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Voluntary initiatives in the mining sector and their principles and criteria on environmental sustainability

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STRADE is an EU-funded research project focusing on the development of dialogue-based, innovative policy recommendations for a European strategy on future raw materials supplies. In a series of policy briefs and reports the project will offer critical analysis and recommendations on EU raw materials policy.

This policy brief reviews environmental principles and criteria in voluntary and legally non-binding initiatives with particular relevance for the ore mining sector.

1. Introduction

The previous policy briefs No. 04/2016 [1] und 05/2016 [2] outlined the various environmental and socio-economic challenges in the ore mining sector, particularly in regions with weak governance. Due to the large number of voluntary initiatives of diverse actors responding to these challenges on top of legal regulations, it is increasingly difficult to maintain a comprehensive overview of the most relevant actors, their goals and their approaches. This and the next policy brief aim to briefly outline the approach of voluntary and legally non-binding initiatives towards responsible mining, the underlying principles and the target groups. The environmental aspects are the focus of the present policy brief, whereas the socio-economic issues will be addressed by the later policy brief.

The present policy brief summarizes the results of a mapping of the most relevant responsible mining initiatives for the ore mining sector and analyses if and to which extent environmental aspects are addressed. It is not the target of this policy brief to evaluate the effectiveness of the approaches. This will be the subject of a later policy brief. Instead, this policy brief aims to provide a basic understanding of the landscape of legally non-binding initiatives and their principles for responsible mining in terms of environmental sustainability. Based on this insight, STRADE will determine in its coming dialogue processes which role EU policy can and could play in relation to these voluntary initiatives. For this dialogue, the STRADE approach is very broad and will not be limited to individual measures, such as certification and due diligence schemes, but rather will assess a wide range of dialogue and policy options.

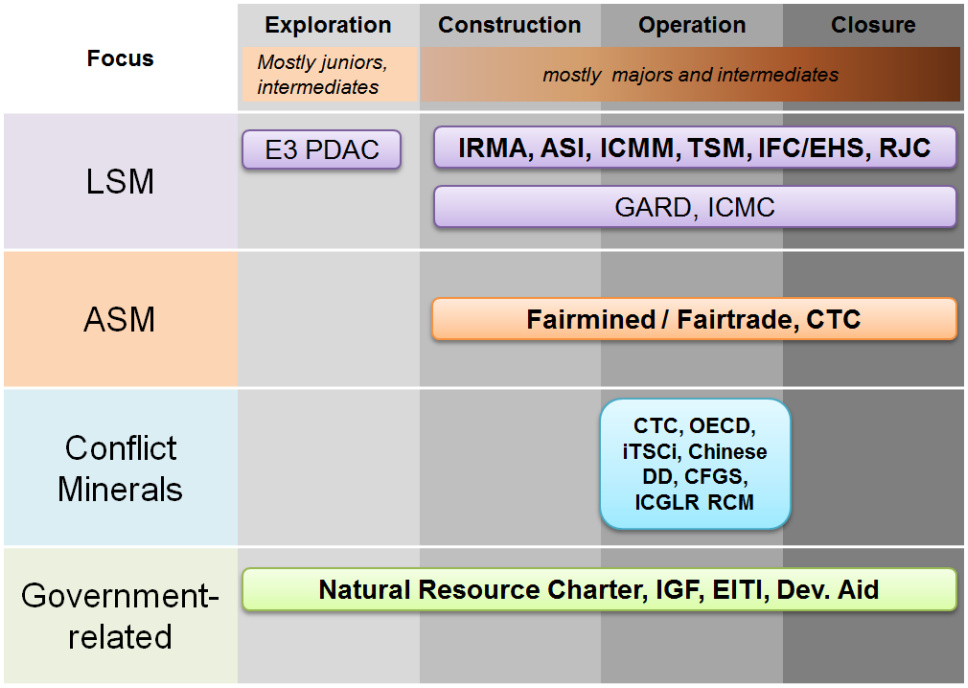
2. Scope of the policy brief

In the last 15 years within the mining sector, a large number of voluntary responsible mining initiatives were created with broad and diverse variations in their addressed topics and target groups. Some of the initiatives addressing environmental aspects focused on one type of commodity whereas others developed principles for a wide range of minerals. Differences also relate to the region (specific region or global view) and their focus (e.g. specific impacts from chemicals such as mercury or from all processes). Furthermore, initiatives may differ in the target group, e.g. the large scale mining (LSM) sector, the artisanal and small scale mining (ASM) sector, the supply chain or the governing actors.

