re-sourcing

Meeting the Milestones in the Responsible Sourcing Roadmap

Good Practice Guidelines for the Mobility Sector

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Keywords: Mobility, Lithium-Ion Batteries, Circular Economy, Regulations, Business Case, Best Practice

The good practice guidelines on responsible sourcing (RS) in the mobility sector outline outstanding key practices distilled from the RE-SOURCING Project's research and consultations on the mobility sector. To promote peer learning and increase the uptake of RS practices, this document is of relevance to all actors involved in the mobility sector, especially for lithium-ion batteries, in the EU as well as internationally. Four good practice guidelines are elaborated in this document, with case studies to show how they have been implemented.

The first good practice guideline focuses on **responsible procurement of minerals by using a strong and comprehensive RS standard** by a lead firm in the automobile sector. The guideline uses the case of BMW group's adoption of the Initiative for Responsible Mining Assurance (IRMA), outlining the advantages of adapting a strong and comprehensive RS standard, including certified products, in their purchasing requirements. The case outlines the characteristics of a strong RS standard and how it can meet a lead firm's RS purchasing requirements.

The second good practice guideline describes the development of an **overarching regulation for a circular economy**, which is illustrated by the proposal of EU's Battery Regulation. The good practice presents considerations on bringing together different measures to achieve regulation supporting circular economy of batteries with sustainability aspects.

The third good practice guideline considers the development and implementation of a **circular economy for lithium-ion batteries in vehicles**. The guideline describes as example the business model of KYBURZ and the steps how circular economy can work. This includes sales of new batteries in vehicles, the collection and reuse or repurpose of used lithium-ion batteries as well as the treatment of end-of-life lithium-ion batteries. This practice example also illustrates the importance of a close connection and communication between producer and consumer.

The final good practice guideline outlines the **major policy approaches undertaken by the Chinese government in introducing sustainability** standards across the electric vehicle value chain. It outlines the multi-pronged approach, such that all nodes of the value chain are addressed at the same time, rather than a linear approach. The case study presents the salient features of the Green Mining and Construction framework; the introduction of an integrated management platform for the national monitoring of electric batteries and the policy approach to promote second life use for batteries.

Abbreviations

CO_2	Carbon dioxide
CSO	Civil society organization
CNIMA	China Nonferrous Metals Industry Association
DRC	Democratic Republic of Congo
EoL	End of Life
ELV	End of Life Vehicles
ESG	Environmental, Social and Governance
EC	European Commission
EU	European Union
EV	Electric vehicle
LFP	Lithium iron phosphate
LIB	Lithium-ion batteries
MIIT	Ministry of Information and Industry Technology (China)
NGO	Non-Governmental Organisation
OECD	Organization for Economic Co-operation and Development
OEM	Original Equipment Manufacturer
PEF	Product Environmental Footprint
RS	Responsible Sourcing
SoH	State of Health
WEEE	Waste Electrical and Electronic Equipment

1 Introduction

1.1 The Vision for the Mobility Sector

The European Union (EU) committed to the Paris Agreement 2015 with a path to a transition toward a low-carbon, circular economy. In line with these commitments, the European Commission published in November 2018its strategic roadmap for a climate-neutral Europe by 2050. The roadmap's strategic priorities include 1) putting industrial modernisation at the centre of a fully circular economy; 2) embracing clean, safe, and connected mobility; and 3) fully decarbonising Europe's energy supply, amongst other milestones. (EC 2018)

The objective of a climate-neutral EU by 2050 is also at the core of the European Green Deal. The mobility sector is an important component of this transition plan. In 2019, the mobility sector was responsible for the highest share of EU greenhouse gas (GHG) emissions with 31 % of total EU GHG. (EC 2021) The Green Deal requires a 90% reduction of emissions from transport by 2050 to achieve climate neutrality. Of the various transportation categories, road transportation is seen to generate the highest GHG emissions. Currently, battery technology is the most promising technology to support this transformation. It is predicted that by 2050, 80 % of all newly registered passenger vehicles worldwide could be equipped with alternative drive systems (Oeko-Institut 2019). The RE-SOURCING Project's research on the mobility sector focuses on the global value chains for lithium-ion batteries (LIBs). These traction batteries require a wide range of metals, including critical minerals. The project focuses on lithium, cobalt, nickel and graphite in the mobility sector.

All of these minerals are largely extracted outside the EU and imported through supply chains. Cell production is currently dominated by Asian countries. The EU increasingly attempts to build cell production capacity in Europe. Nevertheless, the raw materials and semi-finished products such as cathode materials need to be largely imported into the EU. The State of Play & Roadmap Concept: Mobility Sector Report (2021) discusses the challenges with these imports in more detail.

Further addressing challenges, and in consultation with key stakeholders, the project team has developed a Vision and a Roadmap for the mobility sector. To support the roadmap process and to transfer the identified good-practice examples, this document provides a set of guidelines for specific aspects in the mobility sector. Companies and governments can utilise these guidelines and case examples in achieving the milestones laid out in the roadmap.

1.1.1 Why Responsible Sourcing Matters across the Mobility Sector

The transformation of the mobility sector to only using battery-electric vehicles makes a positive contribution towards achieving the Paris Agreement and the EU's green transition goals. But the challenges inherent to responsible sourcing (RS) as concern the inputs for this technology need to be considered to understand the net contribution of the sector toward sustainability. The value-chain nodes of extraction and production for the mobility sector have been found to include human rights violations, significant environmental impacts, and a lack of commitments to paying fair wages, ensuring gender equality, and preventing conflicts with local communities.

Challenges are not limited to the extraction phase. Cell production is very energy intensive, having its own impact on the environment. At the recycling stage, responsible collection and treatment of end-of-life lithium-ion batteries (LIBs) is of great importance for RS practices. Additionally, as the LIB

components and the LIB itself has a potential to be hazardous, all steps of the value chain, including recycling, have to be critically evaluated for their social and environmental aspects.

1.1.2 Purpose of this Document

The State of Play & Roadmap Concept: Mobility Sector Report (2021) provides a comprehensive list of challenges faced at the value chain steps mining, cell production and recycling for lithium-ion batteries in vehicles. Some of these challenges are being addressed through Sustainability and Responsible Sourcing legislation[1] (EU), voluntary industry standards and due diligence guidelines and reporting mechanisms.

More and more companies, both upstream and downstream, are implementing RS practices. At the same time, governments are increasing their efforts in developing legislation and policies to support and ensure responsible practices.

This document shares good practice approaches that are considered relevant for many stakeholders and actors in the mobility and other sectors. The aim is for other institutions, companies and governments to transfer these good-practice guidelines and approaches on responsible sourcing to within their own institutions.

Each of the four chapters discussing good-practice principles starts with a description of the good-practice case. This is followed by an explanation of characteristics. Based on the concrete cases, the transferrable steps for implementing the transferable aspects of the case are given. Then, the impacts to different stakeholder groups are expressed, and finally, key considerations are made.

The good-practice cases serve as a basis from which the guidelines are derived. The discussions from the flagship lab (held on 1 March 2022) were also considered in the development of the guidelines. The most important takeaways of the good practice approaches and key considerations are outlined in green boxes in the different chapters.

1.1.3 Methodology & Approach

During consultations with sector stakeholders, good-practice cases were identified for the mobility sector. These were defined as the use of innovative approaches addressing existing and foreseen challenges. Through a selection process involving discussions with sector experts, the Project's Advisory Board and Project Steering Committee, four cases were selected that addressed different nodes of the value chain, offered global/regional coverage, and addressed different issues within the RS agenda.

Case owners (experts involved in the design or implementation of the respective practice) were identified for each of the good-practice examples and interviewed by the project team. The case owners presented and discussed their cases at the project's Flagship labs for the mobility sector in 2022.

Distilling the information presented by the case owners, as well as additional research carried out for this document, the guidance document presented here is a step further from the specificities discussed in the Flagship labs.

[1] e.g. the proposal for the EU Battery Regulation

It is important to note that this guidance document is focused on more general *good-practice principles* and, while organisations have illustrated these practices, the RE-SOURCING project *does not speak to the overall responsible sourcing performance of the specified organisation* – we only highlight aspects of a particular good-practice approach that the organisation has undertaken.

This document provides four cases for the mobility sector (see

Table 1). The first good practice principle is applicable across all mineral value chains. The second principle can be applied to all technical products and waste. This includes not only batteries, but also waste of electrical and electronic equipment (WEEE) and end-of-life vehicles (ELV), while the third case can be applied to all battery distributing companies. The fourth case focuses on the Chinese region. Where appropriate, this document includes additional resources for the reader.

Table 1 Selected good practice principles

Responsible procurement of minerals by using a strong standard **Case Study: IRMA & BMW**
Strategy • Develop responsibility criteria for suppliers of raw materials and semi-finished products • Implement certified products in the supplier's contracts and supply guidelines at large firms Process • Identify a suitably strong standard and join it • Start company-internal communication about change in supplier criteria • Include the requirement of certified products in the supplier's contracts and continuous communication with suppliers about the requirements and benefits • Engage with suppliers to undergo the required certification process • Start external communication about the change in responsible sourcing requirements Impact • Ensured improved corporate responsible sourcing and responsible procurement • Strengthen the knowledge within the company about its own suppliers. • Promote critical points through higher rates of audited mining sites
Overarching regulation for a circular economy covering the entire product value chain and focussing on sustainability **Case Study: European Commission's Proposal for a new Battery Regulation**
Strategy • Design a regulation for circular economy with overarching ambitious ESG criteria, including specific, mandatory targets. • Review the regulation regularly to keep up to date with technology development and rising challenges. Process • Bring together actors from different aspects to include appropriate ESG criteria in regulations. Impact • Intensified use of batteries, design criteria, higher material recovery from end-of-life batteries and recycled content in the production. • Decreased emissions related to cell production. • Ensuring responsibly sourced battery materials.

Implementation of a circular economy for batteries **Case Study: KYBURZ**
Strategy • Develop an effective system to collect, reuse, repurpose and recycle EoL batteries. **Process:** • Develop an approach to sell and rebuy products, including LIBs. • Ensure a high rebuy share by close connection and communication with the customer. • Develop a strategy for reuse, repurpose and high-quality recycling of batteries. • Develop an approach to ensure the use of the collected and recycled material. **Impact** • Prolonged lifetime of batteries due to reuse and repurpose of batteries • Less primary raw material input by high recovery of material • Compliance with recycling regulations of manufacturer and customer is ensured • Perfectly adapted recycling process by deconstruction of the battery
Chinese standards: What can they achieve and where do they fail? **Case Study: by MineHutte**
Strategy • Understand non-EU approaches to sustainability in global e-mobility value chains • Promote awareness of common denominators and areas for collaboration and development **Process** • Expand responsible sourcing practices to all nodes of the LIB value chain **Impact** • Implement transferable aspects into EU-based e-mobility value chains from Chinese experience

The next four chapters address each of these cases in detail, with the final chapter offering some general guidance based on these cases.

