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Sustainable Development

STATE OF
SUSTAINABILITY
INITIATIVES REVIEW

STANDARDS AND THE EXTRACTIVE ECONOMY

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SSI
State of
Sustainability
Initiatives

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The International Institute for Sustainable Development (IISD) launched the State of Sustainability Initiatives (SSI) in 2008. The SSI is an international transparency and capacity building project which aims to improve strategic planning and sustainable development outcomes related to VSSs by providing in-depth, credible and needs-based information.

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DEDICATION

This report is dedicated to the indomitable spirit of Jason Potts, who served as a lead author on this report and was a guiding force behind the SSI. Jason, who passed away in January 2018, leaves a formidable legacy. He devoted himself to advancing sustainable development through the design and use of effective voluntary standards and initiatives and was an inspiration to so many, including all who worked on this report.

A dear colleague and a trusted friend, he is truly missed.

ACKNOWLEDGEMENTS

The State of Sustainability Initiatives (SSI) project depends on the support and efforts of many individuals and organizations. The SSI team thanks all those who supported the development of the project and, in particular, this edition of the SSI Review.

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We express our deep gratitude to all of the sustainability initiatives that provided information to the SSI project, both directly and through publishing publicly accessible data. Participating organizations were Aluminium Stewardship Initiative (ASI); Bettercoal; International Finance Corporation (IFC); Initiative for Responsible Mining Assurance (IRMA); International Council on Mining and Metals Sustainable Development (ICMM); Responsible Jewellery Council (RJC); Responsible Mining Index (RMI); Mining Association of Canada, Towards Sustainable Mining (TSM); Alliance for Responsible Mining Foundation, Fairmined Gold (ARM); Fairtrade International, Fairtrade Gold and Silver; Cornerstone Standards Council (CSC); Natural Stone Council (NSC); The Forest Trust, Responsible Stone Programme (TFT), Fair Stone, and XertifiX.

The SSI team would also like to thank colleagues at BGR, Ms. Gudrun Franken and Ms. Karoline Kickler, for sharing the scheme profiles referred to in Appendix II, where there was much overlap in the schemes covered in our respective studies—and for participating in our events and joining in on some organizational phone calls in the early days of research.

Other IISD staff who provided input at the early stage of research are Ms. Nathalie Bernasconi-Osterwalder and Mr. Aaron Crosby. We extend a special thanks to Ms. Flavia Thomé, who supported and helped coordinate the research activities from inception to close.

Finally, *State of Sustainability Initiatives: Standards and the Extractive Economy* would not have been possible without funding from the Intergovernmental Forum on Mining, Minerals, Metals and Sustainable Development (IGF), hosted by the International Institute for Sustainable Development (IISD) at the time of writing. IGF members were keen to have additional guidance material on the interface between public policy and standards, to which a section of the report is dedicated. At the IGF, Mr. Greg Radford, Mr. Matthew Bliss and Mr. Tristan Easton went beyond our expectations with their active participation as working group members.

DECLARATION OF INTERESTS

This study strives to provide an objective analysis of voluntary sustainability initiatives applicable to mining. Perhaps inevitably, the authors of the study have had previous involvement with several of the initiatives that are included in the study and wish to ensure that these interests are made known to readers.

Matthew Wenban-Smith has worked as a consultant for the Initiative for Responsible Mining Assurance (IRMA), Fairtrade Labelling Organizations (FLO), Cornerstone Standards Council (CSC) and the Alliance for Responsible Mining (ARM), all of which are included in the analysis, and is currently working for ResponsibleSteel, which is described in the context of downstream initiatives that are creating demand for material from responsible mining operations. Matthew has also been a long-time ISEAL subscriber and chaired the ISEAL Technical Committee between 2014 and 2017.

Alan Young, who provided strategic oversight in research and communications, is a Steering Committee member of the Initiative for Responsible Mining Assurance (IRMA).

NOTE FROM THE SSI MANAGEMENT TEAM

The State of Sustainability Initiatives (SSI) project was founded under the auspices of the UNCTAD/IISD Sustainable Commodity Initiative and is implemented by the International Institute for Environment and Development (IIED), the International Institute for Sustainable Development (IISD) and the Finance Alliance for Sustainable Trade (FAST). The SSI is motivated by recognition of the need for improved information exchange among stakeholders in voluntary sustainability initiatives and among voluntary sustainability initiatives themselves. The objective of the SSI is to stimulate regular reporting on the state of play across voluntary sustainability initiatives, offering a framework for understanding the characteristics, important issues and market trends for select sustainability initiatives and standards operating in global markets.

It is hoped that the SSI Review can serve as a tool for learning and strategic decision making between the public and private sectors as well as sustainability initiatives themselves.

FOREWORD

The 2030 Agenda for Sustainable Development and the Sustainable Development Goals (SDGs) sets out a plan of action for socially and environmentally sound economic development. Many mineral-rich developing countries rely on the mining sector as an engine for economic development. But to ensure that mining is socially and environmentally sound and contributes to advancing SDGs requires extra efforts from policy-makers and the private sector alike. Only if it is managed responsibly can mining bring much-needed revenue to public coffers, create jobs, invigorate innovation and improve infrastructure. If poorly managed, mining can be environmentally harmful, displace communities, exacerbate or create conflict, and deepen inequalities.

Advancing the SDGs in the context of mining requires policy action at the national, regional and international levels, including coordinated efforts by governments. But government action alone is insufficient. This reality has led to an exponential growth in the number and use of private voluntary sustainability initiatives (VSIs) in the mining sector, implicating the private sector, consumers and civil society. The increasing number of VSIs in the mining sector gives rise to challenges. In particular, the multiplicity of these initiatives makes it increasingly difficult for stakeholders to stay informed on their utility, performance and best practices.

In this report, we unpack this complexity. The *State of Sustainability Initiatives Review: Standards and the Extractive Economy* highlights diversity within the mining sector, both in the commodities being mined and in the range of environmental, social and economic impacts associated with mining activity. My hope is that policy-makers will use this report to inform themselves of the important role various VSIs play and what they can do to capitalize on VSIs to support and complement policy frameworks.

I believe the depth of the analysis in this report provides value. Using the comprehensive CARE criteria (standing for coverage, assurance, responsiveness and engagement) to assess 15 major initiatives (see the table in the executive summary), and examining the level of obligation they impose on mining companies to comply, this report provides a nuanced and revealing picture of the state of sustainability initiatives in mining. In line with the overarching goal of the State of Sustainability Initiatives (SSI) series, it is my hope that the data and analysis provided in this report will help supply chain decision-makers strengthen their own strategic decision-making processes in ways that provide optimal sustainable development impact.

Finally, I would like to extend my deepest appreciation to Jason Potts, co-author of this report. Throughout his career, Jason dedicated himself to innovative solutions to advance sustainability and justice. His passing last January is a tremendous loss for the International Institute for Sustainable Development (IISD), where he initiated and led the SSI. It has been an enormous privilege to know and work with Jason. His tireless search for excellence and precision will live on through his work. This report is one such testimony.

Nathalie Bernasconi-Osterwalder

EXECUTIVE SUMMARY

In the last decade, the international community has increasingly recognized the central role of sustainable consumption and production in the implementation of sustainable development. As a result, the mining sector, like other primary commodity sectors, has seen a wide variety of multistakeholder, market-based supply chain initiatives arise. These are called voluntary sustainability initiatives (VSIs), and they aim to promote sustainable production practices, often at the global level.

The rapid growth in the number of VSIs has been cause for concern for some civil society and public-sector players, as well as for the private sector, as keeping track of the sheer volume and diversity of initiatives is challenging and costly. Because this monitoring is difficult, the value of VSIs to society and the marketplace may suffer as a result. This report dives headfirst into this complex and quickly moving space to provide readers with synthesis and analysis across a number of areas. We have applied a distinctly rigorous methodology across 15 major initiatives, capturing not only the content (environmental, social and business dimensions)—where most other analyses end off—but also the level of obligation demanded by the initiative to implement sustainability actions. Our review is comprehensive, revealing the different strengths (and often the different intended purposes) of VSIs and the challenge of finding a one-size-fits-all initiative.

Section 1 summarizes sustainability issues in the mining sector, broken down into four impact categories: environmental, pollution, occupational health and social. It then sets out the major related drivers of VSIs, which include strategic considerations, reputational risk, corporate and brand values, social and environmental costs and risks, regulatory benefits, market demand, and investor or lender requirements. To provide context for this report, we then present a history of VSIs in the mining sector from their early examples in the mid-1990s through today.

WHO SHOULD READ SECTION 1?

Those with a general interest in VSIs will find Section 1 a good place to start. Section 1.1 describes the environmental and social impacts of the mining sector, providing the rationale for the emergence of VSIs. Section 1.2 then provides an overview of the major reasons why mining companies might choose to adhere to a VSI (the "drivers"). Section 1.3 goes on to describe the history of VSIs in the mining sector, which facilitates an understanding of the evolution of standards in the sector. For those who might be familiar with VSI uptake in other sectors (e.g., forest products, agricultural products) the history section may offer some valuable insights for comparing how the mining sector is similar or different.

Section 2 addresses the role of public policy in regard to VSIs. As VSIs grow in popularity, one of the major outstanding requirements for policy-makers is to understand when, where and how they have, or can generate, the most impact. As such, it is important to situate VSIs in their wider context at the public policy–private sector interface. This focus on designing effective public policy is also a feature of the present report that seeks to set it apart from other studies on VSIs in mining.

Government regulation is a major driver of the uptake of mining VSIs—in some cases as a legal obligation, or to demonstrate compliance with sustainable development practices or principles. Nonetheless, it is important to keep in mind that VSIs are fundamentally instruments of the market, subject to private, individual preferences and market forces. It is critical to maintain this distinction in a discussion of the potential, and limitations, of VSIs to create lasting, sustainable development outcomes.

Both the expansion and the contraction of public regulation can be drivers for VSI emergence and uptake.

- Regulation, including public policy, procurement policy, environmental standards and international standards in general, can create a need for VSIs as providers of deeper technical specifications and as demonstrations of compliance. Regulation can also establish positive incentives for VSIs.
- Where good policy or regulation is taken away, or where none exists to begin with, there is an opportunity for VSIs to fill the void, advancing sustainable development goals and acting as de facto regulators, establishing rules and monitoring actions and performance.

Among other things, this report aims to help public sector officials understand how to take advantage of VSIs in the mining sector to advance their sustainable development goals. VSIs can be used to help identify key mining issues, can serve as models to be incorporated into the body of regulation and can act as tools to broaden support for progressive policy intervention. This report does not provide explicit policy guidance, but suggests that there are many opportunities for alignment between the public and private sectors to improve sustainable development.

WHO SHOULD READ SECTION 2?

Policy-makers, public authorities and governance professionals may be most interested in Section 2, which looks at the issue of VSIs from the perspective of public regulators. The section answers questions such as *How does public policy affect the design and uptake of VSIs?* and *How can my country benefit from VSIs operating on mine sites?* Indeed, this report seeks to increase public sector awareness of the effect of the policy environment on the design and uptake of VSIs. In turn, it encourages policy-makers to take advantage of VSIs for their policy needs when appropriate for meeting sustainable development goals.

Section 3 focuses on the findings of the IISD CARE analysis of mining initiatives. It is broken down into four subsections, one for each element of the CARE analysis: coverage (divided into sub-sections on content and level of obligation), assurance, responsiveness and engagement. The section begins with a description of the selection process of going from a long list of 158 standards down to 15 for a full CARE analysis, as shown below.

VSIs covered in the CARE analysis of this report

ASI PERFORMANCE STANDARD & ASI CHAIN-OF-CUSTODY STANDARD

Year initiative established: 2012

Year standards developed: 2014

Founding stakeholders: Civil society, private sector

Commodities scope: Aluminum

Geographic scope: Global

BETTERCOAL CODE

Year initiative established: 2011

Year standards developed: 2013

Address: 14 Gray's Inn Road, London, WC1X 8HN, United Kingdom

Founding stakeholders: Civil society, private sector, public institutions

Commodities scope: Coal

Geographic scope: Global (Australia, Colombia, Germany, Great Britain, Indonesia, Kazakhstan, Norway, Poland, Russia, South Africa, United States)

INTERNATIONAL COUNCIL ON MINING AND METALS SUSTAINABLE DEVELOPMENT FRAMEWORK [ICMM]

Year initiative established: 2001

Year standards developed: 2003-2015

Address: 35/38 Portman Square, London, W1H 6LR, United Kingdom

Founding stakeholders: No information is provided for the participation of civil society, private sector or public institutions

Commodities scope: All mineral commodities

Geographic scope: Global

IFC'S ENVIRONMENTAL AND SOCIAL PERFORMANCE STANDARDS

Year initiative established: 1956
Year standards developed: 2006
Address: 2121 Pennsylvania Ave, NW, Washington, DC, 20433 USA
Founding stakeholders: Civil society
Commodities scope: All mineral commodities
Geographic scope: Global

IRMA STANDARD FOR RESPONSIBLE MINING

Year initiative established: 2006
Year standards developed: 2014
Address: P.O. Box 66236, Washington, DC, 20035-6236 USA
Founding stakeholders: Civil society, private sector
Commodities scope: All mineral commodities, except for energy fuels
Geographic scope: Global (not yet implemented though)

TOWARDS SUSTAINABLE MINING (TSM)

Year initiative established: 2004
Year standards developed: 2004
Address: 275 Slater Street, Suite 1100, Ottawa, ON, K1P 5H9 Canada
Founding stakeholders: Civil society, private sector
Commodities scope: All mineral commodities
Geographic scope: National: Canada (mandatory for MAC members). Global: national chambers of mines of Finland, Argentina and Botswana have formally adopted TSM

RESPONSIBLE JEWELLERY COUNCIL (RJC)

Year initiative established: 2005
Year standards developed: 2009
Address: 9 Whitehall, London, SW1A 2DD, United Kingdom
Founding stakeholders: Public institutions (there is no information available)
Commodities scope: Diamonds (CoP), Gold and platinum group metals (CoP, Coc), with an expansion of scope to coloured stones current under consideration
Geographic scope: Global

FAIR STONE – INTERNATIONAL STANDARD FOR THE NATURAL STONE INDUSTRY

Year initiative established: 2014

Year standards developed: Version 1: 2009. Version 6: 2016

Address: Schuhstrasse 4, 73230, Kirchheim unter Teck, Germany

Founding stakeholders: Civil society, private sector, public institutions

Commodities scope: Natural stone

Geographic scope: Global (China, India, Vietnam)

CORNERSTONE STANDARDS COUNCIL

Year initiative established: 2012

Year standards developed: 2013

Address: 9520 Pine Valley Drive, Woodbridge, ON, L4L 1A6, Canada

Founding stakeholders: Civil society, private sector, public institutions

Commodities scope: Aggregates: stone, gravel, sand

Geographic scope: National (Canadian). Regional: Ontario

NATURAL STONE COUNCIL

Year initiative established: 2003

Year standards developed: 2014

Address: P.O. Box 539 Hollis, New Hampshire, 03049, USA

Founding stakeholders: Civil society, private sector

Commodities scope: Natural stone

Geographic scope: National (US)

THE FOREST TRUST RESPONSIBLE STONE PROGRAMME

Year initiative established: TFT Founded 1999, programme launched 2012

Year standards developed: Unknown

Address: The Clock House, Gaters Mill, Mansbridge Road, Southampton, SO18 3HW, United Kingdom

Founding stakeholders: Private sector

Commodities scope: Forestry, palm oil, sugar, stone and minerals, shoe and leather, charcoal, and pulp and paper

Geographic scope: Global

FAIRMINED STANDARD FOR GOLD FROM ARTISANAL AND SMALL-SCALE MINING

Year initiative established: 2004

Year standards developed: 2006

Address: Calle 32 B SUR # 44 A 61, Envigado, Colombia

Founding stakeholders: Civil society, private sector, public institutions

Commodities scope: Gold and associated precious metals

Geographic scope: Global

FAIRTRADE STANDARD FOR GOLD FOR ARTISANAL AND SMALL-SCALE MINING

Year initiative established: 1997

Year standards developed: 2013

Address: Fairtrade Foundation 3rd Floor Ibex House, 42-47 Minories London, EC3N 1DY, United Kingdom

Founding stakeholders: Civil society, private sector, public institutions

Commodities scope: Gold and associated precious metals

Geographic scope: National (Peru and East Africa)

RESPONSIBLE MINING INDEX

Year initiative established: 2012

Year standards developed: 2017

Address: Barbara Strozzilaan 101, 1083 HN Amsterdam, The Netherlands

Founding stakeholders: Civil society, private sector, public institutions

Commodities scope: All mined commodities

Geographic scope: Global

XERTIFIX STANDARD

Year initiative established: 2005

Year standards developed: 2005

Address: Arndtstr. 20, 30167 Hannover, Germany

Founding stakeholders: Unknown

Commodities scope: Natural stone

Geographic scope: National (India, China, Vietnam)

Coverage refers to building a comprehensive and effective set of rules that define the parameters of sustainable or responsible practice. No initiative fully covers all of the environmental, social and business practice issues that provided the basis for this assessment. As well, with some exceptions, the initiatives differ greatly in terms of both their coverage and the level of compliance or performance each one demands of its adherents, ranging from optional to conditional or flexible to obligatory. We do not conclude on this basis that some initiatives are better or worse than others. However, they are different, and those differences should have implications in terms of the claims that might be made of mines that meet the different standards, and in terms of the potential relationships between different initiatives. As well, while in some cases there are significant, sector-specific reasons for such differences, in other cases there seems to be potential for greater alignment.

Assurance refers to the methodology that an initiative employs to verify that the practices defined in its standard are being achieved in practice, whether this is as a basis for public claims of compliance, for business-to-business claims, or as a requirement for participation in a business association or scheme. The CARE assessment of assurance has three parts. The first part describes key elements of an initiative's assurance model. The second part identifies differences in the quality of the various assurance systems, through the creation of an assurance index. The index is based on the key assumption that a well-designed independent third-party verification system is likely to be more reliable than other types of assurance. The third part of the assurance assessment covers the initiatives' different approaches to value chain traceability, which is the process by which material from an identified mine site can be tracked as it is transported between sites, processed and traded, through to the point at which it is used to manufacture an end product.

Responsiveness looks at indicators for continuous improvement, adaptation, capacity building and cost reduction. Our findings emphasize the need to look closely at sub-index scores, which vary greatly, before drawing conclusions based on the high-level index scores alone.

Engagement looks at indicators for board diversity, stakeholder accessibility and access to information. As was the case for the responsiveness index, one of the clearest findings for the engagement index was that the two artisanal and small-scale mining initiatives score more highly than other initiatives, and in particular score more highly than the stone or aggregates initiatives. The most likely explanation for the many low scores here may be that some of the initiatives in the study do not place a high value on being stakeholder-driven initiatives.

WHO SHOULD READ SECTION 3?

Industry players and scheme owners and management will no doubt be most interested in the findings of our CARE analysis in Section 3 (those interested in how and why we chose these 15 initiatives should read Appendix 1 first). This section goes through the coverage (content and level of obligation), assurance systems, responsiveness and engagement of each of the 15 initiatives assessed, generating valuable new metrics on VSIs in mining, revealing differences and developing rankings across many environmental, social and business related considerations.

Colleagues from think tanks, NGOs and academia will be curious to look through the methodology and additional background information found in the Appendixes related to Section 3.

Section 4 presents a snapshot of the mining and minerals sector by commodity type, commenting on the specific environmental and social challenges associated with extracting and treating material, and estimating the amount of production of each commodity that is covered by a VSI.

WHO SHOULD READ SECTION 4?

Those with a specific commodity of interest (e.g., copper, aluminum, conflict minerals) or those interested in **aggregated uptake of standards by commodity** should head straight to Section 4. Here we break the sector down into 10 groups of major mined commodities with a corresponding discussion of their specific impacts, the management strategies being used to mitigate impacts, as well as the percent market coverage by VSIs and an outlook to future trends. This section will equally be of interest to those seeking to know more about specific impact categories and which corresponding commodity to focus reform efforts on (e.g., for carbon emissions, a focus on steel, coal and aluminum mining; for leaching of radioactive chemicals, a focus on copper mining).

In conclusion, while in many respects VSIs are still in their infancy, we can observe a number of trends:

- Coordination and rationalization of sustainability schemes are major themes in the sector. Industry players and scheme owners are beginning to work toward the interoperability of VSIs, both up and down the value chains, as well as across different sector-focused schemes. Further research is needed to analyze the potential for interoperability.
- Governments have a key role in continuing to create an enabling environment. Producing countries have many opportunities to take advantage of these kinds of initiatives where they can meet policy needs. For countries that largely import raw or processed materials, and that want to promote sustainability down the supply chain, there are many opportunities to complement policy needs but also many pitfalls and potentially perverse incentives that can result. Careful targeted design of policy is needed. Governments must also have the legal framework in place, and the capacity, to protect whistleblowers and reporters who take great risks to expose abuses.
- Policy dialogues are needed to disseminate the research already conducted but also to further understand the interplay between VSIs in the sector and public policy.
- Civil society must continue to be vigilant, monitoring environmental and social impacts of mining activity. The mining supply chain is particularly opaque, and it is notoriously difficult to trace an end product to the mine site, making this role even more important.

CONTENTS

LIST OF FIGURES

LIST OF TABLES

ABBREVIATIONS

3TG	tin, tungsten, tantalum and gold
ARD	acid rock drainage
ARM	Alliance for Responsible Mining
ASI	Aluminium Stewardship Initiative
ASM	artisanal and small-scale mining
BGR	Bundesanstalt für Geowissenschaften und Rohstoffe (Federal Institute for Geosciences and Natural Resources, Germany)
CCCMC	China Chamber of Commerce of Metals, Minerals and Chemicals Importers and Exporters
CSC	Cornerstone Standards Council
DRC	Democratic Republic of the Congo
EITI	Extractive Industries Transparency Initiative
FSC	Forest Stewardship Council
ICMM	International Council on Mining and Metals
IFC	International Finance Corporation
IGF	Intergovernmental Forum on Mining, Minerals, Metals and Sustainable Development
IISD	International Institute for Sustainable Development
ILO	International Labour Organization
IRMA	Initiative for Responsible Mining Assurance
KP	Kimberley Process
KPCS	Kimberley Process Certification Scheme
MAC	Mining Association of Canada
MCEP	Mining Certification Evaluation Project
MMSD	Mining, Minerals and Sustainable Development
NGO	non-governmental organization
NSC	Natural Stone Council
OECD	Organisation for Economic Co-operation and Development
RJC	Responsible Jewellery Council
RMI	Responsible Mining Index
SSI	State of Sustainability Initiatives
TFT	The Forest Trust
TSM	Towards Sustainable Mining
UNEP	United Nations Environment Programme
VPSHR	Voluntary Principles for Security and Human Rights
USGS	U.S. Geological Survey
VSI	voluntary sustainability initiative
WEF	World Economic Forum
WGC	World Gold Council
WTO	World Trade Organization
WMI	Whitehorse Mining Initiative

1.0 INTRODUCTION

By Matthew Wenban-Smith
and Jason Potts

Since the Rio Earth Summit in 1992, the international community has come to recognize the central role of sustainable consumption and production in implementing sustainable development. Since the summit, and particularly in the last decade, there has been a rapid growth in the development and adoption of multistakeholder, market-based supply chain initiatives aimed at promoting sustainable production practices, often at the global level. The mining sector, like other primary commodity sectors, has seen the development of a wide variety of such initiatives. This introductory section summarizes sustainability issues in the mining sector, discusses the major drivers of voluntary sustainability initiatives (VSIs) and presents a history of VSIs in the mining sector.

1.1 SUSTAINABILITY ISSUES IN THE MINING SECTOR

The importance of mining to socioeconomic development cannot be understated, but at the same time, mineral extraction and related downstream processing continue to be associated with significant negative social and environmental impacts. Table 1.1 lists a range of environmental, pollution, occupational and social impacts of mining. The list is not intended to be definitive, but indicates the range of environmental impacts that mining may have.

VSIs aim to reduce or avoid such negative impacts while also supporting socioeconomic benefits. Therefore, when reviewing the potential effectiveness of standards, we must make sure we understand the negative impacts associated with mining that standards might help to address. Section 3.5 of this report presents this analysis of VSIs.

The nature and intensity of potential impacts will differ according to the kind of mining taking place (e.g., open-pit, underground, placer or marine mining), the phase of development, the exact location and the specific techniques being used. In terms of location, mine sites themselves represent one site of impact, but downstream processes such as smelting, refining or milling will also have their own substantive impacts. Potential impacts include emissions of sulphur dioxide, nitrous oxides and heavy metals (lead, arsenic, cadmium); increased demand for electrical power, and associated greenhouse gas emissions; discharge of chemicals and other wastes to surface waters; and off-gassing and toxic dusts.

In terms of phase or stage of development, mining is a long-term activity, and impacts may occur at different points of the mine life cycle (WWF, 2015). For example, in

Table 1.1. Environmental, pollution, occupational health and social impacts of mining

Environmental impacts	Pollution impacts	Occupational health impacts	Social impacts
• Destruction of natural habitat at the mining site and at waste disposal sites. • Destruction of adjacent habitats as a result of emissions and discharges. • Destruction of adjacent habitats arising from influx of settlers. • Changes in river regime and ecology due to siltation and flow modification. • Alteration in water tables. • Change in landform and land instability. • Land degradation due to inadequate rehabilitation after closure. • Danger from failure of structures and dams. • Abandoned equipment, plants and buildings.	• Drainage from mining sites, including acid mine drainage and pumped mine water. • Sediment runoff from mining sites. • Pollution from mining sites in riverbeds. • Effluent from mineral processing operations and sewage effluent from the site. • Oil and fuel spills. • Soil contamination from treatment residues and spillage of chemicals. • Leaching of pollutants from tailings and disposal areas and contaminated soils. • Air emissions from minerals processing operations. • Dust emissions from sites close to living areas or habitats. • Release of methane from mines. • Release of other greenhouse gases.	• Handling of chemicals, residues and products. • Dust inhalation. • Fugitive emissions within the plant. • Air emissions in confined spaces from transport, blasting and combustion. • Exposure to asbestos, cyanide, mercury or other toxic materials used on site. • Exposure to heat, noise and vibration. • Physical risks at the plant or at the site. • Unsanitary living conditions.	• Human displacement and resettlement. • Threats to rights of Indigenous Peoples. • Migration once a site begins operation. • Lost access to clean water. • Threats to livelihoods. • Threats to public health. • Threats to cultural and aesthetic values. • Broader societal concerns around bribery, corruption, the misuse of mining revenues, the financing of conflict, and human rights abuses associated with mine security.

Source: Adapted from United Nations Environment Programme (UNEP), 2000. Column on social impacts was added by the authors of this report.

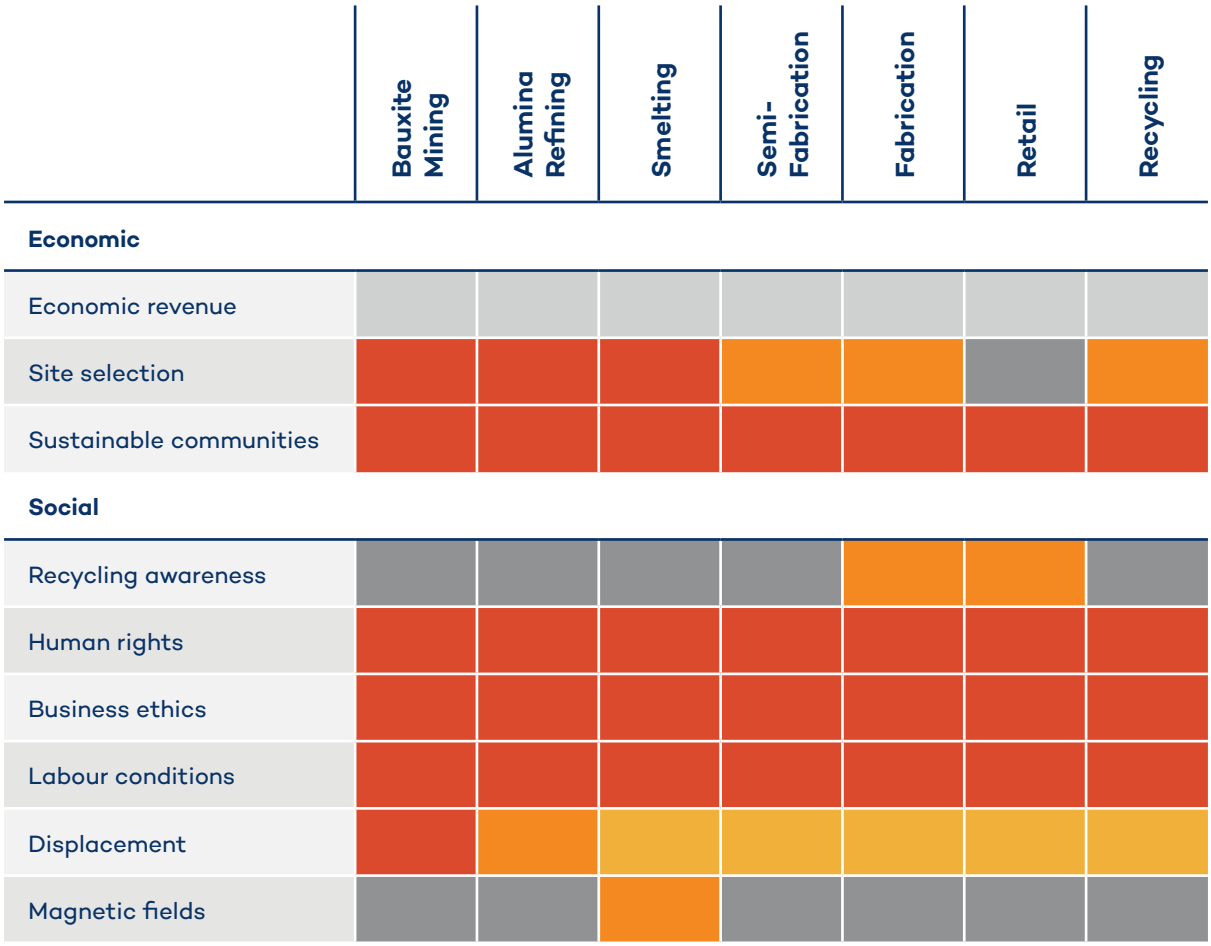
the "Exploration" stage, activities such as drilling, trenching, blasting and road construction can have negative impacts such as habitat loss and fragmentation, decreased water and soil quality due to spills, and species loss. At the "Site Preparation" stage, infrastructure and waste piles affect landscape forms and processes and species' habitats and can potentially displace human communities. At the "Primary Processing" stage, the concentration of minerals can discharge hazardous chemicals and other waste to surface and ground waters. The "Product Transport" stage causes greenhouse gas emissions and noise disturbance. Finally, the "Mine Closure/Post-Operation" stage is associated with persistent environmental problems such as contaminants in water and toxicity to local organisms. For a more detailed description of impacts by stage of development, see the table in Appendix IV.

One of the many challenges of applying VSIs to mining is that by the time a mine is operational, much of its impact may be "locked in." In other words, the time at which the impact could have been avoided or addressed has passed, but the mine may continue to operate for many years. Some impacts will continue long after the mine has ceased to operate, and some will only become apparent when the mine is closed. This points to the need for standards to be applied, ideally, from the inception of a mining project.

Many mined materials are highly recyclable. Recycling can significantly reduce mining impacts, for example in energy use. It can also reduce the need for mined materials and hence diminish the associated impacts (and, indeed, the benefits). However, recycling may also be associated with its own negative social and environmental impacts, such as in the scrap metals industry and the processing of electronic waste. Table 1.2 illustrates this, showing how the impacts of mining and downstream processing may be distributed across the life cycle of aluminum. A final consideration, in this rapid overview of sustainability issues, is the extent to which specific sustainability concerns are associated with particular kinds of mined materials or their processing. Risks associated with toxic emissions, for example, are particularly high in the case of primary processing for gold and copper. In terms of overall impact, some commodities are associated with a high concentration of impacts in relation to relatively small volumes of production (e.g., diamonds and gemstones), whereas others are associated with cumulative impacts due to high volumes of production (e.g., zinc or iron). In terms of processing, different impacts are associated with different processing streams. Total greenhouse gas emissions are significant for aluminum smelting, steelmaking and cement production. Section 4 of this report provides short sketches of key issues for particular commodities.

Table 1.2. Issue priority impacts in the life cycle of aluminum

	Bauxite Mining	Alumina Refining	Smelting	Semi-Fabrication	Fabrication	Retail	Recycling
Environmental							
Bauxite residue							
Caustic soda							
Chlorine management							
CO_2 emissions							
Design for recycling							
Dust emissions							
Energy efficiency							
Land management							
NO_x emissions							
PFC emissions							
Protected areas							
Run around scrap							
Scope II energy issues							
Scrap availability							
Scrap for recycling							
SO_2 emissions							
Spent pot lining							
Corridor management							
Water management							



Key

	Important
	Quite important
	Unimportant
	Not applicable
	Limited data/not rated

Source: Track Record [now Track Record Global] (2010), used with permission.

1.2 MARKET DRIVERS FOR SUSTAINABILITY STANDARDS

Examining the factors that have motivated mining companies to take on standards is important, as these reasons will affect many aspects of a standard, including its design, the scope of issues it covers, stakeholder involvement in its development and governance, the importance of its international or market recognition, and its compatibility with other initiatives. Standard initiatives have different "theories of change," meaning different understandings of the drivers for their uptake, which result in different design characteristics. For instance, mining companies motivated by their downstream customer needs will adhere to standards that resonate with their customers.

The motivations for using sustainability standards are diverse and will be different for each company. A company may have a range of motivations, and their relative importance can change over time. Market demand can be driven by a range of different downstream customer motivations, which may be strategic, reputational or compliance related. From the perspective of a mining company, customers' motivations are less important than the need to meet the customers' requirements. Sections 1.1.1 to 1.1.12 examine potential motivations.

1.2.1 STRATEGIC CONSIDERATIONS

Companies may perceive a range of strategic advantages in aligning with the achievement of social and environmental standards. The nature of the advantage will depend on a range of factors. A company may recognize that its own operations already meet, or are close to meeting, relatively high standards. In this case, it would be advantageous if competitors were obliged to meet equivalent high standards rather than being able to compete purely in terms of price. Or, based on an understanding of consumer trends and likely regulatory developments, a company may believe that its entire sector will be required to meet higher standards. In this case, the company may feel it is important to be ahead of the curve or to position itself as a leader in relation to social and environmental issues to take advantage of these trends. Finally, the strategic consideration may be defensive: a company may recognize that it is vulnerable to competitors who are better positioned on key social or environmental issues and feel it needs to address these issues before they lead to a loss of markets.

As outlined in Davis and Franks (2014), these considerations are relevant to different types of companies in the mining sector:

- Companies that operate primarily in countries with high social and environmental requirements but that compete with companies subject to lower requirements.
- Companies producing material they consider has inherent social or environmental advantages when compared with a competing material, for example in relation to carbon emissions.
- Companies that believe a superior ability to manage social or environmental challenges would give them a competitive advantage if other companies were forced to compete on this basis.
- Companies that believe their ability and reputation in managing social or environmental issues will give them preferential access to new opportunities for exploiting limited resources.

Analogous considerations would apply to companies downstream, but with quite different specific examples. Strategic drivers might include the positioning of a company in marketing mined products such as diamonds, gemstones or precious metals to increasingly socially and environmentally concerned consumers, or aiming to address concerns related to the mining of coal, as coal comes under increasing scrutiny as a fuel source due to its carbon emissions.

1.2.2 REPUTATIONAL RISK AND CORPORATE BRAND VALUES

Many companies perceive benefits in the use of standards to build corporate brand value and, conversely, to protect them and their brands from reputational damage associated with negative social or environmental performance and resulting publicity. Although this may be closely related to strategic positioning, it relates to specifically reputational issues.

Sustainability standards may be used to identify and help manage key social and environmental issues that are most likely to result in bad publicity, including issues of most concern to unions or social pressure groups, local communities, or environmental non-governmental organizations (NGOs). Standards may provide a company with a response to criticisms that it believes are unwarranted, when it can show that it is meeting standards that are supported by reputable organizations. More pragmatically, a company may believe that adopting sustainability standards may provide it with some level of reputational protection if problems do in fact occur.

For mining companies, reputational damage may be caused by ongoing activities or accidents that result in deaths or injuries to workers or members of local communities, short- or long-term environmental damage, or objections or protests from local communities, Indigenous Peoples or NGOs.

Downstream companies may be exposed to similar reputational risk in relation to their own operations. In addition, they may be exposed to risk resulting from their association with the social or environmental impacts of their suppliers, considered below.

1.2.3 DIRECT SOCIAL OR ENVIRONMENTAL COSTS AND RISKS

Businesses may decide that implementing social or environmental standards can help reduce their costs. For example, they may save money by reducing water or energy consumption. Or, they may decide to reduce greenhouse gas emissions because they expect that emissions will be priced in the future and that companies with lower emissions will be at a competitive advantage.

However, a much broader range of cost savings may be related to reductions in delays or stoppages resulting from improved planning, fewer accidents, better labour relationships, and better relationships with local communities and regulators.

Companies often perceive the implementation of social and environmental standards simply as a cost. If it can be shown to *reduce* direct costs or financial risks, or improve productivity, uptake is more likely.

1.2.4 SOCIAL AND ENVIRONMENTAL RISKS IN THE SUPPLY CHAIN

Companies may use standards as a framework or guide to identify opportunities for sustainable practices along the supply chain, as well as to identify and help manage key social or environmental risks associated with their supply chains.

On the risk side, companies are increasingly aware of threats to the continuity of supply of unsustainably exploited renewable materials, as well as potential interruptions to supply as a result of environmental impacts such as constraints on water availability. Even where the threat does not actually disrupt the supply of material, it can affect the cost of maintaining supply. Companies may also be vulnerable to reputational risk associated with the social or environmental performance of their suppliers. Examples in the mining sector include risks related to companies' continued access to water for critical operations, and the implications of water availability for power generation.

1.2.5 REGULATORY BENEFITS

Companies may use standards in a variety of ways in relation to regulation. In some cases, standards compliance may be a specific legal obligation. Less directly, while compliance with a specific standard may not be an explicit legal requirement, it may be a recognized tool to help achieve or demonstrate compliance. For example, downstream companies may choose to comply with a voluntary standard to demonstrate due diligence in compliance with the conflict minerals requirements of the US Dodd–Frank Wall Street Reform and Consumer Protection Act. Environmental and social management standards often include legal compliance provisions, for example requiring companies to define and implement formal systems to identify and address relevant environmental and social legislation.

In contrast to the reasons listed above, some companies may have quite different regulatory motivations for using sustainability standards. In some cases, a company may be motivated to develop and use standards as a way to avoid statutory regulation, on the basis that addressing an issue voluntarily, and on the company's own terms, is better than being subject to legislation. Section 2 discusses this interplay between standards and regulation in detail.

1.2.6 SOCIAL LICENCE TO OPERATE

Companies that depend on access to public goods, or that are highly dependent on their relationships with communities to operate effectively, may see the adoption of social or environmental standards as a way to build or strengthen their social licence to operate. The social licence is distinct from the legal licence to operate, but is related to it to the extent that legal controls are responsive to social concerns. Breakdown of the social licence may be highly damaging, potentially causing operational delays and even withdrawal of legal licences.

1.2.7 MARKET DEMAND

One of the most obvious motivations for meeting social and environmental standards is simply to meet customer requirements. At the simplest level, suppliers seek to satisfy customer demands, and if a customer asks for a particular specification, suppliers that wish to sell products to that customer need to meet the specification. In the longer term, working with a customer to meet their needs may be part of a broader business relationship, of which meeting social and environmental standards becomes a part. Customer-supplier loyalty and stable commercial relationships are highly motivating for companies, traders and exporters. Ultimately, if a specification becomes established in the market, a supplier may have no choice but to meet it to continue to do business in that market.

Mining companies are often insulated from direct consumer demand, but their customers are not. More and more consumer-facing companies in the jewellery, consumer electronics, automotive and construction sectors require their suppliers of materials such as steel, aluminum, precious metals or gemstones to provide information about the social and environmental credentials of their material.

1.2.8 PRODUCT BRANDING

Just as companies may see value in the use of sustainability standards to develop or protect their corporate brands, so they may see value in building or protecting the brand value of particular products. While there is clearly some relationship between corporate and product brand values, the relationship may be stronger or weaker in different situations. Companies may market a range of products aiming at different segments of the market, with stronger or weaker sustainability credentials based on compliance or claims of compliance with different standards.

A number of schemes have been launched in the jewellery sector with the intent of building or protecting product brands.

1.2.9 PRODUCT PRICING

Closely related to market demand and the brand value of products is the issue of product pricing. There has been considerable research about the extent to which compliance with social and environmental standards can be used to increase the price at which products are sold, whether between businesses or, ultimately, to consumers. The research shows that the potential to raise prices based on compliance with sustainability standards varies considerably across products, across markets and over time. However, the potential to raise prices or to use compliance to maintain access to higher-value markets, or to position brands as "premium" brands (with associated prices), is undoubtedly one of the factors motivating some companies to use sustainability standards.

1.2.10 INVESTOR AND LENDER REQUIREMENTS

Just as companies need to meet their customers' demands, they also need to meet the requirements of their investors and lenders. Investors and lenders may be motivated by their own responses to some of the factors already listed, or they may be motivated by their assessment of the impacts of standards compliance on the profitability of the companies they finance. The bottom line for the company seeking finance is that it needs to be able to meet its financiers' requirements in terms of social or environmental compliance, just as it needs to meet their requirements in relation to financial control, reporting, and so on.

1.2.11 EMPLOYEE SATISFACTION

Some companies consider that compliance with sustainability standards benefits them in terms of their ability to recruit, motivate and retain staff.

1.2.12 CORPORATE VALUES

Finally, companies may not see compliance with social and environmental standards as a uniquely business-related decision, but more importantly as a reflection of their underlying ethos. The adoption of standards has to be compatible with long-term profitability, but it may not be driven entirely by that consideration.

1.3 HISTORY OF VOLUNTARY INITIATIVES IN THE MINING SECTOR

Over the past three decades, the international community has launched a series of measures to promote improved sustainability in extractives (see Box 1 for a summary). Following growing public and corporate awareness of the sustainability challenges associated with mineral extraction, mining companies around the world began implementing in-house corporate social responsibility codes of conduct through the 1980s and 1990s (International Institute for Sustainable Development [IISD], 2002). In 1992, a group of Canadian companies and representatives from civil society, under the leadership of the Mining Association of Canada (MAC), launched the Whitehorse Mining Initiative (WMI). The WMI played a leadership role in demonstrating the potential of multistakeholder collaboration in implementing sustainability across the mining sector. The WMI, which culminated in a broadly accepted set of principles for the sustainable management and implementation of mining projects in Canada, was unique in its application of a multistakeholder consultation process to develop a consensus-based approach to mining development.

The success of the WMI paved the way for the pursuit of a broader global multistakeholder process in 2000. This process was aimed at ensuring the sustainability of the global mining sector under the Mining, Minerals and Sustainable Development (MMSD) project, led by the World Business Council for Sustainable Development. Like the WMI, the MMSD placed a strong emphasis on wide-reaching consultations with stakeholders from around the world, which included more than 700 participants from 20 countries. Although the MMSD did not become a permanent initiative of its own, the process, which culminated in the release of a final report in 2002, stimulated a new interest and confidence in multistakeholder collaboration for sustainability in mining around the world.

