Draft concept for a data and knowledge information system on mineral mining and trade and related environmental and socio-economic issues:

Part III
Draft concept of country profiles

Draft for workshop participants (Brussels, 20 June)

Öko-Institut e.V.

STRADE

Part III

Draft concept of country profiles

Content:

- **Economic contribution from mining**
- **Production**
- **Trade**
- **Governance**
- **Human rights and social issues**
- **Environmental issues**
- **Initiatives for responsible mining and development**

Preface

This document is Part III of the “Draft concept for a data and knowledge information system on mineral mining and trade and related environmental and socio-economic issues”. Part I examines the necessity and feasibility of a data and knowledge information system on mineral mining and trade and related environmental and socio-economic issues.

The data is broadly structured into:

- Part II – Raw-material-specific information and
- Part III – Country-specific information.

Part III here presents a concrete example of compiling a country-specific profile and offers Brazil as the example. The data collection for these examples does not claim completeness but builds on easily available data to illustrate the underlying concept and serve as a basis for a general discussion of the structure of the information system. Further data collection will be necessary to elaborate comprehensive raw material and country profiles if the STRADE team and the requested stakeholders agreed upon their principal architecture.

Economic contribution from mining

Economic contribution from mining

Basic data on mineral's economic contribution

Mineral production

Parameter	Value	Reference
Production value, all minerals (ores, minerals, crude fertilizer, scrap, NF metals)	62 billion US$	ICMM (2014), data for 2012
Production value, all minerals as % of GDP (ores, minerals, crude fertilizer, scrap, NF metals)	2.9 %	ICMM (2014), data for 2012
Minerals of highest relevance	Iron, accounts for 17 % of global production and > 80 % of mineral exports (value)	IBRAM (2017e), data for 2012
Mineral exports, all minerals (ores, minerals, crude fertilizer, scrap, NF metals)	39 billion US $	IBRAM (2017e), data for 2012
Ores and NF-metals exports as % of merchandise exports (ores, minerals, crude fertilizer, scrap, NF metals)	19 % (in 2010) ⇨ 10.8 % (in 2015)	WorldBank (2017c),
Mineral rent[1] (% of GDP)	1.3 %	WorldBank (2017c), data for 2015
Oil rent[1] (% of GDP)	0.9 %	WorldBank (2017c), data for 2015
Coal rent[1] (% of GDP)	0.005 %	WorldBank (2017c), data for 2015
ICMM Mining Contribution Index[2]	75	ICMM (2014), data for 2012

[1] A rent is the difference between the value of production for a stock of minerals at world prices and their total costs of production.
[2] The country with highest MCI has 96 scores; country without contribution have 0 scores.

Economic contribution of iron and steel exports

Parameter	Value	
Iron and steel exports as % of merchandise exports	4.3 %	Workman (2017), data for 2016
Export share of steel production (steel export / domestic steel production)	44 %	Workman (2017), data for 2016

Economic contribution from mining

Government revenues from mining

Government revenues

Note: The data are preliminarily from 2012 and should be updated in the course of the project; R$ = Brazilian Real

Parameter	Value	Reference
Government revenues from mining (CFEM mining royalties only; no corporate taxes and VAT included)	1.8 billion R$	IBRAM (2017e), data for 2012
Additional government revenues from further taxes (e.g. corporate taxes; export taxes; VAT)	n.n.	
Total government tax revenues including social security funds	1500 billion R$	OECD.Stat (2017), data for 2012
Contribution of mining royalties to total government revenues including social security funds	0.1 %	Calculated, data for 2012
Contribution of all government revenues from mining to total government revenues including social security funds	n.n.	

Information on royalty and taxation regime

(status from 2012):
CFEM (Mining Royalty) is payable as consideration for the economic exploitation of mineral resources in their respective territories. They are distributed as follows:

- 12% to the Federal Government (DNPM 9.8%, IBAMA 0.2%, MCT/FNDCT 2%);
- 23% to the state where the mineral has been sourced;
- 65% to the producing municipality.

Tax rates are applied onto the net revenue, and they vary according to the mineral involved:

- 3% for: aluminum ore, manganese, salt-gem, and potassium;
- 2% for: iron, fertilizer, coal and other substances;
- 0,2% for: precious stones, colored gemstones, carbonates and noble metals;
- 1% for: gold

Corporate tax: 34 % (Deloitte 2017)
VAT: standard rate, average 17 %
Export tariffs: 0 % (World Bank 2017d)

Further Reading:

- CFEM – Compensação Financeira pela Exploração de Recursos Minerais, http://blog.cfem.com.br/ (in portuguese, data on 2015 and 2016 royalties)
- Natural Resource Governance Institute, Brazil's Performance on the Resource Governance Index, http://www.resourcegovernance.org/our-work/country/brazil?page=1 (focus on oil revenues)
- Wold Bank (2006): Mining Royalties. A Global Study of Their Impact on Investors, Government, and Civil Society. Internet: http://siteresources.worldbank.org/INTOGMC/Resources/336099-1156955107170/miningroyaltiespublication.pdf (last visited 10.05.2017)

Economic contribution from mining

Employment

General data on employment

Parameter	value	Reference
Unemployment rate	11 %	ILOSTAT, data for 2016
Share of industry in total employment	21 %	ILOSTAT, data for 2016
Total employment	95 million workers	ILOSTAT, data for 2017
Informal economy rate in the non-agriculture sector	36.9 % 30.5 million workers	ILOSTAT, data for 2013

Employment in the mining sector

Parameter	value	Reference
Workforce in mining (formally employed)	175 000 workers	IBRAM 2017e, data for 2011
Informal workforce (estimates)	~ 300 000 – 500 000 workers, mainly in the extraction of gems, gold, diamond and mineral aggregates for the civil construction sector	IBRAM 2017e, data for 2011

Job multiplier in the extractive industries (UNCTAD 2015)

Country	Job Multiplier
Brazil	no data
Scotland	2.5
USA	5.0
Chile	7.0
Ghana	28.0

Reference:

- UNCTAD (2015): 17th Africa OilGasMine: Extractive Industries and Sustainable Job Creation. Internet: http://unctad.org/meetings/en/SessionalDocuments/suc_OilGasMine2015_bgNote_en.pdf (last visited 08.05.2017).
- IFC (2013): IFC Jobs Study Assessing Private Sector Contributions to Job Creation and Poverty Reduction. Internet: https://www.ifc.org/wps/wcm/connect/0fe6e2804e2c0a8f8d3bad7a9dd66321/IFC_FULL+JOB+STUDY+REPORT_JAN2013_FINAL.pdf?MOD=AJPERES (last visited 08.05.2017).

Economic contribution from mining

Resource endowment and reserves

Parameter	Global ranking
Fraser Institut: Best Practices Mineral Potential Index: This index is based on a survey and ranks the jurisdictions based on which region's geology "encourages exploration investment" or is "not a deterrent to investment", assuming their policies are based on "best practices" . (Rank 1 is the highest ranking. Rank 104 is the lowest ranking)	54/104
Further indexes giving information on the potential size of future mining projects, the country's mining experience and potential tier 1 assets: …	

Production and Reserves

Commodity	Annual production 2014 (USGS 2017, BGS 2017)		Reserves 2013 (USGS 2017)		Static lifetime
	[%] of global Production	[t]	[%] of global reserves	[t]	Years
Tantalum & Niobium	92.3	280,400	95	4,100,050	15
Bauxite	13.6	35,409,900	9	2,613,300,000	74
Iron ore	10.2	345,800,000	18	15,962,000,000	46
Talc	7.37	600,000	41	18,000,144	30
Tin	4.8	17,000	15	699,840	41
Manganese	4.6	2,498,220	10	54,150,000	22
Nickel	4.2	85,600	11	9,072,000	106
Natural graphite	3.7	78,460	36	39,999,540	510
Cobalt	2.7	3,500	1	84,521	24
Gold	2.7	80	4	2,382	30
Aluminium	1.8	962,000	9	569,699,400	592
Lithium	1.2	8,000	0.4	54,316	7
Magnesite	1.2	550,000	4	86,040,000	156

References:

- Fraser Institut (2017): Fraser Institute Annual Survey of Mining Companies 2016 https://www.fraserinstitute.org/sites/default/files/survey-of-mining-companies-2016.pdf (02.05.2017)

Note: The report and its rankings are based on 350 respondents from mining and exploration companies to the global survey.

Economic contribution from mining

Responsible Mining Index evaluation on mining companies' business socio-economic development engagement

company-specific but not mining-site specific

Company	Location of mine operation	Ore	RMI evaluation on companies' development engagement	Reference year	Details
The content and the structure of this table will be discussed in detail when first RMI data are published (scheduled in 2018). The current draft RMI methodology foresees a set of 5 indicators related to major mining companies' development engagement. These indicators are company-specific (overall, no country-specific distinction) and will only be derived for 30 major global mining companies. STRADE will discuss on the June 2017 workshop to which extent this perspective as part of a raw material information system. The list below shows the development engagement which will be included in the RMI (draft status May 2017).					

