Metabolic
Consulting

A Circularity Model for Reconomy Recycling

Reconomy

November 2023

Summary

Reconomy's Recycle Division is a front-runner in sustainable waste management, diverting nearly 97% of waste from landfills and managing 1.2 million tonnes of various waste streams each year. To quantify Reconomy's impact in the circular economy and establish a baseline for its ongoing operations, Metabolic was commissioned to develop a circularity model to approximate the carbon avoidance potential inherent to Reconomy's operations.

This report outlines the development of Reconomy's circularity model, focusing on assessing the environmental impacts related to their operations and quantifying their level of circularity. The model employs a Life Cycle Impact Assessment (LCIA) approach to account for the environmental impacts associated with Reconomy's waste streams. The Circular Footprint Formula (CFF) serves as a central framework for the model, enabling the allocation of burdens and benefits within circular systems. By aligning with European Commission standards, the model ensures reliability and consistency in its output.

The circularity model was created to estimate the environmental impacts associated with the annual waste streams of Reconomy's business units Casepak, Combineering and Eurokey, covering the waste streams' entire life cycles from raw material extraction to End-of-Life treatment, excluding the use phase.

Likewise, the model estimates the environmental impacts in an "industry average" scenario, enabling a comparison of Reconomy's waste treatment activities with an industry average benchmark.

Consequently, the model generates a multidimensional circularity scorecard which includes various environmental impact categories, including an estimated avoided impact of Reconomy's activities compared to the industry average. The results may be used to conduct a hotspot analysis on the most relevant environmental impact categories, life cycle stages, waste streams, and business units.

The model was adjusted to accommodate the data availability of Reconomy's business units Casepak, Combineering and Eurokey. To accurately compute the environmental impacts of waste streams, specific data for all life cycle stages is necessary. However, due to limited primary data availability across Reconomy's business units, the model relies on secondary data to compensate for unavailable primary data. Therefore, the results produced by the model should be regarded as approximations of the actual environmental impacts rather than absolute values.

Using Reconomy's data for the year 2022, the circularity model determined the overall 'cradle-to-grave' carbon footprint of Reconomy's annual waste streams, totalling 1,673 kilo tonnes of CO_2 equivalent emissions. This calculation employs the Circular Footprint Formula, accounting negative credits for recycled material and recovered energy from waste processing activities. Consequently, Reconomy's End-of-Life operations avoid a total of -394 kilo tonnes of CO_2 equivalent emissions. Across the environmental impact categories on the circularity scorecard, Reconomy consistently performs better than the industry average benchmark. Specifically, Reconomy's activities are estimated to result in a 32% decrease in carbon footprint, an 89% decline in water use, a 23% reduction in land use and a 42% decrease in material loss, relative to the industry average benchmark.

Overall, the project equips Reconomy with a robust tool to monitor and evaluate their circularity efforts, thereby facilitating informed decision-making and strategic planning for their operations. As a result, Reconomy is well-positioned to enhance its environmental performance, fostering a more effective transition to circular economy practices within the industry.

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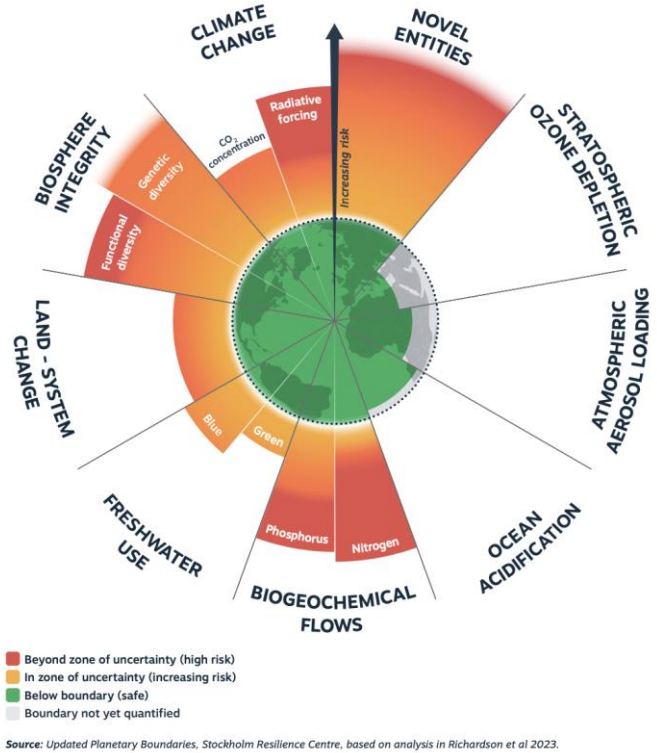
01 Introduction

Sustainable waste management

Pivotal role in transitioning towards a circular economy

- Reduce environmental impacts by retaining materials at their highest value
- Reconomy Group's Recycle Division is a front-runner
- How to quantify circularity?