At the same time, by 2002 voluntary multistakeholder initiatives were becoming increasingly recognized as offering special value as vehicles for stimulating improved practices in global markets and supply chains.

BOX 1. THE WHITEHORSE MINING INITIATIVE: MINING FOR TRUST ACROSS MINING'S DIVERSE STAKEHOLDER BASE

As a response to declining mine openings and increasing tensions between industry and the broader public, the Mining Association of Canada (MAC), through the Whitehorse Mining Initiative (WMI), led a multistakeholder process to develop a consensus-based national strategy for mining. The initiative concluded in 1994 with a final report outlining a series of principles and actions to ensure the sustainability of mining activity within Canada. The WMI process was an unprecedented example of cooperation and negotiation between labour organizations, environmentalists, Indigenous groups, government and the mining industry. The WMI led to the adoption of a set of principles and goals calling for increased clarity and efficiency in regulatory decision making in the mining sector; comprehensive reclamation plans and corresponding financing, implementation and monitoring mechanisms; as well as increased incorporation of Indigenous and community participation in the design of mining projects. Most importantly, within the Canadian context, the WMI represented a turning point in how the mining sector related to social and environmental concerns.

Voluntary initiatives had begun presenting themselves in the mid-1990s as a response to the growing impact of international trade and the corresponding reduced authority of national governments in influencing practices along international supply chains. Voluntary initiatives were particularly appealing due to their ability to leverage existing market relationships and governance structures to overcome the bureaucratic and political hurdles often associated with more traditional public mechanisms.

Several key stepping stones facilitated the growing acceptance of voluntary standards as international instruments supporting the implementation of sustainable development:

- **1992:** Principle 8 of the Rio Declaration calling upon states to "reduce and eliminate unsustainable patterns of production and consumption and promote appropriate demographic policies" (UNESCO, 1992).
- **1993:** Establishment of the Forest Stewardship Council (FSC), the first high-profile multistakeholder-governed voluntary standard aimed at implementing an integrated approach to sustainable development (FSC, n.d.).
- **1997:** Establishment of Fairtrade Labelling Organizations International (also called Fairtrade and Fairtrade International), the first international labelling organization emphasizing a "needs-based" approach to sustainable development with a focus on poverty reduction (Fairtrade, n.d.).
- **1998:** Establishment of the Ethical Trading Initiative, one of the first multistakeholder initiatives to embody the idea of sustainable development as a "partnership" between civil society and the private sector (Ethical Trading Initiative, n.d.).

Through these and several other nascent initiatives launched in the late 1990s, the voluntary sector established the workability of the concept of multistakeholder-owned, -operated and -financed organizations tasked with defining, overseeing and implementing sustainable practices across global supply chains. This context set the stage for the establishment of a similar initiative in the mining sector and offered fuel to the MMSD process.

The MMSD participants considered creating a voluntary standard, but they were unable to reach an agreement because of their widely divergent starting positions and the unprecedented complexity associated with diverse mining activities, regions and markets (IISD, 2002). Instead, the MMSD served as a groundbreaking opportunity to launch multistakeholder dialogue in the sector, culminating in a series of recommendations, the most ambitious of which called for the establishment of an "international multistakeholder forum on minerals and sustainable development." When even this more modest recommendation could not be met, various splinter groups resorted to promoting the voluntary approach within their respective jurisdictions and constituencies.

Governments themselves were one of the first groups to use voluntary normative frameworks for the mining sector, which reflects the important role of governments in the mining approval and management process. Several high-level government-led initiatives with direct relevance to the mining sector were launched during and following the MMSD process:

- **2000:** Voluntary Principles for Security and Human Rights (VPSHR), a government-led multistakeholder initiative aimed at consolidating voluntary approaches for implementing a set of principles expressly focused on protecting human rights within the context of mineral production.
- **2002:** Extractive Industries Transparency Initiative (EITI), a government-to-government voluntary initiative aimed at generating demand, capacity and commitments among producing countries to document and report financial flows related to investments in the minerals sector.
- **2003:** Kimberley Process Certification Scheme (KPCS), a government-led,

multistakeholder initiative managing a standard and certification process for ensuring that diamond production is not used to support conflict, particularly in Africa.

As might be expected, the public voluntary initiatives sought to leverage the specific role of governments (and other supply chain actors) in promoting improved transparency and good governance within the mining sector. And while the leadership of governments in establishing these various initiatives played an important role in enabling rapid acceptance on a broad basis of several of the initiatives (e.g., the Kimberley Process [KP] membership accounts for 99.8 per cent of the global diamond trade), this level of adoption has come at the price of weak enforcement processes (Howard, 2015). For example, neither the VPSHR nor the KPCS includes actual specifications on what participating countries must do to "prove" their compliance with the agreed-upon principles and rules of the respective initiatives.[1] Demands for national sovereignty within such voluntary processes have posed a significant obstacle to their securing consistent top-down conformity assessment systems for their respective rules and principles.

In 2005, led by the Canadian government, several major mineral-producing countries joined forces through the establishment of the Intergovernmental Forum on Mining, Minerals, Metals and Sustainable Development (IGF). The forum was created to address the challenges posed by the diverse interests and conditions of the mining sector, while recognizing the need for enhanced consistency and capacity among jurisdictions to ensure longer-term sustainability. The IGF's Mining Policy Framework offers a platform for developing national policies that promote consistency and transparency across national jurisdictions. In this way, the IGF addresses one of the key challenges associated with its predecessor intergovernmental voluntary initiatives.

While diverse intergovernmental efforts refined and reinforced the normative framework for the global mining industry, the most prominent early movers focusing specifically on supply chain sustainability, following the MMSD process, came from industry associations. The most notable of these were the newly formed International Council on Mining and Metals (ICMM) (itself a product of MMSD) and MAC, each of which established their own voluntary initiatives in the years immediately following the MMSD process:

- **2003:** ICMM Sustainable Development Principles, a set of corporate-level commitments to promoting best practices across 10 sustainable development principles designed to address the nine key challenges to mining sustainability in the MMSD process.
- **2004:** MAC Towards Sustainable Mining, a set of mine-level commitments, including a documentation and reporting process established as a requirement for Canadian mine operations of MAC members.

While these early industry-led initiatives differed from their intergovernmental counterparts by focusing on the practices of mining companies during the mining process, they displayed a similar approach to the reporting and enforcement process for normative compliance with a focus on verification and self-reporting rather than on independent certification. At the same time, while the industry initiatives included input from non-industry stakeholders, none of these initiatives included civil society on an equal footing, thus leaving room for ongoing division and discontent among civil society and industry proponents of supply chain–focused efforts.

Civil society nevertheless remained highly engaged in promoting mining sustainability by pursuing distinct strategies to address the distinct sustainability issues in small- and large-scale mining. In many ways, the structure of the supply chain associated with small-scale mining was particularly

[1] Global Witness left the Kimberley Process in 2011 on the basis that it was unaccountable (Global Witness, 2011).

well suited to civil society intervention and support. The dominant role of communities, combined with a general absence of organization and the greater degree of diversity in supply from small-scale miners, gave civil society groups a natural edge to intervene in the promotion of more systemic, standards-based approaches to sustainable production.

Indeed, the first certification initiative in the mining sector can be traced to the seminal Oro Verde initiative, which sprung out of an effort to improve the livelihoods of artisanal gold miners in Colombia and culminated in a regional standard for the certification of sustainable artisanal gold in 2002. By 2004, Oro Verde had already gained enough traction to justify the creation of the Alliance for Responsible Mining (ARM) with a mandate to develop a global standard for the artisanal sector. Following a lengthy consultation process and eventual collaboration with Fairtrade Foundation UK, ARM formally released the Fairmined Standard in 2010.

Meanwhile, just as Oro Verde was launching the first standard for artisanal mining in 2002, WWF-Australia launched the Mining Certification Evaluation Project (MCEP), with the specific objective of studying the feasibility of an FSC-style multistakeholder standard specifically addressing large-scale mining. Although the MCEP was regionally initiated and focused, it acted as something of a litmus test for understanding the feasibility of a global certification initiative as well. Through a series of dialogues and reports carried out between 2002 and 2005 (Franks, 2015), the MCEP more or less confirmed the deep challenges associated with implementing a single certification system within the context of the geographical and product diversity of the minerals sector. It also confirmed the tension between more business-oriented approaches eager to demonstrate results and those of civil society, which tended to focus on comprehensive coverage and inclusive governance. These challenges and tensions ultimately led to the project concluding without any concrete outcome or initiative (WWF-Australia, 2015).

The dissolution of the MCEP initially reinforced the divisions between industry and civil society. In the absence of agreement on a single approach forward from either the MMSD or MCEP process, Earthworks, in partnership with Oxfam, launched the No Dirty Gold campaign in 2004 with a view to tapping the jewellery market as a basis for stimulating a more generalized demand for responsible mining production.[2] The No Dirty Gold campaign quickly gained media attention and subsequently industry attention, with 104 retailers endorsing the initiative's 10 "Golden Rules" by 2014 (Earthworks, 2014). By 2005, focused media and civil society attention on gold, combined with long-standing challenges linked to the reliable sourcing of conflict-free diamonds under the KP, led to the establishment of the Council for Responsible Jewellery Practices. This became the Responsible Jewellery Council (RJC) in 2008. In 2009, the RJC developed one of the first operational private sustainability certifications applicable to the large-scale mining sector.

While the establishment of the RJC was largely a response to civil society concern, the RJC was nevertheless driven primarily by industry players and thus left many civil society proponents searching for a certification system with broader coverage.[3] In 2006, support for an alternative, more comprehensive and inclusive approach was agreed upon by various civil society and industry players including, notably, Walmart, in the form of the Vancouver Dialogue. This in turn resulted in the launch of the Initiative for Responsible Mining Assurance (IRMA).

[2] Although the No Dirty Gold campaign was nominally directed at gold production, the proponents of the campaign believed that the jewellery market offered the lowest-hanging fruit to stimulate adoption of more generalized standards in the mining sector.

[3] The 14 founding organizations were ABN AMRO, BHP Billiton Diamonds, Cartier (part of Richemont), World Jewellery Confederation, Diamond Trading Company (part of De Beers), Diarough, Jewelers of America, National Association of Goldsmiths (UK), Newmont Mining, Rio Tinto, Rosy Blue, Signet Group, Tiffany & Co. and Zale Corporation.

Contrary to the early strategies of the No Dirty Gold campaign and the RJC, IRMA defined itself from the beginning as a generic multi-commodity initiative focused on developing an FSC-style standard and corresponding governance model for large-scale mining. To many early proponents, the original vision was that the RJC would create market demand in the jewellery sector, while IRMA would provide the underlying multistakeholder standard for responsible mining. However, the ambitious and inclusive nature of the IRMA process resulted in a long development process, with the first draft standard being ready for testing only in 2016. In the meantime, the RJC determined to develop its own standard applicable to mining, fully independent of the IRMA initiative.

While IRMA promised to offer a one-stop solution for growing consumer, producer and retailer demands for responsible, industrial-scale mining, various mineral supply chains nevertheless continued to feel a specific need to respond to the changing market conditions more rapidly than IRMA permitted. In the wake of the RJC's successful launch, and in the absence of a well-defined, market-ready set of standards for adoption in other sectors (via IRMA or otherwise), industry players from a variety of other supply chains began their own sector-focused conversations for the certification of responsible mining and downstream processing. In the arena of large-scale mining (as opposed to ASM), two initiatives in particular have taken the lead in developing multistakeholder, sector-specific standards:

- **Aluminium Stewardship Initiative (ASI):** Multistakeholder discussions on sustainability in the aluminum sector began in 2009, following an initial scoping report and dialogue under the UK-based Eden Project. The ensuing discussions led to the commissioning of the International Union for Conservation of Nature to facilitate a multistakeholder standards development process between 2013 and 2015. The ASI was incorporated in 2015, with the first certification under its standard beginning in 2018.
- **ResponsibleSteel:** The Steel Stewardship Forum was formed in 2008 as a sustainability program for the Australian steel industry. The Steel Stewardship Forum developed the ResponsibleSteel certification scheme, modelled on the RJC, between 2008 and 2015. However, the scheme did not generate broad support, and following a strategic review the program was redesigned as a global multistakeholder initiative. The Steel Stewardship Council was established for this purpose in 2016. A fully revised ResponsibleSteel standard, covering responsible sourcing of raw materials as well as steelmaking, is now under development, with the first certifications planned to take place in 2019. A significant feature of the ResponsibleSteel scheme is that it intends to recognize existing standards for mined materials, rather than develop its own, and is in discussion with both IRMA and MAC to this end.

If the history of voluntary initiatives in the mining sector has been characterized by false starts and low levels of stakeholder trust, its most recent trajectory would appear to be defined by extreme proliferation and competition. The past decade has given rise to a common interest among diverse stakeholder groups in using private voluntary standards as instruments for addressing a wide range of social issues such as the social licence to operate, anti-corruption, fair-labour conditions and the avoidance of conflict—not to mention environmental protection through, inter alia, greenhouse gas reduction and the prevention of water pollution. So far, the convergence toward the use of voluntary instruments seems to have stopped at the point of initiative development, with a host of different initiatives serving different interests or markets.

Indeed, in identifying mining sector standards or initiatives for this report, we began with a list of no fewer than 158 potentially relevant mining standards or initiatives (see Appendix I). Increasingly, this multiplicity of initiatives presents a new burden on mining supply chains, with all actors facing what would appear to be an unsustainable growth in administrative paperwork and other transaction costs. Given this context, one can expect that the current growth in initiatives will eventually become rationalized along common standards and principles.

While much of the future may simply be born out of market pragmatism and consolidation, two initiatives currently under way could be said to be taking a lead in promoting consolidation more proactively.

On the "private" side of the spectrum, RESOLVE, a United States–based NGO with historical roots in the development of certification in the mining sector, is facilitating discussions initially brokered under the World Economic Forum (WEF) seeking opportunities for streamlining and coordinating the diversity of voluntary initiatives in the mining sector. On the "public" side of the spectrum, the OECD guidelines for due diligence (OECD, 2014) set a common set of baseline practices that potentially offer a springboard for consolidating credible voluntary approaches for the mining sector.

As the results of these initiatives are yet to be determined, at present, we can only rely on the indications from the market as we attempt to ascertain the current and eventual manifestation of voluntary standards in the mining sector.

Figure 1.1. Timeline of VSIs in the Mining Sector

1992

- Rio Earth Summit
- Whitehorse Mining Initiative (WMI) launched

1993

- Forest Stewardship Council (FSC) founded

1997

- SA8000 founded
- Fairtrade Labelling Organizations International founded
- Global Reporting Initiative founded

1998

- Ethical Trading Initiative founded
- Global Mining Initiative is the first global effort; this evolves into the Mining, Minerals and Sustainable Development project (MMSD)

2000

- Voluntary Principles for Security and Human Rights (VPSHR) established
- MMSD launched
- Global Compact founded

2001

- Global Reporting Initiative becomes independent organization based in Amsterdam

2002

- MMSD concludes
- Oro Verde (first mining certification initiative) launched in Colombia

2002

- Extractive Industries Transparency Initiative (EITI) founded
- Kimberley Process (KP) launched

2003

- International Council on Mining and Metals (ICMM) sustainable development principles (the ICMM Principles) established

2004

- Towards Sustainable Mining (TSM) launched
- No Dirty Gold campaign launched
- Alliance for Responsible Mining (ARM) founded by Oro Verde

2005

- Intergovernmental Forum on Mining, Minerals, Metals and Sustainable Development (IGF) established
- Council for Responsible Jewellery Practices established

2006

- Vancouver Dialogue
- Initiative for Responsible Mining Assurance (IRMA) founded

2008

- Council for Responsible Jewellery Practices becomes Responsible Jewellery Council (RJC)

2009

- RJC standard released

2010

- Fairmined Standard released by ARM

2015

- Aluminium Stewardship Initiative (ASI) incorporated

2016

- Steel Stewardship Council founded

2.0 THE ROLE OF PUBLIC POLICY VIS-À-VIS VOLUNTARY SUSTAINABILITY INITIATIVES

By Laura Turley

The development of VSIs represents a potentially important complement to existing mining policy. One of the central benefits of market-based approaches is their ability to respond directly to market needs and constraints efficiently and in a targeted manner. As VSIs grow in popularity, one of the major outstanding requirements for policy-makers is to understand when, where and how VSIs have the most impact or hold the greatest potential to generate such impact.

As such, it is important to situate VSIs in their wider context at the public policy–private sector interface. This is important not only because this State of Sustainability Initiatives (SSI) report has been prepared under the auspices of the IGF, but also, more broadly, to frame the discussion for policy-makers writ large, a core target audience for IISD, who may be in a position to leverage VSIs for their sustainable development objectives. This focus on designing effective public policy is also a feature of the present report that sets it apart from other studies on VSIs in mining.

VSIs appeal to different sectors for different reasons. From an industry perspective, they may be a way to differentiate products in the global marketplace, they may represent the desire to contribute to good corporate governance and sustainable development, they might be good for business reputation, or they might stem from a frustration with the absence of robust regulations and implementation by the public sector. In short, there is a market for sustainability standards and a corresponding response to this market demand.

Public officials may perceive VSIs as an opportunity to build skills or to build the reputation of the domestic mining and mineral sector internationally. From another perspective, their active presence could represent unwelcome external scrutiny or administrative hurdles for local businesses.

What there can generally be agreement on, however, is that VSIs are tools for sustainable development, that this is a growing and quick-moving space to pay attention to (particularly in the mining sector), and that VSIs represent sustainable development "governance" as being much broader than—but at the same time intricately linked to—the role of governments.

2.1 SITUATING VSIs AS INSTRUMENTS OF THE MARKET

As described in Section 1.1 on market drivers, government regulation is also a major driver of the uptake of mining VSIs, either as a legal obligation or to demonstrate compliance with sustainable development practices or principles. Nonetheless, it is important to keep in mind that VSIs are fundamentally instruments of the market, subject to private, individual preferences and market forces (see Figure 1). It is critical to maintain this distinction in a discussion of the potential, and the limitations, of VSIs to create lasting, sustainable development outcomes.

2.2 HOW PUBLIC POLICY SHAPES VSI DESIGN AND UPTAKE

Generally speaking, both the *expansion* and the *contraction* of public regulation can be drivers for VSI emergence and uptake.

2.2.1 REGULATORY EXPANSION

Public rules, regulations and norms evolve or change in ways that may be more or less conducive to sustainable development. A positive example is the introduction of environmental protection legislation and environmental impact assessments in many countries in the 1970s. These rules provide an opportunity, at least on paper, for a wider participation in public policy processes, for instance through public submission and objection processes that allow interested groups to argue that projects should not proceed, should be modified substantially before proceeding, or should be subject to environmental and other conditions (O'Faircheallaigh, 2013).

Many VSIs emerge from such changes and advances in public policy by providing companies a way to demonstrate compliance with the regulation (i.e., they provide a "market" for compliance). The public sector is therefore creating the conditions for VSI business models to emerge, not only through environmental regulation, but also through social and financial regulation. The much-discussed Section 1502 of the Dodd-Frank financial regulations in the United States is a case in point. It required companies using gold, tin, tungsten and tantalum to make efforts to know their country of origin and to determine whether their purchases are funding armed groups in the Democratic Republic of the Congo (DRC). The regulations pave the way for VSIs to assist them with this undertaking.

Public procurement policy can also create a powerful market demand for VSIs. In their purchasing of goods, services or infrastructure (notably electronics, automobiles and construction materials in relation to mining and minerals), public authorities can require specific criteria, in line with VSI criteria, for their purchases. This is realized through various steps in the tendering process, including pre-qualification, technical specifications, awarding and contract monitoring. For public buyers in Europe, Electronics Watch is an independent monitoring organization that provides valuable data to public procurers on the social and environmental impacts of their information and communication technology hardware supply chains (Electronics Watch, n.d.).

At the international level, World Trade Organization (WTO) agreements show preference for product regulations based on internationally recognized standards. Specifically, the *Agreement on Technical Barriers to Trade* and the *Agreement on the Applications of Sanitary and Phytosanitary Measures* contain preferences for product regulations based on "international standards." This provision can quickly extend the reach of a private standard to be considered by all WTO member countries and is evidence that countries have a preference for trade-related standards (as opposed to human rights approaches, etc.) (Ward & Ha, 2012). This can quickly create an international market for compliance with a particular standard.

The public sector can also generate information on companies' environmental and social practices, putting the social licence to operate in the public eye and acting as a de facto driver to take VSIs seriously. Gunningham and Sinclair summarize this point:

> **"In the case of the mining industry, the capacity for corporate shaming, the importance of reputation capital and protecting the social license to operate (because what a company does in any location and with any stakeholder, will contribute to the company's reputation worldwide) may be the points of vulnerability which give the necessary incentive to large mining companies to take a code of practice seriously and in the longer term, to pressure their peers to take it equally seriously. In this exercise, governments can help, if not by direct regulation, then by initiatives which provide environmental information and rankings and which facilitate corporate shaming."**
>
> *(Gunningham & Sinclair, 2002, p. 26).*

Finally, though not exhaustively, public policy can shape the so-called enabling environment for VSIs by establishing, or not, advantages for VSI-compliant companies in terms of permitting (e.g., permit holidays) or fiscal incentives (e.g., reduced tariffs or taxes for VSI-compliant goods or services).

2.2.2 REGULATORY CONTRACTION

The emergence of VSI may parallel a process of "regulatory rollback" of the state, exemplified in neo-liberal economic approaches. Where good policy or regulation is taken away, or where none exists to begin with, there is an opportunity for VSIs to fill the void, advancing sustainable development goals and acting as a de facto regulator, establishing rules and monitoring actions and performance.

The weak capacity of some governments to track and monitor abuses in their mining sector—for example, in the mining of diamonds and other so-called conflict minerals in some African countries—has led to industry action in the absence of government action of the producing country. In developing countries with weak

regulations or regulatory enforcement, VSIs can substitute for bad or non-existent policy on, for example, waste disposal, worker safety and fair wages.

Some areas of policy are simply difficult to regulate due to the technical nature of the industry. One example is specifying what should be included in an effective management system for tailings. These gaps, so to speak, may provide a niche to be filled by VSIs.

Furthermore, there is evidence that in some places it might be cost-effective to let the private sector, through VSIs, improve in-country mining practices (considering the costs of implementing policy, monitoring and imposing sanctions), and to let them bear the brunt of normative change (promoting public participation, women's rights, safer practices, etc.).

"While in theory democratic governments should reflect the diversity of interests that comprise their electorates, in reality they have often been driven by supporting large projects that offer highly visible additions to employment and exports. As a result, they have in the past prioritized rapid development of mineral resources."

(O'Faircheallaigh, 2013).

2.3 HOW VSIs SUPPORT PUBLIC POLICY GOALS

This section aims to help public sector officials understand how to take advantage of VSIs in the mining sector to advance their sustainable development goals. VSIs can be used in three ways: to identify targets (i.e., the major issues in mining we need to focus on), to encourage incorporation of voluntary compliance into formal regulation (e.g., law or contracts) and to broaden support for progressive policy intervention (e.g., building cultural awareness and acceptance).

2.3.1 IDENTIFYING TARGETS

It is challenging for governments to implement sustainable development policies. While many countries have established some commitment to sustainable development through political declarations, policy or sometimes law, it still remains a slow and complex process to devise and then implement. In the mining industry and others, designing and implementing policy that supports the three pillars of sustainable development—environmental, social and economic—may involve difficult trade-offs. Moreover, there is an important political dimension to governance, which can favour economically advantageous projects at the expense of the other two pillars.

VSIs can help draw attention to key issues that require monitoring, research and improved regulation, and can help officials define what constitutes sustainable practice. One example shared with authors from an official from Sierra Leone was that the active presence of the Diamond Development Initiative in their country helped them to identify artisanal and small-scale mines as a priority, specifically the need to integrate them into the formal economy and build compliance with legal frameworks. In this way, and others, VSI activity can

provide substance to otherwise lofty political discussions and statements about "fair" trade, or "environmentally friendly" operations, or "safeguards" for human rights, to name a few, and provide tangible benchmarks therein for demonstrating or tracking progress on challenging sustainable development issues.

2.3.2 INCORPORATING VOLUNTARY COMPLIANCE INTO LAWS

Compliance with a voluntary initiative—and a voluntary standard in particular—could become a standard operating principle (e.g., due diligence), a minimum bar or a best practice; it could be promoted locally or internationally as a model law; or it or could become a requirement for legal compliance.

VSIs may eventually be incorporated into relevant laws or policies, transitioning from voluntary to hard law or regulation (Richards, 2009). One example of this is the European Union's *Conflict Minerals Regulation* coming into effect in 2021. The regulation will *require* all EU importers of tin, tantalum, tungsten and gold (3TG) to check what they are buying, and to ensure it has not been produced in a way that funds conflict or illegal practices.[4] The regulation will require importers to use the five-step due diligence framework developed by the Organisation for Economic Co-operation and Development (OECD),[5] in effect enshrining a list of voluntary principles into law.

Even where incorporation falls short of becoming hard law, VSIs can become an industry norm, attaining the status and reach of hard requirements. In 2011, for example, KPMG concluded that the Global Reporting Initiative had become de facto, albeit voluntary, law, with 95 per cent of the world's 250 largest companies undertaking such reporting (O'Faircheallaigh, 2013). There are other examples of the private sector adopting standards developed by international or intergovernmental organizations. A notable example is the Equator Principles, a risk management framework that more than 90 banks and financial institutions have voluntarily adopted, covering the majority of international project finance debt in emerging and developed markets. The Equator Principles are based on the International Finance Corporation (IFC)'s Performance Standards.

> **"Sometimes, there may also be a possibility of harnessing third parties to act as surrogate regulators; monitoring or policing the code as a complement or alternative to government involvement."**
>
> *(Gunningham and Sinclair, 2002, p. 24).*

2.3.3 BROADENING SUPPORT AND EVIDENCE FOR PROGRESSIVE POLICY INTERVENTION

In many parts of the world, obtaining data on the social, environmental and economic impacts of industrial and artisanal mining is extremely difficult and expensive. Where data do exist, they may not be publicly available, or they may be limited to site- or company-specific information. These challenges result in uninformed—or absent—policy responses to the state of the mining industry. In this context, VSIs can generate data on the sector and its impacts through research, surveys and field work, as well

[4] The legislation will require that smelters and refiners processing 3TG (tin, tantalum, tungsten and gold) conduct due diligence if sourcing from conflict-affected and high-risk areas, not limited to the DRC (in contrast to Dodd-Frank).

[5] Laid out in a document called *Due diligence guidance for responsible supply chains of minerals from conflict-affected and high-risk areas* (the "OECD Guidance"; OECD, 2013). These steps require an importer to establish strong company management systems, identify and assess risk in the supply chain, design and implement a strategy to respond to identified risks, carry out an independent third-party audit of supply chain due diligence, and report annually on supply chain due diligence.

as through their industry network. Such an approach makes up for this chronic lack of information, informing future project selection and contributing to better law and policy design.

On a related note, VSIs can demand public participation and accountability in decision making in ways that local and national governments might not have put in place yet. In some cases, VSIs can directly lobby the government. In other cases, they can mobilize public opinion around specific issues such as land access or Indigenous rights. These approaches could involve bringing scrutiny to public infrastructure, institutions and information systems. Or, some VSIs, through their engagement with local communities and requirements for multistakeholder cooperation, can influence future public policy by *modeling* more inclusive processes, informing citizens about their rights and broadening the range of interests represented in policy making. This can result in innovation and the emergence of more participatory rule-making processes.

Finally, though not exhaustively, VSIs can provide the concrete infrastructure and demand for accountability mechanisms in a given region or country in the form of third-party verification organizations. When operating in countries where they do not yet exist, or are in their infancy, VSIs create a demand for monitoring and verification professionals, technologies, and institutions to ensure legality and sustainability of practices on the ground.

VSIs can also become frameworks for awareness-raising or capacity-building processes, providing the content for a campaign or training program to promote sustainable business and extraction practices. VSIs may require public sector officials to enhance their skills and capacity to oversee a complex and often opaque sector. Indeed, in Sierra Leone, the Diamond Development Initiative has provided guidance and training to miners and the minerals agency for eventual careers outside of mining. It has also trained NGOs to conduct audits.

A keynote speaker from the Sierra Leonean government, in response to the country's commitment to implementing the Extractive Industries Transparency Initiative (EITI) explained their commitment:

"In pledging our commitment to the EITI, we remain conscious of the fact that its implementation comes with its own challenges—it will require consideration of some complicated issues, for example contract, confidentiality, the need for new regulation framework data, and legislation; established modalities for gathering the required data; and building capacity in government and civil society to be able to competently engage in the process and use the information produced."

(Hilson and Maconachie, 2008, p. 81).

2.4 REFLECTIONS FOR POLICY-MAKERS

This report does not provide explicit policy guidance per se, but it suggests that there are many opportunities for alignment between the public and private sectors to improve sustainable development.

Sustainable development requires, above all else, good governance. For most governments, this means striking the right balance between encouraging market forces to support the economy and restraining these market forces to protect the environment and ensure dignified livelihoods for all. IISD believes that a mix of regulatory instruments, including government regulation, self-regulation and third-party oversight, works better than any one or even two of these instruments acting alone. Markets determine the allocation of resources and risk, while public policy sets the framework for market operation, correcting for market imperfections and externalities through incentives, market transparency and related regulations. These two governing regimes are not likely to go away any time soon, so it is best to work toward an optimal balance or mix of the two forces for sustainable development.

Good governance in host countries is indeed a prerequisite for sustainable practices to take root. To be effective, voluntary initiatives must be supported by both a well-coordinated private sector strategy and a carefully conceived public policy and regulatory framework. Individually driven VSIs will not be enough to achieve the mineral sector's long-term goal of sustainable development (Richards, 2009).

The following list outlines general ways in which the public sector must set parameters for markets in pursuit of sustainable development. In other words, without the following provisions it is futile to discuss the success of any VSIs. The public sector must do the following:

- Address market imperfections (e.g., information asymmetry) and negative externalities.
- Provide basic infrastructure and its maintenance.
- Enforce the rule of law, such as minimum wage laws and protection for enforcers, reporters, investigators and monitors.
- Develop monitoring and enforcement capacities.
- Undertake regional cooperation to avoid tax havens or "race to the bottom" regulation.
- Carry out border checks and controls to prevent illegal migration and trade of illicit goods.
- Act on corruption.
- Exert positive influence on companies operating abroad.
- Work toward compliance with international norms (e.g., maritime, aviation).

While the mining industry may, in some cases, be influenced more by reputation and market legitimacy concerns than by the threat of direct regulation, the latter is bound to emerge eventually. For this reason, some scholars suggest that VSIs should be designed to operate in the "shadow" of rules and sanctions provided by the general law. In this way, there is greater incentive for regulatees to comply with the self-regulatory program for the long run. One thing is clear: VSIs on their own are not a substitute for continuing government oversight and the threat of direct intervention where necessary. No VSI will succeed on its own in the long run.

BOX 2.1. QUESTIONS FOR POLICY MAKERS TO THINK ABOUT WHILE READING

How have operational VSIs emerged in your mining sector? Have there been new regulations nationally or internationally? Or have VSIs emerged in response to weak regulation or regulatory roll-back?

How does the policy environment create opportunities or drivers for VSIs? Do VSI-compliant companies have permitting advantages? What about reduced tariffs or taxes? Does public procurement support one or many VSIs?

What benefits can be derived from VSIs in your mining sector? Do VSIs drive public regulators to improve their monitoring or verification capacity? Do they create new cultural norms? Do VSIs contribute to sustainable development? Good governance?

3.0 THE CARE ANALYSIS OF MINING INITIATIVES

By Matthew Wenban-Smith

This chapter presents a CARE analysis of the mining sector. Sections 3.1 to 3.4 explain the CARE approach, describe the process used to select initiatives and summarize the overall findings. The rest of the chapter is broken down into four subsections, one for each element of the CARE analysis: coverage (Section 3.5), assurance (Section 3.6), responsiveness (Section 3.7) and engagement (Section 3.8).

3.1 WHAT IS A CARE ANALYSIS?

Over its series of SSI reports, IISD has developed an analytical framework referred to by the acronym CARE, for the four core elements of analysis: coverage, assurance, responsiveness and engagement.

This chapter presents the findings of the CARE analysis of mining initiatives. Appendix III describes the methodology of how the CARE framework was adapted to be relevant to the mining sector (i.e., exactly which indicators are used for social, environmental and business dimensions).

3.1.1 MAIN ELEMENTS OF THE CARE APPROACH

COVERAGE

Standards are defined by the requirements they set for their users. Although requirements alone do not determine actual outcomes or impact, they do set a system's level of ambition as well as the bar to which systems can be held accountable. Coverage analysis measures the degree to which an initiative sets requirements in relation to key sustainability elements. Scoring is based on the breadth of issues that a standard addresses, the level of performance the standard sets for an initiative's participants and the degree of flexibility permitted to attain that level of performance.

ASSURANCE

The performance requirements VSIs specify often focus on the impacts associated with production processes, and they typically cannot be verified through physical assessment of the outputs of those processes at any subsequent point in a supply chain. The social and environmental impacts of mining generally cannot be deduced from analyzing the mined material produced. Buyer and stakeholder confidence in any claims that producers make about the impacts of their production are therefore critically dependent on the mechanisms available to verify those claims. Independent, third-party certification is widely recognized as the principle assurance mechanism for such claims. A number of so-called chain of custody models then allow downstream manufacturers to add value to their own businesses based on claims about how they sourced the materials used for their production. The assurance analysis describes and analyzes how an initiative confirms compliance with its standards and the options it offers for material to be traced and claims to be made further down the supply chain.

RESPONSIVENESS

Sustainable development is context and time dependent. Global rules will vary in relevance to actual sustainability depending on context-specific factors. The responsiveness analysis measures an initiative's ability to respond to local conditions while moving producers toward continuous improvement.

ENGAGEMENT

Sustainable development is premised on the idea that a minimum level of equity needs to be provided through political and economic processes. Participatory governance is one of the few systemic tools available for ensuring equity across diverse systems, and it forms the basis for the long-term sustainability of an initiative. The engagement analysis measures an initiative's inclusiveness, transparency and dispute-resolution mechanisms.

3.2 SELECTION CRITERIA FOR STANDARDS AND INITIATIVES INCLUDED IN THE CARE ANALYSIS

The selection of standards to be covered in this report began with a long list of 158 standards or initiatives of potential interest (see Appendix I for this long list). The first stage of analysis was to filter out the initiatives that were not considered relevant for further study and to generate a short list for consideration. Of the 158 standards and initiatives on the long list, we considered 23 to be inactive and 35 not to have developed auditable standards. A further nine were eliminated from analysis on the grounds that they were single-corporation or single-NGO specifications, of limited geographical scope, or of only tangential application to mining operations. These groups were eliminated from any further study but are listed in Appendix I for reference.

After the initial filtering process, 91 standards remained for further analysis on the short list. These standards were grouped into six categories:

- Category 1: Multiple-issue standards applicable to large-scale mining.
- Category 2: Multiple-issue standards applicable to artisanal and small-scale mining.
- Category 3: Multiple-issue standards applicable to quarrying.
- Category 4: Financial market influencer standards.
- Category 5: Product specification influencer standards.
- Category 6: Narrow-issue standards applicable to mining.

Appendix I lists the 91 standards organized by category. We then decided that the CARE analysis would focus on category 1, 2 and 3 VSIs only, which narrowed the list down to 21 standards. A series of final, pragmatic decisions were made that then reduced the list from 21 to 15 initiatives, as presented in Table 3.1. Again, more details on the selection process and its rationale can be found in Appendix I.

Table 3.1. Overview of VSIs covered in the CARE analysis

Standards applicable to large-scale mining	Standards applicable to artisanal and small-scale mining	Standards applicable to quarrying and aggregates extraction
• Aluminium Stewardship Initiative (ASI) • Bettercoal (BC) • IFC Performance Standards and Environmental Health and Safety Guidelines (IFC-PS) • Initiative for Responsible Mining Assurance (IRMA) • International Council on Mining and Metals Sustainable Development Framework (ICMM) • Responsible Jewellery Council (RJC) • Responsible Mining Index (RMI) • Towards Sustainable Mining, Mining Association of Canada (TSM)	• Alliance for Responsible Mining Foundation, Fairmined Gold (ARM) • Fairtrade International Fairtrade Gold and Silver (FT)	• Cornerstone Standards Council (CSC) • Natural Stone Council (NSC) • The Forest Trust Responsible Stone Programme (TFT) • Fair Stone (FS) • XertifiX (XFX)

This study intentionally includes initiatives with quite different models of operation. Most are traditional standards and certification initiatives, but some are business associations that use standards and some form of compliance assessment as a membership mechanism (e.g., MAC's TSM scheme and the ICMM Principles). Others are intended to benchmark different initiatives rather than considering themselves to be standards per se (e.g., the Responsible Mining Index [RMI]). Although the range of initiatives included in the study is diverse, we propose that they are all operating in the same "standards initiative space," as evidenced, for example, by their inclusion in other reviews of standards for the mining sector. We believe that for stakeholders interested in comparisons between different initiatives, it is more important to include a range of schemes, while acknowledging their diversity, than to exclude particular initiatives of interest on the grounds that they are not "typical."

3.3 USING THE SSI ANALYSIS AND UNDERSTANDING SCORES

The SSI's indicator analysis is a comparison tool for evaluating where standards lie on the continuum of social, environmental and business practice content and criteria coverage. The analysis is not intended to delineate "good" versus "bad" performance. While we recognize that there will be a natural tendency to regard more complete coverage as "better," this may not necessarily be the case.

If more demanding standards criteria are not achievable in the short or medium term, this may discourage miners from selling into markets that are seeking more sustainable sources of raw materials, thereby restricting the ability of such initiatives to achieve their objectives.

A given initiative may also deem it desirable (e.g., more efficient or transparent) to focus its efforts along specific sustainability vectors with the understanding that other initiatives may be more effective or efficient for delivery on other vectors. At such a point, the question facing the user will ultimately be whether or not a given standard is "fit for purpose," rather than whether or not it covers all possible criteria to the highest degree. TSM is an example of a standard that has limited issue coverage because it was initially established within the regulatory context of Canada. TSM in Canada does not cover reclamation and closure because effective government regulations already exist. In contrast, when Finland adopted TSM, the initiative developed a closure protocol to address a regulatory gap.

Different sustainability challenges will also be of different priority depending on the sector, the geographic or thematic area of concern, and the priorities of a particular initiative's stakeholders. With this in mind, our analysis is based on a condensed and non-exhaustive set of environmental, social and business indicators designed to illuminate key elements of responsible mining. Given that virtually all the systems included in our analysis make some general claim of promoting sustainability through criteria compliance, we must start by considering the full depth and breadth of criteria coverage by initiative in order to understand their respective levels of ambition and scope. At the same time, our analysis should be considered only a starting point for more in-depth analysis relating to specific sustainability priorities.

The variety of approaches is reflected in the range of scores. An initiative that does not set out to be a certification scheme is likely to have a lower score on an index that assesses elements relating to certification. An initiative that aims to encourage compliance with basic requirements will have a lower score on the content of its standard than one that aims to recognize

best practice. This raises the concern that the assessment is "comparing apples and oranges." To some extent, of course, this is true. However, this is also one of the objectives of the exercise. The key point is that the assessment aims to identify differences between initiatives. A second, essential step is to consider the reasons for those differences. Simple scores are no replacement for such consideration.

Many of the initiatives included in this review were established recently, and several are not yet fully operational. As with previous SSI studies, the assessment is based on an initiative's published documentation. Because some of the initiatives are very new, such documentation may be incomplete but nonetheless under development. Low scores for some initiatives may reflect gaps in finalized documentation rather than gaps in the initiative's system or planned approach. Conversely, some initiatives may have very well-developed documentation, but the systems may not yet be fully operational in practice. The initial assessment of documentation took place in June 2017, so the findings reflect the status of documentation at that time. However, new documentation published up until the end of September 2017 has been taken account where the initiatives concerned brought more recently published documentation to our attention. Readers should be aware that all initiatives undergo regular development and that more recent documents may have been published since this report was finalized.

Appendix III presents a detailed explanation of the CARE methodology as applied to this study of mining initiatives. Readers who are interested in these technical aspects are encouraged to review Appendix III for a deeper discussion of the approach taken and some of the limitations.

3.4 OVERALL FINDINGS

Figure 3.1 and Figure 3.2 present a visual summary of the results of the CARE analysis for all 15 initiatives reviewed. As can be seen, the initiatives differ significantly in their overall scores. This is in large part because they are trying to do different things (as described in Section 3.3).

Figure 3.1 summarizes the findings of the coverage index (content and level of obligation) for the different initiatives. The y-axis, Completeness of Content, shows aggregated scores for how much content is included in each of the 15 initiatives, with equal weight given to the social, environmental and business dimensions. No initiative fully covers all the social, environmental and business practice issues that provided the basis for this assessment. Every initiative has at least some gaps, though IRMA comes closest to providing a comprehensive mining standard covering every societal indicator relevant to mining.

The x-axis, Level of Obligation, shows how the initiatives differ in their use of standards in terms of the level of compliance each initiative demands of its adherents. This ranges from *optional* to *conditional* or *flexible* to *obligatory*. We do not conclude that some initiatives are better or worse than others on this basis. We conclude that they are different, and that those differences should have implications in terms of the claims that might be made of mines that meet the different standards, and in terms of the potential relationships between different initiatives.

More conclusions on what these findings mean for the potential for interoperability across VSIs in mining are described in the conclusion of the coverage section (Section 3.5). For instance, where performance on a given social or environmental aspect is similar between two or more VSIs, there may be grounds for mutual recognition, or for downstream users of commodities to consider material supplied from mines participating in the different initiatives as meriting equivalent support.

