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1. Mobility Roadmap Workshop 28 October 2021

Mining session

Lithium, Cobalt, Nickel, Graphite

Stefanie Degreif (Oeko-Institut)

Marie-Theres Kuegerl (Montanuniversität Leoben)





Agenda for the working group sessions

13:40-13:45	Short break & change to Working Groups	
Working Groups 1) Mining 2) Cell production/OEMs 3) Recycling	Moderators: Stefanie Degreif (Oeko-Institut) Dr. Johannes Betz (Oeko-Institut) Tobias Wagner (Oeko-Institut)	Facilitators: Marie-Theres Kügerl (Montanuniversität Leoben) Noé Barriere (Vienna University of Economics and Business) Patrick Nadoll (EIT RawMaterials GmbH)
13:45-14:00	Introduction <i>Current state of play and major challenges</i>	Working group moderators
14:00-14:30	Round of individual statements <i>Your major inputs for the roadmap</i>	Participants
14:30-15:45	Roadmap development <i>Brainstorming and prioritisation of topics, temporal arrangement</i>	Participants
15:45-16:00	Coffee break & change to main conference room	

Current state of play and major challenges in the mining sector (Lithium, Cobalt, Nickel, Graphite)



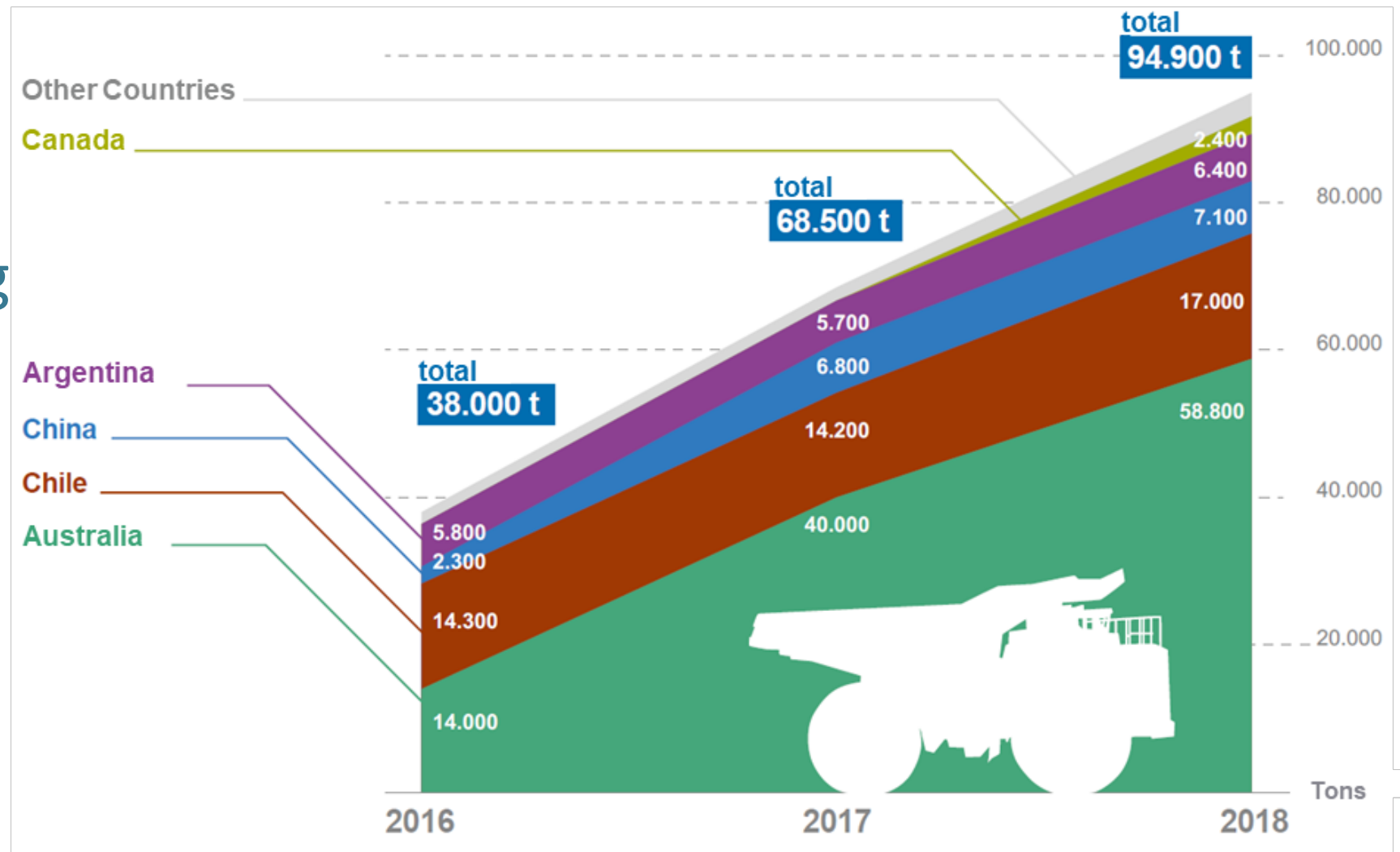
See „State of Play and Roadmap Concept“ on the RE-SOURCING website [here](#)

