.2 Use of free, prior, and informed consent (or consultation) processes

1.3 The establishment of project grievance mechanisms

1.4 The establishment of formal community agreements

2 The discussion shall include due diligence processes employed during all stages of project development (i.e., prior, during, and post).
3 The discussion may include governance mechanisms the company puts in place to ensure that its policies and practices are adhered to throughout all levels of the organization.

4 The discussion shall include how practices apply to business partners, such as contractors, sub-contractors, suppliers, and joint venture partners.

4.1 Where practices do not apply to business partners, the entity may discuss factors that prevent the application of such practices.
Community Relations

**Topic Summary**
Coal operations take place over a number of years and can have a wide range of community impacts. Community rights and interests may be affected by the environmental and social impacts of operations, air emissions, waste generation, wastewater discharges, and decommissioning activities. Coal operations companies often need support from local communities to be able to obtain permits and leases and conduct their activities without disruptions. The expected value of reserves could be affected if the community interferes or lobbies its government to interfere with the rights of a coal company in relation to those reserves. In addition to community concerns about the direct impacts of projects, the presence of coal mining activities may give rise to associated socioeconomic concerns related to education, health, and livelihoods. Coal companies that are perceived as engaging in rent-seeking and exploiting community resources without providing any socioeconomic benefits in return may be exposed to the risk of resource nationalism actions by host governments and communities that restrict their activities or impose additional costs. Companies in the extractives industries can adopt various community engagement strategies in their global operations to manage risks and opportunities associated with community rights and interests, such as integrating community engagement into each phase of the project cycle. Companies that adopt a “shared value” approach may be able to provide key socioeconomic benefits to communities while maintaining profitable operations.

**Accounting Metrics**

**EM-CO-210b.1. Discussion of process to manage risks and opportunities associated with community rights and interests**

1. The entity shall discuss its processes, procedures, and practices to manage risks and opportunities associated with the rights and interests of communities in areas where it conducts business, where community rights and interests include:

   1.1 Economic rights and interests, including, but not limited to, employment, fair wages, payment transparency, and respect of infrastructure and agricultural land

   1.2 Environmental rights and interests, including, but not limited to, clean local air and water, as well as safe discharge and disposal of waste

   1.3 Social rights and interests, including, but not limited to, adequate health care, education, and housing

   1.4 Cultural rights and interests, including, but not limited to, protection of places of cultural significance (e.g., sacred sites or burial sites)

2. The entity shall disclose the following, as relevant:
2.1 Lifecycle stages to which its practices apply, such as: pre-bid (when the entity is considering acquisition of a site), exploration and appraisal, site development, coal production, and during closure, decommissioning, and restoration

2.2 The community rights and interests (enumerated above) specifically addressed by the entity’s practices

2.3 The underlying references for its procedures, including whether they are codes, guidelines, standards, or regulations and whether they were developed by the entity, an industry organization, a third-party organization (e.g., a non-governmental organization), a governmental agency, or some combination of these groups

3 Risks and opportunities include, but are not limited to: non-technical delays, availability and development of local content, availability and access to adequate infrastructure, community actions related to resource nationalism, and challenges associated with resettlement and access to land.

4 The entity shall disclose the degree to which its policies and practices are aligned with the International Finance Corporation’s (IFC) Performance Standards on Environmental and Social Sustainability, January 1, 2012, including specifically:

   4.1 Performance Standard 4 — Community Health, Safety, and Security

   4.2 Performance Standard 5 — Land Acquisition and Involuntary Resettlement

   4.3 Performance Standard 8 — Cultural Heritage

5 The discussion shall include how practices apply to business partners such as contractors, sub-contractors, suppliers, and joint venture partners.

6 The entity may describe its efforts to eliminate or mitigate community risks and/or address community concerns, including, but not limited to:

   6.1 The use of a social impact assessment (SIA) that evaluates, manages, and mitigates risks

   6.2 Efforts to engage with stakeholders, build consensus, and collaborate with communities

   6.3 “Shared” or “blended” value projects that provide quantifiable benefits to the community and the entity

7 The entity may quantify its community risks by calculating the aggregate estimated value at risk to its capital expenditure projects as the difference in value between a project free from country, regional, and/or community risks (hereafter, country risk) and the value of a project adjusted for these risks.