2 Responsible procurement of minerals by leading firms, through aligning with a strong responsible sourcing scheme

Within the larger sustainability and responsible sourcing (RS) global agenda, there is an increase of calls for evidence of RS practices.[2] Given the complexity of lithium-ion battery value-chains, it is not enough to focus on the RS performance of the leading firms only. This would provide an incomplete picture of the sector's overall impact. With the market power held by leading firms, they are in an ideal position to work with their many suppliers and competitors to drive change: 1) with a view of promoting the adoption of RS practices across the whole sector; and 2) creating a level playing field within the supply industry such that specified minimum RS standards are met.

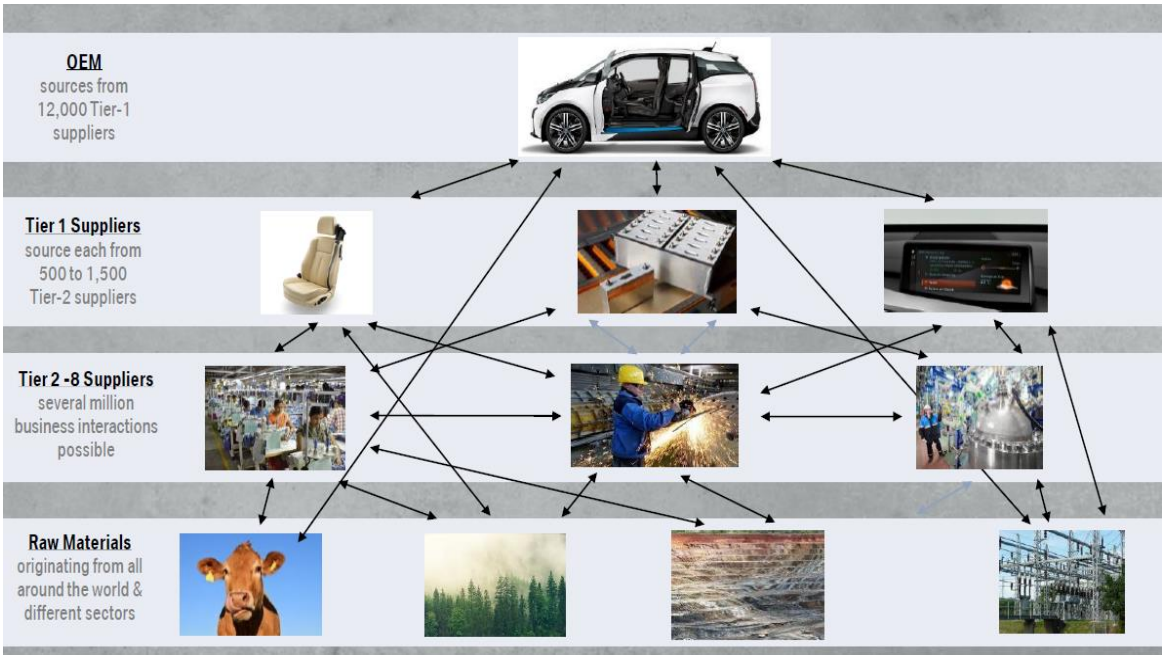
Internationally, leading firms in the automobile sector – and their suppliers – are linked to sectors other than mobility, as automobile companies may share suppliers and associated value chains. In particular, lithium-ion batteries are not only used in the mobility sector but in other sectors as well (such as electronics). The automobile industry has been criticized for not paying sufficient attention to environmental and social challenges in battery production in the process of expanding e-mobility. While many automobile manufacturers have joined various certification schemes, it remains difficult for these companies to determine the level of acceptance of the standard amongst different stakeholders. Additionally, companies can find it difficult to determine what is a good standard to follow. This case study considers the example of the Initiative for Responsible Mining Assurance (IRMA), which many automobile manufacturers such as BMW, Mercedes-Benz, Ford, General Motors, VW and Tesla have joined in recent years. This means some of the leading firms in the mobility sector are pledging to source raw materials from IRMA-assessed mines and, in some cases, including the IRMA certification requirement in their purchasing contracts.

2.1 Business Case

Large scale, globally active companies, such as those in the mobility sector, often have hundreds or thousands of suppliers for different semi-finished products or raw materials (see Figure 1). For a leading firm, it is nearly impossible to carry out due diligence on the origins of individual raw materials that enter their supply chains. Given the immense market power these leading firms wield, they can incorporate a strong RS standard in their purchasing contract for their tier-1, tier-2, and direct mining suppliers. Therefore, these lead firms have the ability to influence RS practices across multiple suppliers in the entire mineral value chain.

[2] See The International Responsible Sourcing Agenda Report (2020) for more information

Figure 1: Complexity of automotive supply chains



Source: IRMA & BMW, 2022

2.1.1 The Good Practice Principles

This good-practice principle focuses on responsible procurement of minerals by a leading firm using a strong RS standard. The case considers the good-practice principle of being able to identify a strong RS standard for adoption and then incorporating that standard in existing procurement contracts.

The first aspect of the good-practice principle addresses the question of identifying a good RS standard, given the vast number of guidelines, certification schemes and standards in the mining sector with different scopes (material specific, geographical focus, social focus, etc.) that are available to the private sector. For a leading firm that sources many raw materials and semi-manufactured goods, a standard should be able to cover a range of primary raw materials. Apart from coverage, the lead firm needs to consider a standard that has taken on board views of a diverse set of stakeholders in its making, such that the standard has wide acceptance across the board.

The second aspect of this good-practice principle considers how, once identified, a strong RS standard can be adopted by a leading firm in its existing procurement operations. The adaptation benefits the lead firm by making its supply chain more sustainable in the short, mid, and long term, whilst building trust for/with the different stakeholder groups, including NGOs and CSOs.

The benefits of a leading firm using a strong RS standard can lead to improvements across supply chains that contribute to the improvement of the mining sector. It also ensures that consumers benefit from manufactured products that have been responsibly sourced. The guidelines in this section therefore focus on:

- Learning how to identify a strong standard for responsible sourcing
- Gain insights into the procedure of the certification and joining a standard

- Understanding the wider benefits of leading firms that require raw material suppliers to be assessed against a strong standard

2.1.2 Guidelines Scope & Contribution

The guidelines presented in this chapter above primarily address procurement departments in leading firms that source raw materials from multiple, often global, suppliers. Given that sustainability issues in large firms are being addressed by a number of corporate departments, this chapter is also useful for sustainability departments.

The next section outlines the characteristics of the case study – the IRMA standard, and its characteristics that make it a strong RS standard. The following section illustrates how a strong standard can be incorporated into a company's contract requirements from its suppliers. The final section addresses general considerations for those looking to identify and adapt a strong RS standard for their procurement operations.

2.2 Characteristics of a Strong Responsible Sourcing Standard

A strong RS standard should be able to offer comprehensive global coverage for minerals that are included in the product of a lead firm. In addition, it should have evolved from multi-stakeholder consultations on all pillars of sustainability, including social responsibility, environmental responsibility, business integrity and planning for positive legacies. Here, all actors should have the same voting rights at the board level. Such a standard should also have a strong third-party verification and assessment process. This section considers the case of IRMA to showcase these characteristics. IRMA was founded in 2006 by a coalition of non-government organizations, businesses purchasing minerals for use in their products, affected communities, mining companies, and labour unions.

The finance sector was added to the governing board of IRMA in 2021.

The IRMA Standard Coverage (numbers are constantly evolving; status May 2022)
IRMA members
- 6 mining companies
- 11 companies in Mining-Exploration / Development
- 15 purchasing companies
- 16 NGOs
- 2 labour organisations
- 4 communities
- 12 other organisations standard setters, consulting / expert services

2 mines with completed audits
- Unki Mine in Zimbabwe, by Anglo American Platinum, with achievement level 75
- Carrizal's Zimapan Mine in Mexico, by Carrizal Mining, with achievement level "Transparency"

9 mines with ongoing IRMA audits

Source: IRMA 2022c

2.2.1 Characteristics of IRMA

This section outlines some of the characteristics that make IRMA a strong RS standard:

- **Comprehensive LSM focus:** IRMA is a comprehensive global standard covering all industrially mined materials (except energy fuels). The global perspective includes 26 chapters with criteria for all pillars of sustainability:
  - **social responsibility** (e.g. labour rights, workers and communities health and safety, cultural heritage protection, ASM)
  - **environmental responsibility** (e.g. water, waste (tailings) management, air, GHG emissions, noise, biodiversity, cyanide and mercury management)
  - **business integrity** (e.g. legal compliance, stakeholder engagement and grievance mechanisms, human rights due diligence, revenue transparency)
  - **planning for positive legacies** (e.g. EIA, SIA, free, prior and informed consent, community support and benefits, emergency preparedness, resettlement, closure)
- **Having stakeholders with equal votes leads to more credibility:** IRMA is governed equally by a diverse set of stakeholders (including NGOs, mining-impacted communities and labour). The decision-making process is based on consensus. This means that the support of various elements of IRMA, such as criterion in the standard, is required from all sectors and that no single organization, company, or stakeholder sector has authority to make decisions that are not supported by other stakeholder groups. That leads to a broad acceptance of the standard.

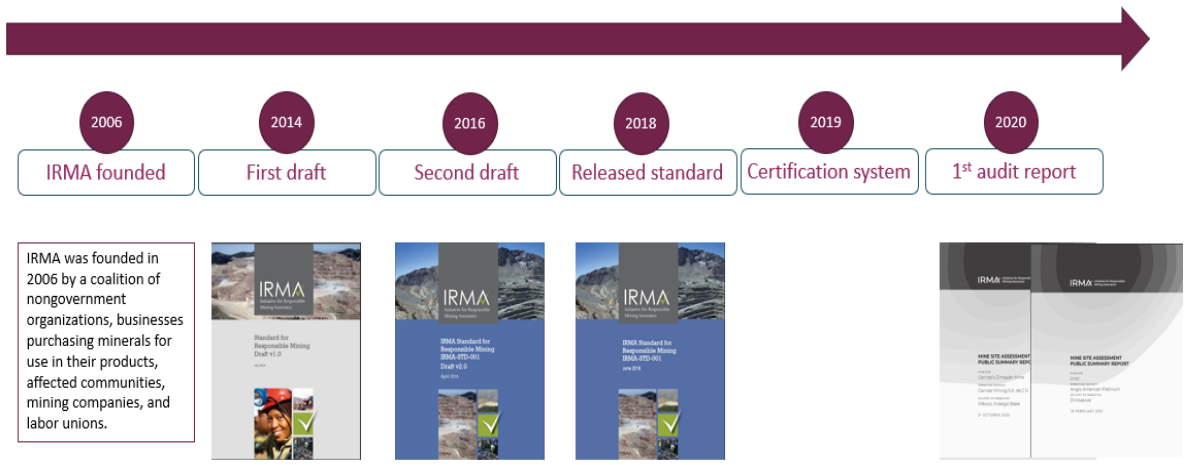
Figure 2: IRMA's multi-stakeholder governance (each sector has same voting rights)

Mining	Purchasing	NGOs	Organized Labor	Affected Communities	Investors and Finance
Anglo American	Tiffany & Co	Earthworks	United Steelworkers	Tsilhqot'in Nation	Royal London Asset Management
ArcelorMittal	Microsoft	Human Rights Watch	IndustriALL Global Union	Mining Affected Communities United in Action, South Africa	NEI Investments

Source: IRMA, 2022a

- **Public consultation process of the standard:** The IRMA standard was developed through an extensive public consultation process. IRMA received more than 2,000 comments from over 100 individuals/organizations in the consultation process. The standard has gone through multiple drafts and had field tests to simulate the mine audits. The first audit reports were published in 2020.

