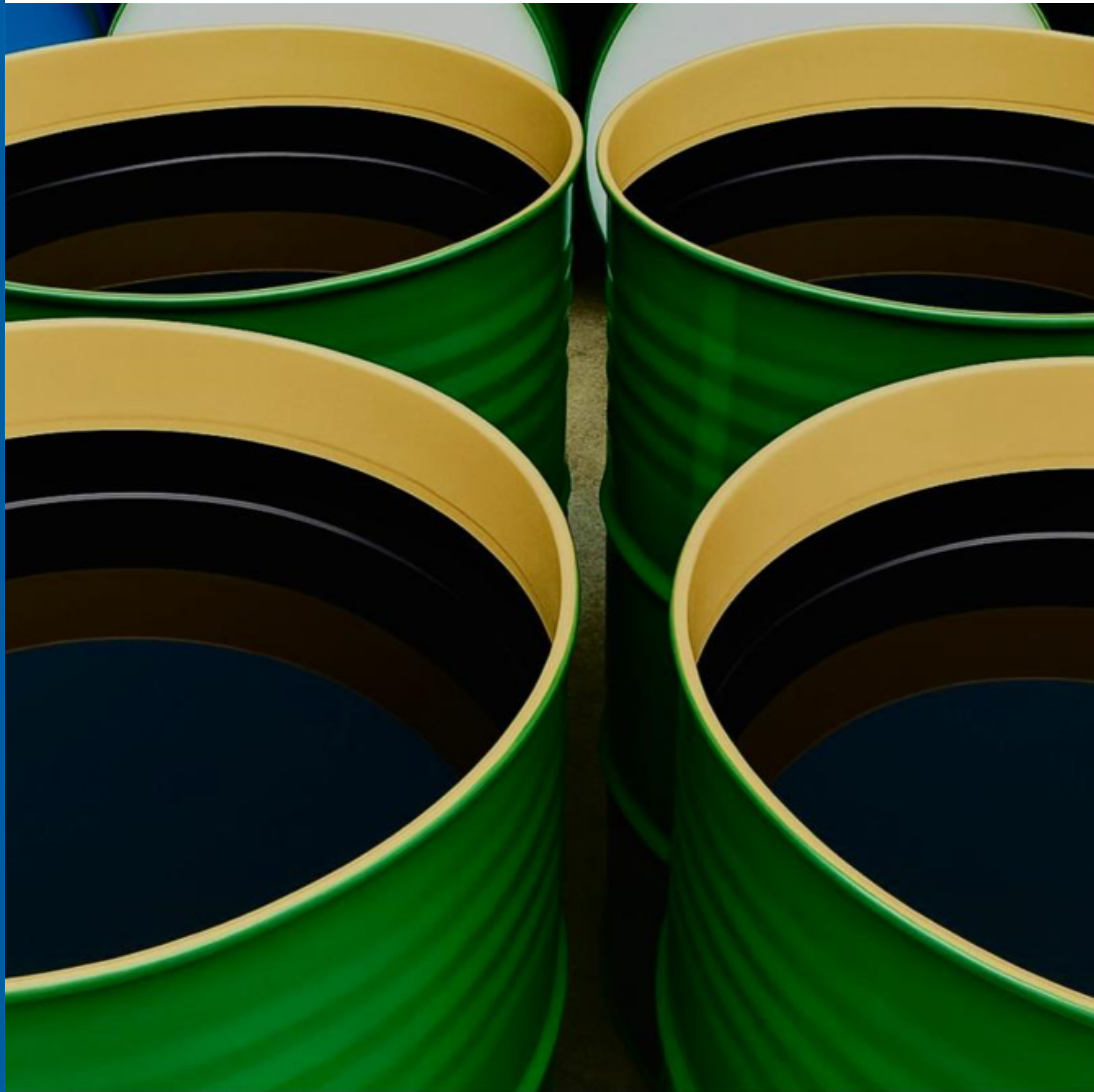
LCA background report

Trinidad Lake Asphalt (TLA)

Lake Asphalt of Trinidad and Tobago (1978) Limited

Programme operator:	Kiwa-Ecobility Experts
Calculation number:	ReTHiNK-111853
Generation on:	29-10-2025
Issue date:	29-10-2025
Valid until:	29-10-2030
Status:	verified



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1 Verification of the life cycle assessment

The independent verification is in accordance with the ISO 14025:2011. The LCA is in compliance with ISO 14040:2006 and ISO 14044:2006. The EN 15804+A2:2019 serves as the core PCR.

☐ Internal ☒ External

Third party verifier: Jekaterina Krastina, Kiwa Latvia

2 General

2.1 INTRODUCTION

This report for review is a result of a life cycle analysis (LCA) made by using the R<THINK application. The report is based on the following chapters which correspond to the phases of a LCA.

- Goal and Scope Definition
- Life Cycle Inventory
- Impact assessment
- Interpretation of results

2.2 COMPANY INFORMATION / DECLARATION OWNER

Declaration owner: Lake Asphalt of Trinidad and Tobago (1978) Limited

Address: Brighton, 630509 La Brea, Trinidad & Tobago

E-mail: sramlal@trinidadlakeasphalt.com

Website: https://trinidadlakeasphalt.com/

Production location: Lake Asphalt of Trinidad and Tobago (1978) Limited

Address production location: Brighton, 630509 La Brea, Trinidad & Tobago

2.3 INFORMATION LCA CALCULATION

LCA calculation for: Trinidad Lake Asphalt (TLA)

Calculation number: ReTHiNK-111853

Generation on: 29-10-2025

Date of issue: 29-10-2025

End of validity: 29-10-2030

Version calculation core R<THINK: v2.0

Version Environmental Profile database: v3.20 (2025-10-21)

PCR:

Kiwa-EE GPI R.3.0 (2025)

Kiwa-EE GPI R.3.0 Annex B1 (2025)

2.4 COMPARABILITY

In principle, a comparison or assessment of the environmental impacts of different products is only possible if they have been prepared in accordance with EN 15804+A2:2019. For the evaluation of the comparability, the following aspects have to be considered in particular: PCR used, functional or declared unit, geographical reference, the definition of the system boundary, declared modules, data selection (primary or secondary data, background database, data quality), scenarios used for use and disposal phases, and the life cycle inventory (data collection, calculation methods, allocations, validity period). PCRs and general program instructions of different EPD program operators may differ. Comparability needs to be evaluated. For further guidance, see EN 15804+A2:2019 and ISO 14025.

2.5 CALCULATION BASIS

LCA method R<THINK: Ecobility Experts | EN15804+A2

LCA software*: Simapro 9.6

Characterization method: RETHINK characterization method (see references for more details)

LCA database profiles: ecoinvent (for version see references)

Version database: v3.20 (2025-10-21)

* Simapro is used for calculating the characterized results of the Environmental profiles within R<THINK.

2.6 COMPILER LCA

The project team for drafting this LCA consists the following persons

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2 General

2.7 ABBREVIATIONS

EPD
Environmental Product Declaration

RSL
Reference service life

LCA
Life Cycle Assessment

NMD
Dutch Environmental Database (Nationale Milieudatabase)

PCR
Product Category Rules

3 Product

3.1 PRODUCT DESCRIPTION

This EPD is stated as the product-specific environmental performance for Trinidad Lake Asphalt (TLA).

Trinidad Lake Asphalt (TLA), also known as Trinidad Epuré, is a refined bituminous material derived from naturally occurring asphalt. It is used as a high-quality binder modifier that provides performance-enhancing properties to bituminous binders and Hot Mix Asphalts (HMA) in the asphalt industry. The natural asphalt originates as a semi-solid emulsion containing soluble bitumen, mineral matter, and other minor constituents. The mineral content contributes to improved resistance to skid and increases the stiffness of the binder. TLA serves as an ideal modifier for refinery bitumen used in heavy-duty Hot Mix Asphalt (HMA) pavements in various countries.

Trinidad Lake Asphalt (TLA) is refined from natural asphalt mined from the large natural asphalt deposit located in the La Brea Pitch Lake, Brighton, La Brea, in the south-western part of the island of Trinidad, West Indies.
Lake Asphalt of Trinidad & Tobago (1978) Limited is the sole custodian responsible for managing and extracting material from this deposit. TLA is produced by refining the naturally occurring asphalt to obtain a consistent, high-purity bituminous material suitable for industrial and construction applications.

TLA can be blended with refinery bitumen to produce the modified binder for asphalt mix production or can be added independently and directly at the asphalt plant during Hot Mix Asphalt (HMA) production.

Material	Composition
Bitumen	52 - 55%
Mineral matter	33 - 38%
Other constituents	10 - 15%

3.2 APPLICATION (INTENDED USE OF THE PRODUCT)

TLA can be blended with refinery bitumen to produce the modified binder for asphalt mix production or can be added independently of the refinery bitumen and directly at the asphalt plant during Hot Mix Asphalt (HMA) production. TLA is a natural bitumen based modifier and is completely compatible with refinery bitumen. Some of the most common types of asphalt pavement applications where TLA is used are Asphaltic Concrete, Mastic Asphalt, Stone Mastic Asphalt (SMA). TLA is also used in the waterproofing and coatings industries.

