Lecture 03

Circularity matrix: secondary material grading and Brazilian Circular Economy approaches

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Circular economy principles and actions

- The vision of a circular economy is to provide **adequate solutions for the reduction, efficient, and effective use of virgin resources**, and to prevent harmful releases, losses and environmental degradation when meeting consumption needs.

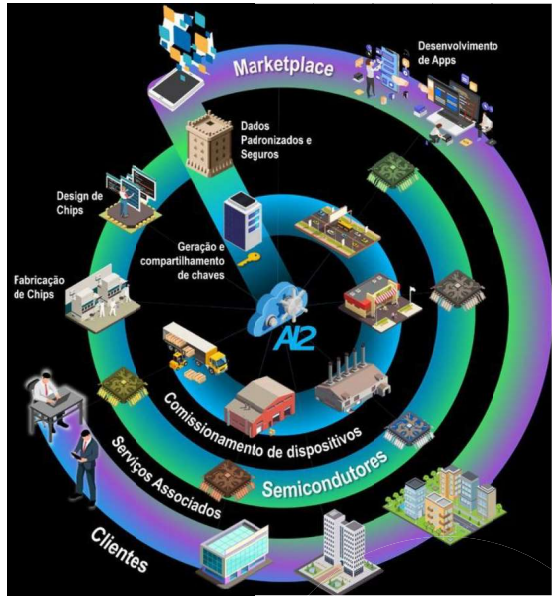
- The type and sequence of **activities and processes related to resources recovery are defined as the recovery pathway**. According to the way in which they are **collected, stored, sorted or handled**.

Brazilian regulation

- **Brazilian Policy on Solid Waste** provides main requirements for waste reverse logistics management.
- Decree No 11.413/2023 establishes **reverse logistics credits** procedures and validation criteria.
- Resolution No 2/2021 of Ministry of Mine and Energy presented **the list of strategic minerals.**
- **Roadmap for the Critical and Strategic Minerals** to be presented in May 2024.
- **Brazilian Circular Economy Policy to be enacted in 2024**.

AI 2 Project

- Next stage of Brazil ID Project.
- Concept of **Digital Product Passport (DPP).**
- Concept of **Product as a Service (PaaS).**
- Enable the **authentication and traceability of objects** at all stages of the distribution chains.



Secondary materials

- **Non-destructive processes** are intended to the recovery of parts, components and co-products through reuse, repair, reconditioning and remanufacturing.

- **Destructive processes** aim to recover materials through recycling techniques, for the most part, and there is no concern with maintenance of functionality.

Material categorization and classification

- ***Categories***: identification of the type of product according to production and funcionality (E.g., textiles, e-waste, vehicles);

- ***Classes***: qualification acording to established criteria such as the material complexity (monomaterial, multimaterial), hazardousness potential (regulation requirements), recoverability potential (embling and/or sorting capacity level), etc.

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A FRAMEWORK FOR SECONDARY MATERIAL CIRCULARITY ASSESSMENT

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Circularity assessment

- The circularity assessment enables the measurement of the degree of circularity by **comparative material grading**.
- The proposed weighting is based on established dimensions and criteria, providing a **customized analysis**.
- The weights and scores consider the area of analysis (region, country or municipality) to reach the **material circularity score (CS).**

CS = Σ dimension scores + (disassembling and sorting capacity index * material complexity level index * technological recovery solution costs)