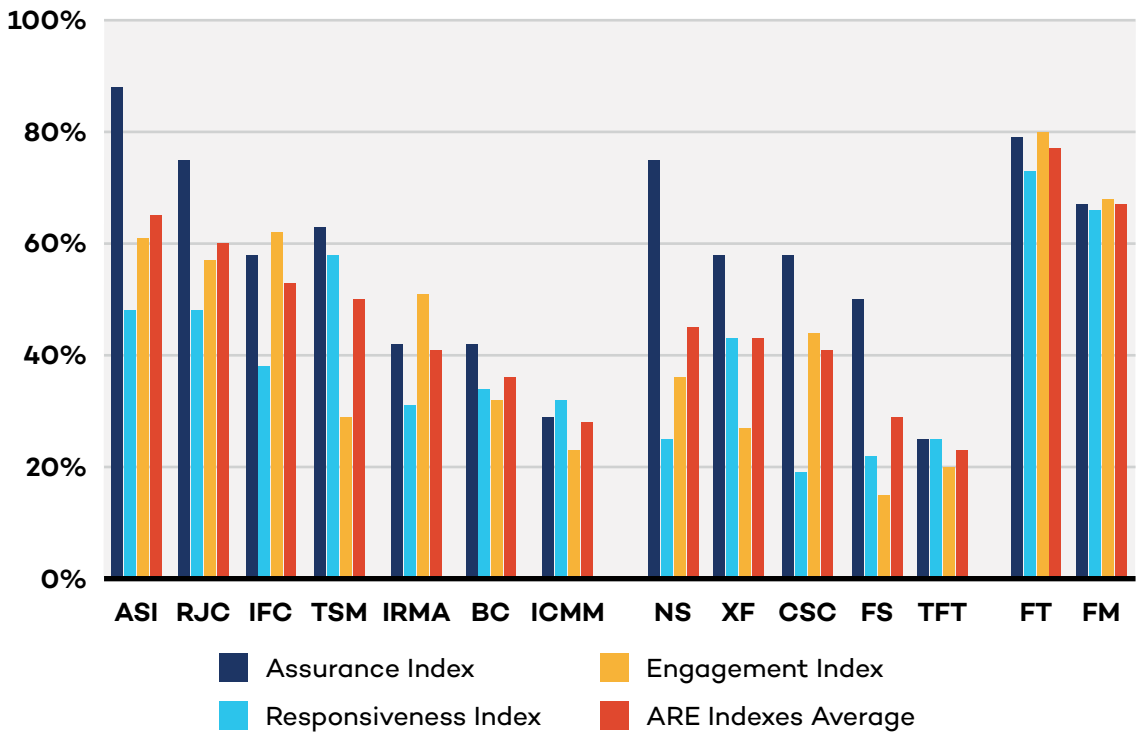
Figure 3.1. Summary of coverage findings (content and level of obligation)

(dark blue dot) Multiple-issue standards applicable to large-scale mining
(red dot) Multiple-issue standards applicable to artisanal and small-scale mining
(light blue dot) Multiple-issue standards applicable to quarrying

ASI: Aluminium Stewardship Initiative
BC: Bettercoal
IRMA: Initiative for Responsible Mining Assurance
ICMM: International Council on Mining and Metals
IFC: International Finance Corporation Environmental and Social Performance Standards
TSM: MAC's Towards Sustainable Mining
RJC: Responsible Jewellery Council
RMI: Responsible Mining Index
CSC: Cornerstone Standards Council
FS: Fair Stone
NSC: Natural Stone Council
TFT: The Forest Trust Responsible Stone Programme
XF: XertifiX
FM: Fairmined
FT: Fairtrade Gold and Silver

Figure 3.2 summarizes the findings of the assurance, responsiveness and engagement indexes for each initiative.

Figure 3.2. Summary of assurance, responsiveness and engagement index results



ASI: Aluminium Stewardship Initiative
BC: Bettercoal
IRMA: Initiative for Responsible Mining Assurance
ICMM: International Council on Mining and Metals
IFC: International Finance Corporation Environmental and Social Performance Standards
TSM: MAC's Towards Sustainable Mining
RJC: Responsible Jewellery Council
RMI: Responsible Mining Index
CSC: Cornerstone Standards Council
FS: Fair Stone
NSC: Natural Stone Council
TFT: The Forest Trust Responsible Stone Programme
XF: XertifiX
FM: Fairmined
FT: Fairtrade Gold and Silver

On the combined ARE analysis (Figure 3.2), two general observations can be made. First, the two artisanal and small-scale mining (ASM) initiatives, Fairtrade and Fairmined, score well across all three indexes. Second, although there is evidence of some level of correlation between scores for the different indexes, the correlation does not appear to be particularly strong. A high score on the assurance index does not necessarily imply a high score in relation to responsiveness, for example. Nor, however, does there appear to be a negative correlation: high levels of engagement and responsiveness do not appear to lead to the implementation of less robust assurance models.

However, as the following sections show, care needs to be taken in interpreting these findings. The initiatives differ greatly in terms of their stage of development; some have been operational for several years already, while others were not yet operational at the time of assessment.

We will now turn to a more detailed unpacking of the CARE analysis on mining initiatives.

3.5 COVERAGE

Coverage analysis measures the degree to which an initiative sets requirements in relation to key sustainability elements.

3.5.1 COVERAGE INDICATORS

The standards for each initiative included in the assessment were scored on their coverage of 63 sustainability indicators. These indicators are organized into 16 higher-level indexes, themselves divided between broadly environmental, social and business practice categories, as listed in Tables 3.2 to 3.4.

Each initiative's standard was rated on the extent to which the standard addresses key elements for each indicator and the level of obligation associated with the requirements for each indicator. The raw data and ratings for each initiative are provided in this report's technical supplementary material.[6] Table 3.5 and Table 3.6 show the rating schemes for indicator content and level of obligation.

Scores for each indicator were then aggregated, and averages for all the indicators within each higher-level index were calculated as percentages of the maximum possible score.[7] These index-level averages were then aggregated and averaged to create percentage scores for the environmental, social and economic dimension (see Box 3.1).

The results were analyzed separately for the initiatives applicable to large-scale industrial mining initiatives, the initiatives applicable to quarrying and aggregates extraction, and the initiatives applicable to ASM.

[6] The technical supplementary material is a series of Excel files of raw data available upon request.

[7] The maximum score will vary depending on how many indicators there are in each piece being looked at. For content, each indicator is given a score of 2, 1 or 0. So if there were four indicators in an index or sub-index, the maximum score for that index or sub-index would be 8. The scores for the ARE indicators (Sections 3.6 to 3.8) are a bit more variable, but the principle is the same.

Table 3.2. SSI environmental indexes and indicators

Index	Indicator
Environmental impact assessment	Environmental impact assessment
Biodiversity and ecosystems	Protected areas
	High biodiversity areas
	Offshore mining
Water use, management and protection of sources	Watershed assessment
	Water use plan
	Groundwater
	Water quality
	Alluvial mining
Waste and hazardous substances	Waste disposal
	Management of hazardous substances
	Mercury
	Cyanide
Air emissions and dust	Air emissions and dust
Noise and vibration	Noise and vibration
Greenhouse gas and energy	Greenhouse gas accounting
	Greenhouse gas reporting
	Greenhouse gas reductions
	Energy use reduction
Mine closure and land rehabilitation	Mine closure

Table 3.3. SSI social indexes and indicators

Index	Indicator
Labour rights	Equal remuneration
	Freedom of association
	Collective bargaining
	Non-discrimination
	Forced labour
	Worst forms of child labour
	Minimum age
	Women's labour rights
Employment conditions and benefits	Treatment of part-time and seasonal workers
	Written contracts for employees
	Legal minimum wage
	Living wage
	Timely payment of wages
	Maximum working hours
	Paid maternity, paternity and sick leave
	Pension and security benefits
	Corporal punishment and degrading treatment
Human rights	Access to education
	Access to medical care
	Access to housing and sanitary facilities
	Human rights impact assessment

Index	Indicator
Workers' health and safety	Safety at work
	Healthy work conditions
	Access to safe drinking water
	Access to sanitary facilities
	Access to medical care, including TB and HIV/AIDS measures
	Access to medical insurance at work
	Emergency preparedness
Community rights, relationships, health and safety	Social impact assessment
	Community consultation
	Free, prior and informed consent
	Resettlement
	Local hiring
	Community health
	Conflict resolution
	Access to grievance processes

Table 3.4. SSI business practice indexes and indicators

Index	Indicator
Business ethics	Legal compliance
	Provisions against corruption
	Provisions to combat money laundering
	Disclosure of payments and revenues
Social and environmental reporting	Reporting of impacts
Terms of trade (ASM only)	Social premiums
	Trade contracts

Table 3.5. Rating scheme for indicator content

Indicator content	Rating
Most elements are addressed	2
Some elements are addressed	1
Indicator not addressed	0

Table 3.6. Rating scheme for level of obligation

Level of obligation	Description	Rating
Obligatory	Compliance is obligatory: • Compliance is a condition of certification or membership.	3
Conditional or flexible	Compliance is conditional or flexible: • Compliance must be achieved at a specified point in time in order to remain within the scheme. OR • Compliance must be achieved for a proportion of the listed requirements, but there is flexibility in relation to the range of requirements that must be met by a particular applicant	2
Optional	There is no obligation to comply within the period of certification or membership: • Compliance may be recommended. OR • Compliance may count toward a higher grade or score but is not obligatory within a specified period of time.	1

3.5.2 COVERAGE INDEX FINDINGS

In this section, we examine our coverage findings, first by looking at the aggregate scores and then by focusing on level of obligation and content.

BOX 3.1. AGGREGATION OF INDICATOR SCORES

Our analysis of a standard's coverage considers indicators within environmental, social and business practices categories. Within each of these categories, sets of indicators may be grouped together into a number of separate indexes.

There are eight indexes in the environmental dimension, five in the social dimension and three in the business dimension category. The number of indicators within each index is also variable; some indexes consist of just a single indicator, whereas one of the indexes in the social grouping is made up of nine separate indicators.

The implication is that the individual indexes in the smaller groupings, as well as the individual indicators within the smaller indexes, have a correspondingly greater weight in the calculation of overall average scores.

Conversely, this approach ensures that each of the indexes within each category has an equal weight in the calculation of the category's overall score, rather than being weighted in favour of the indexes that happen to contain more indicators. Similarly, the environmental, social and business practices categories have equal weight in the calculation of an initiative's overall score, rather than giving greatest weight to the environmental category, which happens to contain a greater number of indexes.

A case can be made that for the highest-level analysis it would be appropriate to give equal weight to each index, rather than equal weight to each category. However, when the results from the two approaches were compared, they did not show major differences (see Figure III.1 and Figure III.2 in Appendix III).

A more general issue is the risk that aggregated data may conceal significant variation in the underlying data.

This is not generally the case in relation to the level of obligation values, where an initiative's approach to compliance is typically embedded in the overall design of the initiative, and variations in the approach as it is applied to different requirements of the initiative's standard are relatively minor. Findings in relation to level of compliance are therefore only presented and discussed for the aggregated data.

However, in terms of content, the aggregated scores can conceal significant variations at a more detailed level. While some general, high-level trends are fairly clear from the aggregated data, it is important to consider the findings for different initiatives in greater detail before drawing any firm conclusions. The results in relation to the content for each standard are therefore presented and discussed both for the high-level aggregated data and for more detailed disaggregated data. Ultimately, however, it is necessary to consider each initiative's standard as whole, in the original, to understand the full implications of its application.

3.5.2.1 AGGREGATE SCORES

Figure 3.3 provides an overview of the scores for the coverage analysis for all 15 standards initiatives included in the study, aggregated for all indicators, with equal weight given to the social, environmental and business dimensions.

The figure shows how the initiatives differ in their use of standards, both in terms of the level of obligation each initiative demands and in terms of each initiative's coverage of issues. The initiatives' distribution along the x-axis shows how they differ in relation to the level of obligation they require. Their distribution along the y-axis shows how they differ in terms of the content of their standards.

Figure 3.3. Distribution of content and level of obligation scores

Note: Scores are aggregated and averaged for all indicators, with equal weight for social, environmental and business practice groupings.

ASI: Aluminium Stewardship Initiative
BC: Bettercoal
IRMA: Initiative for Responsible Mining Assurance
ICMM: International Council on Mining and Metals
IFC: International Finance Corporation Environmental and Social Performance Standards
TSM: MAC's Towards Sustainable Mining
RJC: Responsible Jewellery Council
RMI: Responsible Mining Index
CSC: Cornerstone Standards Council
FS: Fair Stone
NSC: Natural Stone Council
TFT: The Forest Trust Responsible Stone Programme
XF: XertifiX
FM: Fairmined
FT: Fairtrade Gold and Silver

3.5.2.2 LEVEL OF OBLIGATION

The initiatives in the study can be divided into three broad groups in relation to the level of obligation specified in each initiative's standard.

The first group comprises ASI, IFC, IRMA and RJC from the large-scale mining initiatives, CSC and Fair Stone from the aggregates initiatives, and both of the two ASM initiatives, Fairtrade and Fairmined. For these initiatives, full compliance with all the requirements of their respective standard is more or less obligatory. There is some variation in relation to some elements; Fairtrade, for example, allows certificate holders up to six years to comply with some requirements, and IFC allows some flexibility in the application of some of its requirements. Overall, however, certificate holders (or equivalent) are expected to meet all the specified requirements in order to participate in the initiative.

In the second group, comprising ICMM, Natural Stone and XertifiX, there is more flexibility. Natural Stone has bronze, silver, gold and platinum levels of achievement; XertifiX defines some criteria as compulsory and others as additional; and ICMM's requirements are defined at a high level, allowing for a relatively high degree of flexibility in interpretation and discretion in terms of how it is applied, and as to what qualifies as compliance. In this second group a mine site would have to achieve the level of performance shown by the content score over time, or it would have to achieve this level of performance to score the highest performance grade for the initiative, but it would not need to achieve this level of performance simply to participate in the initiative.

For the third group, comprising Bettercoal, TFT and RMI, either compliance is required at a very basic level or the standard is used primarily as a reporting tool. In this group, a mine may participate in the initiative despite having a low level of performance compared to those defined in the standard. The incentive to improve performance is not driven by the reward of association with the scheme or by the incentive of achieving higher-level awards (e.g., platinum rather than bronze), but by whatever value external stakeholders place on the scores themselves, if they are known.

TSM also broadly fits into this third group, though with some variations. TSM requires members to report their scores, to have those scores independently verified and to publicly report them. Additionally, three levels of achievement awards are provided (bronze, silver, gold) for facilities that achieve level A, AA and AAA across all indicators. These awards are issued to facilities only in the year that they undertake verification; award winners are listed in the annual report and website.

There is nothing inherently problematic with any of these approaches. It is worth pointing out that neither ICMM nor TFT would claim to be certification schemes. Their models for achieving improvements in performance over time are not based on public claims of compliance with their standards.

Furthermore, it is quite possible for an initiative to change its approach over time. Indeed, IRMA has considered introducing two levels of compliance to its scheme. If such an approach had been in place at the time of our assessment, it is likely that IRMA would have moved into the second group as described above.[8]

Although there appears to be a weak correlation between the level of obligation required and the level of performance specified in the respective standard, the link is certainly not universal. Bettercoal stands out in specifying high performance requirements, but it uses the standard as a basis for reporting rather than as the specification for a minimum level of performance that mine sites must achieve.

[8] Since our assessment, IRMA has completed a revision of its standard based on public comments and field testing, and published the revised version in June 2018 for mine site self-assessment and auditor-verified scoring only. Fully certification is expected to take place after a final update in mid-2019.

3.5.2.3 CONTENT

In relation to content, there is a similarly broad range of variation across the aggregate scores, with TFT and XertifiX appearing to specify relatively low levels of performance overall, Bettercoal and IRMA specifying the highest levels, and the other initiatives spread between them.

In the case of level of compliance, there is little variation in a given initiative's approach to compliance in relation to different elements of that initiative's standard, and so the aggregated compliance scores accurately reflect the initiative's general approach. This is not necessarily the case in relation to the content scores. In terms of content, the aggregated scores can conceal significant variations at a more detailed level.

It is worth noting here that the scoring system for content focuses on the extent to which different elements of an issue are covered by a particular standard, rather than on the level of performance the standard specifies in relation to those elements. Initiatives can achieve the same score in relation to content despite differing significantly in relation to the level of performance that would be required to meet the standard.

While the high-level trend is fairly clear, it is important to consider the scores for different initiatives in greater detail before drawing any conclusions. In this case, it is important to note that both TFT and XertifiX cover a relatively narrow range of sustainability issues, with a particular focus on social issues. This reduces their aggregated scores, as discussed in section 3.5.3.2.

3.5.3 CONTENT SCORES IN MORE DETAIL

This section analyzes the disaggregated content scores separately for large-scale initiatives, quarrying and aggregates initiatives, and ASM initiatives. For each of these groups two types of analysis are considered. The first analysis (Figure 3.4, Figure 3.5 and Figure 3.6) compares the content scores of the different initiatives aggregated for the environmental, social and business practice groupings. Table 3.7, Table 3.8 and Table 3.9 show the data used to generate these figures.

The second analysis (Table 3.7, Table 3.8 and Table 3.9) shows the average scores for each index. This analysis therefore reveals some details of the performance of the different initiatives at the level of each index that may otherwise be hidden by the aggregated approach of the first analysis. As in the

first analysis, scores are presented as percentages of the maximum possible score[9] that could have been achieved.

3.5.3.1 LARGE-SCALE MINING INITIATIVES

Eight initiatives applicable to large-scale industrial mining were included in the analysis: ASI, Bettercoal, IRMA, ICMM, IFC, TSM, RJC and RMI.

Figure 3.3 shows considerable variation in the overall scores of these initiatives. IRMA (91 per cent) and Bettercoal (79 per cent) score highest when content specifications are averaged for environmental, social and business practice indexes, followed by ASI (63 per cent), IFC (62 per cent), RJC (61 per cent), RMI (49 per cent), ICMM (38 per cent) and TSM (30 per cent).

Figure 3.4 shows a similar level of variation within all three main groupings of indicators: environmental, social and business practice. For the environmental specifications, the content scores range from 33 per cent (TSM) to 94 per cent (IRMA), for the social specifications from 27 per cent (TSM) to 91 per cent (IRMA), and for the business practice specifications from 31 per cent (TSM) to 88 per cent (IRMA).

At this level of aggregation, TSM scores consistently lower than the other initiatives. However, this masks significant variations within indexes. On three environmental indexes (air emissions and dust, noise and vibrations, and mine closure and rehabilitation) TSM scores zero; in other words, the initiative does not assess these aspects of environmental performance at all. In contrast, TSM scores 100 per cent in terms of greenhouse gas emissions and is the only initiative to score this high on that aspect of assessment. Similarly, TSM does not evaluate companies' performance in relation to employment conditions and benefits, scoring zero on this aspect of assessment. However, it also scores relatively low in its assessment of the other social elements covered by this assessment of standard content.

ICMM also scores lower than the other initiatives on social and environmental aspects of its specifications, although it scores relatively well in relation to the business practice elements. Like TSM, the ICMM initiative does not cover air emissions and dust, or noise and vibrations, pulling down its overall environmental score. However, it does not score particularly well in terms of its specifications for other social or environmental requirements, with no index scoring higher than 50 per cent overall. Its strongest coverage is for the business ethics index, for which it scores 63 per cent.

At the other end of the spectrum, IFC (87 per cent) and IRMA (94 per cent) score most strongly for their environmental specifications. IRMA scores more strongly than IFC in terms of its specifications for water use, management and protection of sources. On other environmental aspects, at least at the low level of specificity of this evaluation, IFC's and IRMA's scores on the whole range of environmental indexes are quite similar.

The three remaining initiatives, Bettercoal (70 per cent), RJC (65 per cent) and ASI (59 per cent) all have relatively similar scores in relation to the environmental content of their standards. Within these aggregated scores all three initiatives score 100 per cent in relation to their standard's coverage of environmental impact assessment, mine closure and land rehabilitation. RJC also scores 100 per cent in relation to biodiversity and ecosystems, and was the only initiative scoring 100 per cent on that index. Bettercoal scores 100 per cent in relation to air emissions and dust.

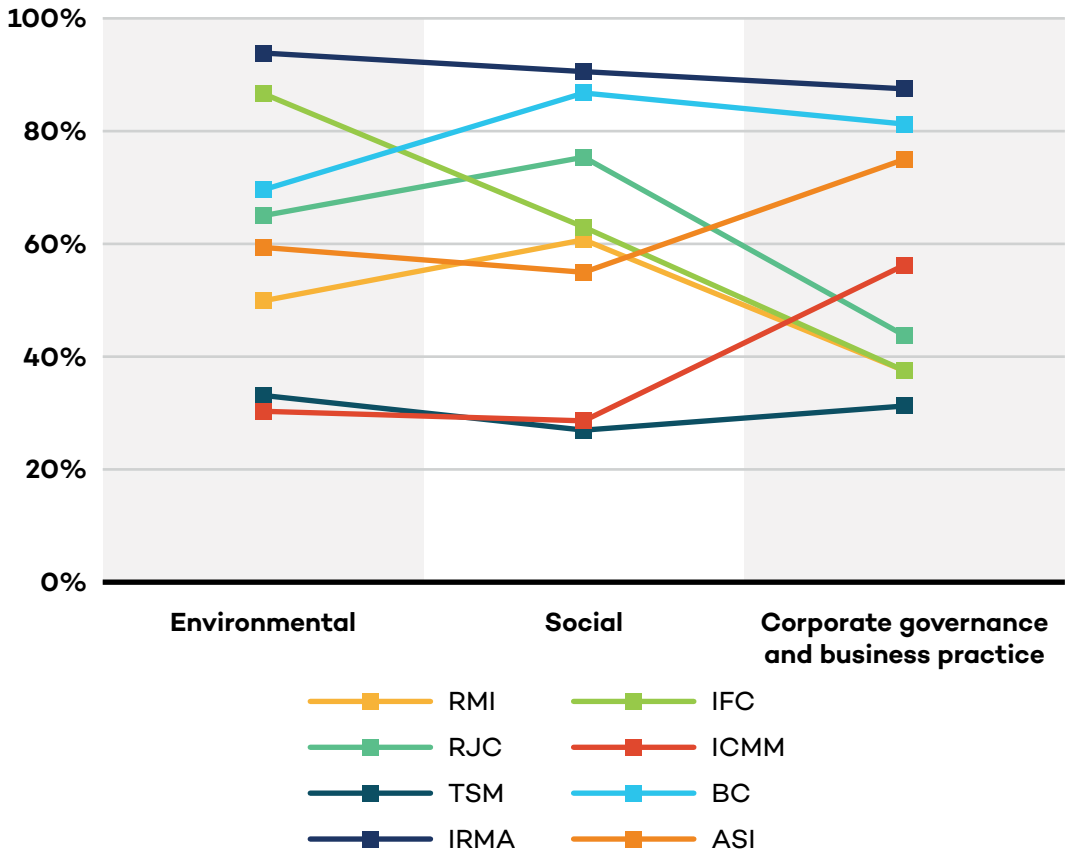
The data for social indexes tell a somewhat similar story. Bettercoal (87 per cent), IRMA (91 per cent) and RJC (75 per cent) score highest overall, followed by IFC (63 per cent) and ASI (55 per cent).

On the business practice indexes, Bettercoal (81 per cent), IRMA (88 per cent) and ASI (75 per cent) cluster at the top end of the spectrum, with TSM at the low end.

[9] See footnote 25 on maximum scores.

However, ICMM (56 per cent) scores more strongly than either RJC (44 per cent) or IFC (38 per cent). However, one needs to be careful in interpreting these findings. For the large-scale mining initiatives, the business practice grouping consists of just two indexes, covering business ethics and social and environmental reporting. The large-scale initiatives were not assessed on whether they gave preferential terms of trade for producers (although RJC scores for its recognition of ASM). A lot of the overall variation in scores is accounted for by the fact that Bettercoal, IRMA and ASI all score 100 per cent in relation to social and environmental reporting. RJC scores poorly on this aspect, which pulled its score down significantly. IFC's score was low because its performance standards do not cover business ethics. These elements of performance may be covered by other aspects of IFC's overall compliance system that were not included in this study.

Figure 3.4. Large-scale mining initiatives: Environmental, social and business practice groupings



ASI: Aluminium Stewardship Initiative
BC: Bettercoal
IRMA: Initiative for Responsible Mining Assurance
ICMM: International Council on Mining and Metals
IFC: International Finance Corporation Environmental and Social Performance Standards
TSM: MAC's Towards Sustainable Mining
RJC: Responsible Jewellery Council
RMI: Responsible Mining Index

Table 3.7. Large-scale mining initiatives: Standards content at level of indexes

	ASI	BC	ICMM	IFC	IRMA	TSM	RJC	RMI
Environmental impact assessment (%)	100	100	50	100	100	50	100	50
Biodiversity and ecosystems (%)	50	67	50	83	83	50	100	17
Water use, management and protection of sources (%)	50	40	30	60	80	40	20	20
Waste and hazardous substances (%)	38	50	38	75	100	25	88	63
Air emissions and dust (%)	50	100	0	100	100	0	50	0
Noise and vibration (%)	0	50	0	100	100	0	50	100
Greenhouse gas and energy (%)	88	50	25	75	88	100	13	50
Mine closure and land rehabilitation (%)	100	100	50	100	100	0	100	100
Environmental indexes average (%)	**59**	**70**	**30**	**87**	**94**	**33**	**65**	**50**
Labour rights (%)	94	94	31	69	100	38	88	88
Employment conditions and benefits (%)	44	72	6	17	78	0	78	28
Human rights (%)	25	75	13	63	88	13	63	38
Workers' health and safety (%)	43	93	50	86	100	29	93	57
Community rights, relationships, health and safety (%)	69	100	44	81	88	56	56	94

	ASI	BC	ICMM	IFC	IRMA	TSM	RJC	RMI
Social indexes average	**55**	**87**	**29**	**63**	**91**	**27**	**75**	**61**
Business ethics (%)	50	63	63	25	75	13	88	63
Social and environmental reporting (%)	100	100	50	50	100	50	0	50
Terms of trade (ASM and aggregates only) (%)	0	0	0	0	0	0	25	0
Business practice indexes average (%)	**75**	**81**	**56**	**38**	**88**	**31**	**44**	**38**
OVERALL AVERAGE (%)	**63**	**79**	**38**	**62**	**91**	**30**	**61**	**49**

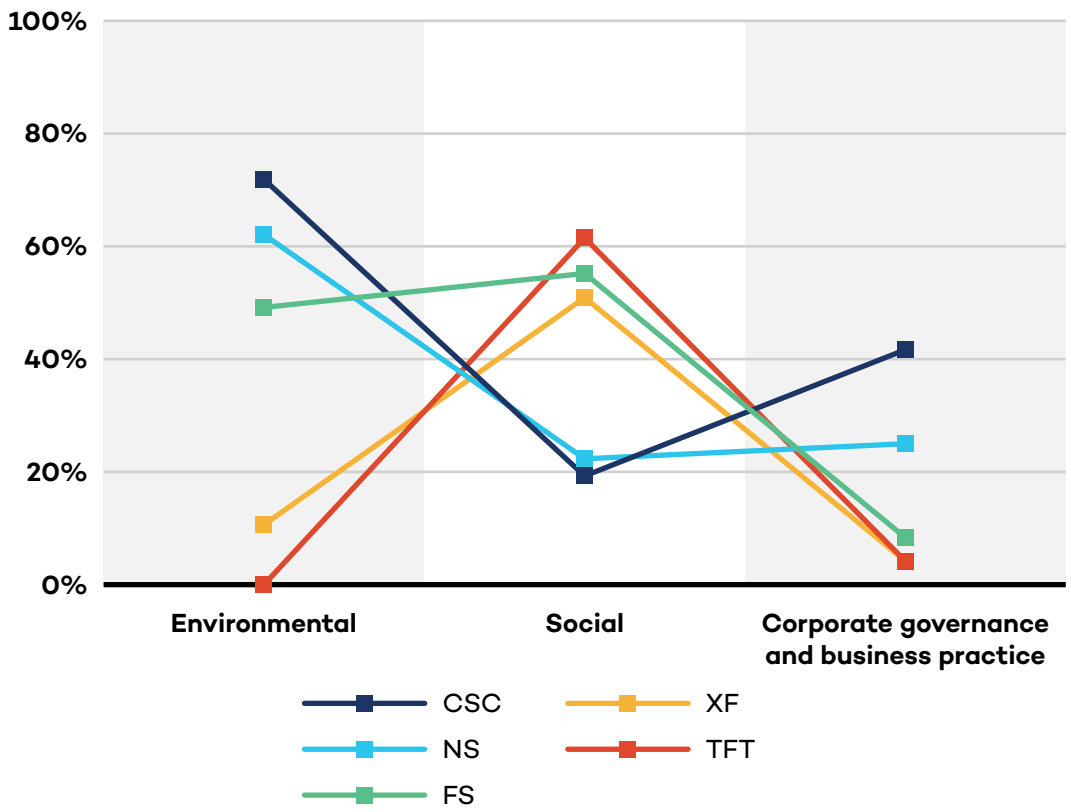
3.5.3.2 AGGREGATES AND QUARRYING INITIATIVES

Five aggregates and quarrying initiatives were included in the analysis: Fair Stone, CSC, NSC, TFT Responsible Stone and XertifiX. Compared to the large-scale mining initiatives, their coverage of social, environmental and business practice issues is generally in the mid to low range of performance.

The initiatives can be divided into three broad groups. TFT and XertifiX make up one group, focused almost exclusively on social issues. In fact, the TFT standard for responsible stone does not cover any purely environmental issues (TFT, 2016). The XertifiX standard references a number of environmental considerations but does so with very little detail, making it hard to determine what the standard's requirements mean in practice. The focus on social issues means that the aggregated scores for content for both TFT and XertifiX as shown in Figure 3.3 are low. The more disaggregated data in Figure 3.5 show, however, that these initiatives still score relatively well when social issues are considered separately.

The CSC and NSC make up the second group. Both of these standards score high on environmental issues but low on social issues. Some care is required in interpreting this finding, as these initiatives are based in Canada and the United States, respectively. The apparent gaps in terms of social coverage may be explained, to some extent, by the assumption that basic social provisions can be taken for granted in these jurisdictions. Thus, for example, neither scheme scores well on basic human rights or worker health and safety, and the CSC standard does not specify requirements covering labour rights or employment rights and benefits. There is always a cost associated with verifying compliance, and if verification of particular requirements adds no social value, it is likely to create a barrier to uptake. However, this does not mean that these gaps are irrelevant. The Natural Stone standard is intended to be

Figure 3.5. Aggregates and quarrying: Environmental, social and business practice groupings



internationally applicable, and social elements that may normally be addressed in the United States without the need for explicit inspection may not be covered in other jurisdictions. Similar considerations would become relevant if the CSC standard were to be adopted more widely.

The final standard is the Fair Stone standard. Fair Stone is in a group of its own in covering environmental issues at a basic level, but also covering social issues at a similar level as TFT and XertifiX. The Fair Stone standard most resembles the Fairtrade and Fairmined initiatives, which focus on ASM, considered in Section 3.5.3.3, with the major differences that it is not based on a group client model for assessment and does not offer an explicit premium for the sale of products claiming compliance with the standard. In terms of its focus, however, it aligns with these ASM standards in focusing mainly on the conditions of workers while aiming to provide a more basic level of assurance in relation to environmental impacts.

Table 3.8. Aggregates and quarrying: Standards content at level of indexes

	CSC	FS	NS	TFT	XF
Environmental impact assessment (%)	100	50	100	0	0
Biodiversity and ecosystems (%)	50	33	17	0	0
Water use, management and protection of sources (%)	50	10	30	0	10
Waste and hazardous substances (%)	25	38	50	0	13
Air emissions and dust (%)	100	100	100	0	0
Noise and vibration (%)	100	100	0	0	0
Greenhouse gas and energy (%)	50	13	100	0	13
Mine closure and land rehabilitation (%)	100	50	100	0	50
Environmental indexes average (%)	**72**	**49**	**62**	**0**	**11**
Labour rights (%)	0	75	50	94	94
Employment conditions and benefits (%)	0	78	0	83	78
Human rights (%)	13	38	13	38	13
Workers' health and safety (%)	21	86	43	93	64
Community rights, relationships, health and safety (%)	63	0	6	0	6
Social indexes average	**19**	**55**	**22**	**61**	**51**
Business ethics (%)	25	25	25	13	13
Social and environmental reporting (%)	100	0	50	0	0
Terms of trade (ASM and aggregates only) (%)	0	0	0	0	0
Business practice indexes average (%)	**42**	**8**	**25**	**4**	**4**
OVERALL AVERAGE (%)	**44**	**38**	**36**	**22**	**22**

CSC: Cornerstone Standards Council
FS: Fair Stone
NSC: Natural Stone Council
TFT: The Forest Trust Responsible Stone Programme
XF: XertifiX

3.5.3.3 ASM INITIATIVES

Only two ASM[10] initiatives were included in the detailed CARE analysis: the Fairtrade initiative for gold and associated precious metals, and ARM's Fairmined initiative. Although there are a number of other schemes focused on mining gemstones in a variety of countries, public information about these initiatives and their standards is sparse, and we decided not to include them in the detailed CARE analysis.

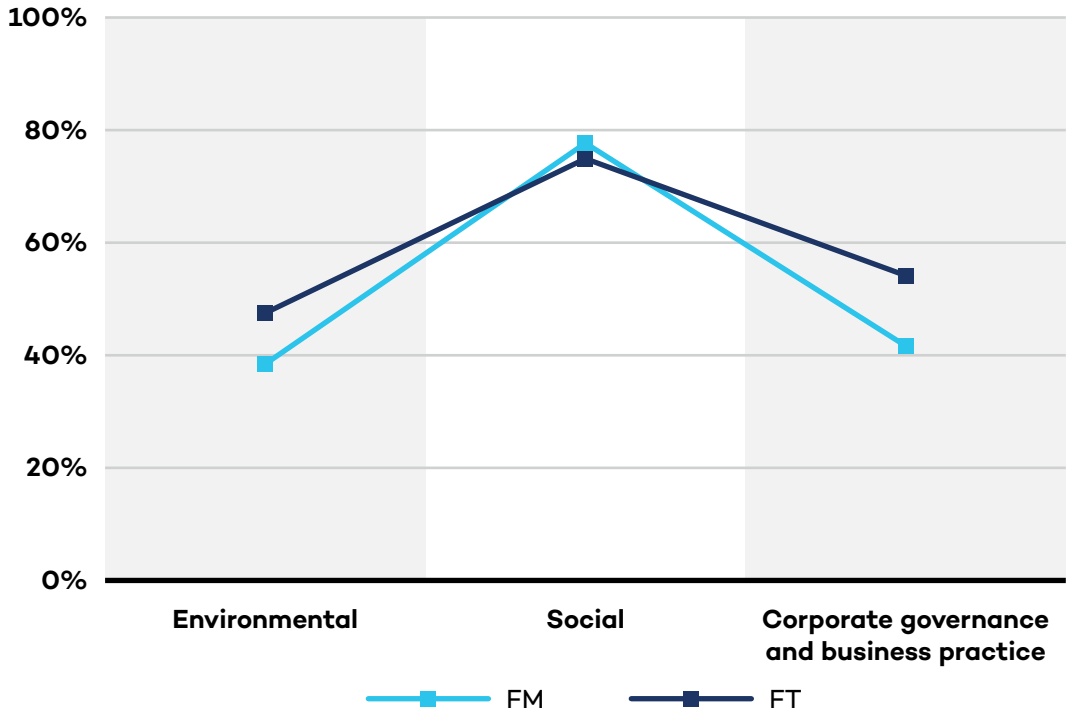
Comparing Fairtrade and Fairmined standards is relatively simple, firstly because there are only two standards to consider, and secondly because the two initiatives collaborated and shared the same standard until 2013. Fairtrade then published its own revised standard in November 2013 (see Fairtrade, 2013), and a new version of the ARM standard was published in April 2014 (see ARM, 2014). Although some changes were introduced in both revision processes, the great majority of requirements remained the same for both new standards.

The 2013 revision of the Fairtrade standard introduced several new requirements, in particular in relation to conflict-affected areas, traditional community rights, the management of toxic substances (mercury and cyanide), and payment and oversight of the Fairtrade premium. The new requirements increased the standard's content scores in relation to the environmental and business practice indexes, as illustrated in Figure 3.6.

[10] Different initiatives have their own specific definitions of ASM. However, in general terms, when we refer to ASM we are using this definition from the OECD:

> Artisanal and small-scale mining comprises of formal or informal mining operations with predominantly simplified forms of exploration, extraction, processing, and transportation. ASM is normally low capital intensive and uses high labor-intensive technology. "ASM" can include men and women working on an individual basis as well as those working in family groups, in partnership, or as members of cooperatives or other types of legal associations and enterprises involving hundreds or even thousands of miners. For example, it is common for work groups of 4-10 individuals, sometimes in family units, to share tasks at one single point of mineral extraction (e.g. excavating one tunnel). At the organizational level, groups of 30 – 300 miners are common, extracting jointly one mineral deposit (e.g. working in different tunnels), and sometimes sharing processing facilities. (OECD, 2013, p. 65)

Figure 3.6. ASM initiatives: Environmental, social and business practice groupings



The analysis shows some general differences in ASM initiatives when compared with the large-scale mining initiatives and the quarrying and aggregates initiatives. Perhaps the first thing to point out is that both these ASM initiatives offer premiums to their certificate holders as a benefit of scheme participation, in line with the tradition of Fairtrade schemes. Although one might not expect the large-scale mining initiatives to offer similar premiums, it is perhaps surprising that none of the initiatives working with suppliers of quarried stone do so.

The Fairmined and Fairtrade standards are comparable to the Fair Stone, TFT and XertifiX standards in terms of their coverage of social issues, but they also score relatively highly on environmental issues, being more similar to Fair Stone, CSC and NSC in that regard. Fair Stone generally resembles the Fairmined and Fairtrade approaches, except for the absence of a premium payment for producers.

Table 3.9. ASM initiatives: Standards content at level of indexes

	FM	FT
Environmental impact assessment (%)	50	50
Biodiversity and ecosystems (%)	50	50
Water use, management and protection of sources (%)	20	30
Waste and hazardous substances (%)	88	100
Air emissions and dust (%)	0	50
Noise and vibration (%)	0	0
Greenhouse gas and energy (%)	0	0
Mine closure and land rehabilitation (%)	100	100
Environmental indexes average (%)	**38**	**48**
Labour rights (%)	100	100
Employment conditions and benefits (%)	100	89
Human rights (%)	75	75
Workers' health and safety (%)	57	36
Community rights, relationships, health and safety (%)	56	75
Social indexes average	**78**	**75**
Business ethics (%)	25	63
Social and environmental reporting (%)	0	0
Terms of trade (ASM and aggregates only) (%)	100	100
Business practice indexes average (%)	**42**	**54**
OVERALL AVERAGE (%)	**53**	**59**

FM: Fairmined

FT: Fairtrade Gold and Silver

3.5.4 CONCLUSIONS

The analysis above is essentially descriptive: the initiatives' standards are assessed in terms of their content and the degree to which participating mines are required to comply with specified performance levels. The analysis tries to identify high-level differences between initiatives and to explain the reasons for these differences at a more granular level. Based on these findings, we propose a number of general conclusions.

First, no initiative fully covers all the environmental, social and business practice issues that provided the basis for this assessment. To the extent that the indicators listed in Table 3.2, Table 3.3 and Table 3.4 reflect real societal concerns, every initiative has gaps, although IRMA comes closest to providing a comprehensive mining standard covering every societal indicator relevant to mining.

Second, there are clear differences between initiatives in terms of their coverage of issues and the depth of this coverage. Although the scope of the initiatives in terms of minerals is different, it is not the case that if one were to set aside these differences in scope the initiatives would all be essentially the same in terms of their content. There are, however, exceptions to this general conclusion. In the ASM space, the Fairmined and Fairtrade standards are notably similar and, notwithstanding the absence of a premium payment mechanism, are also similar to the Fair Stone standard.

Third, there are clear differences in the performance levels specified by different initiatives. We do not conclude that some initiatives are better or worse than others on this basis. We conclude that they are different and that those differences should have implications in terms of the claims that might be made of mines that meet the different standards, and in terms of the potential relationships between different initiatives. Where performance on a given social or environmental aspect is essentially similar, there may be grounds for mutual recognition or for downstream users of commodities to consider material supplied from mines participating in the different initiatives as meriting equivalent support. Where performance requirements are very different, those differences should be recognized; they may provide a basis for supporting mines along a development pathway, from relatively low levels of social and environmental performance toward much higher levels of performance.

Fourth, despite their differences, initiatives also have considerable areas of overlap. This is not surprising. Many of the social and environmental impacts of coal mining will be the same as those for bauxite mining and gold mining. It would be surprising if initiatives trying to define standards for responsible coal, bauxite and gold mining did not cover a lot of the same ground and in similar ways. This is especially true given that no initiative is working in isolation and that most initiatives explicitly reference earlier standards such as the IFC Performance Standards or the International Labour Organization (ILO) conventions on employment and workers' rights. However, where there is overlap in terms of content, there may also be differences in terms of the wording and specific guidance on compliance. In some cases there will be significant, sector-specific reasons for such differences, but in other cases there seems to be potential for greater alignment, to the benefit of the initiatives themselves, their direct users, and their users' stakeholders and downstream customers.

3.6 ASSURANCE

Building a comprehensive and effective set of rules that define the parameters of sustainable or responsible practice (i.e., a system's "coverage," as per Section 3.5) is a core component of any sustainability standard. However, another key component is the methodology that an initiative employs to verify that the practices defined in its standard are being achieved in practice, whether this is as a basis for public claims of compliance, for business-to-business claims, or as a requirement for participation in a business association or scheme.

The second component of the CARE methodology therefore looks at assurance, meaning how an initiative determines whether the requirements of its standard are being met at mine sites, and the basis, if applicable, for downstream claims about the sourcing of mined material. Value chain traceability is considered here as a key aspect of assurance.

Whereas the previously examined level of obligation is a characteristic of the way the standard is designed, the assurance section relates to how *compliance* with the standard is assured in the field. The level of obligation tells us how much flexibility there is in relation to the requirements of the standard. A high level of obligation means that the standard is not very flexible, while a low level of obligation means there is a lot of flexibility. For assurance, a high score means that inspection is carried out by trained, independent auditors, irrespective of how much flexibility there is in terms of the standard's design.

The CARE assessment of assurance has three parts. The first part describes key elements of an initiative's assurance model. Just as initiatives may adopt different approaches

to the definition of standards, so they may apply different approaches to assurance. The descriptive part of the assessment is not intended to imply any differences in quality between different initiatives, but is intended to highlight key differences of the initiatives' assurance models.

The second part of the analysis is intended to identify differences in quality of the different assurance systems, through the creation of an assurance index. The index is based on the key assumption that a well-designed independent third-party verification system is likely to be more reliable than other types of assurance.

The third part of the assurance assessment is, like the first, descriptive, and covers the initiatives' different approaches to value chain traceability. This is the process by which material from an identified mine site can be tracked as it is transported between sites, processed and traded, through to the point at which it is used to manufacture an end product.

3.6.1 ASSURANCE INDICATORS

Table 3.10 lists the four indicators that have been used to characterize each initiative's assurance model, subdivided into a number of descriptive elements. Each initiative in the study was assessed, based on its publicly available documentation, as to the presence or absence of each of these elements. The findings are presented in Table 3.11 and Table 3.12.

Table 3.10. Assurance model descriptive indicators

Indicator	Description
Role of self-assessment	Self-reporting is a major element of conformity assessment.*
	Initiative-supported claims may be based on self-assessment only.
Role of third-party conformity assessment	Third-party assessment is a major element of conformity assessment.
	Initiative-supported claims may be based only on third-party assessment.
Role of the initiative	Initiative carries out audit.
	Initiative reviews audit reports.
	Initiative issues certificates and determines membership.
	Initiative provides formal accreditation of audit bodies.
Independent accreditation or other oversight mechanism	Audit bodies are formally accredited.
	Initiative meets ISEAL Assurance Code.

* In first-party reporting, a site assesses its own performance against specified requirements. In second-party assesment, a site's performance is assessed by a customer or other interested party. In third-party assessment, a site's performance against specified rquirements is assessed by a party independent of the site's own management or other interested parties.