TLA has proved to be particularly effective in heavy duty pavements with specialized use in areas such as bridge-decks, airport runway and taxiway, sea ports, racetracks, tunnels, heavy traffic intersections and heavily trafficked roadways such as truck lanes.

TLA has been used in specialized projects due to its proven history of successful asphalt modification, providing performance characteristics such as high durability, resistance to permanent deformation and rutting, high fatigue resistance and high mixture stabilities which results in an asphalt pavement that is capable of providing a long service life with low requirements for maintenance interventions. Other properties TLA provides are:

- Improved pavement load carrying
- Improved whole-life pavement costs
- A light coloured, safer, surface
- Enhanced skid resistance properties due to mineral matter component
- Enhanced workability of asphalt mixtures
- Improved low temperature thermal cracking resistance
- Improved ability to display pigments effectively
- Effective blending with other additives
- Allows for reduced layer thickness

3 Product

- Improved adhesiveness and resistance to the effect of water
- Decreased rate of aging

3.3 TECHNICAL DATA

References	Parameters	Units	TLA	
			Min	Max
ASTM D5	Penetration at 25°C	0.1mm	0	5
ASTM D36	Softening Point – T R&B	°C	85	99
ASTM D92	Flash Point	°C	150	-
ASTM D2172	Solubility in Trichloroethylene (Bitumen content)	wt%	52	62
ASTM D2415	Ash Content	wt%	33	38
ASTM D70	Density	g/cm³	1.0	1.5
ASTM D6	Loss on Heating, 50g, 5hrs at 163°C	wt%	-	2
ASTM D5	Retained Penetration after TFOT	°C	50	-

3.4 SUBSTANCES OF VERY HIGH CONCERN

The product does not contain any substances from the ‘Candidate List of Substances of Very High Concern’ (SVHC) in quantities of more than 0.1% (1,000 ppm).

3.5 DESCRIPTION PRODUCTION PROCESS

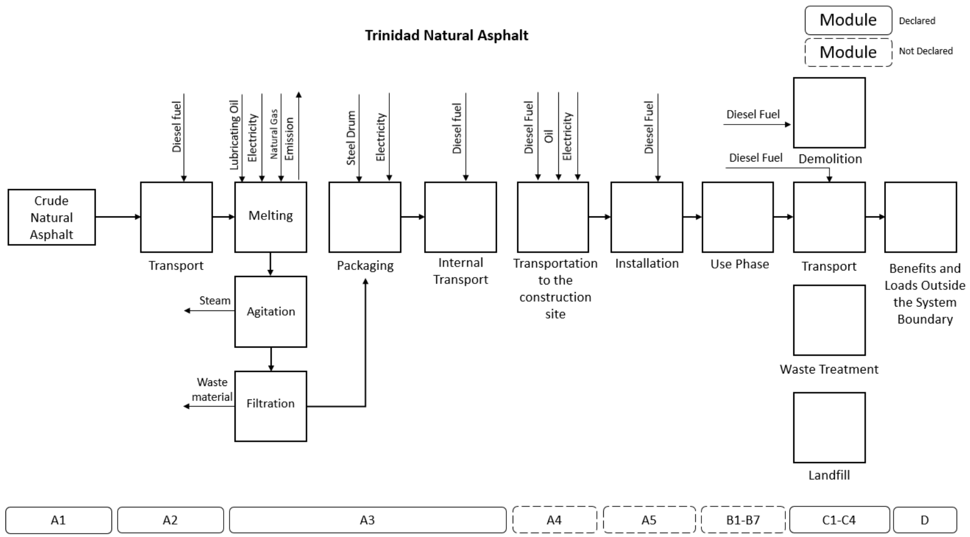
Natural asphalt extracted from the La Brea Pitch Lake in Trinidad is refined through controlled heating and purification processes to produce Trinidad Lake Asphalt (TLA). The lake measures approximately one hundred acres on the surface (41 hectares), and is estimated to be two hundred and fifty (250) feet (76 meters) deep in the centre. The naturally occurring material is mined in an open pit manner and then goes through a simple refining process in which the material is essentially dehydrated and all the extraneous organic matter is removed following which it is filled in 250kg steel drums for export. A more detailed explanation of the process is below:

Mining: Crawler tractor fitted with a hydraulically operated bulldozing blade and rear-mounted ripper, rip and cross rip the surface on a selected area on the Pitch Lake. The tractor then bulldozes the fragmented asphalt into a mound from which the front end loader, loads the trailer tractor. This is then transported to a stockpile site.

Loading of Refining Stills: From this stockpile, the crude asphalt (pitch) is then loaded into rail wagons (buckets which hold one (1) Metric Tonne). When filled the rail wagons are drawn by hoist cables up a trestle to the refining Still (Open top vessels fitted with steam coils and a series of perforated pipes in the bottom for introduction of steam, used for agitating the mass of asphalt during melting).

Refining: The steam at an average temperature of 300 °F is passed through the coils, the crude asphalt gradually melts and the water it contains, about 25-30% is driven off as steam. This process is one of dehydration. After sixteen (16) hours the agitation lines are opened to assist the melting operation and to keep the mineral matter, present in the asphalt, in suspension. At the end of an average eighteen (18) hours the process is completed. The agitation lines are closed and the molten asphalt is drawn off from the bottom of the Still, passed through a fine screen to remove extraneous waste material, then filled into steel drums holding approximately 250 Kg each.

Packaging, storage and shipment: Four (4) drums are placed on a wooden pallet for easy movement by forklift. The drums are cooled, stored and are then loaded into 20ft or 40ft shipping containers and transported to the shipping port.



3 Product

3.6 REFERENCE SERVICE LIFE

RSL PRODUCT

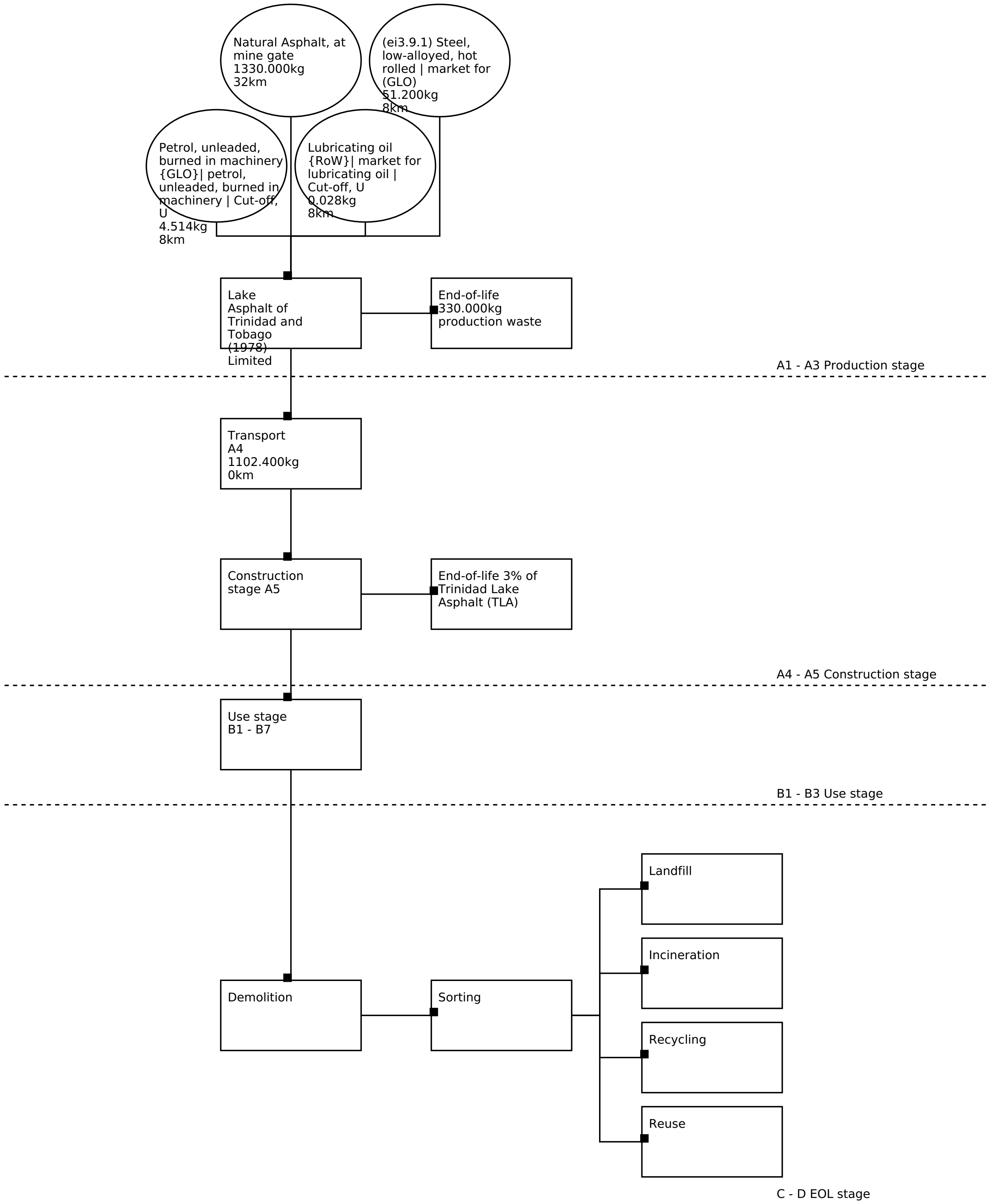
Not applicable. The assumed RSL of 50 years does not represent a declared value under EN 15804+A2, nor is it verified for a specific use condition.