Circularity matrix

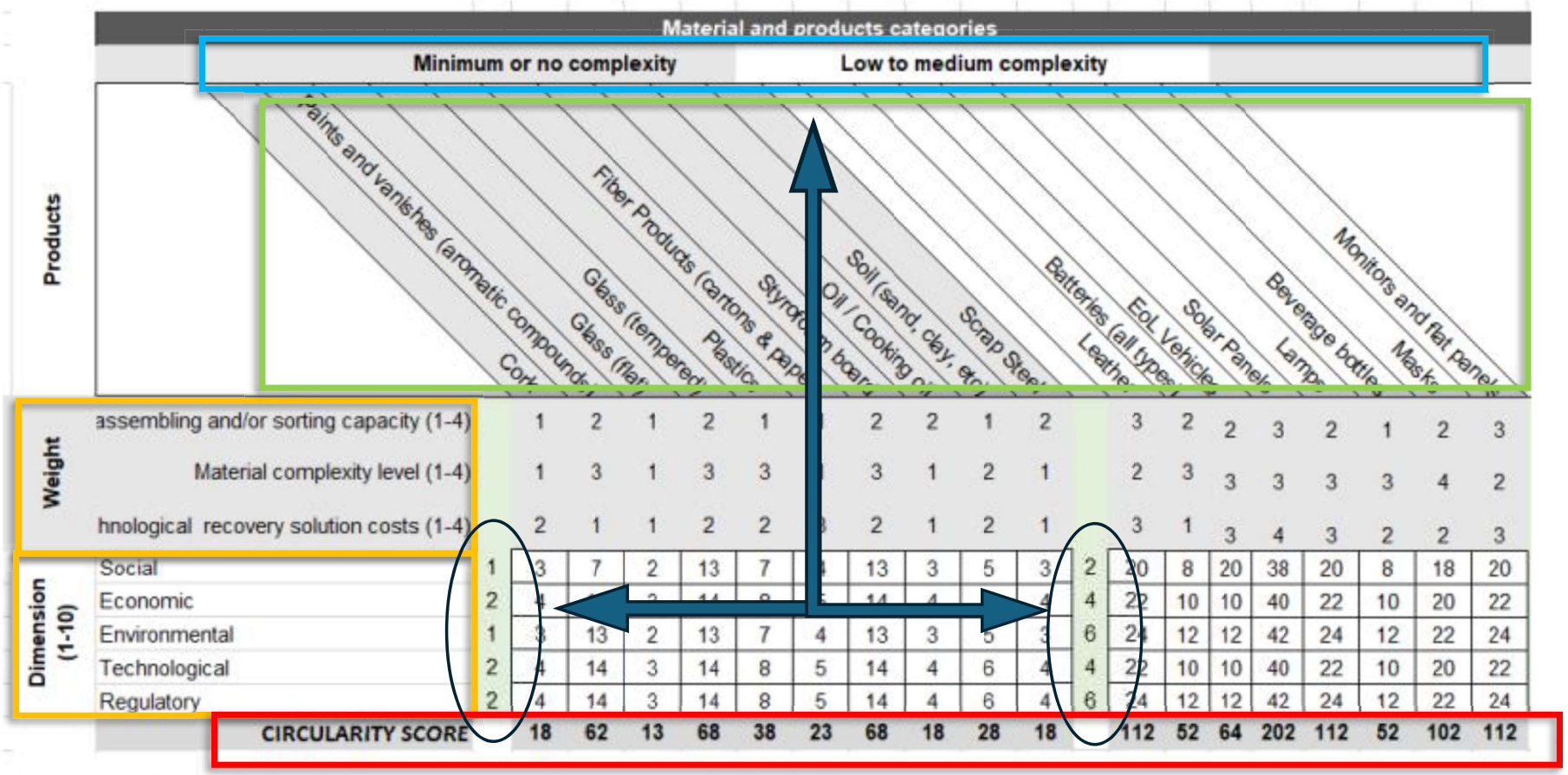

Figure 1. Material circularity assessment framework simulation.

Circularity matrix

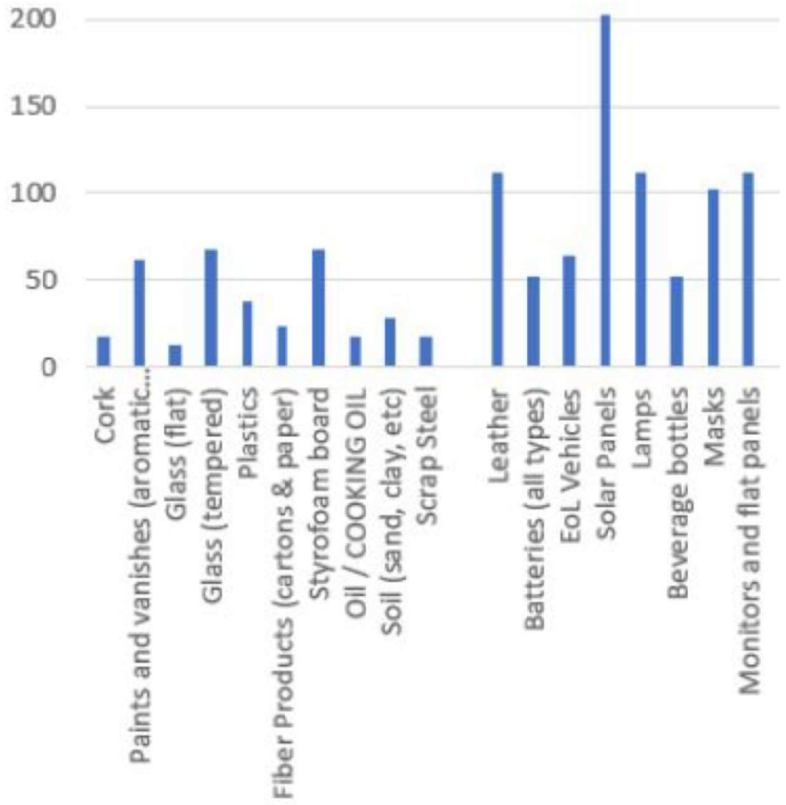

Figure 2. Material circularity scores simulation.