Table 3.11. Assurance model descriptive elements: Large-scale mining initiatives

	ASI	BC	ICMM	IFC	IRMA	TSM	RJC
Role of self-assessment							
Self-reporting is a major element of conformity assessment	✓	✓	✓	✓	✗	✓	✓
Initiative-supported claims may be based on self-assessment only.	✗*	✓	✗	✗	✓*	✓*	✗
Role of third-party conformity assessment							
Third-party assessment is a major element of conformity assessment.	✓	✓	✓	✗	✓	✓	✓
Initiative-supported claims may be based only on third-party assessment.	✓	✗*	✗	✗	✓	✓*	✓
Role of the initiative							
Carries out audit.	✗	✗	✗	✓	✗	✗	✗
Reviews audit reports.	✓	✓	✓	✓	✓	✗	✓
Issues certificates and determines membership.	✓	✗	✓	✓	✓	✓*	✓
Provides formal accreditation.	✗	✗	✗	✗	✗	✓*	TBD
Independent accreditation or other oversight mechanism							
Audit bodies are formally accredited.	✓	✗	✗	✗	✓	✗*	✗*
Initiative meets ISEAL Assurance Code.	✗	✗	✗	✗	✗	✗	✓

** Cells are marked with an asterisk where there was difficulty in interpretation. Specific observations are available in technical supplementary material, available on request.*

ASI: Aluminium Stewardship Initiative
BC: Bettercoal
IRMA: Initiative for Responsible Mining Assurance
ICMM: International Council on Mining and Metals
IFC: International Finance Corporation Environmental and Social Performance Standards
TSM: MAC's Towards Sustainable Mining
RJC: Responsible Jewellery Council

Table 3.12. Assurance model descriptive elements: Aggregates, quarrying and ASM initiatives

	CSC	FS	NSC	TFT	Xf	FM	FT
Role of self-assessment							
Self-reporting is a major element of conformity assessment	⊗	✓	⊗	⊗	⊗	⊗	⊗
Initiative-supported claims may be based on self-assessment only.	⊗	✓*	⊗	⊗	⊗	⊗	⊗
Role of third-party conformity assessment							
Third-party assessment is a major element of conformity assessment.	✓*	✓	✓	⊗	✓	✓	✓
Initiative-supported claims may be based only on third-party assessment.	✓	⊗*	✓	⊗	⊗	✓	✓
Role of the initiative							
Carries out audit.	✓*	⊗	⊗	✓	✓	⊗	✓*
Reviews audit reports.	✓	⊗	⊗	✓	✓	⊗	✓*
Issues certificates and determines membership.	✓	✓	⊗	✓	✓	⊗	✓*
Provides formal accreditation.	⊗	⊗	⊗	⊗	⊗	⊗	⊗
Independent accreditation or other oversight mechanism							
Audit bodies are formally accredited.	⊗	⊗*	✓*	⊗	⊗	✓*	✓
Initiative meets ISEAL Assurance Code.	⊗	⊗	⊗	⊗	⊗	⊗	✓

** Cells are marked with an asterisk where there was difficulty in interpretation. Specific observations are available in technical supplementary material, available on request.*

CSC: Cornerstone Standards Council
FS: Fair Stone
NSC: Natural Stone Council
TFT: The Forest Trust Responsible Stone Programme
XF: XertifiX
FM: Fairmined
FT: Fairtrade Gold and Silver

The descriptive part of the assessment highlights a number of characteristics of the large-scale mining initiatives. First, almost all the initiatives include a significant role for self-assessment in their approach to assurance. Typically, an initiative asks applicants to carry out a self-assessment against the initiative's standard at an early stage, and then this self-assessment provides the starting point for further, independent evaluation. This approach is quite different than approaches taken by many initiatives in other sectors, in which assessment is presented as a less collaborative process. Applicants may be encouraged in other processes to carry out their own self-assessment, but an auditing body would be expected to start with its own assessment of compliance, rather than starting with the client's self-assessment findings.

Second, although several of the initiatives would not characterize themselves as operating third-party assurance programs, almost all of them employ some form of third-party assurance within their program. In some cases, they require initiative participants to commission their own third-party assessments and make the findings available to the initiative for review. In other cases, the initiative may employ third-party auditors to carry out a site visit on the initiative's behalf, and then the initiative reviews the report to come to its own view on standards conformity.

Third, and related to the previous point, it is notable that most initiatives reserve to themselves the final determination on standards conformity, rather than devolving this final decision making to a third party. This approach is certainly not unique, but it differs from the traditional third-party *certification* model, in which the third party not only carries out an inspection of the client's conformity with a standard, but is also empowered to determine conformity and issue a certificate of conformity. Presumably related to this, few of the initiatives make use of a formal accreditation program to provide a guarantee that the third-party audit bodies are operating in accordance with specific auditing quality systems. To the extent that the initiatives are directly involved in determining whether a candidate does or does not comply with their own standard, they may see relatively little added value in employing an additional external body to underwrite that determination.

In contrast to the large-scale mining initiatives, self-assessment does not appear to form a key aspect of assurance for the initiatives focusing on aggregates, quarrying and ASM. It is not obvious why this should be the case, though it may reflect an assumption about the relative capacity of clients to carry out and report self-assessments against technical standards.

As for the large-scale initiatives, the most common model of assurance is one of independent third-party auditing, followed by the initiative itself determining compliance and issuing a certificate. The principal exception to this model is the Natural Stone program, which follows the model of formal separation between the standards owner (Natural Stone) and third-party certification by independent bodies.

3.6.2 ASSURANCE INDEX FINDINGS

As noted in the introduction above, the assurance index is based on the key assumption that a well-designed independent third-party verification system is likely to be more reliable than other types of assurance.

Following this assumption, the assurance index is based on the assessment of a number of indicators we suggest contribute to the quality of an initiative's assurance system, as listed in Table 3.13. The list of indicators is short, and we do not suggest it is complete. We do propose, however, that it provides some indication of the robustness of an initiative's assurance system at the time of the analysis.

Each initiative was scored, in accordance with the scoring criteria described in Appendix III, on the basis of its publicly available documentation. Scores were tabulated and an overall score calculated as a percentage of the maximum possible score. The results for each initiative are shown in Figure 3.7, with the scoring of the individual components shown in Table 3.14 and Table 3.15.

Table 3.13. Assurance index indicators

Indicator	Basis of assessment
Audit model	The role of external audits in determining scheme participation.
Site audit frequency	Frequency of second- or third-party site audits, if required.
Auditor competency	Specifications for auditor qualifications or training.
Independent oversight	Mechanisms for ensuring audit body quality.

Figure 3.7. Assurance index scores

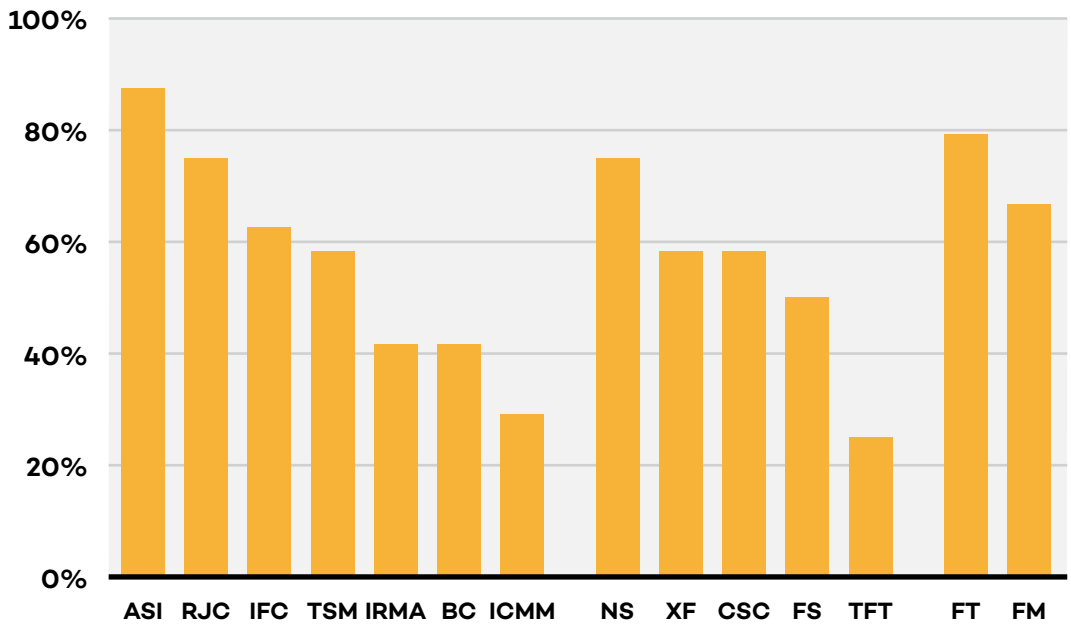


Table 3.14. Assurance index scores: Large-scale mining initiatives

	ASI	BC	ICMM	IFC	IRMA	TSM	RJC
Audit model	3	3	2	3	1.5	2.5	3
Site audit frequency	2.5	1	1	2	1.5	2	2
Auditor competency	2	1	0.5	2	1	2	2
Independent oversight	3	0	0	0	1	1	2
Total Score (%)	**88**	**42**	**29**	**58**	**42**	**63**	**75**

Table 3.15. Assurance index scores: Aggregates, quarrying and ASM initiatives

	CSC	FS	NS	TFT	XF	FM	FT
Audit model	3	2.5	3	3*	3	3	3
Site audit frequency	2	2	3	n/a	3	3	2.5
Auditor competency	2	1	2	n/a	1	1	1
Independent oversight	0	0.5	1	0	0	1	3
Total Score (%)	**58**	**50**	**75**	**25**	**58**	**67**	**79**

* TFT does not describe its services as auditing, but it does provide third-party assessment against its standards and so has been scored 3 on this element of its model.

ASI: Aluminium Stewardship Initiative
BC: Bettercoal
IRMA: Initiative for Responsible Mining Assurance
ICMM: International Council on Mining and Metals
IFC: International Finance Corporation Environmental and Social Performance Standards
TSM: MAC's Towards Sustainable Mining
RJC: Responsible Jewellery Council
RMI: Responsible Mining Index
CSC: Cornerstone Standards Council
FS: Fair Stone
NSC: Natural Stone Council
TFT: The Forest Trust Responsible Stone Programme
XF: XertifiX
FM: Fairmined
FT: Fairtrade Gold and Silver

Overall, there is considerable variation in scoring on the assurance index between ASI (88 per cent) and TFT (25 per cent). It must be emphasized that the differences in index scores first and foremost reflect the fact that the initiatives are being assessed in terms of their implementation of an independent third-party assurance program. The initiatives that score highest are all traditional certification programs: ASI, RJC, Natural Stone, Fairtrade and Fairmined. ICMM and TFT, the programs that score lowest, are not traditional certification programs. ICMM incorporates elements of third-party assessment, but it did not set out to establish an independent third-party program to certify conformity with a standard. TFT intentionally follows a completely different model. It is not surprising, therefore, that these initiatives do not score high on this index.

Second, it must be emphasized that this analysis is entirely document-based. Low scores reflect systems with incomplete documentation, not necessarily weak assurance systems. Conversely, high scores reflect well-designed and well-documented systems on paper, but they are not based on any assessment of effectiveness in practice.

ASI scores high, but at the time of the assessment its assurance program was not yet operational. Its high score reflects the completeness of its documentation. IRMA is not yet operational either, and has until fairly recently focused on finalizing its standard rather than on establishing its assurance program. Bettercoal is operational but is in the process of upgrading its documentation to reflect a growing focus on assurance. It expects to publish a revised assurance manual in 2018, and when this is done one would expect its score on the assurance index to increase.

In summary, some scores reflect differences in maturity of the different programs, whereas others reflect different assurance models. It will be hard to compare like for like until all programs are fully up and running.

Notwithstanding these provisos, what do the differences in scores mean? Perhaps the main observation is one that is not explicitly visible from the data. Of the initiatives in the study applicable to large-scale mining, only RJC and TSM operated fully functional third-party assurance programs when the assessments were completed. However, ASI has been launched during this study, and Bettercoal and IRMA are both in the process of launching their own assurance programs.

The key message of this analysis is that there may be a trend toward the development of third-party assurance against broad "sustainability" requirements applicable to the mining sector.

3.6.3 VALUE CHAIN TRACEABILITY DESCRIPTIONS

Value chain traceability may serve a number of different purposes in a voluntary sustainability system, reflecting the different market drivers described in Section 1:

- Provide a way for processors, manufacturers or traders to reassure themselves (and, subsequently, their downstream customers) that they are not inadvertently sourcing material from mines that are operating illegally or are associated with social, environmental or business practices that conflict with their own corporate codes. Systems to exclude conflict minerals are an example of this.
- Allow manufacturers or traders at different points in the chain to make a variety of claims about the content and origin of the material in the products they manufacture or sell, or to meet specifications that allow their customers further downstream to make such claims.

- Drive uptake of a standard at the mine level through the participation of downstream processors and traders.
- Generate public awareness around an issue or build brand value by labelling downstream products.
- Create revenue to allow a standards initiative to maintain its standard and assurance program, or to support participation in the scheme, as for example in the Fairtrade system.

A number of models have been developed to meet these various objectives. It is essential to note that they do not all provide assurance of the *physical traceability* of material from a mine through to an end product. Providing reliable physical traceability from mine to end product can be extremely challenging and may be very costly. Some models are designed to drive the uptake of standards at the mine level or generate public awareness without necessarily requiring physical traceability. These kinds of models may be highly effective in achieving their objectives, without providing a basis for claims about the physical origin of the material in a specific product and without providing reassurance about sourcing.

There is no universally recognized classification of the different types of traceability schemes, and there is some overlap between different approaches. Box

BOX 3.2. CHAIN OF CUSTODY MODELS

SOURCE IDENTITY PRESERVATION

In a source identity preservation model, information about the original source of the material in a product is preserved to the point at which a claim can be made about it. If used through the whole value chain, this model requires certified material from a specific source to be traced through the production process from a mine to the last point of transformation or labelling of a product, and supports claims about the unique origin of the material in the product.

Identity preservation of this kind can support strong, consumer-oriented narratives about the origin of the material in a product, as well as strong claims about the exclusion of material from unacceptable sources. To achieve source identity preservation, certified material from a specific mine (or known group of mines) must not be physically mixed with other certified or non-certified material of the same commodity or ingredient.

CERTIFIED CONTENT CONTROL

Certified content control allows material from a number of different certified sources to be mixed without having to preserve information about specific sites of origin. Certified material may or may not be mixed with non-certified material, but if it can be mixed, the proportions of certified and non-certified material are recorded and must be within parameters specified by the scheme. Certified content control supports claims about the proportion of certified material contained in a product or product line but does not support claims about the specific origin of that material.

Some content control systems require that certified material must be segregated from equivalent non-certified material. Segregation systems of this type support claims that 100 per cent of the material within a product was produced in compliance with a particular standard but without linking that to claims about the specific sites of origin of the material.

MASS BALANCE

In the mass balance model, the quantity of certified material that is used as an input at a given stage of the value chain is measured over a period of time, and outputs using an equivalent quantity of material of the same type can be sold with a mass balance claim. The quantity sold is "balanced" against the quantity of certified input purchased. The key feature of the approach is that there is no requirement to control the amount of certified material that is physically contained in the specific product associated with the claim. Mass balance systems support claims related to participation in a scheme and support for the scheme's objectives but cannot (on their own) support claims about the source or certified content of the material in a particular product.

BOOK AND CLAIM, OR CERTIFICATE TRADING

Book and claim models (also known as certificate trading) go a stage further than mass balance systems in breaking the physical link between a product and an associated claim related to material sourcing. In the book and claim system, a certificate of compliance with a sustainability standard is issued at the start of the value chain, and the producer is allocated a quantity of credits based on the quantity of their production. These credits can then be traded. In principle, anyone could buy the credits, which can be completely decoupled from the physical value chain. An end user might buy production credits that cover an amount of material equivalent to the amount they use to make their product. There does not need to be any physical link at all between end user and the material produced in compliance with standard at the start of the chain.

Advantages of the book and claim approach are that they eliminate the cost and complexity of tracking and tracing material through the supply chain, and the producer can receive a direct "premium" for their compliance with a sustainability standard, even when the source is not easily linked to end users who want to support the program. However, book and claim systems cannot support any claims about the source or certified content of material that is actually contained in a product.

3.2 distinguishes between source identity preservation, certified content control, mass balance, and book and claim models. These models have been adopted by ISEAL (ISEAL Alliance, 2016), but where ISEAL treats segregation as a distinct category, we use the category of certified content control, of which segregation is a subcategory.

As indicated by the descriptions in Box 3.2, the choice of a particular chain of custody approach will be dictated by the kinds of claims that a scheme is intended to support, and vice versa.

For instance, where end users are driven by the need to exclude unacceptable material from their supply chains, and to make claims on that basis, they need a system of physical traceability, and some level of certified content control or identity preservation is essential.

Where end users are not obliged to make claims based on physical traceability, mass balance or book and claim approaches may provide a quicker and cheaper alternative. A key challenge, however, is the perception that these approaches are weaker. They are certainly harder to communicate to consumers. However, care needs to be taken before assuming that certified content control approaches necessarily provide a strong physical connection between certified material and end product. When the minimum proportion of certified material used at a given link in the supply chain is low, where there are many links in the chain

or where the content requirements are assessed for a product line over a period of time, the actual amount of "certified origin" material in a particular end product may be low or zero, even under the requirements of a content control system.

Both book and claim and mass balance systems break the physical link between material produced in compliance with a standard and the material actually contained in an end product. However, mass balance systems still require that each link in the chain between a producer and an end user be covered by a certification. This can mean that sustainability issues at each of these links can be assessed, in addition to any requirements that relate specifically to the traceability of material.

For this study, each standards initiative was evaluated using its publicly available documentation to determine whether it supported each possible approach to chain of custody, as described in Table 3.16. Table 3.17 and Table 3.18 show the findings for the initiatives applicable to industrial mining, quarrying and aggregates, and ASM. The findings are discussed in the remainder of the section.

Table 3.16. Chain of custody model descriptive indicators

Indicator	Description
1. Product certification	The scheme defines requirements that allow purchasers of mined material to identify that material as having come from a certified mine.
2. Downstream claims	The scheme supports scheme-related claims by downstream users of mined material.
3. Chain of custody standard	The scheme has its own standard and assurance program for traceability and claims by downstream users of mined material.
• Mine source identity preservation	The scheme's program for downstream traceability and claims includes an identity preservation option: the amount of certified material from a specific source that is contained in a product can be tracked through all stages of the supply chain, allowing claims about the origin of the material in a product to be made at the end of the chain.
• Certified content control	The scheme's program for downstream traceability and claims includes a certified content control option: the amount of certified and non-certified material that is contained in a product can be tracked through all stages of the supply chain, allowing claims about the certified content of the material in a product to be made at the end of the chain. If the certified content is 100 per cent, this equates to segregation.
• Mass balance	The scheme's program for downstream traceability and claims includes a mass balance claims option: the amount of certified product sourced by each supply chain actor is tracked, and this determines the amount of certified product that they may sell with an approved claim. The certified product that is sold with a claim may or may not contain material from a certified source.
• Book and claim	The scheme's program for downstream traceability and claims includes a book and claim option: sustainability certificates are granted based on the application of sustainable practices, but the certificates are completely decoupled from the product and are transferable on the market.

Table 3.17. Value chain traceability elements: Large-scale mining

Chain of custody system	ASI	BC	ICMM	IFC	IRMA	TSM	RJC
1. Product certification	✓						✓
2. Downstream claims	✓				TBD		✓
3. Chain of custody standard	✓				TBD		✓
• Mine source identity preservation					TBD		
• Certified content control					TBD		✓
• Mass balance	✓				TBD		
• Book and claim	✓				TBD		

Table 3.18. Value chain traceability elements: Aggregates, quarrying and ASM

Chain of custody system	CSC	FS	NS	TFT	XF	FM	FT
1. Product certification	✓	✓	✓		✓	✓	✓
2. Downstream claims	✓	✓	✓		✓	✓	✓
3. Chain of custody standard		✓	✓		✓	✓	✓
• Mine source identity preservation					✓*	✓	N/A
• Certified content control	✓	✓	✓		✓	✓	✓
• Mass balance							✓
• Book and claim						✓	

* The system appears to be capable of maintaining information back to the quarry, though it is not clear that this information is available at the point of sale.

ASI: Aluminium Stewardship Initiative
BC: Bettercoal
IRMA: Initiative for Responsible Mining Assurance
ICMM: International Council on Mining and Metals
IFC: International Finance Corporation Environmental and Social Performance Standards
TSM: MAC's Towards Sustainable Mining
RJC: Responsible Jewellery Council
RMI: Responsible Mining Index
CSC: Cornerstone Standards Council
FS: Fair Stone
NSC: Natural Stone Council
TFT: The Forest Trust Responsible Stone Programme
XF: XertifiX
FM: Fairmined
FT: Fairtrade Gold and Silver

In relation to the chain of custody approaches of the large-scale mining initiatives, of the eight initiatives assessed, only two (ASI and RJC) expect to support a full traceability system from mine through to end user. A third, IRMA, expects to work with downstream partner initiatives in support of traceability but not to provide a full service itself. Notably, the development of both ASI and RJC schemes have been driven to a large extent by the needs of downstream, consumer-facing users and brands. These schemes also have relatively narrow and vertically integrated value chains: for aluminum production in the case of ASI, and for diamonds in the case of RJC (although it has subsequently expanded to cover precious metals). Where value chains are more diverse, implementation is more challenging.

The other initiatives, for a variety of reasons, have not been motivated to date by the need to support downstream claims: TSM and ICMM have been driven primarily by mining companies aiming to improve their practices and reputations; Bettercoal has to date needed to address only the single link between an energy generator and its own suppliers, and has no need to consider further downstream product claims; IFC needs to assess the projects it supports in order to meet its own needs, rather than those of any downstream users of the material a project produces; and RMI focuses on providing information for mining company investors. Nonetheless, there is no intrinsic reason why these schemes could not either develop or support a downstream traceability scheme themselves or partner with other downstream schemes in the same way that IRMA proposes to. Indeed, in the interviews carried out for this study, a number of these schemes suggested that they were actively considering this option as a response to growing downstream interest in the social and environmental conditions of raw material production.

In the case of chain of custody approaches for initiatives applicable to the quarrying of stone and aggregates, the picture contrasts with that for the large-scale mining initiatives, although it reflects the same underlying drivers. Five of the six initiatives in the study have developed specific chain of custody systems (the exception being TFT). The schemes that have been driven by public concerns about sourcing (Fair Stone, XertifiX) or with the intent of making claims to consumers or for public procurement purposes (Fair Stone, XertifiX, Natural Stone, CSC) have physical traceability systems in place. The exception, TFT, has a somewhat different role; its business model is to work behind the scenes with consumer-facing companies and to try to identify and resolve potential supply chain concerns before they come to public attention. TFT is interested in tracing supply chains to identify sources and resolve issues of potential concern, but its clients may wish to avoid the kinds of constraints that would be inherent in adopting a commitment to a particular system of source certification and physical traceability.

Finally, both ASM initiatives, Fairtrade and Fairmined, have been motivated to support consumer-facing claims, principally in the jewellery sector. As such, they have needed to develop traceability standards and systems to meet the needs of retailers.

3.7 RESPONSIVENESS

The responsiveness analysis measures initiatives' ability to respond and adapt to local conditions and examines their relevance, push for continuous improvement, capacity-building resources and cost reduction strategies.

3.7.1 RESPONSIVENESS INDICATORS

The indicators used for the analysis of responsiveness are shown in Tables 3.19 to 3.22. Appendix III shows the methodology for scoring. The indicator scores are presented in Tables 3.25 to 3.32, and the raw data itself, cross-referenced to each initiative's documentation, is presented for reference in the technical supplementary material.[11] The findings are summarized and discussed in Section 3.7.2.

Table 3.19. Continuous improvement indicators

Indicator	Indicator element(s)
Performance levels	Does the scheme explicitly identify different levels of performance, for example through a system of ratings, scores or performance data reporting?
Continuous improvement requirement	Does the scheme explicitly require participants to improve their performance over time?
Incentives	Does the scheme provide the producer with concrete incentives for exceeding basic compliance over time, for example through reduced fees or special services?
Independent oversight	Mechanisms for ensuring audit body quality.

[11] The technical supplementary material is a series of Excel files of raw data available upon request.

Table 3.20. Adaptation indicators

Indicator	Indicator element(s)
Regional standards and localized indicator development	Does the initiative allow for adaption of indicators and standards to local and regional contexts?
Local auditor engagement	Does the initiative require the use of local auditors for conformity assessment?
ISEAL Impacts Code compliance	Has the initiative been independently verified as complying with the ISEAL Impacts Code?
Revision period for standard	How often is the standard reviewed, with the potential for revision to respond to changing needs and conditions?

Table 3.21. Capacity-building indicators

Indicator	Indicator element(s)
Funding	Does the initiative make a dedicated fund or discounts available to producers to aid in compliance with certification requirements or continual improvement?
Technical assistance materials	Does the initiative provide support to the producer other than financial, such as tools, training and guidance?

Table 3.22. Cost reduction indicators

Indicator	Indicator element(s)
Separate standard for smallholders	Are there standards or processes written specifically for ASM that differ from the standards and processes for large producers?
Group certification	Does the standards system set customized requirements for group certification, such as requirements for sampling policies and audit evaluations?
Mutual recognition	Does the standard recognize compliance with other standards systems as full or partial compliance with its own requirements?

3.7.2
RESPONSIVENESS INDEX FINDINGS

The scoring for each sub-index for responsiveness, together with the consolidated scores for the index as a whole, are presented in Table 3.23 and Table 3.24, and illustrated in Figure 3.8 and Figure 3.9.

Figure 3.8. Responsiveness index scores

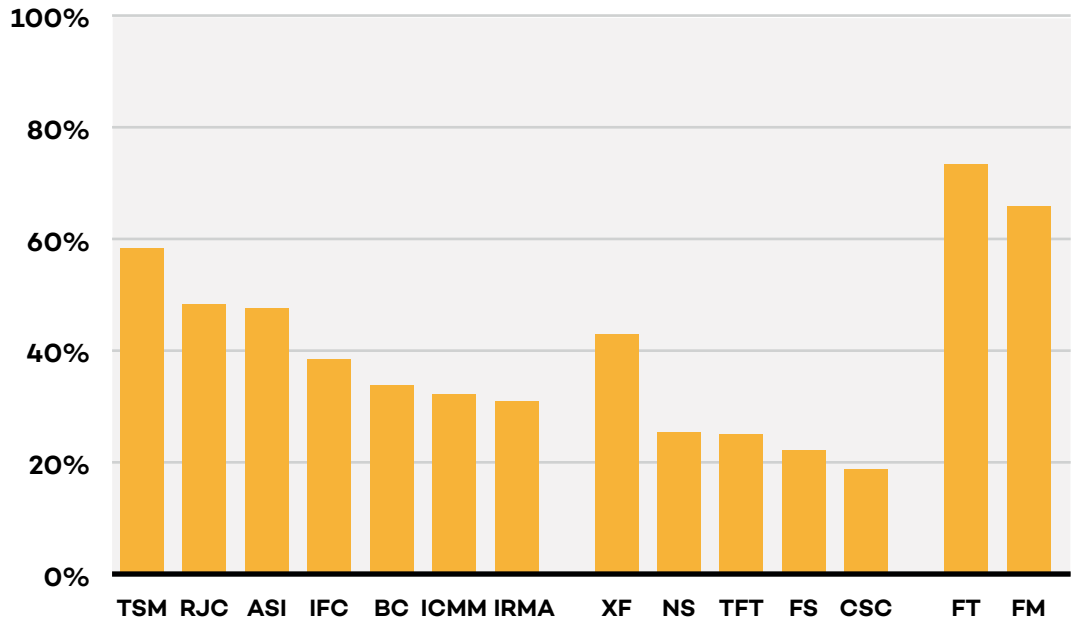


Figure 3.9. Responsiveness sub-index scores

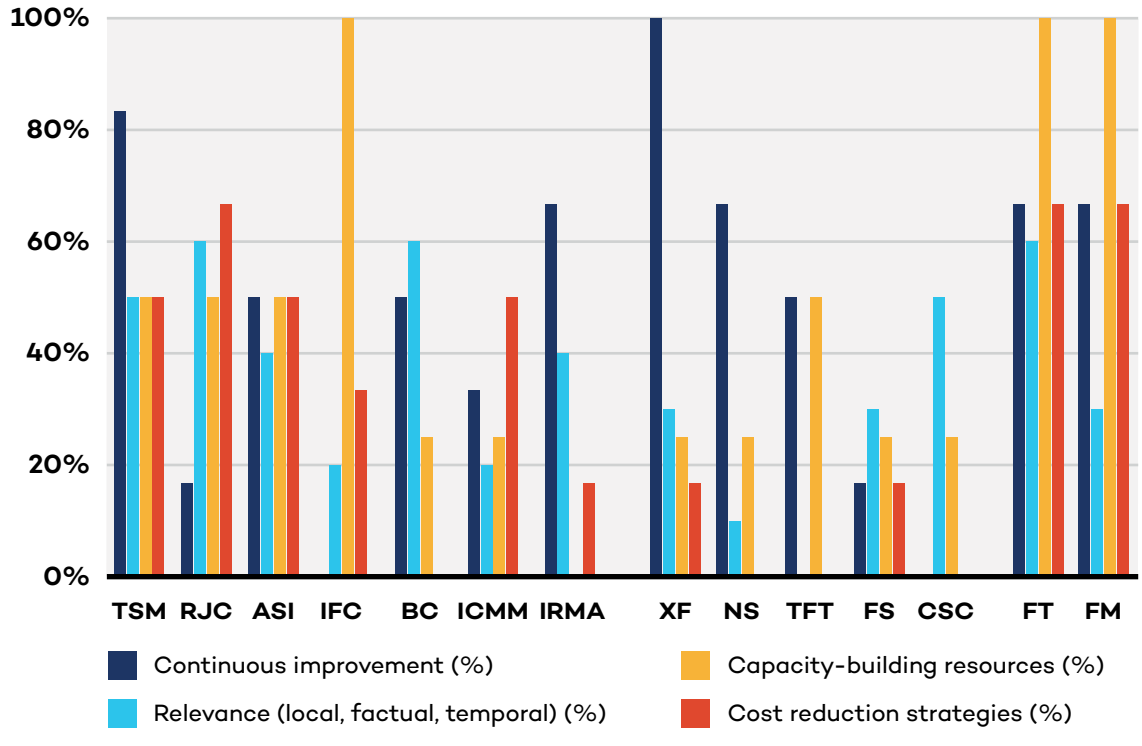


Table 3.23. Responsiveness index score summary: Large-scale mining initiatives

	ASI	BC	ICMM	IFC	IRMA	TSM	RJC
Continuous improvement (%)	50	50	33	0	67	83	17
Relevance (local, factual, temporal) (%)	40	60	20	20	40	50	60
Capacity-building resources (%)	50	25	25	100	0	50	50
Cost reduction strategies (%)	50	0	50	33	17	50	67
Overall (average of sub-indexes) (%)	**48**	**34**	**32**	**38**	**31**	**58**	**48**

Table 3.24. Responsiveness index score summary: Aggregates, quarrying and ASM initiatives

	CSC	FS	NS	TFT	Xf	FM	FT
Continuous improvement (%)	0	17	67	50	100	67	67
Relevance (local, factual, temporal) (%)	50	30	10	0	30	30	60
Capacity-building resources (%)	25	25	25	50	25	100	100
Cost reduction strategies (%)	0	17	0	0	17	67	67
Overall (average of sub-indexes)	**19**	**22**	**25**	**25**	**43**	**66**	**73**

ASI: Aluminium Stewardship Initiative
BC: Bettercoal
IRMA: Initiative for Responsible Mining Assurance
ICMM: International Council on Mining and Metals
IFC: International Finance Corporation Environmental and Social Performance Standards
TSM: MAC's Towards Sustainable Mining
RJC: Responsible Jewellery Council
RMI: Responsible Mining Index
CSC: Cornerstone Standards Council
FS: Fair Stone
NSC: Natural Stone Council
TFT: The Forest Trust Responsible Stone Programme
XF: XertifiX
FM: Fairmined
FT: Fairtrade Gold and Silver

There are three main observations to highlight. First, although Figure 3.8 shows the variation in the overall responsiveness index scores, these overall scores conceal considerable variation at the level of the sub-indexes (Figure 3.9). For example, although Bettercoal and ICMM have fairly similar scores overall, these scores consist of very different patterns at the sub-index level. Similarly, in the aggregates and quarrying category, TFT and Fair Stone have fairly similar overall scores but very different sub-index scores. The findings emphasize the need to look more closely at sub-index scores before drawing conclusions based on the high-level index scores alone.

Second, although TSM has relatively low scores in relation to its content requirements, it has the highest score overall in relation to responsiveness, in part because of its particularly high score on the continuous improvement sub-index. The high overall score reflects the fact that TSM is the only initiative with a nationally devolved program and with a range of incentives for better

performance, in addition to the different grades built into its system.

Third, it is notable that the two ASM initiatives, Fairtrade and Fairmined, both score significantly higher on the overall index than any of the other initiatives, and these scores reflect consistently high scoring at the level of sub-indexes. This may reflect a relatively mature developmental approach adopted by these initiatives, based in part on Fairtrade's experience in the agriculture sector, as well as on the cooperative model they both apply to ASM, focusing on establishing and strengthening of membership-based ASM organizations. This is in contrast to most of the initiatives focused on quarrying, which also apply to a greater or lesser extent on relatively small-scale operations, but whose organizational focus is on the processing of stone, rather than on cooperatives involved in quarrying itself.

3.7.3 RESPONSIVENESS DATA[12]

Tables 3.25 to 3.32 show the data we gather for responsiveness across the 15 initiatives.

Table 3.25. Continuous improvement: Large-scale mining initiatives

	ASI	BC	ICMM	IFC	IRMA	TSM	RJC
Performance levels	0.5	1	0.5	0	1	1	0
Continuous improvement requirement	0	0.5	0.5	0	0	0.5	0.5
Incentives	1	0	0	0	1	1	0
Total score (%)	**50**	**50**	**33**	**0**	**67**	**83**	**17**

Table 3.26. Continuous improvement: Aggregates, quarrying and ASM initiatives

	CSC	FS	NS	TFT	Xf	FM	FT
Performance levels	0	0	1	1	1	0	0
Continuous improvement requirement	0	0.5	0	0.5	1	1	1
Incentives	0	0	1	0	1	1	1
Total score (%)	**0**	**17**	**67**	**50**	**100**	**67**	**67**

[12] See Appendix III for how the initiatives are scored against the indicators.

Table 3.27. Adaptation: Large-scale mining initiatives

	ASI	BC	ICMM	IFC	IRMA	TSM	RJC
Regional standards and localized indicator development	1	1	1	1	1	2	1
Local auditors engaged in the conformity assessment process	0	1	0	0	0	0	0
ISEAL Impacts Code compliance	0	0	0	0	0	0	1
Revision period for standard	1	1	0	0	1	0.5	1
Total score (%)	**40**	**60**	**20**	**20**	**40**	**50**	**60**

Table 3.28. Adaptation: Aggregates, quarrying and ASM initiatives

	CSC	FS	NS	TFT	Xf	FM	FT
Regional standards and localized indicator development	1	1	0	0	0	1	1
Local auditors engaged in the conformity assessment process	0.5	0.5	0.5	0	0.5	0	0
ISEAL Impacts Code compliance	0	0	0	0	0	0	1
Revision period for standard	1	0	0	0	1	0.5	1
Total score (%)	**50**	**30**	**10**	**0**	**30**	**30**	**60**

Table 3.29. Capacity building: Large-scale mining initiatives

	ASI	BC	ICMM	IFC	IRMA	TSM	RJC
Funding	0	0	0	2	0	0	0
Technical assistance materials	2	1	1	2	0	2	2
Total score (%)	**50**	**25**	**25**	**100**	**0**	**50**	**50**

Table 3.30. Capacity building: Aggregates, quarrying and ASM initiatives

	CSC	FS	NS	TFT	Xf	FM	FT
Funding	0	0	0	0	1	2	2
Technical assistance materials	1	1	1	2	0	2	2
Total score (%)	**25**	**25**	**25**	**50**	**25**	**100**	**100**

Table 3.31. Cost reduction: Large-scale mining initiatives

	ASI	BC	ICMM	IFC	IRMA	TSM	RJC
Separate standard for smallholders	0.5	0	0	0	0	0	1
Group certification	0	0	0.5	0	0	0.5	0
Mutual recognition	1	0	1	1	0.5	1	1
Total score (%)	**50**	**0**	**50**	**33**	**17**	**50**	**67**

Table 3.32. Cost reduction sub-index: Aggregates, quarrying and ASM initiatives

	CSC	FS	NS	TFT	Xf	FM	FT
Separate standard for smallholders	0	0.5	0	0	0.5	1	1
Group certification	0	0	0	0	0	1	1
Mutual recognition	0	0	0	0	0	0	0
Total score (%)	**0**	**17**	**0**	**0**	**17**	**67**	**67**

ASI: Aluminium Stewardship Initiative
BC: Bettercoal
IRMA: Initiative for Responsible Mining Assurance
ICMM: International Council on Mining and Metals
IFC: International Finance Corporation Environmental and Social Performance Standards
TSM: MAC's Towards Sustainable Mining
RJC: Responsible Jewellery Council
RMI: Responsible Mining Index
CSC: Cornerstone Standards Council
FS: Fair Stone
NSC: Natural Stone Council
TFT: The Forest Trust Responsible Stone Programme
XF: XertifiX
FM: Fairmined
FT: Fairtrade Gold and Silver

3.8 ENGAGEMENT

The engagement analysis measures an initiative's inclusiveness, transparency and dispute-resolution mechanisms.

3.8.1 ENGAGEMENT INDICATORS

The indicators used for the analysis of engagement are shown in Tables 3.33 to 3.35. The methodology for scoring is given in Appendix III. The indicator scores are presented in Tables 3.38 to 3.43, and the raw data itself, cross-referenced to each initiative's documentation, is presented for reference in the technical supplementary material.[13] The findings are summarized and discussed in Section 3.8.2.

[13] The technical supplementary material is a series of Excel files of raw data available upon request.

Table 3.33. Board diversity indicators

Indicator	Indicator element(s)
Board representation, developed country : developing country	Proportion of board members who are from developed and developing countries.
Board representation, men: women	Proportion of board members who are men and women.
Board representation: stakeholder diversity	Inclusion of at least one board member broadly representative of each of the following interests: mining, social impacts, environmental impacts, government, the initiative itself, other business interests (e.g., downstream), and scientific, independent or undefined.

Table 3.34. Stakeholder accessibility indicators

Indicator	Indicator element(s)
Membership system	The initiative is based on a membership that has a role in decision making.
ISEAL Standard-Setting Code	The ISEAL Standard-Setting Code of Good Practice defines good practices to be followed in standard development for any sector or product to ensure the standard is credible and effective and that it achieves its objectives.
Stakeholder consultation in standard setting	Business and civil society stakeholders are formally consulted on the content of the standard during its development.
Stakeholder decision making in standard setting	• Multistakeholder committee vote is required for approval of final draft of standard (2). • Multistakeholder committee has a role in drafting standard (1). • No formal multistakeholder committee role in drafting of standard (0)
Public complaints procedure	The standard body's policies and procedures for complaints are available online to the general public.
Local accessibility of complaints procedure	• The standard body's complaints and dispute-resolution procedures are available online in other languages (apart from English) to the general public. • Processes are in place that enable complaints to be received locally and that take into consideration language or literacy barriers or lower access to formal means of communication. • Processes are in place that enable complaints to be addressed regardless of language.
Independent dispute resolution body	A dispute settlement body that is not made up of the organization's board members has been established and formally recognized in writing.

Table 3.35. Access to information indicators

Indicator	Indicator element(s)
Annual reports	The standard body's annual reports are made available online to the general public.
Financial statements	The standard body's independently audited financial statements are made available online to the general public.
Board membership	A list of the standard body's board members is made available online to the general public.
Committee membership	A list of the standard body's committee members is made available online to the general public.
Committee minutes	The standard body's committee meeting minutes are made available online to the general public.
Standard-setting procedures	The processes undertaken by a scheme owner in setting and reviewing the standard(s) are made available online to the general public.
Stakeholder comments on standards	Stakeholder comments on draft standards are made available online to the general public.
List of applicant enterprises	A list of the enterprises that have applied for assessment and for which assessment is not yet completed, or that have been evaluated and found not to be compliant with the scheme's requirements, is made available online to the general public.
List of compliant enterprises	A list of the enterprises that are deemed to be compliant with the scheme's requirements is made available online to the general public.
Compliant enterprise impact assessment reports	Environmental impact assessment reports submitted by the producer unit are made available online to the general public.

3.8.2 ENGAGEMENT INDEX FINDINGS

In this section, we consider our engagement findings in terms of overall scores aggregated for the index as whole (Figure 3.10) and in terms of sub-index scores (Figure 3.11).

Figure 3.10. Engagement index scores

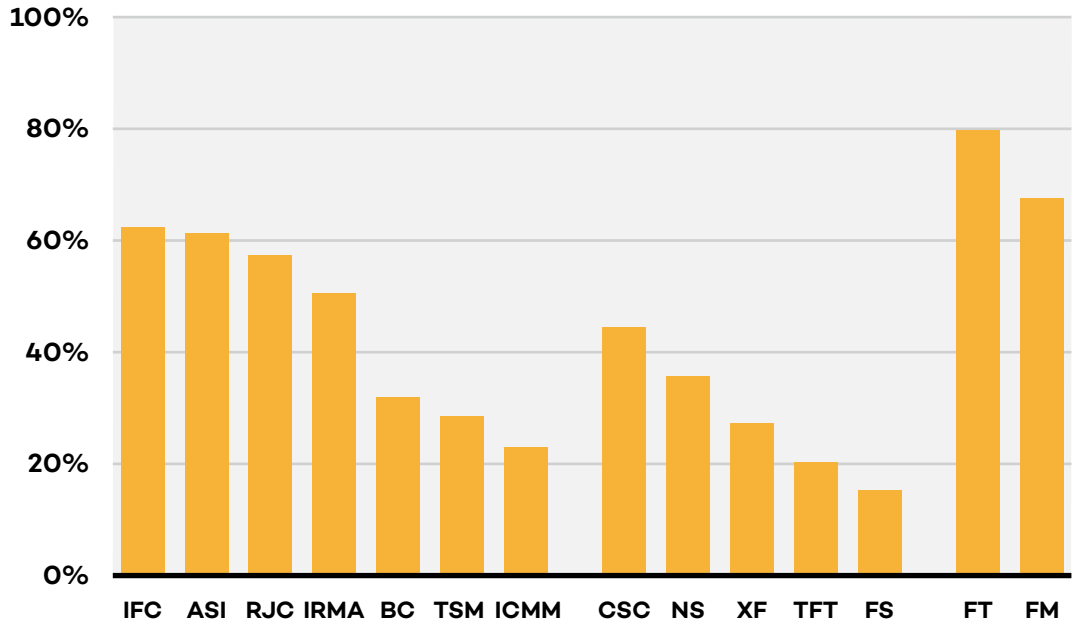
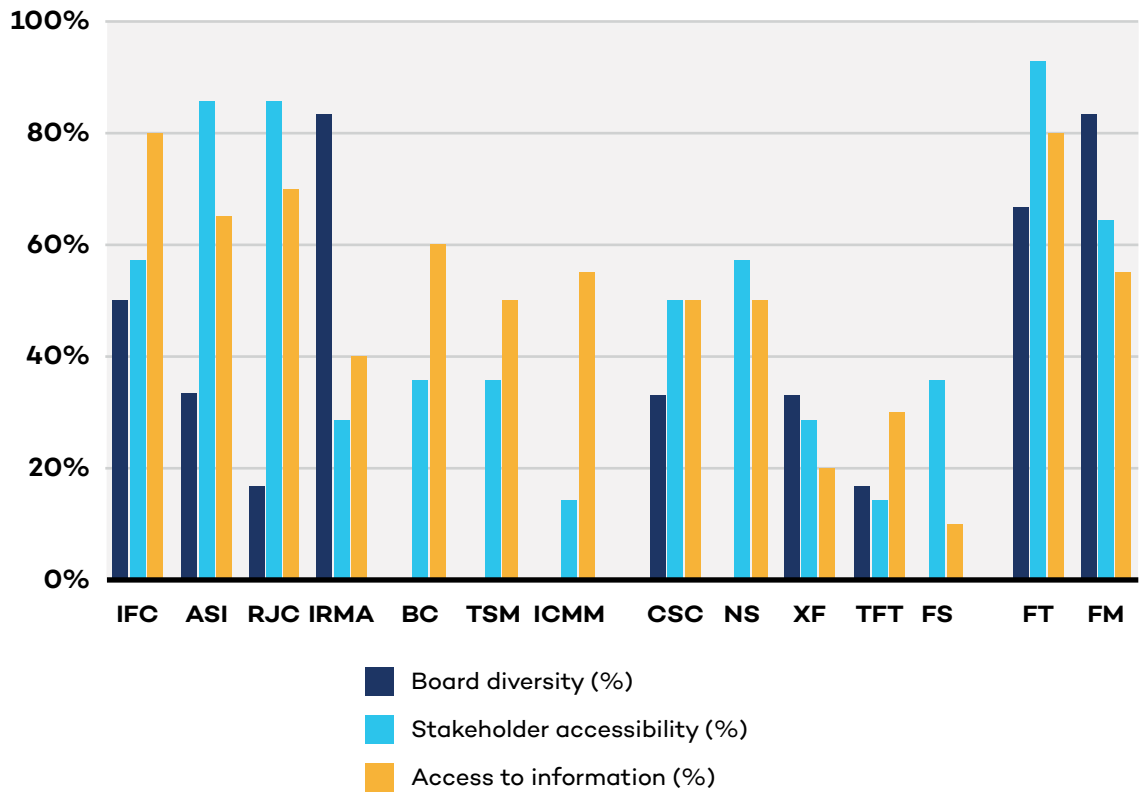


Figure 3.11. Engagement sub-index scores



Note: see Table 3.40 for data.