Source: *Updated Planetary Boundaries, Stockholm Resilience Centre, based on analysis in Richardson et al 2023.*

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Project goals

Develop

Develop a robust model to **approximate the carbon avoidance** inherent to Reconomy Group's recycling processes based on Casepak, Combineering and EuroKey data

Assess

Assess the effectiveness of Reconomy Group's **recycling practices** based on a diverse set of environmental impact indicators

Benchmark

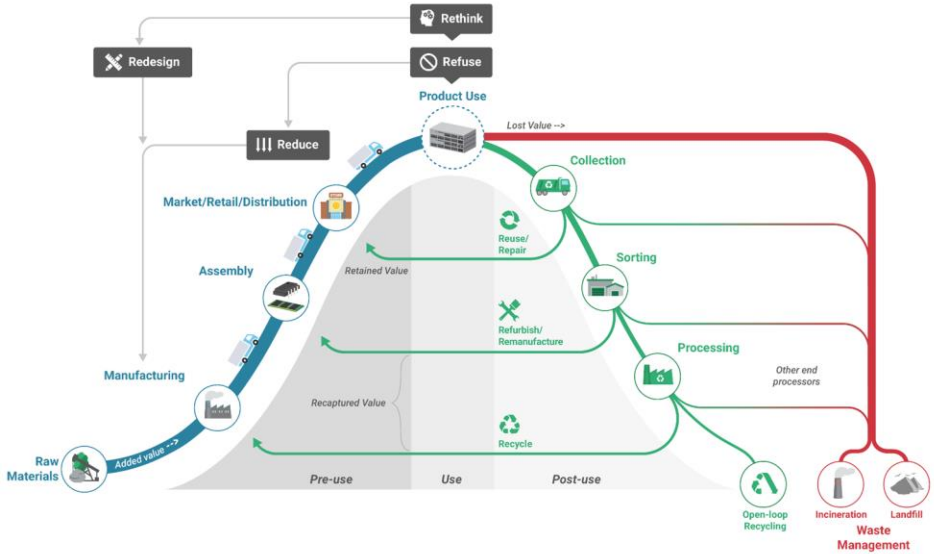
Baseline existing recycling activities to serve **as a reference point and benchmark** to industry averages

02 Approach

Circularity assessment

Ensure responsible and equitable use of resources

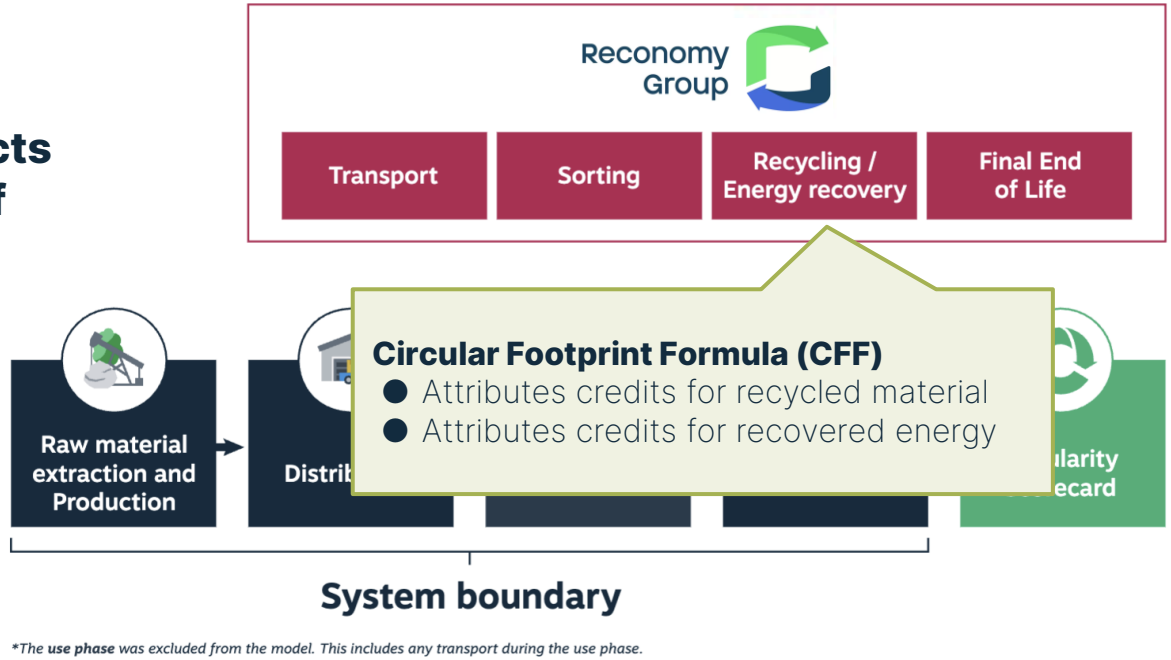
- Not only **avoid** product and material **disposal**
- Consider a **systemic view** of the circular economy
- Need to look **beyond End-of-Life** and also account for upstream environmental impacts