Lithium





Country overview for lithium mining



Data source: USGS Mineral Commodity Summaries, 2018 (<https://bit.ly/3mmezgB>), 2019 (<https://bit.ly/32xEnyB>), 2020 (<https://on.doi.gov/33paCil>)



Challenges of lithium mining

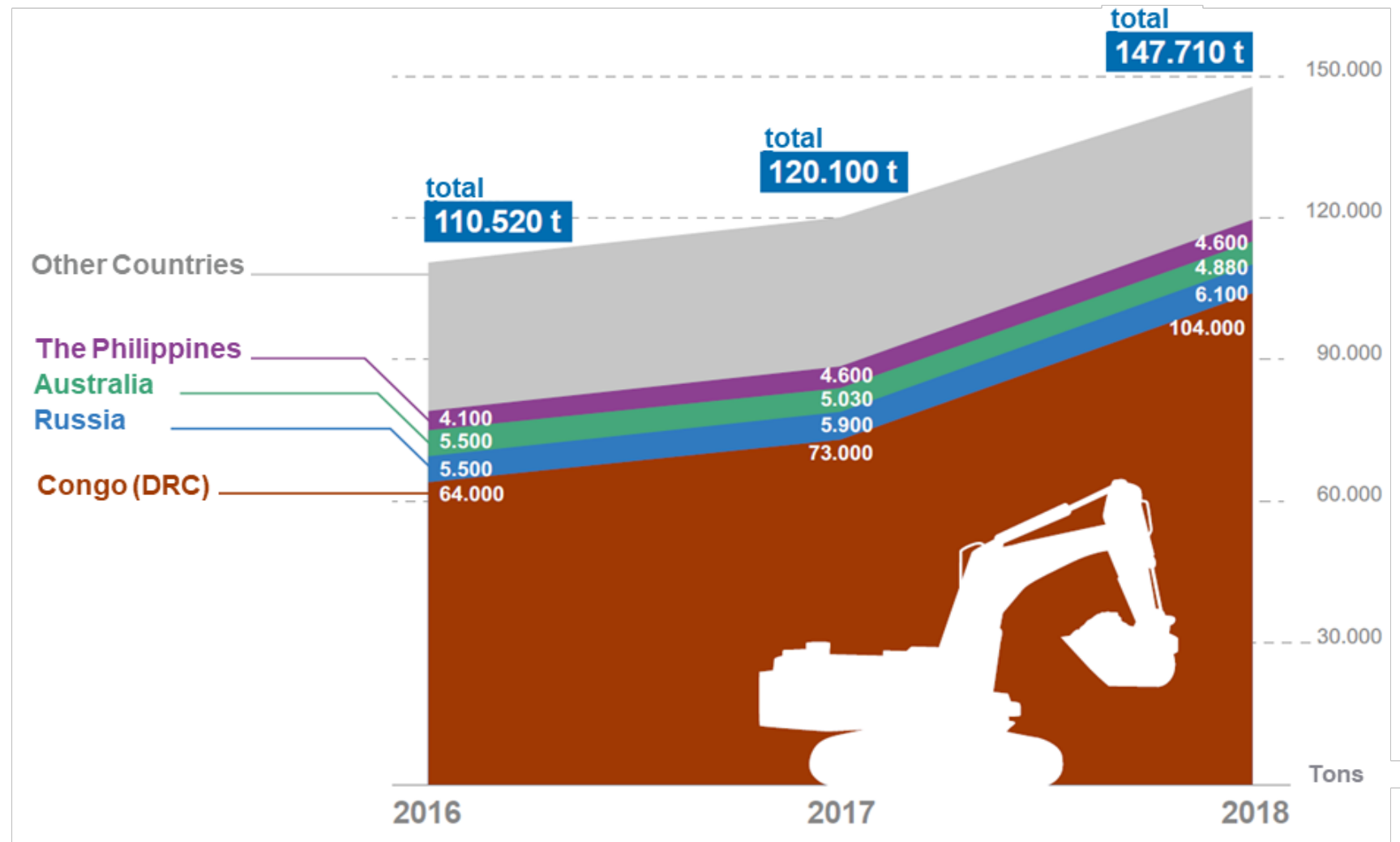
- Hard rock mining (mainly Australia):
 - Mining of spodumene in open pits
 - Extraction followed by roasting and acid treatment
 - Related problems are
 - Heavy metal pollution
 - Acid mine drainage
 - Energy intensive processing
- Lithium rich brines in the Andes region
 - Evaporating water out of a hyper-saline solution in arid region leading to
 - Water scarcity, leading to social tensions
 - Dust evolution
- Refining mostly takes place in China



