

Life Cycle Assessment of Cibes C1 Pure Lift by CIBES

Title: Life Cycle Assessment of Cibes C1 Pure Lift by CIBES

Date: 11/09/2025

Ordered by: CIBES lifts group AB

Report number: 1851

Name and location of database: SimaPro@192.168.15.21\Default\
MiljogiraffUpdate102\1851 LCA och EPD Cibes C1

LCA practitioner: Emilia Ingemarsdotter, Marcus Bernhard, Sofia Lindroth, Miljögiraff AB

Copyright © 2025 Miljögiraff AB All rights reserved

Miljögiraff

Table of Contents

1	Introduction	7
1.1	Reading Guide	7
1.2	General Description of the Product and its Context	7
1.3	The Sustainability Challenge.....	8
2	Life Cycle Assessment (LCA)	10
2.1	LCA Methodology Background	10
2.2	Environmental Product Declaration (EPD)	11
2.2.1	General Program Instructions (GPI)	12
2.2.2	Product Category Rules (PCR)	12
2.3	Standards and Frameworks.....	13
2.4	LCA Software	13
3	Goal and Scope	14
3.1	The goal of the Study.....	14
3.1.1	Product description and Functional unit.....	14
3.2	Scope of the Study.....	14
3.2.1	System Boundary.....	14
3.2.2	Cut-off Criteria.....	16
3.2.3	Allocation Procedure	17
3.2.4	Method of Life Cycle Impact Assessment (LCIA)	17
3.2.5	Data quality requirements (DQR).....	19
3.2.6	Type of critical review, if any.....	20
4	Life Cycle Inventory (LCI)	20
4.1	Product Specification.....	20
4.2	Product content declaration	22
4.3	Assumptions	22
4.4	Input data references.....	24
4.5	Raw material (A1).....	25
4.5.1	Supplier raw material extraction and production	25
4.5.2	Components provided by Plieno Fortas JSC.....	33
4.5.3	Components provided by EVI Industries Stockholm AB.....	35
4.5.4	Components provided by Profilplåt i Järbo AB	36
4.5.5	Components provided by CIBES Poland	37
4.5.6	Components provided by Erdoğanlar Alüminyum A.S.	38
4.5.7	Modelling of laminated MDF from Direktlaminat AB	42
4.6	Transport of raw materials (A2)	42
	Manufacturing (A3).....	43
4.6.1	Energy.....	43
4.6.2	Direct emissions	44
4.6.3	Consumables	44
4.6.4	Packaging.....	44
4.6.5	Internal transports.....	45
4.6.6	Production waste.....	46
4.7	Transport of finished goods (A4).....	47
4.8	Installation (A5)	47

4.9	Usage and maintenance (B1-B7)	48
4.10	End-of-Life (C1-C4) + potential benefits and loads from material recycling or energy recovery (D module)	48
5	Result of Life cycle impact assessment (LCIA)	52
5.1	Environmental Footprint Midpoint	54
5.2	Environmental Footprint Endpoint	57
5.3	Climate impact (GWP-GHG)	59
5.4	Use of resources and energy CED 1.12.....	67
5.5	Waste production and output flows	69
6	Interpretation	71
6.1	Key aspects of results	71
6.2	Sensitivity analysis.....	73
6.3	Data quality assessment.....	74
6.3.1	Validation of data and share specific data A1-A3 GWP-GHG.....	74
6.3.2	DQA of data contributing to at least 80% of absolute impact	75
6.4	Limitations.....	76
7	Conclusions and recommendations.....	77
7.1	Summary of the results	77
7.2	Recommendation on how to mitigate the hot spots	77
7.3	How to communicate the results.....	77
7.4	How to reduce uncertainties.....	77
8	Bibliography.....	78
9	Appendix list.....	80
Appendix 1	Basics of Life Cycle Assessment.....	81
A.	Goal and scope definition	81
i.	System boundary.....	81
ii.	Cut-off.....	83
iii.	Allocation.....	83
iv.	Data requirements (DQR).....	83
B.	Inventory analysis (LCI).....	84
C.	Impact assessment (LCIA).....	84
i.	Classification and characterisation.....	84
ii.	Weighting	85
D.	Interpretation.....	85
i.	Evaluation of the results.....	85
Appendix 2	Environmental footprint 3.1.....	86
Appendix 3	IPCC 2021.....	88
Appendix 4	Cumulative Energy Demand, CED.....	89
Appendix 5	SimaPro model	90
Appendix 6	Report of energy efficiency measurement.....	91
Appendix 7	DQA of individual datasets	97
Appendix 8	Guarantees of Origin and other certificates.....	100
Appendix 9	End-of-life modelling based on PCR 2019:14	103
Appendix 10	D module modelling based on PCR 2019:14	107

Ordered by: CIBES Lift

Cibes is a brand owned by Cibes Lift Group AB, Europe's leading manufacturer of space-saving, modular lifts known for its Swedish quality and design. The products are customized for both public and private markets. Sales, installation, and service are provided through the company's global network of subsidiaries and partners. Cibes, with its head office in Gävle, Sweden, has more than 1000 employees, a partner network in more than 70 countries and subsidiaries in about 20 countries.

Issued by: Miljögiraff AB

Miljögiraff is an environmental consultant specialising in product Life Cycle Assessment and Life Cycle Design. We believe that combining analysis and creativity is necessary to meet today's challenges. Therefore, we provide Life Cycle Assessment to evaluate environmental aspects and design methods to develop sustainable solutions.

We create measurability in environmental work based on a life cycle perspective on ecological aspects. The LCA methodology establishes the basis for modelling complex systems of aspects with a credible assessment of potential environmental effects.

Miljögiraff is part of a global network of experts in sustainability metrics piloted by PRé Sustainability.

Abbreviations and Expressions

Clarification of expressions and abbreviations used in the report

CO₂ eq – Carbon dioxide equivalents

EPD – Environmental Product Declaration

GWP – Global Warming Potential

ISO – International Organization for Standardisation

IPCC – Intergovernmental Panel on Climate Change

LCA – Life Cycle Assessment

LCI – Life Cycle Inventory Analysis

LCIA – Life Cycle Impact Assessment

PCR - Product Category Rules

RER – The European region

RoW – Rest of the world

GLO – Global

APOS – Allocation at the point of substitution (system model in ecoinvent)

Cut-off in ecoinvent – Allocation cut off by classification (system model in ecoinvent)

Cut-off in general – Environmental impact that contributes insignificantly to the overall results.

Environmental aspect - An activity that might contribute to an environmental effect, for example, “electricity usage”.

Environmental effect - An outcome that might influence the environment negatively (Environmental impact), for example, “Acidification”, “Eutrophication”, or “Climate change”.

Environmental impact - The damage to a safeguarding object (i.e., human health, ecosystems, health, and natural resources).

Life Cycle Inventory (LCI) data – Inventory of input and output flows for a product system

Abstract

This report presents the results for the environmental impacts calculated for the C1 lift produced by Cibes Lift Group AB. The assessment is carried out according to a life cycle perspective using the ISO 14040 standard and in conformance with EN 15804:2012+A2:2019/AC:2021 (CEN, 2021), PCR 2019:14 version 2.0 (EPD International, 2025b), c-PCR 2020:008 Lifts (Elevators) v. 2020-10-30 (EPD International, 2020) and JRC characterization factors (EF3.1). This LCA report is third-party reviewed and will be used to create an Environmental Product Declaration (EPD) that can be used for external communication.

The function of the C1 lift is to transport load between the floors of a building. The lift is sold in different configurations, varying in travel height, number of stops, cabin dimensions, and shaft design. For this LCA, the selected configuration is a 2-stop C1 lift with a travel height of 3.5 meters and a total height of 6.1 meters. The lift is equipped with a cabin with 1400 x 1100 mm floor size and a custom ready-made shaft with steel panels. This is one of the most common models Cibes deliver to their customers.

In accordance with the PCR (EPD International, 2020), the functional unit was defined to be the transportation of a load over a distance, expressed as one tonne transported vertically over one kilometre, (i.e. 1 tonne*kilometre or tkm). The reference service lifetime (RSL) is set to 25 years, in alignment with the PCR. The so-called transportation performance, i.e. the number of tkm travelled during the RSL is calculated to 53.7 tkm.

The results are presented both per unit (1p) of C1 lift, and per functional unit (1 tkm). The A1-C4 GWP-GHG impact is calculated as 10300 kgCO₂eq./lift or 192 kgCO₂eq./tkm.

A1 dominates the impact on both EF3.1 single score (~71%) and GWP-GHG (68%). The electricity consumption during the use phase (B6) contributes approximately 23% to single score and GWP-GHG results alike. The activities at CIBES Gävle (A3) contribute approximately 1% to single score results, and approximately 2% to GWP-GHG results. Downstream transportation contributes approximately 3% to single score results and 5% to GWP-GHG results.

The use-phase electricity is modelled based on an average European electricity mix. When communicating the results, it is important to note the sensitivity of the results to the use phase electricity mix.

It is recommended that Cibes works on reducing the energy consumption of the lift. In addition, it would be beneficial to work with suppliers to improve the environmental performance of components in the lift, especially the guide profile, the floor, and electronic components such as PCB and motors.

Tier 1 supplier data has been collected for a large part of the lift mass (>70%). However, since A1 impact is mainly driven by raw material production, it would be beneficial to have more information about the raw material itself. For example, it might be possible to find EPDs for the raw material that the Tier 1 suppliers purchase. This would increase the data quality of the study. Moreover, since electronic components have a large impact on single score impacts, it is recommended to improve the data quality for these components. Again, EPD results from suppliers would be beneficial.

1 Introduction

Life cycle assessment (LCA) is a standardised method to quantify the potential environmental impact of a product or service from a holistic perspective. With its holistic perspective, LCA avoids the so-called burden-shifting from one part of the lifecycle to another or across impact categories. LCA results provide an understanding of a product's life cycle burdens and hotspots and allow for identifying opportunities to mitigate adverse effects.

This report presents the results for the environmental impacts calculated for the C1 lift produced by Cibes Lift Group AB. The assessment is carried out according to a life cycle perspective using the ISO 14040 standard.

1.1 Reading Guide

The purpose of the report is to provide valuable insight to decision making and detailed information about how the study was made and the results. Readers can select sections of the report depending on their role and usage of it.

- 5 minutes – strategic planning
 - The summary explain in short the purpose and the conclusions.
- 20 minutes – product development
 - Section 7 and section 6 give the reader some more nuance and depth as it includes interpretation and sensitivity analysis that underpins the conclusions.
- >20 minutes - Understanding
 - Section 7, section 6 and section 5 present detailed results through flowcharts or diagrams for the different impact categories that support the conclusion and recommendations.
- >60 minutes – Review and reproducibility
 - For in-depth detail and transparent documentation on the modelling of each part of the life cycle, see section 4 (“Life Cycle Inventory”)
 - For information about methodology, scope and functional unit, see sections 2 (“Life Cycle Assessment”) and section 2.3 (“Goal and Scope”)

1.2 General Description of the Product and its Context

The product under study is the C1 Lift, designed to transport passengers and goods between the floors of a building. The lift is available in several configurations, varying in travel height, number of stops, cabin dimensions, and shaft design. For this LCA, the selected configuration is a 2-stop C1 lift with a travel height of 3.5 meters and a total height of 6.1 meters. The lift is equipped with a cabin with 1400 x 1100 mm floor size and a custom ready-made shaft with steel panels. This configuration is representative for Environmental Product Declaration (EPD) purposes as it is one of the most common models Cibes deliver to their customers.

1.3 The Sustainability Challenge

Sustainability comprises meeting our own needs without compromising the ability of future generations to meet their own needs. Industrial and natural systems depend on a stable Earth system to function. A quantitative planetary boundary within which humanity can continue to develop and thrive for generations to come has been proposed (Richardson et al., 2023) . These researchers describe nine processes that determine the resilience and stability of the Earth system, such as climate change, water use, and land use. Crossing these boundaries increases the risk of abrupt and irreversible environmental change, while staying within the boundaries represents a safe operating space for a sustainable society, see figure below.

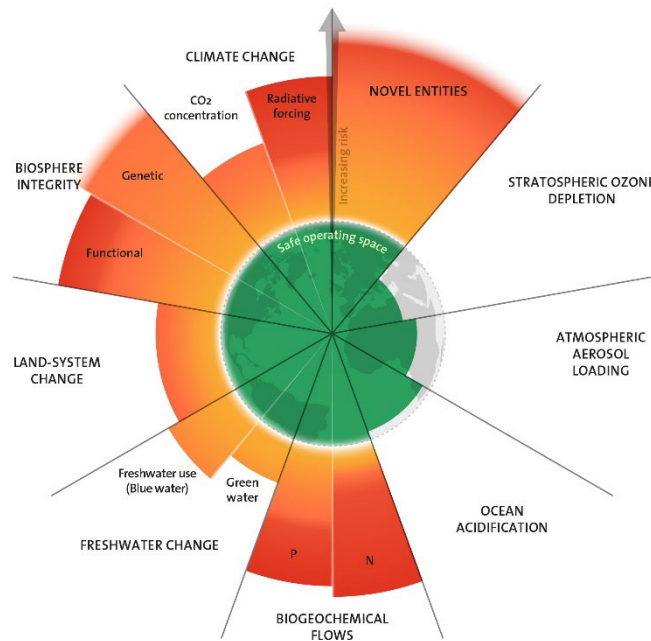
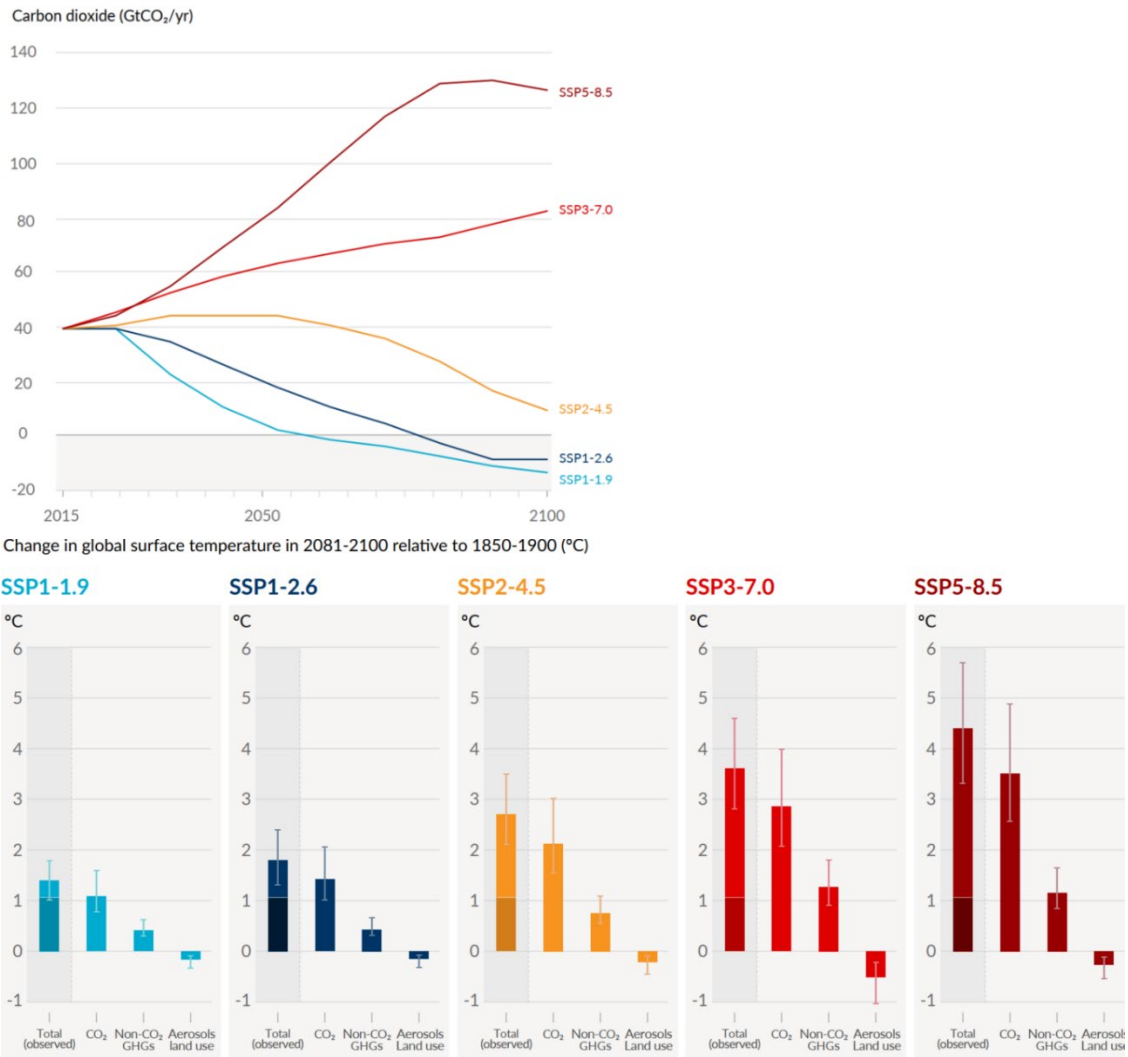


Figure 1:Depiction of the planetary boundaries, from (Richardson et al., 2023).

One critical environmental problem we face today is climate change. The report from the Intergovernmental Panel on Climate Change (IPCC), shows that only the most ambitious of five scenarios for greenhouse gas emissions would result in a temperature increase within 2°C (IPCC, 2021a), see Figure 2. Considering that limiting temperature rise below 1.5°C is the ambition of the Paris Agreement 2016, it is evident that the available space for mitigating radical climate change is ever-shrinking, necessitating decisive action in all parts of society. This is also evident in the latest report from IPCC (IPCC, 2022).



Total warming (observed warming to date in darker shade), warming from CO₂, warming from non-CO₂ GHGs and cooling from changes in aerosols and land use

Figure 2: Future annual emissions of CO₂ (top) and contribution to global surface temperature increase from different emissions, with a dominant role of CO₂ emissions (bottom) across five illustrative scenarios. Image from IPCC (2021b).

2 Life Cycle Assessment (LCA)

2.1 LCA Methodology Background

Understanding the potential environmental impact in connection with the manufacture and use of products is increasingly important. LCA is an accepted standardised method that is applied to create this understanding. Being a quantitative tool, LCA can contribute to more sustainable development by identification of hotspots and by guiding actionable measures to reduce environmental impacts. A business can use the results of an LCA to develop strategy, management and communication of environmental issues related to products. By including environmentally relevant input and output flows through a product's entire supply chain, from raw material extraction to final disposal, LCA provides a comprehensive basis for the environmental impact of a product's supply chain (see Figure 3).

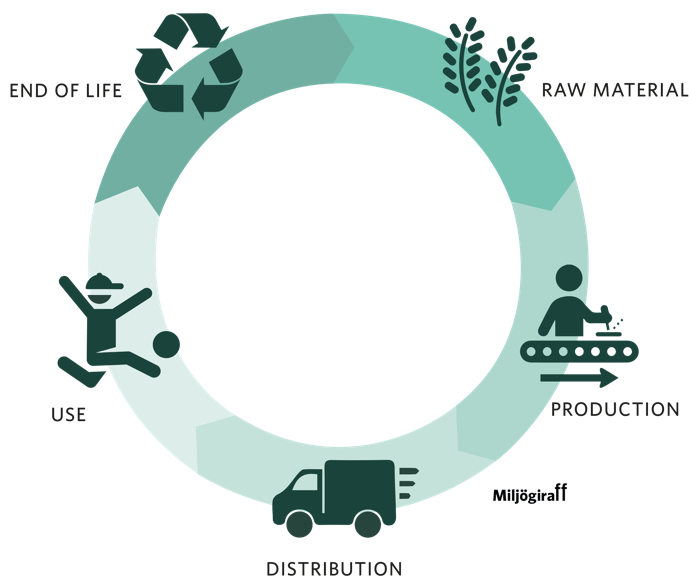


Figure 3: The Life Cycle concept, starting from raw material extraction, production, and distribution, followed by use and end-of-life.

Products' supply chains are complex and involve numerous connections. Therefore, in order to analyse a product's entire life cycle, LCA practitioners must simplify it into a model which involves limitations, as those as summarised by Guinée et al. (2002):

- Localised aspects are typically not addressed, and LCA is not a local risk assessment tool
- LCA is typically a steady-state approach rather than a dynamic approach
- LCA does not include market mechanisms or secondary effects on technological development
- Processes are considered linear, both in the economy and the environment, meaning that impact increases linearly with increased production.
- LCA involves several technical assumptions and value choices that are not purely science-based
- LCA focuses on environmental aspects and excludes social, economic, and other characteristics

The study presented in this report is a result of Miljögiraff's work which combines the confidence and objectiveness of the strong and accepted ISO standard with the scientific and reliable LCI data from ecoinvent and with the world-leading LCA software SimaPro for calculation and modelling (see Figure 4.)



Figure 4: ISO standard combined with reliable data from ecoinvent and the LCA software SimaPro.

Already in 1997, the European Committee for Standardisation published their first set of international guidelines for the performance of LCA. This ISO 14040 standard series has become widely accepted amongst the practitioners of LCA and is developing along with progressions within the field of LCA (Rebitzer et al., 2004). The guidelines for LCA are in two documents: ISO 14040, which contains the main principles and structure for performing an LCA, and ISO 14044, which includes detailed requirements and recommendations. Furthermore, a document containing the format for data documentation (ISO/TS 14048) and technical reports with guidelines for the different stages of an LCA are available in ISO/TR 14047 and ISO/TR 14049 (ISO, 2012b, 2012a).

The method used in the study is Life Cycle Assessment (LCA) as described in:

- ISO 14040: 2006 – Principles and framework (ISO, 2006b)
- ISO 14044: 2006 – Requirements and guidelines (ISO, 2006c)

2.2 Environmental Product Declaration (EPD)

The International Organization for Standardization defines an Environmental Product Declaration (EPD), ISO standard 14025 (ISO, 2006a), as a Type III declaration that "quantifies environmental information on the life cycle of a product to enable comparisons between products fulfilling the same function."

The purpose of EPDs is to facilitate business-to-business communication, although they may also benefit consumers concerned with avoiding environmental impact when choosing goods or services. See Figure 5.

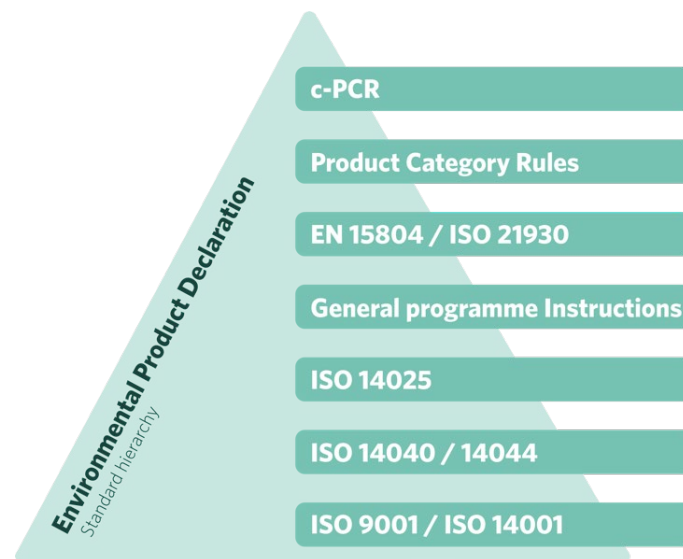


Figure 5: The hierarchy of standards used to create an EPD according to the International EPD system.

2.2.1 General Program Instructions (GPI)

General Programme Instructions (GPI) of the International EPD® System form the basis of the overall administration and operation of a programme for Type III environmental declarations according to ISO 14025.

2.2.2 Product Category Rules (PCR)

Product Category Rules (PCRs) provide guidance that enables fair comparison among products of the same category. PCRs include the description of the product category, the goal of the LCA, functional units, system boundaries, cut-off criteria, allocation rules, impact categories, information on the use phase, units, calculation procedures, requirements for data quality, and other information. PCRs aim to help develop EPDs for products comparable to others within a product category. ISO 14025 establishes the procedure for creating PCRs and the required content of a PCR, as well as requirements for comparability.

2.3 Standards and Frameworks

The ISO 14040 and 14044 standards (ISO, 2006b, 2006c) guide this LCA. This study follows an attributional LCA approach (accounting) defined in the ISO 14040 standard.

This Life Cycle Assessment study has been performed in accordance with the requirements of EN 15804:2012+A2:2019/AC:2021 (CEN, 2021), PCR 2019:14 version 2.0 (EPD International, 2025b), c-PCR 2020:008 Lifts (Elevators) v. 2020-10-30 (EPD International, 2020) and JRC characterization factors (EF3.1).

The standards and frameworks guiding this LCA are in Table 1.

Table 1: Standards and framework conformance.

Standards conformance

EN 15804:2012+A2:2019/AC:2021, Sustainability of construction works - Environmental product declarations - Core rules for the product category of construction products (CEN, 2021)

ISO 14040 and 14044 (ISO, 2006b, 2006c)

ISO 14025 (ISO, 2006a)

General Programme Instructions for the International EPD® System. Version 5.0.1 General Programme Instructions for the International EPD® System. Version 5.0.1 (EPD International, 2025a)

PCR 2019:14 version 2.0 (EPD International, 2025b)

Energy performance of lifts, escalators and moving walks — Part 2: Energy calculation and classification for lifts (elevators) (ISO, 2014)

c-PCR 2020:008 Lifts (Elevators) v. 2020-10-30 (EPD International, 2020)

2.4 LCA Software

The life cycle impact assessment (LCIA) was calculated using the LCA software SimaPro (PRé Sustainability, 2024) which includes regularly updated databases with libraries of LCI data (e.g. ecoinvent) and all relevant LCIA methods.

3 Goal and Scope

3.1 The goal of the Study

The reasons for carrying out the study is to have a solid analysis of the environmental impact of CIBES' C1 lift, which can be used as basis for product development, communication, and continuous strategic work within sustainability. The study's method and documentation follow the ISO 14040-44 standard (ISO 14044).

The intended applications of the LCA results are:

- Internal communication and business and product development for reduced environmental impact.
- External communication: to produce an Environmental product declaration (EPD) for B2B communication.
- External communication: to produce an LCA report that fulfils the requirements for a third-party report (ISO 14044) intended to be used in external communication.

3.1.1 Product description and Functional unit

The product under study is the C1 Lift (Figure 7) and its function is to transport load between the floors of a building. The lift is sold in different configurations, varying in travel height, number of stops, cabin dimensions, and shaft design. The following approach was used to define a representative product: For this LCA, the selected configuration is a 2-stop C1 lift with a travel height of 3.5 meters and a total height of 6.1 meters. The lift is equipped with a cabin with 1400 x 1100 mm floor size and a custom ready-made shaft with steel panels. This configuration is representative for Environmental Product Declaration (EPD) purposes as it is one of the most common models Cibes deliver to their customers.

The functional unit is the basis that enables alternative goods, or services, to be compared and analysed. The primary purpose of a functional unit is to provide a reference to which the result and the input and output data are normalised and can therefore be compared. The function of a lift is the transportation of persons and/or freight. For this study, in accordance with the PCR (EPD International, 2020), the functional unit was thus defined to be the transportation of a load over a distance, expressed as one tonne transported vertically over one kilometre, (i.e. 1 tonne*kilometre or tkm). The reference service lifetime (RSL) is set to 25 years, in alignment with the PCR The so-called transportation performance, i.e. the number of tkm travelled during the RSL is calculated to 53.7 tkm, see section 4.1 for details.

3.2 Scope of the Study

This section specifies the scope of an LCA, including a description of the system's functions (performance characteristics).

3.2.1 System Boundary

The system boundary for the study is defined as cradle-to-grave. The following type of EPD is developed based on this LCA report:

c) Cradle-to-grave with modules (A + B + C + D)

The modules are defined according to the Construction PCR, chapter 2.2.2 (EPD International, 2025b)

All processes needed for raw material extraction, manufacturing, transport, usage, and end-of-life are included in the study. A simplified schematic representation of a cradle-to-grave system under study is presented in Figure 6, where the dotted lines indicate aspects that have been included in this study. A more detailed presentation of the system's boundaries is in Figure 8.

The method chosen for separating consecutive life cycles is the cut-off method which means for recycled material used as inputs to the product system the recycling process and transport from recycler to production is included in the system boundary. For materials that are sent to recycling, only the transport to the recycler is included. This approach to end-of-life allocation is described in ISO 14044 section 4.3.4.3.3 (ISO, 2006c). More details are given in section 3.2.4.

However, avoided materials from recycling are in this report presented as separate environmental impacts and benefits, represented by the D-module, as recommended by EN15804.

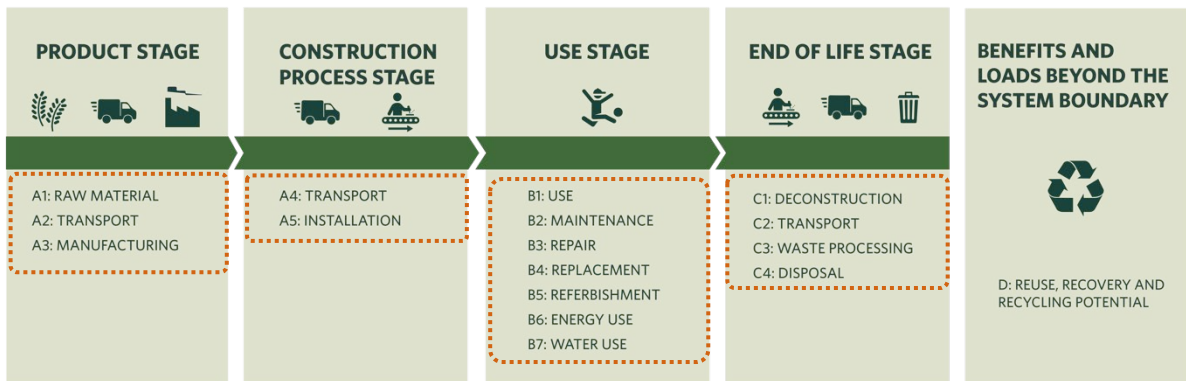


Figure 6: System boundaries for the model of the product system. The red dotted line marks the included modules.