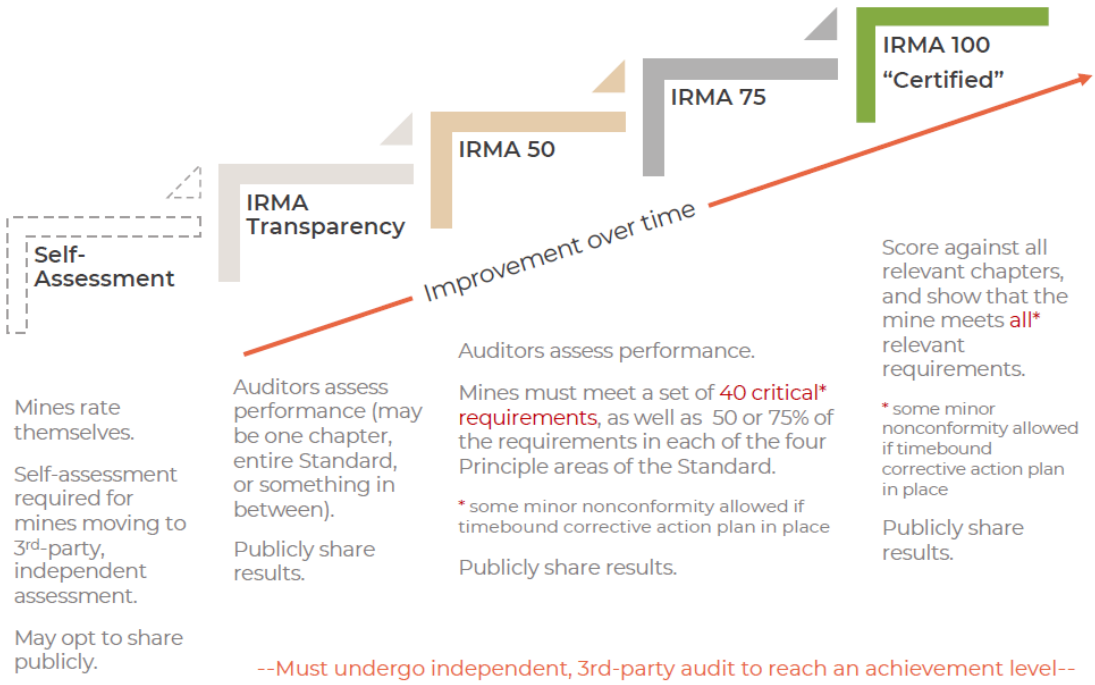
Figure 3: IRMA's development process from foundation to first audit report



Source: IRMA & BMW 2022

Improvement approach: IRMA has a step-by-step improvement approach. By using a scoring system, it recognizes improvement at a mine site over time.

Figure 4: IRMA's improvement approach



Source: IRMA & BMW 2022

- **Independent audits:** Independent auditors undertake a desk review and on-site visits for every mine audit and include stakeholder engagement in the process. For the stakeholder engagement there is a special effort to reach out to local communities, NGOs and mine workers to receive information for the audit.
- **Transparency**: All IRMA audit reports are published on IRMA's website for anyone to review. The audits are developed for specific sites, as the mining risks and impacts are site-specific.

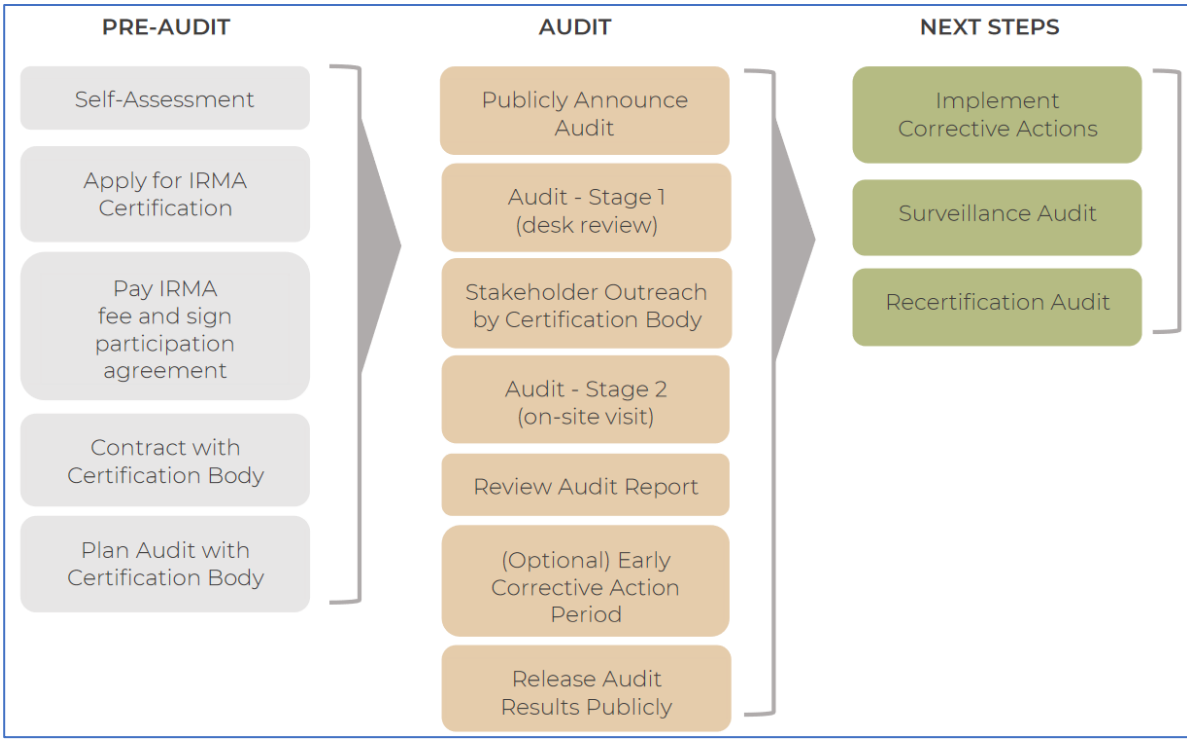
These criteria lead to a standard which has credibility among diverse stakeholders, including NGOs.

2.2.2 The Audit Process

The IRMA assessment process is carried out by independent external auditors who are approved by IRMA. These auditors are neither mining company employees nor employed by IRMA. Typically, the assessment process is divided into three steps:

- **PRE-AUDIT,** including Self-Assessment, applying for IRMA certification and signing a participation agreement, contracting with certification body and audit planning.
- **AUDIT,** including the public announcement of the audit, desk review, stakeholder outreach, on-site visit, review of audit report, optional early corrective action period and audit results publication. The seven steps in the audit are detailed below.
- **NEXT STEPS** include the implementation of the corrective actions, the surveillance audit and the recertification audit.

Figure 5: IRMA's audit process



Source: IRMA 2022b

The seven steps of the Audit process are as follows:

Step 1: Publicly announce commencement of assessment

All upcoming third-party IRMA assessments are published on the IRMA website and via IRMA's newsletter. The mine site profile, filled out in the self-assessment, is published in IRMA's Engagement Map. The mine site can also publish the information but must adhere to IRMA's Communications and Claims Policy. This announcement is aimed at mine site stakeholders, such that they are aware of the audit and can participate in the process.

Step 2: Desk review

- Stage 1 of the audit typically starts with an opening meeting, where mines and auditors discuss the certification requirements, review the audit scope and plan, discuss confidentiality as well as conformance evaluation method and management of non-conformities and corrective actions.
- For the provision of evidence, mines provide documentary evidence to demonstrate IRMA requirements conformance. The more information that can be provided at this stage in detail and with references in these documents, the less time is needed by the auditors for reviewing. In case of very sensitive or confidential information that cannot be provided electronically, the review is postponed to the on-site visit (stage 2).
- Next, the auditor reviews the materials of the mine's self-assessment and identifies areas where additional information or clarification is needed.
- In a closing meeting the findings of the desk review are evaluated and areas with potential nonconformities are discussed. The mine has the chance to implement improvements before the auditor progresses to stage 2.

Step 3: Stakeholder outreach by certification body

The stakeholder outreach can be done in parallel to the public announcement and desk review, but at least 30 days prior to stage 2 (on-site visit). The aim is to receive input from affected and interested stakeholder groups regarding environmental and social management of the mine operation. Here, the input can be in written form or via phone interviews. The audits always include interviews with mine workers, and if possible, with mine contractors and workers' organizations. Interviews are also conducted with indigenous people, property owners, water rights holders, affected communities, artisanal and small-scale miners, CSOs (local, regional, national), regulatory agency personnel (local, state, federal) and other identified and relevant groups. During the on-site visit, the auditors carry out in-person interviews as well. Engaged stakeholders are not mentioned by name in any publicly available material.

Step 4: On-site visit

- The on-site visit starts with an opening meeting where the mine operation and the audit team review the scope and onsite audit plan, discuss updates of mine activities, review how nonconformities and corrective actions are managed and the onsite emergency and security procedures of the audit team.
- In the observation phase, the auditors tour around the mine site facilities and any relevant off-site locations.
- The in-person interviews are conducted one-on-one or in groups. The interviews are held with mine managers, workers and workers representatives (without mine management) and the above-mentioned stakeholder groups.

- In case sensitive documents could not be sent digitally in stage 1, the review of this documentary evidence is carried out at this stage.
- In the closing meeting, the preliminary findings, including nonconformities and observations, are discussed as well as the next steps are agreed upon between the auditors and the mine operation.

Step 5: Review audit report

Within 30 days after the stage 2 closing meeting, a draft report is developed and reviewed before sending to the operating company. The company has 30 days to review the report for factual errors and, if necessary, they are to use that time to develop corrective actions (e.g., for critical requirements). Afterwards, the certification body has 15 days for revisions. IRMA's Director of Standards and Assurance has a further 15 days for review and the report is finalized within seven days by the certification body.

Step 6: Optional early corrective action period

The audit results can be postponed by the mine/company for up to 12 months to implement corrective actions. This can be the case when the mine has a major nonconformity with one or more critical requirements. If the company/mine chooses to use this 12-month corrective action period, any improvement or change need to be verified by auditors within that 12-month period.

Step 7: Public disclosure of audit summary

An audit report is made public on IRMAs website. The public reports include information like scores on each requirement and chapter, and a section on areas for improvement. There is an opportunity for the mine/company to include information on planned corrective actions and comments. The company has the option between publishing the full audit report or request that confidential information be redacted prior to the summary report's public release.

