EPD™

Environmental Product Declaration

Global GreenTag EPD Program:

Compliant to EN15804+A2 2019

Laminex Industries Pty Ltd
Composite Solid Surfaces
Fusion® Phenolic Core 6mm and 13mm
332 Bay Rd, Cheltenham
Victoria 3192,Australia

Laminex®

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Composite Solid Surfaces – Fusion®

Mandatory Disclosures

EPD type	Cradle to grave A1-C4 +D	**Issue Date**	29 July 2023
Product Range	Fusion® Phenolic Core	**Valid Until**	29 July 2028
EPD Number	LGFM03 2023EP		LGFM04 2023EP
Code Name	6mm Phenolic Core		13mm Phenolic Core
Product Photograph			

Demonstration of Verification	
PCR	Standard EN 15804+A2 2019 serves as core Product Category Rules (PCR) [1]. Wall and Ceiling Linings Sub-PCR WCL:2023 as well as Fitted Cabinetry Sub-PCR FIC:2023 also applies [2 and 3].
☑ Internal	Delwyn Jones 29July 2023 — LCA Developed by Delwyn Jones, The Evah Institute 25.07.2023 — LCA Reviewed by Direshni Naiker The Evah Institute 20/12/2023 — EPD Reviewed by David Baggs, Global GreenTag International Pty Ltd
☑ External	24 07 2023 — Third Party Verifier[a] Mathilde Vlieg Malaika LCT a. Independent external verification of the declaration and data, mandatory for business-to-consumer communication according to ISO 14025:2010 [2].
Communication	This EPD discloses potential environmental outcomes compliant with EN 15804 for business-to-business communication.
Comparability	Construction product EPDs may not be comparable if not EN15804 compliant. Different program EPDs may not be comparable. Comparability is further dependent on the product category rules and data source used.
Reliability	LCIA results are relative expressions that do not predict impacts on category endpoints, exceeding of thresholds, safety margins or risks.
Owner	This EPD is the property of the declared manufacturer.
Explanations	Further explanatory information is available at info@globalgreentag.com or by contacting epd@globalgreentag.com [3].

EPD Program Operator	**LCA and EPD Producer**	**Declaration Owner**
Global GreenTag International Pty Ltd L38, 71 Eagle St., Brisbane City QLD 4170 Australia Phone: +61 (0)7 33 999 686 http://www.globalgreentag.com	Ecquate Pty Ltd PO Box 123 Thirroul NSW 2515 Australia Phone: +61 (0)7 5545 0998 http://www.ecquate.com	Laminex Industries Pty Ltd 90-94 Tram Road, Doncaster VIC 3108 Australia Phone: 132 136 http://www.laminex.com.au

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Program Description

EPD type	Cradle to grave A1 to C4 + D as defined by EN 15804 [1]
System boundary	The system boundary with nature includes material and energy acquisition, processing, manufacture, transport, installation, use plus waste arising to end of life.
Stages included	Stages A1-3 A4-5, B1-4, C1 to C2 and C4 D1 to D3
Stages excluded	No stage was excluded but flows and results for B5-B7, C3 and D3 were all zero.
Scope Depiction	Figure 1 depicts all modules being declared including some with zero results. Any module not declared (MND) does not indicate a zero result.

Model	Actual			Scenarios												Potential		
Information	Building Life Cycle Assessment															Supplement		
Stages	Product			Construct		Use							End-of-Life				Benefit & load beyond system		
Data Modules						Fabric					Operate								
Unit Operations	A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D1	D2	D3
Cradle to Gate+ Options & Grave	Resources	Transport	Manufacture	Transport	Construct	Use	Maintain	Repair	Replace	Refurbish	Energy use	Water use	Demolish	Transport	Process Waste	Disposal	Reuse	Recovery	Recycling

Figure 1 EPD Life Cycle Modules Cradle to Grave

Data Sources

Primary Data	Data was collected from primary sources 2019 to 2022 including the manufacturer and suppliers' standards, locations, logistics, technology, market share, management system in accordance with EN ISO 14044:2006, 4.3.2, [4]. All are biochemical-physical allocated none are economically allocated.
A1-A3 Stage inclusions	Operations include all known raw material acquisition, refining, processing plus scrap or material reuse from prior systems; electricity generated from all sources with extraction, refining & transport plus secondary fuel energy and recovery processes. Also, transport to factory gate; manufacture of inputs, ancillary material, product, packaging, maintenance, replacement plus flows leaving at end-of-waste boundary and fate of all flows at end of life.
Variability	Significant differences of average LCIA results are declared.
Chemicals of Concern	Contains no substances in the European Chemicals Agency "Authorised or Candidate Lists of Substances of Very High Concern" (SVHCs).

Data Quality

Data cut-off & quality criteria complies with EN 15804 [1] The LCA used background data aged <10 years and quality parameters tabled below.

Background	**Data Quality**	**Parameters and Uncertainty (U)**			
Correlation	**Metric σg**	U ±0.01	U ±0.05	U ±0.10	U ±0.20
Reliability	**Reporting**	Site Audit	Expert verify	Region	Sector
	Sample	>66% trend	>25% trend	>10% batch	>5% batch
Completion	**Including**	>50%	>25%	>10%	>5%
	Cut-off	0.01%w/w	0.05%w/w	0.1%w/w	0.5%w/w
Temporal	**Data Age**	<3 years	≤5 years	<7.5 years	<10 years
	Duration	>3 years	<3 years	<2 years	1 year
Technology	**Typology**	Actual	Comparable	In Class	Convention
Geography	**Focus**	Process	Line	Plant	Corporate
	Range	Continent	Nation	Plant	Line
	Jurisdiction	Representation is Global. Africa, North America, Europe, Pacific Rim			

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Product Information

The Laminex Group is a leading manufacturer, distributor and marketer of decor board and surfaces.