USED RSL (YR) IN THIS LCA CALCULATION:

50

3 Product

3.7 PRODUCT FLOW DIAGRAM



4 Goal and Scope Definition

4.1 PURPOSE AND TARGET GROUPS

The purpose of this study is to define the environmental impact of the examined product by creating an Environmental Product Declaration (EPD) based on a Life Cycle Assessment (LCA). The potential environmental impacts are calculated in accordance with ISO 14040 and 14044, which define the LCA method. The EPD is created in accordance with ISO 14025, which defines principles and procedures of Type III environmental declarations, and EN 15804, which defines core rules for EPDs of construction products.

The EPD is not only used to determine the environmental impact of the product, but also shows the material and energy flows of the production and thus identifies optimisation potential. By publishing the LCA results in an EPD, it is possible to communicate the environmental impact of the product to relevant stakeholders. In addition, the EPD enables the calculation of the environmental impact at the building level.

4.2 FUNCTIONAL UNIT

The declared unit is 1 metric ton of Trinidad Lake Asphalt

1 metric ton (1,000 kg) of Trinidad Natural Asphalt.

This is a specific product EPD.

Reference unit: ton (ton)

4.3 CONVERSION FACTORS

Description	Value	Unit
Reference unit	1	ton
Weight per reference unit	1000.000	kg
Conversion factor to 1 kg	0.001000	ton

4.4 REPRESENTATIVENESS

This EPD is representative of Trinidad Lake Asphalt (TLA) produced by Lake Asphalt of Trinidad and Tobago (1978) Limited. The product is manufactured in Trinidad & Tobago, while the geographical reference area for the end-of-life scenarios considered in this EPD is the European Union.

4.5 SCOPE OF DECLARATION AND SYSTEM BOUNDARIES

This is a Cradle to gate with modules C1-C4 and module D EPD. The life cycle stages included are as shown below:

(X = module included, ND = module not declared)

A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
X	X	X	ND	ND	ND	ND	ND	ND	ND	ND	ND	X	X	X	X	X

The modules of the EN 15804 contain the following:

Module A1 = Raw material supply	Module B5 = Refurbishment
Module A2 = Transport	Module B6 = Operational energy use
Module A3 = Manufacturing	Module B7 = Operational water use
Module A4 = Transport	Module C1 = De-construction / Demolition
Module A5 = Construction - Installation process	Module C2 = Transport
Module B1 = Use	Module C3 = Waste Processing
Module B2 = Maintenance	Module C4 = Disposal
Module B3 = Repair	Module D = Benefits and loads beyond the product system boundaries
Module B4 = Replacement	

4 Goal and Scope Definition

4.6 CUT-OFF CRITERIA

Product stage (Modules A1-A3)

All relevant input flows (e.g., raw materials, transport, energy use, packaging, etc.) and output flows (e.g., production waste) are considered in this LCA. Neglected input flows do not exceed 5% of the total energy use or mass, in accordance with EN 15804.

The following processes are excluded from the system boundaries:

- Long-term emissions
- The manufacture of equipment used in production, buildings or other capital goods;
- Transport of employees to the plant;
- Transport of employees within the plant;
- Disposal of packaging waste, which was not considered due to differing local disposal practices and regulatory conditions in customer countries;
- Research and development activities.

For A1, Land occupation and land transformation flows have been included in the modelling. Based on a disturbed area of 63,855 m², an annual ouput, and a mine lifetime of 400 years, the calculated flows per 1 kg crude asphalt are: 5.97 $m^2 \cdot a$ occupation/kg and 3.73×10^{-5} m^2 transformation/kg. These values have been added in SimaPro as elementary flows.

End-of-life phase (C1-C4)

All relevant input flows (e.g. energy consumption for demolition or dismantling, transport for waste recovery, etc.) and output flows (e.g. waste recovery of the product at the end of its service life, etc.) are considered in this LCA. The neglected input flows therefore do not exceed the limit of 5% of energy consumption and mass.

Benefits and loads beyond the system boundary (Module D)

This LCA takes into account all relevant benefits and loads beyond the system boundary that result from reusable products, recyclable materials and/or useful energy carriers leaving the product system.

4.7 ALLOCATION

Allocations were avoided as far as possible. No by-products or co-products are produced during the manufacture of the analysed product. The energy requirements of production were determined based on energy consumption measurements for the product. Specific information on the allocations within the background data can be found in the documentation of the Ecoinvent datasets.

The packaging steel (51.2 kg per declared unit) contains 30.06 % secondary content according to the applied ecoinvent dataset. This corresponds to 15.391 kg of secondary material, which is reported under the SM indicator in Module A3.

No secondary fuels were used in the manufacturing process.

ALLOCATION USED ENVIRONMENTAL PROFILES / DATASETS

There is no allocation applied for the environmental profiles / datasets used in this LCA. For the sake of clarity, the generic processes which are not changed (e.g. EcoInvent waste treatment processes) are not shown in this overview.

4.8 DATA COLLECTION & REFERENCE PERIOD

All process-specific data was recorded from January 2024 to December 2024. The quantities of raw materials, consumables and supplies used and the energy consumption were recorded and averaged from January 2024 to December 2024. The reference area is Trinidad and Tobago.

4.9 ESTIMATES AND ASSUMPTIONS

As no dataset exists for crude natural asphalt, a custom unit process was developed to represent its life cycle inventory. This process included diesel consumption for mining and lubricating oil for the machinery.

Electricity consumption was modeled using the national average grid mix for Trinidad and Tobago, due to the absence of site-specific electricity supply data. This approach reflects the typical fossil fuel–based energy profile of the region and provides a conservative estimate of associated environmental impacts.

4.10 DATA QUALITY

The quality of the geographical representativeness can be considered as 'moderate'.

The quality of the technical representativeness can be considered as 'good'.

The temporal representativeness can also be considered as 'good'.

The overall data quality for this EPD can therefore be considered as 'good'.

The secondary data from the EcoInvent database (2022, version 3.9.1) were used in the calculation as no primary data avaialble. The database is regularly reviewed and thus meets the requirements of DIN EN ISO 14040/44 (background data not older than 10 years). The background data meet the requirements of EN 15804+A2. The quantities of raw

4 Goal and Scope Definition

materials and supplies used and the energy consumption were recorded and averaged over the entire operating year.

The general rule that specific data from certain production processes or average data derived from certain processes must take precedence when calculating an EPD or LCA was observed. Data for processes over which the manufacturer has no influence were assigned to generic data/scenarios. When selecting this data, care was taken to always choose the data set/scenario that most realistically represents the processes.

4.11 POWER MIX

This Environmental Product Declaration (EPD) applies the “location-based approach” in accordance with the energy mix of Trinidad and Tobago, as no site-specific electricity supply contract was available.

The electricity generation data for Trinidad and Tobago from Ecoinvent 3.9.1 is used. The overall GWP of the electricity mix used is 0.659 kg CO_2 equivalent per kWh.

5 Life Cycle Inventory

5.1 RAW MATERIALS SUPPLY (A1)

To produce the product the following raw material inputs are needed per ton. The net amounts (leaving the factory gate as a product) are displayed. Excluding additional amounts related to production waste, construction waste, etc., these amounts are declared at the module they appear. The waste scenario is declared per modeled input to show the link between the amounts accounted for waste processing and the net raw material input. However, waste processing, final disposal and loads and benefit beyond the system boundaries are not declared in module A1 but in C3, C4 and D." The total amount of secondary content at the last row of the table is displayed in kilograms.

Description	Environmental profile / dataset used*	Amount	Unit	Secondary content [%]	LHV [MJ/kg]	Supplier	Waste Scenario used	Comments
Crude Natural Asphalt	Natural Asphalt, at mine gate	1000.000	kg	0.00		Mining: Paramount Transport and Trading Company Ltd.	(ei3.9.1) Asphalt road constructions, SMA & AC Surf (Benefits 50%/50%) [Asphalt PCR NL v2.0]	Crude Natural Asphalt was modeled using a custom unit process based on extraction and minimal processing. Inputs included diesel use (0,000003 kg/kg) and lubricating oil (0,00018471 kg/kg). Packaging and transport were excluded from the A1 boundary. All background data were sourced from Ecoinvent 3.9.1 (cut-off system model, RoW).
Total [kg]		**1000.000**		**0.000**				

* A shortened name for the used process/data set is presented in the report. The full name of the used data set is shown at Annex 10.3

5.2 TRANSPORT TO MANUFACTURER (A2)

The raw materials are transported from the production location and/or mining location of the supplier to the production location of the manufacturer. The following transport conveyances and distances are applicable for suppliers of the raw materials.