Life Cycle Impact Assessment approach

Assess environmental impacts across the entire life cycle of products

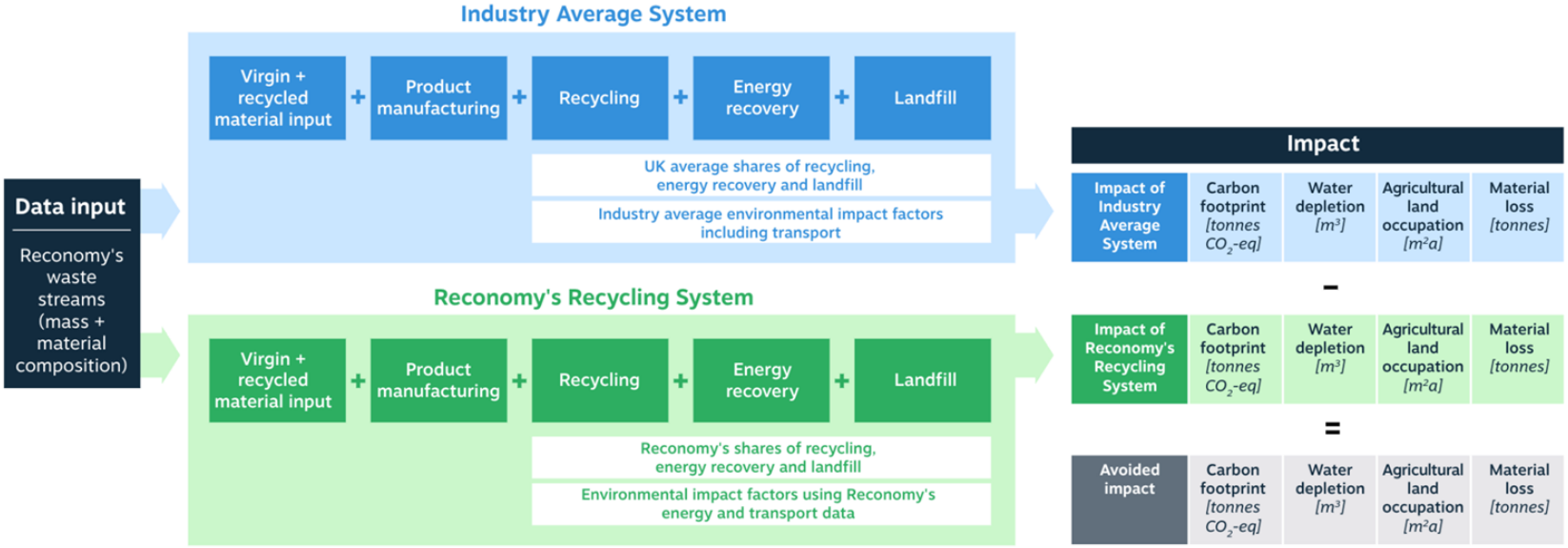
- In line with European Commission guidelines
- How to account for the benefits of recycling and energy recovery?



*The **use phase** was excluded from the model. This includes any transport during the use phase.