Brand Name & Code	Fusion® 6mm Phenolic Core	Fusion® 13mm Phenolic Core
Range Names	Composite Solid Surfaces	
Factory warranty	10 years internal use only	
Factory address	Laminex Industries 332 Bay Rd., Cheltenham VIC 3192 Australia	
Site representation	Australasia	
Geographical Area	Use and disposal as for Australasia	
Application	Residential and commercial benchtops, vanities, desktops, tabletops, seating, cabinetry, lockers, wall linings, induction splashbacks, toilet partitions and wall	
Function in Building	Benchtop, Cabinetry & Wall Linings.	
Lifetime [5,6]	20 years Reference Service Life (RSL) [ISO 15686]	
Declared unit	Fusion® 6mm Phenolic Core sheet 8.7kg/m^2 in building interior wall lining and induction hob splashbacks.	Fusion® 13mm Phenolic Core sheet 18.85kg/m^2 in interior building benchtops and partitions
Functional unit	6mm Phenolic Core sheet/kg 20 years internal use cradle to grave	13mm Phenolic Core sheet/kg 20 years internal use cradle to grave

Product Components

This section summarises factory components, functions, source nation and % mass share. In product content listed below the % mass has a ±5% range and a confidence interval that is 90% certain to contain true population means at any time. Listing such 90±5% certainty considers normal resource acquisition, supply chain, sedimentation, seasonal, manufacturing and product variation over this EPD's validity period. This also allows for intellectual property protection whilst ensuring fullest possible transparency.

Function	Component	Cradle	6mm %	13mm %
Filler	Cellulose Fibre	Global	>66 <71	>64 <69
Binder	Phenol Formaldehyde	Germany	>30 <34	>30 <33
Binder	Acrylate	Germany	>1.0 <2.0	>3.0 <4.0
Other Agents	Plasticiser, Fire Retardant, Catalyst, biocide, wetting & release agents	Global	Each <1.0	Each <1.0
Packaging				
Crate	Timber	Global	>3.0 <4.0	
Pallet	Timber	Global	>1.5 <2.0	
Wrapping etc	Polymers	Global	>1.0 <1.5	
Coverboards	Medium density fibreboard	Global	>0.1 <0.2	
Straps & Tape	Polyester	Global	>0.05 <0.10	

Product Functional & Technical Performance Information

This section provides manufacturer specifications and additional information.

Specifications, Maintenance, Fire, Safety & Installation	https://www.laminex.com.au/trade
AS/NZS	Classification Group 3
Panel dimensions Length*Width ±10 mm	3.6*1.5m or 3.6*0.75m
ASTM D5116 Specific Area VOC[1] Emission Rate	0.5mg/m^2/hr
ISO12460-3 Specific Area Formaldehyde Emission Rate	≤1.05mg/m^2/hr

[1] Volatile Organic Compounds (VOCs)

System Analysis Scope and Boundaries

Stages A1 to 3 model actual operations. Stage A4 to C4 are model scenarios.

Typical scenarios are assumed to forecast unit operations as described in the next section.

Figure 2. shows included processes in a cradle to grave system boundary to end of life fates to unshown beyond the boundary reuse, recycling or landfill grave.

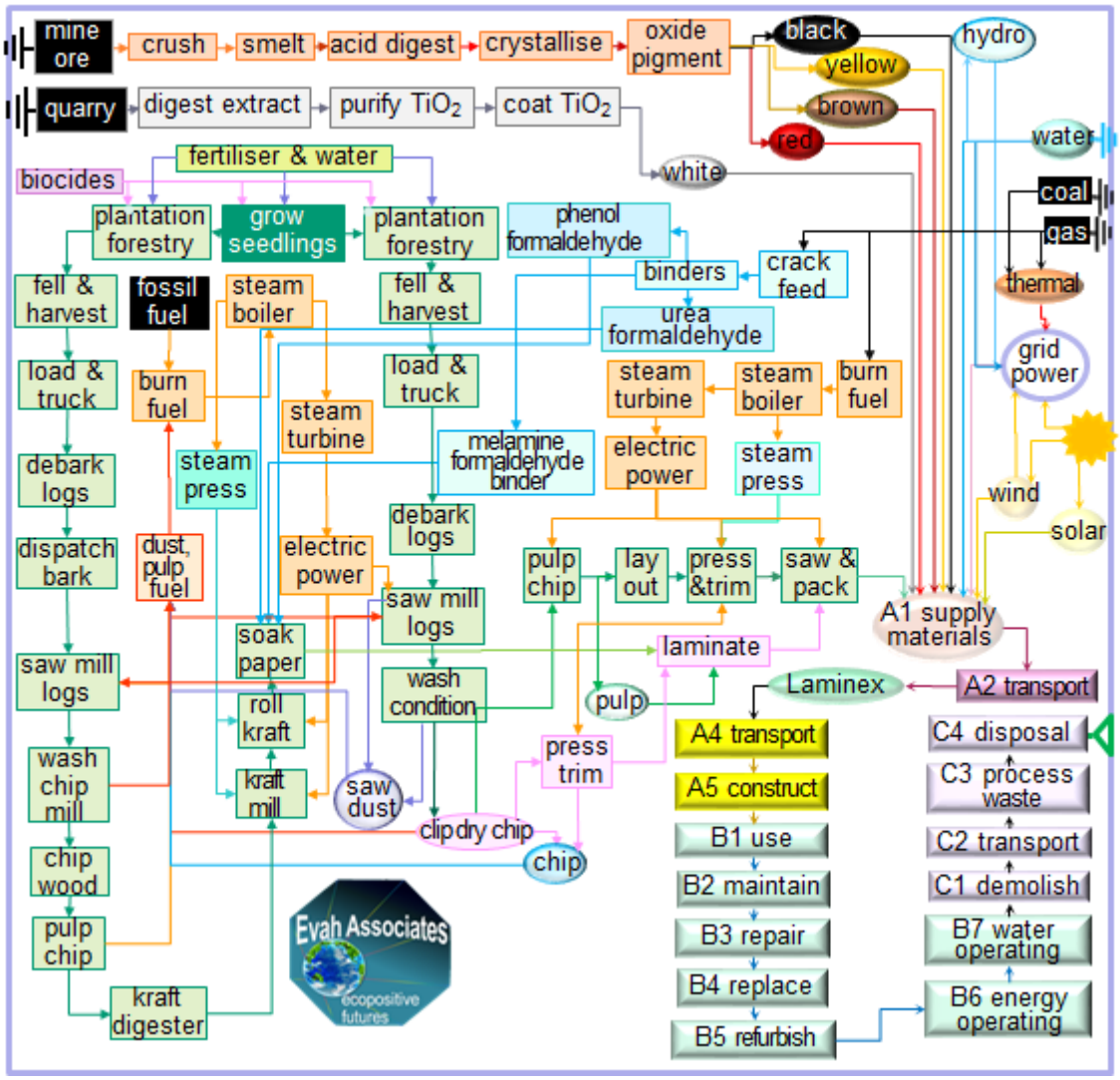

Figure 2. Product Process Flow Chart

Scenarios for Modules/Functional Unit

Stages A1 to A3 model actual operations. This section defines scenarios A4 to D3. C3 Waste Treatment has no flows.