Table 3.36. Engagement index score summary: Large-scale mining initiatives

	ASI	BC	ICMM	IFC	IRMA	TSM	RJC
Board diversity (%)	33	0	0	50	83	0	17
Stakeholder accessibility (%)	86	36	14	57	29	36	86
Access to information (%)	65	60	55	80	40	50	70
Annual budget**	$$	*	$$$	$$$	$$	$$	$$
Overall (average of sub-indexes) (%)	**61**	**32**	**23**	**62**	**51**	**29**	**57**

Table 3.37. Engagement index score summary: Aggregates, quarrying and ASM initiatives

	CSC	FS	NS	TFT	Xf	FM	FT
Board diversity (%)	33	0	0	17	33	83	67
Stakeholder accessibility (%)	50	36	57	14	29	64	93
Access to information (%)	50	10	50	30	20	55	80
Annual budget**	*	*	$	$$$	$	$$	$$$
Overall (average of sub-indexes) (%)	**44**	**15**	**36**	**20**	**27**	**68**	**80**

** Not known*

*** Income is considered for the body that is responsible for the standard. It is recognized that some bodies will be responsible for multiple standards and others for just a single standard.*

$: <US$500,000 per year

$$: US$500,000–5,000,000 per year

$$$: >US$5,000,000 per year

ASI: Aluminium Stewardship Initiative
BC: Bettercoal
IRMA: Initiative for Responsible Mining Assurance
ICMM: International Council on Mining and Metals
IFC: International Finance Corporation Environmental and Social Performance Standards
TSM: MAC's Towards Sustainable Mining
RJC: Responsible Jewellery Council
RMI: Responsible Mining Index
CSC: Cornerstone Standards Council
FS: Fair Stone
NSC: Natural Stone Council
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As with the responsiveness index, one of the clearest findings for the engagement index was that the two ASM initiatives score higher than other initiatives, and in particular score higher than the stone or aggregates initiatives. However, whereas the difference in scores on the responsiveness index might relate to underlying differences between the kinds of groups that the initiatives work with, there does not seem to be any inherent reason why this should be the case in relation to engagement. It is hard to see why any of these initiatives should not be able, in principle, to establish a diversified board, develop explicit mechanisms to improve stakeholder accessibility and provide public access to information.

In some cases, the low scores reflect an initiative's particular circumstances. CSC, for example, has been established for operation in Ontario, Canada, so the proportion of its board members that come from developing countries is not particularly relevant. Nonetheless, this may become important if the initiative expands the geographic scope of its work.

For some initiatives, the low scores may reflect an early stage of organizational development. Providing access to information may be less of a priority at an early stage, and in some cases scores are limited simply because the initiative is not yet up and running (e.g., it is not surprising that initiatives have not published lists of certificate holders before they issue certificates). Some initiatives may have limited financial capacity and therefore lack resources to devote to "non-essential" tasks like publishing information on a website.

None of these possible causes provides a complete explanation. Some initiatives are well-established, well-resourced and operate in developing countries, and yet still have low scores across the range of criteria that have been assessed.

The most likely explanation may be that some initiatives in the study do not place a high value on being considered stakeholder-driven initiatives. We have emphasized that this report, to a greater extent than other IISD SSI reports, has covered initiatives that would not claim to be traditional multistakeholder sustainability standards initiatives. Perhaps the more notable finding is not that some of these initiatives do not score high on a stakeholder engagement index, but rather that IFC, not usually considered to be a multistakeholder initiative, scores higher than the other initiatives applicable to large-scale mining that would consider themselves to be multistakeholder initiatives.

3.8.3 ENGAGEMENT DATA

Tables 3.38 to 3.43 show the data we gathered on engagement for the 15 initiatives.

Table 3.38. Board diversity: Large-scale mining initiatives

	ASI	BC	ICMM	IFC	IRMA	TSM	RJC
Developed country : developing country	0	0	0	2	1	0	0
Men : women	1	0	0	1	2	0	1
Stakeholder diversity	1	0	0	0	2	0	0
Total score (%)	**33**	**0**	**0**	**50**	**83**	**0**	**17**

Table 3.39. Board diversity: Aggregates, quarrying and ASM initiatives

	CSC	FS	NS	TFT	Xf	FM	FT
Developed country : developing country	0	0	0	0	0	2	2
Men : women	0	0	0	0	1	2	1
Stakeholder diversity	2	0	0	1	1	1	1
Total score (%)	**33**	**0**	**0**	**17**	**33**	**83**	**67**

Table 3.40. Stakeholder accessibility: Large-scale mining initiatives

	ASI	BC	ICMM	IFC	IRMA	TSM	RJC
Membership system	1	1	1	0	0	1	1
ISEAL Standard-Setting Code	0	0	0	0	0	0	1
Stakeholder consultation in standard setting	1	1	0	1	1	1	1
Stakeholder decision making in standard setting	1	0.5	0	0	1	0.5	1
Public complaints procedure	1	0	0	1	0	0	1
Local accessibility of complaints procedure	1	0	0	1	0	0	0
Independent dispute resolution body	1	0	0	1	0	0	1
Total score (%)	**86**	**36**	**14**	**57**	**29**	**36**	**86**

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IFC: International Finance Corporation Environmental and Social Performance Standards
TSM: MAC's Towards Sustainable Mining
RJC: Responsible Jewellery Council
RMI: Responsible Mining Index
CSC: Cornerstone Standards Council
FS: Fair Stone
NSC: Natural Stone Council
TFT: The Forest Trust Responsible Stone Programme
XF: XertifiX
FM: Fairmined
FT: Fairtrade Gold and Silver

Table 3.41. Stakeholder accessibility: Aggregates, quarrying and ASM initiatives

	CSC	FS	NS	TFT	Xf	FM	FT
Membership system	0	1	1	1	0	0	1
ISEAL Standard-Setting Code	0	0	0	0	0	0.5	1
Stakeholder consultation in standard setting	1	0	1	0	0	1	1
Stakeholder decision making in standard setting	0.5	0	0.5	0	0	1	0.5
Public complaints procedure	1	1	1	0	1	1	1
Local accessibility of complaints procedure	0.5	0	0.5	0	0	1	1
Independent dispute resolution body	0.5	0.5	0	0	1	0	1
Total score (%)	**50**	**36**	**57**	**14**	**29**	**64**	**93**

ASI: Aluminium Stewardship Initiative
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TFT: The Forest Trust Responsible Stone Programme
XF: XertifiX
FM: Fairmined
FT: Fairtrade Gold and Silver

Table 3.42. Access to information: Large-scale mining initiatives

	ASI	BC	ICMM	IFC	IRMA	TSM	RJC
Annual reports	0.5	1	1	1	0	1	1
Financial statements	1	0	0.5	1	0	0	1
Board membership	1	1	1	1	1	1	1
Committee membership	1	1	0	0	0	1	1
Committee minutes	1	1	0	0	0	0	1
Standard-setting procedures	1	1	0	1	1	0	0
Stakeholder comments on standards	0	1	0	1	1	0	1
List of applicant enterprises	0.5	0	1	1	0	1	0
List of compliant enterprises	0.5	0	1	1	0	1	1
Compliant enterprise impact assessment reports	0	0	1	1	1	0	0
Total score (%)	**65**	**60**	**55**	**80**	**40**	**50**	**70**

ASI: Aluminium Stewardship Initiative
BC: Bettercoal
IRMA: Initiative for Responsible Mining Assurance
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NSC: Natural Stone Council
TFT: The Forest Trust Responsible Stone Programme
XF: XertifiX
FM: Fairmined
FT: Fairtrade Gold and Silver

Table 3.43. Access to information: Aggregates, quarrying and ASM initiatives

	CSC	FS	NS	TFT	Xf	FM	FT
Annual reports	0	0	1	1	1	1	1
Financial statements	0	0	0	1	0	0.5	1
Board membership	1	0	1	1	1	1	1
Committee membership	1	1	1	0	0	0	1
Committee minutes	0	0	1	0	0	0	1
Standard-setting procedures	0	0	0	0	0	1	1
Stakeholder comments on standards	1	0	0	0	0	1	1
List of applicant enterprises	0.5	0	0	0	0	0	0
List of compliant enterprises	1	0	1	0	0	1	1
Compliant enterprise impact assessment reports	0.5	0	0	0	0	0	0
Total score (%)	**50**	**10**	**50**	**30**	**20**	**55**	**80**

ASI: Aluminium Stewardship Initiative
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4.0 POTENTIAL IMPACTS

By Matthew Lynch

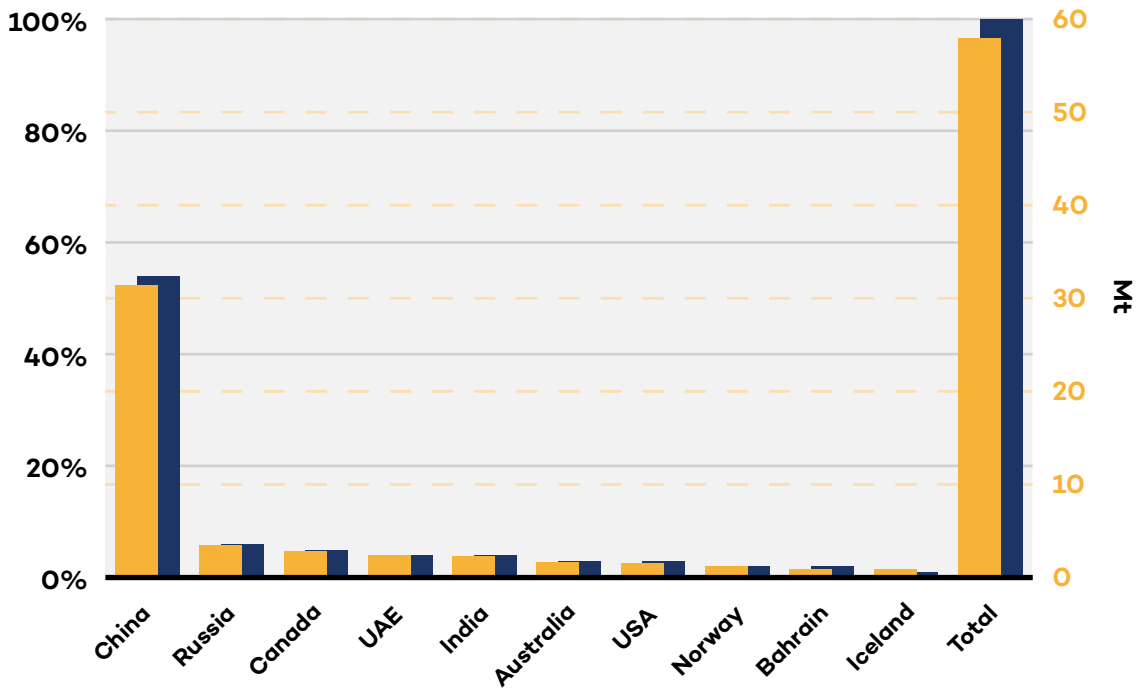
VSIs are self-governing mechanisms with different theories of change, applied to different sectors of the economy. This section aims to help the reader draw a link between VSI governance, outlined in Section 3, and the social and environmental impacts of the various extractive economies in order to better understand their theories of change and scope of potential impacts on each sector. It also seeks to quantify the degree of VSI engagement with industry in order to understand the scale of each standard's potential impact. A scientific assessment of VSI impacts on the extractive economy is outside the scope of this report but is an important area of potential future research for understanding mining VSIs and strengthening their credibility.

4.1 ALUMINUM

Aluminum is used mostly in transportation (25 per cent), construction (25 per cent) and powerlines (20 per cent). Aluminum is especially valued for its light weight, with a density three times that of water and one-third that of iron.

Aluminum passes through the Hall–Héroult electrolytic smelting process, and the aluminum life cycle produces 1 per cent of global greenhouse gas emissions. Aluminum results in roughly six times the average metal life cycle emissions per volume mined. Most aluminum smelting uses coal-powered electricity, while 30 per cent uses water and 10 per cent uses gas.

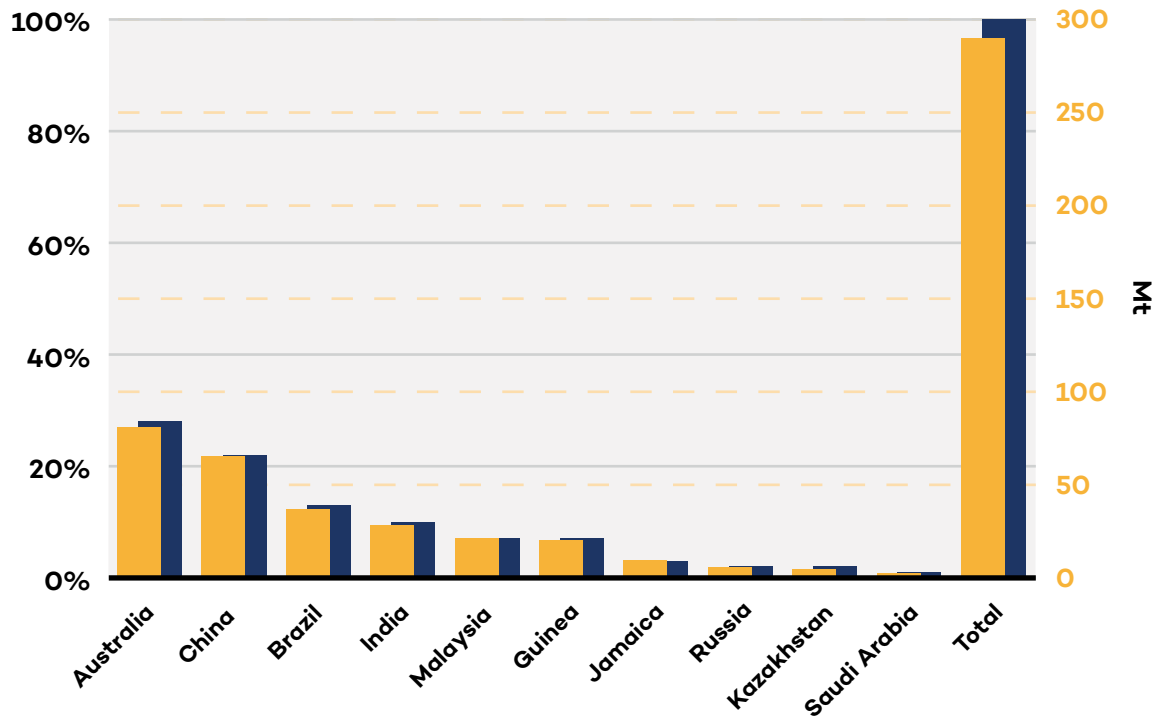
Figure 4.1. 2015 global aluminum production



Source: Reich et al., 2017.

Aluminum is concentrated from the ore bauxite during the Bayer leaching process. Bauxite is strip mined in China, Australia, Brazil and India, as well as in the smaller economies of Malaysia, Jamaica and Guinea. Alumina concentration (an intermediate product) is usually performed near the bauxite mine source and generates alkaline tailings. Figure 4.1 shows global aluminum production in 2015, while Figure 4.2 shows global bauxite production.

Figure 4.2. 2015 global bauxite production.



Source: Reich et al., 2017.

The Aluminium Stewardship Initiative (ASI) is a voluntary standard that includes codes for the entire supply chain, including tailings, labour rights, life-cycle analysis and Indigenous rights. ASI is a multistakeholder forum for supply chain protocols and is a protocol itself. Requirements for smelters involves setting a plan to reduce carbon emissions to 8 kilograms of carbon dioxide equivalent per tonne of aluminum by 2030. Hydro-powered smelters fall below this limit and have become the first ASI members.

ASI mining members are UC Rusal, Rio Tinto, Alcoa and Norsk Hydro. These companies represent 40 per cent of the bauxite production base in diverse countries and 25 per cent of aluminum production. Downstream members include Audi, BMW, Jaguar Land Rover, Nestlé Nespresso and Tetra Pak. Board members are grouped by production and transformation members, industrial members, and civil society members (two each).

The ASI standard currently relies on a mass balance system, whereby certified and non-certified aluminum can be mixed, and companies make claims on the percentage of certified content. ASI has proposed a future consultation for the use of credit trading (ASI, 2014, 2017).

Notably, low-carbon aluminum has already been marketed and sold at premium prices. Prior to low carbon primary production, recycling was the differentiating factor for preferred purchasing, particularly in the automotive and building sectors. About one-third of aluminum production is re-melt.

Companies mining bauxite (as well as other minerals), can join the International Council on Mining and Metals (ICMM). Membership of the ICMM involves adherence to its 10 principles. It also includes position statements on water stewardship, Indigenous Peoples, and mercury risk. One of ICMM's goals is to establish an integrated and globally effective carbon regime, to which end it has developed framework principles for climate change policy design (ICMM, 2011). ICMM members include South32, Rio Tinto and Norsk Hydro, which account for 11 per cent of global aluminum production.[14]

The Initiative for Responsible Mining Assurance (IRMA) Standard for Responsible Mining (the IRMA Standard) is under development and will be applicable to most large-scale metal mining operations. IRMA is piloting its standard to be applicable to many types of mines, geographies and social contexts globally. Based on the input received during this piloting phase, the IRMA Standard will be updated.

Towards Sustainable Mining (TSM), a mine site–level protocol that began as a Mining Association of Canada (MAC) program, has expanded internationally. It had not engaged with bauxite production at the time of writing.

[14] To see a list of all ICMM members visit the website (ICCM, n.d.) or see Appendix I.

4.2 COAL

Coal is used for electricity generation (75 per cent), iron and steel production (15 per cent), and cement making (10 per cent). Overall, coal burning causes 20 per cent of greenhouse gas emissions[15] and 25 per cent of total mercury emissions. Coal is found in association with sulfide pyrite ("fool's gold"), the main source of acid rock drainage (ARD) worldwide. Figure 4.3 shows global coal production for 2015.

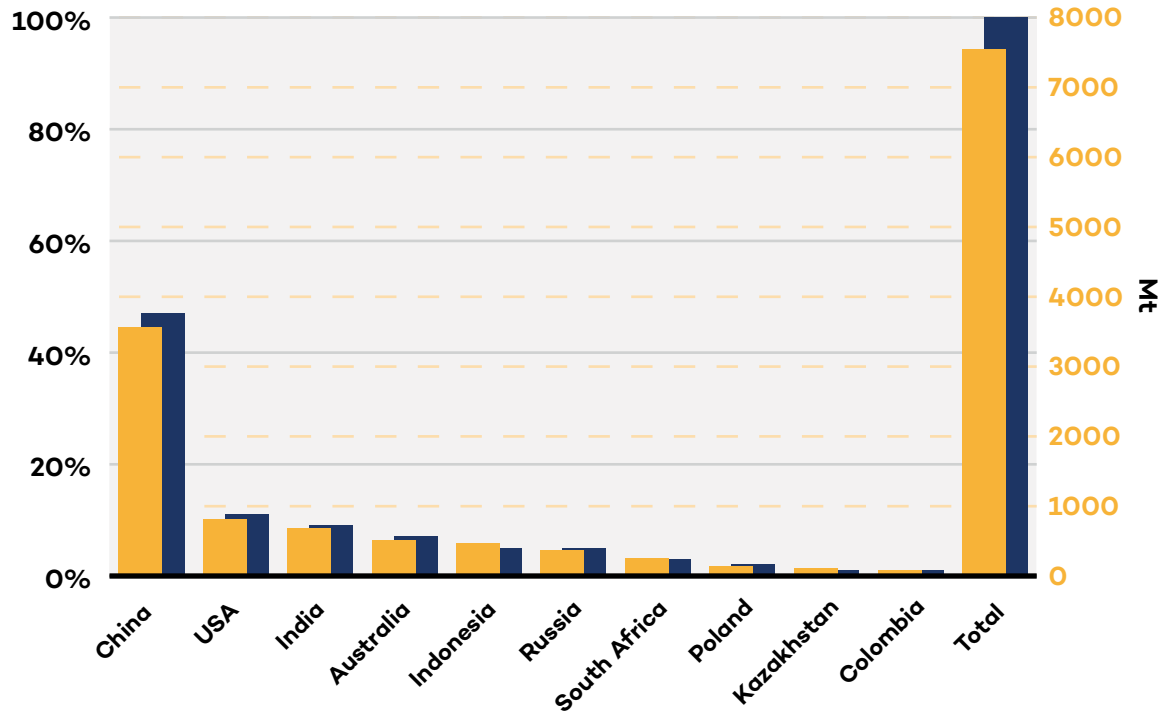
Technologies that can help reduce coal's greenhouse gas release include carbon capture and storage. One meta-study showed that carbon capture and storage reduced emissions in coal power generation by 63 to 82 per cent (Cuéllar-Franca & Azapagic, 2015).

The Bettercoal initiative was developed by a group of European utilities that account for 70 per cent of European coal use and 5 per cent of total coal use. The standard involves commitments to continuous improvement and transparency in coal mining and has been verified against 23 per cent of coal supplied to Bettercoal members.

ICMM member coal producers include Anglo American, BHP Billiton, South32, Teck and Glencore, which together account for 15 per cent of global coking coal production and 7 per cent of total coal production.

TSM, a mine site–level protocol, was applied by the coal miner Teck, which accounted for 90 per cent of Canadian coking coal production but less than 1 per cent of global coal production by 2016.

Figure 4.3. 2015 global coal production



Source: Reich et al., 2017.

[15] By 2012, coal used in electricity generation accounted for about 16 per cent of greenhouse gas emissions (calculated with data from Intergovernmental Panel on Climate Change, 2014; U.S. Energy Information Administration, 2016).

4.3 COPPER

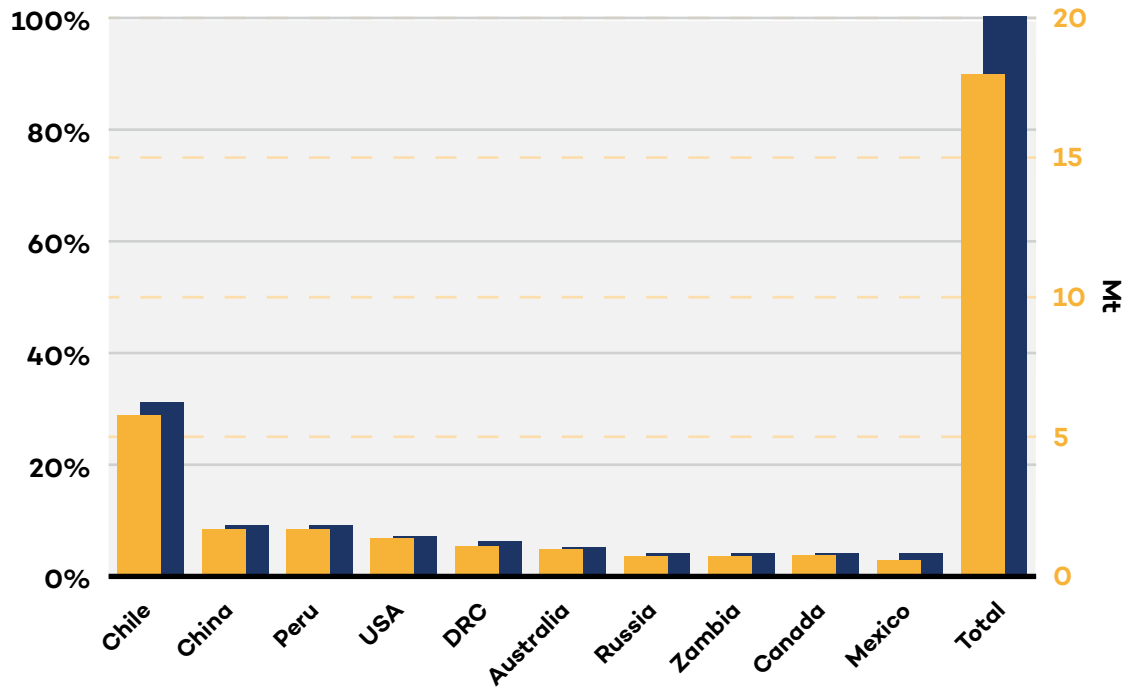
Copper wire is used in construction, personal electronics, industrial machinery (heating, power generation) and transportation. Copper accounts for only 1 per cent of the volume of metals mined (equivalent to 0.2 per cent of the volume of coal mined), but at relatively low average grades of 0.5 per cent. Figure 4.4 shows global copper production in 2015.

Nuss and Eckelman (2014) suggest that of all the metals, the aggregate potential for damage to human and environmental health is the greatest for copper. Most copper production (75 per cent) comes from sulphides and is processed through pyrometallurgy (smelting). This life-cycle process involves a concentration phase of crushing and separating, followed by smelting and electrorefining.

Hydrometallurgical copper processing involves spraying copper oxides with sulphuric acid, either in-situ or through heap leaching. The leach solution is then extracted from the ore, from which copper is extracted via electrowinning. Hydrometallurgy uses less energy, can mine lower ore grades and is associated with precious metal recovery.

Hydrometallurgical copper production expanded in the 1990s and 2000s and accounted for 22 per cent of primary copper production in 2014. Copper hydrometallurgy is used primarily in Chile (46 per cent of total hydrometallurgical copper), DRC (22 per cent), the United States (13 per cent), Zambia (5 per cent) and Mexico (5 per cent).

Figure 4.4. 2015 global copper production



Source: Reich et al., 2017.

Copper mining is a leading source of ARD, caused when (copper) sulphides oxidize and mix with water. Copper is associated with the heavy radioactive metals uranium, thorium and radium, which may be leached by ARD. Management strategies for avoiding ARD include tailings neutralization, mine site flooding and underwater tailings disposal (Johnson & Hallberg, 2005). Recycled copper accounts for 20 per cent of total copper production.

ICMM copper-producing members include CODELCO, Freeport-McMoRan, Glencore, BHP Billiton, Rio Tinto, Anglo American and Antofagasta, which account for about 40 per cent of copper production.

TSM, a mine site–level protocol, was applied to 3 per cent of copper production in 2014. Companies with copper mines that have implemented the standard include (these are Canadian operations except where otherwise noted): Vale, Teck, Taseko, Glencore, Hudbay Minerals, New Gold, First Quantum Minerals (Turkey, Finland), Imperial Metals, Agnico Eagle and Nyrstar.

4.4 DIAMONDS

Diamonds, like gold, tin, tungsten and tantalum ('3TG'), can be extracted through informal means. Also like 3TG, diamonds have been associated with conflict funding, particularly in Africa, where 14 per cent of the world's natural diamonds are extracted by more than one million miners (gold, by comparison, is extracted by an estimated 15 million small-scale miners, and overall there are an estimated 20–30 million small-scale miners). While the process for producing synthetic diamonds has existed for more than half a century, diamond prices remain high (though falling) and are a source of income for some of the world's poorest people. Figure 4.6 shows global diamond production in 2015.

Most diamonds, however, are produced by large-scale open-pit mines, whose mining processes involve extracting, crushing and separating kimberlite and lamproite rock deposits.

Figure 4.5. Conflict diamond timeline

1998

- Global Witness publishes a report, entitled *A Rough Trade*, on the use of diamond digging to fund the Angolan Civil War (Global Witness, 1998). The report coincides with UN sanctions against the Angolan rebel group UNITA, which, among other things, prohibit the purchase of diamonds mined in areas controlled by UNITA (UN, 2000).

2000

- The UN releases the Fowler Report, demonstrating how the UNITA sanctions are being violated. Among other methods, the group is selling diamond parcels to traders, particularly in Belgium, through intra-African trade originating in Angola. Once the diamonds reach the Belgian market, they are virtually impossible to trace. The Fowler Report coincides with the World Diamond Council's meeting in Kimberley, South Africa, to form the Kimberley Process (KP). The KP works by verifying non-conflict funding by the import/export regimes of member states, which together account for 99 per cent of diamond production. Prior to the KP, conflict diamonds had in certain cases been sold from countries that were not even diamond producers.

Traceability is a challenge with diamonds and other high-value conflict commodities such as gold. It remains difficult to track the transport of conflict diamonds across local borders and to verify the highest levels of the supply chain. Notably, the KP is an intergovernmental agreement rather than a voluntary multistakeholder standard, which is the focus of this report.[16]

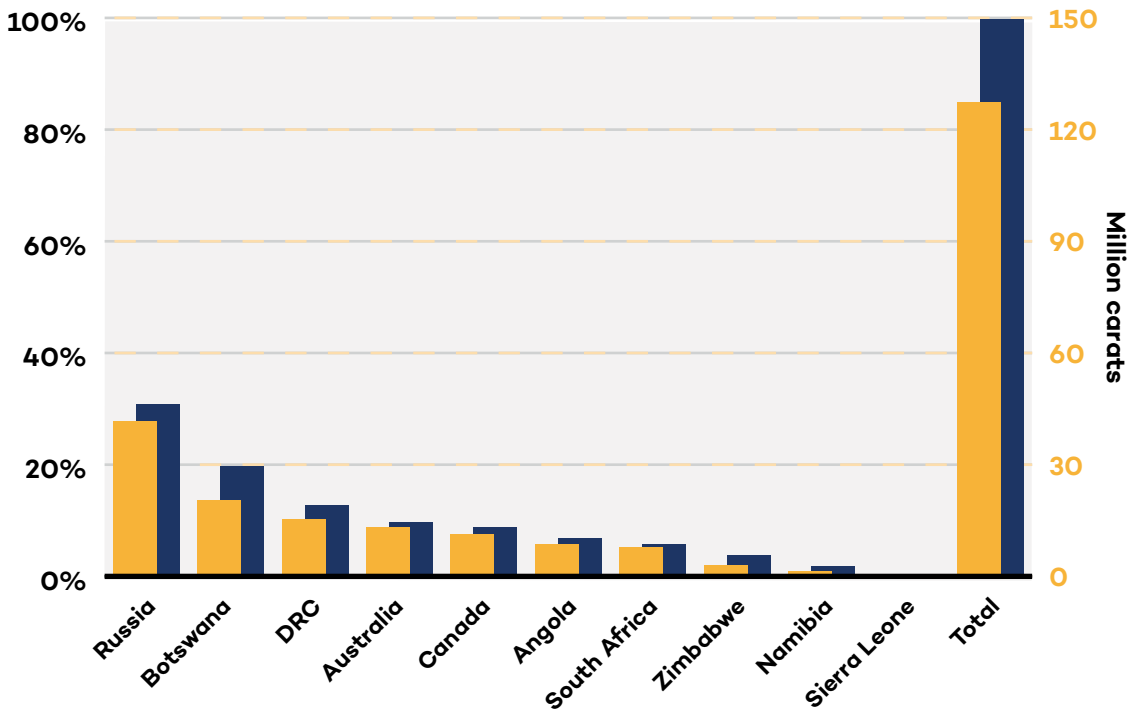
The Responsible Jewellery Council (RJC) standard engages all parts of the supply chain and includes guidance for risk assessment and record keeping. The standard includes certain due diligence requirements for members, such as audits for compliance with the Kimberley Process.

By 2017 RJC members included De Beers, Dominion Diamond, ALROSA, Rio Tinto and Lucara, representing 70 per cent of diamond production. De Beers and ALROSA alone account for 60 per cent.

All Canadian diamond mines have adopted the TSM, as have mines in Botswana owned by the company Debswana. Together, these mines account for 16 per cent of total diamond production.

The characteristics of the diamond market, such as its high value, the prevalence of conflict diamonds, and the prevalence of theft and fraud, have provided incentives for an early use case of blockchain.[17]

Figure 4.6. 2015 global diamond production



Source: Reich et al., 2017.

[16] The KP is notably a different approach for diamonds than Dodd-Frank is for 3TG. The KP audit is performed by governments and encompasses the virtual entirety of production, while Dodd-Frank is performed by companies and can be summarized as, "declare what country your 3TG is from and prove non-conflict sourcing if from the DRC or nine adjoining countries."

[17] A blockchain is a decentralized, public and permanent digital ledger of transactions. Everledger, founded in 2015, is a company that uses a blockchain to track diamonds based on the characteristics of each diamond, such as its shape and the 4Cs (colour, clarity, cut and carat weight). By mid-2017, Everledger had registered 1.6 million diamonds on a blockchain (Altoros, 2017; Roberts, 2017a, 2017b).

4.5 GOLD

Primarily, gold is used for jewellery (45 per cent) and bar and coin (30 per cent). Its main industrial use is in electronics, due to its conductivity, ductility and low reactivity ("nobility"). Gold is soft and usually alloyed with other metals when used as jewellery. Remarkably, the compound average growth in gold prices since 2002 is more than 10 per cent per annum. Figure 4.7 shows global gold production in 2015.

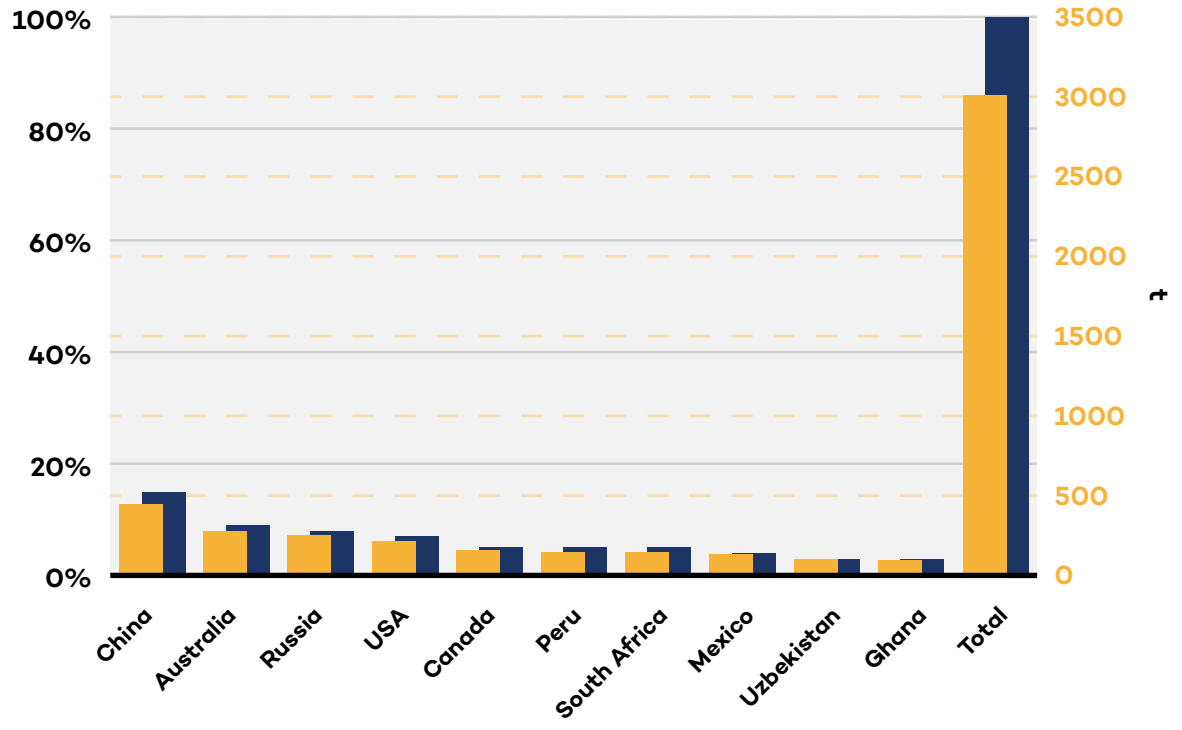
Due to its nobility, gold is commonly found natively, in veins and streambeds. It is extracted at low average grades (~0.001 per cent) from sediment through cyanidation (large scale) or mercury amalgamation (small scale). Mercury has a remarkably low melting point of −39 C and forms an alloy with gold and other metals. It has been used for gold extraction since at least the third century BCE, as described in alchemical texts.

Mercury exposure, including through vapour inhalation, can result in brain malfunctions, seizures and hearing loss. Most mercury is emitted when gold is smelted from its amalgam, accounting for nearly half of global mercury emissions.

In 2013, UNEP formed the *Minamata Convention on Mercury*, which officially convened in August 2017, with more than 70 countries ratified (UNEP, 2017a, 2017c). The Convention stipulates, inter alia, a ban on new mercury mines, phasing out existing mines over 15 years and a regime for mercury trade registration.

Of the 20 to 30 million small-scale miners, nearly half are estimated to be gold miners (Buxton, 2013; World Gold Council [WGC], 2012a). Small-scale gold mining occurs in many regions around the world, and the gold from these mines is also considered a conflict mineral.

Figure 4.7. 2015 global gold production



Source: Reich et al., 2017.

Most gold mining companies use cyanidation. This process involves heap leaching if the sediment is lower grade (more common) and vat leaching if it is higher grade (less common). Cyanide exposure is dangerous to humans and can cause, among other symptoms, interference with the body's oxygen uptake, which results in cardiac arrest.

In 2000, a cyanide tailings spill in Romania caused UNEP to form the International Cyanide Management Code for the Manufacture, Transport, and Use of Cyanide in the Production of Gold, referred to as the Cyanide Code. By 2017, membership accounted for most gold production, including 8 of the top 10 producing companies. Notably, compliance with the Cyanide Code is required by the International Finance Corporation (IFC) (IFC, 2007), though application of the code is voluntary.

The Fairmined standard is a Fairtrade standard for small-scale miners. Fairmined-certified gold premiums are set at US$4,000/kilogram, (~10 per cent), and US$2,000 more for gold produced without the use of cyanide or mercury (ARM, 2014). Premiums are pooled and redistributed to participants through investments such as medical facilities, mine improvement, schools, re-certification costs and soccer fields (Fairmined, n.d.).

Mines have been certified against the Fairmined standard in a diverse set of countries, including Bolivia, Burkina Faso, Ecuador, Mongolia, Peru and Senegal, together registering about 500 kilograms of annual certified production. Of this, 193 kilograms (39 per cent) was sold in 2016. Fairtrade schemes commonly face oversupply, and the average oversupply of Fairtrade bananas, cocoa, coffee, cotton, sugar, tea, and gold markets approaches 200 per cent.

Fairtrade International published its own Fairtrade gold standard in 2013 after splitting from Fairmined. Fairtrade-certified gold premiums are half those of Fairmined ($2,000/kilogram), though they are the same for gold produced without the use of cyanide or mercury ($2,000) (Fairtrade, 2013).

ICMM members are Barrick Gold, Newmont Mining, AngloGold Ashanti, Goldcorp, Gold Fields, and Polyus Gold, which account for 20 per cent of global gold mining.

The IRMA Standard is under development and will apply to large-scale gold mining. It will apply to small-scale mining only if it is sourced by large-scale mining

According to its website, the RJC has engaged 59 jewellers and 69 jewellery traders. It has also engaged two small-scale gold mining operations, one in 2012 and one in 2017, both in Peru.

The TSM mine-site protocol is used by gold mines in Canada, Finland, Mexico, Burkina Faso, and Suriname, which together account for 3 per cent of global production.

4.6 IRON AND STEEL

Most iron is used to make steel for building and infrastructure (>50 per cent) and transportation (15 per cent). Iron is mined at 20 per cent the rate of coal but accounts for 90 per cent of all metals mined. However, average iron ore grades are higher than other metals, at 45 per cent (compared to 20 per cent for aluminum and 0.5 per cent for copper). Figure 4.8 shows global iron production for 2015.

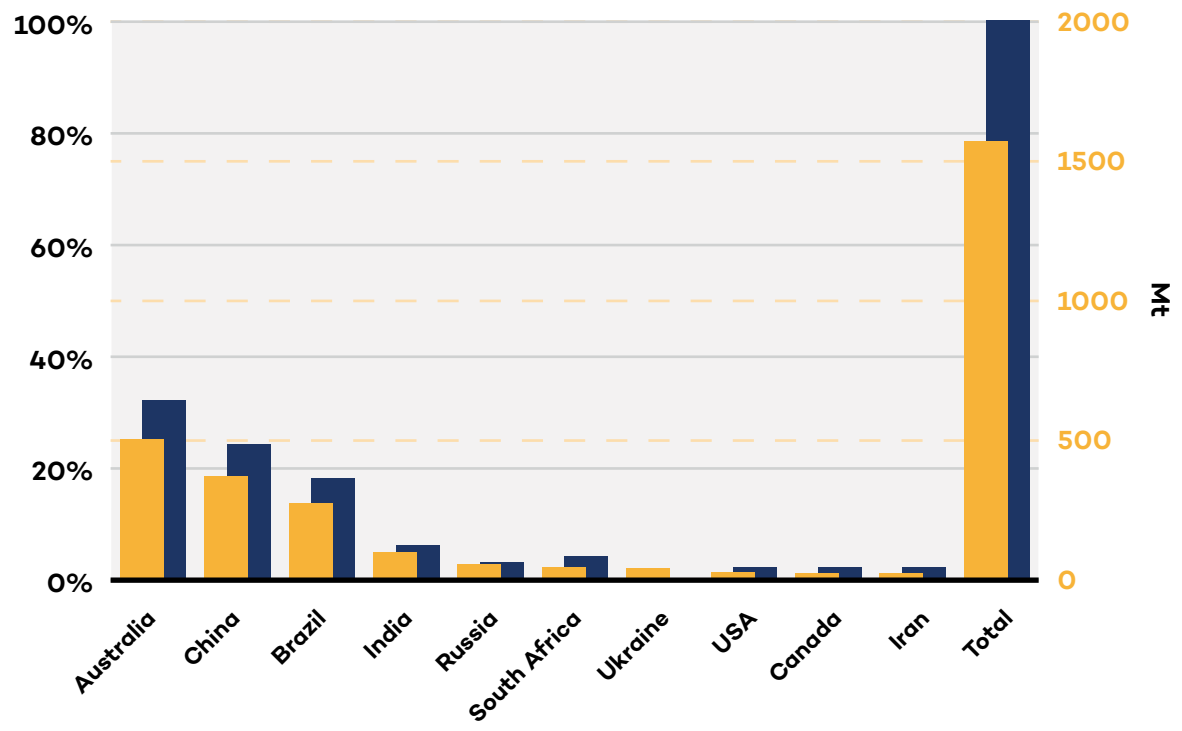
The main iron inputs into steelmaking are iron pellets and fines. Fines are produced from high-grade ores with content of close to 60 per cent. They are crushed and roasted for separation. Fines are prevalent in Brazil and Australia. Low-grade ores (<58 per cent) cannot be roasted but are pelletized using hydrometallurgy.

