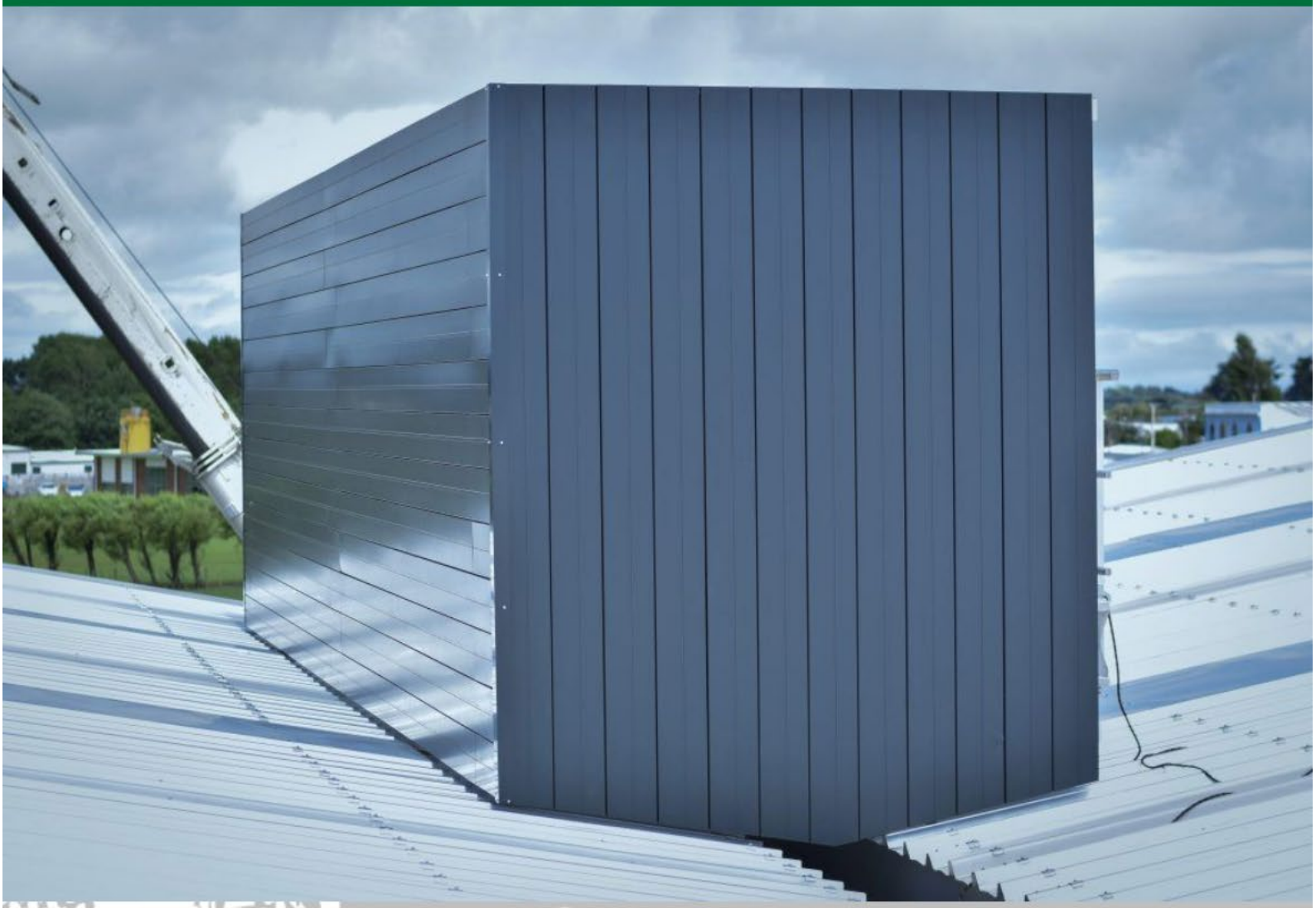
GLOBAL GREEN TAG INTERNATIONAL PTY LTD

EPD™
Environmental Product Declaration

Environmental Product Declaration
Global GreenTag^{CertTM} EPD Program

Compliant to EN 15804:2012+A2 2019



Monkeytoe

MonkeyToe Group Ltd
XBEAM platform system with Hushmonkey barrier

GLOBAL GREENTAG® INTERNATIONAL

1. General Information

Owner of the declaration	MonkeyToe Group Ltd 45A Mahitiwhiti Rd Normanby 4674 Taranaki North Island https://www.monkeytoe.co.nz	
EPD Program holder	Global Green Tag International Pty Ltd	
Product Category Rules (PCR)	EN 15804:2012+A2:2019- Sustainability of construction works – Environmental product declarations – Core rules for the product category of construction products	
Independent Verification	X internal	☐ external
Approved and verified by	Dr Nana Bortsie- Aryee, Global GreenTag International	
EPD prepared by	IKE Environmental Technology Co. Ltd. Tel & Fax: +86-028-85404099 www.ike-global.com support@ike-global.com	
LCA Software and LCI database:	eFootprint software CLCD database0.8/0.9, Ecoinvent v3.5 database	
Registration Numbers:	MOG:XB01:2022:EP	
Issue date:	May 29, 2023	
Valid to:	May 29, 2028	
Markets of Applicability:	New Zealand	
EPD Type:	Product Specific	
EPD Scope:	Cradle to Gate	
Time representativeness:	Jan 2021- Dec 2021	
Intended application	Business-to-Business	

2. Product Information

2.1 Goal and Scope

This EPD evaluates the environmental impacts of 1 ton of XBEAM platform system with Hushmonkey barrier as specified above from cradle-to-gate with options, as being intended for Business-to-Business communication with clients and relevant stakeholders within several sectors.

2.2 Product Specification

The XBEAM platform system with Hushmonkey barrier, which is XBEAM complete platform product, including bearers, studs, flooring, secondary, and sub secondary members, support posts, acoustic enclosure system etc. The XBEAM platform system is manufactured from a combination of 2 technologies, carbon fibre-reinforced polymers and high tensile T6 aluminium. The carbon fibre's strength as a material comes down to the nature of the composite. The ability to tailor the direction of the carbon fibres means this can can yield stiffness, 20 times greater than a metal baseline. The carbon fibre structures can span further distances and support greater weights whilst weighing less allowing for more designs.