Phase	Operation	Type specified	Amount	Type specified	Amount
A4 Transport	Transport to Site	25t semi-trailer	60 km	85% Capacity	Full back load
	Long distance road	25t semi-trailer	600km	85% Capacity	Full back load
	Continental freight rail	Diesel train	600km	85% Capacity	Full back load
	Container shipping	Factory to CBD	1,200km	85% Capacity	Full back load
	Volume capacity (<1 ≥1)	Utilisation factor	1	Uncompressed	Un-nested
A5 Construct	Ancillaries	Adhesive	0.025kg	Edge trim	0.0001kg
	Packing	Cardboard	0.005kg	Polymer	0.00001kg
	Water & Energy	Town water	0.5litre	Grid power	0.0002 MJ
	Waste on site	Trims	0.05kg	All packaging	As shown kg
	Scrap collection & route	25t semi-trailer	60 km	to landfill	In LCA report
	Emissions	Nil to air & water	0.0kg	All from landfill	In LCA report
B2 Maintain	Maker's specification	URL Declared	Specified	Clean cycle	Weekly
	Ancillaries	Wipes	Negligible	Detergent	0.007kgpa
	Surface Washdown	Town water	1.95kgpa	Net to drain	1.90kgpa
B3 Repair	Typical practice	Damaged parts	0.05kg	Worn parts	Same 5%
	Maker's specification	As per website	Specified	Freight to site	As A5
	Energy input & source	No excess	0.0MJpa	Packaging	As A5
C1 Demolish	Typical practice	Remove worn	0.05kg	Collect Separate	0.05kg
	Collection process	In site waste	0.40kg	Separate to reuse	0.0kg
C2 Transport	Typical practice	25t truck road	50km	85% capacity	No back load
C3 Waste Treatment	Typical practice	No waste treated	0.0kg	Not for energy	0.0kg
C4 Dispose	Typical practice	Product specific	0.05kg	Collect separately	0.05kg
	Typical practice	Worn to landfill	5%	All emissions	mass share
	Recovery system	No recycling	0.0kg	Not for energy	0.0kg
D1 Reuse	Typical practice	Reuse	95%	Patch 5%	0.05kg
D2 Recover	Typical practice	Recover	100%	Cleaning	sweep
D3 Recycle	None typically	At 60 years	Nil	None	0%

Environmental Impact Terminology

The United Nations reports only a few decades are left to resolve accelerating climate emergency and extinction crises. It is a call to action to all people to reverse the loss of climate and biodiversity security from human development in all activity [16]. Key environmental damages contributing to risks of ecological and community loss and collapse are tabled below with common names and remedies for each indicator.

Climate change from anthropo-genic infrared forced global warming	Greenhouse gases absorb infra-red radiation. This heat reduces thermal energy differentials, from equator to poles, forcing ocean current and wind circulation to blend and regulate climate. Weakly blended "lumpier" weather has more frequent, extreme heat wave, fire-storm, cyclone, rain-storm, flood and blizzard events. Accumulation of carbon dioxide, natural gas methane, nitrous oxides and volatile organic compounds from burning fossil fuels causes global warming. Forest and wilderness growth absorbing air-borne carbon in biomass can drawdown such accumulation. Urgent renewable energy reliance is vital in time to avoid imminent tipping points and the worsening "***climate emergency***".
Ozone layer depletion	Stratospheric ozone loss weakens the planet's solar shield so more shorter wavelength ultraviolet (UVB) light reaching earth damages plants and increases malignant melanoma and skin cancer in humans and animals. Chlorofluorocarbons, hydrochlorofluorocarbons (HCFC), hydrobromofluorocarbons, carbon tetrachloride, chlorobromomethane, methyl chloroform, methyl bromide and halon gas cause ozone layer loss. To repair the ***"ozone hole"*** reliance on ozone-safe refrigerants, aerosols and solvents is essential to avoid further its depletion and enable accumulation of naturally-formed ozone.
Acidification of air, land and waters	Acidification in the atmosphere reduces soil and waterway pH, impedes nitrogen fixation vital for plant growth and inhibits natural decomposition. It increases rates and incidence of fish kills, forest loss and deterioration of buildings and materials. Chief synthetic causes of "***acid rain***" are emissions of sulphur and nitrogen oxides, hydrochloric and hydrofluoric acids and ammonia from burning fossil fuels polluting precipitation of rain and snow world-wide.
Eutrophication of terrestrial, freshwater and marine life	Eutrophication from excessively high macronutrient levels added to natural waters promotes excessive plant growth that severely reduces oxygen, water and habitat security for aquatic and terrestrial organisms across related ecosystems. Chief synthetic cause of "***algal blooms***" is nitrogen (N, NOx, NH_4) and phosphorus (P, PO_4^{3-}) in rain run-off over-fertilised land catchments.
Photochemical ozone creation	Tropospheric photochemical ozone, called "***summer smog***" near ground level, is created from natural and synthetic compounds in UV sunlight. Low concentration smog damages vegetation and crops. High concentration smog is hazardous to human health. Chief synthetic causes are nitrogen oxides, carbon monoxide and volatile organic compounds (VOC) pollutants. Avoiding reliance on dirtiest coal fuel and volatile chemicals has reduced smog incidence in many areas globally.
Depletion of minerals, metals & water	Abiotic depletion of finite mineral resources increases time, effort and money required to obtain more resources to the point of extinction of naturally viable reserves. This can limit access to available, valuable and scarce elements vital for human-life. The youth movement "***extinction rebellion***" calls on adults to secure climate, material reserves and biodiversity for current and future generations.
Depletion of fossil fuel reserves	Abiotic depletion of resources by consuming finite oil, natural gas, coal and yellowcake fossil fuel reserves leaves current and future generations suffering limited available, accessible, plentiful, essential valuable as well as scarce raw material, medicinal, chemical, feedstock and fuel stock. Approaching "***peak oil***" acknowledged fossil fuel reserves are finite and the need for decision-makers to act to avoid market instability, insecurity and or oil and gas wars.