About 15 per cent of coal production is metallurgical coal (used as both a fuel source and a reducing agent for iron smelting). Iron production accounts for 7 per cent of greenhouse gas emissions and 2 per cent of global mercury emissions.

Techniques for controlling blast-furnace emissions include carbon capture and storage technology, using more scrap, and shifting away from coal use toward hydrogen or electrolytic reduction (Singh, 2012). Most greenhouse gas emission release in iron and steel production comes from cast iron production in the smelting phase.

Iron mining results in the most tailings of any metal, though Nuss and Eckelman (2014) suggest the aggregate risk for toxicity and human health to be second to copper. However, coal beds pose a high risk for ARD

Figure 4.8. 2015 global iron production



Source: Reich et al., 2017.

due to pyrite, and coal overall is extracted at seven times the rate of iron.

The basic oxygen steelmaking process (75 per cent of steel production), involves re-oxidizing molten cast iron with oxygen blasts and mixing it with 25 per cent steel scrap and other alloy metals. Arc furnace steelmaking (25 per cent of steel production) is mostly recycled steel scrap. Considering both processes, about 40 per cent of total steel input comes from recycled sources. Figure 4.9 shows global steel production for 2015.

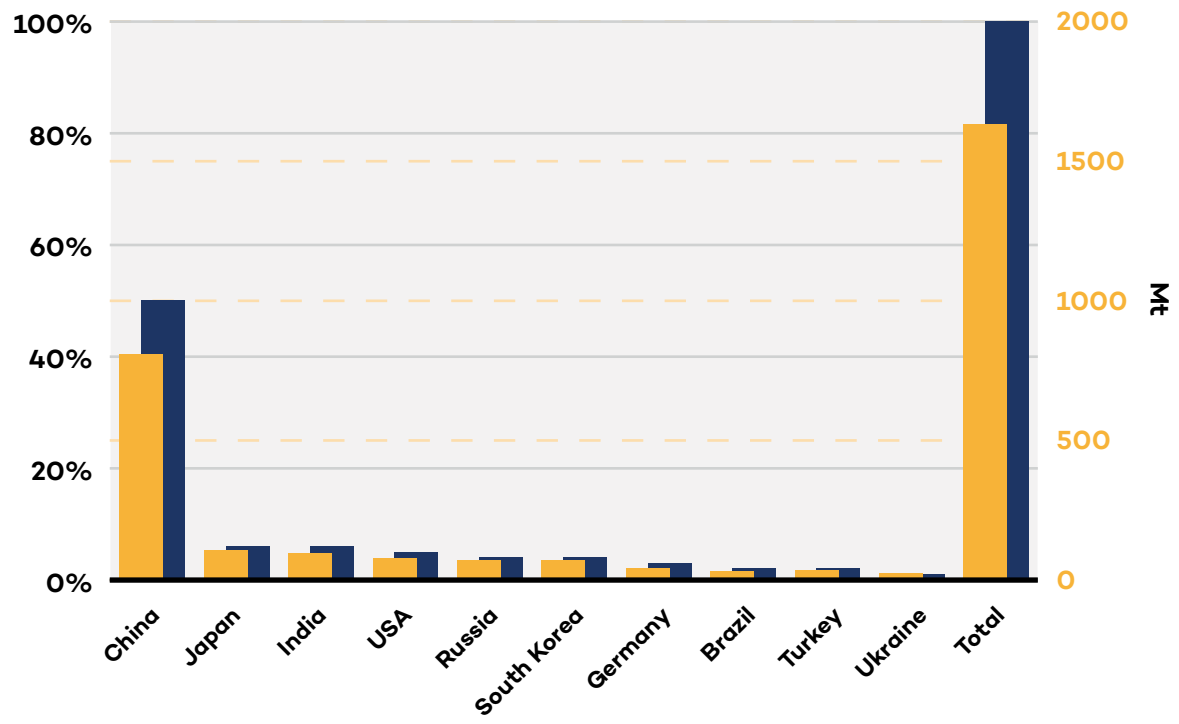
ICMM members Rio Tinto, BHP Billiton, Anglo American and ArcelorMittal account for 40 per cent of iron production. ArcelorMittal is also the world's leading steel producer, with a 6 per cent share.

The TSM mine-site protocol is used by iron mines in Canada, which account for 2 per cent of global iron ore production.

The IRMA Standard is under development. Steering committee members involved in steel production are Anglo American and ArcelorMittal.

The ResponsibleSteel standard is under development for application to the steel sector. The standard is proposing to recognize both the TSM and IRMA standards as they apply to the mining of the raw materials for steelmaking, potentially including iron ore, coking coal and limestone, as well as the mining of ores for metals used as steel coatings and alloys.

Figure 4.9. 2015 global steel production



Source: World Steel Association, 2017.

4.7
CONFLICT MINERALS

Mining of tin, tungsten and tantalum and gold (3TG) has been associated with funding paramilitary groups, primarily in Africa. In the DRC, approximately 4 million people were killed from 1998 to 2012 due to conflict-related reasons, funded in part by conflict minerals (European Commission, 2017; Prospectors & Developers Association of Canada, 2013; WGC, 2012a). Conflict minerals are also known for employing child labour and slavery. Figure 4.11, Figure 4.12 and Figure 4.13 show global production of the tin, tungsten and tantalum for 2017.

3TG metals are purchased to varying degrees by the personal electronics industry. Starting in 2010, a series of legislation and public and private standards emerged regarding supply chain due diligence and conflict mineral sourcing.

Figure 4.10. Conflict mineral timeline

2010

- The U.S. Dodd-Frank Wall Street Reform and Consumer Protection Act requires companies traded on U.S. exchanges whose products involve the use of conflict minerals (3TG) sourced from the DRC or its nine adjoining countries to submit a report to the Securities and Exchange Commission (SEC) detailing measurements taken to ensure conflict-free sourcing, including the use of third-party audits (SEC, 2013).
- The Conflict-Free Smelter Program is launched by the Electronic Industry Citizenship Coalition (now the Responsible Business Alliance) and the Global e-Sustainability Initiative. The program cross-recognizes other smelter-level and mine-level chain of custody standards, including the International Tin Research Institute, the Tin Supply Chain Initiative and the Tungsten Industry–Conflict Minerals Council (Young, 2015).

2011

- Several Central African companies shut down tantalum operations, and prices nearly treble.
- The international framework for the implementation of conflict-free metal sourcing, the *OECD Due Diligence Guidance for Responsible Supply Chains of Minerals from Conflict-Affected and High-Risk Areas* is released for tin, tungsten and tantalum (the gold supplement is released in 2012). The guidance identifies the RJC and the Conflict-Free Smelter Program as private standards with which participating refiners might engage (OECD, 2013).

2014

- The China Chamber of Commerce of Metals, Minerals and Chemicals Importers and Exporters (CCCMC) develops the *Guidelines for Social Responsibility in Outbound Mining Investments* (CCCMC, 2014).
- The OECD reports a decrease in interference from paramilitary groups at mine sites from 57 per cent in 2009–10 to 26 per cent in 2013–14 (OECD, 2015). Tin production from the DRC has been reduced by 75 per cent. A shift in production in the region from tin, tungsten and tantalum to gold has occurred.

2015

- The Conflict-Free Smelter Program has engaged 40 per cent of known tin smelters, 97 per cent of known tantalum smelters, 50 per cent of known tungsten smelters and more than 50 per cent of known gold smelters.

2016

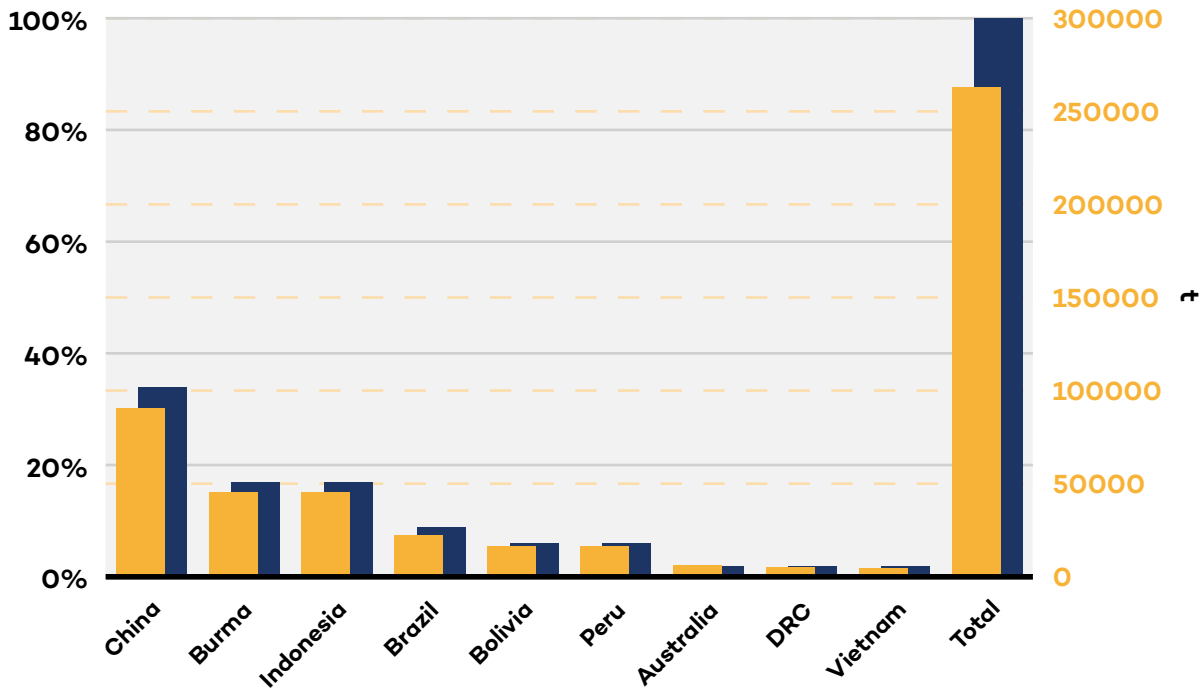
- The CCCMC releases a guide "to operationalize and provide detail to Clause 2.4.6 [regarding conflict minerals] of the Chinese Guidelines." The guide is entitled *Chinese Due Diligence Guidelines for Responsible Mineral Supply Chains* (CCCMC, 2015).

2017

- The European Union Conflict Minerals Regulation is developed and will take effect on January 1, 2021. In addition to the DRC and its nine adjoining countries, the legislation will also apply to the rest of Africa, Asia and South America.

Notably, tantalum production is centralized in Central Africa, while Central Africa is but a small part of the tungsten and tin trade. Tantalum production increased significantly under Dodd-Frank, and overall sourcing has been increasing rapidly (44 per cent from 2016 to 2017), though an increased proportion is coming from recycled sources.

Figure 4.11. 2017 global tin production



Source: U.S. Geological Survey (USGS), 2018a.

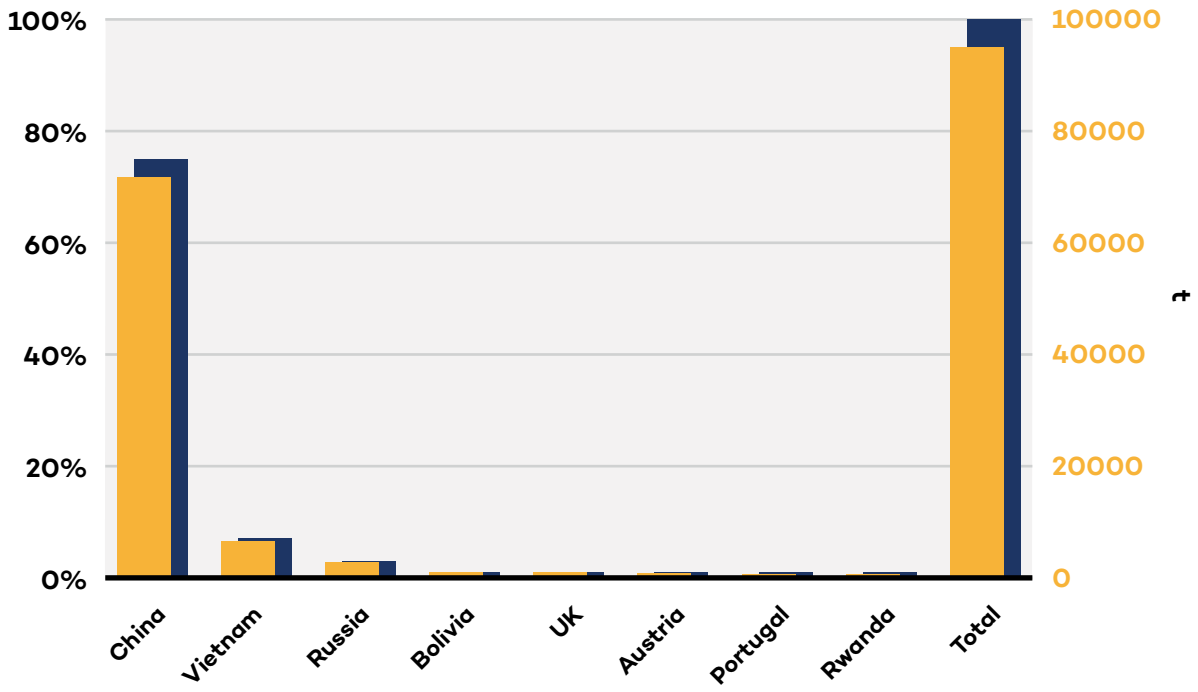
4.8 SAND, GRAVEL, AND DIMENSION STONE

Sand and gravel ("aggregates") are the world's most extracted material, used to make cement, concrete and asphalt.

Dimension stone, like aggregates, is extracted from quarries, though like conflict minerals, its major supply chain concern is child labour (though conflict minerals have also a question of mortality). Quarrying may affect local communities through air and noise pollution, and aquatic sand mining may be particularly damaging to waterways and biodiversity.

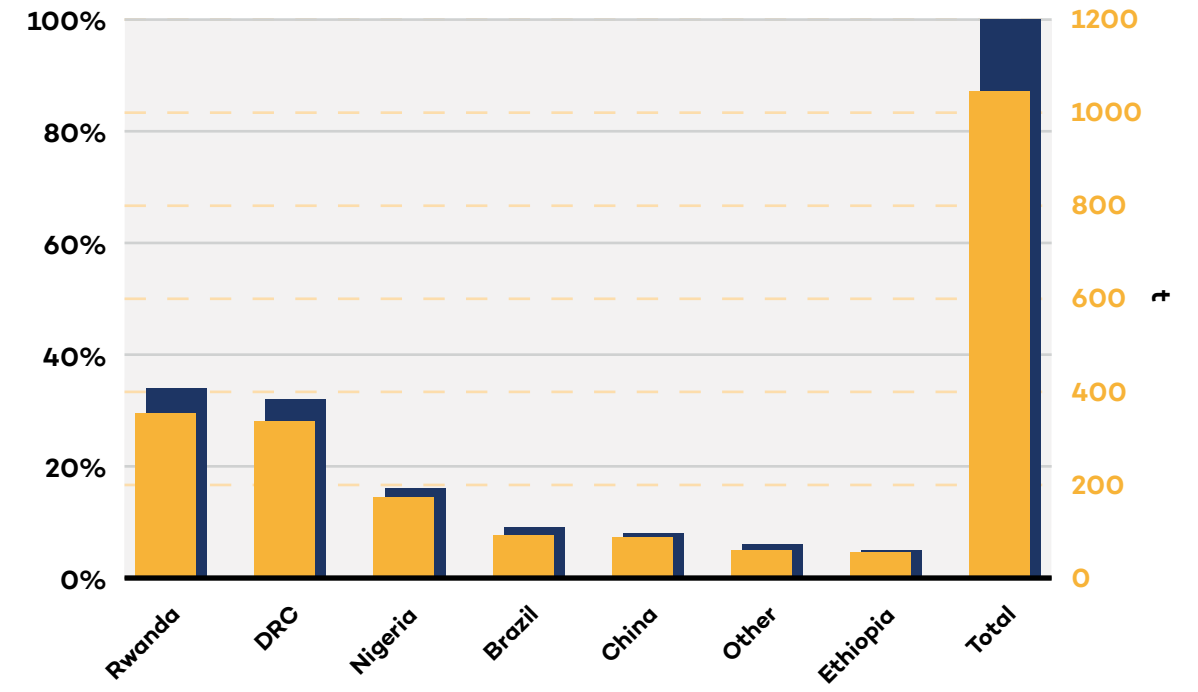
Standards operating in the quarrying space include the Cornerstone Standards Council (Canada), the Natural Stone Council (United States), Fair Stone (China, Vietnam and Turkey) and XertifiX (Asia). Statistics regarding their respective relative market uptake is limited, due to limited global data on volumes of stone and aggregates mined.

Figure 4.12. 2017 global tungsten production



Source: USGS, 2018b.

Figure 4.13. 2017 global tantalum production



Source: USGS, 2018c.

5.0 CONCLUSION: LOOKING AHEAD

There is widespread interest from industry, civil society and the public sector to understand the ever-growing array of sustainability standards in the mining sector.

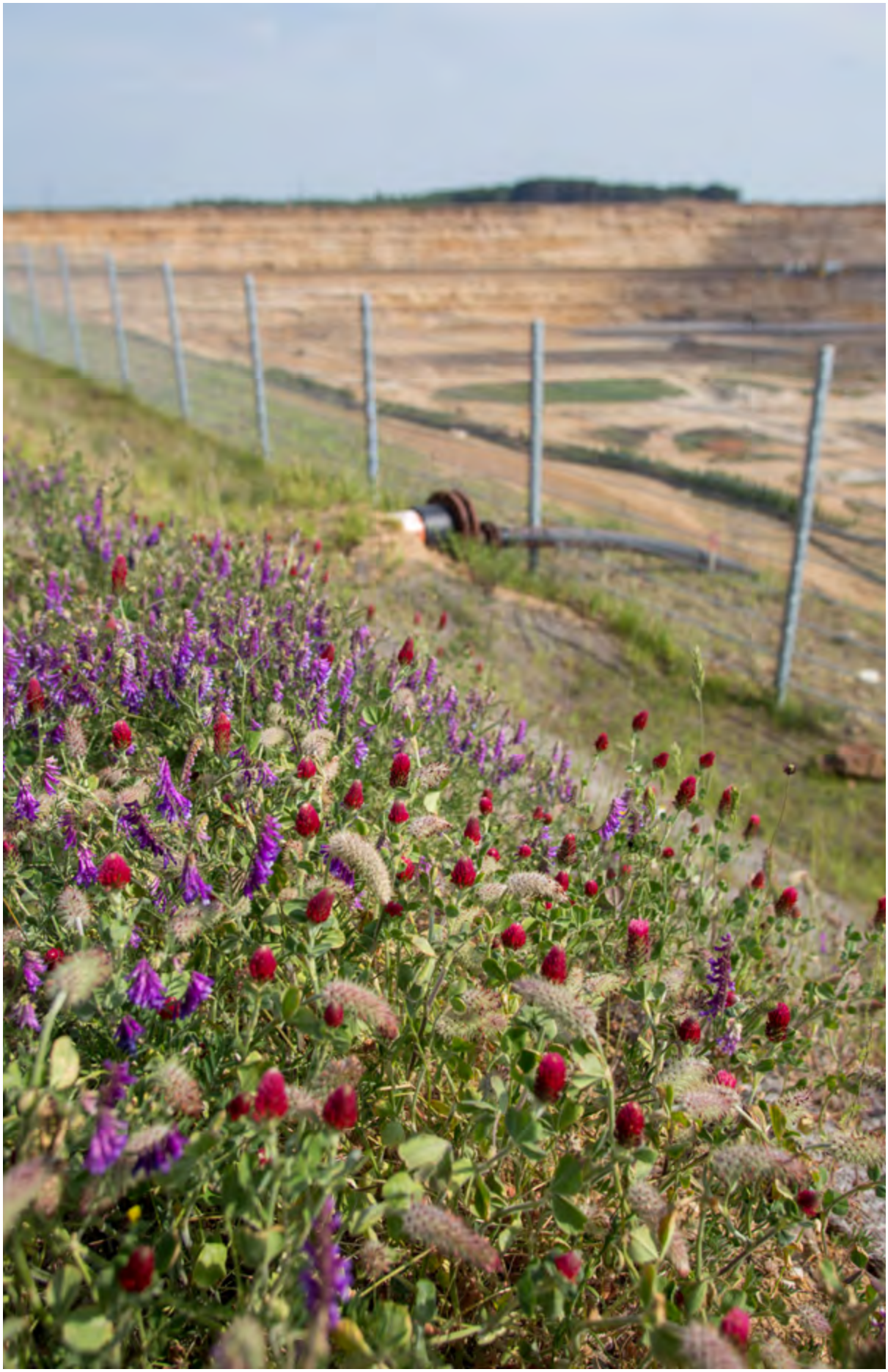
The discussion in this report has been framed in particular for a public-sector audience, including the IGF membership and beyond. Regulation is one of the major drivers of VSIs, as discussed in Section 2; it is important for policy-makers to think about the interplay between regulation and standards. It has been argued that VSIs emerge in both the absence of good domestic regulation (e.g., where human rights are not enforced) and in the context of expanding regulation (e.g., as a means to demonstrate compliance with new environmental laws). VSIs can also complement regulation by focusing on areas that are difficult or too technical to regulate effectively (e.g., what should be included in an effective management system for tailings). Governments can use market-based tools like public procurement (e.g., through award criteria) and fiscal incentives (e.g., tariffs or subsidies) to encourage more sustainable practices on mine sites and along the supply chain, and sometimes VSIs can support these approaches. Financial regulation (e.g., Dodd-Frank) has shown to be another driver for VSIs in mining but needs to be considered carefully to avoid unintended incentives.

We have assessed 15 major initiatives, evaluating not only the content of their standards (across environmental, social and business dimensions) but also the extent to which requirements are obligatory or voluntary for initiative participants. The IISD CARE methodology also considers key aspects of initiatives' approaches to assurance, responsiveness, and engagement with stakeholders. This comprehensive approach reveals differences between initiatives, often reflecting differences in their intended purpose and application, and highlighting some of the challenges of seeking a 'one-size-fits-all' solution.

The report has also presented a snapshot of the mining and minerals sector by commodity type, commenting on the specific environmental and social challenges associated with the extraction and treatment of material, and providing estimates of the amount of production by commodity that is covered by a VSI. Demand for VSIs stems, at least initially, either from upstream (at the level of mines, mining companies or national mining associations) or mid- to downstream (retailers or industry associations). The former is generally associated with business risk and reputation management, with a focus on performance improvement and response to societal concerns. Downstream demand comes from societal concerns about conflict funding, emissions management and fair labour, which in turn builds interest in sourcing from certified supply chains.

While it is still early days in many respects, we have observed the following trends as a result of our analysis:

- Coordination and rationalization of sustainability schemes are major themes in the sector at the time of publication, even if they largely remain more conceptual than practical for the time being. Leadership on this issue is coming from many areas, including intergovernmental bodies, civil society organizations, industry association, VSI owners and companies.
- Industry players and scheme owners are beginning to work towards the interoperability of VSIs, both up and down the value chains, as well as across different sector-focused schemes. There are encouraging signs of this, at least in the case of the initiatives applicable to large-scale mining, and we cautiously note that the appearance of new large-scale applicable schemes appears to be slowing. Notably, TSM, IRMA and ResponsibleSteel have shown a commitment to coordination over competition, a trend which must continue. Collaboration is encouraged above the creation of new schemes.
- Future research is needed to analyze the aforementioned potential for interoperability across VSIs, both upstream and downstream and across different sector-focused schemes. There is interest for better data on



the geography of these initiatives, namely where demand is coming from and where along the supply chain this downstream pressure is actually having a positive impact on livelihoods and the natural environment.

- While this issue is not discussed in detail in this report, as we move to an increasingly de-carbonized economy, society is going to require more metals and minerals, and we need to ensure that these raw materials are sourced using responsible methods. For example, stricter vehicle emissions requirements in the automotive sector are expected to increase the sector's aluminum consumption by 10 to 20 per cent per year over the next five years. Meanwhile, most aluminum smelting (about 60 per cent) still uses coal-powered electricity, and aluminum production accounts for as much as 1 per cent of all global greenhouse gas emissions. Additional research is warranted to gain a deeper understanding of the life-cycle impacts of products using mined materials (and any other raw material) and to ensure that we can responsibly meet this increased need brought on by climate change mitigation efforts and other factors.
- Civil society must continue to be vigilant, monitoring environmental and social impacts of mining activity. The mining supply chain is particularly opaque, and it is notoriously difficult to trace an end product to the mine site, making the role of civil society even more important. Other sectors, such as forestry, have faced similar challenges in their early days of employing VSIs, and data-tracking systems have had to be developed to meet these transparency needs. New tools such as blockchain present opportunities to access more reliable data in the mining field, but will require inputs from cross-sectoral users in order to design systems that serve accountability interests in an equitable and efficient manner.
- Governments have a key role, as discussed above, in continuing to put the enabling environment in place. Producing countries have many opportunities to take advantage of these kinds of initiatives where they can meet policy needs (e.g., building a culture of participatory processes, enhancing skills and capacity, cost-effectively monitoring human rights abuses). For countries that mostly import raw or processed materials but that want to promote sustainability down the supply chain, there are many opportunities to complement policy needs (e.g., demonstrating compliance) but also many pitfalls and potentially perverse incentives that can result. Carefully targeted policy design is needed.
- Governments must also have the legal framework in place and the capacity to protect whistleblowers and reporters who take great risks to expose abuses.
- Policy dialogues are needed to disseminate the research already conducted but also to further understand the interplay between VSIs in the sector and public policy.

REFERENCES

Altoros. (2017, April 27). A close look at Everledger—How blockchain secures luxury goods. Altoros [blog]. Retrieved from https://www.altoros.com/blog/a-close-look-at-everledger-how-blockchain-secures-luxury-goods/

Alliance for Responsible Mining (ARM). (2014). *Fairmined standard for gold from artisanal and small-scale mining, including associated precious metals*. Retrieved from http://www.responsiblemines.org/images/sampledata/EstandarFairmined/FAIRMINED_V2.0-RC_EN.pdf

Aluminium Stewardship Initiative (ASI). (2014). *ASI performance standard part I: Principles and criteria*. Retrieved from http://aluminium-stewardship.org/wp-content/uploads/2014/12/ASI-Performance-Standard-v1.pdf

Aluminium Stewardship Initiative (ASI). (2017). *ASI chain of custody standards*. Retrieved from https://aluminium-stewardship.org/asi-standards/chain-of-custody-standard/

Bundesanstalt für Geowissenschaften und Rohstoffe (BGR). (2017). *Sustainability schemes for mineral resources: A comparative overview*. Retrieved from https://www.bgr.bund.de/EN/Themen/Min_rohstoffe/Downloads/Sustainability_Schemes_for_Mineral_Resources.pdf?__blob=publicationFile&v=6

Buxton, A. (2013). *Responding to the challenge of artisanal and small-scale mining. How can knowledge networks help?* London: IIED. Retrieved from http://pubs.iied.org/16532IIED/

CCCMC. (2014). CCCMC *Guidelines for social responsibility in outbound mining investments*. Retrieved from https://www.globalwitness.org/sites/default/files/library/CCCMC%20Guidelines%20for%20Social%20Resposibility%20in%20Outbound%20Mining%20Investments%20Oct%202014%20CH-EN_1.pdf

CCCMC. (2015). *Chinese due diligence guidelines for responsible mineral supply chains*. Retrieved from https://www.oecd.org/daf/inv/mne/CCCMC-Guidelines-Project%20Brief%20-%20EN.pdf

Cuéllar-Franca, R. M., & Azapagic, A. (2015). Carbon capture, storage and utilisation technologies: A critical analysis and comparison of their life cycle environmental impacts. *Journal of CO2 Utilization, 9*, 82–102. https://doi.org/10.1016/j.jcou.2014.12.001

Davis, R., & Franks, D. (2014). *Costs of company-community conflict in the extractive sector*. Retrieved from https://sites.hks.harvard.edu/m-rcbg/CSRI/research/Costs%20of%20Conflict_Davis%20%20Franks.pdf

Earthworks. (2014). *No dirty gold Valentine's Day fact sheet*. Retrieved from https://earthworks.org/publications/no_dirty_gold_valentines_day_fact_sheet/

Ethical Trading Initiative. (n.d.). *Ethical Trading Initiative*. Retrieved from https://ethicaltrade.org/

Electronics Watch. (n.d.). *Electronics Watch*. Retrieved from http://electronicswatch.org/en

European Commission. (2017). *Conflict Minerals Regulation explained*. Retrieved from http://ec.europa.eu/trade/policy/in-focus/conflict-minerals-regulation/index_en.htm

Fairmined. (n.d.). *Fairmined premium use in 2016*. Retrieved from http://www.fairmined.org/wp-content/uploads/2017/07/INFORME-PREMIO-2016.pdf

Fairtrade. (n.d.). *Fairtrade International*. Retrieved from https://www.fairtrade.net/

Fairtrade. (2013). *Fairtrade Standard for Gold and Associated Precious Metals for Artisanal and Small-Scale Mining*. Retrieved from http://wordpress.p20126.webspaceconfig.de/wp-content/uploads/2014/01/Gold-and-Precious_Metals-Standard.pdf

Forest Stewardship Council (FSC). (n.d.) *Forest Stewardship Council*. Retrieved from https://ic.fsc.org/en

Franks, D. (2015). *Mountain movers: Mining, sustainability and the agents of change*. New York, NY: Routledge.

Global Witness. (1998). *A rough trade*. Retrieved from https://www.globalwitness.org/en/archive/rough-trade/

Global Witness. (2011). *Global Witness leaves Kimberley Process, calls for diamond trade to be held accountable*. Retrieved from https://www.globalwitness.org/en/archive/global-witness-leaves-kimberley-process-calls-diamond-trade-be-held-accountable/

Gunningham, N., & Sinclair, D. (2002). Voluntary approaches to environmental protection: lessons from the mining and forestry sectors. *OECD Global Forum on International Investment*. Retrieved from https://www.oecd.org/env/1819792.pdf

Hilson, G., & Maconachie, R. (2008). "Good governance" and the extractive industries in Sub-Saharan Africa. *Mineral Processing and Extractive Metallurgy Review, 30*(1), 52–100.

Howard, A. (2015). Blood diamonds: The successes and failures of the Kimberley Process Certification Scheme in Angola, Sierra Leone and Zimbabwe. *Washington University Global Studies Law Review, 15*(1).

ICMM. (n.d.). *ICMM member companies*. Retrieved from http://www.icmm.com/en-gb/members/member-companies

International Finance Corporation (IFC). (2007). *Environmental, health and safety guidelines for mining*. Retrieved from http://www.ifc.org/wps/wcm/connect/1f4dc28048855af4879cd76a6515bb18/Final%2B-%2BMining.pdf?MOD=AJPERES&id=1323153264157

International Institute for Sustainable Development. (2002). *Breaking new ground: Mining, minerals, and sustainable development project*. Retrieved from http://pubs.iied.org/pdfs/9084IIED.pdf

Intergovernmental Panel on Climate Change. (2014). *Technology-specific cost and performance parameters*. Retrieved from https://www.ipcc.ch/pdf/assessment-report/ar5/wg3/ipcc_wg3_ar5_annex-iii.pdf

ISEAL Alliance. (2016). *Chain of custody models and definitions*. Retrieved from https://www.isealalliance.org/sites/default/files/resource/2017-11/ISEAL_Chain_of_Custody_Models_Guidance_September_2016.pdf

Johnson, D. B., & Hallberg, K. B. (2005). Acid mine drainage remediation options: a review. *Science of The Total Environment, 338*(1–2), 3–14. https://doi.org/10.1016/j.scitotenv.2004.09.002

Nuss, P., & Eckelman, M. J. (2014). Life cycle assessment of metals: A scientific synthesis. *PLOS ONE, 9*(7), e101298. https://doi.org/10.1371/journal.pone.0101298

Organisation for Economic Co-operation and Development (OECD). (2013). *Due diligence guidance for responsible supply chains of minerals from conflict-affected and high-risk areas: Second edition*. Retrieved from http://dx.doi.org/10.1787/9789264185050-en

Organisation for Economic Co-operation and Development (OECD). (2015). Mineral supply chains and conflict links in eastern Democratic Republic of Congo: Five years of implementing supply chain due diligence Retrieved from https://mneguidelines.oecd.org/Mineral-Supply-Chains-DRC-Due-Diligence-Report.pdf

O'Faircheallaigh, C. (2013). Public policy processes for transition to a sustainable enterprise society. In M. McIntosh (Ed.), *The necessary transition: The journey towards the sustainable enterprise economy* (pp. 198–212). New York, NY: Taylor & Francis.

Prospectors & Developers Association of Canada. (2013). *The growing market demand for responsibly-produced, conflict-free metals: What mining companies need to know*. Retrieved from http://www.pdac.ca/docs/default-source/public-affairs/rjc-solidaridad---growing-market-demand-for-responsibly-produced-conflict-free-metals.pdf?sfvrsn=4

RESOLVE & World Economic Forum (WEF). (2015). *Voluntary responsible mining initatives: A review*. Retrieved from http://www3.weforum.org/docs/Voluntary_Responsible_Mining_Initiatives_2016.pdf

Richards, J. (Ed.). (2009). *Mining, society, and a sustainable world*. Springer Science & Business Media.

Roberts, J. J. (2017a). IBM-backed hyperledger releases new blockchain code "Fabric." *Fortune*. Retrieved from http://fortune.com/2017/07/11/ibm-blockchain-hyperledger-fabric/

Roberts, J. J. (2017b). The diamond industry is obsessed with the blockchain. *Fortune*. Retrieved from http://fortune.com/2017/09/12/diamond-blockchain-everledger/

Singh, P. (2012). *CO2 capture technologies for industry*. Retrieved September 4, 2017, from http://ieaghg.org/docs/General_Docs/IEAGHG_Presentations/13_-_14_june_-_P._Singh_CO2_Capture_Technologies_Industry.pdf

The Forest Trust (TFT). (2016). No exploitation of workers - natural stone guidelines for sites. Retrieved from http://www.tft-earth.org/wp-content/uploads/2015/03/TFT-No-Exploitation-Guidelines-Stone.pdf

Track Record. (2010). *Responsible aluminium scoping phase, main report*. Retrieved from https://aluminium-stewardship.org/wp-content/uploads/2014/12/Track-Main-Report-v2.pdf

United Nations Environment Programme (UNEP). (2000). *Mining and sustainable development II*. Retrieved from http://www.uneptie.org/media/review/vol23si/unep23.pdf

UNEP. (2013). Global Mercury Assessment.

UNEP. (2017a). *First meeting of the Conference of the Parties to the Minamata Convention on Mercury (COP1)*. Retrieved from http://www.mercuryconvention.org/Negotiations/COP1/tabid/5544/language/en-US/Default.aspx

UNEP. (2017c). *Minamata Convention on Mercury*. Retrieved from http://www.mercuryconvention.org/Convention/tabid/3426/language/en-US/Default.aspx

UNESCO. (1992). *Rio Declaration*. Retrieved from http://www.unesco.org/education/pdf/RIO_E.PDF

United Nations. (2000). *Final report of the UN Panel of experts on violations of security council sanctions against Unita. The "Fowler Report."* Retrieved from http://www.un.org/ga/search/view_doc.asp?symbol=S/2000/203

U.S. Energy Information Administration. (2016). *International energy outlook 2016*. Retrieved from https://www.eia.gov/outlooks/ieo/

U.S. Securities and Exchange Commission (SEC). (2013). *Dodd-Frank Act rulemaking: specialized corporate disclosure*. Retrieved from https://www.sec.gov/spotlight/dodd-frank/speccorpdisclosure.shtml

U.S. Geological Survey (USGS). (2018a). *Global tin production data*. Retrieved from https://minerals.usgs.gov/minerals/pubs/commodity/tin/mcs-2018-tin.pdf

U.S. Geological Survey USGS. (2018b). *Global tantalum production data*. Retrieved from https://minerals.usgs.gov/minerals/pubs/commodity/niobium/mcs-2018-tanta.pdf

U.S. Geological Survey USGS. (2018c). *Global tungsten production data*. Retrieved from https://minerals.usgs.gov/minerals/pubs/commodity/niobium/mcs-2018-tanta.pdf

Ward, H., & Ha, M.-L. (2012). *Voluntary social and environmental standards and public governance: Reviewing the evidence and setting principles for standards-setters*. The Foundation for Democracy and Sustainable Development & The Pacific Institute. Retrieved from http://pacinst.org/wp-content/uploads/2013/06/pacinst-standards-and-public-governance-review-nov-2012.pdf

World Gold Council (WGC). (2012a). *Conflict-free gold*. Retrieved from http://www.gold.org/sites/default/files/documents/WGC172_Conflict_Free_Gold_brochure_0.pdf

World Steel Association. (2017). *Steel markets*. Retrieved from http://www.worldsteel.org/steel-by-topic/steel-markets.html

WWF. (2015). *WWF mining, mineral and metal production standards review* [internal WWF report used with permission]

Rae, M., & Rouse, A. (2001). Mining certification evaluation project: independent certification of environmental and social performance in the mining sector. Resources Conservation Program, Mineral Resources Unit (WWF Australia).

Young, S. B. (2015). Responsible sourcing of metals: Certification approaches for conflict minerals and conflict-free metals. *The International Journal of Life Cycle Assessment*, 1–19. https://doi.org/10.1007/s11367-015-0932-5

APPENDIX I. VSIs OF POTENTIAL RELEVANCE TO THE MINING SECTOR: LONG LIST TO FINAL SELECTION FOR CARE ANALYSIS

I.I DEVELOPING THE LONG LIST (158 INITIATIVES)

The first step in this analysis was to identify the mining sector standards or initiatives of potential interest. The starting point was a list of 124 initiatives previously identified in a study commissioned by WWF-Australia in 2015. Initiatives referenced in other reports were then added to the list, together with potentially relevant standards listed on the ITC Standards Map. The result was an initial list of 158 standards or initiatives of potential interest.

In some ways, this initial list exaggerates the number of standards and initiatives of real current interest. It includes, for reference, several initiatives that were significant at the time, which are often referred to in reviews, but which are no longer active (e.g., the Mining Certification Evaluation Project, the Berlin Guidelines, the Whitehorse Mining Initiative). It also includes many initiatives that have not published auditable standards to date, or which are relevant and important but cannot be considered to be sustainability standards for the purpose of this study (e.g., Kellogg Innovation Network, Solutions for Hope, the WEF Responsible Mineral Development Initiative, the United Nations Sustainable Development Goals).

However, the initial listing could also have been much longer. No attempt was made to include all the standards or similar documents that could potentially be relevant. It included over 50 narrow-issue standards but made no attempt to include all such standards that are potentially applicable in the mining sector. Thus, the list includes examples of greenhouse gas measurement, reporting and reduction standards, water-specific standards, and biodiversity-specific standards, but there are many more that have not been listed. Similarly, a small number of business association schemes and government-led voluntary standards initiatives were included where they were mentioned in reviewed reports, but no attempt was made to identify such schemes systematically. A limited number of downstream standards applicable to the sourcing of mined materials for use in electronics, construction and jewellery were included, but again no attempt was made to identify the full range of downstream standards with implications for their upstream material suppliers. Nor were in-house mining company management tools or government statutory requirements and policy instruments included.

In summary, this initial set of standards identified for preliminary review is considered to be reasonably comprehensive in relation to internationally applicable, publicly available, multiple-issue standards that are directly applicable to mining. However, the list is illustrative rather than comprehensive in relation to narrow-issue standards and downstream standards applicable to mining and minerals and metals supply chains in general. And, as noted, it includes a range of initiatives that are not relevant to the current study.