The following figure summarizes the scope of this policy brief, with focus on the initiatives in bold. The other initiatives will not be presented so as to not overcharge this analysis. The analysis starts in chapter 3 with initiatives that mainly target LSM. Later chapters analyse initiatives with relevance for ASM and conflict minerals and their relation to environmental aspects. Finally, the policy brief looks at initiatives addressing good governance in the mining sector.

The following figure classifies the selected initiatives, frameworks and approaches along the life cycle phases of a mine with different environmental challenges. Other classification schemes that classify standards and frameworks along the supply chain can be found in literature, e.g. in the recent analysis from the German Federal Institute for Geosciences and Natural Resources (BGR) [3].

Figure 1: Overview of selected initiatives, frameworks and approaches



Abbreviations:

ASI = Aluminium Stewardship Initiative; CFGS = Conflict-free Gold Standard; CTC = Certified Trading Chains in Minerals Production; E3 PDAC = Prospectors & Developers Association of Canada e3 Plus Framework for Responsible Exploration; EITI = Extractive Industries Transparency Initiative; GARD = Global Acid Rock Drainage Guide; GRI = Global reporting Initiative; ICGLR RCM = Mineral Certification Scheme of the international Conference on the Great Lakes Region / Regional Certification Mechanism; ICMC = International Cyanide Code; ICMM = International Council on Mining and Metals; IFC/EHS = International Finance Corporation Environmental, Health and Safety Guidelines for Mining; IGF = Intergovernmental Forum; IRMA = Initiative for Responsible Mining Assurance; iTSCi = International Tin Supply Chain Initiative; RJC = Responsible Jewellery Council; OECD = OECD Due Diligence Guidance for Responsible supply Chains of Minerals from Conflict-Affected and High-Risk Areas; Chinese DD = Chinese Due Diligence Guidelines for Responsible Mineral Supply Chains; TSM = Towards Sustainable Mining

3. Environmental principles in guidelines for large-scale mining

3.1. Analysis of selected standards

This chapter briefly describes and analyses selected standards that have a set of environmental principles designed for application in LSM and that include the ore mining sector: the International Finance Corporation's Environmental, Health and Safety Guidelines (IFC/EHS), the International Council on Mining and Metals' Framework (ICMM), the Mining Association of Canada's Towards Sustainable Mining (TSM), the Initiative for Responsible Mining Assurance (IRMA; draft status), the Responsible Jewellery Council and the Aluminium Stewardship Initiative (ASI; draft status). The frameworks ICMC and GARD are not included in the overview because they are highly specific to cyanide management and acid mine drainage. More detailed presentations are given in the recent publications from the German Environment Agency [4] and German Geologic Survey [3].

- The World Bank Group launched the **IFC Environmental and Social Performance Standard** and the **Environment, Health & Safety (EHS)** guidelines for mining. These standards are not only applied to World Bank financed projects but also to publicly supported export projects from OECD member states and to around 80 international private and public banks committed to the Equator Principles (see chapter 3.3).
- The **International Council on Metals and Mining (ICMM)** includes 23 major mining companies and associated mining associations such as the Minerals Council of Australia, Euromines, the Chamber of Mines of South Africa and the Nickel Institute. The 23 full-member companies commit to the 10 ICMM principles and very comprehensive guidelines for most environmental protection areas. Each member must conduct an annual third-party audit and publish its results. In 2014, ICMM member companies

operated in 58 countries at 950 operational mining sites and had a share in global production of 54% for copper ore, 29% for iron ore and 30% for gold, 25% for nickel, 45% for platinum group metals, 15% for lead and 21% for zinc [5].