Good Practice:

- Engagement with local stakeholders such as workers and communities
- Mandatory transparency of the audit and the results to the public
- Consultation with the company and opportunities for corrective actions to be undertaken

2.3 Steps on implementing a strong standard in procurement contracts

For a lead firm in the automobile sector, with thousands of different suppliers and raw materials in the automobile parts, the origin of the raw materials plays an important role for addressing sustainability.

Often, the automobile industry is criticized for not paying sufficient attention to environmental and social challenges in battery production as the e-mobility sector expands. To address these concerns, companies like BMW are joining IRMA and publicly expressing their aim to source raw materials from mines assessed through IRMA. The detailed sustainability requirements under a good RS standard (IRMA in this case) allow lead firm procurement departments to include concrete specifications to include in their procurement contracts. For consumer-facing brands, such as car companies, a

transparent standard allows for consumers and investors to access their sustainable procurement practices, to understand current practices and encourage change where needed.

For a lead firm, the following steps are relevant to implement a strong RS standard.

2.3.1 Senior management buy-in within the lead firm

To adopt and implement a strong RS standard, senior management buy-in is crucial. A number of employees and divisions need to be involved. This can also include convincing senior management and department heads of the validity and business benefits of taking up such a standard. For example, procurement departments often use price and technical specification requirements as the main criteria in the decision-making process. To include RS practices in this decision-making procurement process, senior management needs to provide internal leadership on the importance of doing so and should continuously reinforce the need to do so. This ensures that implementation of RS practices is across different company divisions, particularly in large firms where sustainability aspects and purchasing are not always part of the same division. Additionally, a leading firm's implementation of a strong RS standard has a strong and positive public relations impact for the company. Therefore, the communications department should also be involved in understanding the implementation process and its impact on a company's ESG credentials.

2.3.2 Identify a suitable strong standard

The decision to use a strong standard is ideally embedded in a company's sustainability strategy. However, a leading firm may require more than one standard. For example, the use of recycling material instead of primary material in product design or the responsibility of recycling material production needs to be considered in the overall strategy as well. In addition, multiple certification schemes need to be identified when material is not available with the selected standard. Therefore, suitable standards need to be identified through examining and benchmarking different standards. A standard that offers greater coverage should take precedence over others if the quality is otherwise equal.

For example, the IRMA standard is applicable to all mined materials and has a global application; data at mine-site level is published and available. Therefore, it provides wide coverage for the RS needs of the lead firm. In addition, the process of the standard, i.e. its robust multi-stakeholder engagement and equal governance format, lends it credibility from consumers and civil society groups. The independent third-party audits at site level are also crucial for a strong standard.

As IRMA is a relatively new certification scheme, it will take time to assess all of the mines producing sufficient materials (by type and volume), required by leading firms. Additional / alternative certification schemes / criteria may also need to be identified by the lead firms to offer greater coverage.

2.3.3 Inclusion of a strong standard in supplier contracts and company supplier sustainability policy

To fully implement a RS standard, a leading firm would need to incorporate the standard's requirements for its tier 1 and tier 2 suppliers, usually through changes in the leading firm's Suppliers Sustainability Policy. This would lead to the inclusion of certified products within procurement contracts and not a purely voluntary action on the part of the suppliers. The request would apply to both the direct purchase of raw materials and the semi-finished product purchase. The new

procurement requirements need to be explained and discussed with the existing suppliers and be a part of negotiations for new contracts.

2.3.4 Support awareness of the selected standard

Leading firms can use their market power to support the awareness of their preferred RS standard within the industry. Ideally, other lead firms will then also select the same/similar standard for their procurement processes. Thus, the sector as a whole can have leverage to ensure compliance amongst suppliers and encourage more uptake across the supply chain. To foster broader outreach and ensure enough certified raw materials are available for all leading firms, companies should develop formal letters to invite raw-material producers in their supply chains to undergo the selected certification. Such awareness can also be created through public communications (press releases, sustainability reports) and in bilateral contacts as well as at events to promote the adoption of strong RS standards by the entire sector.

Good Practice:

- Senior management support ensures inclusion of sustainability requirements across company operations.
- Inclusion of the binding request for certified material in contracts and in the Supplier Sustainability Policy ensures the use of responsibly sourced material.
- Large firms use their market power together to ensure compliance amongst suppliers.

2.4 Impact

The impact of implementing a strong standard in a manufacturing company's contracts can be seen on three levels: corporate benefits, supplier benefits and mining-sector benefits. These are discussed here.

2.4.1 Companies benefit

For global manufacturing companies, the procurement department has concrete RS requirements to implement. By using a comprehensive, well-accepted standard for most (if not all) materials, tier-1 and tier-2 suppliers can focus on meeting a single standard for material sourcing. Leading firms have greater assurance that they are purchasing responsibly mined raw materials and semi-finished products. The lead firm can thus ensure that its due diligence requirements are met. Furthermore, for consumer-facing brands and products that are a part of the green transition, ensuring and evidencing responsibly sourced materials is highly relevant. Also, by using these standards, higher supply chain transparency and verified sustainable business conduct are supported, which improve supply-chain resilience and lower the risk of supply disruptions.

2.4.2 Supplier benefits

By including requirements of using a strong standard in the supplier's contract, suppliers have a clear understanding of requirements from procurement companies. This can lead to a check of the supplier's corporate practices on how responsibility criteria and due diligence requirements are met. Fulfilling strong standard criteria can lead to better acceptance of production at the site. Furthermore, it can lead to competitive advantages and can expand the field of potential purchasers in a sector where RS awareness is continuously rising.

2.4.3 Mining sector benefits

Leading firms implementing a strong RS standard increases pressure on the mining sector to improve its performance. The choice of a good standard allows mining companies to use a step-by-step approach to improve the performance on-site over time, instead of being faced with a 'pass or fail' audit approach. Under a good standard, such as IRMA, mine sites receive a detailed report on nonconformities and where changes are needed to fulfil responsible sourcing. This can assist them in meeting the due diligence requirements of leading firms. Additionally, using an RS standard with broad acceptance, including from NGOs, the mining companies can minimise reputational risks. In the mineral sector, certified responsibly sourced material is increasingly becoming a competitive advantage, where new markets can be expanded.

2.5 Key Considerations for Practitioners

This section outlines key considerations, issues and challenges for companies and industry leaders when joining and implementing a strong standard in their procurement contracts.

2.5.1 Development of sustainability strategy

Implementing a strong standard for primary raw material in procurement contracts covers one aspect of responsible sourcing (RS). Leading firms also need to consider other RS practices that are not met by standards, such as the overall reduction of virgin raw material use and the procurement of responsibly recycled material. Leading firms therefore need to develop an overall sustainability strategy with an overarching RS aspect. This should consider and prioritise the reduction of raw material demand and the use of responsibly recycled material before purchasing certified primary raw material.

2.5.2 Benchmarking of standards and certification schemes

While benchmarking existing standards and certification schemes, as a first step the pros and cons of the different certification schemes need to be identified. Standards change and develop in scope and criteria over time. In the broad landscape of standards, there are different scopes and borders of the schemes (e.g., LSM versus ASM, certification of a site versus a company, only mining or also refining and recycling). A leading firm needs to identify the limits of available certified materials and consider appropriate alternative certification schemes/ criteria for the firm.

2.5.3 Responsible sourcing as a high priority in the company

For continuous improvement of RS practices, they need to be a high priority within and across the entire firm. For this, the firm's sustainability strategy regarding responsible sourcing needs to be regularly discussed in the company and adapted on a continuous basis. All relevant departments (purchasing, sustainability, communication, production, sales, marketing) need to be involved in the selection and adaption process. Additionally, external communication of the responsible sourcing requirements is relevant for suppliers so that they are aware of the lead firm's requirements and can work towards ensuring that enough certified material is available.

Additional Resources:

- RE-SOURCING Flagship Lab: presentation and video on flagship case "responsible procurement by using a strong standard" IRMA & BMW (2022)
- IRMA website
- RE-SOURCING Roadmap Workshop: The Mobility sector (2021)
- RE-SOURCING Report: State of Play & Roadmap Concept Mobility Sector (2021)
- RE-SOURCING Briefing Document: Identifying Challenges & Required Actions for Responsible Sourcing in the Mobility Sector (2022)
- RE-SOURCING Briefing Document: Responsible Sourcing: The Case for Business Competitiveness (2020)

3 Overarching regulation for a circular economy such as the EU's Battery Regulation

The battery market, especially for lithium-ion batteries for electric mobility, is growing very fast. This growth, while positive, can also be linked to immense challenges concerning the environmental and resource footprints, human rights violations, and missing infrastructure to cope with the new flow of battery waste. Mandatory standards are crucial to establishing a level playing field for responsible sourcing and to protecting companies with high environmental, social and governance (ESG) standards from competing players with lower prices and lower standards.

The new proposal for a European Battery Regulation as part of the larger European Strategic Action Plan for batteries intends to create a European-wide law to modernise the EU's regulatory framework for batteries, while securing sustainability principles and leading the global battery industry.

The main objectives of the Regulation are:

- Strengthening the functioning of the internal market (including products, processes, waste batteries and recyclates) by ensuring a level playing field through a common set of rules
- Promoting a circular economy
- Reducing environmental and social impacts throughout all stages of the battery lifecycle

3.1 Business Case

The new proposal for a European Battery Regulation is a good example of different aims being achieved within the same regulation. The main goal of the new proposal is the protection and support of the growing battery market in the EU. To achieve this goal, it defines certain sustainability standards, which are only achievable by companies actually engaged in RS. Thereby, it creates a level playing field for domestic EU battery manufacturing companies and non-EU-based companies producing batteries for the European market. Both groups are required to abide by these EU standards when competing in the European market.

3.1.1 The Good Practice Principle

The proposed EU Battery Regulation intends to introduce many measures, breaking new ground. It can serve as example for other sectors (e.g., WEEE, ELV) looking for ways to improve their responsible sourcing practices. There are several aspects being introduced in the Regulation:

- Mandatory requirements on sustainability
- Carbon footprint rules
- Minimum recycled content
- Performance and durability criteria
- Safety and labelling for marketing and putting into service of batteries
- Requirements for end-of-life management (reuse/repurposing and recycling)
- Due-diligence obligations for economic operators as regards the sourcing of raw materials
- Extended producer responsibility for all batteries

3.1.2 Guideline Scope & Contribution

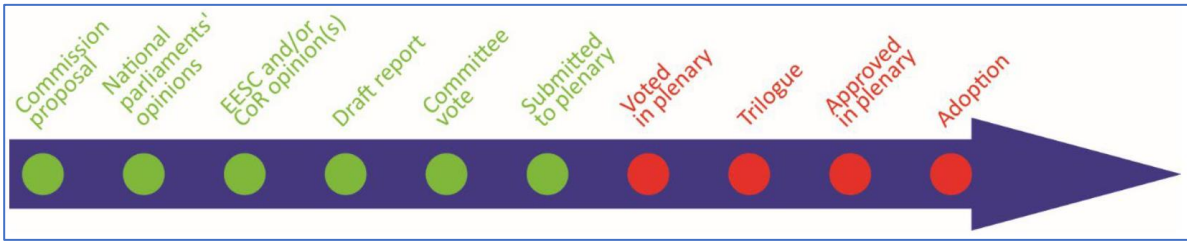
The **guidelines are primarily directed at government agencies, policy makers, NGOs, industry, academia and consultants involved in drafting national and regional policy and consultation processes.** These guidelines should assist them in designing an overarching regulation for a circular economy.