Figure 7: The C1 lift

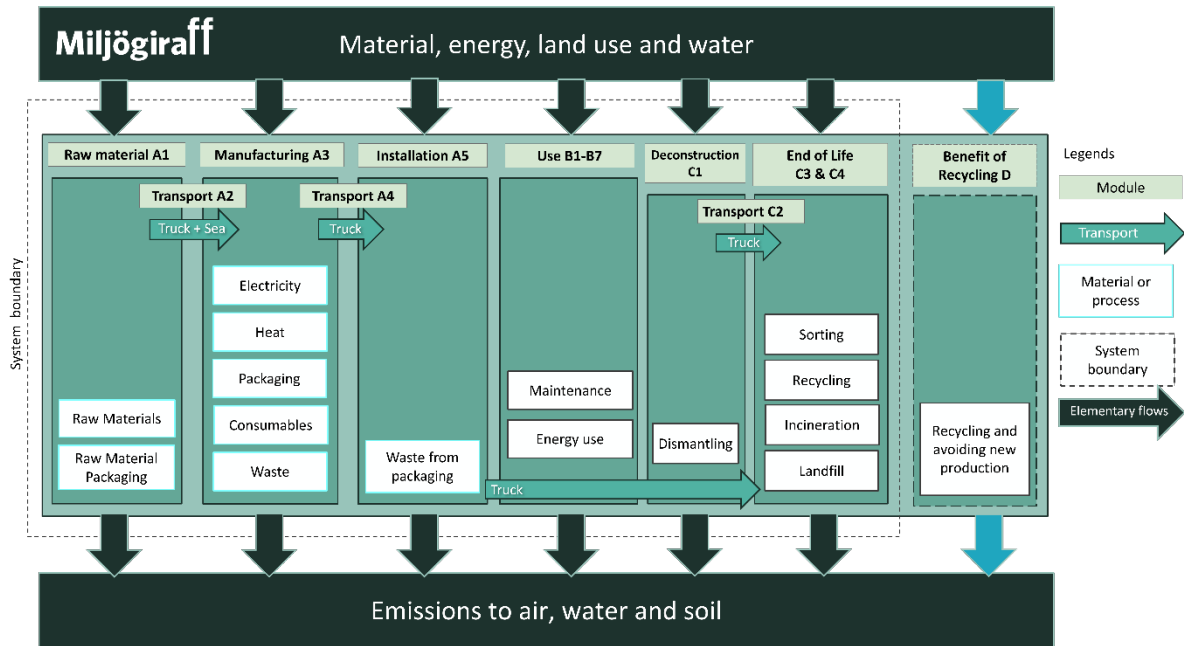


Figure 8: A more detailed representation of the system boundaries of the product system.

3.2.2 Cut-off Criteria

Life cycle assessment aims to include all relevant environmental flows related to a product’s entire supply chain. Quantifying these impacts is done through a simplified model, as it is too time-consuming to obtain data and model every flow in practice. Specific cut-off criteria facilitate the comparison of LCA for different products. To ensure that all relevant environmental impacts were represented in the study, the following cut-off criteria were used, following the EN 15804+A2 standard:

Mass relevance

Mass relevance should be applied if the mass flow of a unit process is less than 1% of the cumulative mass of all the inputs and outputs of the LCI model.

Energy relevance

Energy relevance should be applied if the energy flow of a unit process is less than 1% of the cumulative energy of all the inputs and outputs of the LCI model.

Environmental relevance

Environmental relevance should be applied if the flow of a unit process meets the above exclusion criteria but has a potentially significant environmental impact. The environmental relevance was evaluated with experience and relevant external research on similar products. If an excluded material significantly contributed to the overall LCIA, more information was collected and assessed in the system.

The sum of the neglected material flows should not exceed 5% of mass and energy per module.

There can be other reasons to exclude activities or aspects of the life cycle. An overview of excluded activities is in Table 2.

Table 2: Overview of excluded activities and aspects.

Excluded processes	Reason
Installation, energy use	Below cut-off, energy relevance
Installation, personnel transport	Below cut-off, environmental relevance
Installation, materials needed	Below cut-off, mass relevance

3.2.3 Allocation Procedure

When dealing with a multi-output process, in other words, if a process creates several products or one product along with by-products, this is referred to in LCA as an allocation problem. This is the case for materials like wool, for which production processes produce both meat and wool. The allocation of environmental burden to products and scrap materials are made on basis of physical properties or economical value.

In this study, allocation in specific data was done for the A3 module, where overall energy use was allocated equally to each product manufactured by CIBES Gävle. Moreover, data from the supplier CIBES Poland was allocated to different components based on economic allocation, considering the product’s share of the factory’s total sales value.

With regard to allocation of waste, this study follows the polluter pays principle as described in EN15804 (CEN, 2021). This means that the generator of the waste carries the full environmental impact of waste processing, transport and treatment until the waste fulfils the end-of-waste criteria. In summary the end-of-waste criteria are reached when a waste has been recovered to a material that has an economic value and that can be used as an input to another product life cycle. This implies also that potential benefits of recycling are only accounted for in the life cycle of products that use recycled material as an input, not in the life cycle of products that generate material for recycling. In this LCA, material for recycling leaves the product system from the manufacturing process and at the product end-of-life. For these flows, only the transports to recyclers have been included in the LCA (no burdens nor benefits of recycling). The same procedure applies to the product packaging materials sent to recycling. The full burdens of waste sent to incineration with energy recovery and to landfill have been included in the LCA.

3.2.4 Method of Life Cycle Impact Assessment (LCIA)

The methods used to calculate the relevant environmental effect categories in this study are summarised in Table 3 and Table 4. For further details on the LCIA method, see Appendix 2-Appendix 4. Long term emissions (>100 years) have been excluded from the calculations, according to the PCR.

Table 3: Impact categories, indicators and methods used in the study. The chosen indicators follow the standard for Construction products EN 15804:2012+A2:2019 (CEN, 2024).

Impact category	Abbreviation	Category indicator	Method
Climate Change-total	GWP total	kg CO ₂ equivalents	The baseline model of 100 years of the IPCC based on IPCC 2021
Climate Change-fossil	GWP fossil	kg CO ₂ equivalents	The baseline model of 100 years of the IPCC based on IPCC 2021
Climate Change-biogenic	GWP biogenic	kg CO ₂ equivalents	The baseline model of 100 years of the IPCC based on IPCC 2021
Climate Change-land use and land use change	GWP luluc	kg CO ₂ equivalents	The baseline model of 100 years of the IPCC based on IPCC 2021

Indicator for climate impact GWP-GHG	GWP-GHG	kg CO ₂ equivalents	GWP total, excluding biogenic carbon dioxide emissions and uptakes, and biogenic carbon stored in the product
Ozone-depleting gases	ODP20	CFC 11-equivalents	Steady-state ODPs, WMO 2014
Acidification potential (fate not included)	AP	mol H ⁺ eq	Accumulated Exceedance, Seppälä et al. 2006, Posch et al., 2008
Eutrophication aquatic freshwater	EP-freshwater	kg P equivalents	EUTREND model, Struijs et al., 2009b, as implemented in ReCiPe
Eutrophication aquatic marine	EP-marine	kg N equivalents	EUTREND model, Struijs et al., 2009b, as implemented in ReCiPe
Eutrophication aquatic terrestrial	EP-terrestrial	mol N equivalents	Accumulated Exceedance, Seppälä et al. 2006, Posch et al.
Photochemical ozone creation potential	POCP	kg NMVOC eq.	LOTOS-EUROS, Van Zelm et al., 2008, as applied in ReCiPe
Abiotic resource depletion, mineral and metals,	ADPe	kg Sb eq	CML 2002, Guinée et al., 2002, and van Oers et al. 2002.
Abiotic resource depletion, fossil fuels	ADPf	MJ	CML 2002, Guinée et al., 2002, and van Oers et al. 2002.
Water Deprivation Potential	WDP	m ³ world eq. deprived	Available Water REmaining (AWARE) Boulay et al., 2018

Note that for Climate Change Biogenic, removals of biogenic CO₂ into biomass (with the exclusion of biomass of native forests) and transfers from previous product systems shall be characterised in the LCIA as -1 kg CO₂ eq./kg CO₂ when entering the product system. Emissions of biogenic CO₂ from biomass and transfers of biomass into subsequent product systems (with the exclusion of biomass of native forests) shall be characterised as +1 kg CO₂ eq./kg CO₂ of biogenic carbon, see EN ISO 14067:2018, 6.5.2 (CEN, 2020).

Table 4: Additional environmental impact indicators and methods used in the study as described in EN 15804:2012+A2:2019 (CEN, 2024) and the PCR.

Impact category	Indicator	Unit	Method
Climate change - total	GWP-GHG	kg CO ₂ -eq.	Baseline model of 100 years of the IPCC based on IPCC 2021
Particulate Matter emissions	Potential incidence of disease due to PM emissions (PM)	Disease incidence	SETAC-UNEP, Fantke et al. 2016
Ionising radiation, human health	Potential Human exposure efficiency relative to U235 (IRP)	kBq U235 eq.	Human health effect model as developed by Dreicer et al. 1995 and updated by Frischknecht et al., 2000
Eco-toxicity (freshwater)	Potential Comparative Toxic Unit for ecosystems (ETP-fw)	CTUe	USEtox 2.1. model (Rosenbaum et al, 2008)

Human toxicity, cancer effects	Potential Comparative Toxic Unit for humans (HTP-c)	CTUh	USEtox 2.1. model (Rosenbaum et al, 2008)
Human toxicity, noncancer effects	Potential Comparative Toxic Unit for humans (HTP-nc)	CTUh	USEtox 2.1. model (Rosenbaum et al, 2008)
Land-use-related impacts/Soil quality	Potential soil quality index (SQP)	dimensionless	Soil quality index based on LANCA (Beck et al. 2010 and Bos et al. 2016)

Table 5: Resource use to be declared in the study. The use of primary energy resources is calculated according to option B in Annex 3 in PCR Construction Products v.2.0.

Resource	Unit
Use of renewable primary energy excluding primary energy resources used as raw material (PERE)	MJ
Use of renewable primary energy resources used as raw material (PERM)	MJ
Total Use of renewable primary energy (PERT)	MJ
Use of non-renewable primary energy excluding primary energy resources used as raw material (PENRE)	MJ
Use of non-renewable primary energy resources used as raw material (PENRM)	MJ
Total Use of non-renewable primary energy (PENRT)	MJ
Use of recycled or recycled materials (secondary materials)	Kg
Use of renewable secondary fuels	MJ
Use of non-renewable secondary fuels	MJ
Net use of freshwater	m ³

Table 6: Waste materials to be declared in the study.

Rest materials	Unit
Hazardous waste	Kg
Non-hazardous waste	Kg
Radioactive waste, disposed/stored	Kg
Outputs, secondary materials and exported energy	
Material for reuse	Kg
Recycling material	Kg
Material for energy recovery	Kg
Exported energy	MJ

3.2.5 Data quality requirements (DQR)

The data quality and representativeness is assessed in section 6.3 based on the guidelines established in the EN 15804:A2 standard (CEN, 2021) and PCR 2019:14 version 2.0.1.

The following requirements are used for all the central LCI data. The more peripheral aspects may deviate from the DQI based on the rule for “cut off”.

- Geographical coverage: The processes included in the data set are well representative of the geography stated in the “location” indicated in the metadata
- Technology representativeness: Data of core processes: Data has been collected about the technology used. Data of upstream and downstream processes: Data is representative for the technology used (for example at suppliers) if possible. Otherwise, average technology in the relevant region.
- Time-related coverage: Data of core processes: The collected data is ideally representative for the last 12 months but not older than 5 years. Data of upstream and downstream processes: The collected data is as recent as possible but not older than 10 years.

3.2.6 Type of critical review, if any

A critical review means that the study is reviewed by a third party. According to the standard, this is necessary if the result is to be communicated externally or if the result is to be compared with results from other studies.

A critical review will be carried out according to the International Standards ISO 14040 and 14044 (ISO 2006 b,c), as well as the applied PCR. The LCA will be reviewed according to the following five aspects outlined in ISO 14040. It is assessed whether:

- the methods used to carry out the LCA are consistent with this International Standard and in line with the applied PCR.
- the methods used to carry out the LCA are scientifically and technically valid
- the data used are appropriate and reasonable in relation to the goal of the study
- the interpretations reflect the limitations identified and the goal of the study, and
- the study report is transparent and consistent.

This LCA report was externally reviewed by Hüdai Kara at Metsims, an approved verifier of to Environdec Sweden.

4 Life Cycle Inventory (LCI)

In the life cycle inventory, the product system is defined and described. Firstly, the material flows and relevant processes required for the product system are identified. Secondly, relevant data (i.e., resource inputs, emissions and product outputs) for the system components are collected, and their amounts are related to the defined functional unit.

For data referring to processes beyond the control of the core production, theecoinvent database 3.11 is used. Ecoinvent is one of the world’s leading databases with consistent, open, and updated Life Cycle Inventory Data (LCI). With several thousand LCI datasets in the fields of agriculture, energy supply, transport, biofuels and biomaterials, bulk and special chemicals, construction and packaging materials, basic and precious metals, IT and electronics and waste management, ecoinvent offers the most comprehensive international LCI database. Ecoinvent’s high-quality LCI datasets are based on industrial data and have been compiled by internationally recognized research institutes and LCA consultants.

4.1 Product Specification

The PCR mandates the inclusion of the information in Table 7, which details some key information about the lift and its performance. In particular, note the parameter “Transportation performance”

(TP), which expresses the amount of function (in ton*km) that the lift achieves during its lifetime (see calculation in Table 8. The cabin floor size is 1400 x 1100 mm.

Table 7: Mandatory product specifications, according to the PCR.

Index	Values	Representative values chosen in case of ranges
Type of installation	New generic lift	
Commercial name	C1	
Main purpose	Transport of passengers	
Type of lift	Low speed cabin lift	
Type of drive system	Leadscrew	
Rated load (fixed or range)	630 kg	
Rated speed (fixed or range)	0.15 m/s	
Number of stops (fixed or range)	2	
Travelled height (fixed or range)	3.5 m	
Number of operating days per year (fixed or range)	260 days	
Applied usage category (UC) according to ISO 25745-2	1	50 trips per day
Designed Reference Service Life (RSL)	25 years	
Transportation performance (TP)	53.7 tkm (see Table 8 for calculation details)	
Geographic region of intended installation	Europe	
Additional information		
Recommended application (main market) - Building rise (typical) - Building type	Low-rise residential/ commercial	
Additional requirements	N/A	
Standby power requirement	24 W	

The total amount of tkm fulfilled by the lift during its lifetime (known as transportation performance, TP) is calculated according to the PCR and ISO 25745-2. The LCA results per functional unit are then obtained by dividing all inputs and outputs needed for one lift by the TP.

Table 8: Calculation of transportation performance (TP), according to ISO 25745-2 and the certification report by Liftinstituut in Appendix 6.

Parameter	How to calculate	Calculation
TP (Transportation Performance)	Average car load (Q_{av}) multiplied by the distance travelled by the lift during the service life (s_{RSL})	$0.04725 \text{ tonnes} * 1140 \text{ km} =$ 53.7 tkm
Q_{av} = average car load	Rated load (in tonnes) multiplied by the corresponding percentage from Table 3 of ISO 25745-2	$0.63 \text{ tonnes} * 0.075 =$ 0.04725 tonnes
s_{RSL} = Distance travelled by the lift during the service life	One-way average travel distance (s_{av}) * number of trips per day (n_d) * number of operating days per year (d_{op}) * Reference Service Life (RSL)	$3.5 \text{ meters} * 50 \text{ trips/day} *$ $260 \text{ days/year} * 25 \text{ years} =$ 1140 km

4.2 Product content declaration

This part describes all the different components and packaging materials. The product does not contain any Substances of Very High Concern (SVHC), see declaration of this in Appendix 8¹.

Table 9: Product content declaration

Product components	Weight, kg	Post-consumer material, weight-%	Biogenic material,	
			weight-%	kg C/declared unit
Steel	961,1			0
MDF	92,5		82%	34,2
Aluminium	87,2	5%		0
Plastic	41,5			0
Electric motor	30,4			0
Wood	13,0		100%	5,7
Copper	11,0			0
Rubber	7,1			0
Electronics, other	3,1			0
Battery	3,0			0
Metal other	2,1			0
Oil	1,3			0
PCB	0,5			0
Paper	0,5		90%	0,2
TOTAL	1256	0%	7%	40,1
Packaging materials				
Wood	444,0		100%	195,4
Cardboard	2,0		90%	0,8
Plastic	1,6			0,0
TOTAL	447,6	0%	100%	196,2

1 kg biogenic carbon in the product/packaging is equivalent to the uptake of 44/12 kg of CO₂.

4.3 Assumptions

- The lift is assumed to be sold and used in Europe. This is the largest market for CIBES. A sensitivity analysis added in section 6.2 regarding how variations in electricity mix between countries could impact the results.
- For some small components, the BoM did not specify the exact type of material, e.g. which type of plastics or which type of steel alloy is used. For these components, a genericecoinvent process was selected as documented in the supplementary excel file Complementary materials 1 - BOM and matching table CIBES.xlsx.

¹ SVHC and the Candidate List of SVHC are available via the European Chemicals Agency [Candidate List of substances of very high concern for Authorisation - ECHA \(europa.eu\)](https://echa.europa.eu)

- Similarly, the collected supplier data did not always specify the exact material, and assumptions about e.g. plastic type or metal alloy were made, see Section 4.5.

Assumptions that are general to the entire LCA are:

- choice of energy model: (e.g., regional averages obtained from the ecoinvent LCI database or according to specific conditions);
- Choice of transport model: (e.g., regional averages from ecoinvent) or according to specific conditions calculated according to the Network for Transport and the Environment (NTM).
- Transport distances have been based on Google Maps for road transportation and a port routing tool (e.g., Sea Distances or Port World) for sea transport. Possible deviating routes have not been included in the calculations.
- Ecoinvent processes that contain market funds such as “Diesel burned in building machine {GLO} | market for | Cut-off, U” includes generic shipments from producer to end customer. Therefore, these data sets have no further transport.

For all scenarios of modules A4-A5-B-C-D, the scenarios included are currently in use and representative for one of the most probable alternatives.

4.4 Input data references

Table 10 shows the supplier contacts that have supplied the sources for data input.

Table 10 Input data references

Data contact information	
Company	EVI Industries Stockholm AB
Name	Nicklas Holst
e-mail	nicklas.holst@evi.se
Phone number	+46768865186
Position in company	-
Company	Erdoganlar Aluminium San ve Tic. A.S.
Name	Yağmur Özer
e-mail	yagmur.ozer@erdoganlar.com
Phone number	+902128865577
Position in company	-
Company	Plieno Fortas JSC
Name	Laura Tefelienė
e-mail	laura@fortas.lt
Phone number	+37068676401
Position in company	-
Company	Profilplåt i Järbo AB
Name	Per Norling
e-mail	per@profilplatjarbo.se
Phone number	+46703164846
Position in company	-
Company	Tom Pall Produktion AB
Name	Thomas Markström
e-mail	thomas@tompall.se
Phone number	+46705354054
Position in company	-
Company	Cibes Lift Poland sp. z o.o.
Name	Kamil Mrozowski
e-mail	kamil.mrozowski@cibesliftgroup.com
Phone number	-
Position in company	-

4.5 Raw material (A1)

This section describes all the different raw materials needed for the manufacturing of a C1 lift. Based on the bill of material (BOM), the most important suppliers were identified, together providing components that make up 78 wt-% of the total lift (excluding packaging). Primary data was collected from these suppliers, as well as for the main packaging provider. More details about the primary data from material supplier is provided in section 4.5, and from packaging supplier in section 4.6.4. Please note that one of the main material suppliers for which specific data was collected is CIBES Poland (supplying 10 wt%), which is another company within CIBES group.

4.5.1 Supplier raw material extraction and production

This section describes all the different raw materials needed for the manufacturing of the Cibes C1 lift. The product is complex and contains a large number of parts. The LCA-modelling is based on the bill of materials (BOM) list provided by Cibes which contains 407 rows (parts). The material of each part in the BOM-list has been defined by matching one or more materials from a “Matching table”. The matching table contains 92 materials that can be selected in the BOM list, and that in turn has been defined by matching to ecoinvent processes or to a custom process made in SimaPro. Since the BOM list is 407 rows long it is not added to the report, but as a complementary Excel file named “Complementary materials 1 - BOM and matching table CIBES.xlsx”. This file also contains the mapping table. To give an understanding of how the BOM list and the material matching has been done, an excerpt of the BOM-list is shown in Table 11. The table shows 3 out of the 407 parts that constitutes the product, the components “Threshold cover (254565)”, “Motvikt 2kg (257302)”, and “Drivmotor dörr C-Serie (3540)”. The part “Threshold cover (254565)” weights 2,07 kg per piece and is made from the material “DC 01 + ZE 25 Painted”. The part “Motvikt 2kg (257302)” weights 2 kg per piece and is made from “S 235 JRG2”, while the “Drivmotor dörr C-Serie (3540)” weights 1,93 kg per piece and is made out of the material “Motor”.

Table 11: Excerpt of the BOM list

Grouping	Component	Quantity	Weight per piece	Material 1	Material 1 - percentage of total
DC 01 + ZE 25 Painted	Threshold cover (254565)	1	2,07	DC 01 + ZE 25 Painted	1
S 235 JRG2	Motvikt 2kg (257302)	2	2	S 235 JRG2	1
Motor	Drivmotor dörr C-Serie (3540)	1	1,93	Motor	1

Table 12 shows an excerpt of the matching table for the materials used by the parts in Table 11. The full matching table is available in the tab Matching table in the file “Complementary materials 1 - BOM and matching table.xlsx”. It shows that “DC 01 + ZE 25 Painted” is connected to the processes “MG low-alloyed steel GLO - electrogalvanized RER” and the manufacturing process “Metal working, average for steel product manufacturing {GLO}| market for metal working, average for steel product manufacturing | Cut-off, U” and “[1851] Powder coat, steel {RER}| powder coating, steel | Cut-off, U per kg painted steel”. The MG low-alloyed steel and [1851] powder coat process are edited ecoinvent process that will be explained later. Motor is connected to “Electric motor, vehicle {RER}| electric motor production, vehicle | Cut-off, U”. The material S 235 JRG2 is connected to the process “Steel, low-alloyed {GLO}| market for steel, low-alloyed | Cut-off, U” and “Metal working, average for steel

product manufacturing {GLO}| market for metal working, average for steel product manufacturing | Cut-off, U”.

Table 12: Excerpt of the matching table

Material name	SimaPro process	SimaPro processing process	SimaPro other processing
DC 01 + ZE 25 Painted	MG low-alloyed steel GLO - electrogalvanized RER	Metal working, average for steel product manufacturing {GLO} market for metal working, average for steel product manufacturing Cut-off, U	[1851] Powder coat, steel {RER} powder coating, steel Cut-off, U per kg painted steel
Motor	Electric motor, vehicle {RER} electric motor production, vehicle Cut-off, U		
S 235 JRG2	Steel, low-alloyed {GLO} market for steel, low-alloyed Cut-off, U	Metal working, average for steel product manufacturing {GLO} market for metal working, average for steel product manufacturing Cut-off, U	

Based on the BOM-list and matching table the total amount of each material used in the product is presented in Table 13. This gives an indication about the most relevant materials for the assessment.

Table 13: Total amount of each material used in the product based on the BOM-list.

Material 1	Total weight (kg)	SimaPro process	SimaPro processing process
Material from Profilplåt i Järbo AB	253,8	Material from Profilplåt i Järbo AB	
S 355 JR Painted	245,2	S 355 JR Plieno Fortas	
Material from EVI Industries Stockholm AB - DC01	165,8	Material from EVI Industries Stockholm AB - DC01	
Laminated MDF boards from Direktlaminat	92,5	Laminated MDF boards from Direktlaminat	
DX51D+Z275 MA-C Plieno Fortas	56,1	DX51D+Z275 MA-C Plieno Fortas	
Material from EVI Industries Stockholm AB - DC01 + ZE25	55,3	Material from EVI Industries Stockholm AB - DC01 + ZE25	
Sats Lift Screw C-serie 6m - CIBES Poland	45,5	Sats Lift Screw C-serie 6m - CIBES Poland	
GUIDE PROFILE ALU 239941 - Production - CIBES Poland	45,0	GUIDE PROFILE ALU 239941 - Production - CIBES Poland	
Material from EVI Industries Stockholm AB - DX51D +Z275 MA-C	44,4	Material from EVI Industries Stockholm AB - DX51D +Z275 MA-C	
Motor	28,8	Electric motor, vehicle {RER} electric motor production, vehicle Cut-off, U	
[1851] DRIVPAKET ECO 24mm	22,1	[1851] DRIVPAKET ECO 24mm	
DX51D + Z275 MA-C	18,7	MG low-alloyed steel GLO - electrogalvanized RER	Metal working, average for steel product manufacturing {GLO} market for metal working,

			average for steel product manufacturing Cut-off, U
DC 01 + ZE 25 Plieno Fortas	16,5	DC 01 + ZE 25 Plieno Fortas	
Material from EVI Industries Stockholm AB - Stainless steel EN 1.4301	13,9	Material from EVI Industries Stockholm AB - Stainless steel EN 1.4301	
Longbox - CIBES Poland	13,0	Longbox - CIBES Poland	
[1851] Overload unit materials	12,5	[1851] Overload unit materials	
Doorstep - CIBES Poland	9,8	Doorstep - CIBES Poland	
S 235 JRG2 Plieno Fortas	9,5	S 235 JRG2 Plieno Fortas	
Aluminium-6060 Painted	8,3	Aluminium, wrought alloy {GLO} market for aluminium, wrought alloy Cut-off, U	Metal working, average for aluminium product manufacturing {RER} metal working, average for aluminium product manufacturing Cut-off, U + [1851] Powder coat, aluminium sheet {RER} powder coating, aluminium sheet Cut-off, U per kg painted alu
DC 01 + ZE 25 Painted	8,1	MG low-alloyed steel GLO - electrogalvanized RER	Metal working, average for steel product manufacturing {GLO} market for metal working, average for steel product manufacturing Cut-off, U + [1851] Powder coat, steel {RER} powder coating, steel Cut-off, U per kg painted steel
Cable	7,4	Cable, unspecified {GLO} market for cable, unspecified Cut-off, U	
Fasteners Steel FZB	6,2	MG low-alloyed steel GLO - electrogalvanized RER	Metal working, average for steel product manufacturing {GLO} market for metal working, average for steel product manufacturing Cut-off, U
Aluminium Painted	5,9	Aluminium, wrought alloy {GLO} market for aluminium, wrought alloy Cut-off, U	Metal working, average for aluminium product manufacturing {RER} metal working, average for aluminium product manufacturing Cut-off, U + [1851] Powder coat, aluminium sheet {RER} powder coating, aluminium sheet Cut-off, U per kg painted alu
PVC covering with glass fibre reinforced polyester cellulose backing	5,2	Polyvinylchloride, emulsion polymerised {GLO} market for polyvinylchloride, emulsion polymerised Cut-off, U	Extrusion, plastic film {GLO} market for extrusion, plastic film Cut-off, U
DC 01 Plieno Fortas	5,5	DC 01 Plieno Fortas	
DC 01 + ZE 25	4,2	Steel, chromium steel 18/8 {GLO} market for steel, chromium steel 18/8 Cut-off, U	Metal working, average for steel product manufacturing {GLO} market for metal working, average for steel product manufacturing Cut-off, U

Aluminium skena - CIBES Poland	4,2	Aluminium skena - CIBES Poland	
S 235 JRG2	4,0	Steel, low-alloyed {GLO} market for steel, low-alloyed Cut-off, U	Metal working, average for steel product manufacturing {GLO} market for metal working, average for steel product manufacturing Cut-off, U
DC 01 Electro plated	3,9	MG low-alloyed steel GLO - electrogalvanized RER	Metal working, average for steel product manufacturing {GLO} market for metal working, average for steel product manufacturing Cut-off, U
GUIDE JOINT ODS - CIBES Poland	3,8	GUIDE JOINT ODS - CIBES Poland	
S 235 JRG2 Painted	3,1	Steel, low-alloyed {GLO} market for steel, low-alloyed Cut-off, U	Metal working, average for steel product manufacturing {GLO} market for metal working, average for steel product manufacturing Cut-off, U
Lead and acid Battery 12 V	3,0	Battery, lead acid, rechargeable, stationary {GLO} market for battery, lead acid, rechargeable, stationary Cut-off, U	
Aluminium-6061 Anodized	2,8	MG Aluminium - 6061- anodized - RER	Metal working, average for aluminium product manufacturing {RER} metal working, average for aluminium product manufacturing Cut-off, U
Aluminium skena kort - CIBES Poland	2,6	Aluminium skena kort - CIBES Poland	
Aluminium 6060 T6/T66 Anodized	2,4	MG Aluminium - 6061- anodized - RER	Metal working, average for aluminium product manufacturing {RER} metal working, average for aluminium product manufacturing Cut-off, U
Tröskelavslut - CIBES Poland	2,3	Tröskelavslut - CIBES Poland	
SS-2142 Electro plated	1,5	MG low-alloyed steel GLO - electrogalvanized RER	Metal working, average for steel product manufacturing {GLO} market for metal working, average for steel product manufacturing Cut-off, U
steel Alu Zink coated steel	1,5	MG low-alloyed steel GLO - electrogalvanized RER	Metal working, average for steel product manufacturing {GLO} market for metal working, average for steel product manufacturing Cut-off, U
Aluminium-6060 Anodized	1,4	MG Aluminium - 6061- anodized - RER	Metal working, average for aluminium product manufacturing {RER} metal working, average for aluminium product manufacturing Cut-off, U
Oil	1,3	Lubricating oil {RER} market for lubricating oil Cut-off, U	
Plastic wheel	1,2	[1851] Plastic wheel	
Zinc	1,2	Zinc {GLO} market for zinc Cut-off, U	

Electric connector	1,1	Electric connector, wire clamp {GLO} market for electric connector, wire clamp Cut-off, U	
Aluminium milled	1,1	Aluminium, wrought alloy {GLO} market for aluminium, wrought alloy Cut-off, U	Metal working, average for aluminium product manufacturing {RER} metal working, average for aluminium product manufacturing Cut-off, U
Electronic component, passive, unspecified	1,0	Electronic component, passive, unspecified {GLO} electronic component production, passive, unspecified Cut-off, U	
Iglidur	0,95	Nylon 6-6 {RER} market for nylon 6-6 Cut-off, U	
Wallfastening alu SVART 1125 - CIBES Poland	0,89	Wallfastening alu SVART 1125 - CIBES Poland	
Rubber	0,78	Synthetic rubber {RoW} synthetic rubber production Cut-off, U	
Consumer electronics, mobile device, smartphone	0,72	[1851] Consumer electronics, mobile device, smartphone {GLO} consumer electronics production, mobile device, smartphone Cut-off, U per kg	
ABS Plastic	0,70	Acrylonitrile-butadiene-styrene copolymer {GLO} market for acrylonitrile-butadiene-styrene copolymer Cut-off, U	Injection moulding {GLO} market for injection moulding Cut-off, U
Zinc Painted	0,63	Zinc {GLO} market for zinc Cut-off, U	[1851] Powder coat, steel {RER} powder coating, steel Cut-off, U per kg painted steel
S 355 J2 Electro plated	0,61	MG low-alloyed steel GLO - electrogalvanized RER	Metal working, average for steel product manufacturing {GLO} market for metal working, average for steel product manufacturing Cut-off, U
PCB	0,53	Printed wiring board, surface mounted, unspecified, Pb free {GLO} market for printed wiring board, surface mounted, unspecified, Pb free Cut-off, U	
Plastic	0,52	Acrylonitrile-butadiene-styrene copolymer {GLO} market for acrylonitrile-butadiene-styrene copolymer Cut-off, U	Injection moulding {GLO} market for injection moulding Cut-off, U
Monomeric vinyl Printed	0,51	Polyvinylchloride, emulsion polymerised {GLO} market for polyvinylchloride, emulsion polymerised Cut-off, U	Injection moulding {GLO} market for injection moulding Cut-off, U
cellular plastic	0,50	Polystyrene, expandable {GLO} market for polystyrene, expandable Cut-off, U	
Stainless steel	0,48	Steel, chromium steel 18/8 {GLO} market for steel, chromium steel 18/8 Cut-off, U	Metal working, average for steel product manufacturing {GLO} market for metal working, average for steel product manufacturing Cut-off, U
Prelaq polyester 010	0,48	Steel, low-alloyed, hot rolled {GLO} market for steel, low-alloyed, hot rolled Cut-off, U	[1851] Powder coat, steel {RER} powder coating, steel Cut-off, U per kg painted steel