Glossary of Impact Assessment Terms, Methods and Units

Acronyms, methods and units of impact potentials plus inventory inputs and outputs, are defined below

Impact Potentials	Acronym	Description of Methods	Units
Climate Change biogenic	GWP $_{bio}$	GWP biogenic [7]	kg CO_{2eq}
Climate Change luluc	GWP $_{luluc}$	GWP land use & change [7]	kg CO_{2eq}
Climate Change fossil	GWP $_{ff}$	GWP fossil fuels [7]	kg CO_{2eq}
Climate Change total	GWP $_{t}$	Global Warming Potential [7]	kg CO_{2eq}
Stratospheric Ozone Depletion	ODP	Stratospheric Ozone Loss [8]	kg CFC_{11eq}
Photochemical Ozone Creation	POCP	Summer Smog [9]	kg NMOC $_{eq}$
Acidification Potential	AP	Accumulated Exceedance [10]	mol H^{+} $_{eq}$
Eutrophication Freshwater	EP $_{fresh}$	Excess nutrients freshwater [11]	kg P $_{eq}$
Eutrophication Marine	EP $_{marine}$	Excess marine nutrients [11]	kg N $_{eq}$
Eutrophication Terrestrial	EP $_{land}$	Excess Terrestrial nutrients [11]	mol N $_{eq}$
Mineral & Metal Depletion	ADP $_{min}$	Abiotic Depletion minerals [12]	kg Sb $_{eq}$
Fossil Fuel Depletion	ADP $_{ff}$	Abiotic Depletion fossil fuel [13]	MJ $_{ncv}$
Water Depletion	WDP	Water Deprivation Scarcity [14,15]	m^3 $_{WDP\ eq}$
Fresh Water Net	FW	Lake, river, well & town water	m^3
Secondary Material	SM	Post-consumer recycled (PCR)	kg
Secondary Renewable Fuel	RSF	PCR biomass burnt	MJ $_{ncv}$
Primary Energy Renewable Material	PERM	Biomass retained material	MJ $_{ncv}$
Primary Energy Renewable Not Feedstock	PERE	biomass fuels burnt	MJ $_{ncv}$
Primary Energy Renewable Total	PERT	Biomass burnt + retained	MJ $_{ncv}$
Secondary Non-renewable Fuel	NRSF	PCR fossil-fuels burnt	MJ $_{ncv}$
Primary Energy Non-renewable Material	PENRM	Fossil feedstock retained	MJ $_{ncv}$
Primary Energy Non-renewable Not Feedstock	PENRE	fossil-fuel used or burnt	MJ $_{ncv}$
Primary Energy Non-renewable Total	PENRT	Fossil feedstock & fuel use	MJ $_{ncv}$
Hazardous Waste Disposed	HWD	Reprocessed to contain risks	kg
Non-hazardous Waste Disposed	NHWD	Municipal landfill facility waste	kg
Radioactive Waste Disposed	RWD	Mostly ex nuclear power stations	kg
Components For Reuse	CRU	Product scrap for reuse as is	kg
Material For Recycling	MFR	Factory scrap to remanufacture	kg
Material For Energy Recovery	MER	Factory scrap use as fuel	kg
Exported Energy Electrical	EEE	Uncommon for building products	MJ $_{ncv}$
Exported Energy Thermal	EET	Uncommon for building products	MJ $_{ncv}$

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6mm Phenolic Core LGFM03 2023EP

Results Module: A1 to A5 Cradle to Site

Table 1 shows A1Resource Acquisition, A2 Transport, A3 Manufacture, A4 Delivery, A5 Construct results.

Table 1 A1 to A5 Impact & Inventory Results/Functional Unit

Result	A1-3	A4	A5
Climate Change biogenic	-2.2	-1.1E-06	-7.5E-02
Climate Change luluc	3.4E-02	1.0E-09	2.8E-03
Climate Change fossil	8.6	1.9E-02	0.47
Climate Change total	6.5	1.9E-02	0.40
Stratospheric Ozone Depletion	4.5E-08	1.7E-13	9.1E-09
Photochemical Ozone Creation	3.8E-02	1.2E-04	2.1E-03
Acidification Potential	1.5E-02	1.2E-05	9.1E-04
Eutrophication Freshwater	3.4E-05	5.6E-10	1.9E-06
Eutrophication Marine	3.1E-03	2.3E-06	2.1E-04
Eutrophication Terrestrial	3.7E-02	7.7E-06	1.9E-03
Mineral and Metal Depletion	1.4E-03	7.2E-06	1.2E-04
Fossil Depletion	4.8	2.2E-02	0.26
Water Scarcity Depletion	3.3E-02	3.0E-06	4.4E-03
Net Fresh Water Use	0.21	1.8E-05	2.7E-02
Secondary Material	0.46	2.3E-06	2.7E-03
Secondary Renewable Fuel	29	6.8E-06	1.4
Primary Renewable Material	0.10	3.0E-04	3.1E-03
Primary Energy Renewable Not Feedstock	5.5	2.4E-03	0.33
Primary Energy Renewable Total	34	2.7E-03	1.8
Secondary Non-renewable Fuel	0.36	7.4E-04	1.0E-02
Primary Energy Non-renewable Material	19	0.11	0.92
Primary Non-renewable Energy Not Feedstock	75	0.19	4.2
Primary Energy Non-renewable Total	94	0.30	5.2
Hazardous Waste Disposed	2.4E-03	3.7E-05	1.2E-04
Non-hazardous Waste Disposed	0.28	3.1E-04	4.1E-02
Radioactive Waste Disposed	7.4E-16	1.1E-31	1.1E-16
Components For Reuse	0	4.4E-3	0
Material For Recycling	0.10	5.7E-06	6.0E-03
Material For Energy Recovery	2.7E-04	2.3E-07	2.1E-05
Exported Energy Electrical	0	0	0
Exported Energy Thermal	0	0	0

Results Module B: Building Fabric and Operations

Table 2 shows B1 Use, B2 Maintain, B3 Repair, B4 Replace, B5 Refurbish, B6 Energy Use, B7 Water Use results.