To illustrate this good practice, this chapter uses the case of the new proposal for a European Battery Regulation. As illustrated before, it is the most advanced of its kind, covering the battery market of the whole EU with impacts on the whole world of battery production, as the EU itself is a huge market for electromobility and batteries in general. The European Commission's (EC) agenda includes environmental, economic, social and governance objectives.

The basis of the European legislative process are several assessments of the current legislation, including an impact assessment of the possible changes in regulation. This is usually done by outside consulting organisations in close cooperation with the responsible policy officers of the EC. It also includes surveys and interviews of experts in the field.

Based on these assessments, a new proposal is written and published by the EC. In this case, it is set up as a Regulation, which means that it will be immediately active in all Member States as soon as it is approved by the European Parliament and the Council. In contrast, the other type of legislation in the EU, a Directive, first has to be transposed to national law, which prolongs the process and leaves space for interpretation and misalignment between the different EU Member States.

Figure 6: Legislative process of the EU Battery Regulation



Source: EPRS (2022)

After the proposal was developed, intensive consultations took place. For its consultative process, the EC's aim was to collect widespread feedback from all actors in the field and reduce the risk for future criticism by different parties. The consultation involved stakeholders from the public and private sector (both national and international), unions, academia, and civil society on the one hand and the Member States on the other.

After further consultation, the Parliament and the Council each created their own version of the proposal by deleting, changing, and complementing the original proposal by the EC and passed it by a vote in March 2022. At the time of writing this RE-SOURCING Good Practice Guidance, the next step is finding a compromise between the three versions. While the EC only has a counselling role in this, the Parliament and the Council have to come to an agreement. The latter process involves the so-called 'trilogue' meetings.

3.2 Measures to Create an Overarching Regulation for a Circular Economy

3.2.1 Higher Mandatory Policies for Recycling

There are several challenges involved in the production, use and end-of-life (EoL) treatment of highly technical products such as LIBs. First, there is an environmental burden in dealing with highly technical EoL products due to the hazardous materials in the batteries and missing collection and sustainable treatment options (like for batteries). This goes along with a loss of material due to the low collection rate target, only general and low recycling efficiencies, and no material specific recovery rates. Another problem is downcycling of materials due to the high costs of recovery and purification, leading to competition with primary material prices. An example for this is the use of lithium-containing slag for street construction purposes.

An overarching regulation can counter this challenge by introducing a higher **collection rate target** that increases in time (e.g., as part of the Battery Regulation Proposal for portable batteries, with a collection rate target starting at 45 % for today and increasing to 65 % in 2025 and 70 % in 2030).

To further circularise the resources of the collected products, **recovery targets** (for metals) as well as **efficiencies for recycling** are set. To give an example of the targets: for batteries, the minimum recycling efficiency for LIBs is currently only at 50 % of total weight, framed under the category "other batteries", as there is no specific category for LIBs in the current Battery Directive. In the new category for LIBs, the recycling efficiency targets are proposed to be 65 % in 2025 and 70 % in 2030. Material-specific recovery targets need to be set for the most important metals. For batteries, these are copper, cobalt, nickel, and lithium. As there is still nearly no lithium recycling today and it is technologically more difficult, the proposed targets for lithium are lower.

To ensure that the recycled materials are used and get a reasonable price, **recycled content targets** need to be set for the relevant materials. In the case of the proposed Battery Regulation, targets for cobalt, lithium, nickel (and lead) in new batteries are defined.

Overall, the recycling targets are all interconnected and enable each other. Without the recovery of a metal, no recycled material is available to meet the targets for the recycled content in new products. The latter measure is in turn necessary to create a stable demand for recyclates that is independent of the primary material market.

Good Practice:

Set mandatory complementary recycling and recovery targets for critical metals from products as well as recycled content targets for new products that increase over time.

3.2.2 Mandatory Due Diligence

Minerals are sourced from around the world, often in countries with low mandatory standards, corruption and low law enforcement. Minerals like cobalt, sourced to a large part in the Democratic Republic of Congo (DRC), have a high risk to be connected to the worst form of worker's rights abuses, child labour and low environmental standards.

There is no global mandatory policy prohibiting companies from benefitting from suppliers with human rights abuses or missing labour rights. Also, there is no transparency concerning the supply chain of OEMs, which is critical to create a liability for their actions.

Ensuring the ethical sourcing of materials (for LIBs: cobalt, natural graphite, lithium, nickel) by requiring manufacturers (or importers) to apply the **OECD Due Diligence guidelines and other standards** on their activities globally and along their entire supply chain could contribute to resolving these challenges. This would include:

- Ensuring not to facilitate the commission of human rights abuses associated with the extraction, transport or trade
- Interrupting engagement with suppliers when there is reasonable risk that they are linked to such practices
- Contributing to the effective elimination of money laundering and bribery across the supply chain

Good Practice:
Set mandatory social and environmental standards for critical metals in products to ensure the ethical sourcing of materials.

3.2.3 Maximum Carbon Footprint

While due diligence is mainly concerned with social sustainability, there are also environmental challenges in the manufacturing processes. The high energy consumption during mining, refining, material and product production leads to a high carbon footprint if the energy is provided by fossil fuels. There is no mandatory policy for imported goods to be produced with low CO_2 emissions. Therefore, the stricter European rules concerning the transformation to renewable energies and the European Union Emissions Trading System could possibly lead to an economic disadvantage for European companies.

To accomplish the shift to lower emissions due to production, companies need to meet criteria and offer more transparency, like declaring the carbon footprint and committing to maximum life-cycle carbon footprint thresholds. According to the EC Product Environmental Footprint (PEF) method, the calculation has to be based on the cost of material, energy, and auxiliary materials used in a manufacturing plant to produce a specific product.

Good Practice:
Introduce mandatory, maximum life-cycle carbon footprint thresholds for certain products based on a standardized calculation method.

3.2.4 Implementing Several Positive Aspects Concerning the Products

There are several additional challenges concerning a product, which could also be addressed in an overarching regulation.

1. Durability: Products differ greatly in their lifespan. They can be designed with different features that come with draw backs in other areas. Increased durability is crucial for the environmental footprint but is not easy to achieve. Performance and durability requirements are needed. The regulation shall set parameters for minimum performance and durability. This should enable only the selling of higher quality products with strong benefits for the ecological impact.
2. Price versus negative impacts: The price usually dictates public procurement, while environmental impacts are not considered. With ‘green’ public procurement including criteria for technical specifications of a product and award criteria, products with lower negative environmental impacts over their lifecycle are chosen.

3. Product information: The information on a product required for reuse/recovery and proper recycling is mostly not accessible to collectors and recyclers. As in the Battery Regulation, the need for labelling can be set. For example, a QR code is an easy option to provide information on product specification (e.g., for batteries, indicating the charging capacity and presence of hazardous substances) as well as information about the carbon footprint, the due diligence report and recycled content. This allows the buyer of a product to base the purchase decision on accurate and reliable information. Furthermore, it enables better law enforcement and should improve the possibilities for reuse, repurposing or recycling of a product.

Good Practice:
Introduce longer mandatory product lifetimes, green public procurement and more information about a product, enabling more sustainable products (or their use).

3.3 Limits and Impact

When developing an overarching regulation, the finalisation process through the aforementioned trilogue meetings can take a long time. Discussed criteria can be changed or weakened. Even though a regulation does not need to be implemented into national law, clear definitions are needed, such as the definition of recycling to avoid downcycling.

The new overarching regulation has thus first to prove its usefulness. However, there are already steps being taken to account for the future measures of the proposal. In case of the battery regulation, research for the recovery of lithium takes place and plans are made on how to reduce the carbon emissions in battery production around the world to be able to still have excess to the EU market. Also, the Nickel Institute is already working on developing a responsible sourcing framework to meet the requirements of the proposed Regulation (Mistry, 2022). Furthermore, the Battery Regulation can serve as a blueprint for other countries to make their battery supply chains and their own production more environmentally conscientious (Burlinghaus 2022).

In general, although already ambitious compared to other regulation so far, the Battery Regulation Proposal is a compromise; some targets could go further or include additional raw materials. In addition, some measures, such as the deposit on portable batteries, are missing as they are considered overly expensive and with too low of a cost-benefit ratio. The question is how much the circular economy and sustainable sourcing should be worth to a society and how much strain can be allowed to be put onto industry.

The latter is also relevant when looking into the timeline of the measures and the possibility to adapt. Several measures of the Battery Regulation take a long time to enter into force.

Naturally, no policy can be designed that would appease all stakeholders on all issues, but a good compromise has to be found, which also makes sense intrinsically.

Developing an overarching regulation instead of a directive leads to direct enforcement without having to be transposed into national law. Different interpretations of criteria in different Member States are thus avoided. In a global supply chain of products, an EU regulation also affects other countries (non-EU MS), as imported products can also be required to comply to EU rules.

3.4 Key Considerations for an Overarching Regulation

In this section, some of the important aspects to be considered in the creation and implementation of such a Regulation are highlighted and complemented by further information.

3.4.1 Designing a Regulation and no Directive

Crucial for the fast implementation is the fact that an EU Regulation comes directly into force when finally passed and does not have to be transposed into the national laws, as is needed for an EU Directive. This not only speeds up the timeline but also avoids the complex transfer to national law by each Member State, where aspects of the measures may be lost and reinterpreted, followed by infringement proceedings, if not all parts are transposed in the right way.

3.4.2 Sustainability as a Competitive Advantage

An overarching regulation has the advantage of combining different policy objectives. From a European point of view, a Regulation can protect a developing industry in the EU. Sustainability is an important competitive advantage for companies operating in the EU, as the EU has more extensive labour and sustainability standards. Overall, the electricity mix is also more oriented towards renewable energy than in China, for example. Therefore, an ambitious regulatory framework on sustainability and responsible resource extraction has great support across all stakeholder groups. Even stakeholders from the industry see advantages in an overarching Regulation.

3.4.3 Resources for Legal Process

A significant amount of knowledge and reporting has to be combined to design a comprehensive regulatory framework. It is important that this framework is built on a solid expert base. This means that many resources need to be allocated to achieve a high-quality outcome. Even though spending on administrative tasks is not very popular, it ensures that the measures are based on reality and saves a lot of financial resources in the future. Therefore, adequate funding must be provided to the necessary government agencies to finance not only the policy makers but also the consulting organisations that can provide the experts in this field and prepare the impact assessment.