- The Canadian **'Towards Sustainable Mining' programme (TSM)** comprises more than 20 major mining companies with head offices in Canada. TSM has developed responsible mining principles for environmental aspects and comprehensive guidelines for bringing them into practice. It annually publishes a classification of members' responsible mining performance within Canada. The principles are binding for members' activities in Canada but only voluntary for operations outside of Canada. The **Finnish Network for Sustainable Mining** adopts the TSM-approach with some modifications and will start with its first audits in 2017. It was founded in 2012-13 after the tailing dam burst in Talvivaara, Finland and is based on a strong, common will to prevent such accidents in future.
- The **Initiative for Responsible Mining (IRMA)**, with members from Civil Society Organisations (CSO), communities, mining companies and downstream companies, is developing a best-practice standard for large-scale mining. It is not yet implemented; currently, the second draft is being reviewed. Implementation is expected in 2017.
- The **Responsible Jewellery Council (RJC)** was founded by 14 companies and trading associations in 2005. The RJC Code of Practice (RJC CoP) is a performance standard for diamonds, gold and platinum mining. The RJC grew rapidly after its founding and in 2014 had 320 CoP certified member companies along the supply chain, among them 7 mining companies and 14 refineries. [3],[4]
- The **Aluminium Stewardship Initiative (ASI)** focuses on the aluminium supply chain and covers bauxite mining, refining, smelting, fabrication and recycling in one common performance standard and one chain of custody standard. The ASI Chain-of-Custody standard is still in draft status. The scheme implementation is planned to start by the end of 2017 and a review of the performance standard until 2019 has been announced [3].

IRMA (second draft), TSM, IFC/EHS and ICMM focus on LSM with very detailed, comprehensive and partly ambitious environmental criteria. In contrast, ASI (first draft), which covers the whole aluminium supply chain, addresses the environmental impacts from mining only very generally and lists no detailed requirements. RJC's requirements show a middle degree of detail.

IRMA, IFC/EHS, ICMM and RJC describe principles and criteria which must be fulfilled to be compliant with the standard. The TSM approach is different in that it utilizes different performance levels to measure and visualize performance improvements over time. A company which does not fulfil any higher criteria and only meets legal requirements is classified at the lowest level. A company meeting ambitious criteria is ranked more highly. The classification of all members is published on the TSM website and shows a successful shift towards higher performance levels since 2006. The Finnish TSM adopted this type of ranking for the stricter environmental regulations in Finland.

To meet the requirements of IRMA, TSM, IFC/EHS and ASI, strong efforts with best available technologies, good management, public reporting and know-how is necessary. ASMs usually lack the capacity or funds for meeting such requirements and are therefore not the target group of these initiatives.

The following list reveals the broad spectrum and complexity of assessing environmental mining performance by summarizing the major requirements formulated by IFC/EHS, IRMA, RJC, ASI and ICMM:

- **Biodiversity:** The analysed initiatives acknowledge Highly Protected Areas as no-go zones. For other areas, they demand – depending on the level of protection – biodiversity assessments and management plans as a result of stakeholder and expert consultations. If avoiding impact on biodiversity is not possible, other offset measures shall be taken to achieve an overall net benefit.
- **Water use:** The analysed initiatives all require monitoring of water use, water management plans and efforts to reduce consumption, including reuse and recycling. They also demand stakeholder consultations on conflicting water use and conservation requirements.
- **Water quality:** The analysed initiatives state that the contaminants' concentrations in surface and groundwater may not significantly increase due to mining. IFC/EHS and IRMA also give limit values. Important other measures are water quality risk assessment, management, monitoring and public reporting. More details are given in the bullet points on tailings and waste rocks, as they are one major cause of water contamination.
- **Air:** The analysed initiatives aim to minimise air emissions, namely dust and gaseous emissions. Some of them regard air quality management plans, monitoring, reporting and specific dust abatement technologies as relevant instruments. IRMA and EHS are more specific and refer to EU and WHO air quality guidelines, which demand complying with specific limit values.

- **Hazardous material management:** EHS and IRMA demand compliance to the International Cyanide Management Code (ICMC). Related to the general management of hazardous materials, EHS lists general technical measurements, such as double-walled pipelines, to prevent hazardous material leaks.
- **Waste rock:** Waste rock is particularly addressed in EHS and IRMA. The targets seek to minimize erosion and groundwater contamination from weathering and seepage and to ensure long-term dump stability. EHS and IRMA name different measurements, such as monitoring, dump covering and insulation of potentially leaching rocks from the environment. IRMA refers to the Global Acid Rock Drainage Guide (GARD), a very comprehensive and detailed guideline specialising in acid rock drainage mines, and further prohibits the use of waste rock and other mining waste in construction if the waste is not free of acid/metal leaching contaminants.
- **Tailings:** The major risk with catastrophic consequences is a tailing dam burst. After recent tailing dam bursts in Mount Polley, Canada and Bento Rodrigues, Brazil, ICMM and TSM started a review process of their tailing management guidelines to prevent further accidents by more thorough tailings management. EHS and IRMA also indicate the importance of proper design and management of tailing storage facilities and refer to the International Commission on Large Dams, the Australian National Committee on Large Dams and the Canadian Dam Association, which published very comprehensive guidelines.