Company-level indicators:	Number of indicators
Subnational, National and Regional Socio-Economic Development Planning	1
Procurement	1
Institutional Capacity Building	2
Enhancing the Skills Base	1
TOTAL	5

Reference:
The Responsible Mining Foundation (2017): http://responsibleminingindex.org/ (last visited 29.05.2017).

Economic contribution from mining

Basic data on the economy

Parameter	Value	Reference
Population (Number of People)	*207,847,528*	World Bank (2017d)
Population density (People / km2)	*25*	World Bank (2017d)
GDP (Gross Domestic Product) (Million US$)	*1,774,725*	World Bank (2017d)
GDP per capita (US$)	*8,539*	World Bank (2017d)
Poverty rate (% of population with less than US$ 2 a day, PPP)	*7 %*	OECD (2015), data for 2013
Foreign direct investment, net inflows (including all sectors)	75 billion US$ 4.2% of GDP	World Bank 2017a World Bank 2017b

References:

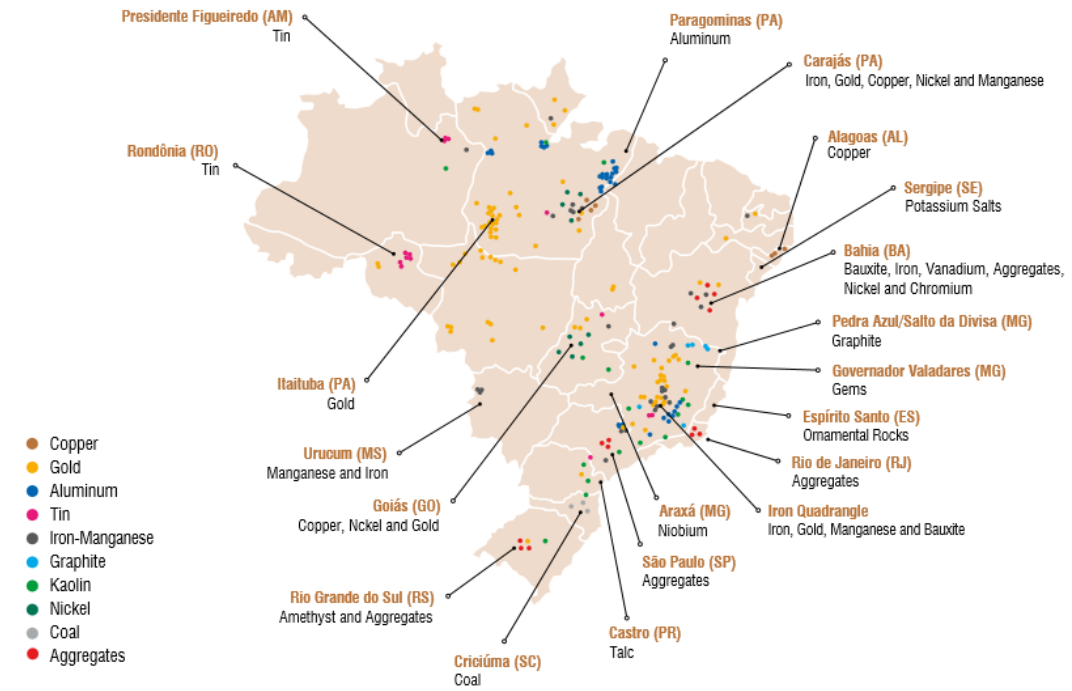
- World Bank (2017d): World Development Indicators: http://data.worldbank.org/data-catalog/world-development-indicators (25.04.2017).
- EBRD (2017): EBRD: Annual Transition Reports and country fact sheets. Internet: http://2016.tr-ebrd.com/countries/ (last visited 08.05.2017)
- UN Statistics Division (2017): https://unstats.un.org/unsd/demographic/products/vitstats/ (last visited 18.04.2017)
- National statistic offices

Production

Production

Overview

MAJOR REGIONS WITH MINERAL DEPOSITS



Source: IBRAM – 2012

Reference:
- **IBRAM** (http://www.ibram.org.br/sites/1400/1457/00000364.pdf)

Mine production

	Unit	Fe	Cu	Ni	…
Production 2016	Mio. t/a	254	…	…	…
Production 2016	Mio. USD/a	28,296	…	…	…
Static lifetime*	a	47	…	…	…

*Static lifetime = Reserves / mine production in 2016
Brazil is the second largest iron ore producer

References:
- Mine Production in t / a (USGS 2017 Mineral Commodity Summaries); for Fe iron ore content is used Production in USD: SNL

Production

Mining sites and mining companies

Selected major mining sites

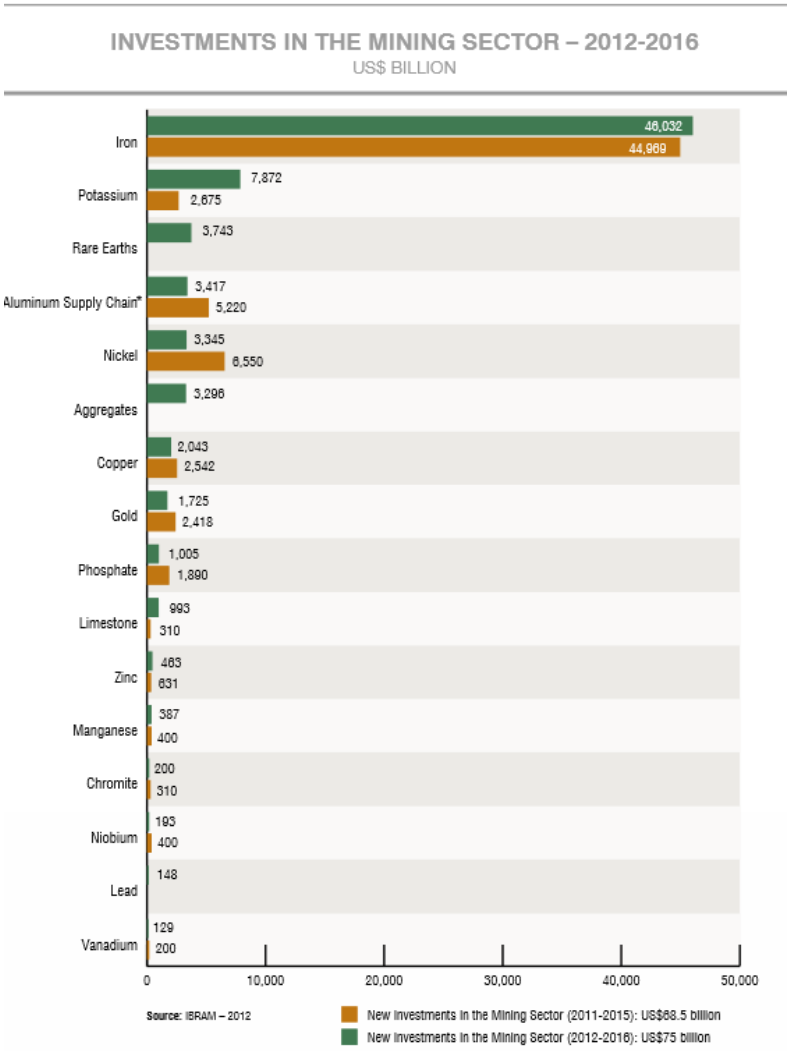
	Fe	Cu	Al
	Carajas, State of Para (3 mines)		
Company name	Vale SA		
Yearly mine production (t/a)	148 mio. t (2016)		
Domestic /foreign company	Domestic		
State-owned / private / enterprise	Privat		
Membership in reporting and responsible mining initiatives (e.g. IRMA, ASI, etc)	GRI, ISO,UN Global Compact		
Company information	http://www.vale.com/EN/investors/information-market/annual-reports/20f/20FDocs/Vale_20-F_FY2016_-_i.pdf http://www.vale.com/hotsite/Style%20Library/RelatorioSustentabilidade/Docs/Vale%20Sustainability%20Report%202016.pdf		

Additional remark:
Further Reading: Overview of State Ownership in the Global Minerals Industry (http://siteresources.worldbank.org/INTOGMC/Resources/GlobalMiningIndustry-Overview.pdf)

Production

Mining and exploration

Investment in mining



Source: IBRAM 2017e

Further reading:
New investment projects in crude steelmaking by economy are provided on http://www.oecd.org/sti/ind/steelcapacity.htm

Parameter	Value	Reference
Exploration spend relative to production value[1]	0,4 x	ICMM (2014)

[1] = country share of world exploration budget / country share of world production value; a value of 1 means that exploration and production are balanced according to global average exploration spendings and production values. The lower the value (less than 1) the less the share in global exploration than in global production.