   7.1 This calculation may be conducted using an appropriate valuation model; variations of the Capital Asset Pricing Model (CAPM) are commonly used to assess country risk.
7.1.1 Value at risk can be calculated by applying an additional discount rate premium when calculating the net present value of a project using discounted cash flow (DCF) analysis.

7.1.2 Value at risk can be expressed as a reduction in the expected cash flows of a project due to country risk when calculating the net present value of a project using DCF.

7.1.3 If a project is insured for country risks, the value at risk can be expressed as a reduction in the cash flows of a project due to the cost of insurance when calculating the net present value of a project using DCF analysis.

7.2 Country, regional, and/or community risks include, but are not limited to: corruption, business legal structure, political stability, regulation, resource nationalism, ethnic conflict, stability of the local market, labor force (skills) availability, resettlement and access to land, quality of access to infrastructure (e.g., ports, roads, shipping channels), and/or general license to operate.

7.2.1 These risks are likely to manifest differently at the country (national), regional (state), community (local) levels, and project levels.

7.2.2 This risk differs from sovereign risk, which is defined as the potential for a central bank or government-backed entity to willingly or unwillingly default on debt obligations, or significantly alter key economic variables such as currency exchange rates, import ratios, and money supply.

7.3 The entity may identify and describe country risks specific to its projects and unique operating context.

7.3.1 This may include the identification of country, regional, and community risks and/or the discussion of specific projects.

7.3.2 This may include discussion of how the entity has mitigated these risks (e.g., through community engagement partnerships, and blended value projects); the entity shall quantify this reduction in risk according to the methods described above.

7.3.3 Discussion should be in addition to broad country risk classification (e.g., OECD Prevailing Country Risk classification, Standard & Poor's Country Risk ratings, and the World Economic Forum Global Competitiveness Index).

7.4 The entity may describe the model or approach used to value capital expenditure projects such as adjusted discount rate, expected cash flow, or other methods.

**EM-CO-210b.2. Number and duration of non-technical delays**

1 The entity shall disclose the total number and aggregate length, in days, of site shutdowns or project delays due to non-technical factors.
2 The scope includes shutdowns and project delays including, but not limited to, those resulting from pending regulatory permits or other political delays related to community concerns, community or stakeholder resistance or protest, and armed conflict.

3 The scope of disclosure excludes delays due to strikes and lockouts that are disclosed according to EM-CO-310a.2.

4 The entity may discuss specific delays including associated costs, root cause and corrective actions for resolved delay, and status of ongoing delays.
Labor Relations

Topic Summary
Coal mining companies face inherent tension between the need to lower the cost of labor to remain price-competitive and the need to manage human resources to ensure long-term performance. Working conditions related to coal operations are usually physically demanding and hazardous. Labor unions play a key role in representing workers’ interests and managing collective bargaining for better wages and working conditions. This makes the management of labor relations critical, as conflict with workers can result in labor strikes and other disruptions that can delay or stop production, leading to significant lost revenue and reputational damage. Continued labor stresses can impact the long-term profitability of the entity. At the same time, positive outcomes of effective labor engagement can include enhanced work practices, labor utilization, as well as the reduction in safety incidents, accidents, or fatalities.

Accounting Metrics

EM-CO-310a.1. Percentage of active workforce covered under collective bargaining agreements, broken down by U.S. and foreign employees
1. The entity shall disclose the percentage of U.S. employees and the percentage of foreign employees in the active workforce that are covered under collective bargaining agreements during any part of the reporting period.

1.1 Active workforce is defined as the maximum number of unique employees employed at any time during the reporting period.

1.2 Collective bargaining agreements are defined as a mechanism or tool of negotiation by which a union has a collective interest in negotiations to the benefit of several employees.

1.3 U.S. employees are defined as employees that do not need a visa to work in the U.S.

1.4 Foreign employees are defined as employees that do need a visa to work in the U.S.

EM-CO-310a.2. Number and duration of strikes and lockouts
1. The entity shall disclose the number of work stoppages and total duration, in worker days idle, of work stoppages involving 1,000 or more workers lasting one full shift or longer.