  EHS and IRMA also address proper storm-water management, which is essential to prevent environmental contamination from the flooding of tailing impoundments and other mining and processing units.

  Runoff and leachate from tailing storage facilities that have the potential to contaminate groundwater and surface water is also addressed in EHS and IRMA. These guidelines list techniques, such as liners, drainage systems and control systems, as potential mitigation measures.

  Regarding long-term disposal, IRMA clearly prefers a dry consistency of the tailings residue after mine closure and only allows wet disposal if a risk assessment is made.
- **Disposal in water bodies:** IRMA does not allow the disposal of mine waste in rivers, streams, lakes and oceans. EHS is less stringent on this subject: while it does not consider riverine or shallow marine tailings disposal as good practice, it leaves the door open for deep sea tailings disposal in the absence of a sound, land-based alternative and based on an independent scientific impact assessment. RJC similarly allows marine or lake disposal under certain circumstances (less environmental and social impact/risk than a land-based tailings facility, no significant adverse effect on coastal or marine species and habitats and long-term impact monitoring).
- **Radioactivity:** The only guideline to address radiation exposure is the EHS-guideline, which limits levels of workers' exposure. The environmental impact from water and air emissions of radioactive substances and radioactive waste disposal is not addressed by any standard.
- **Mine Closure:** EHS, ICMM and IRMA all require comprehensive mine-closure plans with regular updates, detailed technical planning and detailed cost plans for ensuring that sufficient financial funding is available for all reclamation work. RJC demands regular stakeholder engagements on mine closure issues in addition to financial provisions. ICMM has developed a detailed and comprehensive mine-closure tool kit covering environmental, economic and social aspects.

In addition to the guidelines analysed above, two Chinese guidelines are briefly described:

The Chinese Chamber of Commerce of Metals, Minerals & Chemicals Importers & Exporters (CCCMC) in 2014 published the Guidelines for Social Responsibility in Outbound Mining Investments, which refer to Chinese companies' activities in foreign countries and also address environmental issues. The document encourages companies to apply best practice techniques and gives guidance on specific issues such as acid mine drainage or conservation of biodiversity. The CCCMC document includes a benchmark to other standards, such as ICMM or IFC/EHS. Though it seems to be less comprehensive than the formerly analysed guidelines, it offers a good starting point for responsible mining practice.

Another guideline, the Chinese Green mining guideline published in 2010 by China's Ministry of Land and Resources, addresses China's domestic mines. In 2014, a total of 661 mines had been labelled as "Green Mine". The guideline aims at implementing responsible practice at the advanced level of state and includes issues such as emission-reduction, waste reduction, wastewater reuse, risk reduction, site rehabilitation and renaturation [6].

The exploration phase is not in the core focus of any of the above-mentioned standards. Instead, the PDAC's (Prospectors and Developers Association of Canada) e3 Plus Framework for Responsible Exploration offers a very detailed framework on exploration and prospection-related challenges, with a

comprehensive toolkit on environmental stewardship and including around 300 pages of detailed technical guidance. The Finnish TSM is currently also developing an exploration standard.

This analysis shows that most environmental challenges, as outlined in the previous policy brief No. 04/2016 [1], have been addressed by many of the described standards. Only the issues of short- and long-term radiation exposure from mining waste and radioactive air and water emissions are absent[1]. Apart from this, successful implementation of these standards with strong assurance systems could lead to significant progress in environmental performance, particularly in countries lacking adequate governance and poor environmental performance levels. Thus, the current major tasks for expanding responsible mining are to broadly implement existing standards, monitor their efficiency and continuously improve existing frameworks. These steps are far more important than creating new standards and coincide with mining and downstream companies' complaints about an excess of standards and certification schemes that lead to a lack of clarity and fears of excessive administrative efforts [7].

The TSM approach, a supportive approach for integrating mining companies with different performance levels, allows members with low environmental performance to join the initiative and gradually improve. TSM statistics show that this top-runner concept gives positive incentives with the result that the average performance level of the members increases significantly, particularly in the first years of membership. Besides Finland, Botswana has also decided to follow this approach.

Finally, it should be noted that, though mining companies' compliance with the analysed standards will lead to relevant improvements, at least at previously poorly managed mining sites, the standards and certification schemes cannot guarantee a 100% risk-free operation. However, they can help to measure and increase performance. This has been shown in the recent incidents of tailing dam failures with their severe impacts in Brazil, Canada and Finland. Implementation of the standards can contribute to a significant risk reduction by encouraging prevention measures and continuous review processes.