Production

Smelting & refining

Refining capacities and major smelters & refiners

Commodity	Membership in sustainable initiatives	Unit	Steel	…
Total refining capacity		mio. t	48.4	
Major smelters & refiners:				
Companhia Siderúrgica Nacional (CSN)	ISO	mio. t	5.6	
Gerdau S.A.	…	…	…	
Smelter x	…	…	…	
Smelter x	…	…	…	
Smelter x	…	…	…	

Additional remark / sources:
Total existing crude steel capacity: USGS 2016: Minerals Yearbook Brazil
https://minerals.usgs.gov/minerals/pubs/country/2013/myb3-2013-br.pdf
CSN: ttp://www.csn.com.br/conteudo_eni.asp?idioma=1&conta=46&tipo=59621
Gerdau: https://www.gerdau.com/br/en#

Metal & intermediate production

Commodity	Metal production
	t / a
Crude steel	33.3 mio.t / 2015
Refined copper	…
Refined nickel	…
…	

Reference:
Brazil Steel institute (http://www.acobrasil.org.br/site2015/eng/dados.asp)

Production

Business environment

"Ease to do business" – The Competitive Index

	Brazil
	Rank (1 = best ranking; 138 = worst ranking)
Institutions	120
Infrastructure	72
Macroeconomic environment	126
Health and primary education	99
Higher education and training	84
Goods market efficiency	128
Labor market efficiency	117
Financial market development	93
Technology readiness	59
Market size	8
Business sophistication	63
Innovation	100

Explanatory note:
The higher the rank (1) and value (e.g. 5.8), the better the competitiveness (e.g. Switzerland has the highest rank (1) and value (5.8) in innovation and sophistication factors; Mauretania is ranked lowest at 138 (value 1.9) in higher education and training)

Reference:

- World Economic Forum: The Global Competitiveness Report 2016-2017, 2016 (https://www.weforum.org/reports/the-global-competitiveness-report-2016-2017-1)

Trade

Trade
Export

Brazilian ore exports

	Unit	Fe	Cu	…
Ore export (Brazil ⇨ global)	mio t/a	344		
Ore export (Brazil ⇨ global)	mio USD/a	25,800		
Ore export in EU (Brazil ⇨ EU)	mio t/a	54.7		
Ore export in EU (Brazil ⇨ EU)	mio USD /a	5,788		
Total ore export (t) / domestic ore production (t)	%	84		
Brazilian's contribution to EU iron ore imports from global suppliers:				
Ore export to EU (value) / total EU ore import (value)	%	48		
Relevance of Brazilian exports to EU for Brazil:				
Ore export to EU (t) / total ore export (t)	%	16		

Reference:
- COMTRADE (https://comtrade.un.org/data); HS 2601 (ore export) Eurostat Trade data (import EU 28) http://epp.eurostat.ec.europa.eu/newxtweb/mainxtnet.do Data for iron 2014

Additional remarks:

Trade
Export

Brazilian exports of selected intermediate products

	Fe		Cu		…
	t/a	Mio USD/a	t/a	USD/a	
Exports of semi-finished products of iron or non-alloyed steel:					
Export intermediate product (1) (global)	6.9 mio t	2.3 mio USD			
Export intermediate product (1) (to EU)	0.98 mio t	351 mio EUR			
Worldwide EU import intermediate product (1)	7.8 mio t	2.6 mio EUR			
Exports of …					
Export intermediate product (2) (global)	…	…			
Export intermediate product (2) (EU)	…	…			
Worldwide EU import intermediate product (2)	…	…			

Reference /sources:
(1): semi-finished products of iron or non-alloy steel - HS 7207: COMTRADE (https://comtrade.un.org/data); export to used data eurostat (import EU)

Additional remark:

Trade
Import

This issue should be elaborated within other projects. It is not a focus of the STRADE project.

Trade

Trade agreements & trade restrictions

Trade agreements

Free Trade Agreements:

- The EU is negotiating a free trade agreement with Brazil. This is part of the EU's Association Agreement negotiations with the Mercosur countries (which also includes Argentina, Uruguay and Paraguay). (EC 2017a)

Trade restrictions (not limited to mining)

	Brazil
Export tariffs on minerals	0 %
Export tariffs on intermediate products	0 %

Reference /sources:

- World Bank (2017): World Integrated Trade Solutions. Internet: http://wits.worldbank.org/ (31.05.2017).
- OECD Trade in raw materials (http://www.oecd.org/tad/benefitlib/export-restrictions-raw-materials.htm)

Trade

Secondary materials

This issue should be elaborated within other projects. It is not a focus of the STRADE project.

Governance

Governance

World Bank – Worldwide Governance Indicators

**not mining specific, refers to all sectors*

The WGI cover over 200 countries and territories, measuring six dimensions of governance starting in 1996: Voice and Accountability, Political Stability and Absence of Violence/Terrorism, Government Effectiveness, Regulatory Quality, Rule of Law, and Control of Corruption. The aggregate indicators are based on several hundred individual underlying variables, taken from a wide variety of existing data sources. The data reflect the views on governance of survey respondents and public, private, and NGO sector experts worldwide. The WGI also explicitly report margins of error accompanying each country estimate. These reflect the inherent difficulties in measuring governance using any kind of data. Even after taking these margins of error into account, the WGI permit meaningful cross-country and over-time comparisons (Kaufmann et al. 2010).

Indicator	Governance score Highest performance: +2.5 Lowest performance: -2.5	Percentile rank Highest rank: 100 Lowest rank: 0	Number of used data sources
Voice and Accountability	0.38	60.10	14
Political Stability and Absence of Violence/Terrorism	-0.38	34.29	9
Government Effectiveness	-0.19	47.60	11
Regulatory Quality	-0.21	46.63	11
Rule of Law	-0.19	50.00	15
Control of Corruption	-0.43	41.35	12

Reference:
World Bank (2017): Worldwide Governance Indicators. Internet: http://info.worldbank.org/governance/wgi/#reports (last visited 08.05.2017).

Further Reading:
Kaufmann D., A. Kraay, and M. Mastruzzi (2010): The Worldwide Governance Indicators: Methodology and Analytical Issues. Internet: https://papers.ssrn.com/sol3/papers.cfm?abstract_id=1682130 (last visited 08.05.2017).

Governance

Transparency

EITI

The EITI is a standard by which information on the oil, gas and mining industries is published. The EITI is not a prescription for governance of the extractive sector, rather a tool that informs the way the sector is governed.(EITI 2017)

Membership	Since
No	-

BEPS (OECD 2013)

Base erosion and profit shifting (BEPS) refers to tax avoidance strategies that exploit gaps and mismatches in tax rules to artificially shift profits to low or no-tax locations. Over 100 countries and jurisdictions are collaborating to implement the BEPS measures. (OECD 2017b)

Action Brazil: Implementation of country-by-country-report (International Tax Review 2017)

References:

- EITI (2017): EITI. Internet: https://eiti.org/ (last visited 08.05.2017).
- OECD (2013): Action Plan on Base Erosion and Profit Shifting, OECD Publishing. Internet: http://dx.doi.org/10.1787/9789264202719-en (last visited 08.05.2017).
- OECD (2017b): Base erosion and profit shifting. Internet: http://www.oecd.org/tax/beps/ (last visited 10.05.2017).
- Deloitte (2017): BEPS Actions implementation by country – Brazil. Internet: https://www2.deloitte.com/content/dam/Deloitte/global/Documents/Tax/dttl-tax-beps-actions-implementation-brazil.pdf (last visited 10.05.2017).
- International Tax Review 2017: Brazilian rules on country-by-country reporting. 2 May 2017 (http://www.internationaltaxreview.com/Article/3713934/Brazilian-rules-on-country-by-country-reporting.html)

Alternative transparency schemes: …

Governance

EITI requirements Ghana's progress

EITI Requirements		Level of Progress				
Categories	Requirements	No Progress	Inadequate	Meaningful	Satisfactory	Beyond
MSG oversight	Government engagement (#1.1)				■	
	Industry engagement (#1.2)				■	
	Civil society engagement (#1.3)				■	
	MSG governance (#1.4)				■	
	Workplan (#1.5)				■	
Licenses and contracts	Legal framework (#2.1)				■	
	License allocations (#2.2)				■	
	License register (#2.3)			■		
	Policy on contract disclosure (#2.4)				■	
	Beneficial ownership (#2.5)	▒	▒	▒	▒	▒
	State participation (#2.6)			■		
Monitoring production	Exploration data (#3.1)				■	
	Production data (#3.2)			■		
	Export data (#3.3)			■		
Revenue collection	Comprehensiveness (#4.1)			■		
	In-kind revenues (#4.2)			■		
	Barter agreements (#4.3)	▨	▨	▨	▨	▨
	Transportation revenues (#4.4)	▨	▨	▨	▨	▨
	SOE transactions (#4.5)			■		
	Direct subnational payments (#4.6)				■	
	Disaggregation (#4.7)				■	
	Data timeliness (#4.8)				■	
	Data quality (#4.9)				■	
Revenue allocation	Revenue management and expenditures (#5.1)				■	
	Subnational transfers (#5.2)				■	
	Distribution of revenues (#5.3)	▒	▒	▒	▒	▒
Socio-economic contribution	Mandatory social expenditures (#6.1.a)	▨	▨	▨	▨	▨
	Discretionary social expenditures (#6.1.b)	▒	▒	▒	▒	▒
	SOE quasi-fiscal expenditures (#6.2)			■		
	Economic contribution (#6.3)				■	
Outcomes and impact	Public debate (#7.1)				■	
	Data accessibility (#7.2)	▨	▨	▨	▨	▨
	Follow up on recommendations (#7.3)				■	
	Outcomes and impact of implementation (#7.4)				■	
Overall assessment				■		

EITI (2017b): GHEITI Ghana Extractive Industires Transparency Initiatve. Internet: https://eiti.org/ghana#overview (last vsisted 10.05.2017).