Cobalt



Country overview for cobalt mining



Data source: USGS Mineral Commodity Summaries, 2018 (<https://bit.ly/3mmezgB>), 2019 (<https://bit.ly/32xEnyB>), 2020 (<https://on.doi.gov/33paCil>)



Challenges of cobalt mining

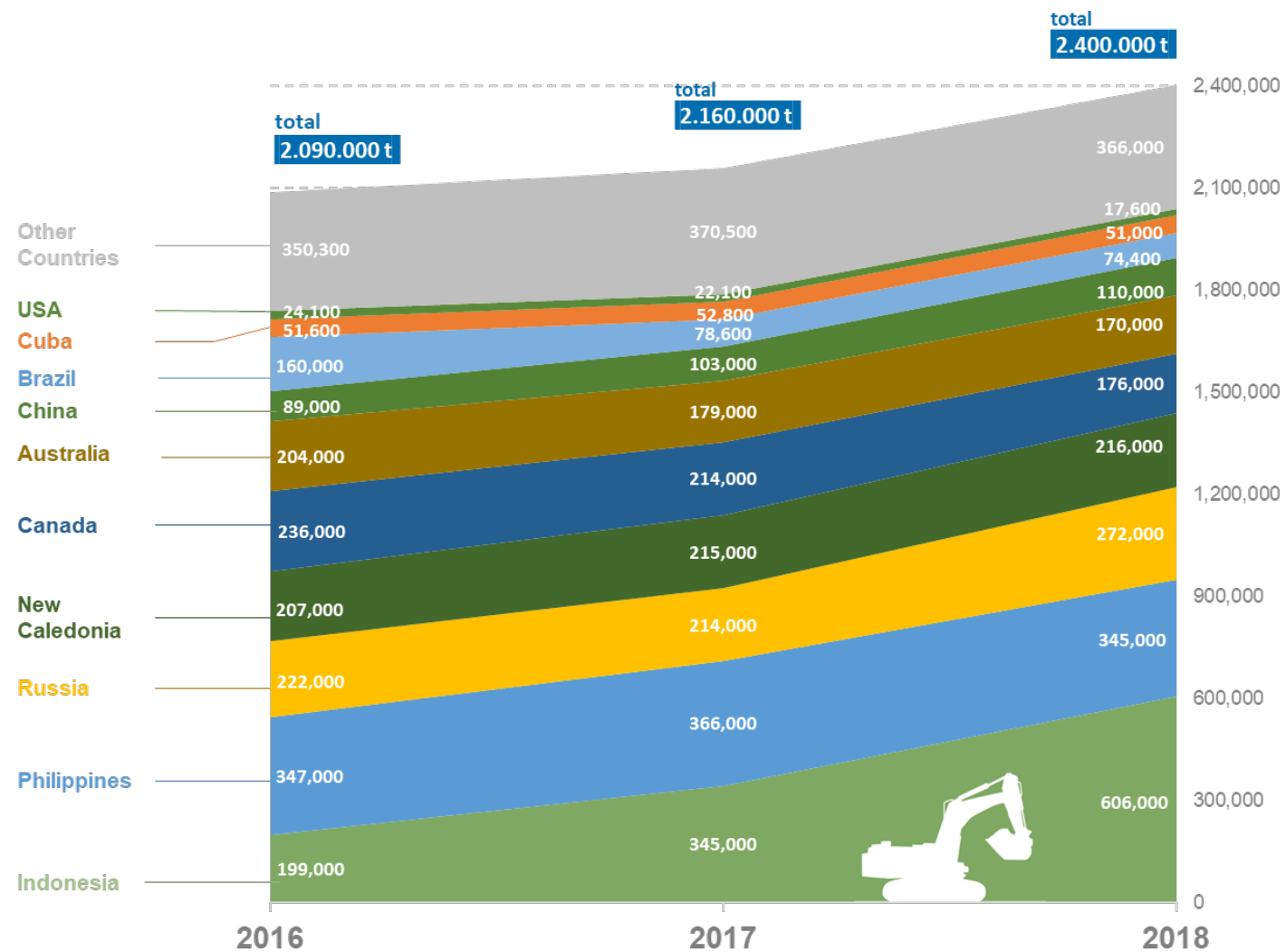
- Production >70% from DRC in 2018; mainly a by-product of copper and nickel mining
- Major issue: social dimension with high share of artisanal and small-scale mining (ASM)
 - Related challenges like child labour, working conditions
 - In 2020, ASM only about 5% of global production due to low cobalt prices
- Further typical problems related to metal mining:
 - Disturbance of land areas
 - Dust pollution
 - Habitat fragmentation
 - Heavy metal pollution



Nickel



Country overview for nickel mining



Data source: USGS Mineral Commodity Summaries, 2018 (<https://bit.ly/3mmezgB>), 2019 (<https://bit.ly/32xEnyB>), 2020 (<https://on.doi.gov/33paCil>)