3.2. Environmental principles of European mining companies

This chapter looks at the commitment to standards and initiatives by European mining companies with headquarters or operations in the EU. The mapping of 25 major companies' commitment firstly looks at sustainability reporting, which is seen as a starting point for broader engagement. Twenty-four major companies have published a sustainability report; twenty-three major companies reported according to the relevant standards by the Global Reporting Initiative (GRI). Regarding the commitment to broader sustainability schemes, the analysis found that 20 of the analysed companies applied the European ISO 14001 standard (Environmental Management), and more than half of the companies were committed to the UN Global Compact Principles.

Only 4 of the 25 major companies are members of ICMM and 7 are members of the Canadian TSM[2]. Instead of membership in a responsible mining initiative, some companies opt to follow their own individual sustainability scheme. However, these individual programs are not part of the mapping within this policy brief. Research on junior and intermediate companies[3] with HQ or operations in the EU has further revealed that these companies commit far less to responsible mining initiatives than major companies. Reasons for this might be budget constraints or the lower relevance of public reputation for junior or intermediate companies.

The example of the Finnish TSM shows that industry initiatives can complement legal requirements and open a platform for higher transparency on responsible mining issues, dialogues with stakeholders and exchange of best practice. Lessons learned and further analysis on impacts will show if TSM in Europe can contribute to further improve performance and also acceptance of mining.

3.3. Environmental principles in the finance sector

The Equator Principles (EP)[4] are a risk management framework currently adopted by 84 financial institutions in 35 countries (the Equator Principles Financial Institutions – EPFIs). The framework requires institutions to determine, assess and manage environmental and social risk in projects in which they are involved or are intending to be involved. The EP are primarily aimed at providing a minimum standard for due diligence to

[1] Radioactive radiation can arise from radioactive elements embedded in the ore that are contained in the tailings. Human health and ecosystems might be endangered by radioactive dusts transported by wind erosion and radioactive groundwater contamination from leaking TSFs. Further details are given in policy brief no. 04/2016.

[2] The principles of the Canadian TSM are only mandatory for members' operations in Canada.

[3] For company definitions see policy brief no. 03/2016. Major companies: considered to have financial strength to develop a major mine on their own; revenues over USD 500 million. Intermediates: revenues between USD 50 million and USD 500 million. Juniors: funding exploration; revenues less than USD 50 million.

[4] http://www.equator-principles.com/

support informed decision-making and to reduce social and environmental risks in investment projects. They are applied to World Bank financed projects, publicly supported projects from OECD member states and to all international private and public banks committed to the Equator Principles. For projects located in "non-designated" countries, which include all developing countries, the assessment process evaluates compliance with the World Bank IFC/EHS Guidelines described in chapter 3.1. The European Bank for Reconstruction and Development (EBRD) and OECD export agencies commit to the EP. However, the European Investment Bank (EIB), which is also present in the mining sector, e.g. in the framework of the ACP Investment Facility[5], has not adopted the Equator Principles and opts to use other mechanisms to cope with environmental challenges [8].

4. Environmental principles in guidelines addressing Artisanal and Small Scale Mining

ASM is not explicitly excluded in most standards that primarily address LSM. However, in practice ASM cannot be expected to fulfil the ambitious and comprehensive criteria because techniques are not available, required investments are too high, skilled staff for management and monitoring is not available or know-how is lacking.

There are only a few standards specifically addressing environmental criteria for ASM. Table 1 summarises the environment principles of three selected standards: Fairmined (FM), Fairtrade (FT) and CTC. Fairmined and Fairtrade are similar standards, as they were developed jointly within multi-stakeholder initiatives in 2011. They refer to gold, silver and platinum mining from ASM and aim to improve social and environmental performance. Fairmined and Fairtrade are already implemented in several mining organizations in Colombia, Peru, Bolivia and Mongolia [3]. The Certified Trading Chains scheme (CTC) has been piloted in Rwanda and is being implemented in the DRC with the objective of certifying responsible mining practices or "ethical" production and trade of minerals, notably the 3TGs from ASM [9]. Overall, the global impact of these ASM-standards is still quite low, for example their global market share for gold is about 0.01% [10].