1.1 Worker days idle is calculated as the product of days idle and number of workers involved.

2. The scope of disclosure includes work stoppage due to disputes between labor and management, including strikes and lockouts.
3 The scope of disclosure excludes work stoppages due to other non-technical reasons that are disclosed according to EM-CO-210a.2.

Note to **EM-CO-310a.2**

1 The entity shall describe the reason for each work stoppage (as stated by labor), the impact on production, and any corrective actions taken as a result.
Workforce Health & Safety

Topic Summary

Safety is critical to coal mining operations due to the often hazardous working conditions. Fatalities or injuries can result from a number of hazards associated with the industry, including accidents, cave-ins, explosions, and flooding. Due to these hazards, the industry is characterized by higher-than-average fatality and injury rates. Coal miners are also susceptible to long-term health risks such as chronic lung disease, commonly known as “black lung” disease, as well as mental health problems. Specific federal health and safety laws protect coal mining workers and make provisions for compensation for black lung disease. These can impose additional costs on companies or lead to regulatory penalties. Changes in legislation can result in additional liabilities. A company’s ability to protect employee health and safety, and to create a culture of safety and well-being among employees at all levels, can help prevent accidents, mitigate costs and operational downtime, and enhance workforce productivity.

Accounting Metrics

EM-CO-320a.1. (1) MSHA All-Incidence rate, (2) fatality rate, and (3) near miss frequency rate (NMFR)

1 The entity shall disclose its U.S. Mine Safety and Health Administration (MSHA) All-Incidence rate and fatality rate.

1.1 For U.S.-based workforces, the entity shall disclose its All Incidence Rate (AIR) and fatality rate, as calculated and reported through the Mine Safety and Health Administration’s (MSHA) Form 7000-1 (as required under U.S. 30 CFR, Part 50), where incidents include:

1.1.1 Fatalities, or work-related injuries resulting in death to employees on active mine property

1.1.2 Nonfatal, Days Lost (NFDL) cases, or occupational injuries that result in loss of one or more days from the entity’s scheduled work, or days of limited or restricted activity while at work

1.1.3 No Days Lost (NDL) cases, or occurrences requiring only medical treatment (beyond first aid); that is, nonfatal-injury occurrences resulting only in loss of consciousness or medical treatment other than first aid

1.2 For non-U.S.-based workforces, the entity shall calculate its AIR and fatality rate according to the MSHA instructions and definitions.

2 The entity shall disclose its near miss frequency rate (NMFR) for work-related near misses.

2.1 A near miss is defined as an unplanned incident in which no property or environmental damage or personal injury occurred, but where damage or personal injury easily could have occurred but for a slight circumstantial shift.
2.2 The U.S. National Safety Council (NSC) provides guidance on implementing near miss reporting, including in, “Near Miss Reporting Systems.”

2.3 The entity may disclose its process for classifying, identifying, and reporting near misses.

3 Rates shall be calculated as: \( \frac{\text{statistic count} \times 200,000}{\text{hours worked}} \)

3.1 The U.S. Bureau of Labor Statistics (BLS) provides additional guidance for the calculation of rates in, “How to Compute a Firm’s Incidence Rate for Safety Management” and “Incidence Rate Calculator and Comparison Tool.”

4 The scope of disclosure includes all employees regardless of employee location and type of employment, such as full-time, part-time, direct, contract, executive, labor, salary, hourly, and seasonal employees.

**EM-CO-320a.2. Discussion of management of accident and safety risks and long-term health and safety risks**

1 The entity shall discuss its management of accident and safety risks.

1.1 The scope of discussion includes how the entity manages safety and emergency preparedness throughout its value chain, such as through training, joint management by the workforce and leadership, rules and guidelines (and their enforcement), and use of technology.

1.2 The scope of discussion includes how emergency preparedness is coordinated amongst business partners (e.g., contractors and sub-contractors).

1.3 The scope of discussion may focus broadly on safety and emergency management systems, but shall specifically address the systems to avoid and manage emergencies, accidents, and incidents that could have catastrophic human health, local community, and environmental impacts.

2 The entity shall discuss how it manages long-term health and safety risks associated with coal mining (e.g., coal worker’s pneumoconiosis) such as through training, rules and guidelines (and their enforcement), use of personal protective equipment, and use of technology.