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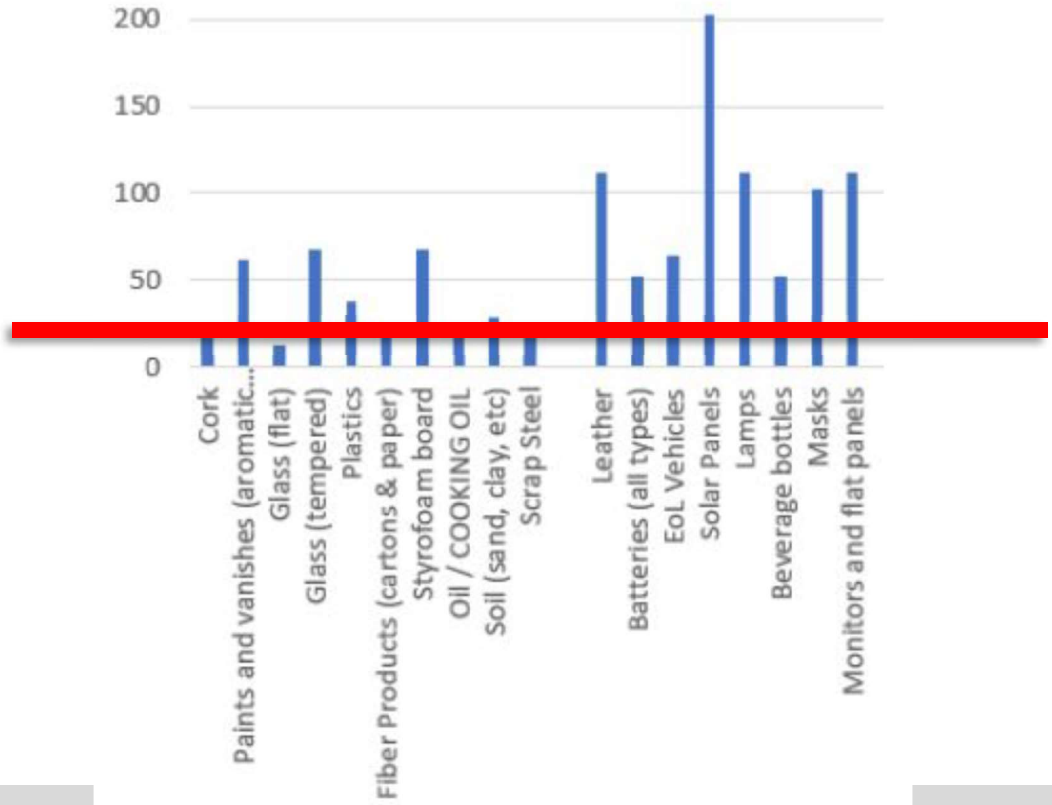
Circularity matrix