Table 1: Overview on selected environmental criteria in two ASM standards

Environmental Criteria	Fairmined / Fairtrade	CTC
Environmental impact study	• Required	• Required
Treatment and management of chemicals, toxic and dangerous substances	<u>Premium/Ecological category:</u> • No use of mercury and cyanide • No discharge of contaminated water <u>Regular category:</u> • Progressive reduction of mercury use • Safety rules for mercury and cyanide handling • Measures to reduce acid mine drainage • Tailings storage outside of water bodies • Proper disposal of waste	• Management plan implemented • Treatment, recycling and optimal use of dangerous substances and waste • Recycling or optimal use of waste rock • Retention dams at site • Progressive reduction of mercury use • Safety rules for mercury and cyanide handling
Rehabilitation after closure	• Rehabilitation through topographic restoration within 2 years after closure	• Provision to cover rehabilitation costs • Closure plan with regular updates (environment and costs)
Contaminated water	• No discharge of contaminated water	• Respect of all legal requirements for water

All three standards pick up the most pressing environmental issues in ASM, particularly the targets to reduce mercury use and better handle mercury and cyanide in gold mining, and consider the specific conditions in the ASM sector. The standards are dynamic and require stepwise improvement, allowing mines to gradually improve their performance. With broader uptake, support and strong assurance, ASM sustainability certification schemes have the potential to dramatically reduce mining's environmental impacts, especially for mercury and cyanide environmental contamination, and alleviate poverty. As with LSM standards, the challenge of implementation is far more important than the creation of new standards. Particularly for ASM

[5] €566 million under the first financial protocol of the Cotonou Agreement (2003-2008) went to the mining sector, which represented 15% of the initial endowment of the ACP Investment Facility and EIB Own Resources. [8]

activities, which operate at a low degree of formalisation, under high poverty conditions or are considered as illegal, the certification process encounters major obstacles.

5. Environmental criteria in conflict-focused initiatives

Many voluntary initiatives from various stakeholders (OECD, authorities, associations, companies, CSOs) have developed additional standards and certification schemes for preventing armed conflict financing from mining revenues (for more background information see policy brief No. 05/2016). Most initiatives focus on tin, tungsten, tantalum (and their ores) and gold (3TG-minerals) from conflict-affected and high-risk areas in the African Great Lakes Region, in particular the Democratic Republic of the Congo (DRC) and neighbouring countries. This section briefly introduces the most relevant initiatives.

The most prevalent chain of custody certification systems in the region, the International Tin Supply Chain Initiative (iTSCi) focuses on 3T minerals (but not gold) and is implemented at more than 1200 ASM sites in the DRC and Rwanda [11]. The CTC scheme was piloted in Rwanda and currently certifies a small number of 3TG ASM sites in the DRC (see chapter 4) [9]. Gold from LSM is mainly addressed by the World Gold Council's (WGC) Conflict Free Gold Standard (CFGS), covering around 23% of the World Gold Production [12]. In this context is should be noted that most of this gold volume did not originate in the African Great Lakes Region, but rather from various LSM sources around the world.

The OECD developed the Due Diligence Guidance for Responsible Supply Chains of Minerals from Conflict-Affected and High-Risk Areas, which principally includes all minerals and has no regional limitation [13]. The Chinese Due Diligence Guidelines for Responsible Mineral Supply Chains addresses all Chinese mining investments outside China.

In contrast to these initiatives, the Regional Certification Mechanism is a mandatory approach for transposing into national legislation all ICGLR member states[6]. Currently, only two countries, DRC and Rwanda, implement the initiative [14]; Uganda is preparing implementation by setting up respective legislation. In 2010, the US Dodd-Frank Act 1502 was passed that requires US stock-listed companies to report their use of conflict minerals from the DRC or bordering countries. First reports from the Act were due in 2014. The similar intention is followed by the in 2016 agreed framework for a future EU regulation on 3TG, which foresees mandatory due diligence checks according to the OECD due diligence guidance by importers of 3TG minerals and metals from conflict and high-risk areas.

Table 2 provides an overview of selected voluntary conflict-focusing initiatives and their relationship to environmental issues. Table 3 maps the mandatory regulations.