3 The entity may discuss implementation of relevant management systems such as CORESafety (developed by the National Mining Association), including progress towards tracking safety and health (S&H) metrics, management system (MS) metrics, and obtaining third-party verification.
Reserves Valuation & Capital Expenditures

Topic Summary
Estimates suggest that coal companies may be unable to extract a significant proportion of their coal reserves if greenhouse gas (GHG) emissions are to be controlled to limit global temperature increases to two degrees Celsius per the Paris Agreement. Stewardship of capital resources while taking into account medium- to long-term trends, particularly related to climate change mitigation actions, is critical in order to prevent asset impairment and maintain profitability and creditworthiness. Globally, regulations and policies are and may continue to be put into place to limit GHG emissions from coal-fired power plants—the customers of coal companies—thus lowering the demand for, and subsequently the prices of, coal. Coal demand is also being affected by regulations governing other harmful air emissions that apply to coal-fired power plants. An expansion of GHG-mitigation regulations may increase the magnitude of potential financial impacts in the medium to long term. Along with improved competitiveness of alternative energy technologies, this poses a long-term risk for the reserves and capital expenditures of coal operations companies.

Accounting Metrics

EM-CO-420a.1. Sensitivity of coal reserve levels to future price projection scenarios that account for a price on carbon emissions
1 The entity shall perform a sensitivity analysis of its reserves to determine how several future scenarios may affect its determination of whether the reserves are proven or probable.

2 The entity shall analyze the sensitivity of its current proven and probable reserves using the price trajectories published by the International Energy Agency (IEA) in its World Energy Outlook (WEO) publication, including:

2.1 Current Policies Scenario, which assumes no changes in policies from the mid-point of the year of publication of the WEO

2.2 New Policies Scenario, which assumes that broad policy commitments and plans that have been announced by countries—including national pledges to reduce greenhouse gas emissions and plans to phase out fossil-energy subsidies—occur, even if the measures to implement these commitments have yet to be identified or announced. This broadly serves as the IEA baseline scenario.

2.3 Sustainable Development Scenario, which assumes an energy pathway occurs that is consistent with the goal of limiting the global increase in temperature to 2°C by limiting concentration of greenhouse gases in the atmosphere to around 450 parts per million of CO₂-e

3 The entity shall consider the WEO scenarios as a normative reference, thus any updates to the WEO made year-on-year shall be considered updates to this guidance.
4 Reserves are defined by U.S. Securities and Exchange Commission (SEC) Industry Guide 7, Description of Property by Issuers Engaged or to Be Engaged in Significant Mining Operations:

4.1 Reserves, as that part of a mineral deposit that could be economically and legally extracted or produced at the time of the reserve determination

4.2 Proven reserves, as reserves for which (a) quantity is computed from dimensions revealed in outcrops, trenches, workings, or drill holes; grade and/or quality are computed from the results of detailed sampling and (b) the sites for inspection, sampling, and measurement are spaced so closely and the geographic character is so well defined that size, shape, depth, and mineral content of reserves are well established

4.3 Probable reserves, as reserves for which quantity and grade and/or quality are computed from information similar to that used for proven (measured) reserves, but the sites for inspection, sampling, and measurement are farther apart or are otherwise less adequately spaced. The degree of assurance, although lower than that for proven (measured) reserves, is high enough to assume continuity between points of observation.

5 The entity shall follow guidance published by the Securities and Exchange Commission (SEC) in its Oil and Gas Reporting Modernization (Section §229.1202 (Item 1202) Disclosure of Reserves) for conducting a reserves sensitivity analysis.

6 The entity may summarize its findings in the following table format:

<table>
<thead>
<tr>
<th>PRICE CASE</th>
<th>PROVEN RESERVES</th>
<th>PROBABLE RESERVES</th>
</tr>
</thead>
<tbody>
<tr>
<td>(Scenario)</td>
<td>Coal (tons)</td>
<td>Coal (tons)</td>
</tr>
<tr>
<td></td>
<td>Product A (measure)</td>
<td>Product A (measure)</td>
</tr>
<tr>
<td>Current Policies Scenario (base)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>New Policies Scenario</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sustainable Development Scenario</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

7 The entity may disclose the sensitivity of its reserve levels in other price and demand scenarios in addition to those described above, particularly if these scenarios differ depending on the type of coal reserves, regulatory environment in the countries or regions where mining occurs, end-use of the entity’s products, or other factors.