Supplier	Transport conveyance 1	Distance 1 [km]
Mining: Paramount Transport and Trading Company Ltd.	(ei3.9.1) Lorry (Truck) 3.5-7.5t, EURO3 | market for (RoW)	32

5 Life Cycle Inventory

5.3 PRODUCTION PROCESS (A3)

ENERGY CONSUMPTION

No secondary fuels were used in the manufacturing process.

To produce the product the following energy inputs are modeled per reference unit (ton).

Description	Environmental profile / dataset used*	Amount	Unit	Supplier	Comments
Electricity for mining and processing	Electricity, high voltage {TT}| market for electricity, high voltage | Cut-off, U	150.464	kWh	n.a.	
Natural gas usage for processing	(ei3.9.1) Heat, district or industrial, natural gas | market for (RoW)	11315.400	MJ	n.a.	321.934 m^3 (35.17 MJ per cubic meter) 321.934×35.17≈11,315.4MJ

* A shortened name for the used process/data set is presented in the report. The full name of the used data set is shown at Annex 10.3

EMISSIONS

No emissions to soil, water and/or air are taken into account in the LCA calculation.

EXTERNAL TREATMENTS

No treatments are performed by an external party during the production of the product.

PRODUCTION WASTE

Disposal of auxiliary packaging waste is not modeled separately, as contributions were screened and found to be <1 % of mass and <5 % of impacts. This treatment is consistent with the cut-off rules of EN 15804+A2.

The following amount of waste is generated during production per ton of the product. The additional needed raw materials, transport to the production plant and waste processing of the production waste up to the end-of-waste state are are all included in module A3. Detailed information of the used waste scenario(s) can be found at chapter 6 Waste scenarios.

Description	Environmental profile / dataset used*	Amount	Unit	Secondary content [%]	LHV [MJ/kg]	Supplier	Waste Scenario used
Crude Natural Asphalt	Natural Asphalt, at mine gate	330.000	kg	0.00		Mining: Paramount Transport and Trading Company Ltd.	(ei3.9.1) Asphalt (Benefits recycling not defined) (NMD ID 7)
Total [kg]		**330.000**	**0.000**				

5 Life Cycle Inventory

* A shortened name for the used process/data set is presented in the report. The full name of the used data set is shown at Annex 10.3

PACKAGING MATERIALS

The following amount of packaging materials is modeled for the product per ton. The production of the packaging materials and transport to the production plant is included in module A3. Waste processing up to the end-of-waste state and final disposal of the packaging material is included in module A5. Loads and benefits beyond the system boundary in module D.

Description	Environmental profile / dataset used*	Amount	Unit	Secondary content [%]	LHV [MJ/kg]	Supplier	Comments
4 Steel drum	(ei3.9.1) Steel, low-alloyed, hot rolled | market for (GLO)	51.200	kg	30.06		Ancillary Material Supplier	The Packaging of the product involve four galvanized steel drums per tonne of Trinidad Lake Asphalt (LTA), with each drum having a mass of 12.8 kg. This results in a total packaging mass of 51.2 kg of steel per tonne of product, allocated proportionally across the functional unit. The packaging steel (51.2 kg per declared unit) contains 30.06 % secondary content according to the applied ecoinvent dataset. This corresponds to 15.391 kg of secondary material, which is reported under the SM indicator in Module A3.
Steel Drum Metal Work	(ei3.9.1) Metal working, average for steel products manufacturing (EU)	51.200	kg	n.a.	n.a.	n.a.	
Total [kg]		**102.400**		**15.391**			

* A shortened name for the used process/data set is presented in the report. The full name of the used data set is shown at Annex 10.3

ANCILLARY MATERIALS

The following amount of ancillary materials is modeled for the product per ton. The production of the used ancillary materials, transport to the production plant and waste processing up to the end-of-waste state of the ancillary materials are all included in module A3. Detailed information of the used waste scenario(s) can be found at chapter 6 Waste scenarios.

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Description	Environmental profile / dataset used*	Amount	Unit	Secondary content [%]	LHV [MJ/kg]	Supplier	Waste Scenario used	Comments
Lubricating Oil	Lubricating oil {RoW}| market for lubricating oil | Cut-off, U	0.028	kg	0.00		Ancillary Material Supplier		
Diesel usage for processing	(ei3.9.1) Diesel, burned in machine (incl. emissions)	0.018	l	n.a.	n.a.	n.a.		
Gasoline usage for processing	Petrol, unleaded, burned in machinery {GLO}| petrol, unleaded, burned in machinery | Cut-off, U	4.514	MJ	0.00		Ancillary Material Supplier		34.2MJ/L 0.132 L
Total [kg]		**0.028**		**0.000**				

* A shortened name for the used process/data set is presented in the report. The full name of the used data set is shown at Annex 10.3

TRANSPORT TO MANUFACTURER

The following transport conveyances and distances to the production location are assumed. The supplier is stated per input flow at this module. The suppliers taken into account for production waste related to the net inputs at module A1 are declared at chapter 5.2.

Supplier	Transport conveyance 1	Distance 1 [km]
Ancillary Material Supplier	(ei3.9.1) Lorry (Truck) 3.5-7.5t, EURO3 | market for (RoW)	8

OUTPUT FLOWS AT MODULE A3

The waste scenario(s) applicable for the production waste and/or ancillary materials are resulting in the following output flows at module A3:

Waste Scenario	Not removed (stays in work) [kg]	Landfill [kg]	Incineration [kg]	Recycling [kg]	Re-use [kg]
Production waste					
(ei3.9.1) Asphalt (Benefits recycling not defined) (NMD ID 7)	0	0	0	330	0
Total	**0.000**	**0.000**	**0.000**	**330.000**	**0.000**

In the EN15804 is stated that, as a general rule, potential loads and/or benefits from modules A1-A3 do not appear in module D. Therefore the potential loads and/or benefits from A1-A3 as a result of the net output flows from the production stage are declared in

5 Life Cycle Inventory

module A3. The following table shows the amount of potential loads and/or benefits beyond the system boundaries that are taken into account.

The primary equivalent that has been accounted as benefit when recycling and/or reusing primary material (net output) are stated in chapter 6 Waste scenarios. This chapter also contains the process taken into account as a benefit for energy recovery for the energy amount as stated in the following table.

The net output flow [kg] is determined by reducing the 'materials for recycling [kg]' by the amount of 'secondary material input [kg]' resulting in the net output flow.

Waste Scenario	Recycling [kg]	Secondary material input [kg]	Net output flow [kg]	Re-use [kg]	Energy recovery [MJ]
Production waste					
(ei3.9.1) Asphalt (Benefits recycling not defined) (NMD ID 7)	330	0	330	0	0
Total	**330.000**	**0.000**	**330.000**	**0.000**	**0.000**

The amount of secondary material input during the production stage by using extra material to compensate production losses is based on the following raw materials which contain (partly) secondary content:

Environmental profile / dataset	Secondary material input [kg]	Primary equivalent for secondary material input
Total	**0.000**	

5.4 DE-CONSTRUCTION, DEMOLITION (C1)

The scenarios included are currently in use and are representative for one of the most likely scenario alternatives.

The following processes are needed at the de-construction / demolition stage.

Description	Environmental profile / dataset used*	Net amount	Unit	Comments
Asphalt removal at end of life	(ei3.9.1) Hydraulic excavator (average) [NMD generic]	0.016	hr	Module C1 was modeled in accordance with the guidelines of the Nationale Milieudatabase (NMD) PCR Asphalt v2.0. For the removal of the asphalt layer, the following process card was used: “C1 Emissions + fuel Stage IIIb/IV removal set asphalt – 400 ton/ day – per ton of asphalt.” According to Table 14 of the PCR, this corresponds to a diesel consumption of 0.25 liters per tonne of asphalt using a removal set in the power class Stage IIIb (130–560 kW). This diesel use was converted to an equivalent machine

5 Life Cycle Inventory

Description	Environmental profile / dataset used*	Net amount	Unit	Comments
				runtime using this environmental profile: representing a machine with an energy consumption of 572 MJ of diesel per hour. This results in 0.01564 hours of machine operation per tonne of asphalt removed. This value was used as the input in the LCA model for Module C1.

5.5 TRANSPORT END-OF-LIFE (C2)

The scenarios included are currently in use and are representative for one of the most likely scenario alternatives.

The applicable end-of-life transport scenarios are in detail described in chapter 6 Waste scenarios.

5.6 WASTE PROCESSING (C3)

The scenarios included are currently in use and are representative for one of the most likely scenario alternatives.

After demolition and transport of the waste streams to the applicable waste processing routes, the waste is processed for final disposal or recycling and/or reuse. The calculated quantities and the applicable end-of-life scenario are shown below. The processes taken into account for waste processing are shown in chapter 6.3.

Waste Scenario	Incineration [kg]	Recycling [kg]	Re-use [kg]
(ei3.9.1) Asphalt road constructions, SMA & AC Surf (Benefits 50%/50%) [Asphalt PCR NL v2.0]	0.000	1000.000	0.000
Total	**0.000**	**1000.000**	**0.000**

5.7 FINAL DISPOSAL (C4)

The scenarios included are currently in use and are representative for one of the most likely scenario alternatives.

