Responsible Business Alliance

Advancing Sustainability Globally

CIRCULAR MATERIALS LANDSCAPE ASSESSMENT

MARCH 2021

1 EXECUTIVE SUMMARY

Global demand for electrical and electronic equipment has increased sharply in recent years, with consumption growing by 2.5 million metric tons (Mt) each year.[1] This has led to extraordinary volumes of electronic waste (e-waste): in 2019, an estimated 53.6 million metric tons of e-waste was generated globally, of which only 17.4 percent was collected and recycled.[2]

As electronics producers face increasing pressure to manage e-waste responsibly, and competition for critical raw material inputs increases,[3] a circular economy for electronics becomes imperative. But building a socially equitable and environmentally responsible circular electronics system will require new levels of collaboration, tools, technologies, and methods for data standardization across the entire electronics value chain.

The Responsible Business Alliance (RBA), the world's largest industry coalition dedicated to corporate social responsibility in global supply chains, seeks to understand the challenges and opportunities within circular material movement in electronics production and e-waste recycling, and by doing so, promote principles and interventions that realize a circular economy within the industry.

While the RBA's current tools and assessment frameworks largely cover the manufacturing stages of the supply chain – including mining, smelting, and manufacturing – the challenge remains to improve collaboration between producers and stakeholders at the waste-management end of the chain: recyclers.

Insights were gathered across three key focus areas, based on the RBA's identified priorities for enabling circular materials:

1. **Data Standardization:** Identify opportunities for data standardization and material measurement; including frequently used/requested data, metrics, and reports.

   RBA Goal: Harmonize data metrics, methodologies and inquiries to drive greater transparency and measurement into reverse supply chains' performance and material movement, so that gaps and opportunities for safe expansion of circular material use can be identified.

2. **Supply Chain Design:** Identify material traceability needs for the industry and individual company goals for integration of reclaimed materials into procurement supply chains.

   RBA Goal: Convene actors across forward and reverse supply chains to evolve practices that lower barriers and optimize processes to achieve more efficient circular material use.

3. **Greater Assurance:** Identify environmental and labor challenges in e-waste processing and assurance, primarily within the formal sector.

   RBA Goal: Provide greater assurance of adequate protection of human rights and the environment, allowing actors to make more informed decisions and create more globally inclusive circular supply chains.

In its fundamental role as a convenor of stakeholders across the electronics value chain, the RBA is uniquely positioned to drive the collaborative effort and investment required to enable systemic circularity in the electronics sector. The insights and recommendations captured in this landscape assessment are intended to stimulate dialogue and inform strategic circular interventions among RBA members and their extended networks.

1 Global E-waste Monitor 2020: https://www.itu.int/myitu/-/media/Publications/2020-Publications/Global-E-waste-Monitor-2020.pdf
2 Ibid.
3 Metabolic (2018). Critical Metal Demand for the Energy Transition. https://www.metabolic.nl/projects/critical-metal-demand-for-the-energy-transition/

DATA STANDARDIZATION

Standardizing data exchange between stakeholders is a key leverage point for creating a circular electronics system. Data is used to track volumes of materials through the recycling process, identify the recycled content of components, assess whether materials are sourced from ethical production sites, and ensure that vendors are meeting environmental and social compliance standards.

Survey insights from this study reveal that data exchange occurs mostly among electronics producers and manufacturers, with the most frequently exchanged data relating to environmental compliance, material composition, the presence of hazardous materials, and material volumes – mainly for reasons of regulatory and quality assurance.

Data is, however, much less frequently exchanged with recyclers, and is often lost beyond the initial e-waste collection stage, making it difficult to track where electronics materials are sent for further processing beyond initial (Tier 1) recyclers. This lack of downstream transparency represents an informational bottleneck for a circular electronics system.

Additionally, as data is collected and shared via a range of channels and requests – most commonly personal communication, bill of materials, and audits – the quality and accessibility of the datasets varies substantially. This creates a large bureaucratic burden, especially for recyclers that need to supply and analyze similar data in different formats.

Finally, manufacturers are often unaware of the amount of recycled content in their products, which is difficult to track when materials are exchanged between multiple production stages. This is an important metric for companies aiming to reduce their Scope 3 emissions by sourcing recycled content in their products.

In outlining the foundation for a circular electronics sector, the report recommends a suite of interventions to standardize critical data collection and exchange.