Key Considerations:

- Create an overarching legislative binding framework by implementing a law at the highest level (EU regulation, not directive)
- Combine different interests and create political support by using sustainability as a competitive advantage
- Ensure high-quality legislation by proper funding of essential legislative processes

Additional Resources:

- RE-SOURCING Flagship Lab: Case Presentation by Cesar Santos (EC) (2021)
- RE-SOURCING Flagship Lab: Battery Regulation Case Description (2021)
- RE-SOURCING Roadmap Workshop: The Mobility Sector (2021)
- RE-SOURCING Report: State of Play & Roadmap Concepts: Mobility Sector (2021)
- RE-SOURCING Briefing Document: Identifying Challenges & Required Actions for Responsible Sourcing in the Mobility Sector (2022)

4 Implement a circular economy for batteries such as KYBURZ

In the EU's Green Deal Roadmap, one of the strategic priorities is to put industrial modernisation at the centre of a fully circular economy. Circular economy considerations, at the firm level, can be assisted by several approaches, one of which is keeping the product as long as possible in the use phase, followed by recycling and recovery of resources.

Following the necessary shift to electromobility, the number of batteries used in the various means of transport shall rise dramatically. With an exponential increase of battery use, also the waste stream will increase significantly (Stahl et al. 2021). The recycling industry is able to recover most of the metals from the battery but faces major challenges. As described in the chapter before, the EU is working on legislation to strengthen the standards and recycling targets concerning batteries in general.

Lithium-ion batteries (LIBs) contain many different metals, some of which even critical due to low abundance in the earth's crust, missing production sites or unsustainable sourcing. The greater the level of circularity that can be achieved within the battery sector, the less reliance on virgin raw material and more independence from non-EU regions.

Designing a business model that incorporates end-of-life management and recycling meets the responsible sourcing agenda on two fronts: 1) it lowers demand for virgin raw materials with all connected negative impacts and reliance on non-EU regions for critical materials supply and 2) decreases waste and material in landfills.

4.1 Business Case

In several countries, recycling of LIBs is either taking place as a voluntary initiative by the industry or occurs under guidance from national legislation. For example, in Switzerland, companies bringing batteries to market have to pay a fee to an installed system taking care of recycling the batteries or they have to organize the recycling of batteries themselves. For the latter, companies in Switzerland have to prove that they achieve an equal or even better recycling performance. The EU has a recovery target of 50 % by weight for LIBs in place, which will be further strengthened by the new battery regulation described earlier (see chapter 3).

Apart from regulation, China for example has voluntary guidelines for companies recycling LIBs concerning the recovery of certain materials. A lot of batteries, however, do not find their way to these specially listed companies (SINA, 2021).

In other regions, due to missing regulatory requirements for recycling, the LIBs are only recycled on a voluntary basis. Especially for small portable LIBs in developing countries, which are, however, not the focus of this paper, no collection or recycling system exists. Nevertheless, as LIBs at their end-of-life can impose a great danger to humans and the environment, it is probable that the global battery sector will move towards more recycling and end-of-life management legislation in the coming years. Therefore, business that can incorporate a recycling element in time will be able to maintain operations in the future as well as gain a competitive advantage in access to markets where such requirements become mandatory.

4.1.1 The Good-Practice Principle

Implementing the Circular Economy by reusing and recycling a firm's own LIBs as a business model allows the firm to benefit economically from the sale of used batteries in vehicles, extend its product portfolio to other battery applications and meet its voluntary and legal obligations on recycling in a recovery process specialized for its own battery system.

The good-practice elements can be defined as follows:

- Keep a close connection between your company and your customers.
- Increase the use-phase of batteries in a second-life vehicle and a third life stationary storage before recycling.
- Design an effective recycling system for LIBs that is based on a pre-funded principle to ensure financial costs for recycling are effectively met for the product.
- Conduct high value recycling to decrease the environmental impact of manufacturing.

The case of KYBURZ Switzerland AG – a Swiss company in Freienstein, near Zurich, Switzerland, providing electric vehicles with three or four wheels for delivery companies, industrial companies, municipalities and private individuals – represents a good practice case. By their own account, the company has sold over 25,000 vehicles around the world and is mostly known for providing the delivery vehicles for the Swiss postal service (KYBURZ 2022a). The company reports that it was the first company in Switzerland to put an innovative in-house recycling system for their own EoL battery modules into operation (KYBURZ 2022b).

In the case of KYBURZ, a more environmentally sustainable approach across its production cycle was developed that includes:

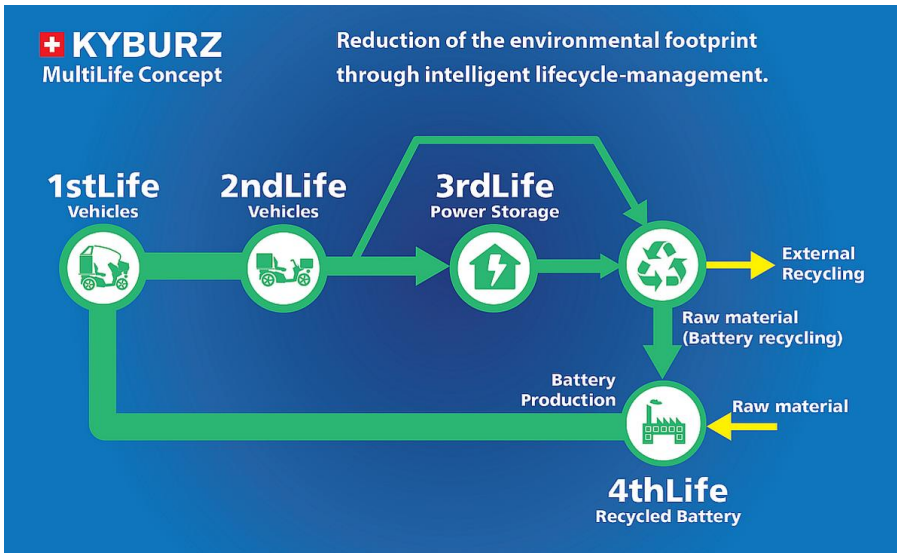
- Material sourcing: Using high-quality materials and long-living battery modules to prolong product life.
- Product design: Standardized battery design for high-value recycling
- Collection: High collection rate by buy-back of vehicles including the battery
- Product use: CO_2 reductions and greater return on energy invested due to longer use
- High-value recycling: Recovering over 91% of material at end-of-life use (KYBURZ 2022c).

The first step to reduce the impact of battery production and raw material use is to keep the product in the use phase as long as possible. To ensure the recovery of the sold batteries and use the batteries in a second life phase, the company keeps a close connection to its customers. After the first lifetime, taking seven years, the vehicles, including the batteries, are bought back. In addition to the close connection and communication between company and customers, the company sets aside funds for this buy-back programme at the moment the vehicles are sold.

After the first lifetime, the batteries are tested, resulting in different routes:

- Batteries over 85 % State of Health (SoH) → Reuse in another vehicle (2^{nd} life vehicle)
- Batteries over 65 % SoH → Repurposing in a stationary storage
- Batteries below 65 % SoH → Recycling in their own recycling facility

Figure 7: Circularity at KYBURZ



Source: KYBURZ (2022)

In particular, reuse in another vehicle (2nd life vehicle) does not happen very often in other companies. This is made possible by the high quality of the batteries and depends on the use-scenario of the customer. Apart from the battery, also other parts of the vehicle can be reused to lower the resource consumption and carbon footprint. Often the 1st life vehicles are just refurbished and only certain parts are replaced to give them a long second life.

The use in stationary storage should not reduce in any way the chance of collection for proper recycling. Therefore, KYBURZ decided to implement a deposit system whereby the customer pays five Swiss francs per battery cell, which are refunded upon return of the battery. Exporting the battery to a country without its own recycling infrastructure should be completely avoided. After use as stationary storage, shipment of batteries that are declared waste batteries is very difficult or even impossible, as there are many restrictions on the shipment (Basel Convention and similar) and the shipping agencies often do not wish to take the risk.

4.1.2 Guideline Scope & Contribution

These **guidelines are primarily applicable to distributors of products for electric mobility (electric cars, e-scooters, e-bikes) and stationary storage containing a lithium-ion battery** that are seeking to implement additional steps in their value chain.

It should be noted that KYBURZ does not produce their own batteries but currently purchases them from China. The batteries are standardized and contain an LFP-based (lithium iron phosphate) battery cell chemistry. This allows the firm to deconstruct the battery and specialize the recycling process to this cell chemistry. However, the general guidance provided in this chapter can be used by other battery distributors as well. The guidelines presented explain the basics for implementing a circular economy for batteries by designing a standardized battery system, keeping a close connection to the

customers (or only lending out the batteries) for easier collection or buy-back, prolonging the battery lifetime and recycling them in the end.

4.2 Creating a Business Model based on Circular Economy

To be able to improve its footprint, a company has to understand the crucial impacts of its actions and where they have the influence to change something. These criteria can include:

- Material sourcing: high-quality versus low quality
- Product design: Standardized battery design for high-value recycling
- Collection: High collection rate by buy-back of vehicles/batteries
- Product use: CO_2 reductions and greater return on energy invested due to longer use
- High-value recycling: High recovery rate.

Analysis of the battery sector indicates that the more important hotspots in the battery value chain are linked to the material footprint of the input (Betz et al. 2021). Quite a few of these hotspots can be addressed through an extended use phase and through implementing high-quality recycling. Also, reuse and repurposing can have a cost advantage, as clients can even be willing to pay higher prices due to the 'sustainable origin' of the battery modules and the security in buying product with a known past.

4.2.1 Prolonging the use phase of a battery

The first step to reduce the impact of battery production and raw material use is to keep the product in the use phase for as long as possible. To ensure the rebuying of the sold batteries and the ability to use the batteries in a second life phase, the batteries are sold for a defined time. After this first lifetime, the vehicles, including their batteries, are bought back. This is possible with a close connection and communication between company and customers and because the company sets aside the buy-back funds when the vehicle was sold.

After an extended use-phase in a vehicle, the battery can be tested, and a decision can be made: The battery can be re-manufactured in another 'second-life vehicle', can be repurposed in a stationary storage unit for electric energy, take the recycling route or be disposed of. Apart from the latter, which is highly dangerous and more and more forbidden, recycling is a cost to a business, from the logistics of collecting used equipment for recycling, to the cost of the recycling process itself. For materials that cannot be reused within the manufacturing process, recovered material (waste or secondary material) will need to be disposed of or sold, again at a cost.

Given the costs associated with recycling and disposal, a business model that can offer a cost competitive solution for clients buying vehicles with LIBs can be a competitive advantage for the firm, as well as address a challenge within the mobility sector.[3]

[3] For more details on these challenges see the State of Play & Roadmap Concepts: Mobility Sector (2021)

Good Practice:

Consider the life cycle management approach to extend the life of a LIB as long as possible. Corporations take responsibility for the items they produce, keep close contact with customers, provide funds for buybacks or implement a deposit system to get the battery back after each phase of use.

4.2.2 High-Quality Battery-Specific Recycling

To ensure high-quality recycling to meet voluntary and legal obligations, a company can construct a specialized unique recycling facility at their manufacturing site. Usually, recyclers collect LIBs from different streams and recycle them in the same facility. A company with a circular economy approach, collecting their own standardized battery module and battery cell chemistry, has the knowledge about the batteries and can develop a battery-specific recycling system.