Some waste streams are not used for reprocessing or energy recovery but are final disposed. This is the case when the material is land-filled and/or when the product is not removed and stays in the work. The following amounts per final disposal stream are

5 Life Cycle Inventory

applicable for the product. The processes taken into account for the type of final disposal can be found at the applicable waste scenario in chapter 6.4.

Waste Scenario	Not removed (stays in work) [kg]	Landfill [kg]
Total	**0.000**	**0.000**

5.8 BENEFITS AND LOADS BEYOND THE SYSTEM BOUNDARY

The scenarios included are currently in use and are representative for one of the most likely scenario alternatives.

LOADS AND BENEFITS BEYOND THE SYSTEM BOUNDARY

When products are reused or materials are recycled a benefit may be taken into account in module D. According to the EN 15804+A2:2019 this benefit may only be calculated for the net output flow of secondary material that comes available for the next life cycle. Determined by reducing the material for recycling by the amount of secondary material input. The amounts are listed per assumed waste scenario in the table below.

In chapter 6.6 the avoided primary equivalent for recycling and re-use and the assumed Q factor (Qr out / Qsub) are listed per waste scenario. In chapter 6.5 the additional needed loads to equal the avoided primary equivalent after reaching the end-of-waste state are declared.

The amount of energy content (LHV in MJ) taken into account for energy recovery by incineration of the materials is also listed. The avoided energy mix and thermal and electric efficiency for the incinerators taken into account are shown at chapter 6.7.

Waste Scenario	Recycling [kg]	Secondary material input [kg]	Net output flow [kg]	Re-use [kg]	Energy recovery [MJ]
(ei3.9.1) Asphalt road constructions, SMA & AC Surf (Benefits 50%/50%) [Asphalt PCR NL v2.0]	1000.000	0.000	1000.000	0.000	0.000
Total	**1000.000**	**0.000**	**1000.000**	**0.000**	**0.000**

The following table shows the amount of secondary material input and when applicable which primary equivalent is taken into account for calculating the load to address to module D.

5 Life Cycle Inventory

Environmental profile / dataset	Secondary material input [kg]	Primary equivalent for secondary material input
(ei3.9.1) Steel, low-alloyed, hot rolled | market for (GLO)	15.39	(ei3.9.1) Benefits module D | World Steel method (Steel production, electric, low-alloyed - Steel production, converter, unalloyed)
Total	**15.391**	

6 Waste Scenarios

In this chapter the used waste scenarios for waste generated during production, construction, use and end-of-life are shown. Per needed input at every stage of the life cycle assessment the used waste scenario is declared. The used scenario design, used processes for impacts and other assumptions are listed per paragraph in this chapter.

6.1 SCENARIO DESIGN

The following scenario design is used per type of waste scenario.

Waste Scenario	Region	Not removed (stays in work) [%]	Landfill [%]	Incineration [%]	Recycling [%]	Re-use [%]
(ei3.9.1) Asphalt road constructions, SMA & AC Surf (Benefits 50%/50%) [Asphalt PCR NL v2.0]	NL	0	0	0	100	0
(ei3.9.1) Asphalt (Benefits recycling not defined) (NMD ID 7)	NL	0	0	0	100	0
(ei3.9.1) Galvanised steel (i.a. profiles, sheets) (NMD ID 75)	NL	0	5	0	95	0

The following considered transport conveyance(s) and distances per waste flow are used for the (different) waste scenario(s).

Waste Scenario	Transport conveyance*	Not removed (stays in work) [km]	Landfill [km]	Incineration [km]	Recycling [km]	Re-use [km]
(ei3.9.1) Asphalt road constructions, SMA & AC Surf (Benefits 50%/50%) [Asphalt PCR NL v2.0]	(ei3.9.1) Standard transport conveyances C2 [PCR asphalt v2.0]	0	0	0	45	0
(ei3.9.1) Asphalt (Benefits recycling not defined) (NMD ID 7)	(ei3.9.1) Standard transport conveyances C2 [PCR asphalt v2.0]	0	0	0	45	0
(ei3.9.1) Galvanised steel (i.a. profiles, sheets) (NMD ID 75)	(ei3.9.1) Lorry (Truck), unspecified (default) | market group for (GLO)	0	100	150	50	50

* A shortened name for the used process/data set is presented in the report. The full name of the used data set is shown at Annex 10.3

6.2 END OF WASTE STATUS

In accordance with the EN 15804+A2:2019 all process needed up until the end-of-waste state must be taken into account in module C. In the following table the assumed end-of-waste state for recycling for each used waste scenario is listed. When not applicable, when

6 Waste Scenarios

for example the scenario consists only of 100% incineration, it is declared at the waste scenario.

Waste Scenario	Substantiation End-of-Waste status
(ei3.9.1) Asphalt road constructions, SMA & AC Surf (Benefits 50%/50%) [Asphalt PCR NL v2.0]	The processed site-recovered asphalt, suitable and ready to be used as a constituent material for asphalt, after it has been tested, assessed and classified in accordance with this standard. Note 1: Processing may include one or more of milling, crushing, screening, mixing, etc....
(ei3.9.1) Asphalt (Benefits recycling not defined) (NMD ID 7)	The processed site-recovered asphalt, suitable and ready to be used as a constituent material for asphalt, after it has been tested, assessed and classified in accordance with this standard. Note 1: Processing may include one or more of milling, crushing, screening, mixing, etc....
(ei3.9.1) Galvanised steel (i.a. profiles, sheets) (NMD ID 75)	The iron or steel scrap shall have been segregated at source or while collecting and been kept separate; or the input wastes shall have been treated to separate the iron and steel scrap from the non-metal and nonferrous components. All mechanical treatment (like cutting, shearing, shredding or granulating; sorting, separation, cleaning, de-polluting, emptying) needed to prepare the material for direct input into final use shall have been completed. [End-of-waste Criteria for Iron and Steel Scrap: Technical Proposals, Publications Office of the European Union, 2010]. In accordance with the world steel method the impact of recycling is included in module D.

6 Waste Scenarios

6.3 WASTE PROCESSING

The following processes are taken into account for each waste processing type. The applicable amount(s) can be found at chapter 5, where all inventory data is declared.

Waste Scenario	Waste processing type	Used environmental profile / dataset*
(ei3.9.1) Asphalt road constructions, SMA & AC Surf (Benefits 50%/50%) [Asphalt PCR NL v2.0]	Recycling	(ei3.9.1) C3 processes Asphalt PCR NL v2.0
(ei3.9.1) Asphalt (Benefits recycling not defined) (NMD ID 7)	Recycling	(ei3.9.1) C3 processes Asphalt PCR NL v2.0
(ei3.9.1) Galvanised steel (i.a. profiles, sheets) (NMD ID 75)	Recycling	(ei3.9.1) Materials for recycling, no waste processing taken into account

* A shortened name for the used process/data set is presented in the report. The full name of the used data set is shown at Annex 10.3

6.4 FINAL DISPOSAL

For final disposal the following process(es) are considered for the different types of final disposal. The applicable amount(s) can be found at chapter 5, where all inventory data is declared.

Waste Scenario	Type of final disposal	Used environmental profile / dataset*
(ei3.9.1) Galvanised steel (i.a. profiles, sheets) (NMD ID 75)	Landfill	(ei3.9.1) Scrap tin sheet {CH}| treatment of, sanitary landfill

* A shortened name for the used process/data set is presented in the report. The full name of the used data set is shown at Annex 10.3

6.5 LOADS FROM END-OF-WASTE STATE TO POINT OF SUBSTITUTION

When the substituted process for recycling and/or reuse of primary content goes beyond the end-of-waste state. An additional burden should be taken into account in module D for the difference between the end-of-waste state and the substituted process. When applicable, in the following table the additional process taken into account is declared per waste scenario.

Waste Scenario	Loads from EoW to point of substitution	Used environmental profile / dataset*
(ei3.9.1) Asphalt road constructions, SMA & AC Surf (Benefits 50%/50%) [Asphalt PCR NL v2.0]	Recycling	

6 Waste Scenarios

Waste Scenario	Loads from EoW to point of substitution	Used environmental profile / dataset*
(ei3.9.1) Asphalt (Benefits recycling not defined) (NMD ID 7)	Recycling	
(ei3.9.1) Galvanised steel (i.a. profiles, sheets) (NMD ID 75)	Recycling	

* A shortened name for the used process/data set is presented in the report. The full name of the used data set is shown at Annex 10.3

6.6 BENEFITS RECYCLING AND/OR RE-USE

When recycling or reusing a raw material of product a benefit may be taken into account in module D. The following table shows the waste scenario's where recycling is applicable and which process is used as avoided primary equivalent. Also the used Q factor is declared and substantiated.