2.3 Material Composition

The primary materials include carbon fibre-reinforced polymers and T6 aluminium..

Table 1. Material content for the product, per ton

Component	Material	Percent
Aluminium profiles	Al>99%	93%
Carbon fibre	Carbon fibre	1%
Polymers	PET	3%
Steel products	Stainless Steel	2%
Adhesive and other materials	/	1%

No substances required to be reported as hazardous are associated with the production of this product

2.4 Packaging

The products are packaged for shipment using wood pallet, cardboard and plastic wrap.

Table 2. Material content for the product packaging, per ton.

Component	Material	Percent
Wood pallet	wood	73%
Plastic strapping, wrap, bags	PE,PET	22%
Cardboard box	Paper	5%

2.5 Reference service life (RSL)

The Reference Service Life (RSL) of the XBEAM platform system with Hushmonkey barrier is 25 years.

3. LCA Calculation rules

3.1 Functional unit and Declared Unit

The declared unit is 1 ton of aXBEAM platform system with Hushmonkey barrier product from cradle to gate （A1-A5）with options of modules c1-c4 and module D without B modules.

The manufacturer declares a 25-year commercial warranty and lifetime residential warranty for their products. For the assessment, a reference service lifetime (RSL) of 25 years is assumed based on the manufacturer's recommendation and consistent with similar, industry-wide LCAs.

3.2 System boundaries

It is a EPD from cradle to gate (A1-A5) with options of modules c1-c4 and module D without B modules. The system boundary is based on the EN 15804 description.

The table below shows the system boundaries according to EN 15804.

Table 3. System boundaries according to EN 15804

Product			**Construction Process**		**Use**							**End-of-life**				**Benefits and loads beyond the system boundary**
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Raw material extraction and	Transport to manufacturer	Manufacturing	Transport	Construction - installation	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	Deconstruction demolition	Transport	Waste processing	Disposal	Reuse, recovery and/or recycling potential
X	**X**	**X**	**NR**	**NR**	**NR**	**NR**	**NR**	**NR**	**NR**	**NR**	**NR**	**X**	**X**	**X**	**X**	**X**

The description of life cycle stage A-D are as follows:

A1 Extraction and processing of raw materials for the product components.