Governance

Attractiveness from mining and exploration companies' perspective according to Fraser Institute's survey

Index	Global ranking Brazil
Policy Perception Index (PPI): The PPI is a composite index that measures the overall policy attractiveness of the 104 jurisdictions in the survey. The index is composed of survey responses to policy factors that affect investment decisions. Policy factors examined include uncertainty concerning the administration of current regulations, environmental regulations, regulatory duplication, the legal system and taxation regime, uncertainty concerning protected areas and disputed land claims, infrastructure, socioeconomic and community development conditions, trade barriers, political stability, labor regulations, quality of the geological database, security, and labor and skills availability. (Rank 1 is the highest ranking. Rank 104 is the lowest ranking)	64/104

References:

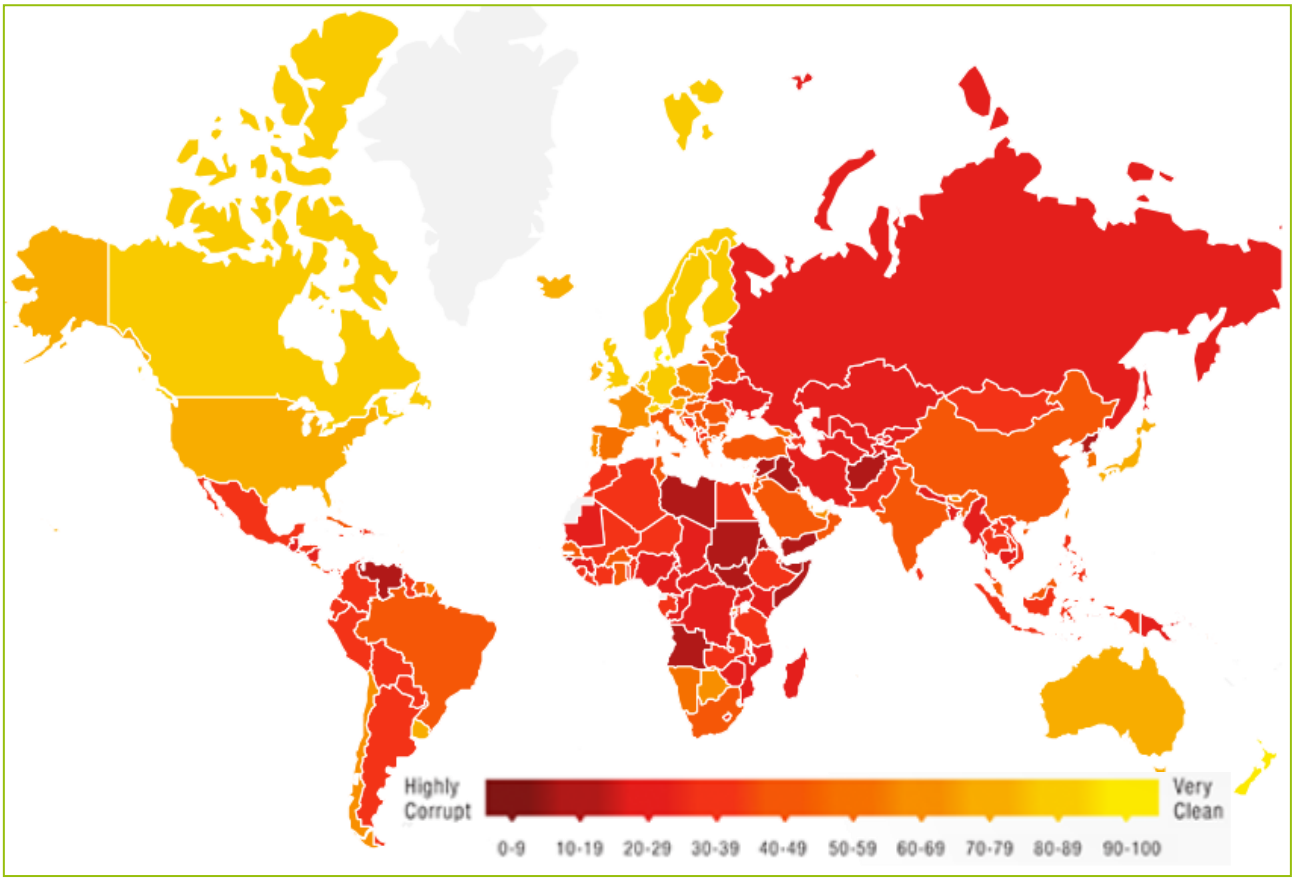
- Fraser Institut (2017): Fraser Institute Annual Survey of Mining Companies 2016 https://www.fraserinstitute.org/sites/default/files/survey-of-mining-companies-2016.pdf (02.05.2017)

Note: The report and its rankings are based on 350 respondents from mining and exploration companies to the global survey.

Governance

Transparency International's Corruption Perceptions Index 2016

The Corruption Perceptions Index aggregates data from a number of different sources that provide perceptions of business people and country experts of the level of corruption in the public sector. The CPI 2016 is calculated using 13 different data sources from 12 different institutions that capture perceptions of corruption within the past two years (Transparency International 2017).



Score	Rank
40/100	79/176

Reference:
Transparency International (2017): Corruption Perceptions Index 2016. Internet: http://www.transparency.org/news/feature/corruption_perceptions_index_2016 (last visited 08.05.2017).

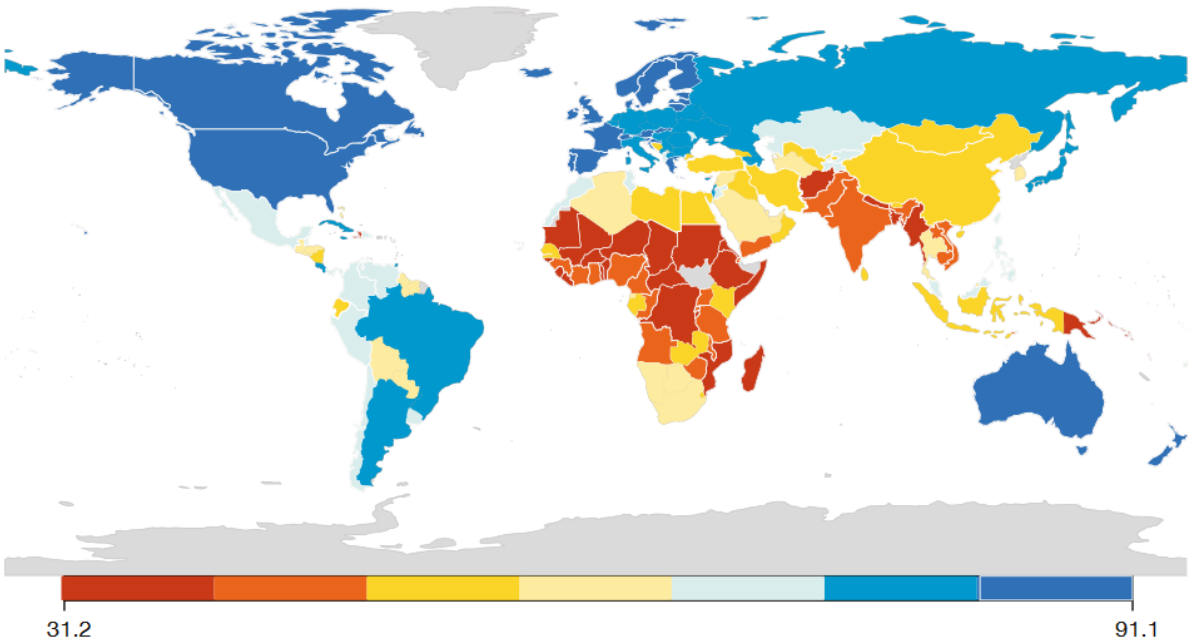
Parameter	Value	Reference
Bribery incidence (% of firms experiencing at least one bribe payment request)	-	World Bank 2017d

Governance

Environmental Performance Index

The Environmental Performance Index (EPI) ranks countries' performance on high-priority environmental issues in two areas: protection of human health and protection of ecosystems. Within these two policy objectives the EPI scores national performance in nine issue areas comprised of more than 20 indicators (see EPI Framework). EPI indicators measure country proximity to meeting internationally established targets or, in the absence of agreed targets, how nations compare to one another. (Yale University 2016)

Figure 24: Global 2016 EPI results range from a score of 31.2 to 91.1, with 100 being the best score and 0 the worst.

