CARBON ASSESSMENT REPORT

Tunley Engineering

"Engineering A Decarbonised Future"

CARBON ASSESSMENT REPORT

for

OPTIMA PRODUCTS LIMITED

Case study 1:

Customer A purchased Optima products for its offices. Several years later, it moves offices to a new location and agrees with the new occupant to leave the Optima products in situ for use by the new occupant Customer B.

Customer B uninstalls the Optima products and uses them in a new design on other floors in the same building. For all the products reused, Customer B makes carbon emissions savings as calculated in this report.

June 2023

Contents

Nomenclature

Nomenclature	Description
GHG	Greenhouse Gases, gases that trap heat in our atmosphere. GHG include Carbon dioxide, methane, nitrous oxides and fluorinated gases.
Embodied Carbon	The total GHG emissions generated to produce a product; It includes those from extraction, manufacture, processing, transportation and assembly in every component.
Carbon Equivalent	The effect on global warming of a greenhouse gas (GHG) relative to that of CO_2.
Zero Carbon	The absence of GHG emissions
Greenhouse Gas Protocol	The GHG Protocol Corporate Accounting and Reporting Standard which provides requirements and guidance to prepare a corporate-level GHG emissions inventory.
Net Zero Carbon (NZC)	The sum effect of combining actions to reduce GHG emissions with actions to off-set them.
Carbon Off-setting	A reduction in emissions of GHG to compensate for unavoidable emissions.
Global Warming Potential (GWP)	The heat adsorbed by any GHG as a multiple of the equivalent in carbon dioxide.
IPCC	The Intergovernmental Panel on Climate Change. It provides regular scientific assessment on climate change to policy makers.
AR5	The fifth assessment report of the IPCC. The most recent assessment report is 2014.
tCO_2e	Notation for tonnes of carbon dioxide equivalent emissions.
$kgCO_2e$	Notation for kilograms of carbon dioxide equivalent emissions.
ICE	The Inventory of Carbon and Energy.
Scope 1	Direct GHG emissions are those that occur from sources that are owned or controlled by the company such as emissions from combustion in owned or controlled boilers, furnaces, vehicles, etc., emissions from chemical production in owned or controlled process equipment.
Scope 2	Indirect GHG emissions account for GHG emissions from the generation of imported energy such as purchased electricity consumed by the company. Purchased electricity is defined as electricity that is purchased or otherwise brought into the organisational boundary of the company. Scope 2 emissions physically occur at the facility where electricity is generated.
Scope 3	Other indirect GHG emissions. The GHG Protocol Corporate Accounting and Reporting Standard defines Scope 3 as an optional reporting category that allows for the treatment of all other indirect emissions. Scope 3 emissions are a consequence of the activities of the company but occur from sources not owned or controlled by the company. Some examples of scope 3 activities are extraction and production of purchased materials; transportation of purchased fuels; and use of sold products and services. BS EN ISO 14064 separates out Scope 3 emissions into categories 3 to 6 covering indirect emissions from transportation, products used, use of products from the business and other sources respectively.

Methodology and Quantification Standards

The Business Carbon Assessments was completed using methodology consistent with the international standards BS EN ISO 14064-1, BS EN ISO 14067:2018 and The GHG Protocol. Quantification of carbon dioxide equivalent emissions arising from business activities were completed in accordance with the emission factors of Greenhouse gas reporting: conversion factors published by DEFRA, the UK government Department for Business, Energy and Industrial Strategy for 2022. Additionally, The Inventory of Carbon and Energy has provided carbon equivalent data conversions for complex materials.

Global Warming Potentials are stated from IPCC Sixth Assessment Report, 2021 (AR6).

Executive Summary

Optima would like to report on the carbon emissions for a case study in which their door and partitioning products were reconfigured and reused. Quantifying carbon emissions in this case study puts Optima in a position to demonstrate sustainability and environmental responsibility to their customers and the wider public. It allows Optima to show how a measurable change can be made to climate change emissions and facilitate the achievement of Net-Zero Carbon (NZC). Optima and Tunley Engineering have collaborated to identify emission sources and collect data.