After a prolonged use phase, the battery can therefore be discharged and dismantled by a machine perfectly designed for this battery type. All data about the battery and the vehicle is available and the design for recycling can be implemented. Therefore, a high recovery rate of the materials is possible. Even direct recycling of active materials could be feasible and investigated. The high recovery rates can lead to decreasing primary raw material intensity of batteries by creating secondary materials and using it for the battery production at the site.

Recycling is also an energy intensive process. For a responsible recycling process, the recycling facility should be powered by renewable energy and could be supported by a stationary battery, supplied through the used batteries already collected.

Good Practice:

To avoid additional recycling costs and secure access to secondary materials, manufacturers can collect back the batteries they produce and set up their own recycling facilities specialised for the specific battery type. Companies can consider further improving the product's carbon footprint by incorporating renewable energy within the recycling process.

4.3 Impact

A life cycle management-based model can provide the firm with several benefits, which include:

- Compliance with recycling regulations of both manufacturer and customer.
- Supply of self-recycled material to a battery production process, leading to more independence from virgin material.
- Better understanding of their own batteries; development to long-lasting products to extend the lifetime to a second and third life phase.
- High material-recovery rates with high purities and low energy costs due to specialized recycling facility.
- Income due to the selling of second-use vehicles and stationary storage.
- Image gain for the company in the eyes of the potential customers.
- External funding for research collaborations and setup of the circular economy scheme.

4.4 Key Considerations in Operationalising Circular Economy for LIBs

There are certain considerations a firm should plan for to support the return of products, such that reuse, repurposing and recycling can take place.

4.4.1 Customer relations

The circular economy approach with rebuying the product is based on a strong connection and communication between producer and customer. At the time of sale, the company must ensure a future relationship to the customer to be kept informed about the whereabouts of the battery. For large public or private customers, this is easier than for private buyers. Other options are a deposit for the battery or the lending of the battery with a return contract. The firm should set aside funds at this stage to cover the collection/ buyback/ deposit and recycling costs.

4.4.2 Return of product

After a certain time or when the end-of-life status for the product has been reached, the customer should be contacted. The company should provide packaging material and collect and transport the battery to its processing centres. The easier and clearer this process is, the better the collection rate can be.

4.4.3 Environment, safety & health considerations

One of the issues related to recycling lithium-ion batteries are health and safety concerns. Recycling centres must have the appropriate measures to address these. One approach is to use a closed system to separate the workers from direct contact with the dismantled LIBs, which can be toxic and cancerogenic. LIBs at their end-of-life are also at risk of having a thermal event. This is especially the case if they are mechanically or thermally damaged. This has to be taken into account when transporting or storing larger amounts of LIBs.

Key Considerations:

- Include re-buying as part of the product offering to clients.
- Ensure the return of products is an easily manageable process for customers.
- Address the environment, health & safety issues related to recycling process.

Additional Resources:

- RE-SOURCING Flagship Lab: Case Presentation by KYBURZ (2021)
- RE-SOURCING Flagship Lab: KYBURZ Case Description (2021)
- KYBURZ: MultiLife concept
- RE-SOURCING Roadmap Workshop: The Mobility Sector (2021)
- RE-SOURCING Report: State of Play & Roadmap Concepts: Mobility Sector (2021)
- RE-SOURCING Briefing Document: Identifying Challenges & Required Actions for Responsible Sourcing in the Mobility Sector (2022)
- RE-SOURCING Briefing Document: Responsible Sourcing: The Case for Business Competitiveness (2020)

5 Chinese Policy Approach to Sustainability

In 2020, Chinese companies accounted for four of the top ten electric vehicle battery makers in the world (Venditti, 2021). In terms of electric car manufacturing, China accounted for over 50 % of the global battery electric vehicle (BEV) market in 2021, with a strong domestic market (McKinsey 2021). The Chinese State recognises the importance of the BEV manufacturing sector and accordingly in the 14th Five Year Plan, it lists "new energy vehicles" (NEVs, include also fuel cell electric vehicles) as one of the "strategic new industries".

The 2021-2035 Energy Vehicle Industry Plan, announced by China's State Council (published in October 2020) envisages 20 % of the market share for NEVs by 2025, and for NEVs to account for the majority of new sales by 2035. While these headline figures point towards final consumption goods and their contribution to reducing overall GHG emissions by China, a host of policy instruments has been crafted to address sustainability aspects at the various nodes of the LIB battery value chain. This chapter outlines the multi-pronged policy approach undertaken by Chinese State policy in creating a more responsibly sourced mineral value chain for batteries.

5.1 Business Case

The LIB value chain is evolving in several regions, including Europe, North America and China, with each region developing its own approach to managing the sustainability issues within these chains. The sourcing dynamics within these chains have some common factors, such as the sourcing of lithium minerals from the global markets, and some distinct features, such as the approach towards recycling and reuse. Understanding how non-European governments are approaching the sustainability agenda can lead to viewing common issues from a different policy lens and identify areas of transferable practices, co-learning for industry actors and possible identification for scientific collaboration for researchers.

5.1.1 The Good Practice Principle

This case study considers the case for creating a set of policy instruments that collectively address various nodes of the e-mobility value chain at the same time, covering the overall sustainability credentials of the chain.

5.1.2 Guideline Scope

The guidance presented in this chapter is **primarily addressed to policy makers and policy evaluators**. A secondary audience is the industry (e-mobility) sector that may consider some of these approaches in designing their industry strategies. The guidance presented here also serves an informational purpose, as limited information is available around Chinese Policy Approaches to sustainability in the mainstream literature on responsible sourcing across mineral value chains outside of China. The guidance was prepared through desk-based research and input from stakeholders at the Flagship Lab organised under the RE-SOURCING Project in March 2021.

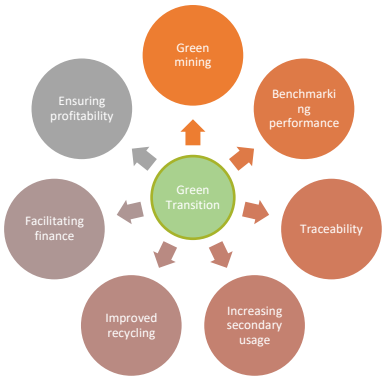
5.2 The Chinese Approach to Value Chain Sustainability

In September 2020, President Xi Jinping announced that the People's Republic of China will 'aim to have CO_2 emissions peak before 2030 and achieve carbon neutrality before 2060' (BBC 2020). In the following year (April 2021), the China Nonferrous Metals Industry Association (CNMIA) released a draft of the carbon peaking implementation plan for the nonferrous industry. The plan targets 2025 for carbon peaking for the industry, five years earlier than the national target. Emphasis is also on increased recycling & utilization of scrap metal, as China enters a peak period for metal scrapping. CNMIA expects that, by 2025, the output from metal recycling alone will equal 20 million tonnes, including 4 million tonnes of recycled copper and 11.5 million tonnes of recycled aluminium (ICAP 2021).

5.2.1 Creating a Set of Policy Tools to Address the Value Chain

To support the implementation of the above-mentioned policy targets, a number of individual policies have been released by the Chinese State, addressing different aspects of the LIB value chain (see Figure 8). These range from standards for extraction in the domestic market such as the introduction of green mining frameworks; addressing standards at the smelting and refining stage (such as creating performance benchmarks and mandating traceability platforms) to addressing the consumption and recycling stage (such as setting secondary-use and recycling mandates). In addition to these directives, the Chinese state policy indirectly addresses the need for creating financial capital for the industry actors as well as considerations for the profitable operations of firms, whilst being compliant with these policies. The next section considers the saliant features of some of these policies.

Figure 8: Multi-pronged Policy Approach



Source: Masuma Farooki

Good Practice:

Design a multi-pronged approach to the LIB mineral value chain, such that all nodes of the chain are addressed at the same time rather than in linear progression

5.2.2 EXTRACTION: National Program of Mineral Resources Developing the Green Mining and Constructing the Green Mine (2010)

According to Chen et al (2020), 'green mining' is '… an advanced mining mode that increases the efficiency of mining activities, decreases the environmental footprint, and allows valuable minerals to be extracted with minimal mining waste at all stages of operations.'

The Green Mining Framework was introduced in 2010 to influence corporate behaviour in the domestic Chinese mining sector, and encourage companies to fulfil their social obligations, be resource-saving and environmentally friendly in their operations[4]. The framework outlines

[4] See Huang et al. (2012) for more details: Status and Achievement of the Green Mine in China.

construction specifications for Green Mines by minerals, including non-metallic, non-ferrous, gold, coal and the metallurgical industry[5]. While China does not have significant domestic production of many of the LIB battery minerals, domestic approaches to mining are likely to be transferred to international mining operations of Chinese firms (or where they are shareholders in other mining companies). Some of the key aspects covered by these regulations include:

- Establishing an environmental evaluation index system[6] and specifying technical standards for operations
- Emphasing technological innovation to optimize mining and smelting practices
- Focusing on minimizing environmental disturbances, and on restoration in equal measure

The Green Mine Framework addresses a number of fundamental challenges in the domestic Chinese mining sector where the traditional mining practices have been characterised by high resource consumption, high pollution, low efficiency, and negative impact on the quality of life. The expansion of the framework, however, is limited at this time, with 1,200 mining companies identified for the Green Mining Project in 2019 – around 2 % of all mines in operation (Zhao, 2020).

Good Practice:

Green Mining Frameworks include technical specifications to be achieved by operations, a clear outline of how performance will be measured, and a benchmarking system that allows for comparison of mines across minerals and regions.

[5] The non-official English translations of these specifications are available here

[6] For an example of this framework please see FS Lab presentation here

5.2.3 MANUFACTURING: Integrated Management Platform for the National Monitoring of New Energy Vehicles and Traceability of Power Battery Recycling (2018)

The traceability of LIBs as they move through their life cycle has been identified as an important goal to support responsible sourcing and sustainability in the LIB value chain. In 2018, the Ministry of Information and Industry Technology (MIIT) issued the 'Interim regulations on the Traceability of new Energy Vehicle Power Batteries', which required the establishment of an integrated management platform to generate information on collection and supervision of the full battery production, sales, use, end of life, recycling and utilisation process[7]. Based on blockchain technology, the information[8] required to be submitted on the platform includes (see Figure 9):

- Basic information & contact details for the company
- Information on battery pack from manufacturer
- Information from disassembler/recycler

Figure 9: Example of integrated management platform data requirement

Business entity	Upload information category	specific contents		Upload module
		Where to go for retired batteries	To company name	
			To the enterprise unified social credit code or D UNS code	
		Date of retirement		
Scrap car recycling and dismantling enterprises	Vehicle scrap information	V IN code		Recycling managemen module
		Battery pack coding		
		Battery type (NiMH / lithium iron phosphate / lithium manganate / lithium cobaltate / ternary / lithium titanate / other)		
		Scrap date		
		Battery shipment date		
		Where the battery pack goes	To company name	
			To the enterprise unified social credit code or D UNS code	
Tiered	Echelon	Ladder Battery (Pack / Module / Single)		

While this platform is still at a primary stage of deployment and implementation, it forms the starting point of a data collection strategy that is expected to increasingly spread and be revised in its level of information[9] collected over time.