I.II
INITIATIVES IN THE SHORT LIST

CATEGORY 1: MULTIPLE-ISSUE STANDARDS APPLICABLE TO LARGE-SCALE MINING

- Aluminium Stewardship Initiative (ASI)
- Bettercoal
- Equator Principles (EP)
- IFC Performance Standards and Environmental Health and Safety Guidelines
- Initiative for Responsible Mining Assurance (IRMA)
- International Council on Mining and Metals Sustainable Development Framework (ICMM)
- ISO 14001, Environmental Management Systems – Requirements with Guidance for Use
- ISO 26000, Guidance on Social Responsibility
- Responsible Jewellery Council (RJC)
- Mining Association of Canada, Towards Sustainable Mining (TSM)
- World Bank Safeguard Policies

CATEGORY 2: MULTIPLE-ISSUE STANDARDS APPLICABLE TO ARTISANAL AND SMALL-SCALE MINING

- Alliance for Responsible Mining (ARM) Fairmined Gold
- Better Gold Initiative
- Diamond Development Initiative (International) (DDI)
- Fair Trade Gems
- Fairtrade International, Fairtrade Gold and Silver

CATEGORY 3: MULTIPLE-ISSUE STANDARDS APPLICABLE TO QUARRYING

- Cornerstone Standards Council (CSC)
- Fair Stone
- The Forest Trust Responsible Stone Programme (TFT)
- Natural Stone Council (NSC)
- XertifiX

CATEGORY 4: FINANCIAL MARKET INFLUENCER STANDARDS

- Dow Jones Sustainability Index (DJSI)
- FTSE4Good Index
- Global Reporting Initiative (including Mining and Metals Sector Supplement) (GRI)
- Principles for Responsible Investment (PRI)
- Responsible Mining Index (RMI)

CATEGORY 5: PRODUCT SPECIFICATION INFLUENCER STANDARDS

- Australian Steel Stewardship Forum, ResponsibleSteel
- BASF Eco-Efficiency (BASF)
- Building Research Establishment 6001: Responsible Sourcing of Construction Products (BES 6001)
- Building Research Establishment Environmental Assessment Method (BREEAM)
- Byggvarubedömningen (BVB)
- Cement Sustainability Initiative (CSI)
- ECOproduct
- Electronic Product Environmental Assessment Tool (EPEAT)
- EUROFER SustSteel (SustSteel)
- European standard for construction products, EN 15804:2012
- ISO 21930:2007, Sustainability in Building Construction – Environmental Declaration of Building Products
- National Ready Mixed Concrete Association (NRMCA) Sustainable Concrete Plant Certification
- Organisation for Economic Co-operation and Development (OECD) Guidelines for Multinational Enterprises
- U.S. Green Building Council Leadership in Energy and Environmental Design (LEED)

CATEGORY 6: NARROW ISSUE STANDARDS APPLICABLE TO MINING

- AccountAbility AA1000 Assurance Standard (AA1000)
- Alliance for Water Stewardship (AWS)
- Business and Biodiversity Offset Program (BBOP)
- Carbon Trust Product Footprint Certification
- Certified Trading Chains (CTC)
- Chilean Clean Production Framework Agreement (Acuerdo Marco de la Produccion Limpia)
- Conflict-Free Tin Initiative/ Tin Supply Chain Initiative (CFTI)
- Conflict-Free Smelter Program (CFSP)
- Conflict-Free Sourcing Initiative (CFSI)
- Devonshire Initiative (DI)
- Dubai Multi-Commodities Centre Practical Guidance (DMCC)
- Ethical Trading Initiative (ETI)
- European Water Stewardship Standard (EWS)
- Extractive Industries Transparency Initiative (EITI)
- Free, Prior and Informed Consent Dialogue
- Greenhouse Gas Protocol
- Global Business Coalition on HIV-AIDS, tuberculosis and malaria (GBC)
- Global Social Compliance Programme (GSCP)
- International Conference on the Great Lakes Region (ICGLR) Regional Certification Mechanism (RCM)
- IFC Against AIDS
- International Aluminium Institute (IAI) Aluminium Sector Greenhouse Gas Protocol
- The International Conference on the Great Lakes Region Mineral Certification Scheme
- International Cyanide Management Code (ICMC, Cyanide Code)
- International Labour Organization (ILO)

- Kimberley Process Certification Scheme (KPCS)
- LIFE Certification (LIFE)
- London Bullion Market Association Responsible Gold Guidance (LBMA)
- Naturemade
- OECD Convention on Combating Bribery of Foreign Public Officials in International Business Transactions
- OECD Due Diligence Guidance for Responsible Supply Chains of Minerals from Conflict-Affected and High-Risk Areas
- OHSAS 18001, Occupational Health and Safety Standard (OHSAS)
- Partnering Against Corruption Initiative (PACI)
- Regional Initiative against the Illegal Exploitation of Natural Resources (RINR)
- SCS Global Services, Responsible Source Standard for Precious Metals (SCS)
- Signet Responsible Sourcing Protocol (SRSP)
- Social Accountability International 8000 (SA8000)
- South African Chamber of Mines Environmental Guidelines and Guidelines on Participation
- Tailings.Info guidelines
- Gold Standard (TGS)
- Transparency International (TI)
- UN Global Compact
- UN Guiding Principles on Business and Human Rights
- UNIDO Global Mercury Project (GMP)
- UN Voluntary Principles on Security and Human Rights
- Verified Carbon Standard (VCS)
- Voluntary Principles on Security and Human Rights for companies in the extractive and energy sectors (VPSHR)
- WindMade
- Workplace Condition Assessment (WCA)
- World Gold Council, Conflict-Free Gold Standard (WGC)

We initially proposed that the CARE analysis should focus only on the multiple-issue standards directly applicable to large-scale mining (category 1). However, given the importance of artisanal and small-scale mining (ASM) in the development context and the desire to cover all major categories of mined material, we subsequently agreed to expand the CARE analysis to also cover standards applicable to ASM (category 2) and quarrying and aggregates (category 3). This meant that the analysis could potentially be applied to 21 standards or initiatives—too wide a range given the available resources.

Further review therefore excluded some additional standards initiatives. Within category 1 we decided not to include the Equator Principles, on the grounds that they are based essentially on the application of the IFC Performance Standards, and not to include the World Bank Safeguard Policies on the grounds that World Bank lending in the mining sector focuses on institutional measures rather than on mining itself.

It was initially proposed to include the two ISO standards in the analysis, despite their being narrow-scope standards, as the ISO 14001 standard in particular is widely used in the sector, and it was thought the comparison, in combination with the ISO26000 approach for coverage of social issues would be of interest. However, they were later excluded for a number of reasons.

In terms of standard content there were major challenges in comparing a quality management system approach with the performance-based approach of the other standards in the study, and concerns about needing to include additional ISO standards to cover specific issues in more depth. ISO does not specify assurance procedures, making application of the Assurance aspects of the CARE methodology difficult. And as different ISO standards have different development histories, it would have been hard to apply the Responsiveness and Engagement elements consistently.

Within category 2, an initial assessment eliminated the Better Gold Initiative and the Fair Trade Gems initiative on the grounds that the Better Gold Initiative referenced other mine-level standards rather than having its own independent standards, and that the Fair Trade Gems scheme was insufficiently documented for full assessment. The Diamond Development Initiative would have been included in the analysis, but the initiative was unable to make its standard available for evaluation.

The standards in categories 4, 5 and 6 were not included in the CARE analysis on the basis that they did not apply directly at the mine site level or did not have enough coverage of social and environmental issues. However, the Responsible Mining Index was subsequently included in the coverage element of the CARE analysis because as a downstream initiative explicitly designed to drive improved performance in the mining sector, it would be useful to compare its coverage of issues with those covered by initiatives directly applicable to mining.

I.III STANDARDS AND INITIATIVES IDENTIFIED IN THE LONG LIST BUT EXCLUDED FROM FURTHER ASSESSMENT

Africa Mining Vision

Amnesty International's Human Rights Principles For Companies

Apple Supplier Responsibility Standards (2017)

Artisanal Gold Council

Berlin Guidelines

Bundesanstalt für Geowissenschaften und Rohstoffe [Federal Institute for Geosciences and Natural Resources]

Business for Social Responsibility

Business Social Compliance Initiative Code of Conduct

Cares UK - Sustainable Constructional Steel Scheme

Certified Trading Chains

Climate, Community & Biodiversity Alliance

Communities, Artisanal and Small Scale Mining initiative

Development by Design

EcoVadis

ECOWAS-OXFAM West African Mining Code Project

Eden Project Responsible Mining Programme

Electronics Industry Citizenship Coalition

Electronics TakeBack Coalition

Energy and Biodiversity Initiative

Equitable Origin

Ethical Metalsmiths

European Automotive Working Group on Supply Chain Sustainability (now Drive Sustainability)

Fair Mining Collaborative (previously the Environmental Mining Education Foundation)

Framework for Responsible Mining

Global Mining Guidelines Group

Global Mining Initiative

Global Social Compliance Programme

Green Karat

Green Lead initiative

Greenpeace Guide to Greener Electronics

IDH (Sustainable Trade Initiative)

Integrated Biodiversity Assessment Tool

Integrated Diamond Management Program in Sierra Leone

Intergovernmental Forum on Mining, Minerals, Metals and Sustainable Development

International Council on Metals and Environment

International Network for Acid Prevention

Kellogg Innovation Network

Madison Dialogue

Minerals Council of Australia, Australian Minerals Industry Code for Environmental Management

Minerals Council of Australia, Australian Minerals Industry Framework for Sustainable Development, Enduring Value

Mining Certification Evaluation Project

Natural Resource Governance Institute, Natural Resource Governance Initiative

Natural Resources Canada, Green Mining Initiative

Non-Ferrous Metals Consultative Forum on Sustainable Development

Oro Verde

Partnership Africa Canada (now IMPACT), Conflict Fee Artisanal Gold project, later Just Gold

Peace Diamond Alliance

Prospectors & Developers Association of Canada, e3 Plus

Public-Private Alliance for Responsible Minerals Trade

RCS Global

Responsible Aluminium (became the Aluminium Stewardship Initiative, ASI)

Roundtable on the Sustainable Production and Use of Platinum Group Metals

Save Act Mine

Solutions for Hope

Sustainable Purchasing Leadership Council

The Sustainability Consortium and Consumer Goods Forum

The Whitehorse Mining Initiative

Transfair USA Fair Trade Diamond Feasibility Study

U.S. Foreign Corrupt Practices Act

UL Responsible Sourcing

UN Millennium Development Goals

UN Norms on the Responsibilities of Transnational Corporations and Other Business Enterprises with Regard to Human Rights

UN Sustainable Development Goals

Walmart, Love, Earth

WEF Responsible Mineral Development Initiative

World Bank Pollution Prevention Handbook 1998

World Business Council for Sustainable Development

World Economic Forum Responsible Mineral Development Initiative

World Mines Ministries Forum

I.IV STANDARDS AND INITIATIVES INCLUDED IN INITIAL ANALYSIS

Name	Category
Aluminium Stewardship Initiative	1
Bettercoal	1
Equator Principles	1
IFC Performance Standards and Environmental Health and Safety Guidelines	1
Initiative for Responsible Mining Assurance	1
International Council on Mining and Metals Sustainable Development Framework	1
ISO 14001	1
ISO 26000	1
Responsible Jewellery Council	1
Mining Association of Canada, Towards Sustainable Mining	1
World Bank Safeguard Policies	1
Alliance for Responsible Mining, Fairmined Gold	2
Better Gold Initiative	2
Diamond Development Initiative (International)	2
Fair Trade Gems	2
Fairtrade International Fairtrade Gold and Silver	2
Cornerstone Standards Council	3

Name	Category
Natural Stone Council	3
The Forest Trust Responsible Stone Programme	3
Fair Stone	3
BASF Eco-Efficiency	4
Building Research Establishment 6001, Responsible Sourcing of Construction Products	4
Building Research Establishment Environmental Assessment Method	4
Byggvarubedömningen	4
Cement Sustainability Initiative	4
ECOproduct	4
Electronic Product Environmental Assessment Tool	4
EUROFER SustSteel	4
European standard for construction products, EN 15804:2012	4
ISO 21930:2007, Sustainability in Building Construction – Environmental Declaration of Building Products	4
National Ready Mixed Concrete Association (NRMCA) Sustainable Concrete Plant Certification	4

Name	Category
Organisation for Economic Co-operation and Development Guidelines for Multi-National Enterprises (OECD Guidelines)	4
Steel Stewardship Forum, ResponsibleSteel	4
U.S. Green Building Council Leadership in Energy and Environmental Design	4
Dow Jones Sustainability Index	5
FTSE4Good Index	5
Global Reporting Initiative (including Mining and Metals Sector Supplement)	5
Principles for Responsible Investment	5
Responsible Mining Index	5
AccountAbility AA1000 Assurance Standard	6
Alliance for Water Stewardship	6
Business and Biodiversity Offset Program	6
Carbon Trust Product Footprint Certification	6
Certified Trading Chains	6
Chilean Clean Production Framework Agreement (Acuerdo Marco de la Produccion Limpia)	6
Conflict-Free Tin Initiative, Tin Supply Chain Initiative	6
Conflict-Free Smelter Program	6
Conflict-Free Sourcing Initiative	6
Devonshire Initiative	6

Name	Category
Dubai Multi-Commodities Centre Practical Guidance	6
Ethical Trading Initiative	6
European Water Stewardship Standard	6
Extractive Industries Transparency Initiative	6
Free, Prior and Informed Consent Dialogue	6
GHG Protocol	6
Global Business Coalition on HIV-AIDS, tuberculosis and malaria	6
Global Social Compliance Programme	6
Gold Standard	6
ICGLR Regional Certification Mechanism	6
IFC Against AIDS	6
International Aluminium Institute (IAI) Aluminium Sector GHG Protocol	6
The International Conference on the Great Lakes Region Mineral Certification Scheme	6
International Labour Organization	6
Kimberley Process Certification Scheme	6
LIFE Certification	6
London Bullion Market Association Responsible Gold Guidance	6
Naturemade	6

Name	Category
OECD Convention on Combating Bribery of Foreign Public Officials in International Business Transactions	6
OECD Due Diligence Guidance for Responsible Supply Chains of Minerals from Conflict-Affected and High-Risk Areas	6
OHSAS 18001 Occupational Health and Safety standard	6
Partnering Against Corruption Initiative	6
Regional Initiative against the Illegal Exploitation of Natural Resources	6
SCS Global Services, Responsible Source Standard for Precious Metals	6
Signet Responsible Sourcing Protocol (SRSP)	6
Social Accountability International 8000	6
South African Chamber of Mines Environmental Guidelines and Guidelines on Participation	6
Tailings.Info guidelines	6
Transparency International	6
UN Global Compact	6
UN Guiding Principles on Business and Human Rights	6
UNIDO Global Mercury Project	6
UN Voluntary Principles on Security and Human Rights	6
Verified Carbon Standard	6
Voluntary Principles on Security and Human Rights for Companies in the Extractive and Energy Sectors	6
WindMade	6
Workplace Condition Assessment	6
World Gold Council Conflict-Free Gold Standard	6
XertifiX	6

APPENDIX II. PROFILES OF SUSTAINABILITY SCHEMES FOR MINERAL RESOURCES

We relied on VSI profiles developed for a report by the Bundesanstalt für Geowissenschaften und Rohstoffe (BGR)—the German Federal Institute for Geosciences and Natural Resources. To be efficient with space, we decided to direct readers directly to page 61 of the BGR Report (see BGR, 2017).

Our review, however, covers some VSIs that were not addressed in the BGR report. As such, below you will find the explanatory template for the VSI profiles, and the four scheme profiles that were not covered in the BGR report but were assessed with the CARE criteria in this report: Responsible Mining Index (RMI), Cornerstone Standards Council (CSC), Natural Stone Council (NSC) and TFT Responsible Stone Programme (TFT). Greyed-out cells indicate parts of the template we did not use.

We are grateful for BGR's willingness to share data.

II.I
EXPLANATORY TEMPLATE FOR THE SCHEME PROFILES[18]

Name of the sustainability scheme	
Background information	
Initiators of the scheme	Name(s) of the organization(s) responsible for founding the scheme.
Administrative body	Name of the scheme (the administrative body that is managing and coordinating scheme documents and activities).
Founding date and location	Founding date and location of the scheme's administrative body (city, country).
Publication of the first standard version	Name of the first standard version and year of publication. (We use the word "standard" for the document that sets the scheme's requirements, which in some cases is called "code," "performance standards," "framework," "program" or "code of practice.")
Up-to-date standard version and next revision	Name of the up-to-date standard version, its year of publication and the year of its next revision
Background of the scheme	The scheme is categorized according to its founding history and its relation to other institutions: 1. Scheme has exclusively been established for the standard development and implementation. 2. Scheme is part of an existing institution (e.g. association or research institute) or requirements are developed by an existing institution. 3. Scheme is governed by a public institution and positioned in legal regulations.
Stakeholder groups in a) First standard-setting b) Latest revision (if applicable)	The scheme is categorized according to different stakeholder groups participating in first standard-setting and latest revision: 1. Civil society 2. Private sector 3. Public institutions
Subject matter of the standard	
Main objective	Description of the scheme's main objective, its supply chain approach and sustainability focus (environmental, social, economic).
Target commodities	Mineral commodities covered by the scheme.

[18] Grey sections indicate sections of the template from the original BGR document that were left out in the summary of VSI profiles for this report.

Name of the sustainability scheme	
Application of the standard along the supply chain	Supply chain tiers addressed by the scheme through scheme implementation and conformity assessments.
Proof of origin	1. Yes: A description of the traceability system is given. 2. No.
Assessment unit	1. All facilities: All mining facilities (projects) of the company are participating in the scheme and are being assessed. 2. Selected facilities: Only certain mine sites or smelters are participating in the scheme are being assessed.
Geographic focus	1. National: List of specific countries, continents or areas. 2. Global.
State of implementation	The implementation status of the scheme is presented. If available, a list of the assessed units (e.g., mining companies, smelters, mine sites) and further information on compliance status (uncertified, active, verified, certified, eligible, etc.), commodities, geographic distribution and major non-compliances is given.
Membership program	1. Yes: The scheme is based on a membership program. If available, the various membership types, recent number of members and company names are listed. 2. No: The scheme doesn't provide a membership program.
Recent developments	Recent developments concerning the scheme's activities and plans are presented (e.g., scheme review processes, extension of the scheme's geographic focus, new collaborations).

Requirements of the standard

Summarized standard requirements	Environmental issues	A representative keyword list selected individually for each scheme is presented.
	Social and societal issues	A representative keyword list selected individually for each scheme is presented.
	Corporate governance and trade	A representative keyword list selected individually for each scheme is presented.

Name of the sustainability scheme	
Rigour or flexibility of the standard model for compliance	A categorization and description of the scheme's rigour or flexibility concerning the implementation of standard requirements is given (some schemes combines two options): 1. Obligatory standard catalogue (including incremental requirements): The scheme has a defined set of requirements that have to be implemented within a given time frame. The scheme may also include addition of new requirements over time. 2. Compulsory voting standard catalogue: The scheme provides a set of mandatory requirements that companies have to choose from and comply with in a given time frame. 3. Voluntary degree of compliance with the standard catalogue: The scheme provides full flexibility regarding the time frame for implementation of requirements.
Provided documents and tools	If available, major documents provided by the schemes on their websites as well as year of publication.
Number of referenced international conventions and other guidance	The number of referenced international conventions or guidance on which the scheme's standard is based is roughly categorized: 1. < 10 2. 10–20 3. > 20
Reference to other mining schemes for more information or guidance	1. Yes: List of the mining and metals specific schemes and standard sections, which are referenced for further information or serve as a basis for the schemes' standards. 2. No: No reference of other mining and metals schemes.
Recognition of other mining schemes for the proof of compliance of certain issues	1. Yes: Explanation of the schemes and the respective standard's sections applicable to cross-recognition. 2. No: There is no cross-recognition with other mining and metals schemes' standards.
Assessment of standard compliance and transparency of the results	
Subject matter of the conformity assessment	Explanation of the subject matter of the scheme's conformity assessment and assessment procedure (e.g., assessment of management systems or of a company report on certain issues and performance levels).
Type of conformity assessment (audit)	The type of conformity assessment (audit) is categorized according to three levels: 1. No assessment 2. Verification 3. Verification and certification (certification requires a verification)

Name of the sustainability scheme	
Auditor status and frequency of audits	Description of the auditor status designated for the conformity assessment (audit) and the frequency of audits: 1. First-party (frequency) 2. Second-party (frequency) 3. Third-party (frequency)
Assessment elements	Presentation of the conformity assessment's elements: 1. Self-assessment 2. Document analysis 3. Site inspection 4. Interviews with workers, managers, etc.
Grievance mechanisms for auditor decisions	1. Yes: A grievance mechanism is available, which gives companies the opportunity to complain about auditor decisions (e.g., inappropriate assessment decision or required corrective action). If available, this mechanism is described in detail. 2. No: There is no such grievance mechanism.
Whistle-blowing mechanism for standard non-compliances	1. Yes: A whistle-blowing mechanism is available, which gives various stakeholders the possibility to report non-compliances with the scheme's standard. If available, this mechanism is described in detail. 2. No: There is no such whistle-blowing mechanism.
Party publishing the results	A description of the parties obliged to publish results on the scheme participation (e.g. type of reports): 1. Standard initiative 2. Company
Degree of detail of the published results	The degree of detail of the results published by various parties (e.g., only consolidated results or very detailed performance levels): 1. Summarized results 2. Results about single standard requirement For both types a description of aggregation of information is provided.
List of references	
The scheme's website(s) and major documents used for the corresponding profile.	

II.II CORNERSTONE STANDARDS COUNCIL

Cornerstone Standards Council	
Background information	
Initiators of the scheme	The Aggregate Forum of Ontario (AFO) and Socially and Environmentally Responsible Aggregate (SERA) merged in 2012 to become the Cornerstone Standards Council. AFO consisted of NGOs and companies including Save the Oak Ridges Moraine, The Conservancy of Canada, Ontario Nature, Coalition on the Niagara Escarpment, STORM Coalition, The Couchiching Conservancy, Gravel Watch Ontario, Lafarge Canada Inc., Capital Paving Inc., CBM Aggregates, Walker Aggregates, Miller Group, and OSSGA. SERA was founded by Holcim Canada, Ivey Foundation, Schad Foundation, Canada Green Building Council, Environmental Defence and the Salmon Federation.
Administrative body	Cornerstone Standards Council (CSC)
Founding date and location	Ontario, Canada, 2012.
Publication of the first standard version	The first draft standard (v1) was published in June 2013.
Up-to-date standard version and next revision	The current draft (v3) was published in January 2015, with a revised version due in 2018.
Background of the scheme	(1) Scheme has exclusively been established for the standard development and implementation.
Stakeholder groups in a) first standard-setting b) latest revision (if applicable)	(1) Civil society (a) (2) Private sector (a) (3) Public institutions (a)
Subject matter of the standard	
Main objective	"CSC seeks to create a prosperous Canadian aggregate industry that locates, develops and uses aggregate materials in a way that respects community concerns and environmental values. Its mission is to improve the conservation of the environment and community health and well-being in Canada by developing and implementing certification standards for aggregate extraction and use by the aggregate and construction industries within Canada." (from organization website)
Target commodities	Aggregates: stone, gravel, sand.

Cornerstone Standards Council	
Application of the standard along the supply chain	Certificate holders need to be able to control and track certified and non-certified material on site. CSC intends to develop requirements for subsequent downstream supply chain certification, but these are not yet in place.
Proof of origin	(2) No
Assessment unit	(2) Selected facilities
Geographic focus	(1) National (Regional): Ontario, Canada.
State of implementation	The scheme is in the final stages of pilot testing. Four certificates have been issued to date: Miller Paving Ltd., Carden Quarry; CRH Canada, Acton Quarry (Phases 1, 2 and 3); Lafarge Canada, Oro Pit; and CRH Canada, Paris Pit.
Membership program	(2) No
Requirements of the standard	
Provided documents and tools	• Certification System Manual (CSC-MAN-001, Version 1-0) • Issues Resolution Policy CSC-POL-001,Version 1-0 • Auditing 101: A guide to auditing of environmental and social standards • Certification 101: A guide to environmental and social standards and certification • Auditor Training: Overview of content requirements for auditor training • Responsible Aggregate Standard, Version 3.0 • CSC'S Responsible Aggregate Standards: Summary of certification requirements for existing aggregate operations in Ontario • CSC'S Responsible Aggregate Standards: Summary of certification requirements for proposed aggregate operations in Ontario
Reference to other mining schemes for more information or guidance	(1) Yes: **Provincial Government** 1. Ministry of Consumer Services/Technical Standards and Safety Authority 1. Technical Standards and Safety Act, 2000, S.O. 2000, c. 16 **Ministry of the Environment** 1. Clean Water Act, 2006, S.O. 2006, c. 22 2. Environmental Assessment Act, R.S.O. 1990, c. E.18 3. Environmental Bill of Rights, 1993, S.O. 1993, c. 28 4. Environmental Protection Act, R.S.O. 1990, c. E.19 5. Lake Simcoe Protection Act, 2008, S.O. 2008, c. 23

Cornerstone Standards Council	
	6. Ontario Water Resources Act, R.S.O. 1990, c. O.40 7. Safe Drinking Water Act, 2002, S.O. 2002, c. 32 8. Soil Management – A Guide for Best Management Practices (Ministry of the Environment, DRAFT) **Ministry of Labour** 1. Occupational Health and Safety Act, R.S.O. 1990, c. O.1 **Ministry of Natural Resources** 1. Aggregate Resources Act, R.S.O. 1990, c. A.8 2. Conservation Authorities Act, R.S.O. 1990, c. C.27 3. Crown Forest Sustainability Act, 1994, S.O. 1994, c. 25 4. Endangered Species Act, 2007, S.O. 2007, c. 6 5. Environmental Assessment Act (A Class Environmental Assessment for MNRF Resource Stewardship and Facility Development Projects) 6. Fish and Wildlife Conservation Act, 1997, S.O. 1997, c. 41 7. Lakes and Rivers Improvement Act, R.S.O. 1990, c. L.3 8. Public Lands Act, R.S.O. 1990, c. P.40 9. Niagara Escarpment Planning and Development Act, R.S.O. 1990, c. N.2 **Ministry of Municipal Affairs and Housing** 1. Planning Act, R.S.O. 1990, c. P.13 2. Oak Ridges Moraine Conservation Act, 2001, S.O. 2001, c. 3. Greenbelt Act, 2005, S.O. 2005, c. 1 4. Municipal Act, 2001, S.O. 2001, c. 25 **Ministry of Northern Development and Mines** 1. Mining Act, R.S.O. 1990, c. M.15 **Ministry of Tourism, Culture and Sports** 1. Ontario Heritage Act, R.S.O. 1990, c. O.18 **Ministry of Transportation** 1. Public Transportation and Highway Improvement Act, R.S.O. 1990, c. P.50 2. Environmental Assessment Act (Class EA for Provincial Highway Facilities)

Cornerstone Standards Council

Federal Government

Fisheries and Oceans Canada (DFO)/Conservation Authority:

1. Fisheries Act, R.S.C., 1985, c. F-°©-14

Natural Resources Canada

1. Explosives Act, R.S.C., 1985, c. E-°©-17

Canadian Wildlife Services

1. Migratory Birds Convention Act, S.C. 1994, c. 22
2. Species at Risk Act, S.C. 2002, c. 29

Canadian Environmental Assessment Agency

1. Canadian Environmental Assessment Act, S.C. 2012, c. 19, s. 52

- Ontario Ministry of the Environment: Management of Excess Soil – A Guide for Best Management Practices, January 2014.
- OSSGA – Aggregate Recycling Ontario (ARO) resources
- Ontario Provincial Standard Specification 1010
- Canadian Council of Independent Laboratories (CCIL) sampling procedures
- Municipal Zoning By-Laws Ministry of Environment publication NPC 119
- OHSA and Regulations for Mines and Mining Plants- Part VI
- Environmental Protection Act, R.S.O. 1990, c. E.19 (Section 9) – Environmental Compliance Approvals (Air/Noise) & Certificates of Approval (C of A)
- Municipal Noise By-Laws
- Noise Pollution Control (NPC) 300 – Environmental Noise Guideline, Stationary and Transportation Sources – Approval and Planning
- Technical Studies in support of OWRA Sect 53 Industrial Sewage Works
- Certificate of Approval (C of A) or Environmental Compliance Approvals (ECA) Industrial Sewage Works
- Protocol for the Sampling and Analysis of Industrial/Municipal Wastewater (Aug/94)
- Standard Methods for the Examination of Water and Wastewater (20th edition)
- Environmental Protection Act R.S.O. 1990
- Niagara Escarpment Planning and Development Act (Development Permit)
- Pesticides Act R.S.O. 1990
- Safe Drinking Water Act S.O. 2002

Cornerstone Standards Council	
	• Technical Support Document for Ontario Drinking Water Standards • Technical Guidance Document for Hydrogeological Studies in support of Category 3 Application for Permit to Take Water – 2008 • Approved Permit to Take Water – Surface and Ground Water. • Ontario Water Resources Act. R.S.O. 1990 • Environmental protection Act. R.S.O. 1990 • Niagara Escarpment Planning and Development Act. • Pesticides Act R.S.O. 1990 • Safe Drinking Water Act. S.O. 2002 • Technical Support Document for Ontario Drinking Water Standards. ISO 14001:2004, Elements 4.5.1 • Liquid Fuels Handling Code, Technical Standards and Safety Act, June 2007 • Draft Environmental Management Protocol for Fuel Handling Sites in Ontario, TSSA, May 2011 • CPPI Colour-Symbol System to Mark Equipment and Vehicles for Product Identification, Canadian Petroleum Products Institute, January 1990 & 2 addendums • Clean Water Act Reg. 287/07 Liquid Fuels Handling Code, Technical Standards and Safety Authority, June 2007 • Ontario Occupational Health & Safety Act • Highway Traffic Act & Regulations • Ministry of Transportation of Ontario Gross Vehicle Weight sheet • Construction Regulations O Reg. 628/05 • OSSGA Safe Haulage Guidelines • Form 1000 – Registration of Constructors & Employers Engaged in Construction
Recognition of other mining schemes for the proof of compliance of certain issues	CSC references elements of the above guidance documents and statutory requirements as requirements, though it does not explicitly reference certifications of compliance as being evidence of compliance with specific aspects of the CSC standard.
List of references	
Organization's website: www.cornerstonestandards.ca	

II.III
NATURAL STONE COUNCIL

Natural Stone Council	
Background information	
Initiators of the scheme	The Natural Stone Council is a collaboration of businesses and trade associations: Allied Stone Industries, Building Stone Institute, Elberton Granite Association, Indiana Limestone Institute, Marble Institute of America, the Mason Contractors Association of America, National Building Granite Quarries Association, National Slate Association, Natural Stone Alliance, New York State Bluestone Association, Northwest Granite Manufacturers Association and Pennsylvania Bluestone Association.
Administrative body	Natural Stone Council (NSC)
Founding date and location	United States, 2003.
Publication of the first standard version	2014
Up-to-date standard version and next revision	ANSI/NSC 373 Sustainable Production of Natural Dimension Stone, 2014
Background of the scheme	(2) Scheme is part of an existing institution (e.g., association or re-search institute) or requirements are developed by an existing institution
Stakeholder groups in a) first standard-setting b) latest revision (if applicable)	(1) Civil society (a) (2) Private sector (a)
Subject matter of the standard	
Main objective	Requirements of the Standard
Target commodities	Natural stone.
Application of the standard along the supply chain	A separate chain of custody standard (NSC Chain of Custody Standard) has been developed to control traceability along the supply chain.
Proof of origin	(1) Yes

Natural Stone Council	
Assessment unit	"The standard applies to all processors of natural stone, from quarry operations through final stone fabrication, and is intended to allow for both domestic and international market participation from natural dimension stone producers. In practice, the facility operator applies this standard to quarry operations, stone fabrication or both. An operator with multiple facilities may choose which of those are to be certified, but only stone produced or processed exclusively by certified facilities may be considered environmentally preferable under this standard." (from organization website)
Geographic focus	(1) National (United States), though the standard is available for international use.
State of implementation	The standard was finalized in 2014 and is available for use. There is no consolidated list of certificate holders.
Membership program	(1) Yes, private sector associations only: Allied Stone Industries, Building Stone Institute, Elberton Granite Association, Indiana Limestone Institute, Marble Institute of America, the Mason Contractors Association of America, National Building Granite Quarries Association, National Slate Association, Natural Stone Alliance, New York State Bluestone Association, Northwest Granite Manufacturers Association and Pennsylvania Bluestone Association.
Requirements of the standard	
Provided documents and tools	• Standard and guidance available for purchase only (http://naturalstonecouncil.org/shop/) • ANSI/NSC 373 Sustainable Production of Natural Dimension Stone (2014) • NSC Chain of Custody Standard (2014)

Natural Stone Council	
Reference to other mining schemes for more information or guidance	(1) Yes: • Age Discrimination in Employment Act of 1967 (U.S. Equal Employment Opportunity Commission) • ASTM C119 - 11 Standard Terminology Relating to Dimension Stone • ASTM C1528-12a Standard Guide for Selection of Dimension Stone • Civil Rights Act of 1991 (U.S. Equal Employment Opportunity Commission) • Equal Pay Act of 1963 (U.S. Equal Employment Opportunity Commission) • Globally Harmonised System (GHS). The Globally Harmonized System of Classification and Labelling of Chemicals (US Department of Labor, Occupational Safety and Health Administration) • International Labour Organization (IARC), Monographs on the Evaluation of Carcinogenic Risks to Humans, (International Agency on the Research of Cancer International Agency for Research on Cancer (IARC)) • Marble Institute of America Glossary (Marble Institute of America) • ISO 14064:2006 Greenhouse gases -- Part 1: Specification with guidance at the organization level for quantification and reporting of greenhouse gas emissions and removals • Natural Stone Council Chain of Custody Standard (NSC) – Version 1.06 (Natural Stone Council) • State of California Environmental Protection Agency, Proposition 65, Safe Drinking Water and Toxic Enforcement Act of 1986 – Title 22, Division 2, Subdivision 1, Chapter 3, Sections 1200, et. seq. (Office of Environmental Health Hazard Assessment) • Titles I and V of the Americans with Disabilities Act of 1990 (ADA) (U.S. Equal Employment Opportunity Commission) • Title VII of the Civil Rights Act of 1964 (U.S. Equal Employment Opportunity Commission) • US Department of Health and Human Services, National Toxicology Program (NTP), Report on Carcinogens (National Toxicology Program (NTP): U.S. Department of Health and Human Services) • US Environmental Protection Agency (USEPA), Toxics Release Inventory (TRI) Program – Persistent, Bioaccumulative, and Toxic (PBT) Chemicals Rules (US EPA) • US Occupational Safety and Health Administration (OSHA) – Regulated Toxic Metal or Carcinogen (US Occupational Safety and Health Administration (OSHA)).
Recognition of other mining schemes for the proof of compliance of certain issues	(1) Yes: ISO 14064:2006 Greenhouse gases -- Part 1: Specification with guidance at the organization level for quantification and reporting of greenhouse gas emissions and removals
List of references	
Organization's website: www.naturalstonecouncil.org	

II.IV
THE FOREST TRUST

The Forest Trust Responsible Stone Programme	
Background information	
Initiators of the scheme	"TFT's Responsible Stone Program was officially launched at the 'Dag van de Openbare Ruimte exhibition in The Netherlands on 11 October 2012. Formed through the merger of TFT's Quarry Working Group and the Dutch-based Working Group on Sustainable Natural Stone (Werkgroup Duurzame Natuurvgsteen —WGDN), with the support of the Dutch Sustainable Trade Initiative (IDH)." (from organization website)
Administrative body	The Forest Trust (TFT; formerly known as Tropical Forest Trust)
Founding date and location	TFT founded in 1999 in the United Kingdom. Responsible Stone Programme launched 2012.
Publication of the first standard version	Not known.
Up-to-date standard version and next revision	December 2015.
Background of the scheme	(2) Scheme is part of an existing institution (e.g., association or re-search institute) or requirements are developed by an existing institution
Stakeholder groups in a) first standard-setting b) latest revision (if applicable)	(2) Private sector (a)
Subject matter of the standard	
Main objective	"TFT is a non profit organisation that helps companies source their products responsibly. The Responsible Stone Programme aims to diminish the negative effects of natural stone mining and processing by sourcing responsibly quarried stone that respects the environment and improves people's lives." (from organization website)
Target commodities	"The organisation started its work in the forest sector, but now covers a wider range of issues such as palm oil, sugar, stone and minerals, shoe and leather, charcoal, and pulp and paper." (from organization website)
Application of the standard along the supply chain	"TFT works with suppliers of its member organisations, including consideration of the supply chain, but does not operate a supply chain certification scheme." (from organization website)
Proof of origin	(2) No

The Forest Trust Responsible Stone Programme	
Assessment unit	(1) All facilities: the organization works at the company level.
Geographic focus	(2) Global
State of implementation	The program is active and working with its members: Aggregate Industries, Arctic Kvartsit, Arte di Granito, B&Q, Beltrami, Everfine Stone Materials, Michel Oprey & Beisterveld, Stoneasy, London Stone, Brett, CRH, Natuursteenbedrijf G. van Leeuwe B.V., and Cosentino.
Membership program	(1) Yes, private sector only: members of TFT's stone program: Aggregate Industries, Arctic Kvartsit, Arte di Granito, B&Q, Beltrami, Everfine Stone Materials, Michel Oprey & Beisterveld, Stoneasy, London Stone, Brett, CRH, Natuursteenbedrijf G. van Leeuwe B.V., and Cosentino.
Requirements of the standard	
Provided documents and tools	• TFT Extractives • Raising Standards in the Stone Industry • No Exploitation of Workers: Natural stone guidelines for sites (December 2015) • Respect for Workers: Guidelines for sites (January 2016)
Reference to other mining schemes for more information or guidance	(1) Yes: The Asia Floor Wage Alliance (AFWA)
Recognition of other mining schemes for the proof of compliance of certain issues	(2) No
List of references	
Organization's website: www.tft-earth.org	

II.V
RESPONSIBLE MINING INDEX

Responsible Mining Index	
Background information	
Initiators of the scheme	Initial funding was provided by the Netherlands Ministry of Foreign Affairs, the Dutch NGO Cordaid and the Swiss foundation PeaceNexus.
Administrative body	Stichting Responsible Mining Foundation
Founding date and location	The Netherlands, November 2012.
Publication of the first standard version	Draft methodology published in February 2017.
Up-to-date standard version and next revision	Final methodology published in September 2017 (for 2018 Index).
Background of the scheme	(1) Scheme has exclusively been established for the standard development and implementation.
Stakeholder groups in a) first standard-setting b) latest revision (if applicable)	(1) Civil society (a) (2) Private sector (a) (3) Public institutions (a)
Subject matter of the standard	
Main objective	"The Responsible Mining Foundation was established to encourage continuous improvement in responsible mining in the minerals and metals industry by highlighting leading practice and transparently assessing the performance of mining companies. It aims to achieve this by creating and publishing an independent Responsible Mining Index on a biennial basis." (from organization website)
Target commodities	All mined commodities.
Application of the standard along the supply chain	None.
Proof of origin	(2) No
Assessment unit in mining	(1) All facilities: the organization applies its index at the company level.
Geographic focus	(2) Global

Responsible Mining Index	
State of implementation	The 2018 Index is due to be published in February 2018, covering the following companies: • Anglo American Plc • Anglogold Ashanti Ltd • Antofagasta Plc • ArcelorMittal • Banpu PCL • Barrick Gold Corp • BHP Billiton Group • Bumi Resources • Coal India Ltd (CIL) • Codelco • Eurasian Resources Group (ERG) • Evraz Group UC • Exxaro Resources Ltd • Freeport-McMoRan Inc • Glencore Plc • Gold Fields Ltd • Goldcorp Inc • Grupo México • Industrias Peñoles • MMG Limited • Navoi Mining & Metallurgical Combinat • Newmont Mining Corp • Newcrest Mining Ltd • NMDC Ltd • Rio Tinto Group • RUSAL Plc • Teck Resources Ltd • Vale SA • Vedanta Resources Plc • Zijin Mining Group Ltd
Membership program	(2) No
Requirements of the standard	
Provided documents and tools	Methodology Report 2017 for the 2018 Responsible Mining Index; Articles of Association of the Foundation 2017

Responsible Mining Index	
Referral to other standards for more information or guidance	(1) Yes • Africa Mining Vision • ASEAN Framework for Extractive Industries Governance in ASEAN • CCCMC (China Chamber of Commerce of Metals, Minerals and Chemicals Importers and Exporters) Guidelines for Social Responsibility in Outbound Mining Investment • CDP (Carbon Disclosure Project) • Corporate Human Rights Benchmark • The EITI Standard 2016 • ARM (Alliance for Responsible Mining) Fairmined Standard for Gold from Artisanal and Small-scale Mining, including associated precious metals 2.0 • GRI Global Reporting Initiative • ICMC (International Cyanide Management Code for the Gold Mining Industry) • ICMM (International Council on Mining & Metals) 10 Principles and eight position statements • IFC (International Finance Corporation) Environmental and Social Performance Standards and Guidance Notes • ILO (International Labour Organization) Conventions 29, 87, 98, 100, 105, 111, 138, 169, 176, 182 • IRMA (Initiative for Responsible Mining Assurance) Draft Standard for Responsible Mining • ISO (International Organization for Standardization) 14001 – Environmental Management Systems • ISO 26000 – Social Responsibility and others • NRC (Natural Resources Charter, Second Edition) • OECD (Organisation for Economic Co-operation and Development) Development Policy Tools: Corruption in the Extractive Value Chain • OECD Due Diligence Guidance for Meaningful Stakeholder Engagement in the Extractives Sector • OECD Due Diligence Guidance on Responsible Supply Chains of Minerals from Conflict-Affected and High-Risk Areas • OECD Guidelines for Multinational Enterprises • OHSAS (Occupational Health and Safety Assessment Series) 18001 • RJC (Responsible Jewellery Council) Code of Practices • SASB (Sustainability Accounting Standards Board) Standards for Companies • Sustainable Development Goals • Towards Sustainable Mining Sustainability toolkit of the Mining Association of Canada • UN Declaration on the Rights of Indigenous Peoples • United Nations Global Compact • UN Guiding Principles on Business and Human Rights (and Reporting Framework) • Voluntary Principles on Security and Human Rights

Responsible Mining Index	
Recognition of other standards for the proof of compliance of certain issues	RMI does not have a compliance approach but references specific aspects of the above standards as covering similar elements that it assesses for scoring for the Index.
List of references	
Organization's website: responsibleminingindex.org	

APPENDIX III. METHODOLOGY: THE CARE FRAMEWORK APPLIED TO THE ANALYSIS OF MINING INITIATIVES

The CARE framework treats a standards initiative as an integrated system. An initiative's standard is of course a key part of the system, but it is not the only part, and it does not function in isolation. In addition to considering an initiative's standard (coverage), the CARE analysis considers key elements of the mechanisms for assuring conformity with the standard (assurance), the processes that exist for adaptation of the standard to local conditions (responsiveness), and the initiative's systems for governance, stakeholder involvement and oversight (engagement).

While these fundamental elements of the CARE framework have remained constant across the whole series of IISD SSI reports, the details of their application have evolved over time as lessons have been learned and in order to address specific aspects of the production systems under study.

Section 3 of the main report provides a general overview of the four main elements of the CARE approach. This appendix describes in detail how we adapted each element to the analysis of mining initiatives. Some key limitations of the approach have been highlighted in Section 3 already.

III.I COVERAGE

Coverage analysis measures the degree to which an initiative sets requirements in relation to key sustainability elements. Because the coverage analysis focused on the two aspects of content and level of obligation, the methodology we used was different than for the other three indexes, as described below.

III.I.I SSI COVERAGE ASSESSMENT METHODOLOGY

Here, we discuss how we developed the indicators and how we scored the initiatives based on content and level of obligation.

Development of Indicators for Assessment of Standards Coverage

The social, environmental and economic indicators used to assess the coverage of mining standards for this study are based first and foremost on the indicators used for previous IISD SSI analyses. These indicators have been developed over a number of years and their repeated use provides a basic element of comparability across successive studies. However, as for previous reports, the initial set of indicators was reviewed and modified for application to the sector under study. In this case, a second major source for the development of indicators was the Bundesanstalt für Geowissenschaften und Rohstoffe (Federal Institute for Geosciences and Natural Resources, BGR) study *Sustainability Schemes for Mineral*

Resources: A Comparative Overview published in March 2017 (BGR, 2017).

The BGR study identified 86 mining-relevant sustainability sub-issues organized into 14 higher-level issues and five overarching categories inspired by ISO 26000 and then amended in a series of project workshops. BGR identified a set of keywords for each sub-issue and based its study on the identification of keywords within the standards documents of each initiative included in its assessment. Use of the BGR study as a primary source had a number of advantages. First, its coverage focuses specifically on mining standards initiatives and covers many of the same initiatives that were also to be included in the current report. Second, its identification of issues and keywords had already been tested in practice. Third, while its selection had been tested on many initiatives that were to be included in the current study, it was nonetheless entirely independent of any of those initiatives, reducing the risk of bias in favour of the particular framework adopted by any of the initiatives included in our own assessment.

To develop indicators for the current study, the BGR sub-issues and keywords were first aligned as far as possible with the sets of IISD indicators used for studies of initiatives in other sectors. Where indicators for the earlier IISD studies were considered to be inapplicable or inappropriate for the assessment of mining (e.g., the assessment of soil carbon sequestration, or reference to the prohibition of destructive fishing methods) the indicators were eliminated. Where issues were present in the BGR sources but not in the earlier sets of IISD indicators, either a new indicator was specified or an earlier indicator was modified to allow it to cover new elements more relevant to mining. Indicators were grouped into three high-level categories: environmental, social, and corporate governance and business practice. This reflected the division into environmental, social and economic categories of the earlier IISD reports, but was modified to cover BGR's corporate governance grouping. Finally, a new definition was developed for each indicator to try to ensure it was applicable to mining, aiming to incorporate all of the concepts covered within the BGR issues and keywords.