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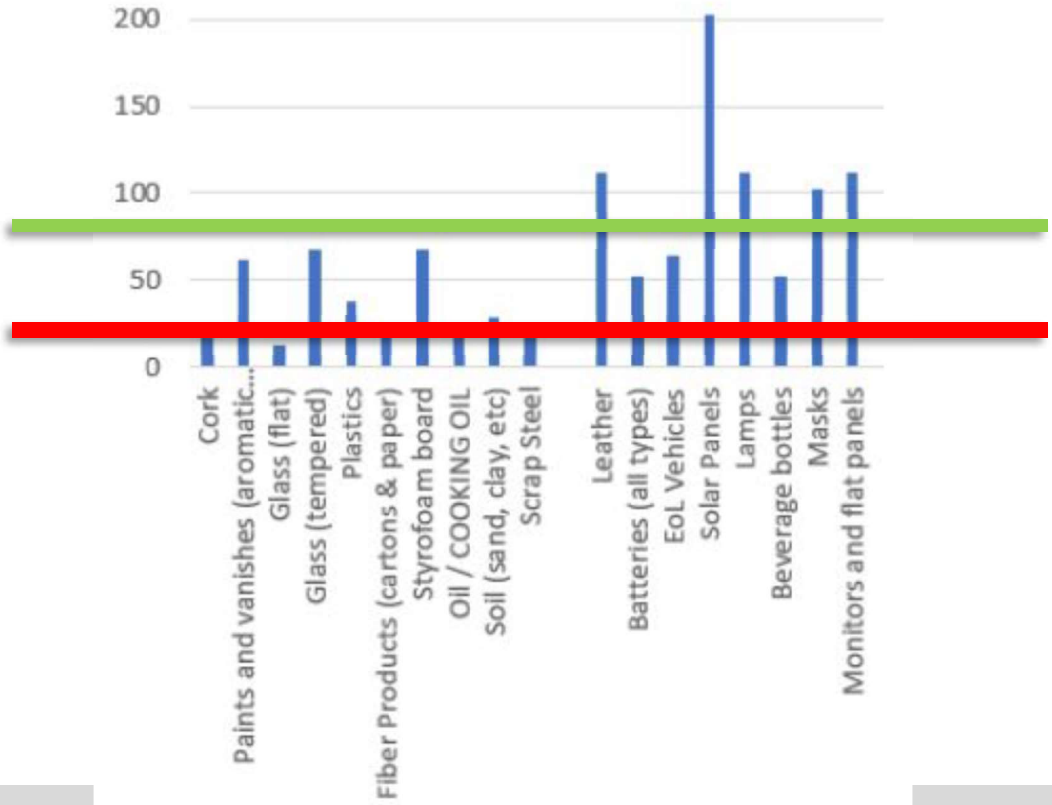
Circularity matrix



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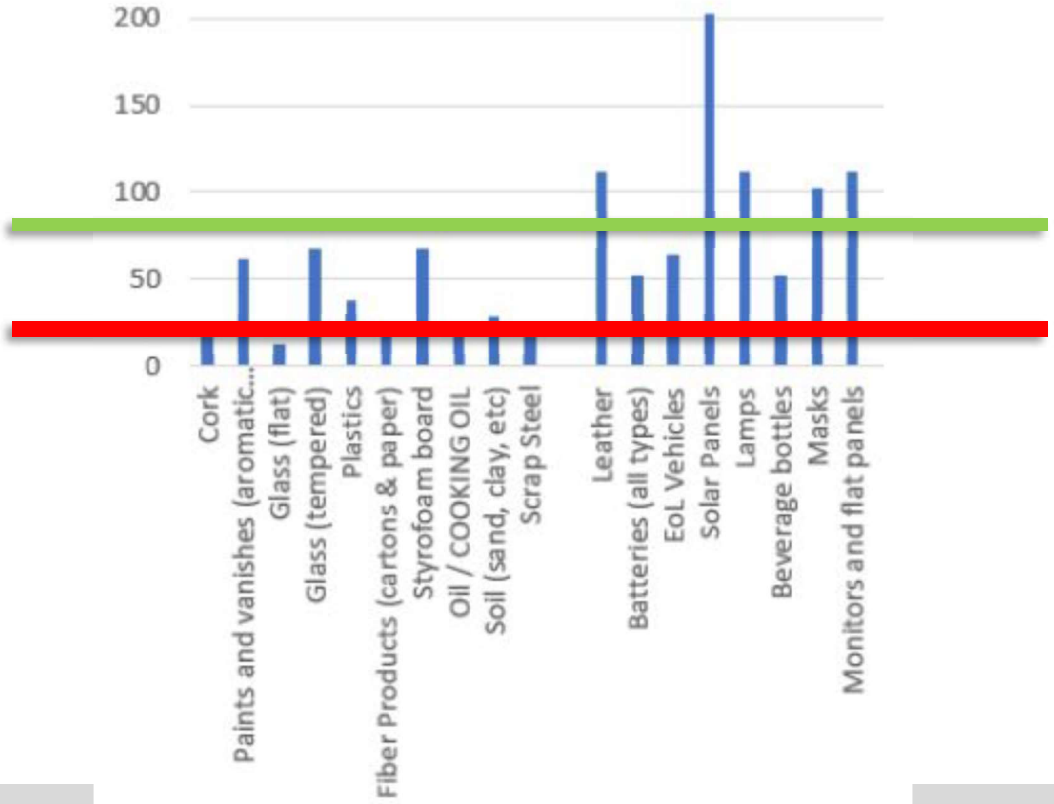
Circularity matrix



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- Current status
- Forecasting
- Integrated value chain
- Decision and policy making support

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Obrigada!
Thank you!

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