Good Practice:

Initiate an information collection platform to track the LIB life cycle. At the primary stage, the platform can focus on collecting basic information, gradually expanding to cover more enterprises and detailed information.

[7] See Cheng et al. (2021) for more details: Traceability Management Strategy of the EV Power Battery Based on the Blockchain

[8] The declaration form in English is available here; the RE-SOURCING Project cannot be held responsible for the authenticity of this form.

5.2.4 RECYCLING: Policy instruments addressing recycling and reuse of batteries

In 2021, a number of policy instruments addressing the recycling & reuse of batteries were introduced, which included Management Measures for the Gradual Utilisation of New Energy Vehicle Power Batteries[10]. The major direction of the policies is to move away from a 'production-sales-application-disassembly' approach and towards a 'production-sales-application-second use for energy storage - disassembly-resource recycle' model. By 2025, the cumulative decommissioning of power batteries in China is expected to reach 780,000 tonnes (GlobalTimes 2021). This is in part related to the fact that recommendations for replacing BEV batteries currently suggest that the battery be at the point where it has lost 20 % to 30 % of its capacity (in the United States and EU respectively). Instead of sending these batteries to a recycling centre (or disposal), the Chinese policy aims at encouraging a ladder/ reuse approach where these batteries can be diverted to other applications before they move to recycling. Second-life applications for BEV batteries include electric bicycles, small-scale energy storage units, large-scale energy storage units for backup power supply and portable charging devices.

Good Practice:

For efficient use of resources, explore and expand the mandate for second-life application of BEV batteries before moving them to the recycling stage.

5.3 Impact

The discussion of the Chinese policy approach has only focused on the policy instruments announced by the Chinese government and does not take into consideration the impact, measurement and effectiveness of these measures. The project team acknowledges that the economic and political structures in China vary from their European counterparts. However, China as a producer and consumer of electric vehicles remains a strong influencer in the global value chains for electric vehicle batteries. Therefore, its policy approach can offer some guiding principles to other policy makers. These are discussed in the next section.

In the review of policies, discussed in this chapter, the emphasis on environmental indicators was clearly noted for green mining standards addressing extraction activities. While social rights, labour health and safety are also addressed, these issues are not discussed in as much detail as in most international standards such as the EU Conflict Mineral Regulations or the IRMA standard.

In the review of policies addressing manufacturing and the recycling sectors, the policy approach leans towards compliance with a given set of information requirements, largely undertaken as reporting requirements for companies to follow rather than standards per se. How this information is utilised and the efficacy of the reporting process remain unclear.

[10] For more details see 'Battery Reuse and Recycling expands to scale in China' (January 2022).

5.4 Key Considerations for Practitioners

The following considerations can be drawn from the evaluation of Chinese policies to promote sustainable practices in the LIB value chain.

5.4.1 Mining principles should be deployed in the domestic sector

The Chinese green mining approach is limited to its domestic market and these requirements are not applicable either to Chinese mining companies operating abroad or to Chinese manufacturers importing minerals from other jurisdictions (Chinese BEV sector relies heavily on external markets to meet its raw material demands). However, by supporting and requiring green principles to be adapted in the domestic sector, the government is able to introduce responsible mining practices and in-effect take advantage of the 'learning by doing' principle. Once firms become familiar with certain operating processes, the same processes can be utilised in their operations abroad. Therefore, where policy makers are introducing standards for extractive activities that may require compliance by operators in other jurisdictions, deploying them within the national sector can serve as a model and test of operability.

5.4.2 Include technical specifications in standard specifications

Mining companies and operators benefit from clearly defined technical standards with which they need to comply in order to meet responsible mining practices. The technical standards clearly spell out the targets to be achieved and therefore incorporate them into company operations. This includes specifications on ore recovery rates, energy consumption limits, utilisation of solid waste, utilisation of wastewater and wastewater discharge limits, to name a few. While it is acknowledged that each mine will differ from the other, a basic technical standard for all to follow can still be utilised. The Chinese framework does allow for some flexibility for determine these rates by local governments, and therefore are not absolutes. Such standards assist in developing a level playing field and establish a common base line for all extractive operations to adhere to.

5.4.3 Include measurement of performance as part of standards

Within the green mining framework, the Driver–Pressure–State–Impact–Response model utilises 20 indicators to construct an index that lends itself to measurement. The index was found to be successful in not only measuring performance but also allowing for comparison with other mines in the region and nationally[11]. The indicators used in the evaluation model are simple in nature. While they do not cover all the complexities that are addressed under sustainability standards[12], they provide a common measuring mechanism that can establish a baseline. Having a performance measurement, even a basic one, provides a starting point for both extraction operations and research data for those who monitor these operations. The information can also assist in the formularisation of other policy directives.

5.4.4 Deploy and improve traceability systems

The Chinese management reporting platform devised to trace the life cycle of LIBs is not a complicated platform in terms of its data requirements as well as its operating system (block chain technology).

[11] See Chen et al (2020): 'Evaluation and future framework of green mine construction in China based on the DPSIR model'

[12] see State of Play and Roadmap Concept: Mobility Sector; Betz et al (2021)

While there have been concerns raised as to how effective the system has been to date, there is evidence that it is increasingly being deployed within the Chinese LIB value chain. Again, starting as a simple platform, the inclusion of criteria and its outreach is expected to increase in the coming years. The system allows for 'learning as you go' and improvements can be made over the medium term from lessons learned in its deployment.

While it is important to have a platform that reflects the sustainability and responsible sourcing concerns in European and other similar international markets, there are also disadvantages in delaying the deployment of a unified traceability system until it is considered comprehensive. By utilizing a state level policy to design such a traceability system, the Chinese government is able to ensure that a single platform is commonly used by all actors and stems the emergence of often competing and overlapping traceability systems from emerging, which can be a cost burden for industry actors.

5.4.5 State takes lead in setting sustainability requirements

The involvement of the state in setting standards in the LIB value chain in China is clearly indicated. From the standards at the extraction stage to the traceability platform, the state has taken the role of clarifying what is expected of individual companies. While the standards may require further strengthening in coverage and depth at a later stage, the availability of one set of specifications allows for compliance from across the industry (rather than on a voluntary basis). In addition, a government set standard ensures a level playing field for all actors, yet leaves the option open for companies to go further than the set standards in response to requirements from their lead firms or clients. This assists companies in having to respond to one set of standards, relative to facing competing demands to show compliance with multiple standards.

5.4.6 Considerations of horizontal linkages to other sectors

At the national level, the government policy can make considerations for horizontal value chain linkages that can be formed with other sectors, such as the Chinese approach for considering second life use of LIBs in other sectors (such as power generation). Governments are well equipped to consider horizontal linkages from one industrial sector to another as they have an overarching view of the needs of the economy, rather than confined to considerations within one industrial supply chain. Other policymakers may consider the formation of horizontal linkages to other sectors, including agricultural and health sectors, for utilising LIBs after they are no longer usable for the mobility sector. This would ensure a broader compliance with sustainability and efficient resource-use objectives.

Additional Resources:

China's approach towards responsible sourcing (March 2018) STRADE Project

Chinese Green Mines Standards (English Translation)

Interim Measures for the Management of Recovery and Utilization of New Energy Vehicle Power Battery (China)

6 Conclusion

The good practice principles discussed in this document address different stages of the lithium-ion battery value-chain. Each segment of the chain has a particular set of challenges, and the selected good-practice guidance focuses on issues that have the highest priority. To re-cap:

- Strong standard: Companies along the whole value chain identify and join a strong standard with transparent information disclosure.
- Suppliers' contracts: Purchasing companies identify a strong standard and implement this requirement in the suppliers' contracts to ensure due diligence requirements.
- Design overarching regulation: Develop an overarching regulation with ambitious criteria from purchase to production and recycling / recycled content to have direct enforcement in the Member States.
- Circular economy business model: Develop a business model based on rebuying the used batteries to prolong lifetimes and to recycle them upon their EoL, which can be specialised because design for recycling was incorporated.
- Chinese approach: Be aware of the major policy approaches undertaken by the Chinese government in introducing sustainability standards across the electric vehicle value chain

There are certain guidelines that are common across the four cases.

Clarity of goal is crucial

A successful responsible sourcing (RS) approach is based on clear goals that the company or institution wants to achieve. These objectives should reflect the company's or government's agenda and therefore be managed and formulated internally. This does not mean that external guidance should not be considered. But the good practice cases discussed here all point to an internalisation of the importance of RS that translates into goals. Companies or governments that try to adopt external objectives without internalising them into the company itself will tend to not take ownership of the RS process they initiate.

Incorporate & follow external guidance where appropriate

In the past decade, a large volume of guidance material in the shape of standards, guidelines, sustainability principles and reporting templates have been developed by technical experts, industry associations, civil society actors and governments. Those wishing to develop and refine their RS approaches should take full advantage of these expertise. While some stakeholders have raised the issue that there are too many guidance documents, looking at established and upcoming externally developed RS approaches nevertheless saves resources.

Transfer responsibility for decisions and actions and keep highest priority

The decision to implement RS approaches must be made at the highest level, usually the Board of Directors for a company and senior politicians in governments. However, once the decision has been made, the responsibility for developing and implementing these approaches must be conveyed and assigned to all member of the organisation (including its sub-contractors). The best practice cases identified in this document assign the responsibility across the organisation and include it into contracts as binding criteria. Those companies who only discuss RS at the senior level, without involving mid-level, junior-level and front-line workers, run the risk of implementation failure. Nevertheless, the RS issue needs to be kept at the highest priority.

Reporting templates & processes should be well designed

With the growing demand from clients, investors, civil society and communities, RS performance needs to be reported. The more standardised the format of this reporting, the better the understanding of the extent of uptake of RS practices across firms and the level of these practices. Reporting should not be considered an after-thought in the RS approach development. When objectives are being designed, the discussion should also consider how progress and achievement of these objectives will be measured and reported.

Communication strategies are important

Communicating what the company or government wants to achieve, why and how they are pursuing RS agendas is important. The communication needs to be targeted at the appropriate audience and be designed for the audience to understand. Too much emphasis on narratives and not on evidence can also cheapen the quality of communication. Actors should consider their communication strategy at the same time as they are designing their objectives and reporting mechanisms. The strategy should consider what information external stakeholders require as well as the information a company or government wants to convey to its audience.

Stepping away from silos in designing practices

One common theme noted across best-practice cases is a unified approach to sustainability and RS, whether it is in designing a regulation or a corporate RS strategy. None of the cases exhibit compartmentalisation but focus only on the environment or on community issues. It is clear that RS is an overarching agenda, and the approaches need to step away from silo thinking. While individual objectives and actions can focus on particular issues, the approach needs to be wider and illustrate interconnectivity.

The future of doing business

While different governments and companies are moving at different paces to address climate change and sustainability issues, it is important to recognise that they are all moving in the same direction. RS approaches ingrained in business practices will become more common. While initially successful RS approaches may set a company or a government apart, in the mid-range these approaches are expected to become normal operating procedures. The better the uptake of RS practices, the more level the playing field.

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