Table 2 B1 to B7 Impact & Inventory Results/Functional Unit

Result	B1	B2	B3	B4	B5	B6	B7
Climate Change biogenic	0	-0.10	-7.5E-02	0	0	0	0
Climate Change luluc	0	6.5E-06	2.8E-03	0	0	0	0
Climate Change fossil	0	0.72	0.47	0	0	0	0
Climate Change total	0	0.62	0.40	0	0	0	0
Stratospheric Ozone Depletion	0	3.2E-09	9.1E-09	0	0	0	0
Photochemical Ozone Creation	0	3.0E-03	2.1E-03	0	0	0	0
Acidification Potential	0	1.3E03	9.1E-04	0	0	0	0
Eutrophication Freshwater	0	6.5E-07	1.9E-06	0	0	0	0
Eutrophication Marine	0	2.1E-04	2.1E-04	0	0	0	0
Eutrophication Terrestrial	0	1.5E-03	1.9E-03	0	0	0	0
Mineral and Metal Depletion	0	3.2E-04	1.2E-04	0	0	0	0
Fossil Depletion	0	0.52	0.26	0	0	0	0
Water Scarcity Depletion	0	1.1E-02	4.4E-03	0	0	0	0
Net Fresh Water Use	0	6.6E-02	2.7E-02	0	0	0	0
Secondary Material	0	2.7E-03	2.7E-03	0	0	0	0
Secondary Renewable Fuel	0	1.4	1.4	0	0	0	0
Primary Renewable Material	0	3.1E-03	3.1E-03	0	0	0	0
Primary Energy Renewable Not Feedstock	0	0.33	0.33	0	0	0	0
Primary Energy Renewable Total	0	1.8	1.8	0	0	0	0
Secondary Non-renewable Fuel	0	1.0E-02	1.0E-02	0	0	0	0
Primary Energy Non-renewable Material	0	0.92	0.92	0	0	0	0
Primary Non-renewable Energy Not Feedstock	0	4.2	4.2	0	0	0	0
Primary Energy Non-renewable Total	0	5.2	5.2	0	0	0	0
Hazardous Waste Disposed	0	9.9E-04	1.2E-04	0	0	0	0
Non-hazardous Waste Disposed	0	0.11	0.40	0	0	0	0
Radioactive Waste Disposed	0	2.7E-17	1.1E-16	0	0	0	0
Components For Reuse	0	0	0	0	0	0	0
Material For Recycling	0	7.6E-02	6.0E-03	0	0	0	0
Material For Energy Recovery	0	3.6E-05	2.1E-05	0	0	0	0
Exported Energy Electrical	0	0	0	0	0	0	0
Exported Energy Thermal	0	0	0	0	0	0	0

Results Module C: End-of-life

Table 3 shows C1 demolish, C2 Transport C3 Waste Processing and C4 Disposal results.

Table 3 C1 to C4 Impact & Inventory Results/Functional Unit

Result	C1	C2	C3	C4
Climate Change biogenic	-7.0E-06	-5.4E-07	0	-3.4E-07
Climate Change luluc	1.0E-08	8.0E-10	0	5.1E-10
Climate Change fossil	1.9E-03	6.2E-03	0	6.1E-03
Climate Change total	1.9E-03	6.2E-03	0	6.1E-03
Stratospheric Ozone Depletion	2.3E-13	1.1E-13	0	8.8E-14
Photochemical Ozone Creation	7.6E-06	6.0E-05	0	1.4E-04
Acidification Potential	3.5E-06	5.1E-06	0	1.8E-05
Eutrophication Freshwater	7.3E-13	3.1E-10	0	2.6E-10
Eutrophication Marine	6.4E-07	9.4E-07	0	3.3E-06
Eutrophication Terrestrial	4.1E-06	3.2E-06	0	6.3E-06
Mineral and Metal Depletion	3.8E-09	4.2E-06	0	4.0E-06
Fossil Depletion	9.2E-04	7.5E-03	0	7.2E-03
Water Scarcity Depletion	2.5E-07	1.4E-06	0	1.2E-06
Net Fresh Water Use	1.5E-06	8.7E-06	0	7.5E-06
Secondary Material	1.5E-05	1.7E-06	0	1.2E-06
Secondary Renewable Fuel	7.4E-08	-5.3E-17	0	3.3E-17
Primary Renewable Material	2.3E-03	2.9E-04	0	2.1E-04
Primary Energy Renewable Not Feedstock	1.4E-07	1.6E-03	0	1.3E-03
Primary Energy Renewable Total	2.3E-03	1.9E-03	0	1.5E-03
Secondary Non-renewable Fuel	1.4E-08	4.8E-04	0	3.9E-04
Primary Energy Non-renewable Material	2.0E-02	6.3E-02	0	6.0E-02
Primary Non-renewable Energy Not Feedstock	2.5E-04	3.7E-02	0	4.0E-02
Primary Energy Non-renewable Total	2.0E-02	0.10	0	0.10
Hazardous Waste Disposed	7.3E-08	1.2E-05	0	1.2E-05
Non-hazardous Waste Disposed	5.6E-06	9.6E-05	0	5.0E-02
Radioactive Waste Disposed	4.4E-21	8.5E-32	0	5.4E-32
Components For Reuse	0	0	0	0
Material For Recycling	2.2E-05	4.0E-06	0	3.0E-06
Material For Energy Recovery	2.9E-10	1.5E-07	0	1.2E-07
Exported Energy Electrical	0	0	0	0
Exported Energy Thermal	0	0	0	0

Results Module D: Beyond System Boundaries

Table 4 has results for benefit and loads in D1 reuse, D3 recycling and D2 recovery.