To address blind spots regarding the final destination of materials as well as recycled content levels in products, reporting requirements should be extended to actors in the more advanced phases of the recycling process (Tier 2 onward), and communicated via a platform that includes recyclers as well as electronics producers. A standardized method for assessing and reporting the quality and quantity of recycled content in metals and plastics should be developed.

Distributed ledger technologies such as blockchain solutions can be employed to facilitate more standardized and automated reporting, as well as data validation. This will require high levels of cooperation and collaboration across the entire value chain, which the RBA is well-positioned to facilitate.

SUPPLY CHAIN DESIGN

A crucial consideration for a circular supply chain is ensuring that recycled materials can meet quality standards and production demand. The survey in this study reveals that inconsistent supply and technical performance are the top perceived risks associated with sourcing recycled materials.

Recycled materials face stiff competition when compared with virgin materials, as virgin material prices fluctuate with global market changes, while recycled materials are priced based on fixed costs for collection, treatment and processing. Uncertain market demand for recycled materials means that recyclers aren't willing to invest in new material recovery technologies, which in turn makes recycled materials difficult for producers to acquire.

Other structural challenges for a circular supply chain include the fact that many recycled materials – particularly plastics – are still considered of lower quality than virgin materials, and that hazardous materials are difficult to track and monitor, particularly when recycling electronics with long lifetimes. Additionally, stakeholders across the electronics value chain are hesitant to engage the informal sector, despite 80 percent of e-waste currently being processed and managed outside the formal recycling system. Engaging with informal markets will be crucial for developing equitable and globally inclusive circular supply chains.

These risks and challenges do not outweigh the top perceived benefits associated with sourcing recycled materials, which include lower environmental impact and circular storytelling.

To overcome these challenges and realize the benefits of a circular electronics sector, systemic collaboration between producers and recyclers is required. The report recommends the creation of a collaborative online platform for recyclers, producers/manufacturers, and material science innovators

- ✓ **to collaborate on design for recycling,**
- ✓ **communicate data on hazardous content,**
- ✓ **outline the market for recycled materials,**
- ✓ **advocate the quality of recycled materials,**
- ✓ **showcase new recycling technologies and innovations,**
- ✓ **share best practices, and highlight opportunities for improved processing efficiencies.**

The report provides deep dive insights on linking product design with e-waste processing metallurgy, in order to keep high-priority materials – particularly critical raw materials and conflict metals – in circulation. Assessing material criticality through a comprehensive risk assessment framework such as ESSENZ can help prioritize specific materials for improved design, increased recovery, and other circular interventions.

GREATER ASSURANCE

Building on current tools and manufacturing supply chain assessments, the RBA aims to determine standardized audits and tools that can provide increased transparency and circularity across the full value chain and achieving greater environmental and social assurance across the recycling chain.

Survey insights revealed that the most commonly used standards for quality assurance in e-waste processing are the WEEE Directive and internally developed standards, followed by e-Stewards, R2 Standard, and EPEAT. While these standards are important and useful and can help companies meet baseline requirements, many are one-time certifications, and producers are increasingly looking for additional assurance that recyclers are continuing to meet environmental and social standards over time.

Barriers to improved assurance include the wide range of existing audits and vendor requirements, which creates auditing fatigue; the fact that existing standards cannot easily be applied to informal recycling contexts; and transboundary shipment restrictions that may hinder effective management of e-waste via advanced or specialty facilities.

Given its existing involvement in auditing programs; experience with the environmental and social challenges of supply chains; and cross-cutting industry influence, the RBA is positioned to create an industry-accepted compliance principles for downstream recyclers, drawing on commonalities between the various members' audit schemes. The RBA can convene all stakeholders and champion greater assurance through pre-auditing recyclers, facilitating communication between recyclers and producers on developing a common audit, and discussing secure options for clearing data for product reuse.

Finally, the report recommends coordinating conversations between RBA members and external experts on specialty topics such as green engineering and the Basel Convention – which restricts illegal international shipments of e-waste, primarily addressing hazardous materials and e-waste dumping in developing countries – to expand the discussion on environmental and socially responsible e-waste management.

In a truly circular electronics system, all recyclers are seen as the upstream suppliers of materials for manufacturers. This report envisions a circular and ethical supply chain for electronics, where incentives are aligned across the value chain to ensure products and materials circulate at their highest value for as long as possible, and responsible environmental, social, and health and safety practices are assured. The RBA can play a key role in bringing together stakeholders across the electronics value chain, galvanizing the collaboration and innovation required to achieve this vision for a circular electronics system.