S 355 JR Electro plated	0,46	MG low-alloyed steel GLO - electrogalvanized RER	Metal working, average for steel product manufacturing {GLO} market for metal working, average for steel product manufacturing Cut-off, U
A3 copy paper Printed	0,42	Paper, woodfree, uncoated {RER} market for paper, woodfree, uncoated Cut-off, U	
Wallfastening alu SVART 1043 - CIBES Poland	0,41	Wallfastening alu SVART 1043 - CIBES Poland	
Steel wire	0,24	Steel, low-alloyed {GLO} market for steel, low-alloyed Cut-off, U	Wire drawing, steel {RER} wire drawing, steel Cut-off, U
Bronze CC493K	0,28	Bronze {GLO} market for bronze Cut-off, U	Contouring, bronze {RER} contouring, bronze Cut-off, U
PVC film	0,27	Polyvinylchloride, emulsion polymerised {GLO} market for polyvinylchloride, emulsion polymerised Cut-off, U	Extrusion, plastic film {GLO} market for extrusion, plastic film Cut-off, U
S 235 JRG2 Electro plated	0,24	MG S235JRG2 low-alloyed steel - electrogalvanized - RER	Metal working, average for steel product manufacturing {GLO} market for metal working, average for steel product manufacturing Cut-off, U
Wire Plastic cover	0,22	Cable, unspecified {GLO} market for cable, unspecified Cut-off, U	
Fasteners Stainless	0,22	Steel, chromium steel 18/8 {GLO} market for steel, chromium steel 18/8 Cut-off, U	Metal working, average for steel product manufacturing {GLO} market for metal working, average for steel product manufacturing Cut-off, U
Sticker	0,21	[1851] Plastic tape	
Material from EVI Industries Stockholm AB - Varmförzinkad B500	0,20	Material from EVI Industries Stockholm AB - Varmförzinkad B500	
Switch, toggle type {RoW} switch production, toggle type Cut-off, U	0,19	Switch, toggle type {RoW} switch production, toggle type Cut-off, U	
TOP NUT FOR BEARING - CIBES Poland	0,18	TOP NUT FOR BEARING - CIBES Poland	
PA66 + GF30 Painted	0,17	Glass fibre reinforced plastic, polyamide, injection moulded {GLO} market for glass fibre reinforced plastic, polyamide, injection moulded Cut-off, U	
Wire	0,15	Cable, unspecified {GLO} market for cable, unspecified Cut-off, U	
Fasteners Plastic	0,13	Nylon 6-6 {RER} market for nylon 6-6 Cut-off, U	Injection moulding {GLO} market for injection moulding Cut-off, U
Polycarbonate clear	0,13	Polycarbonate {RoW} market for polycarbonate Cut-off, U	Injection moulding {GLO} market for injection moulding Cut-off, U
Steel wire Plieno Fortas	0,12	Steel wire Plieno Fortas	
steel Coated steel	0,099	Steel, low-alloyed {GLO} market for steel, low-alloyed Cut-off, U	Metal working, average for steel product manufacturing {GLO} market for metal working, average for steel product manufacturing Cut-off, U

			[1851] Powder coat, steel {RER} powder coating, steel Cut-off, U per kg painted steel
Steel electro plated	0,093	MG low-alloyed steel GLO - electrogalvanized RER	Metal working, average for steel product manufacturing {GLO} market for metal working, average for steel product manufacturing Cut-off, U
POM	0,090	Polyoxymethylene (POM)/EU-27 Industry data 2.0	Injection moulding {GLO} market for injection moulding Cut-off, U
Polycarbonate	0,088	Polycarbonate {RoW} market for polycarbonate Cut-off, U	Injection moulding {GLO} market for injection moulding Cut-off, U
Aluminium extruded	0,085	Aluminium, wrought alloy {GLO} market for aluminium, wrought alloy Cut-off, U	Section bar extrusion, aluminium {GLO} market for section bar extrusion, aluminium Cut-off, U
bronze	0,070	Bronze {GLO} market for bronze Cut-off, U	Contouring, bronze {RER} contouring, bronze Cut-off, U
Rubber belt	0,070	Synthetic rubber {RoW} synthetic rubber production Cut-off, U	
A4 copy paper Printed	0,065	Paper, woodfree, uncoated {RER} market for paper, woodfree, uncoated Cut-off, U	
S 355 J2H Electro plated	0,060	MG low-alloyed steel GLO - electrogalvanized RER	Metal working, average for steel product manufacturing {GLO} market for metal working, average for steel product manufacturing Cut-off, U
Acetalplast POM natur	0,060	Polyoxymethylene (POM)/EU-27	Injection moulding {GLO} market for injection moulding Cut-off, U
Tape	0,037	[1851] Plastic tape	
Stainless Steel	0,029	Steel, chromium steel 18/8 {GLO} market for steel, chromium steel 18/8 Cut-off, U	Metal working, average for chromium steel product manufacturing {RER} metal working, average for chromium steel product manufacturing Cut-off, U
Spring	0,022	Steel, low-alloyed {GLO} market for steel, low-alloyed Cut-off, U	Wire drawing, steel {RER} wire drawing, steel Cut-off, U
Self Adhesive Anti Slip monomeric vinyl	0,010	Polyvinylchloride, emulsion polymerised {GLO} market for polyvinylchloride, emulsion polymerised Cut-off, U	Injection moulding {GLO} market for injection moulding Cut-off, U
Fiber glass	0,010	Glass fibre {GLO} market for glass fibre Cut-off, U	
Plastic (TPE) generic	0,0078	Polyethylene, high density, granulate {GLO} market for polyethylene, high density, granulate Cut-off, U	Injection moulding {GLO} market for injection moulding Cut-off, U
Steel	0,0020	Steel, low-alloyed {GLO} market for steel, low-alloyed Cut-off, U	Metal working, average for steel product manufacturing {GLO} market for metal working, average for steel product manufacturing Cut-off, U

			average for steel product manufacturing Cut-off, U
Rubber Plastic	0,0012	Synthetic rubber {RoW} synthetic rubber production Cut-off, U	Injection moulding {GLO} market for injection moulding Cut-off, U
Plastic foam	0,0008	Polyurethane, flexible foam {RoW} market for polyurethane, flexible foam Cut-off, U	

A lot of materials in the matching table are connected to processes in ecoinvent. However, some more complex materials/parts have been modelled in SimaPro. These has been compiled in Table 14 and is sorted based on mass. Table 14 gives a brief explanation about how each process has been modelled.

Table 14: Compilation of all custom-made processes in SimaPro, sorted based on mass used in the product.

Process	LCA-modelling
S 355 JR Plieno Fortas	See section 4.5.2 for more information.
Material from Profilplåt i Järbo AB	See section 4.5.4 for more information.
Material from EVI Industries Stockholm AB - DC01	See section 4.5.3 for more information.
Laminated MDF boards from Direktlaminat	See section 4.5.7 for more information.
DX51D+Z275 MA-C Plieno Fortas	See section 4.5.2 for more information.
MG low-alloyed steel GLO - electrogalvanized RER	Modelled as 1 kg of "Steel, low-alloyed, hot rolled {GLO} market for steel, low-alloyed, hot rolled Cut-off, U" and 0,04 m2 of "Zinc coat, coils {RER} zinc coating, coils Cut-off, U" per kg material. Estimated 0,04 m2 of zinc coat per kg material based on ecoinvent datasets and ChatGPT.
Material from EVI Industries Stockholm AB - DC01 + ZE25	See section 4.5.3 for more information.
Sats Lift Screw C-serie 6m - CIBES Poland	See section 4.5.5 for more information.
GUIDE PROFILE ALU 239941 - Production - CIBES Poland	See section 4.5.5 for more information.
Material from EVI Industries Stockholm AB - DX51D +Z275 MA-C	See section 4.5.3 for more information.
[1851] DRIVPAKET ECO 24mm	Model based on material composition estimations from Cibes. See Table 44 in Appendix 5 for implementation.
Material from EVI Industries Stockholm AB - Stainless steel EN 1.4301	See section 4.5.3 for more information.
DC 01 + ZE 25 Plieno Fortas	See section 4.5.2 for more information.
Longbox - CIBES Poland	See section 4.5.5 for more information.
[1851] Overload unit materials	Cibes have stated that the overload unit is made from 6.8 kg rubber and the remaining part of spring steel (1.8976 special steel type). Based on this it has been modelled as 6,8 kg Synthetic rubber {GLO} market for synthetic rubber Cut-off, U + Injection moulding {GLO} market for injection moulding Cut-off, U and 5,68 kg Steel, low-alloyed, hot rolled {GLO} market for steel, low-alloyed, hot rolled Cut-off, U. The total weight of the overload unit is 12.48 kg.
Doorstep - CIBES Poland	See section 4.5.5 for more information.
S 235 JRG2 Plieno Fortas	See section 4.5.2 for more information.

DC 01 Plieno Fortas	See section 4.5.2 for more information.
Aluminium skena - CIBES Poland	See section 4.5.5 for more information.
GUIDE JOINT ODS - CIBES Poland	See section 4.5.5 for more information.
MG Aluminium - 6061-anodized - RER	Modelled as 1 kg of "Aluminium, wrought alloy {GLO} market for aluminium, wrought alloy Cut-off, U", 1 kg of "Metal working, average for aluminium product manufacturing {GLO} market for metal working, average for aluminium product manufacturing Cut-off, U" and 0,2 m2 of "Anodising, aluminium sheet {RER} anodising, aluminium sheet Cut-off, U" per kg material. Estimated 0,2 m2 of anodising per kg material based on ecoinvent datasets and ChatGPT.
Aluminium skena kort - CIBES Poland	See section 4.5.5 for more information.
Tröskelavslut - CIBES Poland	See section 4.5.5 for more information.
[1851] Plastic wheel	Plastic wheel with steal bearing. Assume to constitute of 50% <i>Steel, low-alloyed {GLO} market for steel, low-alloyed Cut-off, U + Metal working, average for steel product manufacturing {RER} metal working, average for steel product manufacturing Cut-off, U</i> and 50% <i>Glass fibre reinforced plastic, polyamide, injection moulded {RER} glass fibre reinforced plastic production, polyamide, injection moulded Cut-off, U</i>
Wallfastening alu SVART 1125 - CIBES Poland	See section 4.5.5 for more information.
Wallfastening alu SVART 1043 - CIBES Poland	See section 4.5.5 for more information.
MG S235JRG2 low-alloyed steel - electrogalvanized - RER	Modelled as 1 kg of "Steel, low-alloyed, hot rolled {GLO} market for steel, low-alloyed, hot rolled Cut-off, U" and 0,04 m2 of "Zinc coat, coils {RER} zinc coating, coils Cut-off, U" per kg material. Estimated 0,04 m2 of zinc coat per kg material based on ecoinvent datasets and ChatGPT.
[1851] Plastic tape	Modelled as 0,9 kg "Packaging film, low density polyethylene {RER} packaging film production, low density polyethylene Cut-off, U" and 0,1 kg "Acrylic binder, with water, in 54% solution state {RER} market for acrylic binder, with water, in 54% solution state Cut-off, U" per kg material.
Material from EVI Industries Stockholm AB - Varmförzinkad B500	See section 4.5.3 for more information.
TOP NUT FOR BEARING - CIBES Poland	See section 4.5.5 for more information.
Steel wire Plieno Fortas	See section 4.5.2 for more information.
[1851] Powder coat, aluminium sheet {RER} powder coating, aluminium sheet Cut-off, U per kg painted alu	Modelled as 0,192 m2 of "Powder coat, aluminium sheet {RER} powder coating, aluminium sheet Cut-off, U" per kg powder coated material. Based on an estimated weight of 5,4 kg per m2 for aluminium with thickness 22 mm.

4.5.2 Components provided by Plieno Fortas JSC

Plieno Fortas JSC are located in Siauliai, Lithuania and supply CIBES with Platforms, Floor, Bottom beam, Bracket Safety Edge Joint, Top Yoke, Cover plate, Doorbox, Cabin, Roof frame, Safety edges, and other small parts. Supplier-specific data was collected about the energy use, the production scrap rate, other production waste, and the transport to CIBES Gävle. Table 15 presents the processing data collected from Plieno Fortas, per kg output (average for all products produced by Plieno Fortas). Table 16 shows how the input materials to Plieno Fortas were modelled.

Table 15: Processing data from Plieno Fortas, per 1 kg of output (average of all products produced).

Input/Output	Amount	LCI database representation
Input: Petrol	0.0043 kg	Petrol, unleaded, burned in machinery {GLO} market for petrol, unleaded, burned in machinery Cut-off, U
Input: Diesel	0.0042 kg	Diesel, burned in building machine {GLO} diesel, burned in building machine Cut-off, U
Input: Electricity	0.33 kWh	Electricity, medium voltage {LT} electricity, medium voltage, residual mix Cut-off, U
Input: Gas	0.0095 MWh	Natural gas, burned in gas turbine {GLO} market for natural gas, burned in gas turbine Cut-off, U
Input: Water	4.08 litre	Tap water {RER} market group for tap water Cut-off, U
Output: Wastewater	4.08 litre	Wastewater, average {Europe without Switzerland} market for wastewater, average Cut-off, U
Output: Non-recyclable waste (Halogen-free machine emulsions)	0.0067 kg	Waste emulsion paint {RoW} market for waste emulsion paint Cut-off, U
Output: Recyclable waste	0.012 kg	Core board (waste treatment) {GLO} recycling of core board Cut-off, S

Table 16: Modelling of input materials to Plieno Fortas. See BoM for amounts per material.

Input/Output	LCI database representation material production	Scrap rate	LCI database representation, waste management scrap
S 355 JR (painted)	Steel, low-alloyed, hot rolled {GLO} market for steel, low-alloyed, hot rolled Cut-off, U and [1851] Powder coat, steel {RER} powder coating, steel Cut-off, U per kg painted steel	12%	Steel and iron (waste treatment) {GLO} recycling of steel and iron Cut-off, U
DX51D + Z275 MA-C	Steel, low-alloyed, hot rolled {GLO} market for steel, low-alloyed, hot rolled Cut-off, U and Zinc coat, coils {RER} zinc coating, coils Cut-off, U	12%	Steel and iron (waste treatment) {GLO} recycling of steel and iron Cut-off, U
S 235 JRG2 (painted)	Steel, low-alloyed {GLO} market for steel, low-alloyed Cut-off, U and Metal working, average for steel product manufacturing {GLO} market for metal working, average for steel product manufacturing Cut-off, U and [1851] Powder coat, steel {RER} powder coating, steel Cut-off, U per kg painted steel	12%	Steel and iron (waste treatment) {GLO} recycling of steel and iron Cut-off, U
DC 01 + ZE 25 (painted)	Steel, low-alloyed {GLO} market for steel, low-alloyed Cut-off, U and Sheet rolling, steel {GLO} market for sheet rolling, steel Cut-off, U and Zinc coat, coils {RER} zinc coating, coils Cut-off, U and	12%	Steel and iron (waste treatment) {GLO} recycling of steel and iron Cut-off, U

	[1851] Powder coat, steel {RER} powder coating, steel Cut-off, U per kg painted steel		
DC 01 (electro plated)	Steel, low-alloyed {GLO} market for steel, low-alloyed Cut-off, U and Sheet rolling, steel {GLO} market for sheet rolling, steel Cut-off, U and Hard chromium coat, electroplating, steel substrate, 0.14 mm thickness {GLO} market for hard chromium coat, electroplating, steel substrate, 0.14 mm thickness Cut-off, U	12%	Steel and iron (waste treatment) {GLO} recycling of steel and iron Cut-off, U
Steel wire	Steel, low-alloyed {GLO} market for steel, low-alloyed Cut-off, U and Wire drawing, copper {GLO} market for wire drawing, copper Cut-off, U	12%	Steel and iron (waste treatment) {GLO} recycling of steel and iron Cut-off, U

4.5.3 Components provided by EVI Industries Stockholm AB

EVI Industries Stockholm AB are located in Kungsängen, Stockholm, and provide CIBES with a range of 35 individual components for the C1. The components from EVI Industries are made of one of the following five steel grades: DC01, DC 01 + ZE 25, DX51D + Z275 MA-C, B500, S 355 JR (Stainless steel EN 1.4301). Primary data about energy use, production waste and transport to CIBES was collected from the supplier. Transport from EVI to CIBES Gävle is modelled as 133 km by truck using the dataset Transport, freight, lorry 16-32 metric ton, EURO5 {RER}| market for transport, freight, lorry 16-32 metric ton, EURO5 | Cut-off, U.

Table 17: Modelling of components from EVI Industries.

Input/Output	Amount	Steel option (depending on component)	Origin	LCI database representation	Transport type	Transport distance (km)
Output: steel component	1 kg	-	-	-	-	-
Input: Steel	1.12 kg	DC01	EU	MG Steel, low-alloyed {RER} market for steel, low-alloyed Cut-off, U - w/o transport + Sheet rolling, steel {RER} sheet rolling, steel Cut-off, U	Transport, freight, lorry 16-32 metric ton, EURO5 {RER} market for transport, freight, lorry 16-32 metric ton, EURO5 Cut-off, U	1500
		DC 01 + ZE 25				
		DX51D + Z275 MA-C				
		B500				
		S 355 JR (Stainless steel EN 1.4301)				
Input: electricity	0.624 kWh	-	-	Electricity, medium voltage {SE} electricity, medium voltage, residual mix Cut-off, U	-	-

Output: Production waste - steel	0.12 kg	-	-	Steel and iron (waste treatment) {GLO} recycling of steel and iron Cut-off, U (empty dataset)	Transport, freight, lorry 16-32 metric ton, EURO5 {RER} market for transport, freight, lorry 16-32 metric ton, EURO5 Cut-off, U	100
-------------------------------------	---------	---	---	--	--	-----

4.5.4 Components provided by Profilplåt i Järbo AB

Profilplåt i Järbo AB are located in Järbo, Sweden and supply CIBES with Steel shaft panels. Supplier-specific data was collected about the material type and origin in the component, the electricity consumption, the production waste, and the transport to CIBES Gävle. Transport from Profilplåt to CIBES Gävle is modelled as 45 km by truck, using the dataset Transport, freight, lorry 16-32 metric ton, EURO5 {RER}| market for transport, freight, lorry 16-32 metric ton, EURO5 | Cut-off, U.

Table 18: Modelling of components from Profilplåt I Järbo.

Input/Output	Weight (kg)	Origin	LCI representation	Transport type	Transport distance (km)
Output: 1 Steel shaft panel	13.25 kg				
Input: Galvanized steel, S280GD - S350GD, DX51D, 25% pre-consumer recycled content.	11.57 kg	Oskarshamn, Sweden	MG Steel, low-alloyed {RER} market for steel, low-alloyed Cut-off, U - w/o transport (pre-consumer recycled content modelled as virgin steel)	Transport, freight, lorry 16-32 metric ton, EURO5 {RER} market for transport, freight, lorry 16-32 metric ton, EURO5 Cut-off, U	540
Input: Foam plastic (Frigolit)	1 kg	Kramfors, Sweden	Polystyrene, expandable {RER} polystyrene production, expandable Cut-off, U + Polymer foaming {RER} polymer foaming Cut-off, U	Transport, freight, lorry 16-32 metric ton, EURO5 {RER} market for transport, freight, lorry 16-32 metric ton, EURO5 Cut-off, U	315
Input: 1-Component Polyurethane Adhesive	0.68 kg	Gnosjö, Sweden	Polyurethane adhesive {GLO} polyurethane adhesive production Cut-off, U	Transport, freight, lorry 16-32 metric ton, EURO5 {RER} market for transport, freight, lorry 16-32 metric ton, EURO5 Cut-off, U	520

Input: Electricity	1.2 kWh	-	Electricity, medium voltage {SE} electricity, medium voltage, residual mix Cut-off, U	-	-
Output: production waste	0 kg	-	-	-	-

4.5.5 Components provided by CIBES Poland

CIBES Poland provides 11 different components to CIBES Gävle. Primary data was collected from CIBES Poland regarding energy consumption, manufacturing consumables, packaging, production waste, see Table 19 below. The data collection period was Q3 and Q4 2024. The reason for only including data from half a year is that the factory is relatively new and there was no data available from before Q3 2024. This also means that the data might not be fully representative for the coming years.

For manufacturing data that could not be attributed to a specific component (energy, waste, consumables), allocation was performed based on internal sales price, i.e. the price that CIBES Gävle pays for each component, compared to the total sales value for the data collection period.

All waste material was assumed to be transported 100 km to a waste management facility.

Table 19: Processing data from CIBES Poland, total values for Q3 and Q4 2024.

Input/Output	Amount	LCI database representation	Comment
Input: Electricity 100% onshore wind power	35074 kWh	MG Electricity, medium voltage {PL} Onshore wind - market for electricity, medium voltage Cut-off, U	Modified ecoinvent process to represent 100% on shore wind power in Poland. Certificate for electricity provided in Appendix 1.
Input: Heating	3503 kWh	Heat, district or industrial, other than natural gas {PL} heat and power co-generation, hard coal Cut-off, U	No data about energy source, coal selected as conservative estimate.
Input: Degreaser	262 kg	Solvent, organic {GLO} market for solvent, organic Cut-off, U	
Input: Lubricating oil	262 kg	Lubricating oil {GLO} market for Cut-off, U	
Packaging input: Tape	17 kg	[1851] Plastic tape	See Appendix 5 for details on material modelling.
Packaging input: Foil	5420 kg	Packaging film, low density polyethylene {GLO} market for packaging film, low density polyethylene Cut-off, U	
Production waste: Aluminium	11399 kg	Production of wasted material: Material from Erdoganlar Alüminyum A.S Waste management: Steel and iron (waste treatment) {GLO} recycling of steel and iron Cut-off, U	See section 4.5.6 for details on material modelling
Production waste: Cardboard	29230 kg	Production of wasted material: Corrugated board box {RER} corrugated board box production Cut-off, U Waste management: Core board (waste treatment) {GLO} recycling of core board Cut-off, U	

Production waste: Steel	6144 kg	Production of wasted material: Steel, low-alloyed, hot rolled {RoW} steel production, low-alloyed, hot rolled Cut-off, U Waste management: Steel and iron (waste treatment) {GLO} recycling of steel and iron Cut-off, U
-------------------------	---------	---

Table 20: Modelling of input materials to CIBES Poland.

Material	LCI database representation
Steel - C45	Steel, low-alloyed, hot rolled {GLO} market for steel, low-alloyed, hot rolled Cut-off, U
Aluminium-6061 (from supplier Erdoganlar)	See section 4.5.6
Wood	Sawnwood, softwood, raw, dried (u=10%) {RER} market for sawnwood, softwood, raw, dried (u=10%) Cut-off, U
S 335 JRG2 (electrogalvanized steel)	Steel, low-alloyed, hot rolled {GLO} market for steel, low-alloyed, hot rolled Cut-off, U and Zinc coat, coils {RER} zinc coating, coils Cut-off, U and Metal working, average for steel product manufacturing {GLO} market for metal working, average for steel product manufacturing Cut-off, U
Anodized aluminium (other suppliers)	Aluminium, wrought alloy {GLO} market for aluminium, wrought alloy Cut-off, U and Anodising, aluminium sheet {RER} anodising, aluminium sheet Cut-off, U and Metal working, average for aluminium product manufacturing {GLO} market for metal working, average for aluminium product manufacturing Cut-off, U

4.5.6 Components provided by Erdoğanlar Alüminyum A.S.

Since the primary data collected from the CIBES Poland site only contains the material processing step, supplier-specific data was collected from their largest supplier of aluminium, Erdoğanlar Alüminyum A.S., located in Istanbul and Kırklarel, Turkey. The data is representative for the component Guide profile and thus only used for that component. Transport from Erdoganlar to CIBES Poland is included with a distance of 2120 km by truck, using the dataset Transport, freight, lorry 16-32 metric ton, EURO5 {RoW}| transport, freight, lorry 16-32 metric ton, EURO5 | Cut-off, U.

Table 21: Modelling of 1 kg Aluminium guide profile from Erdoğanlar Alüminyum A.S.

Input/Output	Amount	LCI database representation	Origin	Transport	Transportation dataset	Comment
Output: 1 kg Guide profile (228 mm diameter)	1 kg	-	-	-	-	A total of 1.21 kg Aluminium input needed for 1 kg output
Raw material inputs						
Aluminium virgin	0.57 kg	87% Aluminium, primary, ingot {IAI Area, Asia, without China and GCC} aluminium				

		production, primary, ingot Cut-off, U And 13% Aluminium, primary, ingot {IAI Area, Gulf Cooperation Council} aluminium production, primary, ingot Cut-off, U	35% Turkey 27% Malaysia 13% United Arab Emirates 17% India 3% Tajikistan 5% Indonesia	Based on global dataset for Aluminium, wrought alloy	-	
Aluminium pre-consumer recycled	0.53 kg	Same as virgin aluminium				Conservative to model pre-consumer scrap as virgin.
Aluminium post-consumer recycled	0.21 kg	Aluminium, wrought alloy {RoW} treatment of aluminium scrap, post-consumer, prepared for recycling, at remelter Cut-off, U				
Consumables						
GARDOCLEAN T-5281 (Degreasing)	0.001133 kg	Degreasing, metal part in alkaline bath {RoW} degreasing, metal part in alkaline bath Cut-off, U	Kocaeli, Türkiye	Included in dataset	-	Dataset in m2. Area to be degreased calculated based on cylindrical shape of Alu profile with 228mm diameter.
Caustic Soda (Sodium Hydroxide)	0.076 kg	Sodium hydroxide, without water, in 50% solution state {RoW} market for sodium hydroxide, without water, in 50% solution state Cut-off, U – without transport	Yalova, Türkiye	Estimated to 300km by truck	Transport, freight, lorry 16-32 metric ton, EURO5 {RoW} transport, freight, lorry 16-32 metric ton, EURO5 Cut-off, U	To matt the surface of the profiles. Transport removed from market dataset since specific transport was added.
Caustic Soda (Sodium Hydroxide) + Additive	0.01167 kg	Sodium hydroxide, without water, in 50% solution state {RoW} market for sodium hydroxide,	Yalova, Türkiye			To matt the surface of the profiles. Transport removed from market dataset

		without water, in 50% solution state Cut-off, U – without transport				since specific transport was added.
Sulphuric acid	0.06933 kg	Sulfuric acid {RoW} sulfuric acid production Cut-off, U	Balıkesir, Türkiye			To create an anodized coating on the surface.
Acid Neutralization: Sulphuric acid + Additive	0.0013 kg	Sulfuric acid {RoW} sulfuric acid production Cut-off, U	Balıkesir, Türkiye			To neutralize the surface and prepare the profiles for anodizing
Tin Coloring: GARDO COLOR 7726 - POLIKOLOR 90	0.0015 kg	Chemical, inorganic {GLO} market for chemical, inorganic Cut-off, U	Kocaeli, Türkiye	Included in dataset	-	To color the anodized surface in brown and black tones.
Sealing Auxiliary Product: ALFISEAL 969	0.0064 kg	Polysulfide, sealing compound {RER} polysulfide production, sealing compound Cut-off, U	Andernach, Germany	Estimated to 2500 km by truck	Transport, freight, lorry 16-32 metric ton, EURO5 {RoW} transport, freight, lorry 16-32 metric ton, EURO5 Cut-off, U	To capture chemicals carried into the bath and keep the water pure while sealing the anodized surface.
Energy inputs						
Electricity, extrusion	0.30162 kWh	60% Electricity, medium voltage {TR} market for electricity, medium voltage Cut-off, U And 40% Electricity, low voltage {TR} electricity production, photovoltaic, 3kWp slanted-roof installation, multi-Si, panel, mounted Cut-off, U	Turkish national grid + 40% roof solar power plant.	Included in dataset	-	Average mix used since no residual mix is available for Turkey in ecoinvent.
Natural Gas, extrusion	0.0323 sm ³	Natural gas, burned in gas turbine {TR} natural gas, burned in gas turbine Cut-off, U	Unspecified		-	Converted from m3 to MJ based on 0.028 m3 per MJ (source: ecoinvent documentation)

Electricity, anodizing	0.41 kWh	Electricity, medium voltage {TR} market for electricity, medium voltage Cut-off, U	Turkish national grid		-	Average mix used since no residual mix is available for Turkey in ecoinvent.
Natural Gas, anodizing	0.51 kWh	Natural gas, burned in gas turbine {TR} natural gas, burned in gas turbine Cut-off, U	Unspecified		-	
Packaging						
Plastic, packaging material	0.005 kg	Packaging film, low density polyethylene {RoW} packaging film production, low density polyethylene Cut-off, U	İstanbul, Türkiye	Estimated to 100 km by truck	Transport, freight, lorry 16-32 metric ton, EURO5 {RoW} transport, freight, lorry 16-32 metric ton, EURO5 Cut-off, U	
Paper, packaging material	0.011 kg	Corrugated board box {RoW} corrugated board box production Cut-off, U	İstanbul, Türkiye			
Wood, Packaging material	0.038 kg	EUR-flat pallet {RoW} EUR-flat pallet production Cut-off, U	İstanbul, Türkiye			Converted from p to kg based on 25 kg per piece (source: ecoinvent documentation)
Production waste						
Plastic - recycled	1.30E-04 kg	Mixed plastics (waste treatment) {GLO} recycling of mixed plastics Cut-off, U	-	Estimated to 100 km by truck	Transport, freight, lorry 16-32 metric ton, EURO5 {RoW} transport, freight, lorry 16-32 metric ton, EURO5 Cut-off, U	Packaging material used for packing
Metal waste, non-ferrous metal - recycled	0.22 kg	Aluminium (waste treatment) {GLO} recycling of aluminium Cut-off, U	-			Aluminium scrap
Wood waste - recycled	3.00E-04 kg	Core board (waste treatment) {GLO} recycling of core board Cut-off, U	-			Packaging material used for packing
Caustic Waste	1.30E-02 kg	Hazardous waste, for incineration {RoW} market for hazardous	-			Caustic cleaning waste generated from the die cleaning process

		waste, for incineration Cut-off, U			
Sludges and filter cakes containing hazardous substances	0.00135 kg	Hazardous waste, for incineration {RoW} market for hazardous waste, for incineration Cut-off, U	-		Refers to the sludge accumulated at the bottom of anodizing baths.

4.5.7 Modelling of laminated MDF from Direktlaminat AB

Laminated medium-density fibreboard (MDF) makes up approximately 7.5% of the total product weight. The boards were modelled with generic data, but the split between MDF and laminate was estimated based on product specifications from the supplier. Based on this, 8.75 wt% is high-pressure laminate (HPL), and 91.25 wt% is MDF board. The boards were modelled as presented in Table 22.

Table 22: Modelling of laminated MDF from Direktlaminat AB.