Table 4 D1 to D3 Impact & Inventory Results/Functional Unit

Result	D1	D2	D3
Climate Change biogenic	-0.43	-1.8E-05	-1.3E-03
Climate Change luluc	-1.5E-02	1.8E-09	2.8E-03
Climate Change fossil	-2.8	2.5E-04	0.47
Climate Change total	-2.4	2.3E-04	0.40
Stratospheric Ozone Depletion	-3.4E-08	5.9E-13	9.1E-09
Photochemical Ozone Creation	-1.3E-02	1.0E-06	2.1E-03
Acidification Potential	-5.3E-03	4.4E-07	9.1E-04
Eutrophication Freshwater	-9.9E-06	1.2E-10	1.9E-06
Eutrophication Marine	-1.2E-03	7.7E-08	2.1E-04
Eutrophication Terrestrial	-1.1E-02	5.2E-07	1.9E-03
Mineral and Metal Depletion	-7.2E-04	5.8E-08	1.2E-04
Fossil Depletion	-1.6	1.5E-04	0.26
Water Scarcity Depletion	-2.5E-02	1.8E-05	4.4E-03
Net Fresh Water Use	-0.16	1.1E-04	2.7E-02
Secondary Material	-7.4E-03	0	2.7E-03
Secondary Renewable Fuel	-8.0	1.7E-04	1.8E-03
Primary Renewable Material	-1.7	2.7E-04	0.20
Primary Energy Renewable Not Feedstock	-6.7E-02	3.0E-05	4.3E-03
Primary Energy Renewable Total	-10.0	4.7E-04	0.21
Secondary Non-renewable Fuel	-8.0E-02	7.7E-06	1.5E-03
Primary Energy Non-renewable Material	-26	2.4E-03	1.9
Primary Non-renewable Energy Not Feedstock	-6.0	3.2E-04	0.14
Primary Energy Non-renewable Total	-32	2.7E-03	2.0
Hazardous Waste Disposed	-1.0E-03	1.9E-07	1.2E-04
Non-hazardous Waste Disposed	-6.1E-02	2.0E-05	4.1E-02
Radioactive Waste Disposed	-6.0E-16	4.9E-21	1.1E-16
Components For Reuse	0	0	0
Material For Recycling	-4.9E-02	1.5E-05	6.0E-03
Material For Energy Recovery	-8.3E-05	6.5E-09	2.1E-05
Exported Energy Electrical	0	0	0
Exported Energy Thermal	0	0	0

Results Core Module A1 to A5 Cradle to Site

Table 5 shows A1 Resource Acquisition, A2 Transport, A3 Manufacture, A4 Delivery, A5 Construct results.

Table 5 A1 to A5 Impact & Inventory Results/Functional Unit

Result	A1-3	A4	A5
Climate Change biogenic	-2.2	-1.1E-06	-7.5E-02
Climate Change luluc	3.5E-02	1.0E-09	2.8E-03
Climate Change fossil	8.6	0.02	0.47
Climate Change total	6.4	0.02	0.40
Stratospheric Ozone Depletion	4.4E-08	1.7E-13	9.1E-09
Photochemical Ozone Creation	3.7E-02	1.2E-04	2.1E-03
Acidification Potential	1.5E-02	1.2E-05	9.1E-04
Eutrophication Freshwater	3.4E-05	5.6E-10	1.9E-06
Eutrophication Marine	3.0E-03	2.3E-06	2.1E-04
Eutrophication Terrestrial	3.7E-02	7.7E-06	1.9E-03
Mineral and Metal Depletion	1.2E-03	2.2E-06	1.2E-04
Fossil Depletion	4.8	7.2E-02	0.26
Water Scarcity Depletion	3.3E-02	2.9E-06	4.4E-03
Net Fresh Water Use	0.21	1.8E-05	0.03
Secondary Material	0.47	2.3E-06	2.7E-03
Secondary Renewable Fuel	29	6.8E-06	1.4
Primary Renewable Material	1.0E-02	3.0E-04	3.1E-03
Primary Energy Renewable Not Feedstock	5.5	2.4E-03	0.33
Primary Energy Renewable Total	35	2.7E-03	1.8
Secondary Non-renewable Fuel	3.1E-01	7.4E-04	1.0E-02
Primary Energy Non-renewable Material	18	0.11	0.92
Primary Non-renewable Energy Not Feedstock	75	0.19	4.2
Primary Energy Non-renewable Total	93	0.30	5.2
Hazardous Waste Disposed	2.3E-03	3.7E-05	1.2E-04
Non-hazardous Waste Disposed	0.27	3.1E-04	0.04
Radioactive Waste Disposed	7.6E-16	1.1E-31	1.1E-16
Components For Reuse	0	4.4E-3	0
Material For Recycling	0.10	5.7E-06	6.0E-03
Material For Energy Recovery	1.8E-04	2.3E-07	2.1E-05
Exported Energy Electrical	0	0	0
Exported Energy Thermal	0	0	0

Results Module B: Building Fabric and Operations

Table 6 has B1 Use, B2 Maintain, B3 Repair, B4 Replace, B5 Refurbish, B6 Energy Use, B7 Water Use results.