Reconomy's Circularity Model

Based on Casepak, Combineering and EuroKey data

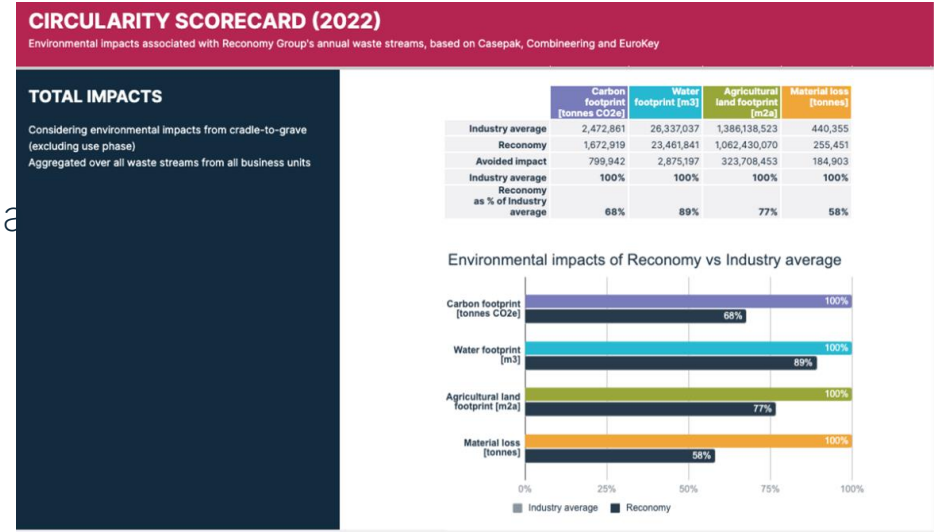


03 Model Showcase & Results

Reconomy's Circularity Model

Tool to measure circularity in a standardized, robust way

- Based on the Circular Footprint Formula
- Multiple environmental impact categories
- Comparison to industry-average benchmark



CIRCULARITY SCORECARD (2022)

Environmental impacts associated with Reconomy Group's annual waste streams, based on Casepak, Combineering and EuroKey

TOTAL IMPACTS

Considering environmental impacts from cradle-to-grave (excluding use phase)
Aggregated over all waste streams from all business units

	Carbon footprint [tonnes CO2e]	Water footprint [m3]	Agricultural land footprint [m2a]	Material loss [tonnes]
Industry average	2,472,861	26,337,037	1,386,138,523	440,355
Reconomy	1,672,919	23,461,841	1,062,430,070	255,451
Avoided impact	799,942	2,875,197	323,708,453	184,903
Industry average	100%	100%	100%	100%
Reconomy as % of Industry average	68%	89%	77%	58%

Environmental impacts of Reconomy vs Industry average

04 Model Limitations

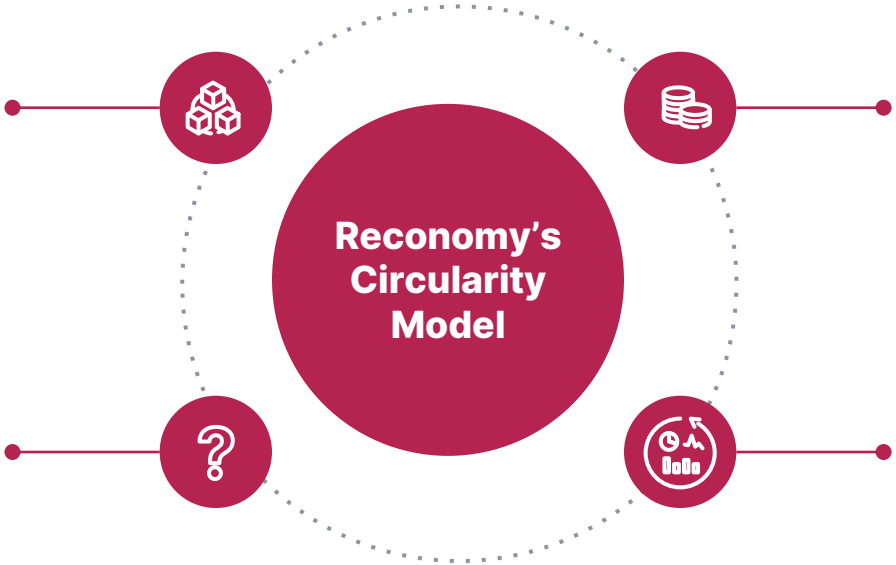
Model limitations

Scenario-based

Approximation of environmental impacts in an industry average scenario

Uncertainty

Reliance on secondary sources due to limited primary data



Data availability

Usefulness of model is tied to data availability & quality

Current model

First iteration with available data, possible improvements in future

05
Recommendations

Recommendations

DATA GAPS

Collect specific and complete data on the inputs required for waste treatment activities

PRIMARY ENERGY DATA

Collect primary data on recovered energy, substituted energy and bottom ash

TRANSPORTATION DATA

Collect fuel consumption data for the transportation of waste

ADDING NEW BUSINESS UNITS

Collect data on waste compositions, masses, processing steps, transport and energy