Waste Scenario	Benefit for	Avoided primary equivalent	Q factor (Qr out / Qsub)	Substantiation Q factor
(ei3.9.1) Asphalt road constructions, SMA & AC Surf (Benefits 50%/50%) [Asphalt PCR NL v2.0]	Recycling	(ei3.9.1) 50% Grondstofequivalent asfaltgranulaat uit deklagen - SMA & AC Surf + 50% Gravel round, market for (ROW)	1	Included in the avoided primary equivalent, therefore 1
(ei3.9.1) Asphalt (Benefits recycling not defined) (NMD ID 7)	Recycling		1	Included in the avoided primary equivalent, therefore 1
(ei3.9.1) Galvanised steel (i.a. profiles, sheets) (NMD ID 75)	Recycling	(ei3.9.1) Benefits module D | World Steel method (Steel production, electric, low-alloyed - Steel production, converter, unalloyed)	1	No loss of quality when recycling the material

6.7 LOADS SECONDARY MATERIAL LOST

In R<THiNK the net output flow is determined by reducing the materials for recycling by the secondary material input. The amount of materials for recycling and the amount of secondary material input are declared in the applicable chapters. The following table shows the Q factor used for secondary material input and the substantiation of the value.

Waste Scenario	Q factor (Qr out / Qsub)	Substantiation Q factor
(ei3.9.1) Galvanised steel (i.a. profiles, sheets) (NMD ID 75)	1	Not applicable

6 Waste Scenarios

6.8 BENEFITS ENERGY RECOVERY

When waste is incinerated with energy recovery a benefit may be taken into account in module D. The following table shows the waste scenario where benefits related to energy recovery is applicable, which energy process is taken into account for avoided energy production and the used electrical en thermal efficiency.

Waste Scenario	Used environmental profile / dataset*
(ei3.9.1) Galvanised steel (i.a. profiles, sheets) (NMD ID 75)	not_applicable

* A shortened name for the used process/data set is presented in the report. The full name of the used data set is shown at Annex 10.3

7 Results

For the impact assessment long-term emissions (>100 years) are not considered. The results of the impact assessment are only relative statements that do not make any statements about end-points of the impact categories, exceedance of threshold values, safety margins or risks. The following tables show the results of the indicators of the impact assessment, of the use of resources as well as of waste and other output flows.

7.1 ENVIRONMENTAL IMPACT INDICATORS PER TON

CORE ENVIRONMENTAL IMPACT INDICATORS EN 15804+A2

Abbr.	Unit	A1	A2	A3	A1-A3	C1	C2	C3	C4	D	Total
GWP-total	kg CO_2 eq.	3.21E-1	1.88E+1	7.39E+2	7.58E+2	8.88E-1	3.75E+0	1.73E+0	0.00E+0	-2.60E+1	7.38E+2
GWP-f	kg CO_2 eq.	3.20E-1	1.88E+1	7.36E+2	7.55E+2	8.88E-1	3.69E+0	1.73E+0	0.00E+0	-2.59E+1	7.35E+2
GWP-b	kg CO_2 eq.	4.39E-4	6.34E-3	3.10E+0	3.11E+0	1.23E-4	6.44E-2	1.84E-4	0.00E+0	-4.61E-2	3.13E+0
GWP-luluc	kg CO_2 eq.	2.73E-4	1.19E-2	2.10E-1	2.22E-1	9.99E-5	1.61E-3	1.46E-4	0.00E+0	-1.85E-2	2.06E-1
ODP	kg CFC 11 eq.	1.19E-8	2.70E-7	1.43E-5	1.46E-5	1.41E-8	8.74E-8	2.11E-8	0.00E+0	-1.68E-6	1.31E-5
AP	mol H+ eq.	1.75E-3	1.04E-1	1.37E+0	1.48E+0	8.23E-3	1.06E-2	7.41E-3	0.00E+0	-2.01E-1	1.30E+0
EP-fw	kg P eq.	7.23E-6	2.08E-4	1.33E-2	1.35E-2	3.21E-6	3.29E-5	4.75E-6	0.00E+0	-4.13E-4	1.31E-2
EP-m	kg N eq.	3.50E-4	3.99E-2	3.71E-1	4.11E-1	3.81E-3	2.90E-3	3.34E-3	0.00E+0	-3.52E-2	3.86E-1
EP-T	mol N eq.	3.64E-3	4.34E-1	3.98E+0	4.41E+0	4.15E-2	3.33E-2	3.62E-2	0.00E+0	-3.80E-1	4.14E+0
POCP	kg NMVOC eq.	5.88E-3	1.37E-1	2.16E+0	2.30E+0	1.23E-2	1.62E-2	1.09E-2	0.00E+0	-2.04E-1	2.14E+0
ADP-mm	kg Sb-eq.	2.39E-6	7.88E-5	1.58E-3	1.66E-3	3.10E-7	1.37E-5	4.60E-7	0.00E+0	-3.79E-5	1.64E-3
ADP-f	MJ	1.95E+4	2.58E+2	1.71E+4	3.69E+4	1.16E+1	5.51E+1	1.73E+1	0.00E+0	-1.15E+3	3.58E+4
WDP	m3 world eq.	8.11E-2	1.16E+0	3.82E+1	3.94E+1	2.51E-2	3.34E-1	3.70E-2	0.00E+0	-4.60E+1	-6.20E+0

GWP-total=Global Warming Potential total (GWP-total) | **GWP-f**=Global Warming Potential fossil fuels (GWP-fossil) | **GWP-b**=Global Warming Potential biogenic (GWP-biogenic) | **GWP-luluc**=Global Warming Potential land use and land use change (GWP-luluc) | **ODP**=Depletion potential of the stratosperic ozon layer (ODP) | **AP**=Acidification potential, Accumulated Exceedance (AP) | **EP-fw**=Eutrophication potential, fraction of nutrients reaching freshwater end compartment (EP-freshwater) | **EP-m**=Eutrophication potential, fraction of nutrients reaching marine end compartment (EP-marine) | **EP-T**=Eutrophication potential, Accumulated Exceedance (EP-terrestrial) | **POCP**=Formation potential of tropospheric ozone (POCP) | **ADP-mm**=Abiotic depletion potential for non fossil resources (ADP mm) | **ADP-f**=Abiotic depletion for fossil resources potential (ADP fossil) | **WDP**=Water (user) deprication potential, deprivation-weighted water consumption (WDP)

7 Results

ADDITIONAL ENVIRONMENTAL IMPACT INDICATORS EN 15804+A2

Abbr.	Unit	A1	A2	A3	A1-A3	C1	C2	C3	C4	D	Total
PM	disease incidence	1.74E-8	1.51E-6	1.62E-5	1.77E-5	2.29E-7	3.77E-7	3.15E-8	0.00E+0	-1.49E-6	1.69E-5
IR	kBq U235 eq.	5.52E-3	1.06E-1	7.35E+0	7.46E+0	2.38E-3	3.05E-2	3.66E-3	0.00E+0	-6.55E-1	6.84E+0
ETP-fw	CTUe	4.89E+0	1.53E+2	1.38E+3	1.54E+3	5.56E+0	3.10E+1	8.22E+0	0.00E+0	-1.26E+3	3.25E+2
HTP-c	CTUh	1.49E-10	1.23E-8	1.16E-6	1.18E-6	2.72E-10	1.48E-9	4.05E-10	0.00E+0	-9.77E-9	1.17E-6
HTP-nc	CTUh	4.06E-9	2.19E-7	4.56E-6	4.78E-6	1.89E-9	3.15E-8	2.72E-9	0.00E+0	-3.11E-7	4.50E-6
SQP	Pt	1.83E+2	1.07E+2	1.19E+3	1.48E+3	7.83E-1	8.44E+1	1.16E+0	0.00E+0	-1.06E+3	5.11E+2

PM=Potential incidence of disease due to PM emissions (PM) | **IR**=Potential Human exposure efficiency relative to U235 (IRP) | **ETP-fw**=Potential Comparative Toxic Unit for ecosystems (ETP-fw) | **HTP-c**=Potential Comparative Toxic Unit for humans (HTP-c) | **HTP-nc**=Potential Comparative Toxic Unit for humans (HTP-nc) | **SQP**=Potential soil quality idex (SQP)

CLASSIFICATION OF DISCLAIMERS TO THE DECLARATION OF CORE AND ADDITIONAL ENVIRONMENTAL IMPACT INDICATORS

ILCD classification	Indicator	Disclaimer
ILCD type / level 1	Global warming potential (GWP)	None
	Depletion potential of the stratospheric ozone layer (ODP)	None
	Potential incidence of disease due to PM emissions (PM)	None
ILCD type / level 2	Acidification potential, Accumulated Exceedance (AP)	None
	Eutrophication potential, Fraction of nutrients reaching freshwater end compartment (EP-freshwater)	None
	Eutrophication potential, Fraction of nutrients reaching marine end compartment (EP-marine)	None
	Eutrophication potential, Accumulated Exceedance (EP-terrestrial)	None
	Formation potential of tropospheric ozone (POCP)	None
	Potential Human exposure efficiency relative to U235 (IRP)	1
ILCD type / level 3	Abiotic depletion potential for non-fossil resources (ADP-minerals&metals)	2
	Abiotic depletion potential for fossil resources (ADP-fossil)	2
	Water (user) deprivation potential, deprivation-weighted water consumption (WDP)	2
	Potential Comparative Toxic Unit for ecosystems (ETP-fw)	2
	Potential Comparative Toxic Unit for humans (HTP-c)	2
	Potential Comparative Toxic Unit for humans (HTP-nc)	2

7 Results

ILCD classification	Indicator	Disclaimer
	Potential Soil quality index (SQP)	2

Disclaimer 1 – This impact category 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 2 – The results of this environmental impact indicator shall be used with care as the uncertainties on these results are high or as there is limited experienced with the indicator.