Input/Output	Weight (kg)	LCI database representation	Database	Comment
Output: laminated MDF	1 kg	-	-	-
Input: MDF	0.9125	Medium density fibreboard {RER} market for medium density fibreboard Cut-off, U	ecoinvent	Conversion from m3 to kg based on a wet mass of 684 kg/m3, based on the ecoinvent documentation. $0.9125 * 1 / 684 = 0.00133 \text{ m}^3$
Input: HPL laminate	0.0875	Coating, with melamine impregnated paper {GLO} market for coating, with melamine impregnated paper Cut-off, U	ecoinvent	Conversion from m2 to kg based on the volume (0.00133 m3) and thickness (16mm) of the MDF. $(0.9125 * 1 / 684) / 0.016 = 0.0834 \text{ m}^2$

4.6 Transport of raw materials (A2)

Upstream transport of raw materials to CIBES in Gävle, Sweden, was modelled based on specific transportation distances for the suppliers listed in Table 23. For the remaining incoming material, the estimated values in Table 24 was used depending on the location of the supplier

Table 23: A2 modelling for specific suppliers

Supplier	Supplier location	Distance truck (km)	Dataset truck	Distance boat (km)	Dataset boat
Plieno Fortas	Siauliai, Lithuania	639	Transport, freight, lorry 16-32 metric ton, EURO5 {RER} transport, freight, lorry 16-32 metric ton, EURO5 Cut-off, U	N/A	N/A
EVI Industries	Kungsängen, Sweden	133		N/A	N/A
Proilplåt i Järbo	Järbo, Sweden	45		N/A	N/A

CIBES Poland	Gdansk, Poland	1055		300	Transport, freight, sea, ferry {GLO} market for transport, freight, sea, ferry Cut-off, U
--------------	----------------	------	--	-----	--

Table 24: A2 modelling for materials other than those presented in Table 23.

Supplier location	Distance truck (km)	Dataset truck	Distance boat (km)	Dataset boat
Germany	1000	Transport, freight, lorry 16-32 metric ton, EURO5 {RER} transport, freight, lorry 16-32 metric ton, EURO5 Cut-off, U	200	Transport, freight, sea, ferry {GLO} transport, freight, sea, ferry Cut-off, U
Sweden	500		0	N/A
China	1000	Transport, freight, lorry 16-32 metric ton, EURO5 {RoW} transport, freight, lorry 16-32 metric ton, EURO5 Cut-off, U Transport, freight, sea, ferry {GLO} transport, freight, sea, ferry Cut-off, U	25000	Transport, freight, sea, container ship {GLO} market for transport, freight, sea, container ship Cut-off, U
Poland	1000	Transport, freight, lorry 16-32 metric ton, EURO5 {RER} transport, freight, lorry 16-32 metric ton, EURO5 Cut-off, U	200	Transport, freight, sea, ferry {GLO} transport, freight, sea, ferry Cut-off, U
Italy	3000		200	Transport, freight, sea, ferry {GLO} transport, freight, sea, ferry Cut-off, U

Manufacturing (A3)

In this chapter, the activities carried out by CIBES Gävle are presented. Energy and waste data was collected for the total factory in 2024. The data was allocated to one (1) unit of C1 lift by dividing by the total number of lifts produced in the factory in 2024.

4.6.1 Energy

Table 25: Energy use at CIBES Gävle site, 1 year, 2024 (corresponding to 4060 produced lifts).

Category	Description	LCI data representation	Amount (kWh)	Certificate?	Comment
Electricity	65% nuclear and 35% renewable from Gävle Energi	MG Electricity, medium voltage {SE} CIBES supplier specific Cut-off, U	362131	Invoice	Modified ecoinvent dataset to represent the specific mix. An invoice stating the specific electricity mix is provided in Appendix 1. GWP-GHG performance of electricity mix: 0.017 kgCO ₂ eq./kWh.
Heating	District heating from Gävle Energi	Heat, district or industrial, other than natural gas {SE} heat	1315960	Invoice	Conservative dataset choice given the large amount of secondary

Residual heat from industrial processes (48%), wood by-products from forestry and scrap from wood- and paper industry (35%), flue gas condensation (7%), post-consumer wood waste (8%), electricity from renewable sources (1%), bio oil (1%), EO5 oil (0%)	and power co-generation, wood chips, 6667 kW, state-of-the-art 2014 Cut-off, U			sources in CIBES district heating mix.
---	--	--	--	--

4.6.2 Direct emissions

No direct emissions reported by CIBES.

4.6.3 Consumables

No consumables reported by CIBES.

4.6.4 Packaging

The packaging material needed for one unit of C1 lift is presented in Table 26. Since the wooden packaging from Tom Pall Produktion AB makes up a substantial part of the combined product and packaging weight, supplier-specific data was collected from this supplier. Data was collected about the production waste and energy consumption, about the type and origin of the material in the packaging as well as the transport to CIBES Gävle. The transport from Tom Pall to CIBES Gävle is modelled as 220 km by truck, using the dataset Transport, freight, lorry 16-32 metric ton, EURO5 {RER}| transport, freight, lorry 16-32 metric ton, EURO5 | Cut-off, U. Other details about the modelling of components from Tom Pall Produktion AB is given in Table 27.

The transport of other packaging material is assumed to be 500km by truck, based on that the suppliers are all located in Sweden. The unspecified cellular plastic material was assumed to be expanded polystyrene. This was considered a reasonable assumption given the small share of this component compared to the total mass.

Table 26: Packaging per 1 C1 lift

Type of Packaging	Material	Amount (kg)	Origin	LCI data representation in ecoinvent	Transport type	Transport distance (km)
Wooden packaging	Wood	354	Sweden	Supplier-specific data (Tom Pall Produktion AB)	Transport, freight, lorry 16-32 metric ton, EURO5 {RER} transport, freight, lorry 16-32 metric ton, EURO5 Cut-off, U	220
Wood box (other supplier)	Wood	90	Sweden	EUR-flat pallet {RER} EUR-flat pallet production Cut-off, U	Transport, freight, lorry 16-32 metric ton, EURO5 {RER} transport, freight, lorry 16-32 metric ton, EURO5 Cut-off, U	500
Plastic foam	EPE	1.2	Sweden	Polyethylene, low density, granulate {RER} polyethylene production, low density, granulate Cut-off, U +	Transport, freight, lorry 16-32 metric ton, EURO5 {RER} transport, freight, lorry 16-32 metric ton, EURO5 Cut-off, U	500

				Polymer foaming {RER} polymer foaming Cut-off, U		
Cardboard box	Cardboard	2	Sweden	Corrugated board box {RER} corrugated board box production Cut-off, U	Transport, freight, lorry 16-32 metric ton, EURO5 {RER} transport, freight, lorry 16-32 metric ton, EURO5 Cut-off, U	500
Cellular plastic	Plastic	0.4	Sweden	Polystyrene, expandable {RER} polystyrene production, expandable Cut-off, U + Polymer foaming {RER} polymer foaming Cut-off, U	Transport, freight, lorry 16-32 metric ton, EURO5 {RER} transport, freight, lorry 16-32 metric ton, EURO5 Cut-off, U	500

Table 27: Modelling of components from Tom Pall Produktion AB.

Input/Output	Material	Amount (kg)	Origin	LCI data representation in ecoinvent	Transport type	Transport distance (km)
Output: Wooden box	Wood	1 kg	-	-	-	-
Input: Plywood	Plywood	0.55 kg	Hässleholm, Sweden	Plywood {RER} plywood production Cut-off, U	Transport, freight, lorry 16-32 metric ton, EURO6 {RER} market for transport, freight, lorry 16-32 metric ton, EURO6 Cut-off, U	900
Input: Wood	Spruce or pine	0.47 kg	Gällö, Sweden	50% Sawlog and veneer log, softwood, measured as solid wood under bark {SE} softwood forestry, spruce, sustainable forest management Cut-off, U And 50% Sawlog and veneer log, softwood, measured as solid wood under bark {SE} softwood forestry, pine, sustainable forest management Cut-off, U		150
Input: Electricity	-	0.05 kWh	-	Electricity, medium voltage {SE} electricity, medium voltage, residual mix Cut-off, U	-	-
Output: Plywood waste	Recycling	0.014 kg	-	Paper (waste treatment) {GLO} recycling of paper Cut-off, U	Transport, freight, lorry 16-32 metric ton, EURO6 {RER} market for transport, freight, lorry 16-32 metric ton, EURO6 Cut-off, U	100

4.6.5 Internal transports

1440 litres of diesel was used for internal transport between the factory and its storage facilities. This was allocated to one C1 lift based on the total number of lifts produced in 2024. The burning of diesel was modelled using the following ecoinvent dataset: Diesel, burned in building machine {GLO}| market for diesel, burned in building machine | Cut-off, U. Conversion between litres and MJ based on a heating value of 38 MJ/litre.

4.6.6 Production waste

The waste generated at the CIBES Gävle in 2024 is presented in Table 28. The table also includes the type of waste treatment reported by CIBES as well as the waste treatment dataset used in the model. The production of the material being wasted is also reported here, but included as part of the A1 module since this is part of the upstream activities. All production waste is assumed to be transported 100 km by truck using the dataset Transport, freight, lorry 16-32 metric ton, EURO5 {RER}| transport, freight, lorry 16-32 metric ton, EURO5 | Cut-off, U.

Table 28: Production waste types and treatment at CIBES Gävle site, 1 year, 2024 (corresponding to 4060 produced lifts).

Type	Quantity (kg)	Upstream production (part of A1)	Treatment type	Treatment dataset	Comment
Batteries, aerosols and glue	1175	Not included, not considered part of the C1 product.	100% recycling	Hazardous waste, for incineration {Europe without Switzerland} market for hazardous waste, for incineration Cut-off, U	Modeled as incineration rather than recycling to be conservative.
Aluminum	12294	Aluminium, wrought alloy {GLO} market for aluminium, wrought alloy Cut-off, U + Metal working, average for aluminium product manufacturing {GLO} market for metal working, average for aluminium product manufacturing Cut-off, U	100% recycling	Aluminium (waste treatment) {GLO} recycling of aluminium Cut-off, U	Empty dataset due to cut-off method for end-of-life allocation
Paper/Cardboard	12725	Corrugated board box {RER} market for corrugated board box Cut-off, U	100% recycling	Core board (waste treatment) {GLO} recycling of core board Cut-off, U	Empty dataset due to cut-off method for end-of-life allocation
Iron	29520	Steel, low-alloyed, hot rolled {GLO} market for steel, low-alloyed, hot rolled Cut-off, U	100% recycling	Steel and iron (waste treatment) {GLO} recycling of steel and iron Cut-off, U	Empty dataset due to cut-off method for end-of-life allocation
Wood	116630	[MG] Sawnwood in kg, softwood, raw, dried (u=10%) {RER} market for sawnwood, softwood, raw, dried (u=10%) Cut-off, U	77% recycling,	Core board (waste treatment) {GLO} recycling of core board Cut-off, U	Empty dataset due to cut-off method for end-of-life allocation
			27% incineration	Waste wood, untreated {GLO} treatment of waste wood, untreated, municipal incineration Cut-off, U	
Glass	1600	Packaging glass, white {RER w/o CH+DE} packaging glass production, white Cut-off, U	100% recycling	Packaging glass, white (waste treatment) {GLO} recycling of	Empty dataset due to cut-off method for end-of-life allocation

				packaging glass, white Cut-off, U	
Plastic	4224	Packaging film, low density polyethylene {GLO} market for packaging film, low density polyethylene Cut-off, U	100% recycling	Mixed plastics (waste treatment) {GLO} recycling of mixed plastics Cut-off, U	Empty dataset due to cut-off method for end-of-life allocation

4.7 Transport of finished goods (A4)

The finished products are loaded onto a truck. The total weight, including packaging, is 1690 kg.

Table 29: Distribution of products

Quantity (kg)	Transport type	Distance (km)	Comment
1690 (Product + Packaging)	Transport, freight, lorry 16-32 metric ton, euro6 {RER} market for transport, freight, lorry 16-32 metric ton, EURO6 Cut-off, U	1600 km	Amount represents the distance between Cibes facilities in Gävle and the location of an average customer (in central Europe, approximated by Amsterdam) (Google Maps).

4.8 Installation (A5)

A small amount of electricity is needed to run the lift during the installation process, but this is considered negligible. Moreover, the transport of the installation technicians to the site is considered negligible.

The following material inputs are needed during installation: Cleaning chemicals (100 ml, considered negligible), paper towels (considered negligible), drill bits and screws. There is no data on the amount of drill bits needed for one installation, and this was considered to fall under the cut-off threshold. The screws are already included in the BoM list and is thus calculated as part of module A1.

Table 30 presents the disposal of the packaging at the installation site, along with the disposal of steel waste from cutting the steel shafts during installation. The split between disposal methods is based on EU averages from the Annex C to the PEF method (Directorate-General for Environment, 2021). Please note that expanded PE is assumed to have a zero percent recycling rate, just like polystyrene.

The waste treatment modelling for the outputs follows the modelling as defined in PCR 2019:14. In short, this includes dismantling of material, transport to waste treatment, sorting and processing of material before sent to waste treatment. See Appendix End-of-life modelling based on PCR 2019:14 for modelling details.

Table 30: Disposal of packaging delivered with the product, as well as of steel waste from cutting the steel shafts at installation.

Type of material and amount			Waste treatment statistics		
Material	Share of recycled content in material for D module calculations ($Share_{MRin}$)	Amount in packaging (kg)	Share Recycling ($Share_{MRout}$)	Share incineration	Share landfilling

Steel	0%	1 (cuttings of steel shaft)	85%	7%	8%
Wood	0%	444	0%	46%	54%
Cardboard	0%	2	75%	12%	14%
Plastic (Polystyrene and EPE, both expanded)	0%	1,6	0%	46%	54%

4.9 Usage and maintenance (B1-B7)

The use of the lift entails energy use and some maintenance. Regarding energy use of the lift, the base performance data was originally obtained from on-site measurements of a 3-stop lift with a travel height of 5.66 m (see certificate from Liftinstituut in Appendix 6). For the present assessment, these data have been recalculated for a 2-stop lift configuration with a travel height of 3.5 m. The recalculation follows exactly the same calculation formulas and methodology as applied in the initial energy performance report (see “C1 (C90) energy comparison 3-stop 5,66m / 2-stop 3,5m” in Appendix 6). All calculations have been carried out in accordance with ISO 25745 to ensure consistency, comparability, and compliance with the standard methodology.

Based on the calculations, the yearly energy use of the 2-stop C1 lift was 282 kWh. Over the reference service life of 25 years, the total energy use is then 7.05 MWh, which was modelled with the process “Electricity, low voltage {Europe without Switzerland}| market group for | Cut-off, U”, to reflect an average European customer.

Maintenance was simply modelled as a change of oil, see Table 31.

Table 31: Materials and energy consumed in the use phase

Material or energy	Quantity	Reference service life	LCI data representation in Ecoinvent	Comment
Energy	7.05 MWh	25 years	Electricity, low voltage {Europe without Switzerland} market group for Cut-off, U	Electricity mix chosen to represent an average European customer GWP-GHG performance of electricity mix: 0.34 kgCO2eq/kWh.
Lubricating oil	6.25 kg	25 years	Lubricating oil {RER} market for lubricating oil Cut-off, U	250 ml per 1 lift per year for 25 years. Density conservatively assumed to be 1kg per liter

4.10 End-of-Life (C1-C4) + potential benefits and loads from material recycling or energy recovery (D module)

The end-of-life phase handles the product and the material it consists of after its use. The final handling includes dismantling of the product, transport to a facility for waste treatment, also energy and materials used for preparation for waste treatment and final waste treatment. If the material is recycled or reused into a new product, the environmental aspects of the processing of the secondary material are allocated to the life cycle of the new product. The end-of-life stage is divided into

several modules, according to the requirements in the PCR; dismantling, transport to waste treatment, waste treatment and final disposal.

According to PCR 2019:14, the end-of-life treatment processes of the product may depend on the destination of the product and on the end-of-life treatment alternatives available where the product is expected to be disposed. For these reasons, the end-of-life stage can be evaluated using one or several scenarios representing the geographical scope. If any of the declared scenarios is a mix of end-of-life alternatives (reuse, recycling, incineration with energy recovery, landfill, etc.), also the corresponding 100% scenarios² (100% reuse, 100% recycling, 100% incineration with energy recovery, 100% landfill, etc.) of relevance shall be declared.

Explanation to end-of-life modules for the product

The different modules for end-of-life are partly based on default data as presented in PCR 2019:14, Table 4, see Appendix 9 for the default data and how these have been modelled.

Explanation of the different end-of-life modules:

C1 – Dismantling or deconstruction of the product

C2 – Transport to waste management

C3 – Preparation for waste treatment and waste incineration with energy recovery

C4 - Incineration without energy recovery and of incineration of hazardous waste, and landfilling.

The end-of-life modules are modelled using a European scenario since most customers exist here. Recycling rates for different materials have been adjusted according to post-consumer non-packaging recycling rates (R2) used in the Circular footprint formula of PEF, as found in Annex C³. The remaining waste is assumed to be incinerated (54%) and landfilled (46%), according to the European average scenario stated in PEF Annex C.

Modules C1, C2, C3, and C4 are modelled using the default values as presented in the PCR 2019:14, see Appendix 9 for further details. Furthermore, C3 and C4 are also modelled using datasets for incineration and landfill for the materials in the product.

The 100% scenarios for end-of-life modules are also modelled according to PCR, here the relevant scenarios for the product are: 100% reuse, 100% recycling, 100% incineration with energy recovery, 100% landfill.

What is included in the modelling for end-of-life of these materials can be found in Appendix 9.

Explanation to D-module for the output flows from the lifecycle

Module D aims to describe potential benefits or loads that can be related to material and energy recovery as well as reuse outside the system boundary. Recycled material or energy has the potential to replace primary resources that would otherwise have been used in new products if the recycled material had not been available. This benefit is calculated with the D-module. For products that contain recycled material as raw material, the recycled share is deducted to avoid double counting. The scenarios included are based on the end-of-life model in module C and representative for one of

² Note that a 100% scenario of, for example, recycling, means that a product is to 100% sent to recycling. As there may be losses in the recycling process or materials and components that cannot be recycled, the share of the product that is actually recycled may be lower than 100%.

³ R2 values, available at <https://eplca.jrc.ec.europa.eu/LCDN/developerEF.xhtml>

the most probable alternatives. The D-module contains net output flows of recovered material and energy from modules A-C. How the D module is calculated and modelled is described in Appendix 10.

As mentioned, the D-module contains net output flows of recovered material and energy from modules A-C. The 100% scenarios for end-of-life modules are also included in the calculations for the D module but then only for the end-of-life of the product and output flows from A5 (mainly packaging waste).

Output flows to the D-module for the packaging is presented in 4.8 Installation (A5). Below are tables presenting data for:

- End-of life product, modules C + D
- D module for remaining output flows, modules A-B (except A5).

The modelling details for the D-module can be found in Appendix 10.

Modelling input parameters for product end-of-life and D-module

Table 32 End-of-life modelling of product (C + D), statistics based on waste scenario and European statistics for incineration and landfilling.

Type of material and amount			Waste treatment statistics		
Material	Share of recycled content in material ($Share_{MRin}$)	Amount in product (kg)	Share Recycling ($Share_{MRout}$)	Share incineration	Share landfilling
Steel	0%	961.1	85%	7%	8%
Wood	0%	105.46	0%	46%	54%
Cardboard	0%	0	75%	12%	14%
Paper	0%	0.5	62%	17%	21%
Glass	0%	0	0%	46%	54%
Copper	0%	13.1	90%	5%	5%
Aluminium	5%	87.2	85%	7%	8%
Plastic	0%	42.8	0%	46%	54%
Rubber	0%	7.1	0%	46%	54%
Textile	0%	0	11%	41%	48%
Electronics	0%	37.0	Copper and plastic are used as a proxy, assumed to be 50%/50% content. ⁴		

The tables below show waste treatment of net output flows from the remaining modules A-B.

Modelling input parameters to D module of remaining output flows, modules A-B (except A5)

The tables below show waste treatment of net output flows from the remaining modules A-B (except A5) for one lift.

Table 33 End-of-life statistics based on waste scenario and European statistics for incineration and landfilling

⁴ According to PEF R2, there are high recycling rates for materials in e.g photovoltaics and electrical appliances.

Type of material and amount				Waste treatment statistics		
Material	Module where net output flow arises	Share of recycled content in material ($Share_{MRin}$)	Amount in output flow (kg)	Share Recycling ($Share_{MRout}$)	Share incineration	Share landfilling
Steel	A3	0%	7,3	98%	1%	1%
Wood	A3	0%	28,7	6%	43%	51%
Cardboard	A3	0%	3,1	90%	5%	5%
Glass	A3	0%	0,4	0%	46%	54%
Aluminium	A3	5%	3,0	100%	0%	0%
Plastic	A3	0%	1,0	39%	28%	33%

5 Result of Life cycle impact assessment (LCIA)

In this section, the results from the different environmental impact assessment methods will be presented. The LCIA method follows the standard for Construction Products EN 15804:2012+A2:2019/AC:2021 (CEN, 2021). EN 15804:2012+A2:2019/AC:2021 uses the impact categories and characterization factors of the LCIA methods used in Environmental Footprint 3.1 (EF 3.1), with the only difference that biogenic carbon dioxide uptake is calculated as -1 and biogenic carbon dioxide emissions as +1, where EF 3.1 calculates this as 0 and 0, respectively.

In addition to the climate impact indicator required in EN 15804:2012+A2:2019/AC:2021, the PCR for Construction Products requires reporting of climate impact with the GWP-GHG indicator, where the characterization factor for biogenic carbon dioxide is set to zero. This is calculated with the IPCC 2021 GWP 100 method.

The results are presented in the following order:

1. Environmental footprint midpoint using the EF 3.1 method, adapted to EN 15804:2012+A2:2019/AC:2021
2. Environmental footprint endpoint using the EF 3.1 method, adapted to EN 15804:2012+A2:2019/AC:2021
3. Climate impact using the GWP-GHG indicator
4. Use of resources and energy using the CED 1.12 method and inventory results based on the list of aspects required by the PCR

Note that the LCIA results are relative expressions, which means that they do not predict impacts on category endpoints or the exceeding of thresholds, safety margins or risk. For further details on the LCIA method and impact categories, Appendix 2 -Appendix 4.

Sankey diagrams are used to display the results as flow diagrams where the thickness of the arrows reflects the relative amount of that flow. All the nodes cannot be displayed simultaneously due to the vast amounts of background data. Therefore, only processes that contribute to a minimum of 5% of total impacts are shown in the diagram.

Disclaimer 1: The results of the environmental impact indicators Abiotic depletion for fossil and non-fossil resources, Water depletion potential, Ecotoxicity-freshwater, Human toxicity-cancer, Human toxicity-non-cancer and Land use shall be used with care as the uncertainties of these results are high or as there is limited experience with the indicator.

Disclaimer 2: The indicator GWP-GHG includes all greenhouse gases included in GWP-total but excludes biogenic carbon dioxide uptake and emissions and biogenic carbon stored in the product. This indicator is thus equal to the GWP indicator originally defined in EN 15804:2012+A1:2013.

Disclaimer 3: The use of the results of modules A1-A3 without considering the results of module C is discouraged.

Disclaimer 4: The indicator Ionising radiation deals mainly with the eventual impact of low dose ionizing radiation on human health of the nuclear fuel cycle. It does not consider effects due to possible nuclear accidents, occupational exposure nor due to radioactive waste disposal in underground facilities. Potential ionizing radiation from the soil, from radon and from some construction materials is also not measured by this indicator.

Disclaimer 5: The results of the impact categories abiotic depletion of minerals and metals, land use, human toxicity (cancer), human toxicity, noncancer and ecotoxicity (freshwater) may be highly uncertain in LCAs that include capital goods/infrastructure in generic datasets, in case infrastructure/capital goods contribute greatly to the total results. This is because the LCI data of infrastructure/capital goods used to quantify these indicators in currently available generic datasets sometimes lack temporal, technological and geographical representativeness. Caution should be exercised when using the results of these indicators for decision-making purposes.

5.1 Environmental Footprint Midpoint

Table 34 shows the result per C1 lift according to the LCIA method EN15804 impact assessment method, based on Environmental footprint 3.1 midpoint level. Table 35 shows the result per functional unit (tkm).

Table 34: Environmental footprint midpoint results per C1 lift (1 p) (EN15804 impact assessment method).

Impact category	Unit	A1-C4 (total)	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
GWP Total	kg CO ₂ eq	1.03E+04	7.00E+03	5.09E+02	1.80E+02	0.00E+00	9.83E+00	0.00E+00	0.00E+00	0.00E+00	2.37E+03	0.00E+00	5.01E-01	2.06E+01	2.31E+02	7.45E+00	-2.20E+03
GWP Fossil	kg CO ₂ eq	1.03E+04	7.26E+03	5.09E+02	1.78E+01	0.00E+00	9.82E+00	0.00E+00	0.00E+00	0.00E+00	2.36E+03	0.00E+00	5.01E-01	2.06E+01	8.39E+01	3.97E+00	-2.19E+03
GWP Biogenic	kg CO ₂ eq	4.82E+01	-2.70E+02	1.09E-01	1.62E+02	0.00E+00	9.57E-03	0.00E+00	0.00E+00	0.00E+00	5.42E+00	0.00E+00	5.56E-05	4.34E-03	1.47E+02	3.48E+00	-2.66E+00
GWP LULUC	kg CO ₂ eq	1.76E+01	1.04E+01	1.71E-01	2.10E-02	0.00E+00	6.79E-03	0.00E+00	0.00E+00	0.00E+00	6.95E+00	0.00E+00	5.12E-05	6.82E-03	3.16E-03	1.42E-03	-1.38E+01
ODP	kg CFC11 eq	1.77E-04	1.20E-04	1.11E-05	3.46E-07	0.00E+00	6.11E-07	0.00E+00	0.00E+00	0.00E+00	4.41E-05	0.00E+00	7.44E-09	4.49E-07	9.69E-08	7.52E-08	-2.12E-05
AP	mol H+ eq	5.90E+01	4.41E+01	1.09E+00	9.23E-02	0.00E+00	4.30E-02	0.00E+00	0.00E+00	0.00E+00	1.35E+01	0.00E+00	4.47E-03	6.61E-02	5.93E-02	2.02E-02	-1.76E+01
EP - Freshwater	kg P eq	6.19E+00	3.89E+00	3.53E-02	3.79E-03	0.00E+00	2.10E-03	0.00E+00	0.00E+00	0.00E+00	2.26E+00	0.00E+00	1.61E-05	1.41E-03	1.30E-03	1.87E-03	-1.74E+00
EP - Marine	kg N eq	1.07E+01	8.10E+00	2.63E-01	1.22E-01	0.00E+00	7.53E-03	0.00E+00	0.00E+00	0.00E+00	2.16E+00	0.00E+00	2.08E-03	2.23E-02	2.88E-02	2.68E-02	-2.23E+00
EP - Terrestrial	mol N eq	1.12E+02	8.91E+01	2.84E+00	4.19E-01	0.00E+00	7.85E-02	0.00E+00	0.00E+00	0.00E+00	1.91E+01	0.00E+00	2.28E-02	2.42E-01	2.87E-01	8.48E-02	-2.44E+01
POCP	kg NMVOC eq	3.67E+01	2.83E+01	1.73E+00	1.37E-01	0.00E+00	1.95E-01	0.00E+00	0.00E+00	0.00E+00	6.11E+00	0.00E+00	6.82E-03	1.00E-01	7.98E-02	3.04E-02	-8.25E+00
ADPE	kg Sb eq	2.76E-01	2.42E-01	1.75E-03	4.17E-05	0.00E+00	8.46E-05	0.00E+00	0.00E+00	0.00E+00	3.13E-02	0.00E+00	1.79E-07	6.94E-05	7.14E-06	7.35E-06	-1.10E-01
ADPF	MJ	1.55E+05	9.31E+04	7.23E+03	2.34E+02	0.00E+00	3.96E+02	0.00E+00	0.00E+00	0.00E+00	5.40E+04	0.00E+00	6.52E+00	2.92E+02	8.18E+01	6.12E+01	-2.92E+04
WDP	m3 depriv.	2.39E+03	1.79E+03	2.84E+01	1.27E-01	0.00E+00	2.19E+00	0.00E+00	0.00E+00	0.00E+00	5.69E+02	0.00E+00	1.39E-02	1.13E+00	6.46E-01	1.03E+00	-2.60E+02

PM	disease inc.	5.95E-04	5.03E-04	3.81E-05	1.86E-06	0.00E+00	3.99E-07	0.00E+00	0.00E+00	0.00E+00	4.80E-05	0.00E+00	1.28E-07	1.65E-06	1.07E-06	5.08E-07	-1.67E-04
IR	kBq U-235 eq	2.01E+03	4.99E+02	8.73E+00	4.46E-01	0.00E+00	8.61E-01	0.00E+00	0.00E+00	0.00E+00	1.50E+03	0.00E+00	2.78E-03	3.48E-01	6.03E-01	9.98E-02	-3.49E+02
ETP – FW	CTUe	5.64E+04	4.73E+04	9.70E+02	5.22E+01	0.00E+00	3.33E+01	0.00E+00	0.00E+00	0.00E+00	7.70E+03	0.00E+00	3.53E-01	3.87E+01	1.72E+02	1.18E+02	-1.45E+04
HTP - C	CTUh	8.67E-06	7.91E-06	8.50E-08	6.83E-09	0.00E+00	2.39E-09	0.00E+00	0.00E+00	0.00E+00	6.49E-07	0.00E+00	5.09E-11	3.49E-09	5.56E-09	2.06E-09	-3.90E-06
HTP - NC	CTUh	1.93E-04	1.51E-04	4.54E-06	4.55E-07	0.00E+00	1.04E-07	0.00E+00	0.00E+00	0.00E+00	3.64E-05	0.00E+00	8.00E-10	1.82E-07	2.48E-07	3.33E-08	-9.37E-05
Land use, SQP	Pt	1.06E+05	9.10E+04	4.34E+03	1.36E+02	0.00E+00	3.50E+01	0.00E+00	0.00E+00	0.00E+00	1.05E+04	0.00E+00	4.33E-01	1.73E+02	1.00E+01	1.01E+02	-1.55E+04
GWP-GHG	kg CO ₂ eq	1.03E+04	7.29E+03	5.09E+02	3.25E+01	0.00E+00	9.83E+00	0.00E+00	0.00E+00	0.00E+00	2.37E+03	0.00E+00	5.01E-01	2.06E+01	8.39E+01	7.45E+00	-2.20E+03
Acronyms	GWP: Global Warming Potential, LULUC: Land Use and Land Use Change, ODP: Ozone Depletion Potential, AP: Acidification Potential, EP: Eutrophication Potential, POCP: Photochemical Ozone Creation Potential, ADPE: Abiotic Depletion Potential – Elements, ADPF: Abiotic Depletion Potential – Fossil Fuels, WDP: Water Scarcity Footprint, PM: Particulate Matter, IRP: Ionizing Radiation - Human Health, ETP-FW: Ecotoxicity Potential – Freshwater, HTP-C: Human Toxicity Potential – Cancer, HTP-NC: Human Toxicity Potential – Non-Cancer, SQP: Soil Quality Potential Index, GWP-GHG: Global Warming Potential, Greenhouse Gases																
Legend	A1-C4: Sum of impacts inside system boundary, A1: Raw Material, A2: Raw Material Transport, A3: Manufacturing, A1-A3: Sum of A1-A3, A4 Transport to Customer, A5: Installation, B1: Use, B2: Maintenance, B3: Repair, B4: Replacement, B5: Refurbishment, B6: Operational Energy Use, B7: Operational Water Use, C1: Deconstruction, C2: Waste Transport, C3: Waste Processing, C4: Disposal, D: Reuse, Recovery, Recycling Potential																

Table 35: Environmental footprint midpoint results per functional unit (tkm) for the C1 lift (EN15804 impact assessment method).