Table 2: Selected conflict-focusing initiatives on ore mining (without smelter) and the addressed environmental issue

Voluntary initiatives	Relevance for environment
iTSCi (ITRI Tin Supply Chain Initiative) (since 2010)	• None, environmental issues not included
Conflict Free Gold Standard (CFGS) (2012)	• Does not include environmental requirements, but refers to the Global Reporting Initiative (GRI), which does include environmental aspects
Certified Trading Chains in Mineral Production (CTC) (since 2012)	• Specific technical and management requirements as described in Table 1 as pre-condition for certification
OECD Due Diligence Guidance for Responsible Supply Chains of Minerals from conflict-affected and high-risk areas (since 2011)	• Environmental harm issues are mentioned but not specified
Chinese Due Diligence Guidelines for Responsible Mineral Supply Chains (since 2015)	• Includes principles for a wide range of environmental issues

[6] Member states are Angola, Burundi, Central African Republic, Republic of the Congo, DRC, Kenya, Rwanda, Sudan, South Sudan, Tanzania, Uganda and Zambia

Table 3: Mandatory regulation on conflict minerals and the addressed environmental issue

Mandatory regulations	Relevance for environment
International Conference of the Great Lakes Region (ICGLR) / RCM (since 2011)	• Environmental aspects are not mandatory for certification, but progress is tracked
Dodd Frank Act 1502 (since 2014)	• None, environmental issues not included
EU conflict minerals framework (in preparation)	• No environmental requirements

Table 2 and Table 3 show that environmental principles are only substantially integrated by CTC and the Chinese Due Diligence Guidelines due to their broader approach "beyond conflict". Debates continue over extending certification and due diligences schemes specialized in conflict minerals by environmental issues. However, the STRADE team recommends not overloading these initiatives with more environmental principles since the implementation of the current requirements is still a huge challenge, especially for ASM gold. The introduction of further requirements at that stage is not realistic. Instead, the highly complex local interrelationship between mining and socio-economic and political processes and the limitations of certification and due diligence schemes must be considered. Their potentially negative side effects, such as job losses in the ASM sector due to unintended market shifts to the more regulated LSM sector, must be carefully considered, attentively monitored and accompanied by positive contributions to local development and active dialogues.

6. Environmental principles in government-related initiatives

The Raw Material Initiative (RMI) and the European Innovation Partnership (EIP) also address environmental issues in raw material supply. For example, these aspects are included in raw material diplomacy, in research agendas and in development assistance [15–17]. The 2015 EU Trade Strategy acknowledges that European consumers are concerned about social and environmental conditions in production sites around the world and increasingly scrutinise the effects of Free Trade Agreements (FTAs) on other countries, notably developing countries. The Strategy concludes that the EU's trade and investment policy must respond to consumers' concerns by reinforcing corporate social responsibility initiatives and due diligence across the production chain, with a focus on respecting human rights and the social and environmental aspects of value chains. The RMI and 'Trade for all' strategy papers give no detailed specifications for practical implication of these principles. It is the task of the subsequent working units and dialogue processes to clarify the goals and translate the overall targets into concrete action.

Europe's development assistance comprises various projects from member states as well as EU projects. The EU is also financing a UNDP-EU-African, Caribbean, Pacific (ACP) Group of States initiative to support the low-value minerals and materials sector in the ACP countries, which also addresses environmental challenges [18].

Globally, a large number of good-governance initiatives addressing responsible mining emerged. Mostly, their focus is on good governance and/or sustainable development in developing countries. Some of them also address environmental issues. The following paragraphs briefly describe the relationship between environmental issues and the Intergovernmental Forum on Mining, Minerals, Metals and Sustainable Development (IGF), EITI, the Natural Resource Charter and the OECD.

The IGF, founded in 2002, is a platform for governments to work collectively to achieve their sustainable mining goals. European members include France, the UK, Germany, the Netherlands and Romania. The members are committed to the Mining Policy Framework (MPF) that compiles governments' tasks to ensure good governance in the mining sector, including environmental management. It also relates to a number of other initiatives, such as the IFC/EHS Guidelines and explicitly addresses topics such as the management of water, biodiversity, mine closure, emergency preparedness and treatment of abandoned mines.

The Extractive Industries Transparency Initiative (EITI) is a pioneer global standard founded in 2003 and implemented in 52 countries and promotes the open and accountable management of oil, gas and mining industry resources. The standard requires countries and companies to disclose information along the extractive industry value chain. Though EITI does not actively address environmental aspects, it can be used to make payments to environmental protection in the mining sector transparent and reveal insufficient funding of environmental needs. For example, Mongolia implemented transparency requirements on companies' payments for the rehabilitation and environmental performance of mining sites.

The Natural Resource Governance Institute (NRGI), with its 2010 National Resource Charter of 12 best-practice principles to manage resource wealth and provisions of policy advice for governing resources, also addresses environmental issues. The Charter was developed in a multi-stakeholder consultation, and the NRGI relies on funding from a wide range of global donors (governments, banks, companies).