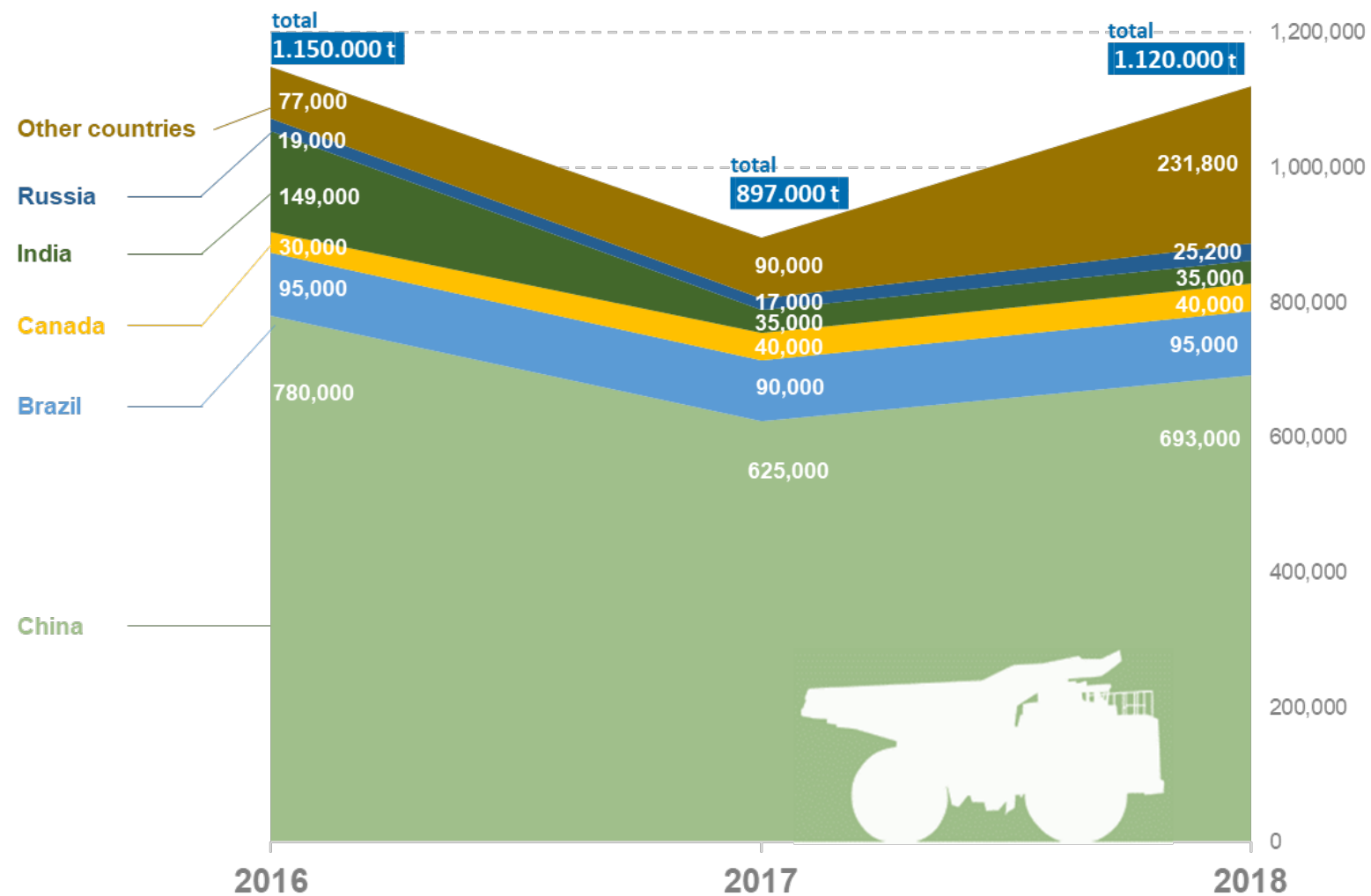
Challenges of nickel mining

- Sulphide deposits
 - Approximately equal shares
 - Mined both in open cut and underground mines
 - Mining is followed by concertation via flotation, smelting of concentrates and refining
 - Potential for acid mine drainage high
 - Lateritic deposits
 - Found in tropical areas with high temperatures and rainfall → high biodiversity and vegetation
 - Mined in open cut
 - High pressure acid leaching follows mining, then hydrometallurgical solvent extraction
 - High energy consumption
- Disturbance of land areas
 - Dust pollution
 - Habitat fragmentation
 - Heavy metal pollution

Graphite



Country overview for natural graphite



Data source: USGS Mineral Commodity Summaries, 2018 (<https://bit.ly/3mmezgB>), 2019 (<https://bit.ly/32xEnyB>), 2020 (<https://on.doi.gov/33paCil>)