7.2 INDICATORS DESCRIBING RESOURCE USE AND ENVIRONMENTAL INFORMATION BASED ON LIFE CYCLE INVENTORY (LCI)

PARAMETERS DESCRIBING RESOURCE USE

Abbr.	Unit	A1	A2	A3	A1-A3	C1	C2	C3	C4	D	Total
PERE	MJ	2.05E-1	4.21E+0	2.82E+2	2.86E+2	6.62E-2	6.45E+0	9.98E-2	0.00E+0	-1.27E+1	2.80E+2
PERM	MJ	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
PERT	MJ	2.05E-1	4.21E+0	2.82E+2	2.86E+2	6.62E-2	6.45E+0	9.98E-2	0.00E+0	-1.27E+1	2.80E+2
PENRE	MJ	1.95E+4	2.58E+2	1.71E+4	3.69E+4	1.16E+1	5.51E+1	1.73E+1	0.00E+0	-1.21E+3	3.57E+4
PENRM	MJ	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
PENRT	MJ	1.95E+4	2.58E+2	1.71E+4	3.69E+4	1.16E+1	5.51E+1	1.73E+1	0.00E+0	-1.21E+3	3.57E+4
SM	Kg	0.00E+0	0.00E+0	1.54E+1	1.54E+1	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	1.54E+1
RSF	MJ	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
NRSF	MJ	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
FW	m^3	2.33E-3	3.71E-2	1.91E+0	1.95E+0	9.13E-4	1.09E-2	1.36E-3	0.00E+0	-1.29E+0	6.75E-1

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**=Net use of fresh water

7 Results

OTHER ENVIRONMENTAL INFORMATION DESCRIBING WASTE CATEGORIES

Abbr.	Unit	A1	A2	A3	A1-A3	C1	C2	C3	C4	D	Total
HWD	Kg	6.24E-5	1.65E-3	5.21E-2	5.38E-2	7.83E-5	3.56E-4	1.16E-4	0.00E+0	-8.58E-4	5.35E-2
NHWD	Kg	2.49E-2	8.06E+0	8.54E+1	9.35E+1	1.66E-2	6.06E+0	2.47E-2	0.00E+0	-2.12E+0	9.75E+1
RWD	Kg	3.29E-6	6.13E-5	5.46E-3	5.53E-3	1.27E-6	2.03E-5	2.01E-6	0.00E+0	-3.72E-4	5.18E-3

HWD=Hazardous waste disposed | **NHWD**=Non-hazardous waste disposed | **RWD**=Radioactive waste disposed

ENVIRONMENTAL INFORMATION DESCRIBING OUTPUT FLOWS

Abbr.	Unit	A1	A2	A3	A1-A3	C1	C2	C3	C4	D	Total
CRU	Kg	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0	0.00E+0
MFR	Kg	0.00E+0	0.00E+0	3.30E+2	3.30E+2	0.00E+0	3.16E-3	1.00E+3	0.00E+0	-1.00E+3	3.30E+2
MER	Kg	0.00E+0	0.00E+0	6.49E-5	6.49E-5	0.00E+0	1.97E-4	0.00E+0	0.00E+0	0.00E+0	2.61E-4
EET	MJ	0.00E+0	0.00E+0	1.77E-3	1.77E-3	0.00E+0	5.35E-3	0.00E+0	0.00E+0	0.00E+0	7.12E-3
EEE	MJ	0.00E+0	0.00E+0	1.02E-3	1.02E-3	0.00E+0	3.10E-3	0.00E+0	0.00E+0	0.00E+0	4.13E-3

CRU=Components for re-use | **MFR**=Materials for recycling | **MER**=Materials for energy recovery | **EET**=Exported Energy, Thermic | **EEE**=Exported Energy, Electric

7 Results

7.3 INFORMATION ON BIOGENIC CARBON CONTENT PER TON

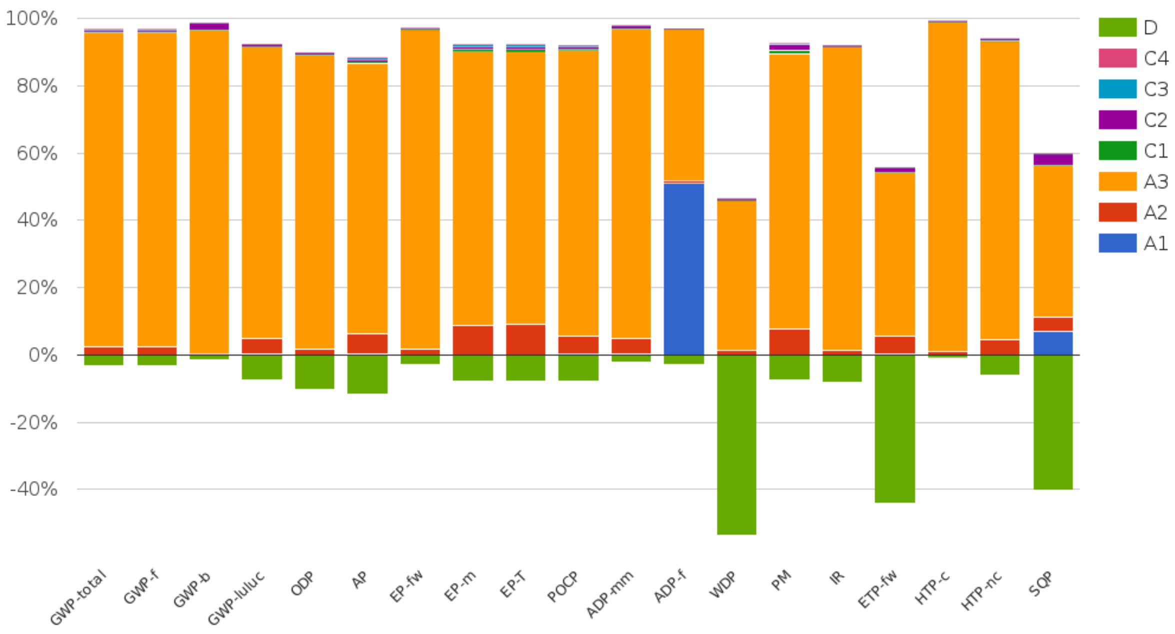
BIOGENIC CARBON CONTENT

The following Information describes the biogenic carbon content in (the main parts of) the product at the factory gate per ton:

Biogenic carbon content	Amount	Unit
Biogenic carbon content in the product	0	kg C
Biogenic carbon content in accompanying packaging	0	kg C

8 Interpretation of results

8.1 CONTRIBUTION ANALYSIS OF THE MODULES

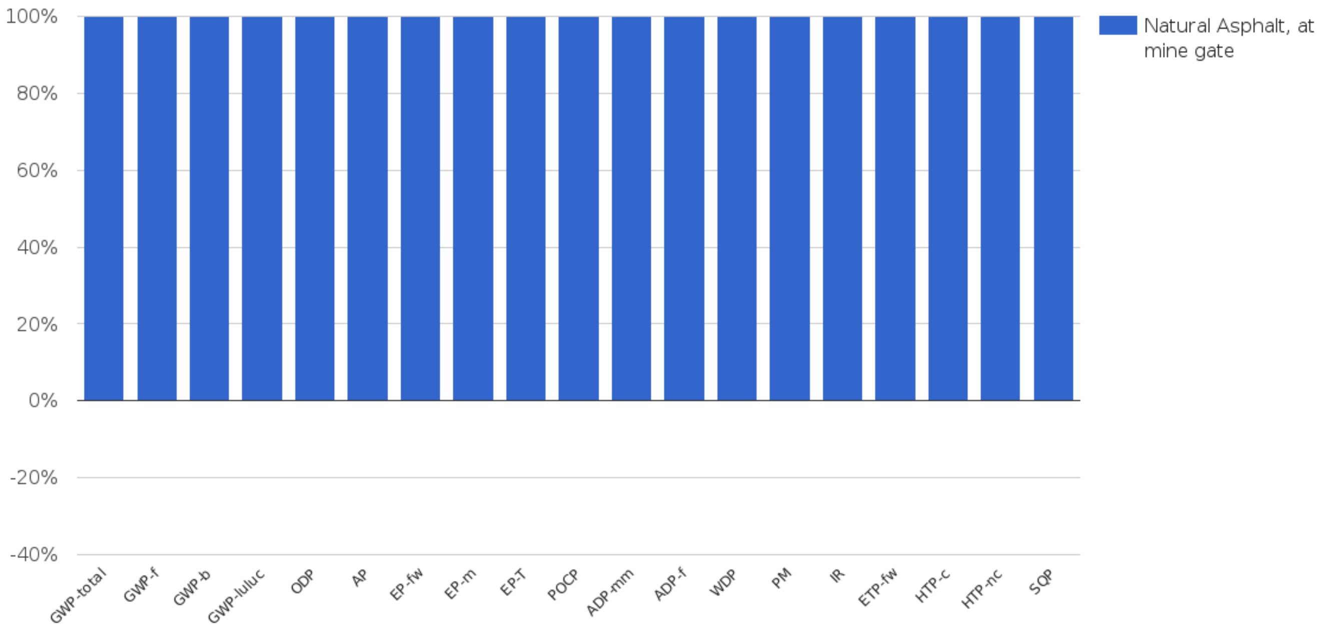


The most significant contribution to the Global Warming potential (GWP-total) is the manufacturing stage (A1-A3) with a contribution of 96%.