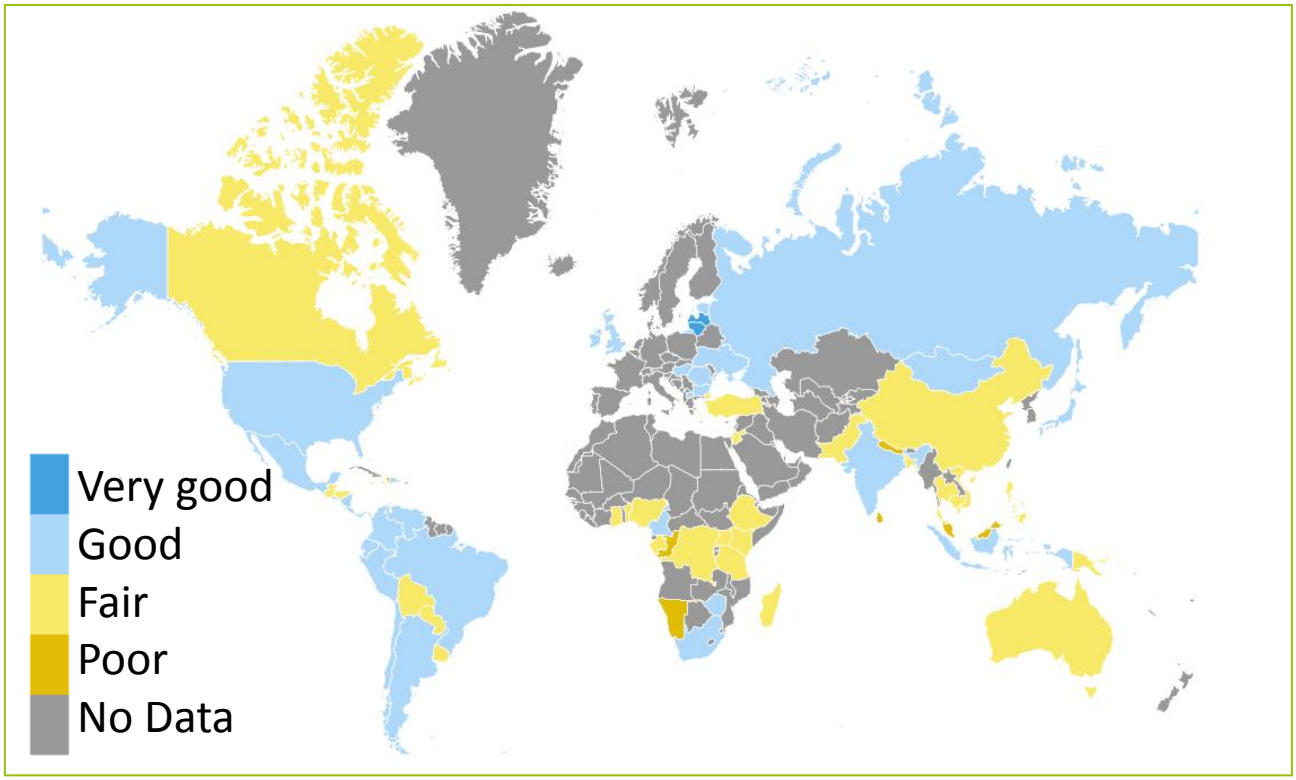


Reference:
Yale University (2016): Global Metrics For The Environment The Environmental Performance Index ranks countries' performance on high-priority environmental issues. http://epi.yale.edu/sites/default/files/2016EPI_Full_Report_opt.pdf (last visited 25.04.2017).

Governance

Environmental Democracy Index

"The Environmental Democracy Index was developed by The Access Initiative (TAI) and World Resources Institute (WRI) in collaboration with partners around the world. The index evaluates 70 countries, across 75 legal indicators, based on objective and internationally recognized standards established by the United Nations Environment Programme's (UNEP) Bali Guidelines. EDI also includes a supplemental set of 24 limited practice indicators that provide insight on a country's performance in implementation. The national laws and practices were assessed and scored by more than 140 lawyers around the world. Country assessments were conducted in 2014 and will be updated every two years. Scores are provisional until September 15th, 2015 as results are being shared with governments and civil society for feedback until July 15." (TAI & WRI 2017)



Reference:
The Access Initiative & World Resources Institute (2017): Environmental Democracy Index. Internet: http://www.environmentaldemocracyindex.org/ (last visited 25.04.2017).

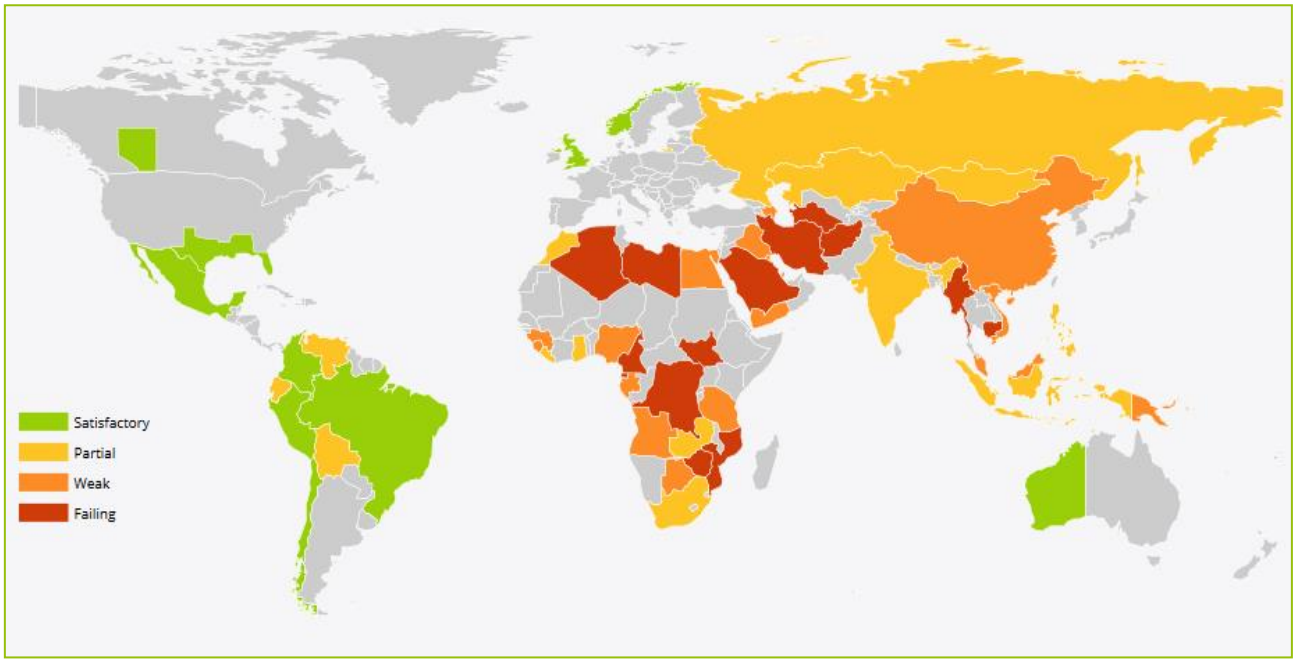
Access to information	Public participation	Access to justice	Country score
2.3	1.04	2.03	**1.8**
Note: 0 lowest score, 3 highest score			

Governance

Natural Resource Governance Index

"The RGI scores and ranks […] countries, relying on a detailed questionnaire completed by researchers with expertise in the extractive industries. The Index assesses the quality of four key governance components: Institutional and Legal Setting; Reporting Practices; Safeguards and Quality Controls; and Enabling Environment. It also includes information on three special mechanisms used commonly to govern oil, gas and minerals—state-owned companies, natural resource funds and subnational revenue transfers" (NRGI 2017).