Impact category	Unit	A1-C4 (total)	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
GWP Total	kg CO ₂ eq	1.92E+02	1.31E+02	9.47E+00	3.12E+00	0.00E+00	1.83E-01	0.00E+00	0.00E+00	0.00E+00	4.41E+01	0.00E+00	9.32E-03	3.83E-01	4.08E+00	1.39E-01	-4.10E+01
GWP Fossil	kg CO ₂ eq	1.91E+02	1.35E+02	9.47E+00	3.30E-01	0.00E+00	1.83E-01	0.00E+00	0.00E+00	0.00E+00	4.38E+01	0.00E+00	9.31E-03	3.83E-01	1.56E+00	7.38E-02	-4.07E+01
GWP Biogenic	kg CO ₂ eq	8.97E-01	-4.58E+00	2.02E-03	2.79E+00	0.00E+00	1.78E-04	0.00E+00	0.00E+00	0.00E+00	1.01E-01	0.00E+00	1.03E-06	8.07E-05	2.52E+00	6.47E-02	-4.96E-02
GWP LULUC	kg CO ₂ eq	3.28E-01	1.94E-01	3.19E-03	3.90E-04	0.00E+00	1.26E-04	0.00E+00	0.00E+00	0.00E+00	1.29E-01	0.00E+00	9.53E-07	1.27E-04	5.88E-05	2.64E-05	-2.57E-01
ODP	kg CFC11 eq	3.29E-06	2.23E-06	2.07E-07	6.43E-09	0.00E+00	1.14E-08	0.00E+00	0.00E+00	0.00E+00	8.20E-07	0.00E+00	1.38E-10	8.36E-09	1.80E-09	1.40E-09	-3.95E-07
AP	mol H+ eq	1.10E+00	8.20E-01	2.03E-02	1.72E-03	0.00E+00	8.01E-04	0.00E+00	0.00E+00	0.00E+00	2.52E-01	0.00E+00	8.32E-05	1.23E-03	1.10E-03	3.77E-04	-3.27E-01
EP - Freshwater	kg P eq	1.15E-01	7.23E-02	6.57E-04	7.05E-05	0.00E+00	3.91E-05	0.00E+00	0.00E+00	0.00E+00	4.21E-02	0.00E+00	3.00E-07	2.61E-05	2.42E-05	3.48E-05	-3.24E-02

EP - Marine	kg N eq	2.00E-01	1.51E-01	4.90E-03	2.28E-03	0.00E+00	1.40E-04	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.02E-02	0.00E+00	3.87E-05	4.14E-04	5.36E-04	4.99E-04	-4.14E-02
EP - Terrestrial	mol N eq	2.09E+00	1.66E+00	5.29E-02	7.80E-03	0.00E+00	1.46E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	3.56E-01	0.00E+00	4.24E-04	4.50E-03	5.33E-03	1.58E-03	-4.55E-01
POCP	kg NMVOC eq	6.83E-01	5.27E-01	3.22E-02	2.56E-03	0.00E+00	3.63E-03	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.14E-01	0.00E+00	1.27E-04	1.86E-03	1.48E-03	5.65E-04	-1.53E-01
ADPE	kg Sb eq	5.13E-03	4.51E-03	3.25E-05	7.77E-07	0.00E+00	1.57E-06	0.00E+00	0.00E+00	0.00E+00	0.00E+00	5.83E-04	0.00E+00	3.32E-09	1.29E-06	1.33E-07	1.37E-07	-2.04E-03
ADPF	MJ	2.89E+03	1.73E+03	1.35E+02	4.35E+00	0.00E+00	7.37E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.00E+03	0.00E+00	1.21E-01	5.43E+00	1.52E+00	1.14E+00	-5.44E+02
WDP	m3 depriv.	4.45E+01	3.33E+01	5.29E-01	2.36E-03	0.00E+00	4.07E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.06E+01	0.00E+00	2.59E-04	2.11E-02	1.20E-02	1.92E-02	-4.83E+00
PM	disease inc.	1.11E-05	9.37E-06	7.09E-07	3.46E-08	0.00E+00	7.42E-09	0.00E+00	0.00E+00	0.00E+00	0.00E+00	8.92E-07	0.00E+00	2.38E-09	3.06E-08	2.00E-08	9.46E-09	-3.11E-06
IR	kBq U-235 eq	3.74E+01	9.29E+00	1.62E-01	8.29E-03	0.00E+00	1.60E-02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	2.79E+01	0.00E+00	5.17E-05	6.48E-03	1.12E-02	1.86E-03	-6.49E+00
ETP - FW	CTUe	1.05E+03	8.79E+02	1.81E+01	9.71E-01	0.00E+00	6.19E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.43E+02	0.00E+00	6.58E-03	7.20E-01	3.20E+00	2.20E+00	-2.71E+02
HTP - C	CTUh	1.61E-07	1.47E-07	1.58E-09	1.27E-10	0.00E+00	4.44E-11	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.21E-08	0.00E+00	9.47E-13	6.50E-11	1.03E-10	3.83E-11	-7.25E-08
HTP - NC	CTUh	3.60E-06	2.82E-06	8.45E-08	8.47E-09	0.00E+00	1.94E-09	0.00E+00	0.00E+00	0.00E+00	0.00E+00	6.78E-07	0.00E+00	1.49E-11	3.39E-09	4.62E-09	6.20E-10	-1.74E-06
Land use, SQP	Pt	1.98E+03	1.69E+03	8.08E+01	2.53E+00	0.00E+00	6.52E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	1.95E+02	0.00E+00	8.05E-03	3.21E+00	1.86E-01	1.87E+00	-2.89E+02
GWP-GHG	kg CO2 eq	1.92E+02	1.36E+02	9.47E+00	6.05E-01	0.00E+00	1.83E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	4.41E+01	0.00E+00	9.32E-03	3.83E-01	1.56E+00	1.39E-01	-4.10E+01
Acronyms		GWP: Global Warming Potential, LULUC: Land Use and Land Use Change, ODP: Ozone Depletion Potential, AP: Acidification Potential. EP: Eutrophication Potential, POCP: Photochemical Ozone Creation Potential, ADPE: Abiotic Depletion Potential – Elements, ADPF: Abiotic Depletion Potential – Fossil Fuels, WDP: Water Scarcity Footprint, PM: Particulate Matter, IRP: Ionizing Radiation - Human Health, ETP-FW: Ecotoxicity Potential – Freshwater, HTP-C: Human Toxicity Potential – Cancer, HTP-NC: Human Toxicity Potential – Non-Cancer, SQP: Soil Quality Potential Index, GWP-GHG: Global Warming Potential, Greenhouse Gases																
Legend		A1-C4: Sum of impacts inside system boundary, A1: Raw Material, A2: Raw Material Transport, A3: Manufacturing, A1-A3: Sum of A1-A3, A4 Transport to Customer, A5: Installation, B1: Use, B2: Maintenance, B3: Repair, B4: Replacement, B5: Refurbishment, B6: Operational Energy Use, B7: Operational Water Use, C1: Deconstruction, C2: Waste Transport, C3: Waste Processing, C4: Disposal, D: Reuse, Recovery, Recycling Potential																

5.2 Environmental Footprint Endpoint

The environmental footprint endpoint shows the contribution of each environmental impact category to the total environmental impact. The result shows that environmental impact categories were Cibes C1 Pure Lift have the most impact to are resource use of minerals and metals, climate change and resource use fossils. Figure 10 shows that most impact occurs due to the electricity consumed in the use phase and due to component manufacturing.

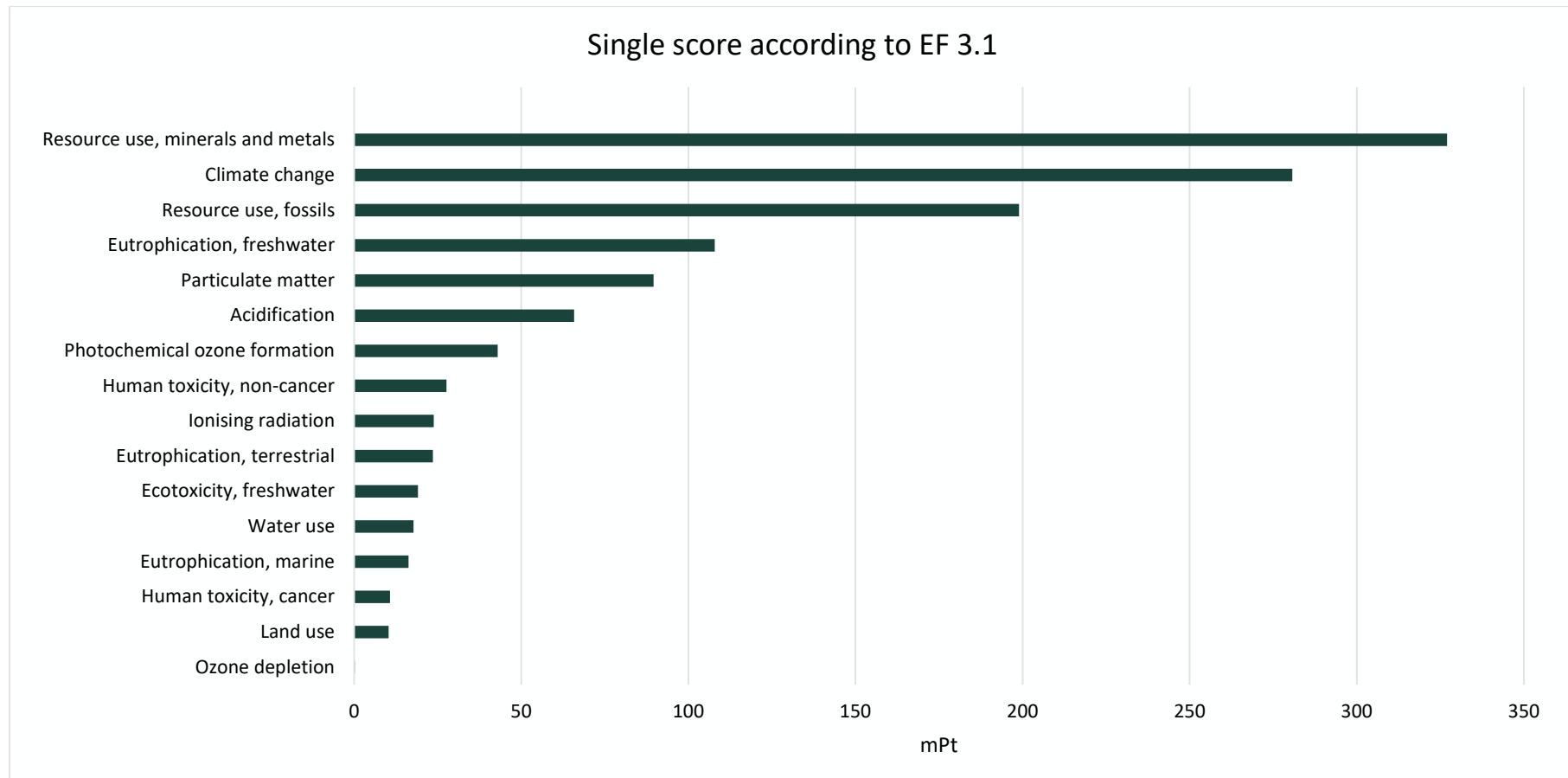


Figure 9: Share of environmental impact per impact category (per 1 C1 lift).

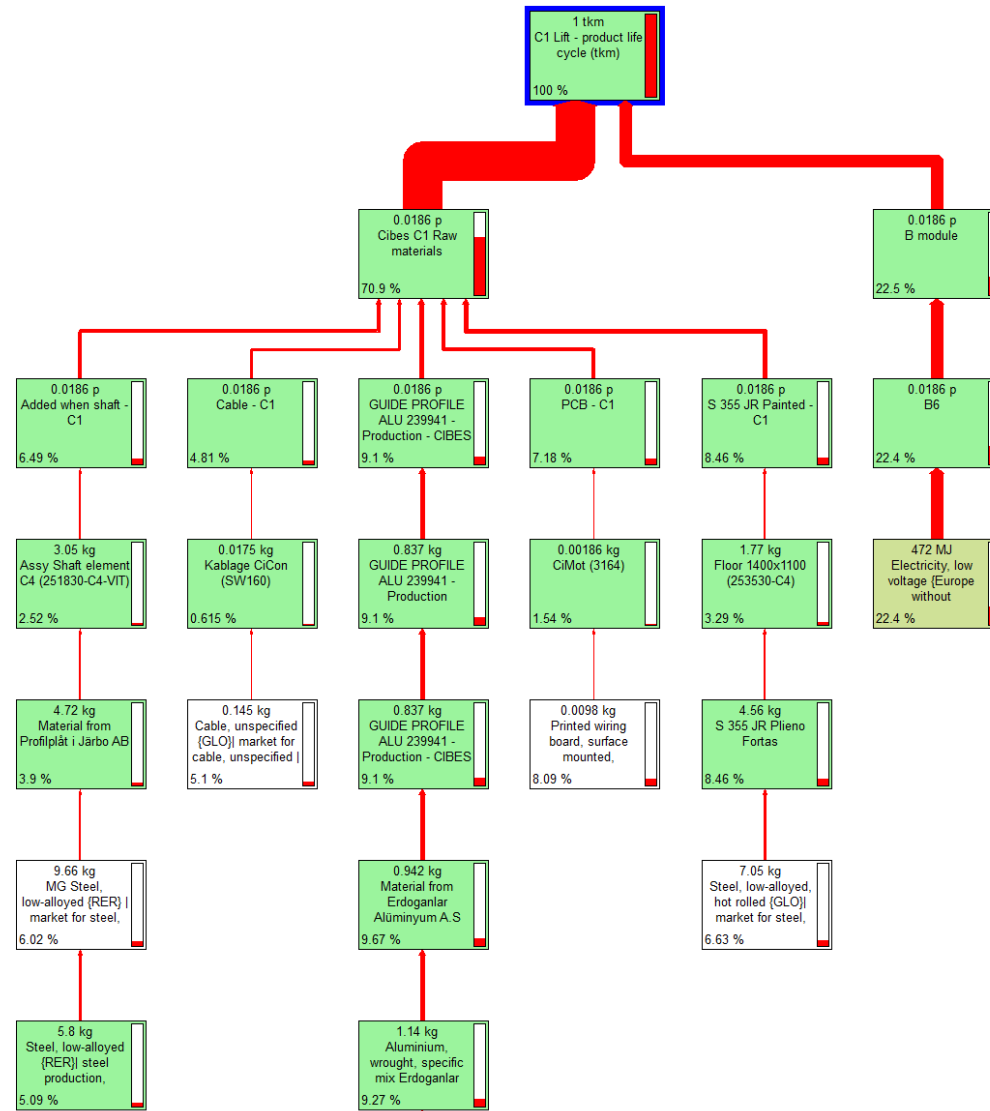


Figure 10: Sankey diagram over share of environmental impact contributions per module and per functional unit (EF3.1 single score, cut off 5%)

5.3 Climate impact (GWP-GHG)

The total GWP-GHG impact per lift is calculated as 10300 kgCO₂eq./unit, whereof the use phase contributes approximately 2370 kgCO₂eq. The A1 module contributes approximately 7000 kgCO₂eq./unit. Table 36 shows the GWP-GHG contribution per component for components that cumulatively make up 90% of the A1 impact.

The climate change impact per functional unit (tkm) is presented in Figure 11 and Figure 12. The Sankey diagram shows all processes that contribute more than 5% to the total climate impact. Upstream material production (A1) clearly dominates the climate change impact, followed by electricity consumption during the use phase (B6).

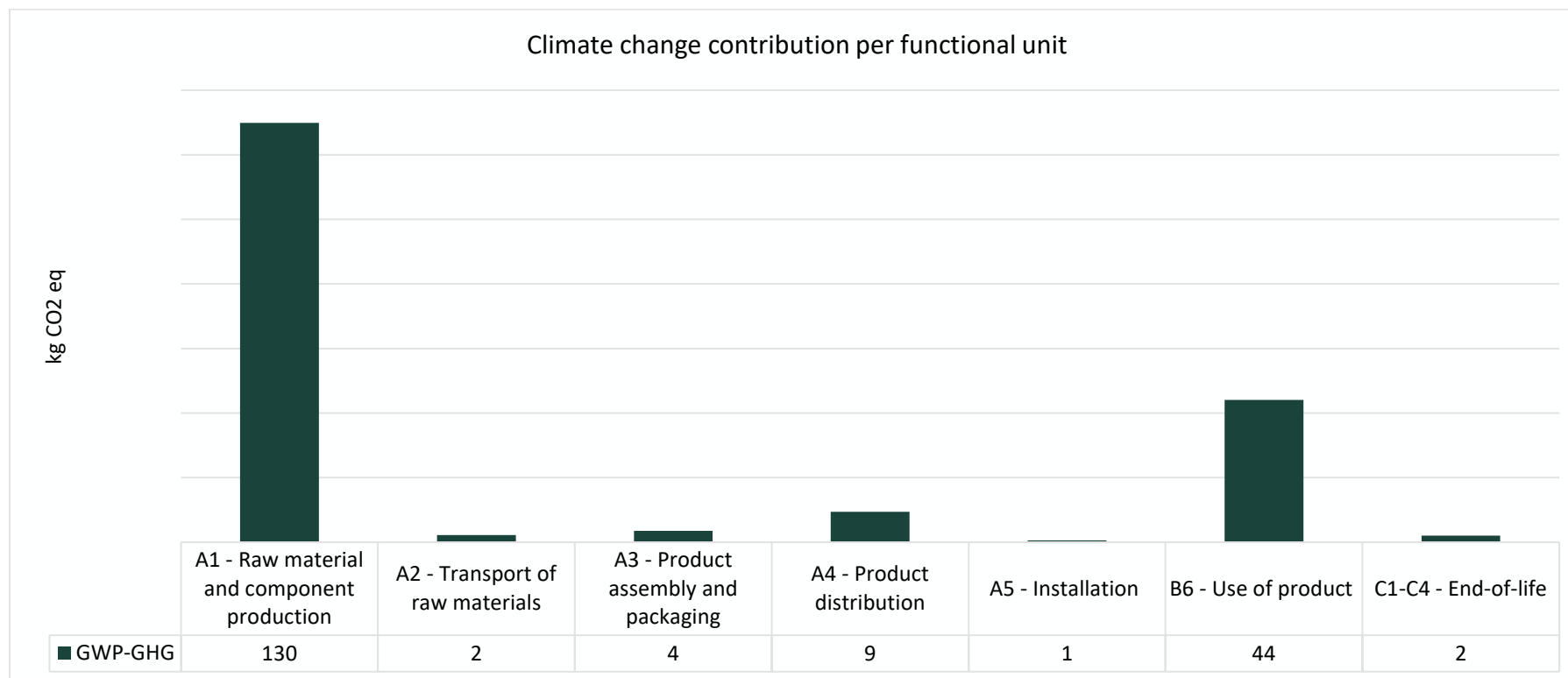


Figure 11: Climate impact according to GWP-GHG (per FU = 1tkm)

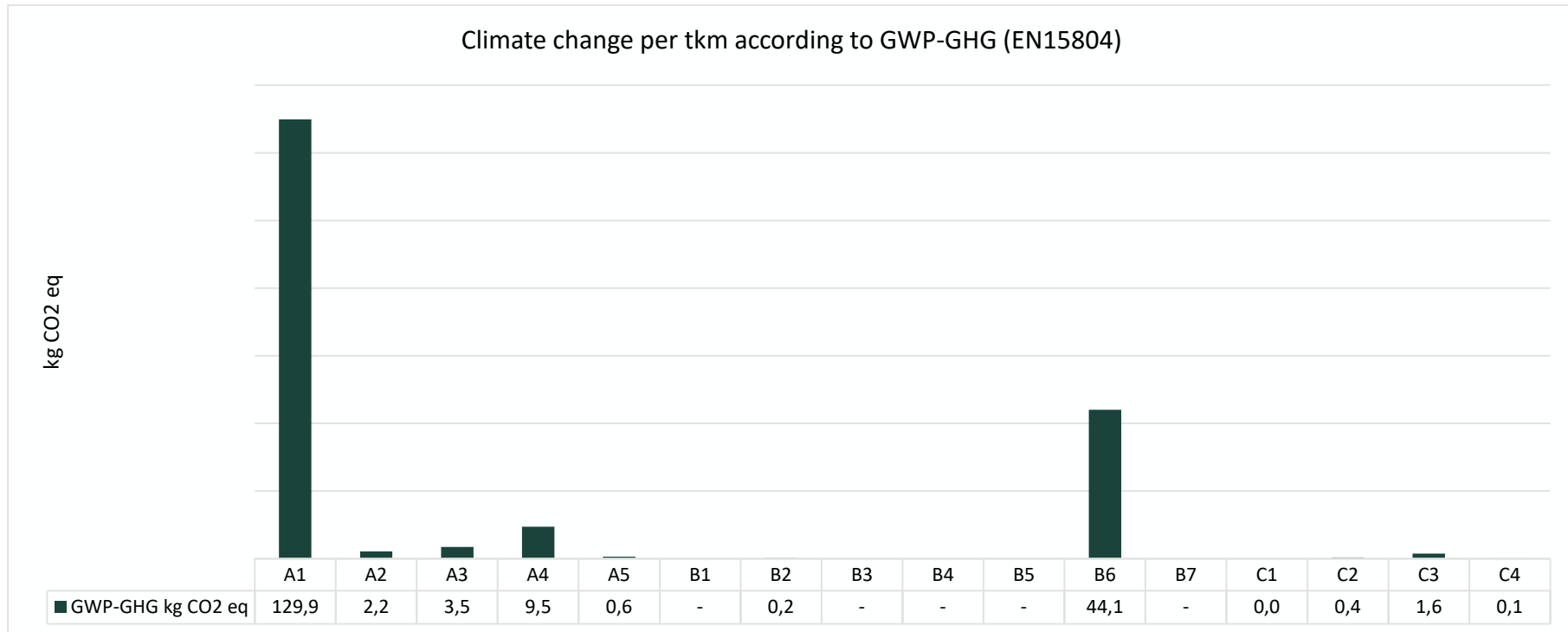


Figure 12 Climate impact per module according to GWP-GHG (per FU = 1tkm)

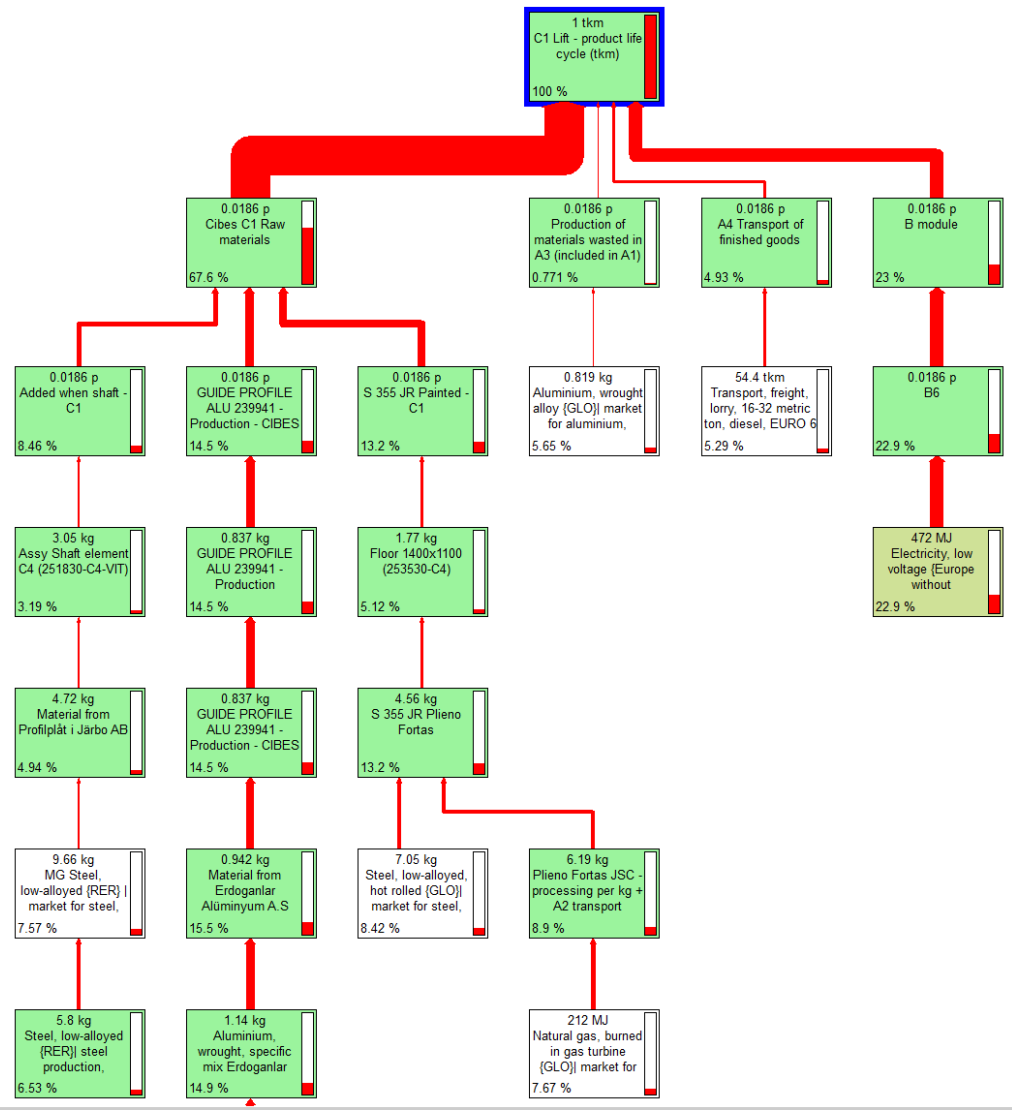


Figure 13: Sankey diagram over life cycle climate impact per functional unit, GWP-GHG (cut-off 5%)

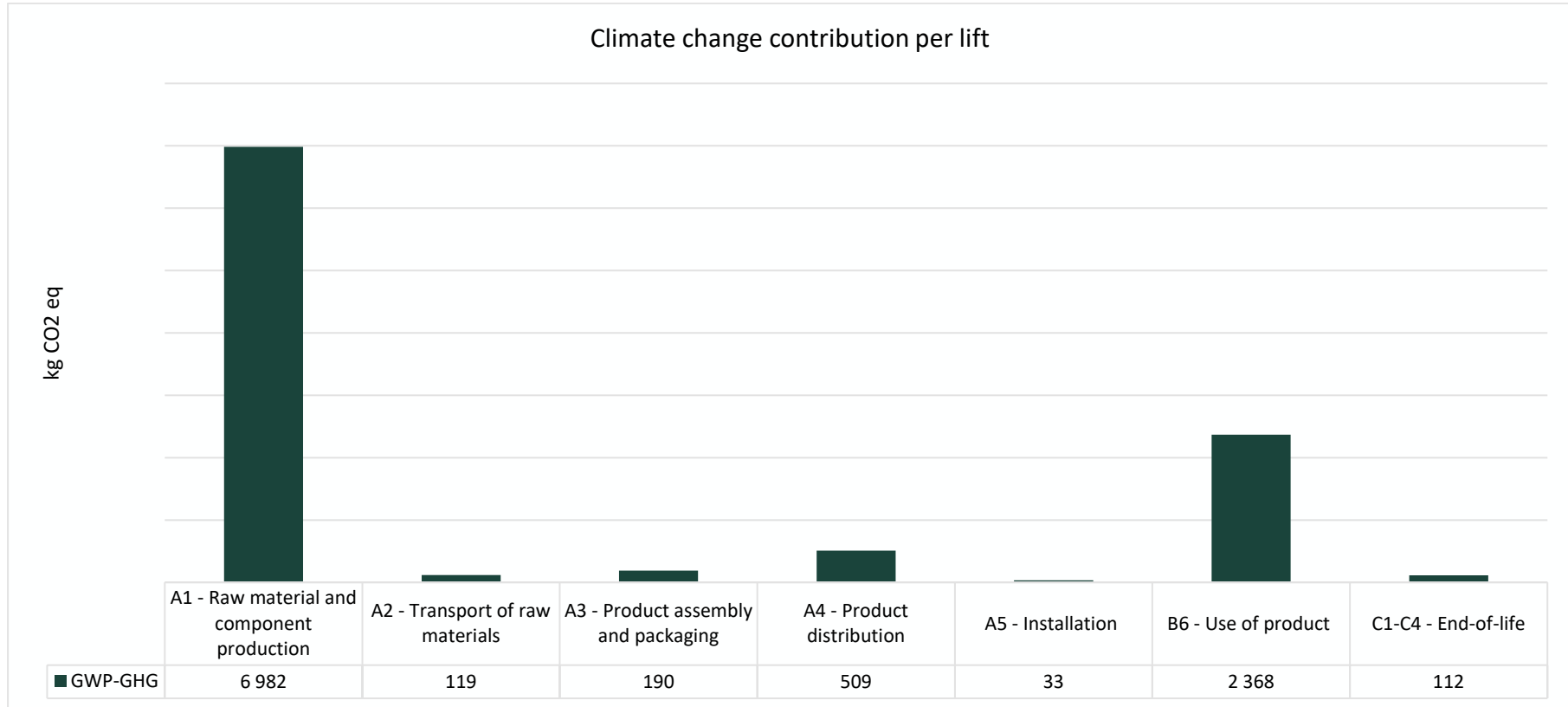


Figure 14 Climate impact according to GWP-GHG (per lift)

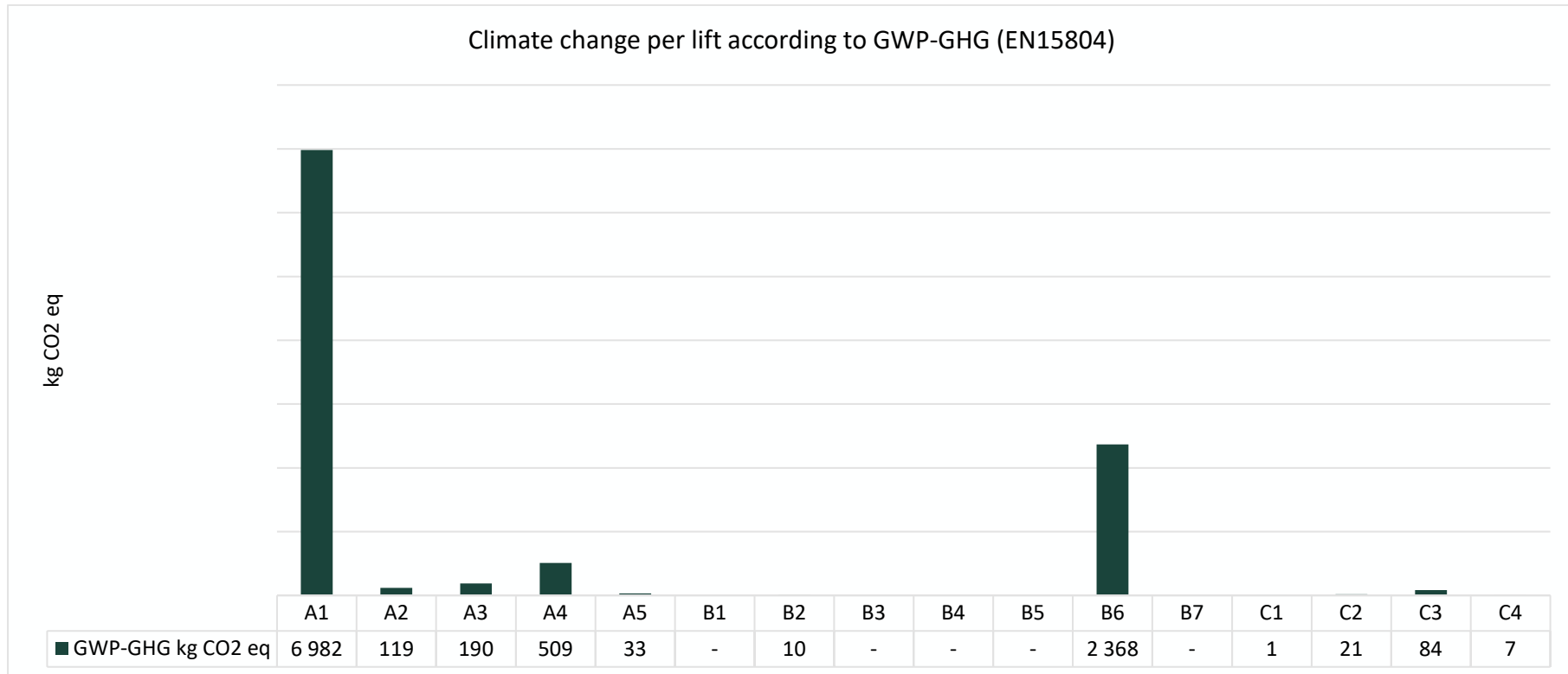


Figure 15 Climate impact per module according to GWP-GHG (per lift)

