Circularity First

Sustainable IT. Sustainable Performance.

Circular Impact Report

Customer X

Service Provider

Who are Circularity First

The way IT is managed and used has impacts. Circularity First uses a circular mindset to take a more sustainable approach to IT.

We design, build, and manage infrastructures that perform in demanding environments, whilst offering solutions that provide the greatest return of investment.

With your carbon emissions, net zero, resource use and e-waste targets in mind, we help balance the needs of your business with the needs of humanity.

99%

Sustainable products delivered

Upload your network hardware items and track their embedded carbon footprint.

Upload your network hardware items and track their embedded carbon footprint.

25%

of energy returned to UK grid

Our UK facility is powered by renewable energy and is carbon neutral. 25% of the energy generated by our solar panels is surplus to requirements so it’s supplied to the grid.

845

Tonnes of eWaste prevented

From 2016 to March 2022, we prevented 845 tonnes of technology equipment from becoming eWaste.

Proudly, we’re on track to prevent more than 1,000 tonnes of IT equipment from becoming eWaste before the end of 2023.

43%

of leaders know their organisation’s IT carbon footprint.

We’ll help you reduce the carbon impact of your IT today.

Carbon Curious?

Book a sustainable IT discovery session with your account manager today.

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Your data part 1

Date: 13th May 2024

Carbon Report

All data is Indicative and based on our ground-breaking research ‘The Tear Down’

Your Hardware

Quantities of remanufactured & new

668 **Remanufactured** + 1,673 **New** = 2,341 **Total Quantities**

Your Carbon

Total tCO2e Cradle-to-Gate

80.94 **Used** + 442.77 **New** = 523.72 **Total tCO2e**

Your Savings

tCO2e saved on remanufactured vs new

80.94 **Used** v 288 **New** = 207.06 **tCO2e Saved**

eWaste Avoided

Total eWaste avoided from remanufactured purchases of hardware

2,965 **Total KGs**

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Your data part 2

Carbon Numbers

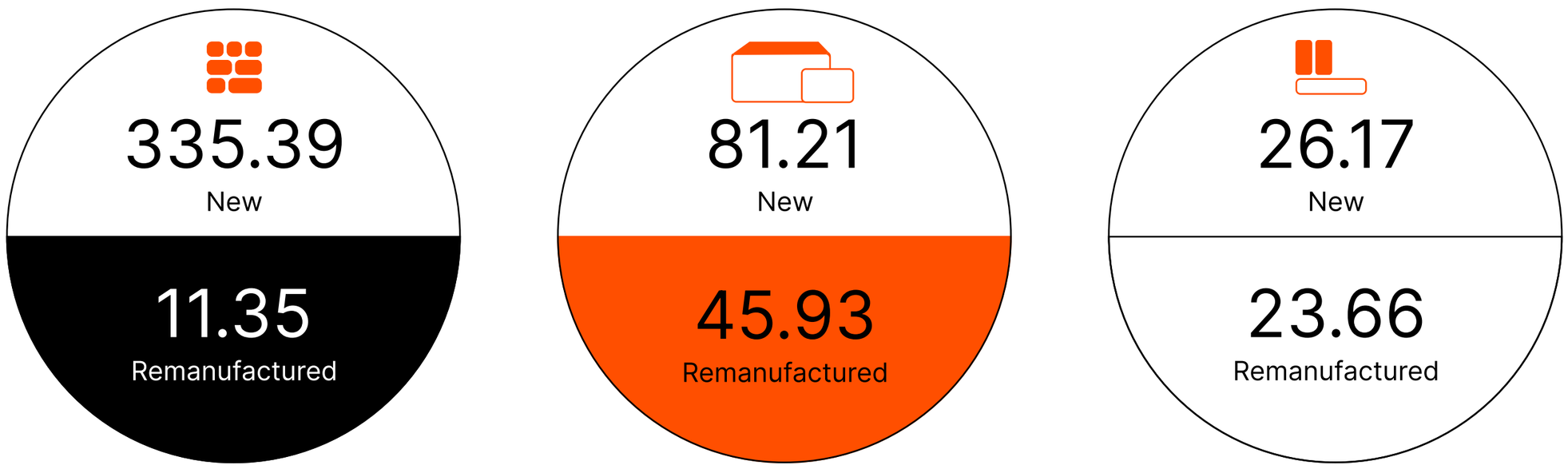
Remanufactured and New

Total: 523.71 tCO2e (80.94 / 441.77) from 2,341 (668 / 1,673) products.