NRGI Composite Score –Global Comparison (NRGI 2017)



Score Brazil (NRGI 2017b)

Rank out of (58)	Component	Score (out of 100)
8	Institutional & Legal Setting	81
9	Reporting Practices	78
2	Safeguards & Quality Controls	96
9	Enabling Enviornment	66
5	**Composite Score**	**80**

References:

- NRGI (2017): Resource Governance Index. Internet: http://www.resourcegovernance.org/resource-governance-index (10.05.2017).
- NRGI (2017b): Brazil's Performance on the Resource Governance Index Internet: http://www.resourcegovernance.org/our-work/country/brazil (last visited 10.05.2017).

Governance

Natural Resource Governance Index

NRGI Methodology (NRGI 2017c)

- **Institutional & Legal Setting:**

  10 indicators that assess whether the laws, regulations and institutional practices enable comprehensive disclosures, open and fair competition, and accountability.

- **Reporting Practices:**

  20 indicators that evaluate the actual disclosure of information and reporting practices by government agencies.

- **Safeguards and Quality Controls:**

  15 indicators that measure the checks and oversight mechanisms that guard against conflicts of interest and undue discretion, such as audits.

- **Enabling Environment:**

  5 indicators of the broader governance environment generated using over 30 external measures of accountability, government effectiveness, rule of law, corruption and democracy. The data reflect the extent to which the broader environment will help or hinder transparency and accountability efforts in the extractive sector. Box 1 below summarizes the discussion about including the enabling environment component in the Index.

References:

- NRGI (2017c):Resource Governance Index: Methodology. Internet: http://www.resourcegovernance.org/resource-governance-index/methodology (10.05.2017).

Governance

Responsible Mining Index evaluation on mining companies' business conduct

company-specific but not mining-site specific

Company	Location of mine operation	Ore	RMI evaluation on companies' business conduct	Reference year	Details
The content and the structure of this table will be discussed in detail when first RMI data are published (scheduled in 2018). The current draft RMI methodology foresees a set of 13 indicators related to major mining companies' business conduct. These indicators are company-specific (overall, no country-specific distinction) and will only be derived for 30 major global mining companies. STRADE will discuss on the June 2017 workshop to which extent this perspective which complements government's governance, can be integrated in country profiles as part of a raw material information system. The list below shows the business conduct topics which will be included in the RMI (draft status May 2017).					

Company-level indicators:	Number or indicators
Business Ethics	2
Board Level and Senior Management Accountability	2
Contracts Disclosure	1
Beneficial Ownership	2
Tax Transparency	2
Payments to Producing Countries	1
Bribery and Corruption	2
Responsible Contracting and Sourcing	1
TOTAL	13

Reference:
The Responsible Mining Foundation (2017): http://responsibleminingindex.org/ (last visited 29.05.2017).

Governance
Further reading

Further Reading:

- OECD (2017): OECD Corporate Governance Factbook 2017. Internet: http://www.oecd.org/daf/ca/Corporate-Governance-Factbook.pdf (last visited 08.05.2017)
- World Economic Forum (2016): The Global Competitiveness Report 2016–2017. Internet: http://www3.weforum.org/docs/GCR2016-2017/05FullReport/TheGlobalCompetitivenessReport2016-2017_FINAL.pdf (08.05.2017).
- Federal Ministry for Economic Cooperation and Development of Germany (): Natural Resource Contracts as a Tool for Managing the Mining Sector. Internet: http://ccsi.columbia.edu/files/2015/07/Natural-Resource-Contracts-as-a-Tool-for-Managing-the-Mining-Sector.pdf (last visited 10.05.2017).

Human rights and social issues

Human rights and social issues

Recognition of the Core Labour Standards of the ILO

(relevant for all sectors, not mining-specific)

Core labour standard	Ratified	In force
Freedom of Association and Protection of the Right to Organise Convention (No 87)		
Right to Organise and Collective Bargaining Convention (No 98)	X	X
Forced Labour Convention (No 29)	X	X
Abolition of Forced Labour Convention (No 105)	X	X
Minimum Age Convention (No 138)	X	X
Worst Forms of Child Labour Convention (No 182)	X	X
Equal Remuneration Convention (No 100)	X	X
Discrimination (Employment and Occupation) Convention (No 111)	X	X

Recognition of further ILO Standards

Core labour standard	Ratified	In force
Indigenous and Tribal Peoples Convention (No 169)	X	X
Safety and Health in Mines Convention (No 176)	X	X

Further reading:

- Max Planck Foundation (2016) Human Rights Risks in Mining – A Baseline Study (Commissioned by BGR) https://www.bmz.de/rue/includes/downloads/BGR_MPFPR__2016__Human_Rights_Risks_in_Mining.pdf (last visited 27.04.2017).

References:

- International Labour Organisation – Ratifications per country http://www.ilo.org/dyn/normlex/en/f?p=NORMLEXPUB:11200:0::NO::P11200_COUNTRY_ID:102571 (last visited 28.04.2017)

Human rights and social issues

General human rights situation

Country reports *(not mining-specific)*

Information source	Weblink
Amnesty International	https://www.amnesty.org/en/countries/americas/brazil/report-brazil/
Human Rights Watch	https://www.hrw.org/world-report/2017/country-chapters/brazil
U.S. Department of State	https://www.state.gov/j/drl/rls/hrrpt/humanrightsreport/index.htm?year=2016&dlid=265568#wrapper

Results of the survey of violations of Trade Union Rights *(not mining-specific)*

The International Trade Union Confederation (ITUC) publishes an annual Global Rights Index that is based on 97 indicators and that takes recoded violations of workers' rights as defined in ILO conventions, as well as particularly vulnerable groups such as migrant workers or workers in the informal economy into account. Countries are rated on a scale from 1 to 5, with 5 being the worst grade with a large number of violations in the respective year.

Results	Weblink
4 (Systematic violations of rights)	http://survey.ituc-csi.org/Brazil.html?lang=en

Reference:

- Amnesty International (2017): The state of the world's human rights. Internet: https://www.amnesty.org/download/Documents/POL1048002017ENGLISH.PDF (last visited 26.05.2017).
- Human Rights Watch (2017): World Report 2017. Internet: https://www.hrw.org/sites/default/files/world_report_download/wr2017-web.pdf (last visited 26.05.2017).
- International Trade Union Confederation: Survey of violations of Trade Union Rights. Internet: http://survey.ituc-csi.org/?lang=en (last visited 26.05.2017).
- U.S. Department of State (2017): Human Rights Reports 2016. Internet: https://www.state.gov/j/drl/rls/hrrpt/index.htm (last visited 26.05.2017).

Human rights and social issues

Prevalence of child labour *(in all sectors, not mining-specific)*

The UNICEF Child labour database comprises existing data on the prevalence of child labour per country. Child labour is defined as the "Percentage of children 5–14 years old involved in child labour at the moment of the survey. A child is considered to be involved in child labour under the following conditions: (a) children 5–11 years old who, during the reference week, did at least one hour of economic activity or at least 28 hours of household chores, or (b) children 12–14 years old who, during the reference week, did at least 14 hours of economic activity or at least 28 hours of household chores." The data is based on Demographic and Health Surveys (DHS), Multiple Indicator Cluster Surveys (MICS) and other nationally representative surveys.

Prevalence of child labor	Source
8 %	UNICEF

Prevalence of forced labour *(in all sectors, not mining-specific)*

The Global Slavery Index is published by the Walk Free Foundation and comprises a vulnerability model based on the four dimensions: civil and political protections; social health and economic rights; personal security and refugee populations and conflict. Each of the dimensions consist of further variables. Altogether the vulnerability model is based on the evaluation of 24 variables. A higher score indicates a higher level of vulnerability. The vulnerability model is the basis for an estimation of prevalence of forced labour [% of population] per country, which is also published in the report.

Civil and political protections	Social health and economic rights	Personal security	Refugee populations and conflict	Mean	Prevalence of forced labour [% of population]
38	20	46	31	34*	0.08 %

* Values range between 17 (Denmark) and 67 (Afghanistan)

Reference:

- UNICEF Child labour database https://data.unicef.org/topic/child-protection/child-labour/ (last visited 27.04.2017)
- Walk Free Foundation – The Global Slavery Index 2016 http://www.globalslaveryindex.org/download/ (last visited 27.04.2017)

Human rights and social issues

Recent violent conflicts with the involvement of the mining sector

The conflict barometer of the Heidelberg Institute for International Conflict Research maps and evaluates non-violent and violent conflicts world-wide. Violent conflicts are divided into violent crisis, limited war and war (with increasing intensity). The country profiles only include violent conflicts, which is based on the consideration that the analysis does a) not exhaustively cover all non-violent conflicts, and b) that non-violent conflicts can often be seen as part of normal societal process balancing the interests of different stakeholder groups.