As with previous SSI reports, groups of related indicators within the broad environmental, social, and corporate governance and business practice categories were then organized into a number of indexes, roughly equivalent to what BGR calls "issues," as shown in Tables III-I, III-II and III-III, respectively.

Table III-I. SSI environmental indexes, indicators and definitions.

Index	Indicator	Definition
Environmental impact assessment	Environmental impact assessment	The standard requires that a comprehensive environmental impact assessment has been carried out, the full results of which are readily accessible to the public.
Biodiversity and ecosystems	Protected areas	The standard requires that internationally as well as nationally protected areas not be used for production or extraction except where this is compatible with the values that have been designated for protection.
	High biodiversity areas	The standard prohibits conversion of areas with high biodiversity value (e.g. high conservation value [HCV], Key Biodiversity Areas [KBA] or other "special biodiversity areas"), or requires conversion to be offset through equivalent positive action.
	Offshore mining	The standard specifies special provisions in relation to offshore exploration and mining, based on a precautionary approach to the protection of marine biodiversity and ecosystems.
Water use, management and protection of sources	Watershed assessment	The standard requires an analysis of the watershed, identifying pre-existing human water use requirements, environmental flow requirements, and the potential social and environmental impacts of the mine's projected water use in relation to these requirements.
	Water use plan	The standard requires a water use plan to be developed that demonstrates how the mine will manage its water use to ensure that this is compatible with the needs of other users and within the watershed's environmental flow limits. This plan must be made publicly available.
	Groundwater	The standard specifies that the mine will not deplete groundwater.
	Water quality	The standard requires that water quality upstream and downstream of the site is monitored and reported. It requires that water quality downstream of the mine site is maintained or improved in the long term compared to its baseline condition and that there is adequate protection against contamination due to high-risk events such as stormwater flow, containment leaks or catastrophic failure of tailings dams.
	Alluvial mining	The standard includes specific criteria for habitat and water quality that must be achieved in the case of alluvial mining, if alluvial mining is permitted within the scope of the standard.

Index	Indicator	Definition
Waste and hazardous substances	Waste disposal	The standard addresses proper disposal of waste (including solid waste, non-solid waste and hazardous waste), including consideration of land application disposal of waste material with the potential to contaminate soil.
	Management of hazardous substances	The standard specifies criteria for identifying and managing hazardous substances that are used or produced at the mine site, including the safe disposal of such substances as required, in line with international best practice.
	Mercury	The standard specifies criteria for the safe use and management of mercury, if relevant, and to eliminate its release into the environment.
	Cyanide	The standard specifies criteria for the safe use and management of cyanide, if relevant, in line with the requirements of the Cyanide Code.
Air emissions and dust	Air emissions and dust	The standard specifies criteria to monitor and minimize dust and other air emissions.
Noise and vibration	Noise and vibration	The standard specifies criteria requiring the measurement and reporting of noise and vibration, and measures to monitor and minimize any related impacts on humans or wildlife.
Greenhouse gas and energy	Greenhouse gas accounting	The standard requires measurement of greenhouse gas emissions.
	Greenhouse gas reporting	The standard requires public reporting of greenhouse gas emissions.
	Greenhouse gas reductions	The standard requires actions to reduce greenhouse gas emissions.
	Energy use reduction	The standard includes requirements to reduce energy use.
Mine closure and land rehabilitation	Mine closure	The standard includes criteria addressing social as well as environmental issues related to mine closure and post-closure land rehabilitation, and ensuring adequate financial resources for the implementation of appropriate measures.

Table III-II. SSI social indexes, indicators and definitions.

Index	Indicator	Definition
Labour rights	Equal remuneration	The standard requires equal remuneration for men and women workers for work of equal value, in accordance with ILO 100.
	Freedom of association	The standard includes criteria for freedom of association, as defined by ILO.
	Collective bargaining	The standard includes criteria for collective bargaining, as defined by ILO.
	Non-discrimination	The standard prohibits discrimination due to race, religion, and social, cultural, age, gender or other factors, as defined by ILO Convention 111.
	Forced labour	The standard prohibits use of forced labour, as defined by ILO.
	Worst forms of child labour	The standard prohibits the use of child labour, as defined by ILO Convention 182.
	Minimum age	The standard sets a minimum age for workers, with ILO 138 as the minimum age threshold.
	Women's labour rights	The standard includes explicit criteria to protect women employees' rights, such as by prohibiting mandatory pregnancy testing.

Index	Indicator	Definition
Employment conditions and benefits	Treatment of part-time and seasonal workers	The standard requires equal rights and benefits for all types of workers, including full time, seasonal, part time and temporary.
	Written contracts for employees	The standard requires written contracts with employees.
	Legal minimum wage	The standard requires compliance with local, regional or national minimum wage laws.
	Living wage	The standard requires workers to be paid minimum levels of wages that cover basic human needs.
	Timely payment of wages	The standard requires wage payment be made without delay.
	Maximum working hours	The standard explicitly sets a maximum number of working hours.
	Paid maternity, paternity and sick leave	The standard requires provision of paid leave for workers, which may include maternity, paternity, sick and public holiday leave.
	Pension and security benefits	The standard requires provision of pensions and social security benefits.
	Corporal punishment and degrading treatment	The standard prohibits the use of corporal punishment and harsh or degrading treatment of workers. The standard also requires that there are provisions to prevent mental, physical or verbal abuse, sexual harassment, or gender-based violence against workers or in local communities.
Human rights	Access to education	The standard requires the promotion, enhancement of education or training for workers and/or their families.
	Access to medical care	The standard requires access to and provision of medical care for workers' families.
	Access to housing and sanitary facilities	The standard includes criteria related to provision of housing and sanitary facilities where on-site housing is provided.
	Human rights impact assessment	The standard requires the implementation of an appropriate human rights impact assessment, including consideration of security and the mine's impact on armed conflict

Index	Indicator	Definition
Workers' health and safety	Safety at work	The standard specifies minimum standards for safety at work.
	Healthy work conditions	The standard requires protection and promotion of health at work.
	Access to safe drinking water	The standard requires workers' access to safe drinking water.
	Access to sanitary facilities	The standard includes criteria relating to sanitary facilities in the workplace (e.g., showers, toilets and changing rooms).
	Access to medical care, including TB and HIV/AIDS measures	The standard requires access to and provision of medical care in the workplace, including explicit measures in relation to the prevention and treatment of TB and HIV/AIDS.
	Access to medical insurance at work	The standard requires access to medical insurance in the workplace.
	Emergency preparedness	The standard requires the development of emergency plans and the implementation of related measures to respond to potential emergencies, including explicit measures for the protection of lives of workers as well as potentially affected communities.

Index	Indicator	Definition
Community rights, relationships, health and safety	Social impact assessment	The standard requires that a comprehensive social impact assessment has been carried out, the full results of which are readily accessible to the public.
	Community consultation	The standard requires consultation with the community regarding changes or impacts from business activities on local resources and communities.
	Free, prior and informed consent	The standard guarantees free, prior and informed consent in relation to the rights of Indigenous Peoples to protect and maintain access to their lands, water and other resources.
	Resettlement	The standard includes criteria providing for appropriate consultation, compensation and long-term support in the event of resettlement.
	Local hiring	The standard includes criteria promoting preference policies for local hiring and purchasing that contributes to the economic development of local communities.
	Community health	The standard specifies criteria for monitoring, responding to and reporting on potential impacts on community health These include both direct and indirect impacts on community health and well-being in relation to such issues as hazardous substances, water contamination, dust, noise, infectious disease, and consideration of risks of potential accidents and emergencies in relation to mine waste, tailings and associated infrastructure.
	Conflict resolution	The standard specifies criteria to promote dialogue, conflict resolution and the development of mutually beneficial relationships between large-scale mining, small-scale mining and other affected parties including, if applicable, Indigenous Peoples.
	Access to grievance processes	The standard specifies criteria requiring the establishment of equitable grievance processes and conflict resolution mechanisms accessible to local communities

Table III-III. SSI business practice indexes, indicators and definitions.

Index	Indicator	Definition
Business ethics	Legal compliance	The standard requires compliance with national laws and regulations consistent with international law, and includes mechanisms to ensure that this is the case.
	Provisions against corruption	The standard includes criteria requiring the definition and effective implementation of anti-corruption policies and procedures, including provisions to combat bribery and extortion.
	Provisions to combat money laundering	The standard includes provisions to combat money laundering in relation to the mining and supply of diamonds, gold and platinum group metals.
	Disclosure of payments and revenues	The standard requires mining companies to provide project-level disclosure of mine revenues and payments, and to endorse and engage with the Extractives Industry Transparency Initiative (EITI) as applicable to companies.
Social and environmental reporting	Reporting of impacts	The standard requires timely and publicly accessible reporting of material social and environmental impacts, in line with international reporting guidelines.
Terms of trade (ASM only)	Social premiums	The standard requires a premium over the conventional price of a product be paid to the producer (ASM only).
	Trade contracts	The standard includes criteria for setting up contracts with traders (ASM only).

RATING INDICATOR COVERAGE: CONTENT AND REQUIRED LEVEL OF OBLIGATION

Previous SSI studies rated the extent to which an initiative's standard covered each social, environmental or economic indicator on a four-point scale for "critical," "required," "recommended" or "not covered."

A challenge with this approach is that giving a rating requires simultaneously assessing the extent to which a given requirement of a standard covers all the elements of a particular indicator in relation to its *content*, together with an assessment of the *extent to which compliance with those elements is obligatory* at a given point in time.

This runs the risk of confusing these two different aspects of assessment. A lower score could mean that an indicator only partially addresses all the relevant elements in terms of its content, *or* it could mean that compliance may not be fully required. In this case a standard that specifies high requirements, but only requires these for a 'gold' level of certification, could be scored

the same as a standard which specifies relatively low requirements, even though these represent quite different approaches.

To address this, in this study the rating of standards coverage was split into two parts. The first part addresses the extent to which all the elements of a given indicator are addressed in relation to content only. The second part addresses the extent to which compliance with that indicator is actually required – referred to as the "level of obligation."

CONTENT

In relation to indicator *content*, a three-point scale was used depending on whether most of the elements included in the indicator definition were addressed (scored 2), some of the elements were addressed (scored 1) or the indicator was not addressed (scored 0), as shown in Table III-IV.

Table III-IV. Rating scheme for indicator content.

Indicator content	Rating
Most elements are addressed	2
Some elements are addressed	1
Indicator not addressed	0

It should not be assumed that a standard that achieves high scores across the full range of its requirements is in some sense "better" than one that does not. A particular scheme may choose not to assess a particular issue, or it may choose to require a lower level of performance in relation to an issue when compared with other schemes, for a variety of reasons, including the following:

- An issue may not be relevant within the geographical or technical context in which a particular initiative operates.
- An initiative may focus on issues of particular importance to its own mission, for example having a stronger emphasis on social rather than environmental concerns.
- A standard may be designed to avoid duplication with other standards that address other issues more effectively.
- An initiative may focus on achieving change by moving low-performing mines toward better performance, or on achieving change by rewarding the "best performers" only. Neither approach is inherently better than the other, but the differing approaches imply that standards will be set to require differing levels of performance.

Scoring content as covering either "most" or "some" of the elements of a given indicator has a low level of precision. A scheme whose requirements cover 60 per cent of the elements of a particular SSI indicator would score the same on that indicator as one whose requirements cover 90 per cent of them. A scheme whose requirements cover just 10 per cent of the elements of a particular SSI indicator would score the same as one whose requirements cover 40 per cent of them. In consequence, the scoring tends to flatten out differences in performance, with schemes that demand very high levels of performance being grouped together with schemes that demand quite average levels, and schemes that have very low levels of performance being grouped with those that are just less than average.

Moreover, the scoring emphasizes the coverage of issues rather than the detailed performance requirements that a standard specifies in relation to the issues it covers. Two schemes could both score 100 per cent in relation to content and yet differ greatly in terms of the performance levels they require for compliance in relation to that content.

An advantage of the lower-precision approach, however, was that it made scoring of each indicator relatively simple and quick. A higher level of precision would inevitably increase the likelihood that each score could be contested; the more grades that

are defined for each indicator, the greater the scope for argument as to whether each grade has been assigned correctly. Moreover, it is debatable whether greater precision would bring with it greater accuracy, given the difficulty in interpreting the wording of specific requirements.

On balance, we determined that using a relatively imprecise scoring system was acceptable, given that scores on most individual indicators would be combined into indexes, and that the emphasis in interpreting results would be on overall performance across a range of indexes, rather than on whether a particular standard scored 1 or 2 on one specific indicator of its coverage.

A more detailed comparison at the level of a specific indicator will always require reviewing the exact wording of a scheme's requirements.

The interpretation of results for the scoring of content at the level of indexes, as opposed to for specific indicators, is considered below.

Box III.1. Standards documents included in the assessment of coverage for the CARE analysis

Sustainability scheme	Assessed documents and sections
Aluminium Stewardship Initiative (ASI)	• ASI Performance Standard, version 2 – Draft 1 for Consultation (May 2017)
Bettercoal	• Bettercoal Code, version 1 (June 27, 2013)
International Council on Mining and Metals (ICMM)	• ICMM Principles and six ICMM positions statements (various years)
International Finance Corporation (IFC)	• IFC Performance Standards on Environmental and Social Sustainability (effective January 1, 2012) • IFC Environmental, Health, and Safety General Guidelines (2007) • IFC Environmental, Health and Safety Guidelines for Mining (2007)
Initiative for Responsible Mining Assurance (IRMA)	• IRMA Standard for Responsible Mining, IRMA-STD-001, draft version 2.0. (April 5, 2016)
Mining Association of Canada, Towards Sustainable Mining (MAC)	Seven Assessment Protocols (various years): • Aboriginal and Community Outreach • Crisis Management Planning • Safety and Health • Biodiversity Conservation Management • Tailings Management • Energy Use and Greenhouse Gas Emissions Management • Preventing Child and Forced Labour
Responsible Jewellery Council (RJC)	• Responsible Jewellery Council Code of Practices, version 2 (November 2013)
Fair Stone	• Serially numbered requirements of Part I and II (requirements for quarries and stone processing very similar) of the Fair Stone Standard (version 4, 2010)

Sustainability scheme	Assessed documents and sections
Cornerstone Stewardship Council (CSC)	• Responsible Aggregate Standard, version 3.0
Natural Stone Council (NSC)	• Sustainability Assessment for Natural Dimension Stone Issue 2, draft 1 (January 8, 2014)
TFT	• Respect for Workers – Extractives Guidelines for sites (January 2016)
Alliance for Responsible Mining (ARM)	• Fairmined Standard for Gold from Artisanal and Small-scale Mining, including Associated Precious Metals, version 2.0 (April 2014)
Fairtrade	• Fairtrade Standard for Gold and Associated Precious Metals for Artisanal and Small-Scale Mining (current version: 08.11.2013 _v1.2)
Responsible Mining Index	• Methodology Report 2017 for the 2018 Responsible Mining Index
XertifiX (XF)	• XertifiX standard (April 27, 2012)

LEVEL OF OBLIGATION

In relation to the required *level of obligation*, we used a three-point scale. Where full compliance with a particular requirement is an obligation for certification or recognition by an initiative, the requirement scored 3. Where compliance is not required immediately but is required within a specified timescale, or where an applicant can exercise some choice in deciding which elements to comply with, the requirement scored 2. Where compliance is optional, for example where compliance contributes to a higher grade or is simply a recommended good practice rather than an obligation, the requirement scored 1. Table III-V summarizes these scores.

Table III-V. Rating scheme for level of obligation.

Level of obligation	Description	Rating
Obligatory	Compliance is obligatory: • Compliance is a condition of certification or membership.	3
Conditional or flexible	Compliance is conditional or flexible: • Compliance must be achieved at a specified point in time in order to remain within the scheme. OR • Compliance must be achieved for a proportion of the listed requirements, but there is flexibility in relation to the range of requirements that must be met by a particular applicant.	2
Optional	There is no obligation to comply within the period of certification or membership: • Compliance may be recommended. OR • Compliance may count toward a higher grade or score but is not obligatory within a specified period of time.	1

Thus, for example, where an initiative distinguishes between core requirements that must always be met and optional requirements that may or may not be met in specific circumstances, the core requirements would be scored 3, and the optional requirements as 1 or 2, depending on the particular rules of the scheme.

There is a significant difference between schemes for which requirements must be achieved over time and schemes for which compliance is required for some proportion of a list of requirements, although both types of schemes would be scored 2. However, in both these cases the level of obligation is less than would be required to score 3 and greater than the minimum requirement implied by the optional level that would score 1.

Once again, it must be emphasized that there is no implication that a score of a 3 is better or worse than a score of 2 or 1. Just as for the content assessment, a higher score simply represents a different approach. Whether that approach is a better or worse way to achieve an initiative's objectives will depend on the initiative's particular context, the kinds of claims it is intended to support and its theory of change. The fundamental proposition is, however, that these differences of approach are significant and relevant when one initiative is being compared with another, and that scoring provides a mechanism to highlight these differences.

For most of the standards assessed for this study, the rating for level of obligation is the same for all requirements of the standard, rather than being specified separately for each individual requirement. However, even where this is the case, some variation of scores at the level of an individual requirement is still possible. This may be because the wording of a given criterion allows for a range of explicit options or specifies a number of sub-criteria, not all of which must be met.

Where an initiative has scored 0 in terms of content for a particular indicator, it is still assigned a score in relation to the level of obligation. If this were not done, a particular scheme's score in relation to level of obligation

would be influenced by its coverage of content and would become a less reliable basis for comparison between initiatives. Where the content score is 0, the level of obligation score has therefore been allocated a neutral score on the following basis:

- Where there is no variation in the level of obligation (all other indicators have the same score), that score is also assigned to all of the blank indicators (those that score 0 for content) for the initiative.
- Where a number of indicators within a given index have been scored for content and have been assigned different scores for level of obligation, the blank indicators are assigned a score equal to the average of the scores for the other indicators within that index.
- Where none of the indicators within a given index have been assigned any score for content, all the indicators within the index are assigned a level of obligation score equal to the average score for the other indexes within that overall category.

The overall impact of this approach is to ensure that where an initiative's requirements do not address a particular indicator, this has no effect on the initiative's score in relation to level of obligation. Where an artificial compliance score has been assigned, this is indicated in the raw data as shown in the technical supplementary material.

INDICATOR, INDEX AND CATEGORY SCORES

Finally, as for the analysis of standards coverage in other SSI reports, scores for individual indicators have been aggregated and calculated as average scores for each of the indexes listed in Tables 3.2 to 3.4, as well as for the high-level environmental, social and business practice categories.

The index scores are arithmetic averages of the scores assigned to each indicator within the relevant index. The high-level category scores are arithmetic averages of the indexes within each respective category. See Box 3.1 for a discussion of the implications of this approach for the implicit weighting of the individual indicators.

To facilitate comparisons between indexes and categories, the aggregated scores have been presented as percentages of the maximum possible score for the relevant index or category. In other words, a standard that was scored 2 for its coverage of critical elements for every indicator of every index within a category would score 100 per cent for both the index and category. Similarly, a standard would score 100 per cent if it scored 3 in relation to its required level of compliance for every indicator of every index within a category.

The use of aggregated scores has some mathematical consequences. A high average score will indicate that a particular standard includes requirements relating to most indicators within the respective index or high level category *and also* addresses the majority of key elements within each indicator in a meaningful way.

However, a low score may be explained by some combination of two factors. It may show that a standard does not address some indicators at all, and the existence of such gaps in a standard's coverage will, inevitably, result in the standard having a lower average score. Alternatively, a low score may reflect broad coverage but with a low score for each indicator.

There may be good reasons for an initiative defining a standard that focuses on some issues rather than others, or for setting requirements at a relatively low level of performance (see discussion in Section 3.3). These approaches do not necessarily indicate a poor or weak standard; they may simply reflect different approaches, different kinds of claims and different theories of change.

The key point is that care needs to be taken in interpreting the results of this analysis. The aggregated scores provide a general indication of the extent to which a standard addresses all the issues included within our set of indicators. To understand these scores, it is then necessary to look into them in more detail, considering whether a low score

reflects gaps in coverage or low performance requirements, or some combination of both. Then, it is necessary to consider whether the approach taken by a standard is compatible with the claims it makes for its participants' performance and with its theory of change.

III.I.II SSI COVERAGE ANALYSIS AND PRESENTATION OF FINDINGS

The previous section describes our methodology for defining indicators and for assessing and scoring the coverage of these indicators by different standards. This section explains in general terms how the results have been analyzed and presented. The results themselves are discussed in the main text of the report.[19]

RAW DATA

The raw data showing how each initiative's standard has been scored in terms of its coverage, for both content and level obligation, are presented in the technical supplementary material, cross-referenced to the relevant section of the standard itself. These data were submitted to each standard for its review and comment, but it should be emphasized that decisions as to the final allocation of scores rested with the authors.

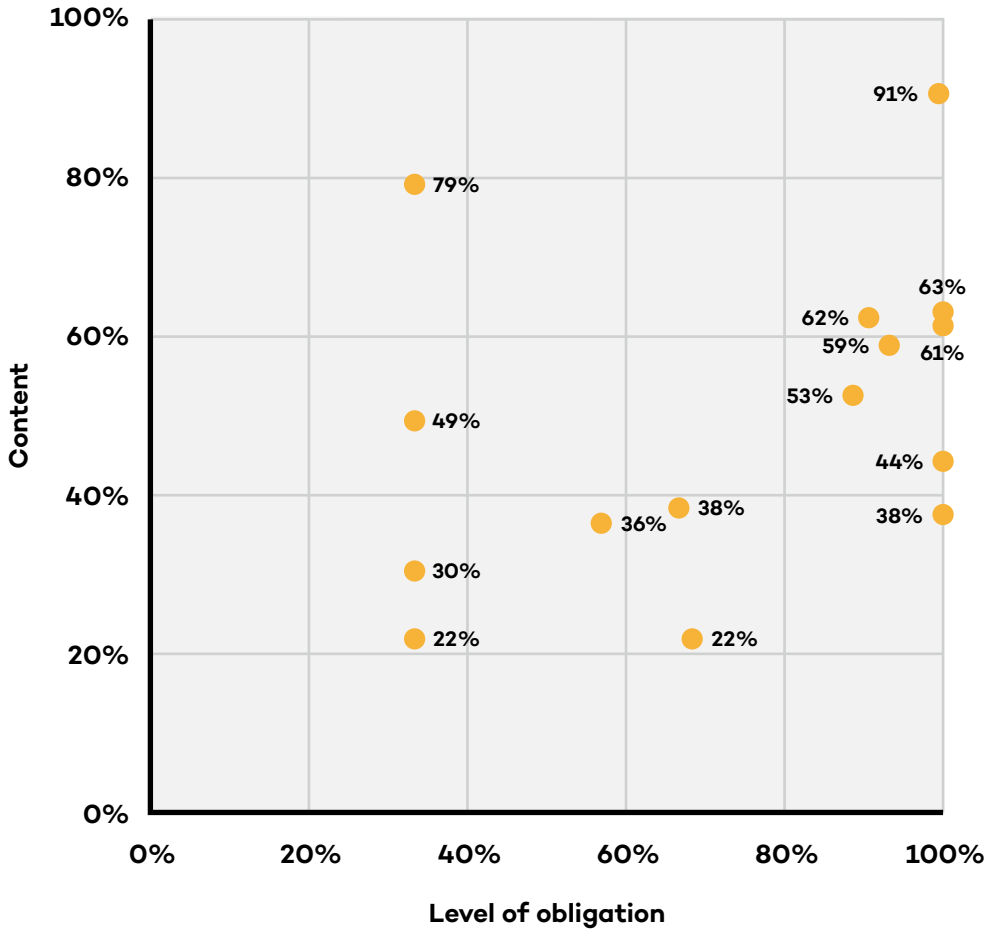
As described in Section III.I.I, the scores for each indicator within a given index were then aggregated and presented as a percentage of the maximum possible score for that index, as shown in Section 3 of the main report. Aggregated scores for each high-level category (environmental, social and business practices) are also shown, together with the overall average score for all three categories, as described in Section III.I.I. The data shown in Section 3 is presented in Figure III.1 and Figure III.2. They illustrate the presentation of the overall average scores for both level of obligation (on the x-axis) and content (on the y-axis) for all 15 initiatives included in the CARE analysis.

Figure III.1 shows the index scores averaged first within the social, environmental and business practice groupings respectively, with the scores for these groupings then averaged. This gives equal weight to each high-level category, rather than to each index. Figure III.2 averages scores for all indicators within each index and then averages the scores for all indexes with equal weighting per index.

Arguments may be made in favour of either approach. It would also have been possible to use both approaches and to present the results side by side. However, as can be seen by comparing Figure III.1 and Figure III.2, the different approaches actually result in relatively minor differences in practice. It was therefore determined that the additional complexity of presenting two different figures was not merited. Unless otherwise noted in the main text, aggregated scores for a standard as a whole have been calculated as the arithmetical averages of the relevant index scores for the respective category, as in Figure III.1.

[19] The discussion of the results will be completed once each initiative has been given the opportunity to review and comment on its own CARE scores.

Figure III.1. Distribution of content and level of obligation scores for all indicators.



Note: Equal weight is given to social, environmental and business practice groupings.

III.II ASSURANCE, RESPONSIVENESS AND ENGAGEMENT

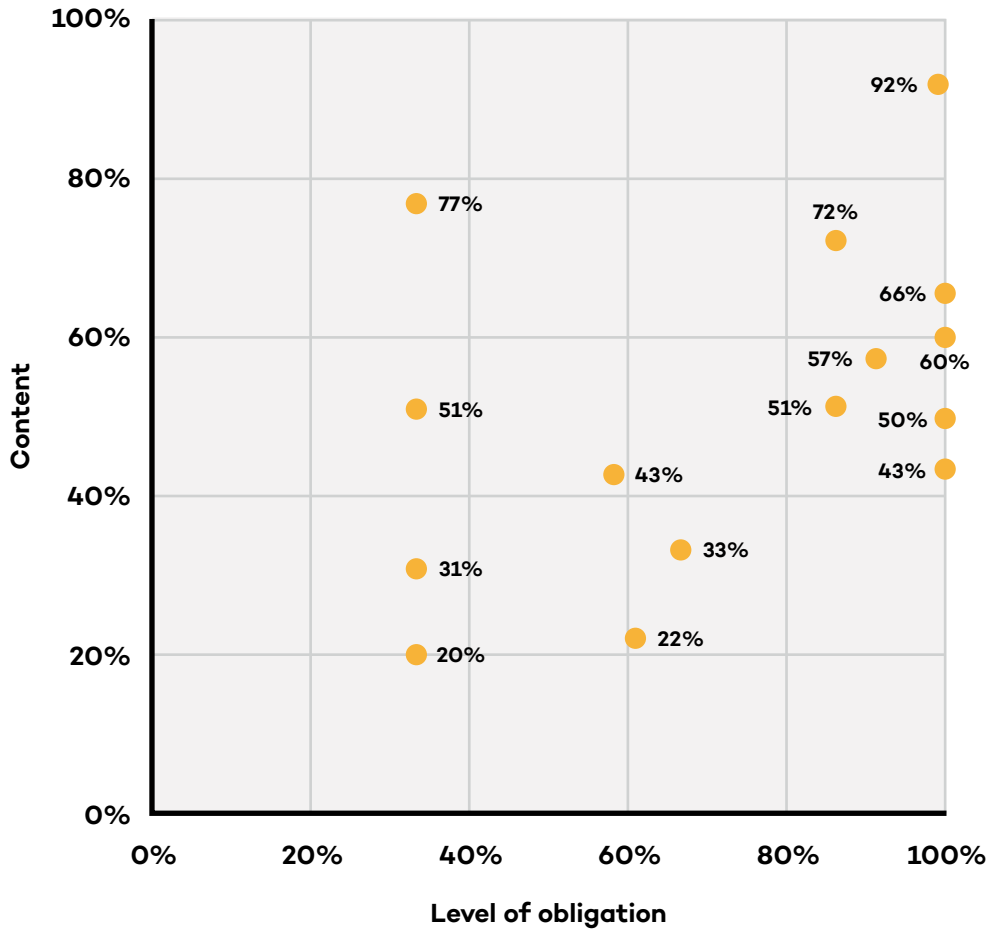
The assurance, responsiveness and engagement aspects of the CARE assessment were evaluated differently than the coverage aspect.

III.II.I INDICATORS

Sets of indicators were developed for each of these aspects, based on previous applications of the CARE methodology for other commodity sectors, as listed in Table III.1, Table III.2 and Table III.3.

Indicators could then be used in one of two ways. Some indicators were used only to describe similarities and differences between initiatives. These descriptive indicators were assessed on a binary yes/no basis, depending on whether the indicator was present or not for a particular initiative. The results are presented as comparative tables in the main text. However, other indicators were assigned scores, allowing an aggregated score for each initiative to be calculated.

Figure III.2. Distribution of content and level of obligation scores averaged for all indicators.



Note: equal weight is given per index.

The lists of indicators for evaluation of the assurance, responsiveness and engagement aspects of each initiative, together with the protocol for assigning scores, if applicable, are given in Tables III.1 to III.10.

For the assurance assessment, there were two sets of unscored, purely descriptive indicators, intended to identify significant differences between the different initiatives' models for assurance (Table III.1), and downstream traceability (Table III.2). A third set of indicators (Table III.3) was intended to provide a measure of the quality of each initiative's assurance program, were scored (Table III.3). The findings are presented and discussed in Section 3.6.

Table III.1. Assurance indicators: Assurance model description.

Indicator	Indicator element(s)	Assessment
Role of self-assessment	First-party reporting a major element of conformity assessment.	Yes/No
	Initiative-supported claims may be based on self-assessment only.	Yes/No
Role of third-party conformity assessmen	Third-party assessment a major element of conformity assessment.	Yes/No
	Initiative-supported claims may be based only on third-party assessment.	Yes/No
Role of the initiative	Initiative carries out audit.	Yes/No
	Initiative reviews audit reports.	Yes/No
	Initiative issues certificate and determines membership.	Yes/No
	Initiative provides formal accreditation of audit bodies.	Yes/No
Independent accreditation or other oversight mechanism	Audit bodies are formally accredited.	Yes/No
	Initiative meets ISEAL Assurance Code.	Yes/No

Table III.2. Assurance indicators: Chain of custody model description.

Indicator	Indicator element(s)	Assessment
1. Product certification	The scheme defines requirements that allow purchasers of mined material to identify that material as having come from a certified mine.	Yes/No
2. Downstream claims	The scheme supports scheme-related claims by downstream users of mined material.	Yes/No
3. Chain of custody standard	The scheme has its own standard and assurance program for traceability and claims by downstream users of mined material.	Yes/No
• Mine source identify preservation	The scheme's program for downstream traceability and claims includes an identity preservation option: the amount of certified material from a specific source that is contained in a product can be tracked through all stages of the supply chain, allowing claims about the origin of the material in a product to be made at the end of the chain.	Yes/No
• Certified content control	The scheme's program for downstream traceability and claims includes a certified content control option: the amount of certified and non-certified material that is contained in a product can be tracked through all stages of the supply chain, allowing claims about the certified content of the material in a product to be made at the end of the chain. If the certified content is 100 per cent, this equates to segregation.	Yes/No
• Mass balance	The scheme's program for downstream traceability and claims includes a mass balance claims option: the amount of certified product sourced by each supply chain actor is tracked, and this determines the amount of certified product that they may sell with an approved claim. The certified product that is sold with a claim may or may not contain material from a certified source.	Yes/No
• Book and claim	The scheme's program for downstream traceability and claims includes a book and claim option: sustainability certificates are granted based on the application of sustainable practices, but the certificates are completely decoupled from the product and are transferable on the market.	Yes/No

Table III.3. Assurance indicators: Assurance model quality.

Indicator	Indicator element(s)	Assessment
Audit model	The role of external audits in determining scheme participation.	• All sites always subject to second-party (scheme) or third-party audit (3) • Second-party (scheme) or third-party audits of some participating sites (2) • Second-party (scheme) or third-party review of information without site visits (1) • First-party reporting only (0)
Site audit frequency	Frequency of second- or third-party site audits, if required.	• Every year (3) • Every 2–3 years (2) • Every 4–5 years (1) • Less than every 5 years, or no second- or third-party site audit (0)
Auditor competency	Specifications for auditor qualifications or training.	• Auditors trained and approved by initiative (+1) • Reasonable auditor qualifications specified (+1)
Independent oversight	Mechanisms for ensuring audit body quality.	• Audit body(ies) required to comply with ISO 17065/17021 (+1) • Audit body(ies) accredited to comply with ISO 17065/17021 (+1) • Verified compliance with ISEAL Assurance Code (+1) • Assessment report summaries publicly available (+1)

For the responsiveness assessment, the indicators were grouped into four subsets covering continuous improvement, adaptation, capacity building and cost reduction, and all indicators were scored, as shown in Table III.4, Table III.5, Table III.6 and Table III.7.

Table III.4. Responsiveness indicators: Continuous improvement.

Indicator	Indicator element(s)	Assessment
Performance levels	Does the scheme explicitly identify different levels of performance, for example through a system of ratings, scores or the reporting of performance data?	• Yes (1) • No (0) • To some extent (0.5)
Continuous improvement requirement	Does the scheme explicitly require participants to improve their performance over time?	• Improvement required even after all requirements for initial participation have been met (1) • Some flexibility is permitted, such as allowing provisional participation on condition of improvement (0.5) • Minor non-compliances may be allowed, but there are no formal mechanisms requiring improvement over time (0)
Incentives	Does the scheme provide the producer with concrete incentives for exceeding basic compliance over time (e.g., reduced fees, special services)?	• Yes (1) • No (0) • To some extent (0.5)

Table III.5. Responsiveness indicators: Adaptation.

Indicator	Indicator element(s)	Assessment
Regional standards and localized indicator development	Does the initiative allow for adaption of indicators and standards to local and regional contexts?	• There is a system of local stakeholder adaptation of international standard (2) • Some requirements reference local requirements (1) • No reference to local requirements (0)
Local auditor engagement	Does the initiative require the use of local auditors for conformity assessment	• Yes(1) • No (0)
ISEAL Impacts Code compliance	Has the initiative been independently verified as complying with the ISEAL Impacts Code?	• Yes(1) • No (0)
Revision period for standard	How often is the standard reviewed, with the potential for revision to respond to changing needs and conditions?	• Specified, and at least every five years (1) • More than five years, or not specified (0)

Table III.6. Responsiveness indicators: Capacity building.

Indicator	Indicator element(s)	Assessment
Funding	Does the initiative make a dedicated fund or discounts available to producers to aid in compliance with certification requirements and continual improvement?	• The initiative itself provides financial incentives that may be used by applicant mining enterprises to aid compliance with the initiative's requirements (2) • The initiative supports or has a clear relationship with organizations that provide financial incentives that may be used by applicant mining enterprises to aid compliance with the initiative's requirements (1) • The initiative is not involved with the provision of financial incentives (0)
Technical assistance materials	Does the initiative provide support to the producer other than financial, such as tools, training and guidance?	• The initiative provides or finances or in-person technical assistance to mining enterprises as an ongoing aspect of its work (2) • In-person technical assistance is supported at some level, for example through the provision of guidance documents explaining how to meet the initiative's requirements (1) • The initiative does not itself provide or support technical assistance (0)

Table III.7. Responsiveness indicators: Cost reduction.

Indicator	Indicator element(s)	Assessment
Separate standard for smallholders	Are there standards or processes written specifically for ASM that differ from the standards and processes for large producers?	• Yes (1) • No (0) • To some extent (0.5)
Group certification	Does the standard system set customized requirements for group certification, such as requirements for sampling policies and audit evaluations?	• Yes (1) • No (0) • To some extent (0.5)
Mutual recognition	Does the standard recognize compliance with other standards systems as full or partial compliance with its own requirements?	• For three or more significant elements (1) • For one or two significant elements (0.5) • No significant elements (0)

The final component of the CARE methodology relates to engagement. As with responsiveness, the different initiatives were scored on a number of subgroups of indicators, covering board diversity, stakeholder accessibility and access to information, as shown in Table III.8, Table III.9 and Table III.10.

Table III.8. Engagement indicators: Board diversity.

Indicator	Indicator element(s)	Assessment (score)
Board representation, developed country : developing country	Proportion of board members who are from developed and developing countries.	• 40–60/60–40 (2) • 60–80/20–40 (1) • 80–100/0–20 (0)
Board representation, men : women	Proportion of board members who are men and women.	• 40–60/60–40 (2) • 60–80/20–40 (1) • 80–100/0–20 (0)
Board representation: stakeholder diversity	Inclusion of at least one board member broadly representative of each of the following interests: i) mining, ii) social impacts, iii) environmental impacts, iv) government, v) the initiative itself, vi) other business interests (e.g., downstream), vii) scientific, independent or undefined.	• 5–7 interest groups: (2) • 3–4 interest groups (1) • 1–2 interest groups (0)

Table III.9. Engagement indicators: Stakeholder accessibility.

Indicator	Indicator element(s)	Assessment (score)
Membership system	The initiative is based on a membership that has a role in decision making.	• Yes (1) • No (0)
ISEAL Standard-Setting Code	The ISEAL Standard-Setting Code defines good practices to be followed in standard development for any sector or product to ensure the standard is credible and effective and that it achieves its objectives.	• Yes (1) • No (0)
Stakeholder consultation in standard setting	Business and civil society stakeholders are formally consulted on the content of the standard during its development.	• Yes (1) • No (0)
Stakeholder decision making in standard setting	Multistakeholder committee vote required for approval of final draft of standard (1) Multi-stakeholder committee role in drafting standard (0.5) No formal multistakeholder committee role in drafting of standard (0)	• 1 ,0.5, 0
Public complaints procedure	The standard body's policies and procedures for complaints are available online to the general public.	• Yes (1) • No (0)
Local accessibility of complaints procedure	• The standard body's complaints and dispute-resolution procedures are available online in other languages (apart from English) to the general public. • Processes are in place that enable complaints to be received locally and that take into consideration language or literacy barriers or lower access to formal means of communication. • Processes are in place that enable complaints to be addressed regardless of language.	• Yes (1) • No (0)
Independent dispute resolution body	A dispute settlement body that is not made up of the organization's board members has been established and formally recognized in writing.	• Yes (1) • No (0)

Table III.10. Engagement indicators: Access to information.

Indicator	Indicator element(s)	Assessment (score)
Annual reports	The standard body's annual reports are made available online to the general public.	• Yes (1) • No (0)
Financial statements	The standard body's independently audited financial statements are made available online to the general public.	• Yes (1) • No (0)
Board membership	A list of the standard body's board members is made available online to the general public.	• Yes (1) • No (0)
Committee membership	A list of the standard body's committee members is made available online to the general public.	• Yes (1) • No (0)
Committee minutes	The standard body's committee meeting minutes are made available online to the general public.	• Yes (1) • No (0)
Standard-setting procedures	The processes undertaken by a scheme owner in setting and reviewing the standard(s) are made available online to the general public.	• Yes (1) • No (0)
Stakeholder comments on standards	Stakeholder comments on draft standards are made available online to the general public.	• Yes (1) • No (0)
List of applicant enterprises	A list of the enterprises that have applied for assessment and for which assessment is not yet completed, or that have been evaluated and found not to be compliant with the scheme's requirements, is made available online to the general public.	• Yes (1) • No (0)
List of compliant enterprises	A list of the enterprises that are deemed to be compliant with the scheme's requirements is made available online to the general public.	• Yes (1) • No (0)
Compliant enterprise impact assessment reports	Environmental impact assessment reports submitted by the producer unit are made available online to the general public.	• Yes (1) • No (0)

III.III DATA COLLECTION AND PROCESSING

- Each initiative was assessed, in accordance with the indicated assessment criteria, on the basis of its publicly available documentation.
- For the coverage aspect of the CARE analysis, initial findings were circulated to each initiative for review and comment, and where comments were made the findings were re-assessed as appropriate.
- In the case of the model description indicators (Table III.1and Table III.2), the findings for the different initiatives were then tabulated and are discussed in the main text.
- In the case of the scored indicators (Tables III.3 to III.10), the scores were used to calculate numerical indexes.
- For the assurance indicators (Table III.3), the scores for each indicator were aggregated, and the total presented as a percentage of the maximum possible score. The resulting percentage scores are presented as the assurance index scores in Section 3.6.2.
- For the responsiveness and engagement indicators (Tables III.4 to III.10), scores for the subgroups were aggregated first, and the totals presented as percentages of the maximum possible score for each subgroup. These percentage scores are presented as the responsiveness and engagement sub-index scores in Sections 3.7.2 and 3.8.2.
- These sub-index scores were then aggregated and averaged, and presented as the responsiveness and engagement index scores in the same sections.
- Scores were tabulated and an overall average was calculated as a percentage of the maximum score.

APPENDIX IV. POTENTIAL ENVIRONMENTAL AND SOCIAL IMPACTS OF EXTRACTIVE INDUSTRIES DEVELOPMENT

Stage	Activities	Potential impact
Exploration	• Geophysical or airborne surveying • Drilling or trenching • Trench blasting • Exploration camp development • Road construction	• Habitat loss or fragmentation • Sediment runoff, increased suspended sediment load to surface waters • Disturbance to wildlife and local communities • Species loss due to hunting • Spills of fuels and other contaminants • Increased colonization due to road building
Site preparation and mineral excavation	• Mine and well construction • Infrastructure development (power lines, roads) • Pipeline construction • Mine camp construction • Creation of waste rock piles • Creation of low- and high-grade ore stockpiles • Creation of waste impoundments • Blasting to release ores	• Habitat loss or fragmentation • Chemical contamination of surface and groundwaters • Declining species populations • Toxicity impacts to organisms (terrestrial and aquatic plants and animals) • Altered landscapes from mine and well workings (e.g., open pits, changes in stream morphology) • Increased demand for water resources • Increased demand for electrical power • Increased erosion and siltation • Altered patterns of drainage and runoff • Dust and fumes from explosives • CO2 emissions (gas flaring) • Increased colonization due to road development • Species loss due to hunting • Increased domestic violence and prostitution • Mine worker accidents resulting in death or disability • Community resettlement and possible human conflict

Stage	Activities	Potential impact
Primary processing	• Milling and grinding ore • Ore concentration through chemical leaching, flotation, electrowinning or gravity separation • Oil concentration in gathering stations	• Discharge of chemicals and other wastes to surface waters • Emissions of sulphur dioxide, nitrous oxides and heavy metals (lead, arsenic, cadmium) • Increased demand for electrical power • Habitat fragmentation due to oil pipelines • Oil spills from pipelines
Product transport	• Packaging and loading product • Transport via sea or land • Infrastructure development (ports and roads)	• Noise disturbance • Greenhouse gas emissions related to fuel use • Pollution of waterways from shipping accidents
Mine closure and post-operation	• Reseeding and revegetation • Recontouring waste piles and pit walls • Fencing dangerous areas • Monitoring seepage	• Persistent contaminants in surface and groundwaters • Expensive, long-term water treatment • Persistent toxicity to organisms • Loss of original vegetation/biodiversity • Windborne dust • Permanent landscape changes • Abandoned pits or shafts that pose hazards and health risks to humans

Source: WWF, 2015.

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