Production of graphite

Synthetic graphite:

- High energy consumption and higher cost
- Precursors resulting as side products from crude oil or coal production

Natural graphite:

- Mined both in open cut and underground mines
 - Similar problems as mentioned before
- Purification often conducted by acid treatment (hydrofluoric acid and others) → Water pollution, if not sufficiently monitored

Initiatives and standards



Mining & Mineral Processing

Production

Disposal & Recycling

- IFC EHS Guidelines
- LME
- EITI
- Extractive Waste Directive
- TSM / TSM
- IRMA
- Global Tailings Review
- CTC
- China Responsible Mineral Supply Chain Due Diligence Management Guide
- CIRAF
- OECD Due Diligence Guidelines
- ARM
- ICMM Mining Principles
- Responsible Minerals Initiative
- ERMA
- Fair Cobalt Alliance
- World Bank Climate-Smart Mining Initiative
- Responsible Cobalt Initiative

- **ELV Directive**
- **Basel Convention**
- WEEE European Standard

Mobility / Battery-Specific Standards and Initiatives

Drive sustainability	EBA	GBA	Proposed EU regulation on (waste) batteries	EGVI
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General Standards

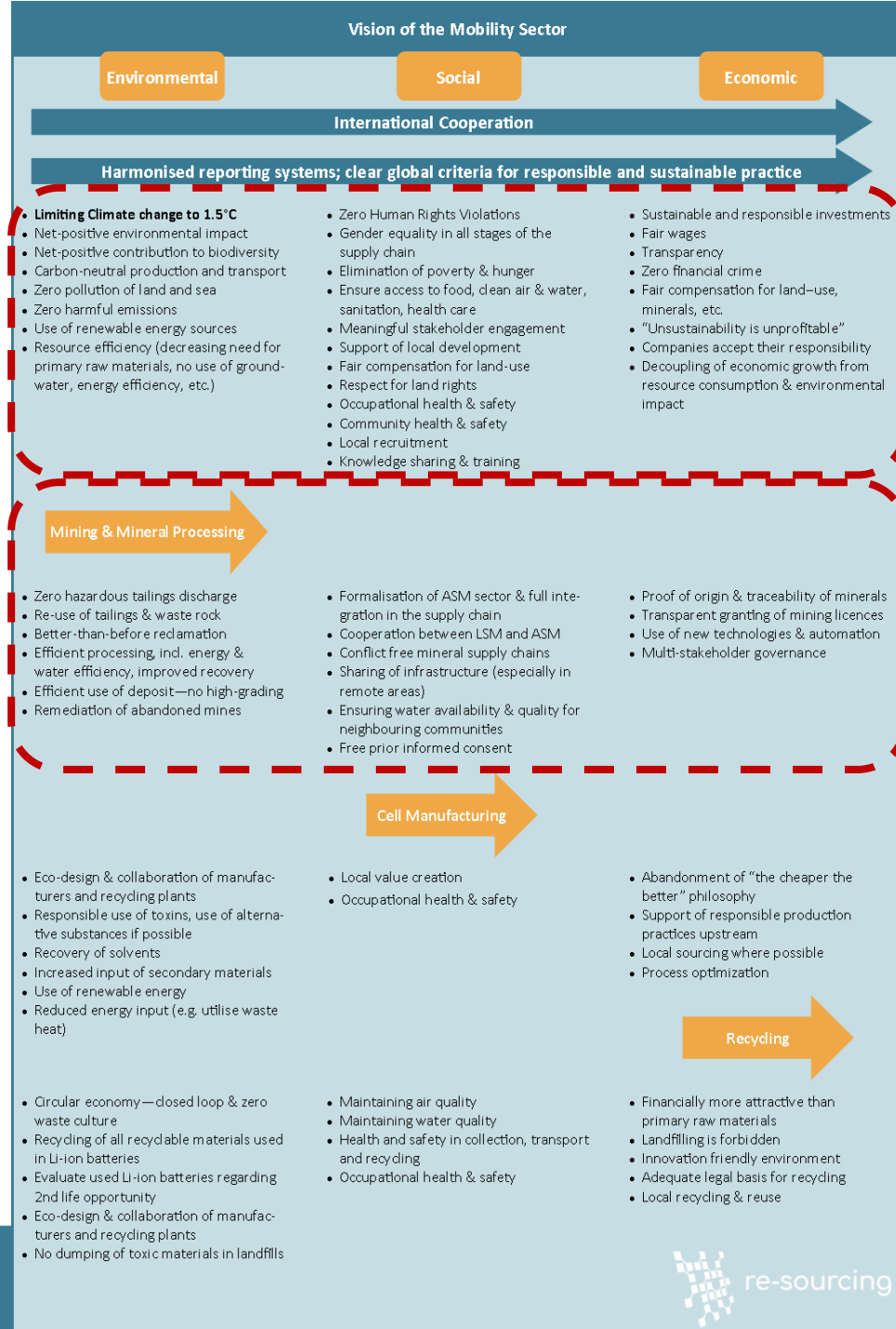
EU Directive on safety and health at work	ISO 50001; 20400; 26000	UN Human Rights Principles; UN Global Compact
ISO 14000-series	GRI	EBRD Guidance
ISO 45001/OHSAS 18001	IFC EHS	OECD Multinational Enterprises
ISO 9001	ILO	SDGs

