



Verification Report for Revive ECO100 and Revive ECO100 Indigo Carbon Emissions Life Cycle Analysis

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Verification summary

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Date:	21 December 2022
Verifiers:	Anthony Collins, Environmental Consultant, Carbon Footprint Ltd
Report reviewed by:	Myles Howard, Senior Environmental Consultant, Carbon Footprint Ltd
Authorised by:	John Buckley, Managing Director / Co-Founder, Carbon Footprint Ltd
Methodology used for the assessment:	14067:2018

1 Introduction

1.1 Objectives

Spicers Australia Pty Ltd commissioned Carbon Footprint Ltd to verify the carbon emissions (CO₂e) calculations for Fedrigoni Spa's recycled paper product Revive ECO100 and Revive ECO100 Indigo produced in Verona, Italy. The emissions were calculated through the LCA Eco-design developed by ERM and updated in July 2022 to v2.0. This verification includes the cradle-to-gate life cycle emissions associated with the production of raw materials, transport, and the manufacturing of Revive ECO100 and the Indigo variant.

1.2 Eco-Design Tool

Fedrigoni commissioned ERM to build an LCA tool in Excel to calculate the cradle-gate carbon footprint of their paper and self-adhesive materials/products. The tool also has the capability to calculate the gate-to-grave carbon emissions elements of a product lifecycle. However, this is purely for additional information and is not considered within the boundary of the assessment. The assessment does not include end-of-life aspects of the product such as disposal as this is out of Fedrigoni's operational control. This approach is reasonable as cradle-to-gate is a widely accepted format for LCA's in line with ISO 14067:2018.

1.3 Documents provided

- ERM's LCA Eco-design tool v1.0 report
- Deutscher Kraftfahrzeug-Überwachungs-Verein e.V (DEKRA) methodology Critical Review Statement (January 2022)
- Wepa Greenfield SAS recycled paper pulp environmental data and impact sheet (January 2020)
- Revive ECO 100 and Revive ECO 100 Indigo carbon life cycle assessment summary documents
- MS Excel emissions calculations produced through the LCA Eco-design tool were provided for both products by ERM.
- SimaPro emissions factor modification evidence (MS Excel)

2 Verification of Results

2.1 Assessment Boundary

The calculations were verified by Carbon Footprint Ltd in an MS Excel format and confirmed to follow the international standards as set out by ISO 14067 for a cradle-to-gate carbon LCA. This verification focused on the fossil fuel carbon impact only. Subsequently, biogenic carbon, soil carbon storage, and land-use change carbon were excluded on the basis that they are out of the scope of assessment resulting in emissions beyond the cradle or manufacturing gate.

The only aspect of the cradle-to-gate process excluded from the calculations was the embodied emissions associated with secondary packaging, due to being immaterial. A similar assessment by ERM prior to the development of the Eco-design tool showed that this can account for only 0.2% of the overall carbon footprint. In the ERM report it is stated that mass and energy contributions less than 1% are cut-off (due to immateriality), therefore this was deemed acceptable by Carbon Footprint.

2.2 Emissions Factors

The majority of emissions factors used were based on accurate proxies and no changes were required. However, for wastepaper pulp production and CHP energy generation these factors were adapted in SimaPro to improve the accuracy of the calculations.

- Eco-design tool emissions factors database - Ecolnvent v3.7.1 (2020)
- GWP factors - IPCC AR5 GWP 100a (Published 2014)
- SimaPro modified factors for:
 - Recycled paper pulp production from the supplier (Greenfield)
 - Heat and electricity generation from the Verona on-site CHP plant.

Revive ECO100 products are made from 100% recycled paper pulp. The Eco-design tool utilises the cut-off approach (0:100% upstream to downstream allocation) where the environmental benefits and burdens of the recycling processes are attributed to the products that utilises the recycled material as an input. For more details, please see section 2.4 of the ERM report. This is a suitable approach as this follows ISO 14067.