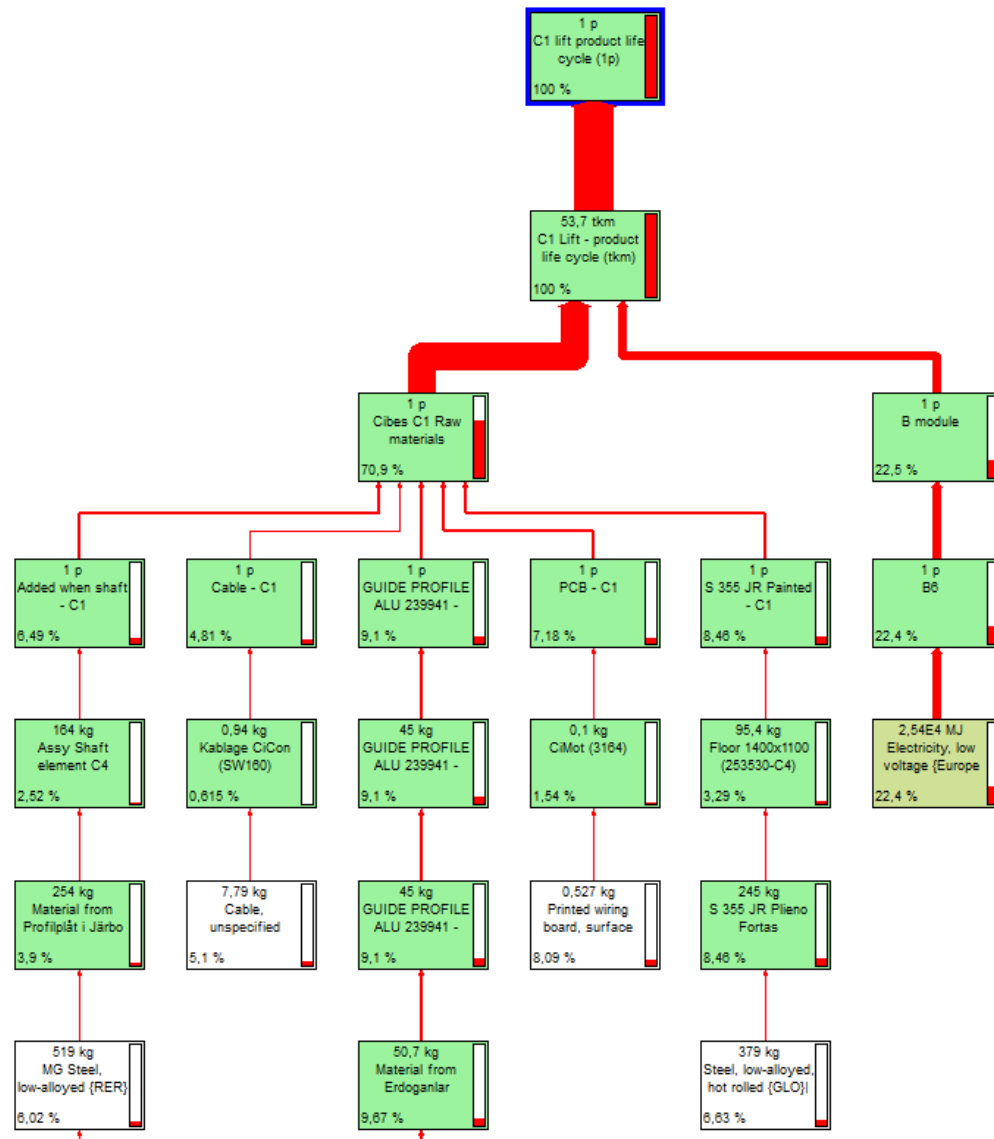


Figure 16 Sankey diagram over life cycle climate impact per lift, GWP-GHG (cut-off 5%)

Table 36: GWP-GHG contribution of components cumulatively contributing to 90% of A1 impacts, and their individual GWP-GHG impact per kg. Sorted by contribution (% of life cycle).

Component	GWP-GHG/kg	Amount	Impact per component	Contribution (% of life cycle)	Contribution (% of upstream impact)
GUIDE PROFILE ALU 239941 - Production (40023-PL)	33.4	45.0	1503.4	15%	21.0%
Floor 1400x1100 (253530-C4)	5.6	95.4	538.3	5%	7.5%
Basmodul Base frame (253490)	5.6	82.8	467.3	5%	6.5%
Door panel complete (253422-VIT)	2.4	145.4	352.9	3%	4.9%
Assy Shaft element C4 (251830-C4-VIT)	2.1	163.8	339.8	3%	4.8%
Doorstep (253399)	20.3	9.8	200.1	2%	2.8%
Roof frame C4 (254087-C4)	5.6	34.9	196.9	2%	2.8%
Schaktelement1545x900 VIT (251848-VIT-S5)	2.1	90.0	186.8	2%	2.6%
Roof plate std 1100 (254091)	5.6	32.0	180.8	2%	2.5%
Sats Lift Screw C-serie 6m (254218-6-PL)	3.7	45.5	170.5	2%	2.4%
HISSTELEF SAFELINE GSM MODUL 4G (3599-GSMLINE)	246.3	0.7	165.1	2%	2.3%
HÖRNPROFIL L= 3000MM (247038)	17.6	7.8	137.5	1%	1.9%
Sillplate Comp Right (253448-R)	26.7	4.8	129.2	1%	1.8%
DRIVPAKET ECO 24mm (260987)	5.1	22.1	111.6	1%	1.6%
Base hat (253930)	7.5	14.2	106.3	1%	1.5%
Corner profile Svart (253950-SV)	17.6	5.9	103.3	1%	1.4%
Profile Right Doorprofile Comp R (253404-R)	5.9	16.5	97.9	1%	1.4%
MOTOR 43KW ELK (BEVI) (3810)	Confidential (ecoinvent EULA)				
Base frame (254178-C4)	7.5	11.8	88.3	1%	1.2%
Innertak publik C4 (254117-C4)	6.3	13.9	87.7	1%	1.2%
Aluminium skena (253254)	20.6	4.2	85.6	1%	1.2%
ÖVRE SKRUVINFÄSTNING 830 (257582-S6)	7.7	9.5	73.0	1%	1.0%
Door fastening Svart (253966-SV)	22.3	2.8	61.5	1%	0.9%
Doorframe EXT right (254551-R)	2.4	24.5	59.6	1%	0.8%
Profile Door frame A-side (257467-R)	2.4	23.0	55.8	1%	0.8%

Aluminium skena kort (253255)	20.7	2.6	54.6	1%	0.8%
Clamping rib svart (253951-SVART)	22.3	2.4	54.3	1%	0.8%
Tröskelavslut (253426)	20.5	2.3	46.5	0%	0.7%
Doorbox comp Cabin R (253376-R)	7.5	6.1	45.4	0%	0.6%
Overload unit 24mm Pitch (260750)	3.6	12.5	45.1	0%	0.6%
Omron (253137-3X400)	63.8	0.6	37.3	0%	0.5%
Guide rail crossbar (253936)	2.4	13.8	33.6	0%	0.5%
Laminat C4 B&D (254113)	1.1	31.2	33.5	0%	0.5%
KRETSKORT CITOP (3411)	Confidential (ecoinvent EULA)				
Kretskort cibut kabin CiCon (3289)					
CiMot (3164)					
NÖDSÄNKNINGSMOTOR ODS CM40 (4108)					
Laminat A&C VIT (253999)	1.1	28.2	30.3	0%	0.4%
Wallfastening alu SVART 1125 (254152-1125-SV)	33.8	0.9	29.9	0%	0.4%
C-serie alu-profil B&D-sida 2134mm (254184-SV)	22.3	1.3	28.5	0%	0.4%
Slideshoe bracket (253428)	7.5	3.6	26.9	0%	0.4%
Control panel base public 2plan (254143)	4.7	5.6	25.9	0%	0.4%
C-series wall bracket (R) (260163)	7.5	3.4	25.6	0%	0.4%
C-series wall bracket (L) (260153)	7.5	3.4	25.6	0%	0.4%
Hangplate (253441)	4.7	5.4	24.9	0%	0.3%
Förstärkningsplåt t 100 mm (254144)	7.2	3.4	24.4	0%	0.3%
Frequency plate M1 3x400 40kW C1 (258539-1)	4.7	5.2	24.2	0%	0.3%
KRETSKORT CIIO (3106)	Confidential (ecoinvent EULA)				
GUIDE JOINT ODS (253920-PL)	5.8	3.8	21.9	0%	0.3%
Carpet C4 (254216-C4)	4.0	5.2	20.9	0%	0.3%
Laminat C4C5 B VIT (253998)	1.1	19.4	20.8	0%	0.3%
Hängplåt kabindörr (253377)	7.5	2.7	20.5	0%	0.3%

5.4 Use of resources and energy CED 1.12

The consumption of resources in terms of energy is measured as primary energy demand with the method Cumulative Energy Demand 1.12 (see Appendix 4). The calculations are done according to option B as described in annex 3 of the construction PCR (EPD International, 2025b).

Table 37: Use of resources and energy for module A-D, per functional unit (1tkm).

Parameter	Unit	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
PERE	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PERM	MJ	1.78E+02	0.00E+00	-1.45E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	-3.31E+01	0.00E+00	0.00E+00
PERT	MJ	1.78E+02	0.00E+00	-1.45E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	-3.31E+01	0.00E+00	0.00E+00
PENRE	MJ	-2.77E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PENRM	MJ	2.77E+01	0.00E+00	-8.49E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	-2.68E+01	0.00E+00	0.00E+00
PENRT	MJ	0.00E+00	0.00E+00	-8.49E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	-2.68E+01	0.00E+00	0.00E+00
SM	kg	4.03E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RSF	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NRSF	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
FW	m3	1.05E+00	2.02E-02	2.35E-03	0.00E+00	8.72E-04	0.00E+00	0.00E+00	0.00E+00	3.08E-01	0.00E+00	8.86E-06	8.07E-04	2.76E-03	1.08E-03	-2.30E-01
Abbreviations	PERE = use of renewable primary energy excluding renewable primary energy resources used as raw materials; PERM = Use of renewable primary energy resources used as raw materials; PERT = Total Use of renewable primary energy resources; PENRE = Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials; PENRM = Use of non-renewable primary energy resources used as raw materials; PENRT = Total Use of non-renewable primary energy resources; SM = Use of secondary material; RSF = Use of renewable secondary fuels; NRSF = Use of non-renewable secondary fuels; FW = use of net fresh water															

Table 38: Use of resources and energy for module A-D, per 1 p lift.

Parameter	Unit	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
PERE	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PERM	MJ	1.78E+02	0.00E+00	-1.45E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	-3.31E+01	0.00E+00	0.00E+00
PERT	MJ	1.78E+02	0.00E+00	-1.45E+02	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	-3.31E+01	0.00E+00	0.00E+00
PENRE	MJ	-2.77E+01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
PENRM	MJ	2.77E+01	0.00E+00	-8.49E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	-2.68E+01	0.00E+00	0.00E+00
PENRT	MJ	0.00E+00	0.00E+00	-8.49E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	-2.68E+01	0.00E+00	0.00E+00
SM	kg	4.03E-01	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RSF	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NRSF	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
FW	m3	1.05E+00	2.02E-02	2.35E-03	0.00E+00	8.72E-04	0.00E+00	0.00E+00	0.00E+00	3.08E-01	0.00E+00	8.86E-06	8.07E-04	2.76E-03	1.08E-03	-2.30E-01
Abbreviations	PERE = use of renewable primary energy excluding renewable primary energy resources used as raw materials; PERM = Use of renewable primary energy resources used as raw materials; PERT = Total Use of renewable primary energy resources; PENRE = Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials; PENRM = Use of non-renewable primary energy resources used as raw materials; PENRT = Total Use of non-renewable primary energy resources; SM = Use of secondary material; RSF = Use of renewable secondary fuels; NRSF = Use of non-renewable secondary fuels; FW = use of net fresh water															

5.5 Waste production and output flows

The production of waste in terms of final waste and the output of materials for recycling, is measured from the calculation of selected inventory results with our own method⁵. Final waste and output flows refers to flows that are leaving the system of the LCA. In this LCA only elementary flows (substances) are actually leaving the system.

Table 39: Waste production for module A1-D, per functional unit (1 tkm)

Indicator	Unit	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Hazardous waste	kg	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Non-Hazardous waste	kg	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Radioactive waste	kg	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Table 40: Waste production for module A1-D, per 1p lift.

Indicator	Unit	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Hazardous waste	kg	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Non-Hazardous waste	kg	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Radioactive waste	kg	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00

Table 41: Output flows for module A-D, per functional unit (1 tkm).

Indicator	Unit	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Components for reuse	kg	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Material for recycling	kg	0.43	0.00	0.03	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.01	0.00	0.00
Materials for energy recovery	kg	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Exported energy, electricity	MJ	0.61	0.00	18.85	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	11.05	0.00	0.00
Exported energy, thermal	MJ	1.41	0.00	43.98	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	25.78	0.00	0.00

⁵ EPD (2018) EN15804 v3

Table 42: Output flows for module A-D, per functional 1 p lift.

Indicator	Unit	A1-A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Components for reuse	kg	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Material for recycling	kg	25.25	0.00	1.50	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.31	0.00	0.00
Materials for energy recovery	kg	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Exported energy, electricity	MJ	35.37	0.00	1100.75	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	645.36	0.00	0.00
Exported energy, thermal	MJ	82.53	0.00	2568.41	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	0.00	1505.83	0.00	0.00

6 Interpretation

This section covers the key aspects of the results, sensitivity analyses, scenario analyses and an evaluation of the model and underlying data.

The quantitative impact assessment results are interpreted to understand the possibilities of reducing environmental impact most efficiently.

6.1 Key aspects of results

The product assess is the Cibes C1 Pure Lift in the product configuration of a 2-stop C1 lift with a travel height of 3.5 meters and a total height of 6.1 meters. The lift is equipped with a cabin with 1400 x 1100 mm floor size and a custom ready-made shaft with steel panels.

The results in this LCA are presented per a declared unit – production of one lift and its lifecycle during the reference service lifetime (RSL) of 25 years. The results are also presented per a functional unit - defined to be the transportation of a load over a distance. More specifically, the functional unit is defined as **one tonne transported vertically over one kilometre (tkm)**. The so-called transportation performance, i.e. the number of tkm travelled during the RSL is calculated to 53.7 tkm for the Cibes C1 Pure Lift, see section 4.1 for details.

The full life cycle results for the C1 are provided in section 5. In summary, the most contributing impact categories to the products environmental impact are Resource use, minerals and metals, Climate change, and Resource use, fossils.

Raw materials and production of components (module A1) dominate the impact on both EF3.1 single score (~71%) and GWP-GHG (68%). The electricity consumption during the use phase (module B6) of the lift contributes approximately 23% to single score and GWP-GHG results alike. The activities at CIBES Gävle (A3) contribute approximately 1% to single score results, and approximately 2% to GWP-GHG results. Downstream transportation contributes approximately 3% to single score results and 5% to GWP-GHG results.

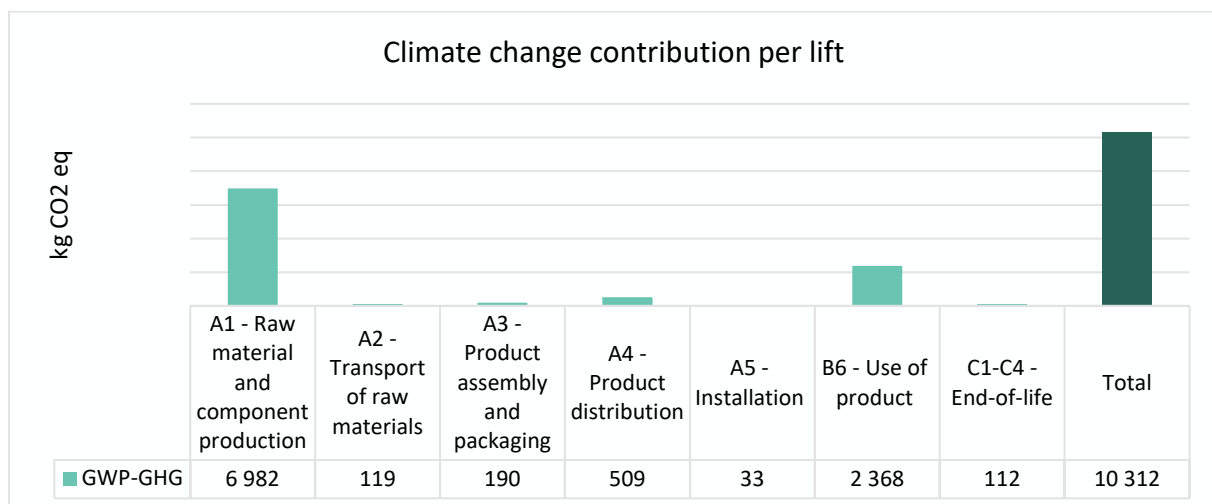


Figure 17 Climate impact according to GWP-GHG (per lift)

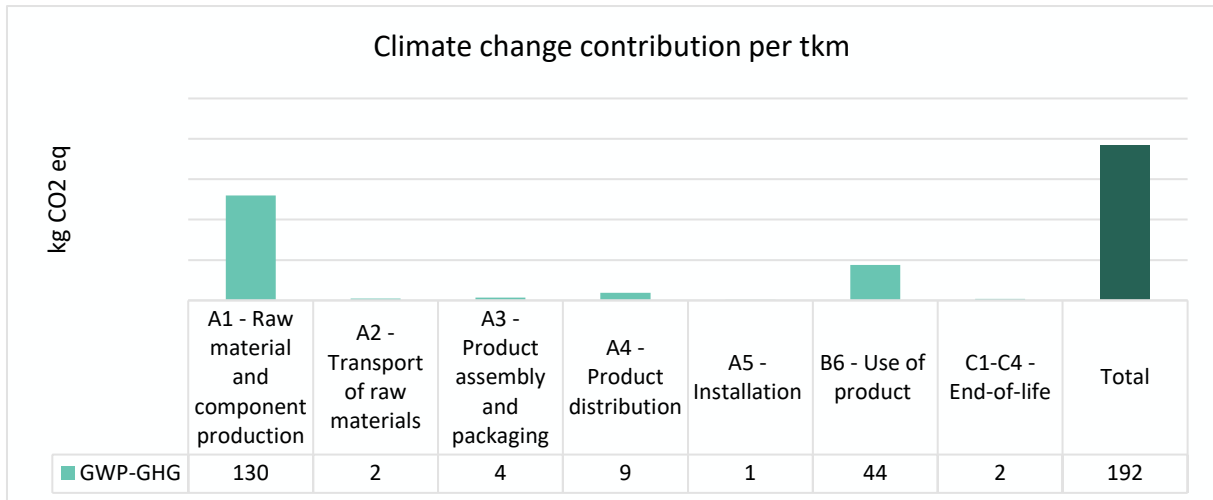


Figure 18 Climate impact according to GWP-GHG (per FU = 1tkm)

The A1-C4 GWP-GHG impact for Cibes C1 Pure Lift presented includes components that are added when it sits in shaft. The result for when these components are removed are presented below.

Table 43 Climate impact per assembly option

Impact from	CO2 eq / lift	CO2 eq / tkm
Lift	9 438	176
Components that are added for shaft	874	16
Lift + added components when shaft	10 312	192

Looking at the EF3.1 Single score results, the most important hotspots in the C1 life cycle are the following: the energy consumption in the use phase (B6), the guide profile, the PCBs, the cables and the CICOMP component.

If GWP-GHG is considered instead, the following hotspots are identified: the energy consumption in the use phase (B6), the guide profile, the floor, the downstream transport (A4), the base module and the assy shaft element.

Impacts on resource use, minerals and metals are mainly driven by electronic components, including the PCB, cables, CICOMP and motors. B6 also contributes approximately 11% to this category.

Finally, for impacts on resource use, fossils, hotspots are B6 (35%), the guide profile, downstream transport (A4) the floor, and the base module.

6.2 Sensitivity analysis

LCA provides a holistic perspective on an entire system. To succeed in this ambitious goal, certain simplifications and value-based choices to cover the entire system are required. By changing these choices, one can, based on the result, assess its relevance and whether there is a reason to revise the assumptions or choices that have been made. This is done in a sensitivity analysis which check the sensitivity in the result when assumptions or choices are changed.

The use phase makes up approximately 20% of the single score and GHG-GWP life cycle impact for the C1 lift. Since the use phase is a hot spot for the result, a sensitivity check was done to see how the result would change if other electricity mixes were to be used.

Three average country mixes were tested: Sweden (low-carbon case), Poland (high-carbon case) and Netherlands (medium-carbon case). These countries are not necessary markets for Cibes, but they serve as a low-to-high carbon electricity mix case to demonstrate the effects of the electricity source.

As seen in Figure 18 and Figure 19, the use phase impact changes significantly depending on the country mix selected. The difference is especially large for GWP-GHG impacts, which are as low as ~10% for the Swedish case (compared to baseline) and ~300% for the Polish case (compared to baseline). The sensitivity check shows that the electricity that powers the lift highly affects its environmental impact. It suggest that if for example renewable electricity were to be used in the building were the lift is installed, the impact from the use phase would decrease significantly.

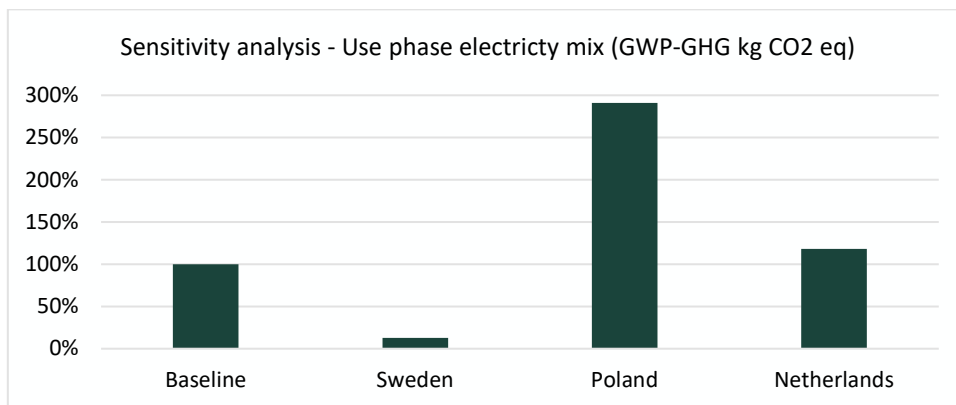


Figure 19: Relative change in use phase GWP-GHG impacts if specific country mixes are used instead of the European mix (baseline).

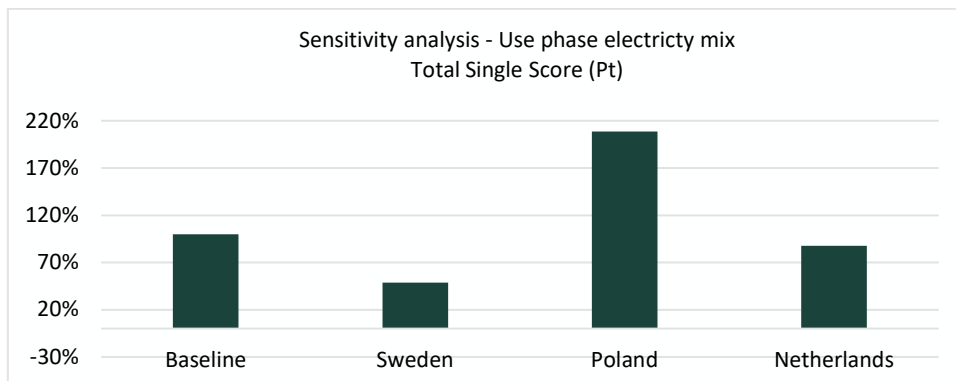


Figure 20: Relative change in use phase single score impacts if specific country mixes are used instead of the European mix (baseline).

6.3 Data quality assessment

The data is valid for the production of the lift C1 produced by Cibes. An evaluation of the model and underlying data is made by a data quality assessment which includes a completeness check, assessing the validity of data and a consistency check.

The data are assessed according to the DQR defined in part 3.2.5. See the table below for the data quality assessment that is general for the study, (see Table E.1, Annex E, in EN 15804 for the method used which is the data quality level and criteria of the UN Environmental Global Guidance on LCA database development). Below is a more specific data quality assessment for the result.

Table 44: General data quality assessment for the study.

Aspect	Notes
Data quality assessment scheme	The data quality level and criteria from EN 15804 have been applied in this study
Validity	The technological and geographical coverage of the data chosen reflects the physical reality of the product system modelled.
Plausibility	The data used for the core process and some upstream processes have been checked for plausibility, using as reference EPDs for similar products.
Precision	Material and energy flow quantified are based on generic data from the ecoinvent database if not specific data has been provided. All is documented in the inventory chapter.
Completeness	Data accounts for all known sub-processes. All upstream processes were modelled using generic data from the ecoinvent database, using country-specific datasets whenever available, otherwise using market datasets.
Consistency, allocation method, etc.	Allocation follows a physical causality in line with EN 15804.
Completeness and treatment of missing data	No data is found missing.
Final result of data quality assessment	Data quality as required in EN15804 is met.

6.3.1 Validation of data and share specific data A1-A3 GWP-GHG

Specific data for Cibes manufacturing was gathered in 2025 and represents the production for 2024. Specific data about supplier processing were collected from main Tier-1 suppliers of components and packaging, e.g. energy- and material consumption. The suppliers were selected based on the bill of material (BOM) where the most important suppliers were identified, together providing components that make up 78 wt-% of the total lift (excluding packaging). All data that have been gathered have been checked by Cibes.

Specific data has been collected from suppliers regarding their manufacturing processes, including raw materials, waste, energy consumption, and transport. However, the overall share of specific data becomes relatively lower because the raw materials used in their production are not classified as specific data under PCR 2019:14. When summarising what can be classified as specific data, it is

manufacturing processes for main components, transport of raw materials/components to core manufacturing and core manufacturing. These contribute to **19% of the GWP-GHG results in A1-A3**.

See Appendix 7 for the calculation and declaration of the share specific data.

To obtain a higher share of specific data, Cibes should aim for demanding EPDs of the raw materials used in components manufacturing for example.

Summary of definition of specific data according to PCR 2019:14:

The share of the GWP-GHG results per functional unit in A1-A3 coming from specific data for the result shall be declared according to PCR 2019:14. Specific data are according to the PCR defined as:

- data gathered from the actual manufacturing plant where product-specific processes are carried out;
- actual data from other parts of the life cycle traced to the product under study, for example site-specific data on the production of materials or generation of electricity provided by contracted suppliers;
- transportation data is accepted as specific if distances, means of transportation, load factor, fuel consumption, etc., of contracted transportation providers are accounted for.
- data from databases on transportation and energy ware that are combined with specific activity data (i.e., actual transportation and energy parameters as listed above).

6.3.2 DQA of data contributing to at least 80% of absolute impact

According to EN 15804 the quality assessment should be carried out for the relevant data, which is described as the data contributing to at least 80 % of the absolute impact of any core environmental impact indicators included in the study. The classification of the data is divided into a five-level grading, which classifies the quality of the data as “very good”, “good”, “fair”, “poor”, and “very poor” (see Annex E, table E.1, in EN 15804 for further explanation). The classification is based on geographical, technical, and time representativeness.

Generic data that have been used in the study is based on ecoinvent 3.11.

The main contributing datasets are presented in Appendix 7 and here is presented a summary of their DQA according to EN 15804:

Geographical – Majority of the dataset are good since the chosen datasets are assumed to be representative for chosen region.

Technological – Where GLO market dataset has been used the representativeness is estimated to be poor since the technology level in these datasets are unknown. For more regionalized datasets the technological representativeness is estimated to be good since these represent current technology used.

Time – The data assessed were still valid in 31/12/2024.

6.4 Limitations

Care has been taken to model the C1 lift in detail, including all 400+ components and collect supplier data from all major components. Some limitations should still be mentioned:

- The use phase is modelled based on an average European electricity mix. The use phase impact could vary significantly for specific European countries.
- Raw material production makes up the majority of the impact for the C1 lift. Even though data has been collected from major Tier-1 suppliers, no specific data has been used for the materials themselves. In the future, if supplier-specific EPD results could be used as input to the C1 study, this would improve the data quality of the study.

7 Conclusions and recommendations

This section summarises the conclusions from the study in terms of highlighting the most important aspects of the results and the interpretation. Recommendations will be presented in suggestions of how to mitigate the hot spots, how to communicate the results and how to reduce the uncertainties of the study.

7.1 Summary of the results

The most contributing impact categories are Resource use, minerals and metals, Climate change, and Resource use, fossils.

A1 dominates the impact on both EF3.1 single score (~71%) and GWP-GHG (68%). The electricity consumption during the use phase (B6) of the lift contributes approximately 23% to single score and GWP-GHG results alike. The activities at CIBES Gävle (A3) contribute approximately 1% to single score results, and approximately 2% to GWP-GHG results. Downstream transportation contributes approximately 3% to single score results and 5% to GWP-GHG results.

The A1-C4 GWP-GHG impact is calculated as **10300 kgCO₂eq./lift** or **192 kgCO₂eq./tkm**.

7.2 Recommendation on how to mitigate the hot spots

- Work on reducing the energy consumption of the lift.
- Work with suppliers to improve the environmental performance of components in the lift, especially the guide profile, the floor, and electronic components such as PCB and motors.
- Try to reduce the impact from downstream transportation, e.g. by producing the lift closer to the customer or by using more sustainable transport alternatives (train, electric trucks/trucks running on biofuel, etc).

7.3 How to communicate the results

This LCA report will be used to create a third-party verified Environmental Product Declaration (EPD) that can be used for external communication.

When communicating the results, it is important to note the sensitivity of the results to the use phase electricity mix.