Colour: **Mandatory regulation**; mandatory standard; voluntary standard; guiding principle; initiative

Vision



Vision





re-s

Vision

Overarching aims

Vision of the Mobility Sector

Environmental

Social

Economic

International Cooperation

Harmonised reporting systems; clear global criteria for responsible and sustainable practice

- **Limiting Climate change to 1.5°C**
- Net-positive environmental impact
- Net-positive contribution to biodiversity
- Carbon-neutral production and transport
- Zero pollution of land and sea
- Zero harmful emissions
- Use of renewable energy sources
- Resource efficiency (decreasing need for primary raw materials, no use of ground-water, energy efficiency, etc.)

- Zero Human Rights Violations
- Gender equality in all stages of the supply chain
- Elimination of poverty & hunger
- Ensure access to food, clean air & water, sanitation, health care
- Meaningful stakeholder engagement
- Support of local development
- Fair compensation for land-use
- Respect for land rights
- Occupational health & safety
- Community health & safety
- Local recruitment
- Knowledge sharing & training

- Sustainable and responsible investments
- Fair wages
- Transparency
- Zero financial crime
- Fair compensation for land-use, minerals, etc.
- "Unsustainability is unprofitable"
- Companies accept their responsibility
- Decoupling of economic growth from resource consumption & environmental impact