Table 6 B1 to B7 Impact & Inventory Results/Functional Unit

Result	B1	B2	B3	B4	B5	B6	B7
Climate Change biogenic	0	-0.10	-7.5E-02	0	0	0	0
Climate Change luluc	0	6.5E-06	2.8E-03	0	0	0	0
Climate Change fossil	0	0.72	0.47	0	0	0	0
Climate Change total	0	0.62	0.40	0	0	0	0
Stratospheric Ozone Depletion	0	3.2E-09	9.1E-09	0	0	0	0
Photochemical Ozone Creation	0	3.0E-03	2.1E-03	0	0	0	0
Acidification Potential	0	1.3E03	9.1E-04	0	0	0	0
Eutrophication Freshwater	0	6.5E-07	1.9E-06	0	0	0	0
Eutrophication Marine	0	2.1E-04	2.1E-04	0	0	0	0
Eutrophication Terrestrial	0	1.5E-03	1.9E-03	0	0	0	0
Mineral and Metal Depletion	0	3.2E-04	1.2E-04	0	0	0	0
Fossil Depletion	0	0.52	0.26	0	0	0	0
Water Scarcity Depletion	0	1.1E-02	4.4E-03	0	0	0	0
Net Fresh Water Use	0	6.6E-02	2.7E-02	0	0	0	0
Secondary Material	0	2.7E-03	2.7E-03	0	0	0	0
Secondary Renewable Fuel	0	1.4	1.4	0	0	0	0
Primary Renewable Material	0	3.1E-03	3.1E-03	0	0	0	0
Primary Energy Renewable Not Feedstock	0	0.33	0.33	0	0	0	0
Primary Energy Renewable Total	0	1.8	1.8	0	0	0	0
Secondary Non-renewable Fuel	0	1.0E-02	1.0E-02	0	0	0	0
Primary Energy Non-renewable Material	0	0.92	0.92	0	0	0	0
Primary Non-renewable Energy Not Feedstock	0	4.2	4.2	0	0	0	0
Primary Energy Non-renewable Total	0	5.2	5.2	0	0	0	0
Hazardous Waste Disposed	0	9.9E-04	1.2E-04	0	0	0	0
Non-hazardous Waste Disposed	0	0.11	0.40	0	0	0	0
Radioactive Waste Disposed	0	2.7E-17	1.1E-16	0	0	0	0
Components For Reuse	0	0	0	0	0	0	0
Material For Recycling	0	7.6E-02	6.0E-03	0	0	0	0
Material For Energy Recovery	0	3.6E-05	2.1E-05	0	0	0	0
Exported Energy Electrical	0	0	0	0	0	0	0
Exported Energy Thermal	0	0	0	0	0	0	0

Results Module C: End-of-life

Table 7 shows C1 demolish, C2 Transport C3 Waste Processing and C4 Disposal results.

Table 7 C1 to C4 Impact & Inventory Results/Functional Unit

Result	C1	C2	C3	C4
Climate Change biogenic	-7.0E-06	-5.4E-07	0	-3.4E-07
Climate Change luluc	1.0E-08	8.0E-10	0	5.1E-10
Climate Change fossil	1.9E-03	6.2E-03	0	6.1E-03
Climate Change total	1.9E-03	6.2E-03	0	6.1E-03
Stratospheric Ozone Depletion	2.3E-13	1.1E-13	0	8.8E-14
Photochemical Ozone Creation	7.6E-06	6.0E-05	0	1.4E-04
Acidification Potential	3.5E-06	5.1E-06	0	1.8E-05
Eutrophication Freshwater	7.3E-13	3.1E-10	0	2.6E-10
Eutrophication Marine	6.4E-07	9.4E-07	0	3.3E-06
Eutrophication Terrestrial	4.1E-06	3.2E-06	0	6.3E-06
Mineral and Metal Depletion	3.8E-09	4.2E-06	0	4.0E-06
Fossil Depletion	9.2E-04	7.5E-03	0	7.2E-03
Water Scarcity Depletion	2.5E-07	1.4E-06	0	1.2E-06
Net Fresh Water Use	1.5E-06	8.7E-06	0	7.5E-06
Secondary Material	1.5E-05	1.7E-06	0	1.2E-06
Secondary Renewable Fuel	7.4E-08	5.3E-17	0	3.3E-17
Primary Renewable Material	2.3E-03	2.9E-04	0	2.1E-04
Primary Energy Renewable Not Feedstock	1.4E-07	1.6E-03	0	1.3E-03
Primary Energy Renewable Total	2.3E-03	1.9E-03	0	1.5E-03
Secondary Non-renewable Fuel	1.4E-08	-4.8E-04	0	3.9E-04
Primary Energy Non-renewable Material	2.0E-02	6.3E-02	0	6.0E-02
Primary Non-renewable Energy Not Feedstock	2.5E-04	3.7E-02	0	4.0E-02
Primary Energy Non-renewable Total	2.0E-02	1.0E-01	0	0.10
Hazardous Waste Disposed	7.3E-08	1.2E-05	0	1.2E-05
Non-hazardous Waste Disposed	5.6E-06	9.6E-05	0	5.0E-02
Radioactive Waste Disposed	4.4E-21	8.5E-32	0	5.4E-32
Components For Reuse	0	0	0	0
Material For Recycling	2.2E-05	4.0E-06	0	3.0E-06
Material For Energy Recovery	2.9E-10	1.5E-07	0	1.2E-07
Exported Energy Electrical	0	0	0	0
Exported Energy Thermal	0	0	0	0

Results Module D: Beyond System Boundaries

Table 8 has results for benefit and loads in D1 reuse, D3 recycling and D2 recovery.

Table 8 D1 to D3 Impact & Inventory Results/Functional Unit

Result	D1	D2	D3
Climate Change biogenic	-0.43	-1.8E-05	-1.3E-03
Climate Change luluc	-1.5E-02	1.8E-09	2.8E-03
Climate Change fossil	-2.8	2.5E-04	0.47
Climate Change total	-2.4	2.3E-04	0.40
Stratospheric Ozone Depletion	-3.4E-08	5.9E-13	9.1E-09
Photochemical Ozone Creation	-1.3E-02	1.0E-06	2.1E-03
Acidification Potential	-5.3E-03	4.4E-07	9.1E-04
Eutrophication Freshwater	-9.9E-06	1.2E-10	1.9E-06
Eutrophication Marine	-1.2E-03	7.7E-08	2.1E-04
Eutrophication Terrestrial	-1.1E-02	5.2E-07	1.9E-03
Mineral and Metal Depletion	-7.2E-04	5.8E-08	1.2E-04
Fossil Depletion	-1.6	1.5E-04	0.26
Water Scarcity Depletion	-2.5E-02	1.8E-05	4.4E-03
Net Fresh Water Use	-0.16	1.1E-04	2.7E-02
Secondary Material	-7.4E-03	0	2.7E-03
Secondary Renewable Fuel	-8.0	1.7E-04	1.8E-03
Primary Renewable Material	-1.7	2.7E-04	0.20
Primary Energy Renewable Not Feedstock	-6.7E-02	3.0E-05	4.3E-03
Primary Energy Renewable Total	-10.0	4.7E-04	0.21
Secondary Non-renewable Fuel	-8.0E-02	7.7E-06	1.5E-03
Primary Energy Non-renewable Material	-26	2.4E-03	1.9
Primary Non-renewable Energy Not Feedstock	-6.0	3.2E-04	0.14
Primary Energy Non-renewable Total	-32	2.7E-03	2.0
Hazardous Waste Disposed	-1.0E-03	1.9E-07	1.2E-04
Non-hazardous Waste Disposed	-6.1E-02	2.0E-05	4.1E-02
Radioactive Waste Disposed	-6.0E-16	4.9E-21	1.1E-16
Components For Reuse	0	0	0
Material For Recycling	-4.9E-02	1.5E-05	6.0E-03
Material For Energy Recovery	-8.3E-05	6.5E-09	2.1E-05
Exported Energy Electrical	0	0	0
Exported Energy Thermal	0	0	0