7.4 How to reduce uncertainties

- Tier 1 supplier data has been collected for a large part of the lift mass. However, since it is the raw materials that really drive the impact, it would be beneficial to have more information about the raw material itself. For example, it might be possible to find EPDs for the raw material that the Tier 1 suppliers purchase. This would increase the data quality of the study.
- Since electronic components have a large impact on single score impacts, it is recommended to improve the data quality for these components. Again, EPD results from suppliers would be beneficial.

8 Bibliography

- CEN. (2020). *EN ISO 14067:2018, Greenhouse gases — Carbon footprint of products — Requirements and guidelines for quantification*.
- CEN. (2021). *EN 15804:2012+A2:2019/AC:2021, Sustainability of construction works - Environmental product declarations - Core rules for the product category of construction products*.
- CEN. (2024). *PCR 2019-14 Construction products v1.3.4*. www.environdec.com.
- Directorate-General for Environment. (2021). *Annexes 1 to 2 to Recommendation on the use of Environmental Footprint methods*.
https://environment.ec.europa.eu/publications/recommendation-use-environmental-footprint-methods_en
- Energiföretagen. (n.d.). *Tillförd energi*. Retrieved November 7, 2023, from <https://www.energiforetagen.se/statistik/fjarrvarmestatik/tillford-energi/>
- EPD International. (2020). *c-PCR 2020:008 Lifts (Elevators) v. 2020-10-30*.
- EPD International. (2025a). *General Program Instructions for the International EPD® System. Version 5.0.1*.
- EPD International. (2025b). *PCR 2019:14 Construction products (EN 15804+A2) (2.0.1)*.
<https://environdec.com/>
- Erlandsson, M., & Peterson, D. (2015). *Klimatpåverkan för byggnader med olika energiprestanda. Underlagsrapport till kontrollstation 2015*.
- Frischknecht, R., Jungbluth, N., Althaus, H. J., Doka, G., Dones, R., Hischier, R., Hellweg, S., Humbert, S., Margni, M., Nemecek, T., & Spielmann, M. (2007). *Implementation of Life Cycle Impact Assessment Methods: Data v2.0. ecoinvent report No. 3*.
- Guinée, J., Gorrée, M., Heijungs, R., Huppes, G., Kleijn, R., Koning, A., Oers, L., Wegener Sleeswijk, A., Suh, S., Haes, H., Bruijn, H., van Duin, R., & Huijbregts, Mark. (2002). *Handbook on Life Cycle Assessment - Operational Guide to the ISO Standards*.
- IPCC. (2021a). *Summary for Policymakers. In: Climate Change 2021: The Physical Science Basis. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change*.
- IPCC. (2021b). *Summary for Policymakers. In: Climate Change 2021: The Physical Science Basis. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change*.
- IPCC. (2022). *Climate Change 2022 Mitigation of Climate Change Working Group III Contribution to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change Summary for Policymakers*. www.ipcc.ch
- ISO. (2006a). *ISO 14025:2006, Environmental labels and declarations – Type III environmental declarations – Principles and procedures*.
- ISO. (2006b). *ISO 14040:2006, Environmental management — Life cycle assessment — Principles and framework*.
- ISO. (2006c). *ISO 14044:2006, Environmental management — Life cycle assessment — Requirements and guidelines* (pp. 1–54).
- ISO. (2012a). *ISO/TR 14049:2012, Environmental management — Life cycle assessment — Illustrative examples on how to apply ISO 14044 to goal and scope definition and inventory analysis*.
- ISO. (2012b). *ISO/TS 14047, Environmental management — Life cycle assessment — Illustrative examples on how to apply ISO 14044 to impact assessment situations*.
- ISO. (2014). *ISO 25745-2:2015, Energy performance of lifts, escalators and moving walks — Part 2: Energy calculation and classification for lifts (elevators)*.
- OVAM. (2018). *Environmental profile of building elements [update 2017]*.
www.ovam.be/materiaalprestatie-gebouwen
- PRé Sustainability. (2024). *SimaPro (9.10)*. PRé Sustainability B.V. <https://simapro.com/>

- Rebitzer, G., Ekvall, T., Frischknecht, R., Hunkeler, D., Norris, G., Rydberg, T., Schmidt, W. P., Suh, S., Weidema, B. P., & Pennington, D. W. (2004). Life cycle assessment Part 1: Framework, goal and scope definition, inventory analysis, and applications. *Environment International*, 30(5), 701–720. <https://doi.org/10.1016/j.envint.2003.11.005>
- Richardson, K., Steffen, W., Lucht, W., Bendtsen, J., Cornell, S. E., Donges, J. F., Drüke, M., Fetzer, I., Bala, G., Von Bloh, W., Feulner, G., Fiedler, S., Gerten, D., Gleeson, T., Hofmann, M., Huiskamp, W., Kummu, M., Mohan, C., Nogués-Bravo, D., ... Rockström, J. (2023). *Earth beyond six of nine planetary boundaries*. <https://www.science.org>

9 Appendix list

Appendix 1	Basics of Life Cycle Assessment.....	81
Appendix 2	Environmental footprint 3.1.....	86
Appendix 3	IPCC 2021.....	88
Appendix 4	Cumulative Energy Demand, CED.....	89
Appendix 5	SimaPro model	90
Appendix 6	Report of energy efficiency measurement.....	91
Appendix 7	DQA of individual datasets	97
Appendix 8	Guarantees of Origin and other certificates.....	100
Appendix 9	End-of-life modelling based on PCR 2019:14	103
Appendix 10	D module modelling based on PCR 2019:14	107

Appendix 1 Basics of Life Cycle Assessment

There are four phases in an LCA study; the goal and scope definition phase, the inventory analysis phase, the impact assessment phase and the interpretation phase. Below is a conceptual picture of this in Figure 15. In sections Appendix 1A - Appendix 1D further details on each life cycle phase are presented.

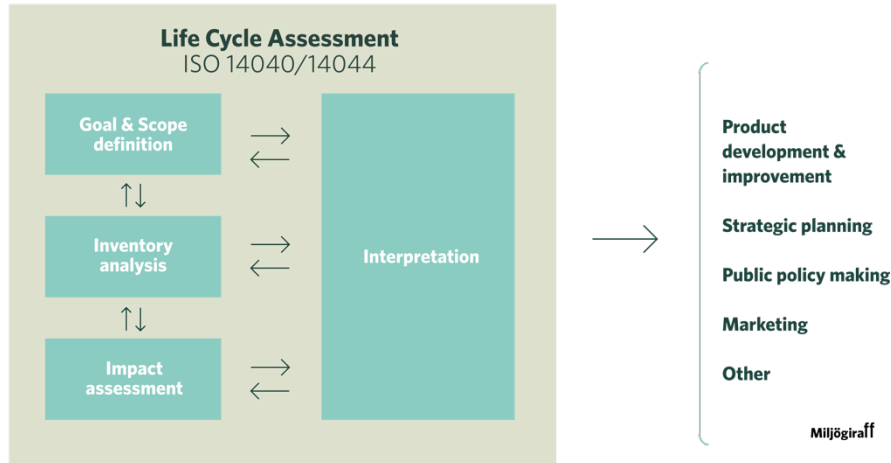


Figure 21. The four phases of the Life Cycle Assessment

A. Goal and scope definition

The first phase is the definition of goal and scope. The goal and scope, including system boundary and level of detail, of an LCA depend on the subject and the intended use of the study. The depth and breadth of LCA can differ considerably depending on the goal of a particular LCA. The goal also affects the choice of system boundaries and data requirements. See further details below.

i. System boundary

The system boundary determines which modules and activities are included within the LCA. The selection of the system boundary shall be consistent with the goal of the study. A system boundary chosen to include all contributing processes for the system while facilitating the modelling and analysis of the system. Therefore, there may be reasons to exclude activities that contribute insignificantly to the environmental effects (so-called “cut-off”). However, the omission of life cycle stages, processes, inputs, or outputs is permitted only if it does not significantly change the study’s overall conclusions. It should be clearly stated if life cycle stages, processes, inputs, or outputs are not included; and the reasons and implications for their exclusion must be explained.

When the life cycle is defined by the system boundary, the environmental aspects included, and the data used to represent the different aspects is in detail described under the LCI part.

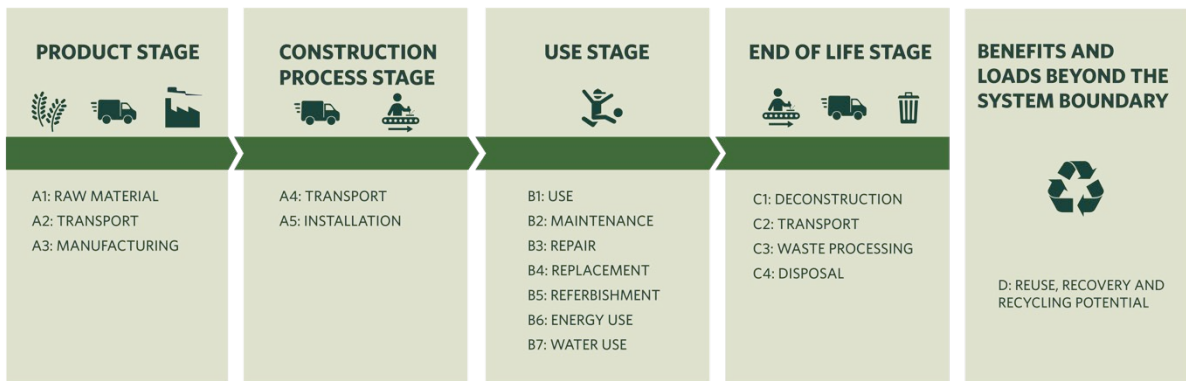


Figure 22: General summary of the modules included in an LCA, based on EN 15804.

In this LCA, boundaries with other systems, and the allocation of environmental burdens between them, are based on the recommendations of the international EPD system⁶, which are also in line with the requirements and guidelines of the ISO14040/14044 standards. Following these recommendations, the Polluter Pays (PP) allocation method is applied (see Figure 17). For the allocation of environmental burdens when incinerating waste, all processes in the waste treatment phase, including emissions from the incineration, are allocated to the life cycle in which the waste is generated. Subsequent procedures for refining energy or materials to be used as input in a following/receiving process are allocated to the next life cycle.

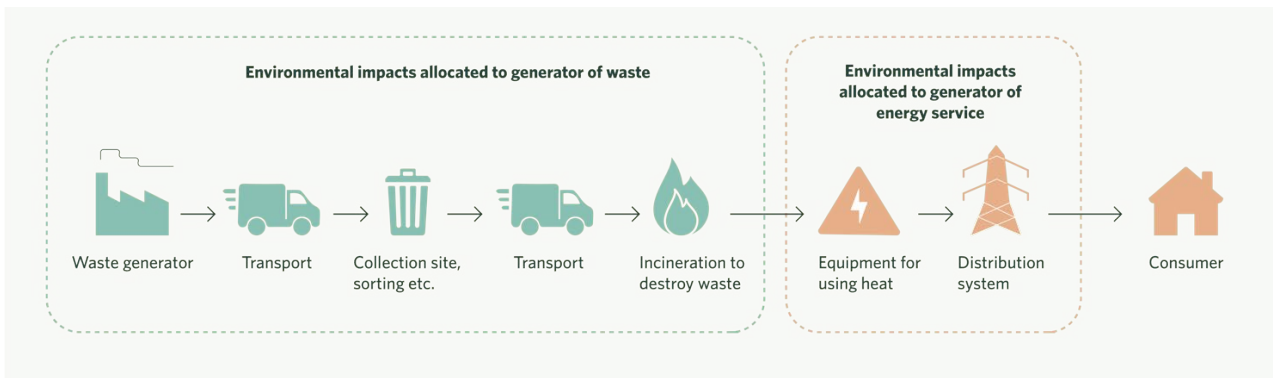


Figure 23: Allocation of environmental impacts between two life cycles according to the PP allocation method. Here in regard to the incineration of waste and resulting energy products.

In the case of recycling, environmental burdens are accounted for outside of the generating life cycle. They have thus been allocated to the subsequent life cycle, which uses the recycled materials as input.

Avoided materials due to recycling are typically not considered in the main scenario, per the International EPD system’s recommendation of the Polluter Pays Principle. In other words, only if the generating life cycle uses recycled material as input material will it account for the benefits of recycling.

⁶ EPD (Environmental Product Declarations) by EPD International®

ii. Cut-off

It is common to scan for the most important factors (a “cut off” of 95% is a minimum) to avoid putting time and effort into irrelevant parts of the life cycle. In general, LCA focuses on the essential material and energy flows, while the flows that can be considered negligible are excluded. By setting cut-off criteria, a lower limit is defined for the flows to be included. Flows below the limit can be assumed to have a negligible impact and are thus excluded from the study. For example, cut-off criteria can be determined for inflows concerning mass, energy, or outflows, e.g., waste.

iii. Allocation

The study shall identify the processes shared with other product systems as co-products, and deal with them according to the stepwise procedure presented below:

- **Step 1:** Wherever possible, the allocation should be avoided by dividing the unit process into two or more sub-processes and collecting the input and output data related to these sub-processes or expanding the product system to include the additional functions related to the co-products.
- **Step 2:** Where allocation cannot be avoided, the inputs and outputs of the system should be partitioned between its different products or functions in a way that reflects the underlying physical relationships between them; i.e., they should reflect how the inputs and outputs are changed by quantitative changes in the products or functions delivered by the system.
- **Step 3:** Where physical relationship alone cannot be established or used as the basis for allocation, the inputs should be allocated between the products and functions in a way that reflects other relationships between them. For example, input and output data might be allocated between co-products in proportion to the economic value of the products.

When other allocation methods are used, it should be documented and assessed whether it may be significant to the results.

iv. Data requirements (DQR)

General LCI databases contain a large amount of third-party reviewed LCI data compiled according to the ISO 14048 standard. Certified LCI data forms a basis for a robust and transparent study. However, it is crucial to understand that specific producers may differ considerably from general practice and average data.

The LCI data can be either specific or general. Specific data means that all data concerning material, energy and waste are specifically modelled for the conditions at the manufacturing facility and the technology used. Generic data means that material or energy are represented using LCI data from ecoinvent or other databases.

Specific data

1. Environmental Product Declarations (type III)
2. Collected data (web format, site visits and interviews).
3. Reported data (EMS, Internal data systems or spreadsheets)

Selected generic data

1. Close proxy with data on a similar product
2. Statistics
3. Public documents

Generic data

1. Public and verified libraries with LCI data

2. Trade organisations’ libraries with LCI data
Sector-based IO data, national

B. Inventory analysis (LCI)

The life cycle inventory analysis phase (LCI phase) is the second phase of LCA. It is an inventory of input/output data with regard to the system being studied. It involves the collection of the data necessary to meet the goals of the defined study.

C. Impact assessment (LCIA)

The life cycle impact assessment phase (LCIA) is the third phase of the LCA. The purpose of LCIA is to provide additional information to help assess a product system’s LCI results so as to better understand their environmental significance. Mandatory steps in the lifecycle impact assessment are classification and characterisation. An optional step is weighting.

Readymade methods for classification, characterisation and weighting have been used to evaluate environmental effects (either from a broad perspective or for a single issue) and find the categories or parts of a system with the most potential impact. Some of the most common LCIA methods are presented in Appendix 2 - Appendix 4.

Classification, characterisation and weighting will here be briefly explained.

i. Classification and characterisation

The process of determining what effects an environmental aspect can contribute to is called classification, e.g. that the use of water contributes to the environmental effect of water depletion, see Figure 18 for an illustration. The characterisation, in turn, means defining how much an environmental aspect contributes to the environmental impact category to which it is classified, e.g. the use of 1 tonne of river water contributes a factor of 0.5 to water depletion. Evaluating how critical it is in a specific area depends on the current environmental impact, the pressure from resource consumption and the ecosystem’s carrying capacity. This is done through normalisation.

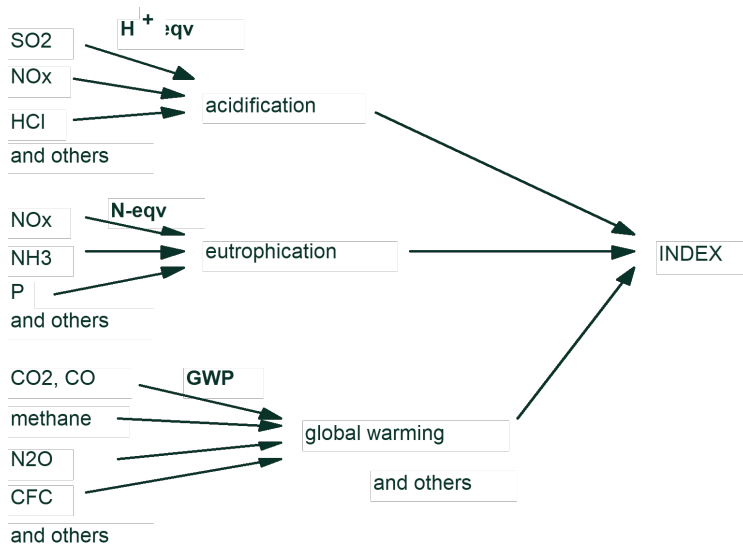


Figure 24: An illustration of the Impact Assessment of an LCA.

ii. Weighting

To compare different environmental effects and to identify “hot spots”, so-called *weighting* is applied. The calculated environmental effects are weighted together to form an index called a “*single score*” which describes the total environmental impact.

Because weighting involves subjective weighting (e.g. by an expert panel), it is recommended for internal communication only. Otherwise, there is a risk of mistrust if the choice of weighting method used leads to results that emphasise the “upsides” and hide the “downsides” of the analysed product. For external communication, only *Single issues* should be communicated.

D. Interpretation

The life cycle interpretation phase of an LCA or an LCI study comprises several elements:

- identification of the significant issues based on the results of the LCI and LCIA phases of LCA
- an evaluation that considers completeness, sensitivity and consistency checks
- conclusions, limitations, and recommendations.

The interpretation of the results in this study is carried out by first identifying the aspects that contribute the most to each individual environmental effect category. After that, the sensitivity of these aspects is evaluated, and the completeness and consistency of the study are assessed. Conclusions and recommendations are then based on the results and a clear understanding of how the LCA was conducted with any subsequent limitations.

i. Evaluation of the results

The objectives of the evaluation element are to establish and enhance confidence and the reliability of the results of the LCA or the LCI study, including the significant issues identified in the first element of the interpretation. The evaluation should use the following three techniques:

- **Completeness check**
The objective of the completeness check is to ensure that all relevant information and data needed for the interpretation are available and complete. If any relevant information is missing or incomplete, the necessity of such information for satisfying the goal and scope of the LCA shall be considered. This finding and its justification shall be recorded.
- **Sensitivity check**
The objective of the sensitivity check is to assess the reliability of the final results and conclusions by determining how they are affected by uncertainties in the data, allocation methods or calculation of category indicator results, etc.
- **Consistency check**
The objective of the consistency check is to determine whether the assumptions, methods and data are consistent with the goal and scope.
- **Uncertainty check**
Is a systematic procedure to quantify the uncertainty introduced in the results of a life cycle inventory analysis due to the cumulative effects of model imprecision, input uncertainty and data variability

Appendix 2 Environmental footprint 3.1

Environmental footprint 3.1 (EF3.1) includes classification, characterisation and optional normalisation and weighting as well as the possibility to calculate a single score including all weighted impacts. The impact categories from EF3.1 are summarized below.

Acidification – EF impact category that addresses impacts due to acidifying substances in the environment. Emissions of NO_x, NH₃ and SO_x lead to releases of hydrogen ions (H⁺) when the gases are mineralised. The protons contribute to the acidification of soils and water when they are released in areas where the buffering capacity is low, resulting in forest decline and lake acidification.

Climate change - Climate change is defined as the warming of the climate system due to human activities. Human activities emitting greenhouse gases (GHG) are the leading cause of global warming. GHG emissions have the property of absorbing radiation, resulting in a net warming effect called the greenhouse effect. These will then perturb the Earth's natural balance, increasing temperature and affecting the climate with disturbances in rainfall, extreme climate events and rising sea levels. Climate change is an impact affecting the environment on a global scale.

GHG sources can be classified of three main types: fossil sources, biogenic sources, and land use change. Fossil sources are formed from the decomposition of buried carbon-based organisms that died millions of years ago. Burning fossil sources leads to an increase in GHG in the atmosphere. Biogenic sources are often considered natural and refer to carbon taken up during the cultivation of a crop, considering that there is no net increase of carbon dioxide in the atmosphere. Another source of carbon dioxide emissions is the effect of land use on plant and soil carbon. For example, carbon is stored naturally in nature, and by changing the characteristics of a land area, this carbon is then released. Land use change hence measures the GHGs emissions that occur when changing the vegetation or other characteristics of the land used for a product's lifecycle.

Ecotoxicity, freshwater – Environmental footprint impact category that addresses the toxic impacts on an ecosystem, which damage individual species and change the structure and function of the ecosystem. Ecotoxicity is a result of a variety of different toxicological mechanisms caused by the release of substances with a direct effect on the health of the ecosystem.

Eutrophication – Nutrients (mainly nitrogen and phosphorus) from sewage outfalls and fertilised farmland and this affects the nutrient cycling in the aquatic and terrestrial ecosystems. Three EF impact categories are used to assess the impacts due to eutrophication: Eutrophication, terrestrial; Eutrophication, freshwater; Eutrophication, marine. In aquatic bodies, this accelerates the growth of algae and other vegetation in the water. The degradation of organic material consumes oxygen resulting in oxygen deficiency and, in some cases, fish death. Terrestrial vegetation can be affected by excess nitrogen, which can lead to changed tolerance to disease or other stressors like drought and frost. The three impact categories hence communicate which environment compartment the eutrophication occurs. Regardless of where it occurs, it changes the structure and function of ecosystems which may result in overall biodiversity and productivity changes.

Human toxicity, cancer – Impact category that accounts for adverse health effects on human beings caused by the intake of toxic substances through inhalation of air, food and water ingestion, penetration through the skin insofar as they are related to cancer.

Human toxicity, non-cancer – Impact category that accounts for the adverse health effects on human beings caused by the intake of toxic substances through inhalation of air, food and water ingestion,

penetration through the skin insofar as they are related to non-cancer effects that are not caused by particulate matter/respiratory inorganics or ionising radiation.

Ionising radiation, human health – EF impact category that accounts for the adverse health effects on human health caused by radioactive releases.

Land use – The land use impact category reflects the damage to ecosystems due to the effects of occupation and transformation of the land. Although there are many links between the way land is used and the loss of biodiversity, this category concentrates on the following mechanisms:

1. Occupation of a certain area of land during a certain time;
2. Transformation of a certain area of land.

Both mechanisms can be combined, often occupation follows a transformation, but often occupation occurs in an area that has already been converted (transformed). In such cases, the transformation impact is not allocated to the production system that occupies an area.

Ozone depletion – EF impact category that accounts for the degradation of stratospheric ozone due to emissions of ozone-depleting substances, for example, long-lived chlorine and bromine-containing gases (e.g. CFCs, HCFCs, Halons).

Particulate matter formation – Fine Particulate Matter with a diameter of smaller than 10 µm (PM10) represents a complex mixture of organic and inorganic substances. PM10 causes health problems as it reaches the upper part of the airways and lungs when inhaled. Secondary PM10 aerosols are formed in the air from emissions of sulphur dioxide (SO₂), ammonia (NH₃), and nitrogen oxides (NO_x), among others (World Health Organisation, 2003). Inhalation of different particulate sizes can cause different health problems.

Photochemical ozone formation – EF impact category that accounts for the formation of ozone at the ground level of the troposphere caused by photochemical oxidation of volatile organic compounds (VOCs) and carbon monoxide (CO) in the presence of nitrogen oxides (NO_x) and sunlight. High concentrations of ground-level tropospheric ozone damage vegetation, human respiratory tracts and manmade materials through reaction with organic materials.

Resource use, fossil: Impact category that addresses the use of non-renewable fossil natural resources (e.g. natural gas, coal, oil).

Resource use, minerals and metals: Impact category that addresses the use of non-renewable abiotic natural resources (minerals and metals). When using these non-renewable resources, there is a decrease in the global stock. Depending on how large the global reserve is assessed to be and the extraction rate of the resource, this impact category regards how rare the mineral and metal are and how much is being used. Hence, this impact category measures the impacts on the global stocks of minerals and metals in the future.

Resource use, fossil: Impact category that addresses the use of non-renewable abiotic natural resources (fossil). Similar to resource use, minerals and metals, when using fossil fuels, there is a decrease in the global stock. Since the industrial revolution, we have created societies highly dependent on fossil resources. Fossil resources are today commonly used to power processes and transports throughout a product's lifecycle. This impact category aggregates this total use of fossil resources throughout the lifecycle. The use of fossil resources is strongly interlinked to many of the other impact categories like climate change, particulate matter formation, and acidification.

Water use – It represents the relative available water remaining per area in a watershed after the demand of humans and aquatic ecosystems has been met. It assesses the potential of water deprivation to either humans or ecosystems, building on the assumption that the less water remaining available per area, the more likely another user will be deprived (see also <http://www.wulca-waterlca.org/aware.html>).

Appendix 3 IPCC 2021

The potential impact on the climate is calculated using the IPCC 2021 GWP 100 v.1.0 model for Global Warming Potential, GWP. The impact of climate gases is expressed as carbon dioxide equivalents, CO₂ eq. It is the most established scientific method and has been implemented (with adaptations) in other methods, such as the GHG protocol and EF3.1. GWP-GHG is a mandatory indicator to include in EPDs of construction products. GWP-GHG accounts for all greenhouse gases except biogenic carbon dioxide uptake and emissions and biogenic carbon stored in the product. As such, the indicator is identical to GWP-total except that the characterization factor for biogenic CO₂ is set to zero.

Appendix 4 Cumulative Energy Demand, CED

Cumulative Energy Demand (CED) is a method to calculate direct and indirect use of energy resources, commonly referred to as *primary energy*. Characterisation factors are given for the energy resources divided into five impact categories:

- Non-renewable, fossil
- Non-renewable, nuclear
- Renewable, biomass
- Renewable, wind, solar, geothermal
- Renewable, water

Some studies also add energy from waste as an indicator. This is not done here, since waste is not considered to be primary energy, and thus the input of energy resources may be less than the final energy (heat and electricity) delivered by the system.

Normalisation is not a part of this method. To get a total (“cumulative”) energy demand, each impact category is given the weighting factor 1 (Frischknecht et al., 2007)

Appendix 5 SimaPro model

Table 45: [1851] DRIVPAKET ECO 24mm

Electric motor, for electric scooter {GLO} market for electric motor, for electric scooter Cut-off, U	0.6	kg	Liten elmotor 0,6 kg
Brass {RoW} market for brass Cut-off, U	1.8	kg	JM5-15 Bly-tennbrons 1,8 kg
Metal working, average for copper product manufacturing {GLO} market for metal working, average for copper product manufacturing Cut-off, U	1.8	kg	JM5-15 Bly-tennbrons 1,8 kg
Wire drawing, copper {GLO} market for wire drawing, copper Cut-off, U	1.415*0.5	kg	Elektromagnet 1,415 kg, proxy assumed 50% copper and 50% steel
Copper, cathode {GLO} market for copper, cathode Cut-off, U	1.415*0.5	kg	Elektromagnet 1,415 kg, proxy assumed 50% copper and 50% steel
Steel, low-alloyed {GLO} market for steel, low-alloyed Cut-off, U	1.415*0.5	kg	Elektromagnet 1,415 kg, proxy assumed 50% copper and 50% steel
Metal working, average for steel product manufacturing {GLO} market for metal working, average for steel product manufacturing Cut-off, U	1.415*0.5	kg	Elektromagnet 1,415 kg, proxy assumed 50% copper and 50% steel
Aluminium, wrought alloy {GLO} market for aluminium, wrought alloy Cut-off, U	0.1	kg	Aluminium 6061
Metal working, average for aluminium product manufacturing {GLO} market for metal working, average for aluminium product manufacturing Cut-off, U	0.1	kg	Aluminium 6061
Steel, low-alloyed {GLO} market for steel, low-alloyed Cut-off, U	17.45	kg	s235 JRG2
Metal working, average for steel product manufacturing {GLO} market for metal working, average for steel product manufacturing Cut-off, U	17.45	kg	s235 JRG2
Steel, low-alloyed {GLO} market for steel, low-alloyed Cut-off, U	0.6	kg	Kullager
Metal working, average for steel product manufacturing {GLO} market for metal working, average for steel product manufacturing Cut-off, U	0.6	kg	Kullager
Switch, toggle type {GLO} market for switch, toggle type Cut-off, U	0.07	kg	electronics switch
Acrylonitrile-butadiene-styrene copolymer {GLO} market for acrylonitrile-butadiene-styrene copolymer Cut-off, U	0.1	kg	ABS plastic
Injection moulding {GLO} market for injection moulding Cut-off, U	0.1	kg	ABS plastic
Electronic component, passive, unspecified {GLO} market for electronic component, passive, unspecified Cut-off, U	0.01	kg	electronics sensors
Polyurethane, flexible foam {RoW} market for polyurethane, flexible foam Cut-off, U	0.1*0.8	kg	drive belt
Wire drawing, steel {GLO} market for wire drawing, steel Cut-off, U	0.1*0.2	kg	drive belt
Steel, low-alloyed {GLO} market for steel, low-alloyed Cut-off, U	0.1*0.2	kg	drive belt

Appendix 6 Report of energy efficiency measurement

The Energy Efficiency Certificate below provides data about the energy efficiency of the C1 lift, based on a 3-stop configuration. Please note that the lift is called C1 externally, but C90 internally. The conversion between the 3-stop lift and the 2-stop 3.5 meter lift is presented below the certificate, with the title “C1 (C90) energy comparison”.



Energy Efficiency Certificate

Issued by Liftinstituut B.V.

Certificate number	NL24EPCL DB132306
Object number.	Not applicable
Address	Blomsterängsvägen 3 802 91 Gävle
User category	1
No. of days in use per year	260
Product description	Low speed cabin lift
Nominal load	630 kg
Nominal speed	0,15 m/s
Manufacturer, type, serial no.	Cibes C90 DB132306
Name and address installer	Cibes Utmarksvägen 13 802 91 Gävle
Name and address owner certificate	Cibes Utmarksvägen 13 802 91 Gävle

Certificate issued on the basis of the following requirements	EN-ISO 25745-2:2015
Performance level for running	6
Performance level idle	1
Performance level standby 5 min	1
Performance level standby 30 min	1
Date of examination	23-05-2024
Annexes to this certificate	Report of Energy Efficiency measurement NL24EPCL DB132306

Conclusion



The energy label shown is based on the energy efficiency measurement for the above mentioned lift.
NOTE: The nominal speed of the installation is 0,15 m/s. According to ISO 25745-2 the performance levels and energy class can be taken as a reference.