2.3 Data Limitations and Management

During an online audit ERM demonstrated the process and theory for the emissions calculations and factors modifications in Excel. Carbon Footprint Ltd did not have direct access to the Eco-design tool however, a summary of the primary data (e.g. energy and water consumption) and evidence used to calculate the emissions for the Revive ECO100 products was provided in ERM's tool report. The only source of secondary data was the emissions factors taken from Ecolnvent v3.7.1. This is sufficient as the difference in emissions factors is immaterial, however Carbon Footprint recommend that the Eco-design tool is updated to version 3.9 (the latest version).

2.4 Materials

- Paper pulp accounts for roughly 1.7% of the mass feedstock to produce 1 kg of paper.
 - This is due to the high volume of water required to produce 1 kg of paper (42 litres) and that fibrous raw materials and additives lost and discharged with the wastewater during the process
 - 5% more additives are required to produce the Revive ECO100 Indigo variant.
- The scrap rate at the Verona site is 12%, therefore all emissions sources for Revive ECO100 have been inflated by 12% to account for this.

The emissions factor for the Greenfield recycled pulp was produced from two factors for the sorting and treatment of paper and production of deinked pulp. The Greenfield environmental data sheet specifies the water and energy consumption, and emissions to air per air-dried tonne of pulp. This data was used to modify the factor for deinked pulp in SimaPro. Additionally, Greenfield supplies the pulp to Fedrigoni with a water content of 10% (by weight) whilst EcoInvent assumes an average water content of 40%, which was accounted for in the modifications. These modifications are logical as they make the composite recycled pulp factor more representative of Revive ECO100's production.

2.5 Raw Material Transport

In previous carbon lifecycle verifications, all supplier road transport (16-32 ton truck) distances were assumed to be 500 km. Carbon Footprint Ltd requested that the transport distance from raw material production to manufacturing sites be acquired and incorporated into the calculations. Primary transport distances have now been integrated into the calculations improving the accuracy of emissions figures for Revive ECO100 and Revive ECO100 Indigo.

2.6 Manufacturing

- Machine-specific primary production data was sourced for 2019 from the plant manager
- Energy consumption data was used to apportion the kWh per kg of paper produced
- 2019 was deemed to be the most representative year of production at Verona prior to the onset of the Covid-19 pandemic in 2020
- Fedrigoni confirmed that there have been no changes in the production since 2019
- Both products undergo fabrication and transformation through Paper Machine 1
- Revive ECO100 Indigo undergoes an additional coating stage through Coating line 1

This is an acceptable approach that would give a valid indication of both products manufacturing emissions. The Verona site has an onsite CHP plant and pulls additional electricity from the Italian grid (1.17%). The CHP plant emissions factors for heat and electricity production were modified to account for the plant's specific efficiency. During the online audit, ERM demonstrated that the efficiency of the Verona CHP plant is lower than the respective EcoInvent factor. Furthermore, the base EcoInvent factor associated with the auxiliary electricity required to power the CHP plant was adapted to account for the Italian grid fuel mix, replacing the average European fuel mix. Carbon Footprint Ltd deemed that these modifications were appropriate and made the LCA more specific to Revive ECO100 and the Indigo variants production.

2.7 Wastewater Treatment

The amount of wastewater produced and treated at Verona was recorded for the reference 2019 year. Primary data on the type and amount of chemicals consumed in 2019 to treat wastewater was collected from the Arco plant and applied to Verona plant. Electricity consumption data to treat wastewater was obtained directly from the Verona plant. This data was used to construct an emissions factor in SimaPro based on Ecoinvent factors. Wastewater emissions were calculated based on the total volume of wastewater treated per kg of paper and this approach is appropriate.

2.8 Packaging

Packaging emissions per ream of Revive ECO100 are estimated based on primary data from the Arco plants (Trentino, Italy) operations, which is also part of the Fedrigoni group. Primary data on packaging usage was not collected for the Verona plant. Based on ERM's calculations this accounts for < 1% of the footprint of each product therefore the impact is relatively minor.