In all of the other impact categories (A3) prove to be most impactful. Apart from GWP-total, (A3) is showing especially high impacts in Eutrophication potential, fraction of nutrients reaching freshwater end compartment (EP-freshwater) with 95%, Potential Human exposure efficiency relative to U235 (IRP) with 90%, Formation potential of tropospheric ozone (POCP) with 84% and Acidification potential, Accumulated Exceedance (AP) with 80% of contribution. (D) is especially impactful in Water (user) deprication potential, deprivation-weighted water consumption (WDP) with 65%.

8 Interpretation of results

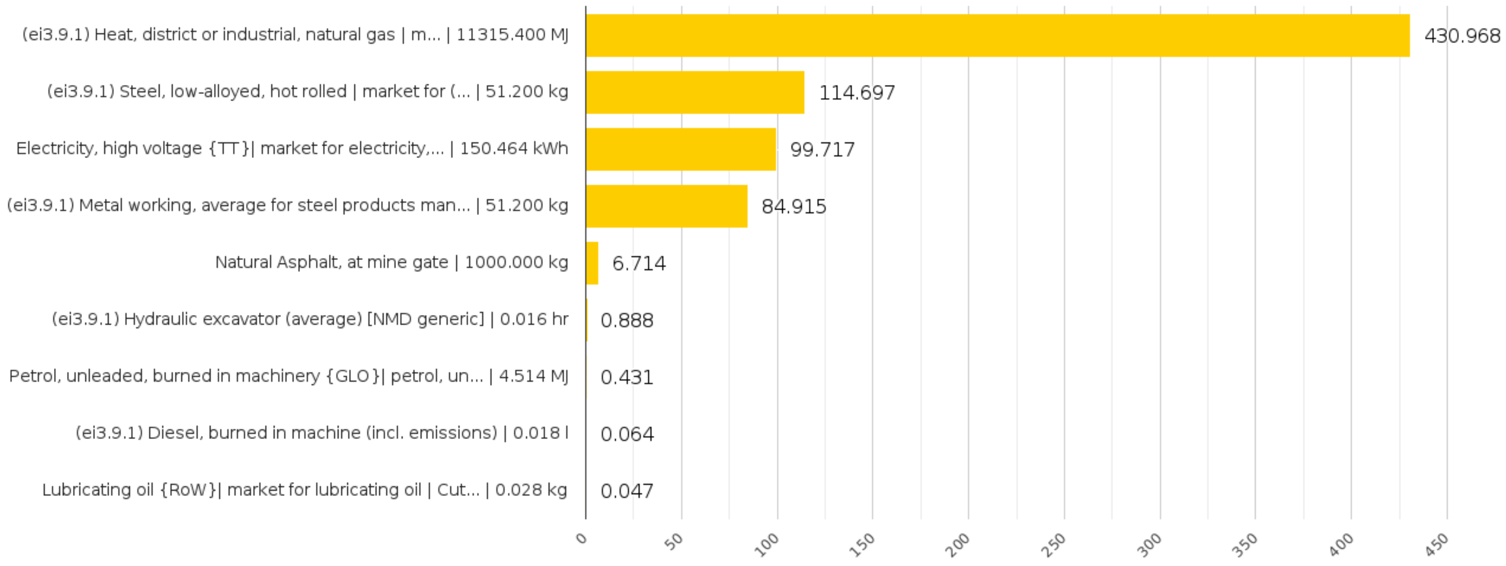
8.2 CONTRIBUTION ANALYSIS OF THE RAW MATERIALS (A1)



8 Interpretation of results

8.3 CONTRIBUTION ANALYSIS OF THE INPUTS

The following diagram shows the contribution of the inputs, expressed in the Global warming potential - total. The results per input are the sum of all declared modules including module D.



9 Sensitivity analysis

10 Data collection details

10.1 DATA QUALITY OF THE LIFECYCLE INVENTORY DATA

Description	Determination matter	Data source
Raw material(s)		
Crude Natural Asphalt	measured	Ecoinvent 3.9.1
Ancillary materials		
Lubricating Oil	average factory	Ecoinvent 3.9.1
Diesel usage for processing	average factory	Ecoinvent 3.9.1
Gasoline usage for processing	average factory	Ecoinvent 3.9.1
Packaging material(s)		
4 Steel drum	average product	Ecoinvent 3.9.1
Steel Drum Metal Work	average product	Ecoinvent 3.9.1
Energy consumption		
Electricity for mining and processing	average factory	Ecoinvent 3.9.1
Natural gas usage for processing	measured	Ecoinvent 3.9.1
Demolition/De-construction		
Asphalt removal at end of life	estimated	Ecoinvent 3.9.1

10.2 APPROACH OF SUPPLIERS FOR LCA DATA

Supplier	supplier approached for company-specific environmental data?	Manner in which the supplier is approached	Received document type
Mining: Paramount Transport and Trading Company Ltd.	no		
Ancillary Material Supplier	no		

10 Data collection details

10.3 USED PROCESSES

Shortened name in report	Processes used	Source	Third-party verified	Valid until	Comments
Natural Asphalt, at mine gate	Open-pit mining using diesel-powered machinery	Ecoinvent 3.9.1	no		
Lubricating oil {RoW}| market for lubricating oil | Cut-off, U	n.a.	Ecoinvent 3.9.1	no		
(ei3.9.1) Diesel, burned in machine (incl. emissions)	1l 0095-pro&Diesel, gasolie, gebruik, liter (o.b.v. 35,8 MJ Diesel, burned in building machine {GLO}| processing | Cut-off, U)	NMD 3.11	no		The combustion emissions of diesel are included in the environmental profile.
Petrol, unleaded, burned in machinery {GLO}| petrol, unleaded, burned in machinery | Cut-off, U	n.a.	Ecoinvent 3.9.1	no		
Electricity, high voltage {TT}| market for electricity, high voltage | Cut-off, U	n.a.	Ecoinvent 3.9.1	no		
(ei3.9.1) Heat, district or industrial, natural gas | market for (RoW)	1MJ Heat, district or industrial, natural gas {RoW}| market for heat, district or industrial, natural gas | Cut-off, U	ecoinvent 3.9.1 (2022)	no		
(ei3.9.1) Steel, low-alloyed, hot rolled | market for (GLO)	1kg Steel, low-alloyed, hot rolled {GLO}| market for steel, low-alloyed, hot rolled | Cut-off, U	ecoinvent 3.9.1 (2022)	no		
(ei3.9.1) Hydraulic excavator (average) [NMD generic]	1hr 0115-pro&Graafmachine, per uur (o.b.v. 572 MJ Diesel, burned in building machine {GLO}| market for | Cut-off, U)	NMD 3.11	no		
(ei3.9.1) Metal working, average for steel products manufacturing (EU)	1kg Metal working, average for steel product manufacturing {RER}| metal working, average for steel product manufacturing | Cut-off, U	ecoinvent 3.9.1 (2022)	no		Includes capital goods, energie use, loss of material, etc.

11 References

ISO 14040
ISO 14040:2006-10, Environmental management - Life cycle assessment - Principles and framework; EN ISO 14040:2006

ISO 14044
ISO 14044:2006-10, Environmental management - Life cycle assessment - Requirements and guidelines; EN ISO 14044:2006

ISO 14025
ISO 14025:2011-10, Environmental labels and declarations — Type III environmental declarations — Principles and procedures

EN 15804+A2
EN 15804:2012+A2:2019/AC:2021, Sustainability of Buildings - Environmental Product Declarations - Framework Development Rules by Product Category

Kiwa-EE GPI R.3.0 (2025)
Kiwa-Ecobility Experts, General Programme Instructions “Product Level”, SOP EE 1201_R.3.0 (03.06.2025)

Kiwa-EE GPI R.3.0 Annex B1 (2025)
Kiwa-Ecobility Experts, General Programme Instructions “Product Level” – Annex B1 Environmental Information Programmeaccording to EN 15804 / ISO 21930 , SOP EE 1203_R. 3.0 (03.06.2025)

Ecoinvent
ecoinvent Version 3.9.1 (December 2022)

R<THINK characterization method
ecoinvent 3.9.1: EN 15804+A2 indicators (EF 3.1)

NMD PCR Asphalt V2.0
Product Category Rules voor bitumineuze materialen in verkeersdragers en waterwerken in Nederland ("PCR Asfalt") versie 2.0

Trinidad and Tobago - Countries & Regions - IEA - Electricity
https://www.iea.org/countries/trinidad-and-tobago/electricity