A2 Transport of component materials to the manufacturing facilities

A3 Manufacturing of products and packaging

A4-5 There is no transport and installation to the building site of the product (NR).

B1-B7 Use of the product in a building setting. This EPD did not include the use of the product.

C1 Demolition of the product is accomplished using hand tools with no associated emissions and negligible impacts

C2 Transport of product to waste treatment and recycle at end-of-life

C3 The product is disposed of by landfilling which require no waste processing

C4 Disposal of product in municipal landfill

D Recycle and recovered energy from waste incineration of product

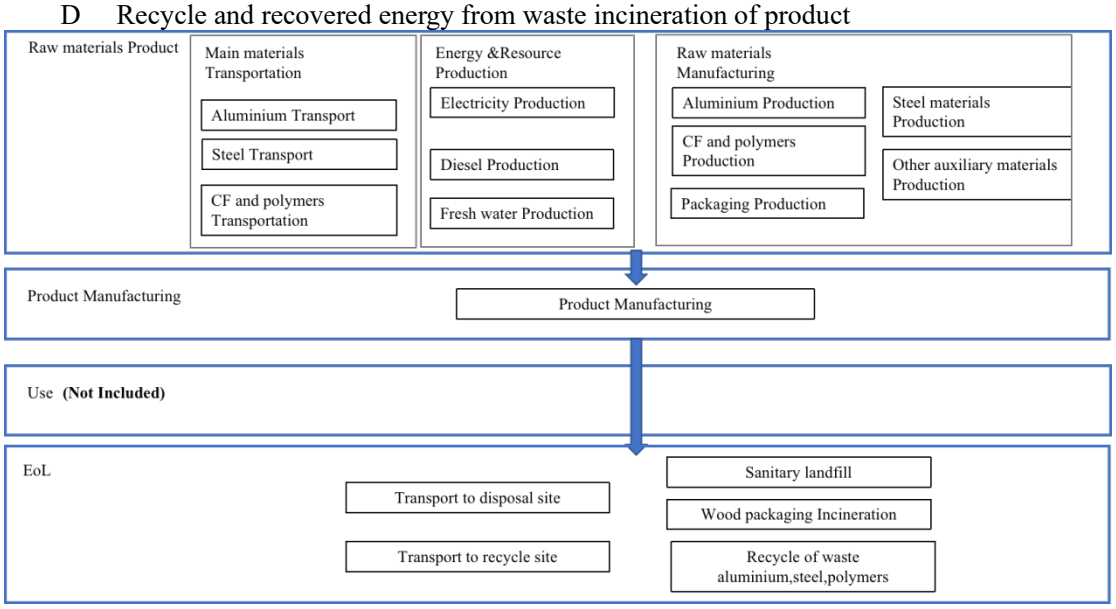


Figure 1. Product Cradle to Gate System Boundary

3.3 Time period

Manufacturer-supplied data (primary data) are based on annualized production for 2021.

3.4 Estimates and assumptions

Module A2 - a EURO4 lorry 16-32 metric ton was utilized for domestic transportation and aircraft for transcontinental transportation;

Module C2 - a conservative assumption of 100 km by lorry 16-32 metric ton was used;

Module D - The scenarios included are currently in use and are representative for one of the most probable alternatives. According to the European Aluminium Association above 90% of the

aluminium for building applications is being recycled. For the study it was assumed that 90% of the aluminium is being recycled at the end-of-life of the products while the rest 10% are being landfilled. For steel and polymers, the recycled content is assumed as 25% and 15%.

All packaging introduced in the production stage is assumed to become waste in module C. Plastic package arises in small quantities and is all assumed to be sent to landfill. Wood and cardboard packaging is assumed to be disposed of by landfill and incineration in equal proportions; energy exported from incineration is included in the Exported Energy indicator and included in Module D calculation.

Energy exported from the incineration is included in Module D, with conversion to energy assumed to be 70% efficient and 20% grid power generation efficiency in the municipal solid waste incineration plants The potential benefits derived from export energy are calculated on the basis that electricity generated substitutes for global average grid electricity.