Tunley Engineering conducted an independent assessment to quantify carbon emissions due to business activities conducted by Optima and their contractors, based on the data provided by the company. The evaluation herein reported includes two components of emission quantifications for comparison:

i) Scenario 1: Assuming all the products used in the new design (for customer B) are bought as new. This is a hypothetical scenario and referred to as new installation. GHG emissions from material usage, transportation and assembly are quantified. Data from EPDs provided by Optima are deployed.

ii) Scenario 2: Dismantling the products at the same location and reconfiguring/reinstalling them for the new design. This is the actual work that was carried out and is referred to as reusing. This considers the reusing of some materials, and purchase of additional items where reuse was not possible. In this scenario, Optima products were dismantled, reconfigured and reinstalled at the same site.

This assessment demonstrates Optima's commitment to showing how carbon emissions can be reduced. It also provides Optima and its customers with a clear evaluation of carbon emissions associated with these business practices and aligns with Optima's ambition for achieving carbon neutrality.

Total carbon emissions in tonnes of carbon dioxide equivalents (tCO_2e) for the two scenarios are 23.4 and 10.0 (Figure 1).

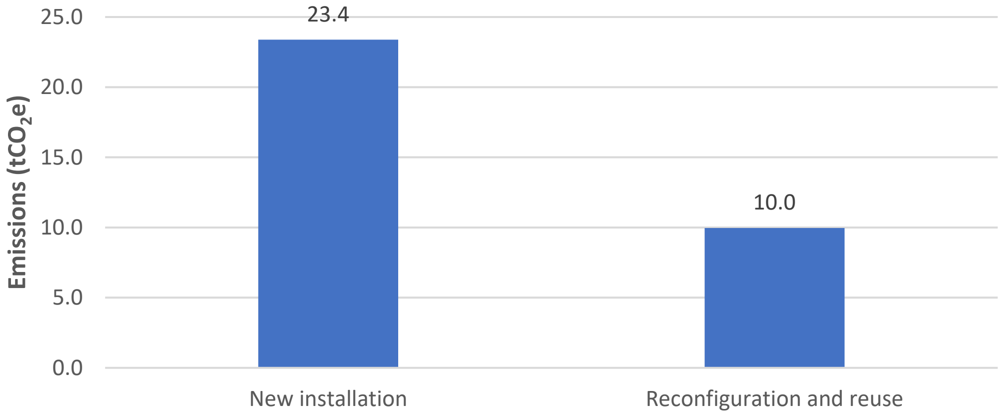

Figure 1: Greenhouse gas emissions from two scenarios.

By reconfiguring and reusing most of the products in this case, approximately 57.4% of GHG emissions were saved (13.4 tCO_2e), in comparison with the installation of the same, totally new products.

This emission saving figure is equivalent to one of the following:

i) Emissions from driving 48,817 miles using an average diesel car,
ii) Emissions from burning approximately 4.7 tonnes of charcoal,
iii) Emissions from consuming 5,247 litres of diesel,
iv) Sequestration from 222 tree seedlings grown for 10 years.

Introduction

Tunley Engineering conducted this assessment using the standard protocols stated above and data provided by Optima for their business activities for the two scenarios:

i) Installation of new products,
ii) The reconfiguration and reuse of 60% of the products and purchase of some new in a mixed design (Revolution 100 partitioning walls and Double-/Single- Glazed Edge Symmetry doors).

For each scenario, where appropriate the assessment provides detailed quantification of GHG emissions due to:

i) Embodied carbon emissions from material usage for partitioning walls and doors, including packaging materials where relevant,
ii) Emissions from transportation of the products,
iii) Emissions from assembly/dismantling/reinstallation of the new/reused products, including disposing of packaging material.

The products considered for this assessment are:

i) Revolution 100 Double Glazed Partition
ii) Double-/Single- Glazed Edge Symmetry Doors
iii) Ironmongery products are assumed to weigh 1.5 kg/set and have the emission factor of 4.4 $kgCO_2e/kg$ for alloy steel.

Information on embodied carbon emissions and emissions from assembling processes were taken from EPD documents. In this assessments, Tunley Engineering assume that:

i) Emissions from assembling and dismantling the products are identical,
ii) As 40% of materials in Scenario 1 were not reusable and thus recycled, the emissions from this were factored in when quantifying the embodied carbon emissions of materials for Scenario 2.
iii) Emissions from dismantling the products to reuse individual components (A5) were assumed negligible.
iv) Transportation distance for a journey was assumed as 50 km, by average HGVs at 50% loading.

Appreciating the importance of determining major contributors to the emissions, Tunley Engineering provides detailed analysis and discussion on different components in each scenario; this will support Optima's customers with their decision-making processes to reduce their carbon emissions. Where information and data were limited, we made reasonable assumptions based on our expertise and external sources of data. This report is completed to internationally recognised standards mentioned previously.