The Arco and Verona plants have very similar packaging processes therefore this approach is found to be suitable by Carbon Footprint Ltd. The required packaging material produces 0.014 kgCO₂e per kg of ream and is consistent between reams of various sizes. Other packaging elements such as pallets, wrapping film, and kraft paper are also incorporated into this factor.

2.9 Summary of Results

The table below shows the product footprint emissions breakdown and forecasted emissions for Revive ECO100 from July 2022 to June 2023 based on current and forecasted production figures.

Product	Average emissions per process (kgCO ₂ e/kg of product)						Emissions kgCO ₂ e/kg of product	Total forecasted production (tonnes)	Total emissions 2022 (tCO ₂ e)
	Fibrous raw materials ¹	Additives	Heat consumption	Electricity consumption	Water	Packaging			
ECO100	0.26	0.58	0.50	0.24	0.01	0.01	1.60	1,400	2,238.31
ECO100 Indigo	0.25	0.78	0.58	0.29	0.01	0.01	1.93	100	192.65
Grand total								1,500	2,430.95

¹ Includes both post-consumer waste recycled paper pulp from Greenfield and internal pre-consumer waste produced at Varone

3 Conclusions

3.1 Carbon Footprint Recommendations

- Offset your total forecasted emissions for 2022/23 to classify Revive ECO100 and Revive ECO100 Indigo as Carbon Neutral for 12 months.
- Update the Eco-design tool calculations to use the:
 - EcolInvent v3.9.1 (2022) factors
 - IPCC AR6 GWP 100a factors (Published 2021)
- Update the Eco-design tool to use 2022 as a reference year for energy consumption data following the end of the Covid-19 pandemic
- Investigate acquiring chemical treatment data specific to the Verona site.
- Investigate opportunities to collect more primary data in the future by working with suppliers to reduce the need for averages from EcolInvent.
- Request Greenfield to re-assess the impact of their recycled paper pulp production as this was last finalised in January 2020

3.2 Carbon Footprint Standard

By completing the verification, Fedrigoni has qualified to use the Carbon Footprint Standard branding (shown below) for a 12-month period for Revive ECO100 and Revive ECO100 Indigo. The emission per kg of both products were calculated through the Eco-design tool, developed by ERM and verified by Carbon Footprint. By achieving this, Fedrigoni has qualified to use the Carbon Footprint Standard branding. This can be used on all marketing materials, including web site and customer tender documents.



The Carbon Footprint Standard is in recognition of your organisations commitment to managing your products' carbon emissions. The text to the right-hand side of the logo demonstrates what level you have achieved in line with international best practice.

To help differentiate this product from competitors, bring additional PR and CSR opportunities and to compensate for the product emissions whilst ensuring that the projects supported are providing the required carbon reduction benefits. We recommend the carbon emissions are offset through certified carbon offset projects to achieve the **Carbon Neutral Product Standard**.



4 References

1. ISO 14067 Greenhouse gases — Carbon footprint of products — Requirements and guidelines for quantification (August, 2018) <https://www.iso.org/standard/71206.html>
2. Ecoinvent database v3.7 2020, available at <http://www.Ecoinvent.org/>
3. Fedrigoni Product Life Cycle Assessment (Cradle To Gate) Life ECO100 (Tool v2.0 July 2022) pub. October 2022
4. Fedrigoni Product Life Cycle Assessment (Cradle To Gate) Life ECO100 Indigo (Tool v2.0 July 2022) pub. October 2022
5. ERM Eco-design tool for paper products Study report – tool version 1.0 (Jan, 2022)
6. DEKRA Critical Review Statement for Excel-LCA tools for paper and self-adhesive materials (Jan, 2022)
7. Wepa Greenfield SAS Pulp Environmental Data Sheet (Jan, 2020)