8 For additional sensitivity analyses, the entity should consider disclosing the following, per the Task Force on Climate-Related Financial Disclosures (TCFD) Recommendations Report Figure 8 as well as the Implementing the Recommendations of the TCFD Report, Section E:

8.1 The alternative scenarios used, including other 2°C or lower scenarios
8.2 Critical input parameters, assumptions, and analytical choices for the climate-related scenarios used, particularly as they relate to key areas such as policy assumptions, energy deployment pathways, technology pathways, and related timing assumptions.

8.3 Time frames used for scenarios, including short-, medium-, and long-term milestones (e.g., how organizations consider timing of potential future implications under the scenarios used).

**EM-CO-420a.2. Estimated carbon dioxide emissions embedded in proven coal reserves**

1. The entity shall calculate and disclose an estimate of the carbon dioxide emissions embedded in its proven coal reserves.

   1.1 *Nota bene* — this estimate applies a factor for potential CO₂ only and does not include an estimate for all potential greenhouse gas emissions, as these are dependent on downstream use (e.g., utility electricity generation, industrial heating and electricity generation, cement production, or steel production).

2. Estimated potential carbon dioxide emissions from proven coal reserves shall be calculated according to the following formula, derived from Meinshausen et al:

   \[ E = R \times V \times C \]

   where:

   2.1.1 \( E \) are the potential emissions in kilograms of carbon dioxide (kg CO₂);

   2.1.2 \( R \) are the proven reserves in gigagrams (Gg);

   2.1.3 \( V \) is the net calorific value in terajoules per gigagram (TJ/Gg); and

   2.1.4 \( C \) is the effective carbon dioxide emission factor in kilograms CO₂ per terajoule (kg/TJ).

3. In the absence of data specific to the entity’s coal reserves, carbon content shall be calculated using default data for each major type of coal resource published by the Intergovernmental Panel on Climate Change (IPCC) in its 2006 IPCC Guidelines for National Greenhouse Gas Inventories.

   3.1 The entity shall use default carbon content values per unit of energy that is listed in IPCC Table 1.3 Default Values of Carbon Content, Volume 2: Energy, Chapter 1.

   3.2 The entity shall use calorific values per weight of coal resource contained in IPCC Table 1.2 Default Net Calorific Values (NCVs) and Lower and Upper Limit of the 95% Confidence Intervals, Volume 2: Energy, Chapter 1.

4. The entity shall use engineering estimates to determine the weight of its coal reserves in gigagrams.
For other assumptions required to estimate the carbon content of coal reserves, the entity shall rely on guidance from the IPCC, Greenhouse Gas Protocol, U.S. Energy Information Agency (EIA), or the International Energy Agency (IEA).

**EM-CO-420a.3. Discussion of how price and demand for coal and/or climate regulation influence the capital expenditure strategy for exploration, acquisition, and development of assets**

1. The entity shall discuss how projections for price and demand for coal and the path of air quality and climate regulation influence the entity’s capital expenditure (CAPEX) strategy.

   1.1 This discussion should include the entity’s projections and assumptions about future coal prices and the likelihood that certain price and demand scenarios occur.

2. The entity shall discuss the implications of price and demand scenario planning (i.e., EM-CO-420a.1) and how they may affect decisions to explore, acquire, and develop new reserves.

3. The entity may discuss factors that materially influence its CAPEX decision-making, including, but not limited to:

   3.1 How the scope of air quality and climate change regulation—such as which countries, regions, and/or industries are likely to be impacted—may influence where the entity focuses its exploration and development.

   3.2 Its view of the alignment between the time horizon during which price and demand for coal may be affected by climate regulation and time horizons for returns on capital expenditures on reserves.

   3.3 How the structure of climate regulation—i.e., a carbon tax versus cap-and-trade—may differently affect price and demand, and thus the entity’s capital expenditure decision making.

4. The entity may discuss how these trends affect decision-making in the context of different types of reserve expenditures, including development of assets, acquisition of properties with proven reserves, acquisition of properties with unproven resources, and exploration activities.