Mining specific aims

Vision

Mining & Mineral Processing

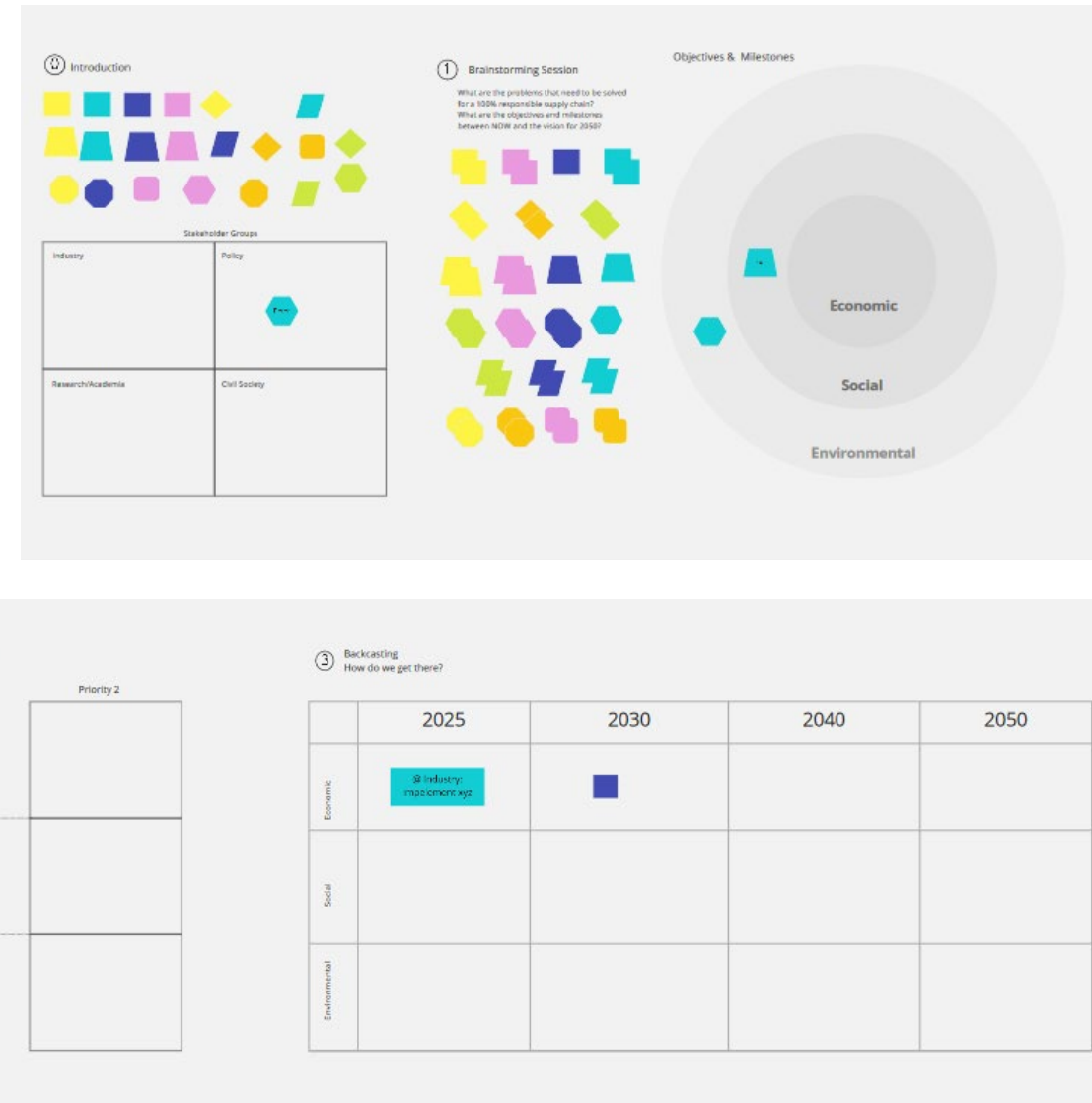
- Zero hazardous tailings discharge
- Re-use of tailings & waste rock
- Better-than-before reclamation
- Efficient processing, incl. energy & water efficiency, improved recovery
- Efficient use of deposit—no high-grading
- Remediation of abandoned mines
- Formalisation of ASM sector & full integration in the supply chain
- Cooperation between LSM and ASM
- Conflict free mineral supply chains
- Sharing of infrastructure (especially in remote areas)
- Ensuring water availability & quality for neighbouring communities
- Free prior informed consent
- Proof of origin & traceability of minerals
- Transparent granting of mining licences
- Use of new technologies & automation
- Multi-stakeholder governance

Roadmap Development



Roadmap Development

- MIRO-Board; Please see link in the chat
- Everyone is invited to participate
- Use the sticky notes
- You can zoom and navigate with mouse of control button
- Step 1: Objectives 2050
 - What do we want to achieve by 2050
 - What Milestones need to be implemented?
- Step 2: Setting Priorities via voting
- Step 3: Timeline
 - What are the concrete steps achieve the objectives?





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THANK YOU
for your attention!



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