3.5 Cut-off criteria

The cut-off criteria adopted is as stated in “EN 15804:2012+A2:2019”. Where there is insufficient data for a unit process, the cut-off criteria are 1% of the total mass of input of that process. The total of neglected input flows per module is a maximum of 5% of energy usage and mass.

3.6 Software and Background data

For life cycle modelling of the considered products, the online software eFootprint has been used to model the product systems considered in this study. All relevant background datasets are taken from the CLCD 0.8/0.9 and Ecoinvent V3.5 (EI v3.5) database. The datasets from CLCD and Ecoinvent date from 2014 to 2018 and are documented in the online documentation.

3.7 Data quality Assessment

The data quality assessment addressed the following parameters: time-related coverage, geographical coverage, technological coverage, precision, completeness, representativeness, consistency, reproducibility, sources of data, and uncertainty.

Table 4. Data quality assessment for the product system

Data Quality Parameter	Data Quality Discussion
Time-Related Coverage: Age of data and the minimum length of time over which data is collected	The most recent available data are used, based on other considerations such as data quality and similarity to the actual operations. Typically, these data are less than 5 years old (typically 2018). All of the data used represented an average of at least one year's worth of data collection, and up to three years in some cases. Manufacturer-supplied data (primary data) are based on annualized production for 2021.
Geographical Coverage: Geographical area from which data for unit processes is collected to satisfy the goal of the study	The data used in the analysis provide the best possible representation available with current data. This study is mainly based on specific data collected from the production site in New Zeland Electricity consumption data from natural gas and geothermal power for product manufacture was collected from manufacturing site in New Zealand and modeled using data for average across countries (including New Zealand). Because in the LCA database, there are no separate New Zealand datasets of natural gas power generation and geothermal power generation. Given the huge technological gap between New Zealand's electricity, which is mainly generated from hydropower, and the enterprise electricity is mainly generated by natural gas and geothermal, so the generation technology is given priority to the database selection . Data representing product disposal are based on NZ regional statistics.
Technology Coverage: Specific technology or technology mix	For the most part, data are representative of the actual technologies used for processing, transportation, and manufacturing operations. Representative fabrication datasets, specific to the type of material, are used to represent the actual processes, as appropriate.
Precision: Measure of the variability of the data values for each data expressed	Data collected for operations were typically averaged for one or more years and over multiple operations, which is expected to reduce the variability of results.
Completeness: Percentage of flow	The LCA model included all known mass and energy flows for production of the product. No known processes or activities contributing to more than 1% of the

that is measured or estimated	total environmental impact for each indicator are excluded.
Representativeness: Qualitative assessment of the degree to which the data set reflects the true population of interest	Data used in the assessment represent typical or average processes as currently reported from multiple data sources, and are therefore generally representative of the range of actual processes and technologies for production of these materials. Considerable deviation may exist among actual processes on a site-specific basis; however, such a determination would require detailed data collection throughout the supply chain back to resource extraction.
Consistency: Qualitative assessment of whether the study methodology is applied uniformly to the various components of the analysis	The consistency of the assessment is considered to be high. Different portions of the product life cycle are equally considered.
Reproducibility: Qualitative assessment of the extent to which information about the methodology and data values would allow an independent practitioner to reproduce the results reported in the study	Based on the description of data and assumptions used, this assessment would be reproducible by other practitioners. All assumptions, models, and data sources are documented.
Sources of the Data: Description of all primary and secondary data sources	Data representing energy use at Monkey's facility in New Zealand represent an annual average and are considered of high quality due to the length of time over which these data are collected. For secondary LCI datasets, CLCD 0.9, Ecoinvent v3.5 LCI data are mainly used.
Uncertainty of the Information: Uncertainty related to data, models, and assumptions	Uncertainty related to materials in the product and packaging is low. Actual supplier data for upstream operations was not available for all suppliers and the study relied upon the use of existing representative datasets. These datasets contained relatively recent data (<5 years).

3.8 EoL Allocation method

In the manufacturing stage, no co-product or by-product is obtained. Allocation of any production processes to more than one product is therefore not needed.

According to ISO 14044/44, allocation is needed in several situations for LCA. One of those is recycling of end-of-life materials.