Emission data

Table 1: Emission data for two scenarios.

	New installation (kgCO_2e)			Reconfiguring and Reusing (kgCO_2e)		
Item	**Embodied carbon emissions**	**Transport**	**Assembly**	**Embodied carbon emissions**	**Transport**	**Reconfiguration and reinstallation**
Life cycle modules	**A1-A3**	**A4**	**A5**	**A1-A3**	**A4**	**A5**
Revolution 100 Double Glazed Partition	2,610	39.5	20.4	1,059	16	40.7
Revolution 100 Single Glazed Partition	10,856	215.0	110.8	4,422	86	221.7
Single Glazed Edge Symmetry Door	5,464	66.4	1.1	2,210	27	2.1
Double Glazed Edge Symmetry Door	3,954	43.3	0.7	1,598	17	1.2
New Ironmongery products	-	-	-	256.2	1.4	-
DDA manifesting	-	-	-	2.8	0.02	-
Total for subcategories	22,884	364	133	9,548	147	266
Total (tCO_2e)	**23.4**			**10.0**		
Carbon savings (tCO_2e)	0			13.4		
Percentage of carbon savings	0%			57.4%		

Table 1 shows emission data for the two scenarios. For the first scenario in which new, same products are implemented, carbon emissions are 23.4 tCO_2e; embodied carbon emissions of the products contribute 98% to the total carbon emissions (Figure 2).

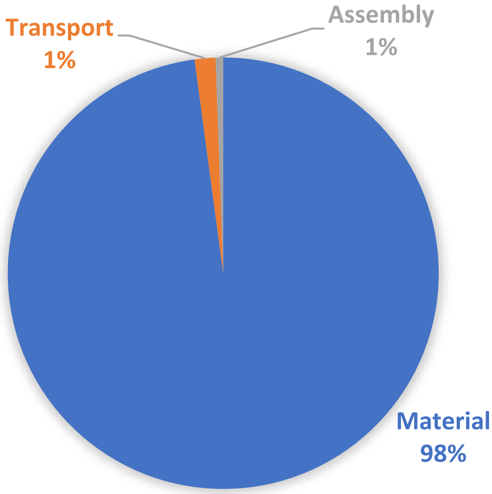

Figure 2: Percentage contributions of emission sources for Scenario 1.

For the second scenario, carbon emissions from material usage (40% new materials) and handling processes for reused materials account for approximately 95.9% (Figure 3). A significant carbon saving of 13.4 tCO_2e was achieved, this is equivalent to 57.4% reduction in the emissions from the new installation of the same products.

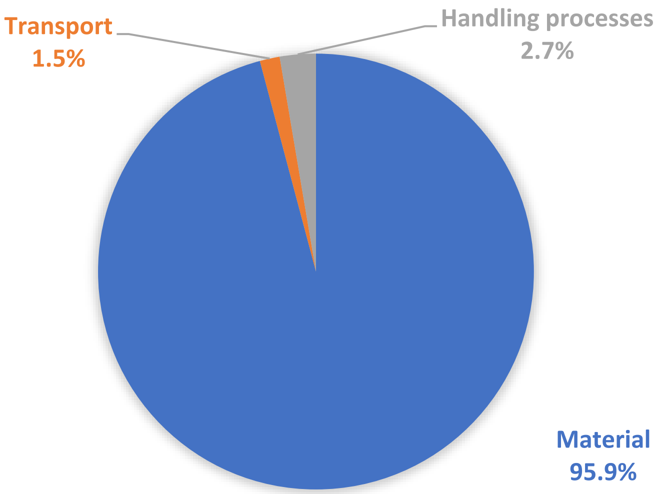

Figure 3: Percentage contributions of emission sources for Scenario 2.

Conclusion

Total GHG emissions for two scenarios (new installation of products and dismantling/reconfiguring/reusing the products) are 23.4 and 10.0 tCO_2e, respectively. The carbon footprint quantification presented in this report was conducted using data provided to Tunley Engineering by Optima.

Tunley Engineering has provided Optima with detailed analysis and discussion of the emission data. By reconfiguring and reusing their products, Optima's customers saved 57.4% of carbon emissions in this analysis.

Tunley Engineering's Report Emission Statement

Tunley Engineering's GHG emissions from completing this assessment were 0.01 $kgCO_2e$.

Approval

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B	Updated the analysis	LH	07th Jun. 2023	TB	7th June 2023
C					
D					
E					
F					

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