Issued in Amsterdam
Date of issue

24-05-2024

Certification decision by

W.G. Kasteleijn
Product Manager Certification



Report of Energy Efficiency Measurement

Report belonging to certificate number	NL24EPCL DB132306
Date of issue original certificate	6-6-2024
No. and date of revision	-
Subject	Energy efficiency labelling lift
Requirements	EN-ISO 25745-2:2015
Object number	Not applicable
Project number	P240207

1. General data

Name and address of installer	Cibes Utmarksvägen 13 802 91 Gävle
Name and address of certificate holder	Cibes Utmarksvägen 13 802 91 Gävle
Product description	Low speed cabin lift
Date of examination	23-05-2024
Examination performed by	E. Verkaik

2. Basic data of lift

Address of lift	Blomsterångsvägen 3, 802 91 Gävle
Manufacturer	Cibes
Type	C90
Serial no.	DB132306
Travel height	5,66 m
Short travel height	0 m
No. of stops	3
Nominal load	630 kg
Nominal speed	0,15 m/s
Balance ratio	
Control system	CiCon
Drive control	Leadscrew
Car light	LED
(Estimated) no. of trips per day	50

3. Measurements

Measuring equipment / serial number	Fliuke [42094220]
Date of calibration	2023-08

The energy consumption is determined based upon the EN-ISO 25745-2:2015 method with an unloaded car. The energy consumption of ancillary power and main power is measured during 10 reference cycles. Also the energy consumption of ancillary power and main power is measured during 10 short cycles. One reference cycle is defined as a trip up and a trip down between the ultimate floors of the total travel height, including the doors active. A short cycle is defined as a trip up and a trip down between floors with a travel distance of at least one-quarter around the mid-point of the total travel height, including the doors active.

Also directly after a cycle, after 5 minutes and after 30 minutes, the energy is measured for one minute.



4. Results

Based on the EN-ISO 25745-2:2015 method the parameters which determine the energy efficiency are measured and calculated. The relevant results are shown hereunder.

Measurement results		
Door cycle time	15	s
Average travel distance	3,8	m
Operating days per year	260	days
Power in Idle mode	24	W
Power in standby after 5 min.	24	W
Power in standby after 30 min.	24	W
Ancillary power during cycles		W
Energy consumption in 10 reference cycles for the travel height 5,66 m	319,60	Wh
Energy consumption in 10 short cycles	n/a	Wh
Temperature control room	20	°C
Temperature lift well	20	°C
Temperature car	20	°C

Calculation results		
Usage category table 1, determined by trips per day	1	
Load factor acc. to EN-ISO 25745-2:2015	1,05	
Percentage of average travel distance table 2	67	%
Percentage of average car load table 3	8	%
Percentage time ratio in Idle table 4	13	%
Percentage time ratio 5 min. table 4	55	%
Percentage time ratio 30 min. table 4	32	%
Running energy of an average cycle with empty car	21,41	Wh
Daily running energy	563,84	Wh
Running time per day	0,57	h
Daily non-running (idle/standby) energy consumption	562,26	Wh
Total energy consumption per day	1126,10	Wh
Total energy consumption per year	293	kWh
Specific running energy for the av. running cycle	4,72	mWh/kgm
Specific running energy for the reference cycle	4,48	mWh/kgm



5. Conclusions	
Performance level for running	5
Performance level idle	1
Performance level standby after 5 min	1
Performance level standby after 30 min	1
The lift belongs to energy class	A
NOTE: The nominal speed of the installation is 0,15 m/s. According to ISO 25745-2 the performance levels and energy class can be taken as a	
Results testing against BREEAM-NL New Construction 2020 v1.0 (for reference only)	
Energy label B or better has been achieved in order to designate the lift as energy efficient for the purpose of the 2 BREEAM credit points to be awarded	YES
Results testing against BREEAM-NL In-Use Homes v6.0.0 (for reference only)	
Energy label C or better has been achieved in order to designate the lift as energy efficient for the purpose of the 1 BREEAM credit point to be awarded	YES
Results testing against BREEAM-NL In-Use 2016 v1.0 (for reference only)	
Energy label C or better has been achieved in order to designate the lift as energy efficient for the purpose of the 2 BREEAM credit points to be awarded	YES

Based upon the results of the energy efficiency measurement Liftinstituut B.V. issues an energy efficiency certificate.

The certificate is only valid for the product mentioned under 2.

The certificate is issued based on the requirements that are valid at the date of issue. Liftinstituut reserves all rights regarding the validity of the certificate with respect to changes in the requirements or changes in the state of the art of the product.

Prepared by:

E. Verkaik

Certification decision by:

W.G. Kaslelejn
Product Manager Certification



Annex 1. Overview of previous revisions of certificate and report

REVISIONS OF CERTIFICATE AND BELONGING REPORT		
Rev.	Date	Summary of revision
	6-6-2024	Original

000-12201

Liftinstituut B.V.
 Buikslotermeerplein 381
 NL - 1025 XE Amsterdam

VAT number: NL.8103.99.441.B.01
 Registered by the Dutch Chamber of Commerce
 under number 34157363

+31 (0)20 435 06 06
 contact@liftinstituut.com
 www.liftinstituut.com

C1 (C90) energy comparison 3-stop 5,66m / 2-stop 3,5m			
Parameter	H=5,66m	H=3,50m	
Energy in 10 ref cycles (Wh)	319,6	197,6	Motor consumption changed due to lower lifting height
Energy per ref cycle (Wh)	32,0	19,8	Motor consumption changed due to lower lifting height
Energy per avg cycle (Wh)	21,4	13,2	Motor consumption changed due to lower lifting height
Running energy per dag (Wh)	563,8	347,6	Motor consumption changed due to lower lifting height
Running time per day (h)	0,6	0,4	The travel time is reduced from ~31 minutes to ~19 minutes per day
Idle energy per day (Wh)	562,3	565,8	Negligible difference, since the idle time increases by about 12 minutes per day, which corresponds to approximately 1.2 kWh per year. 12 minutes per day × 24 W × 260 days = 1.24 kWh
Total energy per day (Wh)	1126,1	913,4	Running energy per dag (Wh) + Idle energy per day (Wh)
Total energy per year (kWh)	293,0	282,0	(Running energy per dag (Wh) + Idle energy per day (Wh) * 260 / 1000(kWh)

Appendix 7 DQA of individual datasets

Below is the presentation of the DQA of the GWP-GHG result A1-A3. All processes contributing to more than 10% of GWP-GHG result A1-A3 are included along with processes where primary data have been collected. Furthermore, manufacturing processes in module A3 (core) is included).

Table 46 DQA for main contributing processes GWP-GHG result modules A1-A3

Process in SimaPro	Process	Source type	Source	Reference year	Data category	Contribution to GWP-GHG result A1-A3 (including raw materials from ecoinvent)	Share of primary data, of GWP-GHG results for A1-A3
	Transport of raw materials/components to core manufacturing	Collected data	EPD owner	2024	Primary data	2%	2%
	Core manufacturing	Collected data	EPD owner	2024	Primary data	3%	3%
GUIDE PROFILE ALU 239941 - Production - CIBES Poland	Component K	Collected data	Supplier	2024	Primary data	21%	1%
S 355 JR Plieno Fortas	Component B	Collected data	Supplier	2024	Primary data	19%	9%
Material from Profilplåt i Järbo AB	Component A	Collected data	Supplier	2024	Primary data	7%	0,4%
Material from EVI Industries Stockholm AB - DC01	Component C	Collected data	Supplier	2024	Primary data	5%	1%
DX51D+Z275 MA-C Plieno Fortas	Component E	Collected data	Supplier	2024	Primary data	6%	2%
Sats Lift Screw C-serie 6m - CIBES Poland	Component G	Collected data	Supplier	2024	Primary data	2%	1%
Total share of primary data, of GWP-GHG results for A1-A3							19%

Data quality assessment of individual datasets covering more than 80% of impact across all impact categories, according to Annex E, table E.1 in EN 15804.

Summary of DQA of individual datasets:

Geographical – Good since the chosen datasets are assumed to be representative for chosen region.

Technological – Were GLO market dataset has been used the representativeness is estimated to be poor since the technology level in these datasets are unknown. For more regionalized datasets the technological representativeness is estimated to be good since these represent current technology used.

Time – The data assessed were still valid in 31/12/2024.

Table 47 DQA of processes covering 80% of impact across all impact categories

Process in model	Representativeness		
	Geographical	Technical	Time
Electricity, low voltage {Europe without Switzerland} market group for electricity, low voltage Cut-off, U	Good Europe without Switzerland.	Good Technology level: Current	Very good Start date: 01/01/2015 End date: 31/12/2024 Is data valid for entire period: True
Steel, low-alloyed {RER} steel production, converter, low-alloyed Cut-off, U	Good Geography: The inventory is modelled for Europe	Very good Technology level: Modern Technology: Represents average European technology; LD converter and secondary metallurgy	Very good Start date: 01/01/2013 End date: 31/12/2024 Is data valid for entire period: True
Aluminium, primary, ingot {IAI Area, Asia, without China and GCC} aluminium production, primary, ingot Cut-off, U	Good Geography: The inventory is modelled for IAI Area, Asia, without China and GCC	Good Technology level: Current	Very good Start date: 01/01/2015 End date: 31/12/2024 Is data valid for entire period: True
Steel, low-alloyed, hot rolled {GLO} market for steel, low-alloyed, hot rolled Cut-off, U	Good	Poor	Very good

	Geography: The inventory is modelled for Global	Technology level: Unknown	Start date: 01/01/2015 End date: 31/12/2024 Is data valid for entire period: True
Natural gas, burned in gas turbine {GLO} market for natural gas, burned in gas turbine Cut-off, U	Good Geography: The inventory is modelled for Global	Poor Technology level: Unknown	Very good Start date: 01/01/2015 End date: 31/12/2024 Is data valid for entire period: True
Aluminium, wrought alloy {GLO} market for aluminium, wrought alloy Cut-off, U	Good Geography: The inventory is modelled for Global	Poor Technology level: Unknown	Very good Start date: 01/01/2015 End date: 31/12/2024 Is data valid for entire period: True
Metal working, average for steel product manufacturing {GLO} market for metal working, average for steel product manufacturing Cut-off, U	Good Geography: The inventory is modelled for Global	Poor Technology level: Unknown	Very good Start date: 01/01/2015 End date: 31/12/2024 Is data valid for entire period: True
Transport, freight, lorry, 16-32 metric ton, diesel, EURO 6 {RER} market for transport, freight, lorry, 16-32 metric ton, diesel, EURO 6 Cut-off, U	Good Geography: The inventory is modelled for Europe	Poor Technology level: Unknown	Very good Start date: 01/01/2009 End date: 31/12/2024 Is data valid for entire period: True
Waste wood, untreated {CH} treatment of waste wood, untreated, municipal incineration FAE Cut-off, U	Good Geography: The inventory is modelled for Switzerland	Good Technology level: Current	Very good Start date: 01/01/2006 End date: 31/12/2024 Is data valid for entire period: True

Appendix 8 Guarantees of Origin and other certificates



Ert elavtal
ENEAS förvaltad elpris

Er anläggning
Anl Id: 735 999 216 000 293 557
Mätmetod: Timmätt
Områdes-id: GVL
Elområde: SE3
Elmätarnr: 317 626 49

Sid 3 av 3

Er specifikation

Anläggningsadress: Utmarksvägen 13, 80291 GÄVLE

Elhandel från Fortum	Period	Antal	Pris exkl. moms	Summa
Eneas förvaltad pris	2024-10-01 - 2024-10-31	23 447,65 kWh	54,20 öre/kWh	12 708,62 kr
Svenska kraftnät	2024-10-01 - 2024-10-31	23 447,65 kWh	1,81 öre/kWh	424,18 kr
Påslag	2024-10-01 - 2024-10-31	23 447,65 kWh	0,50 öre/kWh	117,24 kr
Viktad elområdesjustering	2024-10-01 - 2024-10-31	23 447,65 kWh	-0,42 öre/kWh	-97,53 kr
Elcertifikat	2024-10-01 - 2024-10-31	23 447,65 kWh	1,20 öre/kWh	281,37 kr
Summa Elhandel exkl. moms				13 433,88 kr
Moms 25 %				3 358,48 kr
Summa Elhandel				16 792,36 kr

Er elanvändning de senaste 24 månaderna

Logga in på Fortum Online för mer information

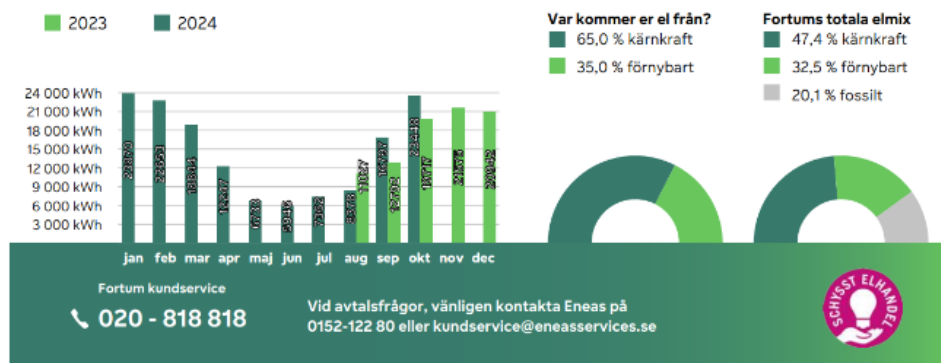


Figure 25: Electricity invoice for CIBES Gävle stating the supplier-specific electricity mix.

Certyfikat

Potwierdzamy, że kupiliśmy dla:

HIGHGATE SP. Z O.O.

gwarancje pochodzenia energii elektrycznej z instalacji odnawialnego źródła energii tj. **lądowe farmy wiatrowe** – w rozumieniu ustawy z dnia 20 lutego 2015 r. o odnawialnych źródłach energii. Odpowiadają one **3645 MWh** rzeczywistej ilości zużytej przez klienta energii elektrycznej w okresie: **01.01.2025- 31.12.2025**



Janusz Moroz
Członek Zarządu
E.ON Polska S.A.



Małgorzata Eull
Dyrektor Pionu Klienci Biznesowi
E.ON Polska S.A.



Figure 26: Certificate of 100% onshore wind energy used by CIBES Poland.

2025-09-02

Concerning Regulation (EC) No 1907/2006 (REACH)

Within the EU, the Regulation (EC) No 1907/2006 of the European parliament and of the council concerning the Registration, Evaluation, Authorization and Restriction of Chemicals – in short REACH regulation, requires all manufacturers and importers of substances in a regulated quantity to register those substances.

The REACH regulation states in article 33 that any supplier of an article containing a substance being included in REACH regulation's so called Candidate list of substances of very high concern for authorization (in short Candidate list of SVHC) in a concentration above 0,1% weight shall provide the recipient respectively the consumer of the article with relevant information.

In accordance with REACH regulation, and the best of our knowledge based on information received from our suppliers and our own product data, we herewith inform you that we supply products of which components – or the products themselves – does not contain substances within the SVHC list in a concentration above 0,1 % and are not subject to any restrictions of the mentioned regulation.

Cibes Lift AB hereby declares that our products are compliant with REACH regulation (EC) 1907/2006 of the European parliament and of the council concerning the registration, evaluation, authorization and restriction of Chemicals

Authorized Signature: _____



Name: Daniel Eriksson

Title: Head of Production Europe

Figure 27 Statement about Substances of Very High Concern (SVHC)

Appendix 9 End-of-life modelling based on PCR 2019:14

In Table 4 of PCR 2019:14, default values have been specified for processes taking place in modules C1, C2, C3, and C4. These default values, based on Erlandsson & Peterson (Erlandsson & Peterson, 2015) (2015) and OVAM (OVAM, 2018), are to be used in modelling of modules C1-C4 if data specific for the intended market is missing. If available, the c-PCR should provide specific default data for the C1-C4 processes of relevance for the specific product category, thus replacing the default data. The default values are shown in the table below.

Table 48 Default data according to PCR 2019:14 v.2.0.0 for modelling modules C1, C2, C3 and C4.

Processes in C1	Energy carrier	Quantity [kWh/tonne]
Demolition/deconstruction of concrete/reinforced concrete	Diesel	10
Demolition/deconstruction of masonry, tiles, and paver blocks	Diesel	5
Demolition/deconstruction of steel, wood, and other materials	Diesel	1,1
Processes in C2	Distance	Means of transport
Transport (for products/materials not to be incinerated)	80 km	16-32 tonne lorry (EURO 5), 50% load factor
Transport (for products/materials to be incinerated)	130 km	16-32 tonne lorry (EURO 5), 50% load factor
Processes in C3	Energy carrier	Quantity [kWh/tonne]
Loading and unloading at sorting facility	Diesel	1,8
Mechanical sorting	Electricity	2,2
Crushing of concrete	Diesel	2,0
Crushing of masonry, tiles and paver blocks	Diesel	1,5
Fragging of steel	Diesel	7,4
Chipping of wood	Diesel	6
Treatment of other materials	Diesel	0,8

Processes in C4	Energy carrier	Quantity [kWh/tonne]
Compacting of inert construction waste for landfills (including backfilling)	Diesel	1,6

The datasets used to model the different aspects in the table above is presented in the table below.

Table 49 Modelling of diesel burning, transport and electricity consumption according to PCR 2019:14

Aspect	Type	Data representation in ecoinvent
Energy carrier	Diesel	Diesel, burned in building machine {GLO} diesel, burned in building machine Cut-off, U
Transport	16-32 tonne lorry (EURO 5), 50% load factor	Transport, freight, lorry 16-32 metric ton, EURO5 {RER} transport, freight, lorry 16-32 metric ton, EURO5 Cut-off, U
Electricity	Market mix	SWE scenario - Electricity, medium voltage {SE} market for electricity, medium voltage Cut-off, U EUR scenario - Electricity, medium voltage {RER} market group for electricity, medium voltage Cut-off, U

Which default modelling is included for each material in end-of-life is presented in the tables below.

Table 50 Modules included for the different materials

Material	Modules used in modelling of each material								
	C1 Steel, wood, and other material	C2 Transport to incineration	C2 Transport to other waste treatment	C3 Loading and unloading at sorting facility	C3 Mechanical sorting	C3 Steel fragging	C3 Wood chipping	C3 Treatment of other materials	C4 Compacting landfill
Steel	X	X	X	X	X	X			X
Wood	X	X	X	X	X		X		X
Cardboard	X	X	X	X	X			X	X
Paper	X	X	X	X	X			X	X

Glass	X	X	X	X	X			X	X
Copper	X	X	X	X	X	X			X
Aluminium	X	X	X	X	X	X			X
Plastic	X	X	X	X	X			X	X
Rubber	X	X	X	X	X			X	X
Textile	X	X	X	X	X			X	X
Electronics	X	X	X	X	X	X		X	X

Table 51 Modelling of incineration and landfilling for the different materials in end-of-life

Material	LCI data in ecoinvent		
	C3 Incineration with energy recovery	C4 Incineration without energy recovery	C4 Landfilling
Steel		Scrap steel {Europe without Switzerland} treatment of scrap steel, municipal incineration Cut-off, U	Scrap steel {Europe without Switzerland} treatment of scrap steel, inert material landfill Cut-off, U
Wood	Waste wood, untreated {CH} treatment of waste wood, untreated, municipal incineration FAE Cut-off, U		Waste wood, untreated {CH} treatment of waste wood, untreated, sanitary landfill Cut-off, U
Cardboard	Waste paperboard {CH} treatment of waste paperboard, municipal incineration FAE Cut-off, U		Waste paperboard {CH} treatment of waste paperboard, inert material landfill Cut-off, U
Paper	Waste graphical paper {CH} treatment of waste graphical paper, municipal incineration FAE Cut-off, U		Waste paperboard {CH} treatment of waste paperboard, inert material landfill Cut-off, U
Glass		Waste glass {CH} treatment of waste glass, municipal incineration FAE Cut-off, U	Waste glass {CH} treatment of waste glass, inert material landfill Cut-off, U
Copper	Steel modelling is used as a proxy		
Aluminium	Steel modelling is used as a proxy		
Plastic	Waste plastic, mixture {CH} treatment of waste plastic, mixture, municipal incineration FAE Cut-off, U		Waste plastic plaster, for final disposal {CH} treatment of waste plastic plaster, inert material landfill Cut-off, U

Rubber	Waste rubber, unspecified {Europe without Switzerland} treatment of waste rubber, unspecified, municipal incineration Cut-off, U		Residues, MSWI, waste rubber, unspecified {Europe without Switzerland} treatment of residues, MSWI, waste rubber, unspecified, residual material landfill Cut-off, U
Textiles	Waste textile, soiled {CH} treatment of waste textile, soiled, municipal incineration FAE Cut-off, U		Residues, MSWI[F], waste textile, soiled {CH} treatment of residues, MSWI[F], waste textile, soiled, residual material landfill Cut-off, U
Electronics	Plastic and metal used as a proxy, assumed 50/50 content		

Appendix 10 D module modelling based on PCR 2019:14

The following formula is used to calculate the potential consequences of material recycling of the product and net output flows of recovered material and energy from modules A-C:

$$e_{module D1} = \sum_i (Y \cdot M_{MR out|i} - Y \cdot M_{MR in|i}) \cdot (E_{MR after EoW out|i} - E_{VMSub out|i} \cdot \frac{Q_{R out|i}}{Q_{Sub|i}})$$

Equation 1 describes how the potential consequences of material recycling has been calculated.

- **Y** is the material yield in the recycling process
- **MMR out** is the amount of material that leaves the product system and will be reused or recycled in subsequent systems. Amount of material in product and packaging multiplied with the recycling rate ($Share_{MRout}$)
- **MMR in** is the amount of secondary material that enters the product's system as raw material
- **EMR after EoW out** are specific emissions and the consumed resources that arise in the recycling process, up to the point where it is assume to substitute virgin material.
- **EVMSub out** are specific emissions and consumed resources that arise during the acquisition and pre-treatment of primary materials in the manufacturing process.
- **QR out** is the quality of the recycled material at replacement.
- **QSub** is the average quality of primary material that the recycled material substitutes.

$Share_{MRout}$ for the different materials are based on European average recycling rates (R2) used in PEF Circular Footprint Formula⁷, and can be seen in the table below.

The following formula is used to calculate the potential benefits of energy recovery from waste incineration of the product and it's packaging:

$$e_{module D3} = -M_{INC out} \cdot (LHV \cdot X_{INC heat} \cdot E_{SE heat} + LHV \cdot X_{INC elec} \cdot E_{SE elec})$$

where,

⁷ R2 values as stated in PEF Annex C available at <https://eplca.jrc.ec.europa.eu/LCDN/developerEF.xhtml>

- M_{INCout} = The amount of material that leaves the product system and will be reused / recycled in subsequent systems. Calculated by subtracting the material that is sent to recycling from the amount in product and packaging, and multiplying with the incineration rate ($Share_{INCout}$)
- LHV = lower heating value of the material
- X_{INHeat} = efficiency of the incineration process for heat
- E_{SEheat} = specific emissions and resources consumed per unit of analysis that would have arisen from specific current average substituted energy source: heat
- X_{INelec} = efficiency of the incineration process for electricity
- E_{SEelec} = specific emissions and resources consumed per unit of analysis that would have arisen from specific current average substituted energy source: electricity

In the incineration process with energy recovery, it is assumed that 30% becomes electricity and 70% becomes heat. The efficiency of the incineration process is assumed to be 80%.

The amount of materials that are not material recycled, are either sent to incineration or landfill. The parameter $Share_{MRin}$ is the recycled content of the material and $Share_{MRout}$ is what goes to recycling in end-of-life and these parameters are reported in section 4.10.

Table 52 Modelling details for module D with a European average scenario

Material	Parameters material recycling	Avoided process in material recycling in ecoinvent	Process for material recycling in ecoinvent	Parameters for energy recycling (for remaining materials after material recycling)	Avoided process for production of electricity in ecoinvent	Avoided process for production of heat in ecoinvent
Aluminium	$Q_{Sub}= 1$ $Q_{Rout}= 1$ $Y=0,97$	Aluminium, primary, ingot {IAI Area, EU27 & EFTA} aluminium production, primary, ingot Cut-off, U	Aluminium, wrought alloy {RER} treatment of aluminium scrap, post-consumer, prepared for recycling, at remelter Cut-off, U	No energy recycling of this material	-	-
Steel	$Q_{Sub}= 1$ $Q_{Rout}= 1$ $Y=0,958$	Pig iron {RER} pig iron production Cut-off, U	Iron scrap, sorted, pressed {RER} sorting and pressing of iron scrap Cut-off, U	No energy recycling of this material	-	-

			(adapted by removing material inputs)			
Copper	$Q_{Sub} = 1$ $Q_{Rout} = 1$ $Y = 0,576$	Copper, cathode {GLO} market for copper, cathode Cut-off, U (removed transports)	Copper, cathode {RER} treatment of copper scrap by electrolytic refining Cut-off, U (changed input of virgin copper to recycled copper)	No energy recycling of this material	-	-
Glass	$Q_{Sub} = 1$ $Q_{Rout} = 1$ $Y = 0,85$	Flat glass production, uncoated RER) Cut-off, U (removed everything except material inputs)	No additional processing required.	No energy recycling of this material	-	-
Cardboard	$Q_{Sub} = 0,85$ $Q_{Rout} = 0,8$ $Y = 1$	Containerboard, fluting medium {RER} containerboard production, fluting medium, semichemical Cut-off, U	Containerboard, fluting medium {RER} containerboard production, fluting medium, recycled Cut-off, U	$Share_{INCout} = 54\%$ LHV = 15,66 MJ/kg	Electricity, high voltage {RER} market group for electricity, high voltage Cut-off, U	[MG] Heat, from district heating Sweden 2022, cut-off
Plastic (non packaging)	$Q_{Sub} = 1$ $Q_{Rout} = 0,8$ $Y = 0,895$	Polyethylene, high density, granulate {RER} polyethylene production, high density, granulate Cut-off, U	Polyethylene, high density, granulate, recycled {RoW} polyethylene production, high density, granulate, recycled Cut-off, U	$Share_{INCout} = 54\%$ LHV = 31,00 MJ/kg	Electricity, high voltage {RER} market group for electricity, high voltage Cut-off, U	[MG] Heat, from district heating Sweden 2022, cut-off
Wood	$Q_{Sub} = 1$ $Q_{Rout} = 0,8$ $Y = 1$	Sawnwood, softwood, raw, dried (u=10%) {RER} market for sawnwood, softwood, raw, dried (u=10%) Cut-off, U	Waste wood, post-consumer {GLO} waste wood, post-consumer, Recycled Content cut-off Cut-off, U	$Share_{INCout} = 54\%$ LHV = 19,00 MJ/kg	Electricity, high voltage {RER} market group for electricity, high voltage Cut-off, U	[MG] Heat, from district heating Sweden 2022, cut-off
Paper	$Q_{Sub} = 1$ $Q_{Rout} = 0,8$ $Y = 0,9$	Paper, woodfree, uncoated {RER} paper production, woodfree, uncoated, at non-	Paper, woodfree, uncoated {RER} paper production, woodfree, uncoated, at non-	$Share_{INCout} = 54\%$ LHV = 29,22 MJ/kg	Electricity, high voltage {RER} market group for electricity,	[MG] Heat, from district heating Sweden 2022, cut-off

		integrated mill Cut-off, U	integrated mill Cut-off, U (changed to recycled content , electricity mix to RER and added a biogenic carbon uptake)		high voltage Cut-off, U		The avoided process for
Rubber	$Q_{Sub} = 1$ $Q_{Rout} = 0,8$ $Y = 1$	No material recycling is assumed for this material		$Share_{INCoUt} = 54\%$ $LHV = 32,06 \text{ MJ/kg}$	Electricity, high voltage {RER} market group for electricity, high voltage Cut-off, U	[MG] Heat, from district heating Sweden 2022, cut-off	
Textile, cotton/cellulose	$Q_{Sub} = 1$ $Q_{Rout} = 0,8$ $Y = 0,5$	Fibre, viscose {GLO} fibre production, viscose Cut-off, U	Fibre, viscose {GLO} fibre production, viscose Cut-off, U (removed input of sulfate pulp)	$Share_{INCoUt} = 54\%$ $LHV = 23,40 \text{ MJ/kg}$	Electricity, high voltage {RER} market group for electricity, high voltage Cut-off, U	[MG] Heat, from district heating Sweden 2022, cut-off	
Textile, wool	$Q_{Sub} = 1$ $Q_{Rout} = 0,8$ $Y = 0,85$	Sheep fleece in the grease {RoW} sheep production, for wool Cut-off, U	No additional processing required.	$Share_{INCoUt} = 54\%$ $LHV = 23,40 \text{ MJ/kg}$	Electricity, high voltage {RER} market group for electricity, high voltage Cut-off, U	[MG] Heat, from district heating Sweden 2022, cut-off	

production of heat (“[MG] Heat, from district heating Sweden 2022, cut-off”) was modelled to represent Swedish district heating, based on Swedish statistics (Energiföretagen, n.d.). The model is summarised below.

Table 53: [MG] Heat, from district heating Sweden 2022, cut-off. Model for Swedish district heating for use as replaced heating in module D

Fuel/input	Ecoinvent-process	Amount	Unit
Municipal waste ☒	Heat, for reuse in municipal waste incineration only {SE} market for heat, for reuse in municipal waste incineration only Cut-off, U	0,212	MJ
Flue gas condensation ☒	Heat, for reuse in municipal waste incineration only {SE} market for heat, for reuse in municipal waste incineration only Cut-off, U	0,106	MJ
Recycled industrial residual heat ☒	Heat, for reuse in municipal waste incineration only {SE} market for heat, for reuse in municipal waste incineration only Cut-off, U	0,083	MJ
Secondary wood chips ☒	Heat, for reuse in municipal waste incineration only {SE} market for heat, for reuse in municipal waste incineration only Cut-off, U	0,077	MJ

Heat from heat pumps	Heat, for reuse in municipal waste incineration only {SE} market for heat, for reuse in municipal waste incineration only Cut-off, U	0,04	MJ
Landfill and digester gas and waste gas from the steel industry	Heat, for reuse in municipal waste incineration only {SE} market for heat, for reuse in municipal waste incineration only Cut-off, U	0,023	MJ
Grit, sawdust, bark	Heat, district or industrial, other than natural gas {SE} heat and power co-generation, wood chips, 6667 kW, state-of-the-art 2014 Cut-off, U	0,251	MJ
Stemwood chips	Heat, district or industrial, other than natural gas {SE} heat and power co-generation, wood chips, 6667 kW, state-of-the-art 2014 Cut-off, U	0,067	MJ
Renewable electricity for electric boilers etc.	Electricity, high voltage {SE} electricity production, wind, 1-3MW turbine, onshore Cut-off, U	0,043	MJ
Pellets, briquettes, powder	Heat, central or small-scale, other than natural gas {RoW} heat production, wood pellet, at furnace 300kW, state-of-the-art 2014 Cut-off, U	0,049	MJ
Bio-oil, crude tall oil	Heat, district or industrial, other than natural gas {SE} heat and power co-generation, wood chips, 6667 kW, state-of-the-art 2014 Cut-off, U	0,021	MJ
Arable crops, mainly Salix	Heat, district or industrial, other than natural gas {RER} heat production, straw, at furnace 300kW Cut-off, U	0,001	MJ
Fuel oil	Heat, district or industrial, other than natural gas {SE} heat and power co-generation, oil Cut-off, U	0,015	MJ
Fossil electricity for electric boilers, etc.	Electricity, high voltage {SE} electricity production, oil Cut-off, U	0,001	MJ
Natural gas	Heat, district or industrial, other than natural gas {CH} refinery gas, burned in furnace Cut-off, U	0,002	MJ
Bituminous coal	Heat, central or small-scale, other than natural gas {Europe without Switzerland} heat production, hard coal coke, stove 5-15kW Cut-off, U	0,001	MJ
Peat and peat briquettes	Heat, central or small-scale, other than natural gas {RoW} heat production, lignite briquette, at stove 5-15kW Cut-off, U	0,0036	MJ
Electricity from nuclear power to electric boilers	Electricity, high voltage {SE} electricity production, nuclear, boiling water reactor Cut-off, U	0,0035	MJ