The OECD has provided three instruments relevant for the mining sector: the Due Diligence Guidance for Responsible Supply Chains of Minerals from Conflict-Affected and High-Risk Areas, the Base Erosion and Profit Shifting ("BEPS") project with currently 80 members, focusing on tax avoidance and profit shifting, and the Guidelines for Multinational Enterprises with currently 46 adhering countries. An OECD guideline, apart from the general guidelines for multinational enterprises, providing specific principles for responsible mining and good governance in the mining sector is not a matter of discussion yet.

7. Conclusion

The analysis shows that most environmental challenges are widely addressed by the described standards that relate to LSM and ASM sites. Only the issues of short- and long term radiation exposure from mining waste and radioactive air and water emissions should be included in relevant areas. Poorly managed mining sites could use standard implementation to significantly improve their performance. The crucial point is the successful and broad implementation of responsible mining schemes rather than the elaboration of further frameworks. A promising approach for a broad implementation in LSM and ASM are dynamic standards that allow stepwise improvements.

Most initiatives on conflict minerals clearly focus on conflict-free sourcing and have little or no connection to environmental principles; it is not recommended to overstrain these schemes. Generally, all approaches aiming at environmental improvements and/or conflict-free sourcing should carefully consider potentially negative side effects, such as job losses in the ASM sector due to unintended shifts to the LSM sector.

Though most major mining companies publish sustainability reports and follow the Global Reporting Initiative, most European companies are not members of a responsible mining initiative that publishes third-party evaluations of their performance. For those companies not operating abroad and in developing countries, true for many European companies, the added value of these initiatives might not initially be evident, as they are already operating in a comparably regulated environment. However, the commitment of Europe's mining companies to responsible mining could be made more transparent if more companies would join associations such as the ICMM, especially if they expand their business to regions outside of Europe.

The EHS Guidelines of the World Bank play a key role in safeguarding environmental standards in their financing of extractive industry projects because the guidelines are applied to publicly supported projects from OECD member states as well as to all international private and public banks, including the European Bank for Reconstruction and Development committed to the Equator Principles. It is therefore recommended that the European Investment Bank also commit to the Equator Principles which refer to the EHS Guidelines.

Regarding governments' role in supporting environmentally-sound mining practices, the EU's commitment to responsible mining principles is included in the Raw Material Initiative (RMI), in developing assistance and in the EU Trade strategy "Trade for all". In addition, global initiatives and organizations such as the Intergovernmental Forum on Mining, Minerals, Metals and Sustainable Development (IGF), the Natural Resource Charter, EITI and OECD also address environmental aspects in the extractive sector.

In conclusion, the various initiatives cover the most environmentally-relevant issues. The landscape is, however, very scattered, and even today there are no globally-accepted guidelines with minimum standards for responsible mining principles and good governance.

STRADE will discuss in further dialogues how the EU's commitment to responsible mining can be advanced and translated to more detailed sub-targets, which will consider the diverse landscape of local and global initiatives. It will also address the EU's role in current and future international initiatives for best practice in the extractive sector.

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Project Background

The Strategic Dialogue on Sustainable Raw Materials for Europe (STRADE) addresses the long-term security and sustainability of the European raw material supply from European and non-European countries.

Using a dialogue-based approach in a seven-member consortium, the project brings together governments, industry and civil society to deliver policy recommendations for an innovative European strategy on future EU mineral raw-material supplies.

The project holds environmental and social sustainability as its foundation in its approach to augmenting the security of the European Union mineral raw-material supply and enhancing competitiveness of the EU mining industry.

Over a three-year period (2016-2018), STRADE shall bring together research, practical experience, legislation, best-practice technologies and know-how in the following areas:

1. A European cooperation strategy with resource-rich countries
2. Internationally sustainable raw-material production & supply
3. Strengthening the European raw-materials sector

Project Identity

Project Name	Strategic Dialogue on Sustainable Raw Materials for Europe (STRADE)
Coordinator	Oeko-Institut; Doris Schueler, Project Coordinator, d.schueler@oeko.de
Consortium	OEKO-INSTITUT E.V. – INSTITUT FUER ANGEWANDTE OEKOLOGIE Merzhauser Strasse 173, Freiburg 79100, Germany
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Funding Scheme	This project has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 689364
Duration	1.12.2015 – 30.11.2018
Budget	EU funding: €1 977 508.75
Website	www.STRADEproject.eu

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