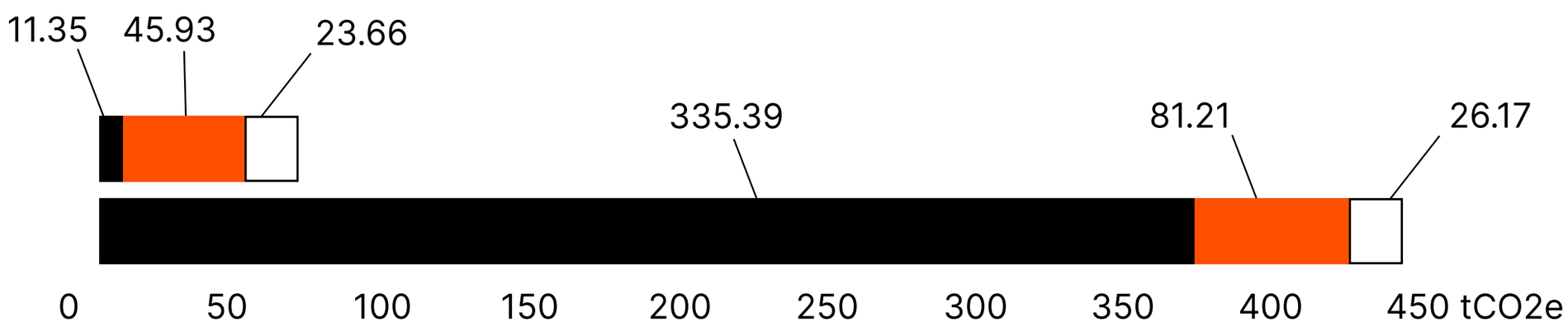
Our carbon tool has measured the greenhouse gas (GHG) emissions associated with your new and remanufactured products. Data below shows your total carbon, which includes raw materials, assembly and transport for cradle-to-grave.

Factors

Emissions factor projection: **Linear** reduction **projection**
Geography: **European Average**
Life Cycle lengths: **5**
Number of cycles: **1**
End of life treatment: **Recycling**



Raw Materials | **Assembly** | **Transport**



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Your data part 3

Carbon Savings

Remanufactured vs New

Total: 207.06 tCO2e

Our tool compares the carbon involved from the extraction of raw materials, the assembly of the product and the transport (including the shipping of components), between remanufactured and new of identical products.

The data below represents your remanufactured purchases and compares them to new.

Savings

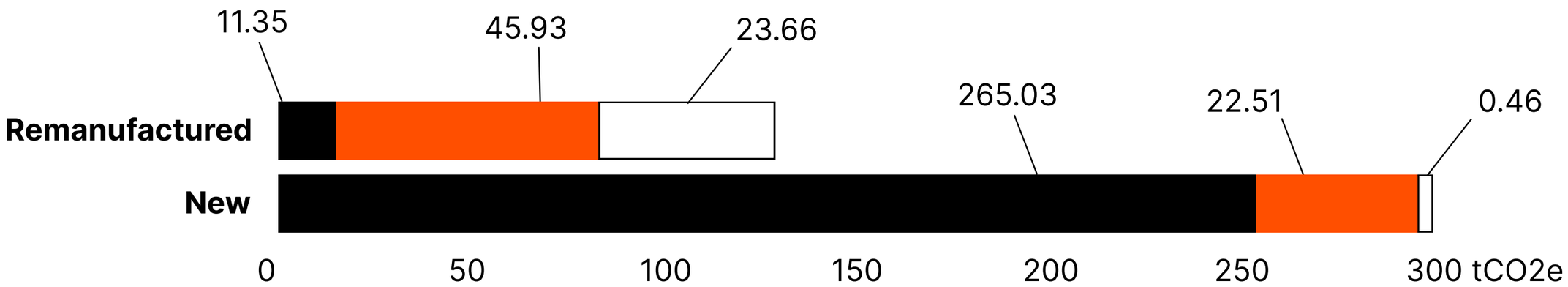
- **Raw Materials Saving:** 253.68 tCO2e
- **Assembly:** -23.42 tCO2e
- **Transport:** -23.2 tCO2e