Start year	Ore type	Location	Parent company	Intensity	Conflict parties	Conflict items
Note: in 2016, HIIK indicated no violent conflicts related to mining in Brazil. In order to illustrate the general approach of this table, the next row gives information on a non-mining conflict.						
1996	No mining specific conflict	São Paulo / Paraná state		Violent crisis	MST*, MTST** vs. government	Land use***

* MST: Landless Workers´ Movement

** MTST: Homeless Workers´ Movement

*** The conflict is mainly about land reforms and land rights in general. So far no mining sites / specific raw materials were addressed in the conflict.

Reference:

- Heidelberg Institut for International Conflict Research – Conflict Barometer 2016
http://hiik.de/de/konfliktbarometer/pdf/ConflictBarometer_2016.pdf
(last visited 27.04.2017)

Further reading:

- International Crisis Group – The monthly CrisisWatch provides a regular up-date on significant conflicts world-wide.
https://www.crisisgroup.org/fr (last visited 28.04.2017)

Further information on conflicts

There are manifold reports and data sources on conflicts available, which provide varying degrees of details on individual conflicts, their history, dynamics and drivers. Nevertheless, it is often difficult to evaluate the credibility and objectiveness of such sources. In many cases, reports on individual conflicts are biased and do not provide holistic analysis of issues and drivers.

The media presence of conflicts cannot be seen as meaningful indicator of the severity of the conflict because the media presence highly depends on the level of public awareness and the extent of public campaigns.

Human rights and social issues

Responsible Mining Index evaluation on socio-economic mine site performance

Company	Location	Ore	RMI evaluation on human rights and social performance	Reference year	Details
The content and the structure of this table will be discussed in detail when first RMI data are published (scheduled in 2018). The current draft RMI methodology foresees a set of 35 indicators related to human rights and social issues on company level and additional indicators on mine-site level. STRADE will discuss on the June workshop to which extent this high complexity can be integrated in country profiles as part of a raw material information system. The list below shows the social topics to be included in the RMI (draft status May 2017; further issues on employment and development are discuss within the section ‚Economic contribution').					

Company-level indicators	
Community Wellbeing	Number of indicators
Human rights	4
Community and Stakeholder Engagement	2
Economic and Social Viabilty	4
Community Health	1
Gender Equity	1
Indigenous Peoples	2
Free, Prior and Informed Consent	1
Land Use and Resettlement	3
Artisanal and Small-Scale mining	2
Security and Conflict-affected Areas	2
Grievance and Remedy	1
Working Conditions	
Living Wage	1
Occupational Health and Safety	3
Rights to Organise, Collective Bargaining and Freedom of Association	1
Worker Recourse	1
Non-discrimination and Equal Opportunity	1
Elimination of Forced Labour and child Labour	1
Further topics	
Post-Clusure Viability for Communities and Workers	4
TOTAL	35
Mine-site indicators	
Community grievance mechanism	
Workers grievance mechanism	

Reference:
The Responsible Mining Foundation (2017): http://responsibleminingindex.org/ (last visited 29.05.2017).

Human rights and social issues

Cases of human rights violations & social grievances (communities and workers) with links to mineral extraction, processing and refining

Date	Location	Description	References
Due to the sensitivity of such case specific listings, scope, method and type of presentation will have to be further elaborated on. The broad range of human rights and social issues illustrates the foregoing table on the Responsible Mining Index approach.			

Further important considerations on case specific reports
Reports on individual human rights abuses, social tension and grievance might partly can be subject to biases, incomplete situation analysis, political tendencies and views. Therefore, the integration of case specific information requires careful and neutral editing that allows the parallel presentation of differing views and standpoints.

Environmental issues

Environmental issues

Recent tailing dam failures and accidents

Year	Ore type	Location	Parent company	Type of incident	Release	Impacts
2015	Iron	Bento Rodrigues, Minas Gerais	Samarco	Tailings Dam Failure	32 million m^3	Flooded town; 17 persons killed; polluted rivers on a distance of 663 km

Reference:
- WISE – World Information Service on Energy: http://www.wise-uranium.org/mdaf.html
- ICOLD – International Commission on large dams: http://www.icold-cigb.net/

Recent pipeline spills and treatment failures

	Location	Company	Description	Impact	Reference
Pipeline Spills	Location 1				
	Location 2				
	Location 3				
Treatment Failures	Location 1				
	Location 2				
	Location 3				

Reference:
- Earthworks (2012) [USA specific]
- Schoproni et al. (2014) [Brazil specific]

Further reading:
- IFC (2014): Water, Mining And Communities: Creating Shared Value through Sustainable Water Management https://commdev.org/userfiles/IFC_140201_Water%20Mining%20Communities_0519c%20web.pdf (last visited 18.04.2017).

Environmental issues

Location specific risks / natural disaster risks

Methodologies to assess and classify natural disaster risks of mining sites are currently developed in the ÖkoRess Project financed by German Environment Agency. The methodologies use data on specific local risks for their risk classification. Relevant documents will soon be published under: https://www.umweltbundesamt.de/umweltfragen-oekoress

	Data source for local data	Fe			Cu		Al	
Selected major mines	USGS (2005)	Mine 1	Mine 2	…	Mine 1	…	Mine 1	….
Water Stress Index	Pfister et al. (2009)	Low/ medium/ high						
Mine within protected or close-by to Protected Areas	IUCN / UNEP-WCMC (2017) & Alliance for Zero Extinction (2010)	No/ Close-by / within						
Risk for earthquakes	Helmholtz-Zentrum Potsdam (2000)	Low/ medium/ high						
Risk for tropical storms	UNISDR (2015)	Low/ medium/ high						
Risk for floods	CIMA Foundation and UNEP-GRID	Low/ medium/ high						

Further reading:

- United Nations Office for Disaster Risk Reduction (2015): Global Assessment Report on Disaster Risk Reduction 2015. http://www.preventionweb.net/english/hyogo/gar/2015/en/home/data.php?iso=BRA (last visited 18.04.2017)
- OECD (2008): Key Environmental Indicators. Internet: https://www.oecd.org/env/indicators-modelling-outlooks/37551205.pdf (last visited 18.04.2017).

Environmental issues

Responsible Mining Index evaluation on environmental mine site performance

Company	Location	Ore	RMI evaluation on environmental performance	Reference year	Details
The content and the structure of this table will be discussed in detail when first RMI data are published (scheduled in 2018). The current draft RMI methodology foresees a set of around 17 indicators related to environmental responsibility on company level and additional indicators on mine-site level. STRADE will discuss on the June 2017 workshop to which extent these indicators might be integrated in country profiles as part of a raw material information system. The list below shows the environmental topics to be included in the RMI (draft status May 2017).					

Company-level indicators:	Number or indicators
Mine Lifecycle Management	2
Environmental Stewardship	2
Tailings Management	2
Air	1
Water	2
Noise and Vibration	1
Biodiversity	1
GHG Emissions and Energy Efficiency	2
Hazardous Materials Management	1
Emergency Preparedness	2
Security and Conflict-affected Areas	3
TOTAL	19
Mine-site indicators	
Local communities engagement in watermanagement decisions	
stakeholder engagement in emergy preparedness	

Reference:
The Responsible Mining Foundation (2017): http://responsibleminingindex.org/ (last visited 30.05.2017).

Environmental issues

Water and air emissions

The current draft proposal for the country profiles does not include quantitative data on water and air emissions due to the lack of meaningful data.
Existing aggregated data such as water use by sector or greenhouse gas emissions by sector, which are partly available on country basis, do not allow conclusions on the major environmental challenge: the level of ecological harm due to hazardous substances in the distinct environmental media (air, groundwater, soil, surface water etc.). These data are only punctually available for some mining sites.
The authors propose to focus in the first development stage of the country profiles on alternative approaches such as the occurrence of tailing dam and pipeline failures and the regional water stress (see previous tables).

Environmental issues

Further information

Further information on environmental issues are included in other sections of the country profiles or raw material profiles:

- Environmental Performance Index: see section on governance
- Association with radioactive substances: see raw material profiles
- Association with heavy metals: see raw material profiles
- Process chemicals use: see raw material profiles
- Potential for Acid Mine Drainage: see raw material profiles
- Mining type: see raw material profiles
- Mining method: see raw material profiles

List of weblinks and literature for further reading on recent other environmental hazards in the mining sector

The following list is meant to encourage further reading. The reader has to assess itself the quality and credibility of the information. Further, it does not claim completeness.