The methodological choices for allocation for reuse, recycling, and recovery have been set according to the PEF method, which is the most common recycling methods. It “allocates the impacts and benefits due to recycling equally between the producer using recycled material and the producer producing a recycled product”

3.9 Comparability

Environmental product declarations of construction products may not be comparable if they do not comply with EN 15804 and environmental product declarations within the same category from different programs may not be comparable.

4. LCA Scenarios and Additional Technical Information

4.1 Transport to the building site(A4)

Distribution of the product to the point of installation is not included in the assessment.

4.2 Installation in the building (A5)

No impacts are associated with the Installation in the building.

4.3 EoL stage (C1 - C4, D)

The disposal stage includes demolition of the products (C1); transport of the product to waste treatment facilities (C2); waste processing (C3); and associated emissions as the product final disposed (C4).

Benefit includes reuse, recovery and/or recycling, and transport to recycling operations.

Transportation of waste materials at end-of-life (C2) and recycle assumes a 100 km average distance.

Table 5. EoL parameters for the product, per 1 ton

Processes	Unit	Quantity
collection process	kg collected separately	160.61
recovery system	kg for recycling	844.83
disposal	kg for final disposal	159.63
transportation	km	100

5. Environmental Performance

This EPD contains environmental information about XBEAM aluminium bearer in the form of quantitative indicator values for a number of parameters, which encompass calculated environmental impact potentials, resource and energy use, and waste generation. These parameters are listed below along with the abbreviations used for them in the tables of indicator values that follow.

Table 6. LCA impact indicators information

Core environmental impact categories and indicators	**Abbreviation**	**Unit**
Global warming potential - fossil fuels	GWP-fossil	$kgCO_2$-eq
Global warming potential - biogenic	GWP-biogenic	$kgCO_2$-eq
Global warming potential - land use and land use change	GWP-luluc	$kgCO_2$-eq
Global warming potential - total	GWP-total	$kgCO_2$-eq
Acidification potential of land and water	AP	$molH^+eq$
Eutrophication potential - freshwater	EP-freshwater	kgPeq
Eutrophication potential - marine	EP-marine	kgNeq
Eutrophication potential - terrestrial	EP-terrestrial	molNeq
Formation potential of tropospheric ozone	POFP	kgNMVOC
Depletion potential of the stratospheric ozone layer	ODP	kgCFC11-eq
Abiotic depletion potential for non-fossil resources	ADPMM	kgSb-eq
Abiotic depletion potential for fossil resources	ADPFF	MJ
Water (user) deprivation potential, deprivation	WDP	m^3
Additional impact categories and indicators	Abbreviation	Unit
Particulate Matter emissions	RI	disease incidence
Ionizing radiation, human health	IRP	kBq U235 eq.
Eco-toxicity (freshwater)	ET-freshwater	CTUh
Human toxicity, cancer effects	HT-non cancer	CTUh
Human toxicity, non-cancer effects	HT-non cance	CTUh

Land use related impacts/Soil quality	LU	dimensionless
Resource Use	Abbreviation	Unit
Renewable primary energy as energy carrier	PERE	MJ
Renewable primary energy resources as material utilization	PERM	MJ
Total use of renewable primary energy resources	PERT	MJ
Non-renewable primary energy as energy carrier	PENRE	MJ
Non-renewable primary energy as material utilization	PENRM	MJ
Total use of non-renewable primary energy resources	PENRT	MJ
Use of secondary material	SM	kg
Use of renewable secondary fuels	RSF	MJ
Use of non-renewable secondary fuels	NRSF	MJ
Use of net fresh water	FW	m3
Waste Production	Abbreviation	Unit
Hazardous waste disposed	HWD	kg
Non-hazardous waste disposed	NHWD	kg
Radioactive waste disposed	TRWD	kg
Output Flows	Abbreviation	Unit
Components for re-use	CFR	kg
Materials for recycling	MFR	kg
Materials for energy recovery	MER	kg
Exported energy, electricity	EEE	MJ
Exported energy, thermal	EET	MJ

Table 7. LCA impact indicators results of 1ton XBEAM platform system with Hushmonkey barrier product