72%
Carbon Saved

Carbon Saving
207.06
tCO2e saved by choosing remanufactured over new

Environment Savings
12K
Oak trees that didn't need to be planted over a 10-year period to sequester the carbon

Equivalent Kilometres
1.1m
The equivalent kilometres in an average petrol car.
29x
around the world



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Your data part 4

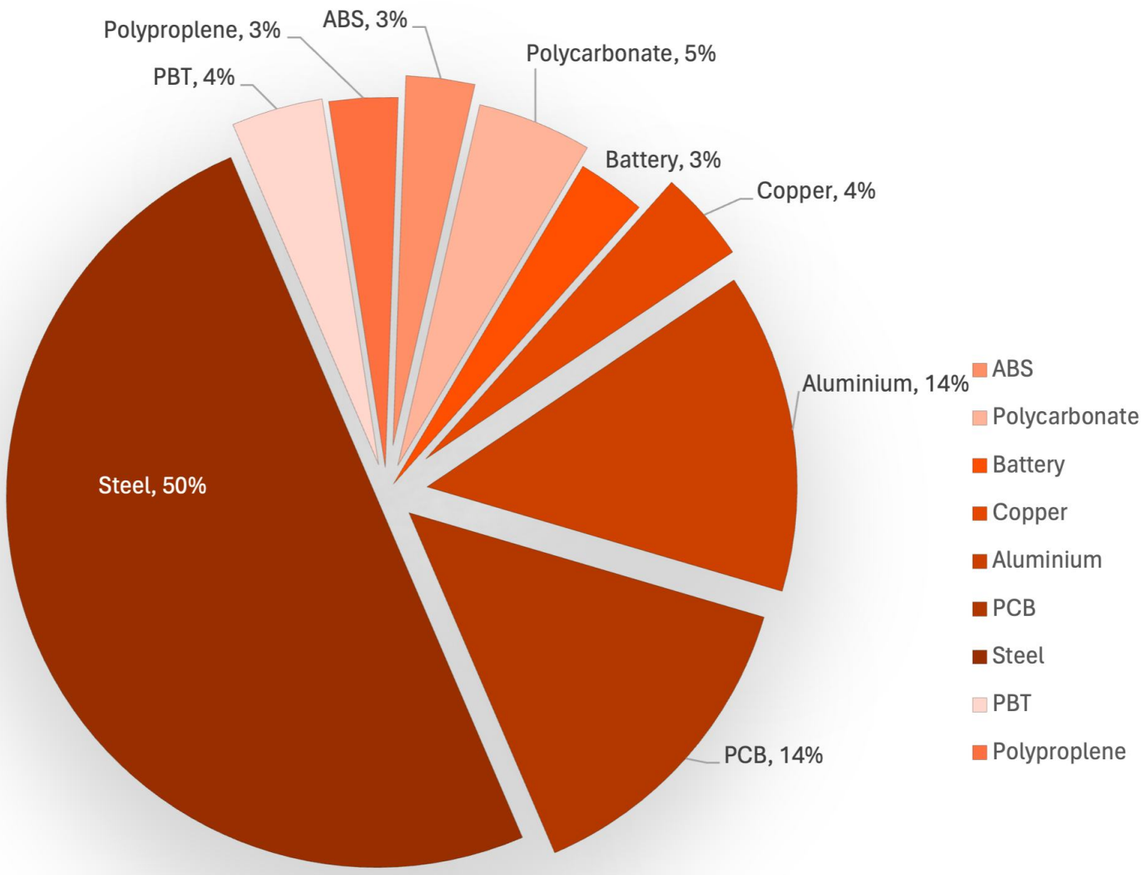
eWaste Avoided

by given products a second life

Total: 2,965KG

Our carbon tool has measured the weight of the raw materials for each **remanufactured product**, to produce the total weight of eWaste avoided from your sustainable purchases, by diverting products from landfill.