Interpretation Cradle to Gate A1 to A3

The first interpretation section discusses product results cradle to gate A1 to A3 for the melamine core 6mm and 13mm (M6 & M13) and phenolic core 6 and 13mm (P6 & P13).

Figure 3 charts material component mass kg/kg product. Figure 4 charts input of energy and feedstock use (MJ) and material (kg) versus GWP (kg)/kg product.

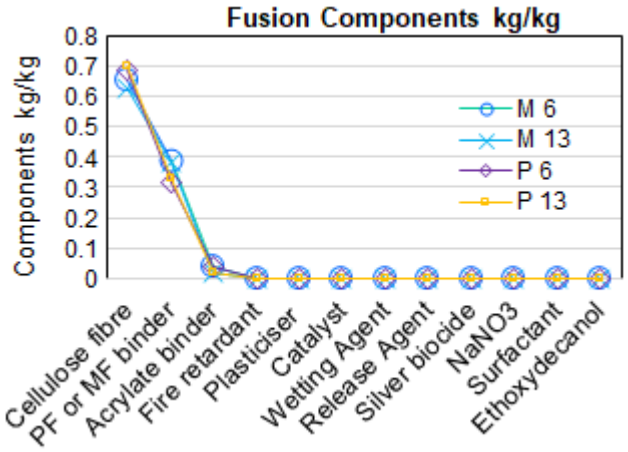

Figure 3 Material Component Share kg/kg

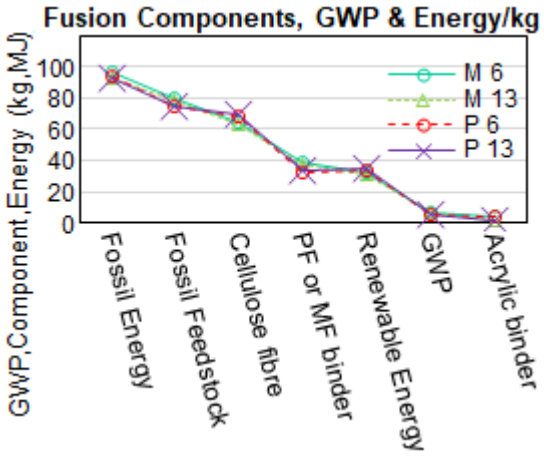

Figure 4 Input Share (MJ & kg) Vs CO_{2e} kg/kg

These charts show the main components were cellulose filler and Phenol or Melamine Formaldehyde binders. Components other than the acrylate had very low mass share. They show highest sensitivity to fossil energy use then fossil feedstock then filler and formaldehyde binders and least sensitivity to low mass acrylic binder. GWP was not significant overall.

Interpretation Cradle to Grave and Beyond the System Boundary A1 to D3

The next section discusses product results cradle to fate A1 to C4 and beyond the system boundary to D1,D2 and D3.

Figure 5 charts these products A1-3 to D3 with highest energy and feedstock use and insignificant. Figure 6 charts these products Acidification and terrestrial Eutrophication (EP $_{land}$) from A1-3 to D3.

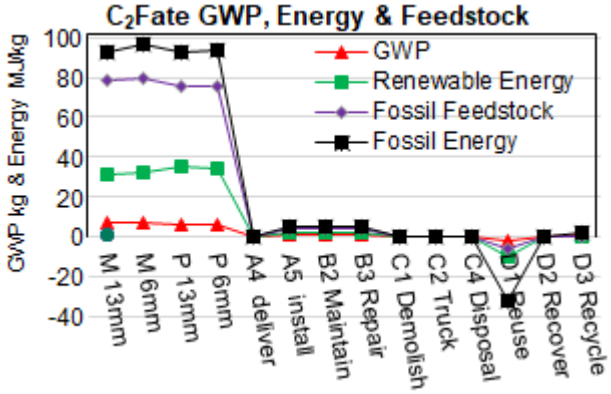

Figure 5 GWP A1 to D3/kg Functional Unit

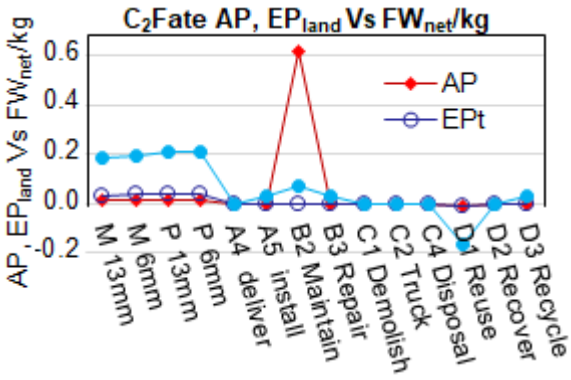

Figure 6 AP, EP & FW A1 to D3/kg Functional Unit

The charts show that all flows have minor credits in reuse beyond 20-years. GWP was not significant overall. Acidification peaks in B2 from cleaning over 20 years. EP has minor credits in D1 reuse beyond 20-years.

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