Parameters	Unit	Total	Product stage A1-A3	Use stage B1-B5	EoL Stage C1-C4	Benefit stage D
GWP-fossil	$kgCO_2$-eq	8.65E+03	1.34E+04	0.00E+00	1.61E+00	-4.73E+03
GWP-biogenic	$kgCO_2$-eq	6.25E+02	1.22E+03	0.00E+00	4.51E-03	-5.95E+02
GWP-luluc	$kgCO_2$-eq	3.16E-03	4.15E-03	0.00E+00	5.15E-06	-9.91E-04
GWP-total	$kgCO_2$-eq	9.27E+03	1.46E+04	0.00E+00	1.61E+00	-5.33E+03
AP	$molH^+eq$	2.41E+01	4.26E+01	0.00E+00	5.31E-03	-1.85E+01
EP-freshwater	kgPeq	2.32E+00	4.08E+00	0.00E+00	3.44E-04	-1.76E+00
EP-marine	kgNeq	1.26E+02	1.84E+02	0.00E+00	8.61E-02	-5.78E+01
EP-terrestrial	molNeq	1.18E+01	1.73E+01	0.00E+00	7.83E-03	-5.48E+00
POFP	kgNMVOC	3.35E+01	4.90E+01	0.00E+00	2.37E-02	-1.55E+01
ODP	kgCFC11-eq	8.27E-04	9.74E-04	0.00E+00	7.72E-07	-1.48E-04
ADPMM	kgSb-eq	2.97E-03	3.17E-03	0.00E+00	1.00E-07	-1.97E-04
ADPFF	MJ	1.55E+05	2.48E+05	0.00E+00	5.66E+01	-9.30E+04
WDP	m^3	5.87E+05	1.02E+06	0.00E+00	4.62E+01	-4.33E+05
Parameters	Unit	Total	Product stage A1-A3	Use stage B1-B5	EoL Stage C1-C4	Benefit stage D
RI	disease incidence	8.36E-04	1.24E-03	0.00E+00	3.89E-07	-4.04E-04
IRP	kBq U235 eq.	4.27E+02	5.31E+02	0.00E+00	2.67E-01	-1.04E+02

ET-freshwater	CTUh	8.55E+05	1.10E+06	0.00E+00	4.35E+01	-2.45E+05
HT-non cancer	CTUh	3.42E-05	3.96E-05	0.00E+00	1.08E-09	-5.40E-06
HT-non cance	CTUh	3.43E-04	4.34E-04	0.00E+00	3.52E-08	-9.10E-05
LU	dimensionless	1.88E+02	1.88E+02	0.00E+00	0.00E+00	0.00E+00
Parameters	Unit	Total	Product stage A1-A3	Use stage B1-B5	EoL Stage C1-C4	Benefit stage D
PERE	MJ	8.92E+01	89.09763703	0.00E+00	1.36E-01	0.00E+00
PERM	MJ	2.20E+03	2.64E+03	0.00E+00	5.13E-02	-4.37E+02
PERT	MJ	2.29E+03	2.73E+03	0.00E+00	1.87E-01	-4.37E+02
PENRE	MJ	3.71E+04	3.71E+04	0.00E+00	2.11E+01	0.00E+00
PENRM	MJ	1.55E+05	2.48E+05	0.00E+00	1.43E+01	-9.30E+04
PENRT	MJ	1.93E+05	2.86E+05	0.00E+00	3.54E+01	-9.30E+04
SM	kg	1.05E+03	1.05E+03	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
NRSF	MJ	5.42E+00	5.42E+00	0.00E+00	0.00E+00	0.00E+00
FW	m3	9.34E-01	9.34E-01	0.00E+00	0.00E+00	0.00E+00
Parameters	Unit	Total	Product stage A1-A3	Use stage B1-B5	EoL Stage C1-C4	Benefit stage D
HWD	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NHWD	kg	1.60E+02	0.00E+00	0.00E+00	1.60E+02	0.00E+00
TRWD	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Parameters	Unit	Total	Product stage A1-A3	Use stage B1-B5	EoL Stage C1-C4	Benefit stage D
CFR	kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MFR	kg	9.83E-01	0.00E+00	0.00E+00	9.83E-01	0.00E+00
MER	kg	2.04E+01	0.00E+00	0.00E+00	2.04E+01	0.00E+00
EEE	MJ	4.76E+01	0.00E+00	0.00E+00	4.76E+01	0.00E+00
EET	MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

6. References

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