2,965KG
eWaste Avoided



Why this data is useful

This gives you insight into the following areas so you can make a more informed choice around the use of sustainable IT in your business

Avoided Emissions

Quantifying the positive impact of using remanufactured technology or extending the life of technology is possible as a result of our work.

Sustainability Goals

The data supports you to build a business case for a more sustainable approach to how IT is sourced and used in your organisation.

Sustainability Impact

Aligns your department with your organisation’s sustainability goals, allowing you to share your positive impact.

Change Your behaviour

Starts to quantify the material impacts on the earth’s resources and supply chains of always defaulting to new.

Conscious Consumption

Sharing this data leads to more conscious consumption.

Proof

It’s tangible evidence of the positive impacts your sourcing decisions have.

Circular Impact Tool

from Circularity First

Our carbon tool, which is grounded in more than 2 years of research, was born out of our desire to know exactly what goes into new IT hardware. At present, there is a gap in knowledge as vendors do not provide this level of insight.

We took it upon ourselves to break down hardware into its individual components and pieces. With this, we're able to build up a holistic picture of the GHG emissions that go into producing new IT hardware, giving you a comparison against reused.

Breaking down and building up

Armed with screwdrivers, drills, and hammers, we stripped hardware back to its individual components. We then traced these components back from assembly to manufacture and then to raw material extraction.

Using this method, we could see that a piece of hardware assembled in Texas was built from components produced on the East Coast of China using minerals extracted across Mainland China. We then calculated the carbon emissions involved in the extraction, transportation, processing, and production of the hardware in its entirety.

Data in Action

Our carbon tool allows users to amend assumptions on how often the product is replaced or remanufactured, the energy efficiency between different generations, the country the technology is used in, and the end-of-life treatment.

This data can be used to align technology choices with decarbonisation (NetZero), circular economy, and waste reduction goals.

Not only that, second-life technology is often more cost-effective and easier to integrate into existing networks.

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Carbon Reporting Documentation

Methodology

The model employs reference part numbers to estimate the carbon footprint of target part numbers. The total CO2 equivalent (tCO2e) for each reference part number is calculated by considering the emissions from raw materials, assembly, transportation, product use, and end-of-life stages. Subsequently, the tCO2e for new target part numbers is derived from the reference data, taking into account factors such as weight, dimensions, and complexity. This methodology focuses exclusively on tCO2e as the output metric.

To ensure reliable outcomes, the analysis utilises the material compositions of reference parts. In line with common practices in carbon footprint modelling, several assumptions underpin the tCO2e estimations. These assumptions are detailed in the "Assumptions" section of this document to enhance transparency. Additionally, the "Data Sources" section provides access to the underlying data that supports these calculations.

A comprehensive teardown approach weights the materials in most of the examined part numbers, while manufacturer data sheets substitute for certain printed circuit board (PCB) components. The tCO2e estimation incorporates variables such as emission factor projection trend, geography, life cycle length, number of cycles, annual reduction in energy use due to increases in efficiency between different generations, product power rating, distribution routes, end-of-life treatment, and the remanufacturing process. These factors derive from an amalgamation of database records, historical analyses, manufacturer disclosures, and governmental data. For further details, the "Assumptions" and "Data Sources" sections are recommended.

The calculation applies these emission factors and assumptions to each part number's material composition, estimating tCO2e emissions from raw materials through to the end-of-life stage for both new and remanufactured items. Our research partner developed the reference part number framework, which is based on international standards.

The current model database comprises ten reference part numbers across six categories: Ethernet Switch, Layer 3 Switch, Router, Wireless Integrated Services Router, Wireless Access Point, and IP Phones.

It estimates emissions based on the presumption of compositional similarity within each category, allowing for extrapolation to new target part numbers by considering factors like weight, dimensions, and complexity. A similarity score aids in identifying the most analogous reference part number for a given category, serving as a proxy for estimation accuracy by assuming uniformity in material composition and other variables between reference and target numbers.