- Environmental Justice Map: https://ejatlas.org/
- …

Initiatives for responsible mining and development

Initiatives for responsible mining and development

Country-specific initiatives in the extractive sector – industry, government, CSO's, multi-stakeholder

Type Initiatives / Organisations	Name	Programs	Reference
Mining Associations	IBRAM – Brazilian Mining Association	Special Program for Safety and occupational Health – MinerAÇÃO	IBRAM 2017a
		Management of Water Resources	IBRAM 2017b
		Tailing Dams Safety Program	IBRAM 2017c
		CONIM – Committee for International Mining standardization	IBRAM 2017d
Governmental programs			
ASM-related initiatives; Multi-stakeholder initiatives			
CSO activities			
Mining companies with best practice according to the Responsible Mining Index evaluation (under development)			

Note: The table is meant to encourage further analysis. The reader has to assess itself the quality and credibility of the initiatives. Further, it does not claim completeness.

Further reading:

Initiatives for responsible mining and development

Official Development Assistance (ODA) and World Bank programmes for all sectors

ODA		
ODA, net	999 US$ million 4.8 US$/capita	OECD 2017, data for 2015

ODA per sector	US $ million	% of total ODA
Economic Infrastructure	620	55
Social Infrastructure	250	22
Multi-Sector	220	19
Production	25	2,2
Admin. Costs of Donors	8	0,7
Humanitarian Aid	4	0,35
Unspecified	2	0,17
Debt Relief	0	0
Refugees in Donor Countries	0	0

Reference: OECD (2017): Compare Your Country. Internet: http://www2.compareyourcountry.org/aid-statistics?cr=oecd&lg=en# (last visited 24.04.2017).

Worldbank projects	
IBRD lending in 2016: US$ 758 million, in 43 projects	World Bank 2017e

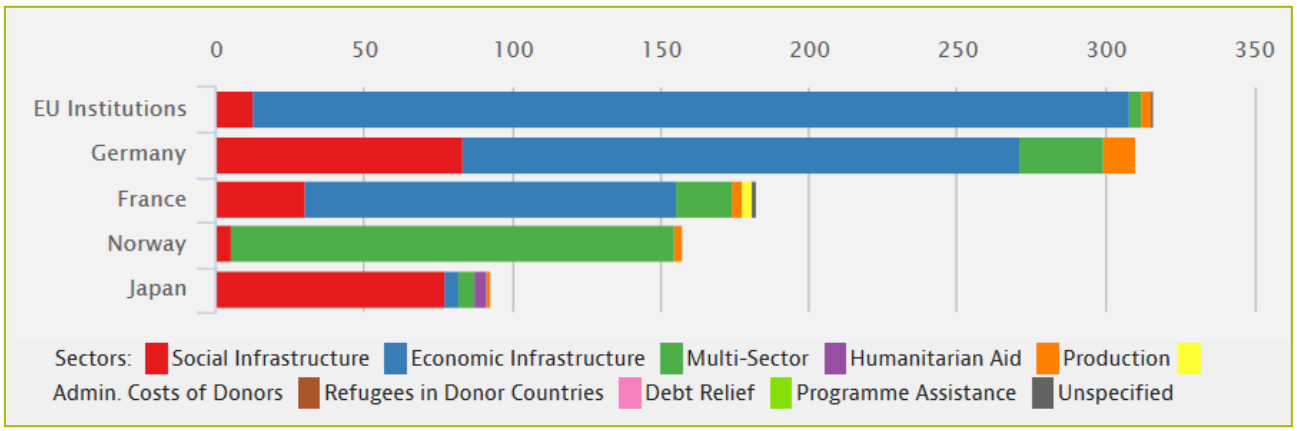
Further reading:

- OECD (2017):Geographical Distribution of Financial Flows to Developing Countries 2017. Disbursements, Commitments, Country Indicators. OECD Publishing. Paris

Initiatives for responsible mining and development

Official Development Assistance for all sectors

ODA by main donor countries and sector (OECD 2017)



Reference:

- OECD (2017): Compare Your Country. Internet: http://www2.compareyourcountry.org/aid-statistics?cr=oecd&lg=en# (last visited 24.04.2017).

Initiatives for responsible mining and development

Development assistance in the mining sector

Projects
2011-2015 Australian Government **30 million US$** *Material efficiency in raw-materials intensive production processes* The International Mining for Development Centre aims to strengthen the capacity of targeted developing partner countries to translate resource richness into significant and sustainable economic and social benefits. (OECD 2017b)
2011-2017 World Bank **50 million US$** *Energy and Mineral Sector Strengthening* The development objective of the Energy and Mineral Sector Strengthening Project for Brazil is to improve the contribution of energy and mining resources to accelerated national economic growth and increased social and environmental sustainability in a context of globalization and technological change (World Bank 2017c)

Reference:

- OECD (2017): Compare Your Country. Internet: http://www2.compareyourcountry.org/aid-statistics?cr=oecd&lg=en# (last visited 24.04.2017).
- OECD (2017b): OECD Stat – Creditor Reporting System. Internet: https://stats.oecd.org/Index.aspx?DataSetCode=CRS1 (last visited 24.04.2017).
- World Bank (2017c): Projects & Operations. Internet: http://projects.worldbank.org/ (last visited 25.04.2017).

Further reading:

- OECD (2017):Geographical Distribution of Financial Flows to Developing Countries 2017. Disbursements, Commitments, Country Indicators. OECD Publishing. Paris

Initiatives for responsible mining and development

EU and member states engagement in all sectors (not limited to mining)

Frameworks / Programmes
EU National / Regional / Multiannual Indicative Programmes: (EC 2017a): • Development Cooperation Instrument (DCI) 2014-2020: Multiannual Indicative Regional Programm for Latin America (EC 2017b)
Strategic Partner Dialogue: • EU-Brazil Strategic Partnership since 2007 (EEAS 2017) • Germany and Brazil conduct a strategic partnership
Free Trade Agreements: • The EU is negotiating a free trade agreement with Brazil. This is part of the EU's Association Agreement negotiations with the Mercosur countries (which also includes Argentina, Uruguay and Paraguay). (EC 2017a) • *For more information on trade issues see section on production & trade*
European Investment Bank (EIB) funding : • currently, EIB does not fund extractive industry projects (EIB 2017)
European Bank for Reconstruction and Development (EBRD) funding: • project list see (EBRD 2017); currently no projects in Brazil

Initiatives for responsible mining and development

Cross-country raw-material specific initiatives

Commodity	Name	Link to raw material profile	Website
Aluminum	Aluminium Stewardship Inititave (in development)	see raw material profile on alluminum	ASI 2017
Iron	Responsible steel scheme	See raw material profile on iron	Responsible steel 2017

Further reading:

Initiatives for responsible mining and development

Further reading

Global Reporting Initiative:
https://www.globalreporting.org/services/Analysis/Reports_List/Pages/default.aspx
……
……

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- ASI - Aluminium Stewardship Inititave (2017): Aluminium Stewardship Inititave. Internet: https://aluminium-stewardship.org/# (24.04.2017).
- British Geological Survey BGS (2017):World Mineral Production 2011-15. Keyworth, Nottingham.
- CIMA Foundation und UNEP-GRID (Quelle!!!)
- Deloitte (2017): Corporate Tax Rates 2017. Internet: https://www2.deloitte.com/content/dam/Deloitte/global/Documents/Tax/dttl-tax-corporate-tax-rates.pdf (last visited 08.05.2017)
- Earthworks (2012): U.S. Copper Porphyry Mines:The track record of water quality impacts resulting from pipeline spills, tailings failures and water collection and treatment failures. Internet: https://www.earthworksaction.org/files/publications/Porphyry_Copper_Mines_Track_Record_-_8-2012.pdf (last visited 18.04.2017).
- EC - European Commission (2017b): Trade – Countries and regions. Brazil. Internet: http://ec.europa.eu/trade/policy/countries-and-regions/countries/brazil/ (last visited 24.04.2017).
- EC - European Commission (2017a): National / Regional / Multiannual Indicative Programmes. Internet: https://ec.europa.eu/europeaid/funding/funding-instruments-programming/nipspins_en (last visited24.04.2017).
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- European Investment Bank - EIB (2017): Unterzeichnete Darlehensverträge. Internet: http://www.eib.org/projects/loan/list/index.htm (last visited 25.04.2017).
- Helmholtz-Zentrum Potsdam (2000): Global Seismic Hazard Map. http://www.gfz-potsdam.de/gshap/
- IBGE PNAD (2014): Instituto Brasileiro de Geografia e Estatística. Continuous National Household Sample Survey (http://www.ibge.gov.br/english/estatistica/indicadores/trabalhoerendimento/pnad_continua/)
- IBRAM (2017a): Instituto Braileiro de Mineracao: Special Program for Safety and occupational Health – MinerAÇÃO. Internet: http://www.ibram.org.br/150/15002005.asp?ttCD_CHAVE=24003 (last visited 24.04.2017).
- IBRAM (2017b): Instituto Braileiro de Mineracao: Management of Water Resources. Internet: http://www.ibram.org.br/150/15002005.asp?ttCD_CHAVE=24004 last visited 24.04.2017).
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