For expanded explanations on calculation methodologies, consult the "Similarity Score" and "Total tCO2e" sections.

The model remains open to including additional types and references to refine its accuracy.

Assumptions

Emission Factor Projection Trend: Linear Reduction Projection
Geography: European Average
Life Cycle Length (years): 5
Number of cycles: 1
End-of-Life Treatment: Recycling

These base assumptions are supplemented by additional specific assumptions, with a comprehensive list potentially included in future updates.

Data Sources

Power Rating:
Manufacturer websites (currently only Cisco): https://www.cisco.com/c/en/us/products/collateral/switches/small-business-smart-switches/data_sheet_c78-610061.html

Production of materials emissions:
Ecoinvent: https://ecoinvent.org/

Incineration emissions:
Ecoinvent: https://ecoinvent.org/

Internal incineration model:
https://eunomia.eco/

Treatment via cement Kilns:
Internal modeling results: https://eunomia.eco/

Recycling:
Ecoinvent: https://ecoinvent.org/

Electricity Grid Factors:
UK: BEIS, UK Government Conversion Factors (2021)
Denmark: https://www.carbonfootprint.com/
Germany: https://www.euractiv.com/section/energy/opinion/germany-leads-europe-with-target-to-reach-100-clean-power-by-2035/
France: https://www.carbonfootprint.com/
Italy: https://www.carbonfootprint.com/
Spain: https://www.iea.org/reports/spain-2021
Belgium: https://www.carbonfootprint.com/
Netherlands: https://www.carbonfootprint.com/
European Average: https://www.carbonfootprint.com/

Transportation Emissions Factors:
Data has been sourced from the UK Government, BEIS, Greenhouse gas reporting: conversion factors 2021 https://www.gov.uk/government/publications/greenhouse-gas-reporting-conversion-factors-2021

Assembly of Produces:
Ecoinvent: https://ecoinvent.org/

Limitations

The model's accuracy hinges on the similarity between target and reference part numbers, assuming that items within the same category can be accurately estimated through extrapolation based on weight and dimensions. However, this may not always be applicable. The similarity score indicates the reliability of the estimates.

Like all models of this nature, it is predicated on numerous assumptions, with a primary aim of transparency regarding these assumptions.

The model focuses solely on tCO2e emissions without considering other potential impacts.

Metrics Explained

Total tCO2e

Based on the reference part numbers, new target part numbers are calculated using weight and dimensions. The reference part number model was developed by our research partner. For a more detailed explanation, view the “Methodology” section in this documentation.

The following simple formula is used to get new target part numbers based on our research partners tool references:

Reference tCO2e * (0.5 * (target weight / reference weight) + 0.5 * (target volume / reference volume))

For ethernet switches and layer 3 switches the calculation also looks at product complexity.
The calculation is based on the principles from the following simple formula:

Reference tCO2e * (0.5 * (target weight / reference weight) + 0.5 * (target volume / reference volume)) * (1.2^(LOG2(target ports / reference ports)) * { [0.9, if POE = "No"] [1, otherwise] })

The number of ports and POE (Power Over Ethernet) are used as proxies for complexity. The parameters 1.2 and 0.9 are based on the examination of part numbers and expert opinions. If the reference part has POE but the target does not, the estimate is multiplied by 0.9. Conversely, if the reference part has 24 ports and the target has 48 ports, the estimate is multiplied by 1.2.

Similarity Score

The Similarity Score represents the degree of correspondence between the target part number and the reference part number. This metric is not employed in the computation of tCO2e; rather, it serves to evaluate the congruence among part numbers given that the calculation of tCO2e is contingent upon the similarity between the reference and target part numbers, as delineated in the section titled "Methodology".

A high Similarity Score suggests a substantial level of confidence in the tCO2e estimate, while a low score denotes diminished reliability of the estimate.

The computation of the Similarity Score is facilitated by the Python package RapidFuzz, which offers enhanced performance over the traditional string matching package FuzzyWuzzy. The score assesses the similarity in both the name and description between the target and reference part numbers. RapidFuzz employs the Levenshtein distance metric, which quantifies the minimum number of edits required to transform one sequence into the other, thereby providing a measure of similarity.