EPD™

Environmental Product Declaration

Global GreenTag EPD Program:

Compliant to EN15804+A2 2019

Billi Australia Pty Ltd
Billi Filtered boiled and chilled water dispensers
Quadra and Quadra Plus

42 Lucknow Crescent
Thomastown VIC 3074, Australia

Billi™

Compliant to EN 15804+A2

Billi Filtered boiling and Chilled Water Dispenser

Quadra and Quadra Plus

Mandatory Disclosures

EPD type	Cradle to grave A1 to C4 + D	**Issue Date**	01 Dec 2023
Product Range	Billi Filtered boiled and chilled water dispenser	**Valid Until**	01 Dec 2028
Brand Name	Quadra		
EPD Number	BLQD01 2023EP		
Code name	BQ 01		
Brand Name	Quadra Plus		
EPD Number	BLQD02 2023EP		
Code name	BQ 02		
Product Photograph		BQ 01	BQ 02

BQ 01

BQ 02

Demonstration of Verification	
PCR	Standard EN 15804+A2 2019 serves as core Product Category Rules (PCR) [1]. Filtered Water Systems Sub-PCR 2023 FWS V1 also applies [3].
☑ Internal	24 11 2023 — Life Cycle Assessment (LCA) & EPD developed by Mathilde Vlieg, Malaika LCT 29 Nov2023 — LCA Reviewed by Direshni Naiker, Ecquate Pty Ltd 30/11/2023 — EPD Reviewed by David Baggs, Global GreenTag International Pty Ltd
☑ External	01 Dec 2023 — LCA Reviewed by Delwyn Jones, The Evah Institute 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	Life Cycle Impact Assessment (LCIA) results are relative expressions that do not predict impacts on category endpoints, threshold exceeding, 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 Level 38 Riparian Centre 71 Eagle Street Brisbane QLD 4000 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	Billi Australia Pty Ltd 42 Lucknow Crescent Thomastown VIC, 3074 Australia Phone: 1800 812 321 http://www.billi.com.au

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Billi Filtered boiling and Chilled Water Dispenser

Quadra and Quadra Plus

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																Supplementary		
Stages	Product			Construct		Building Use							End-of-Life				Benefit & load beyond system boundary		
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
GE0graphy	Focus	Process	Line	Plant	Corporate
	Range	Continent	Nation	Plant	Line
	Jurisdiction	Representation is Global: Africa, North America, Europe, Pacific Rim			

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Billi Filtered boiling and Chilled Water Dispenser

Quadra and Quadra Plus

Details of Manufacturer

Originating in Australia, Billi has manufactured instant filtered boiling, chilled and sparkling drinking water systems industry for over 30 years. Billi's water systems are made in Melbourne and comply with strict quality standards. The Billi product range includes features such as water-cooled technology, space saving underbench footprints, specialty dispensers, plus a large range of models that do not require cupboard ventilation. Their units are easy to install, energy efficient and user-friendly.

Product Information

Billi is a leading manufacturer of filtered boiling, chilled and sparkling drinking water systems.

Range Names	Billi Filtered boiled and chilled water dispenser	
Brand Name	Quadra	Quadra plus
Model Numbers	904010, 904020, 904040, 904060, 904100, 904180	904025, 904065, 904105, 904107, 904187
Manufacturer address	42 Lucknow Crescent, Thomastown, Victoria 3074, Australia	
Site representation	Australia	
Factory warranty	2 years	
Declared unit	Declared filtered boiled and chilled potable water dispenser mass in kg for commercial and residential building interiors.	
Functional unit	Declared product 20 year use dispensing 0.216Ml 2:3 chilled: boiling water cradle to grave and beyond the system boundary.	
Geographical Area	Australasia	
Application	Boiling and chilled filtered water dispensers	
Function in Building	Generating and dispensing boiling and chilled filtered water	
Lifetime [5,6]	7 years Reference Service Life [ISO 15686]	

Product Functional & Technical Performance Information0.0

This section lists manufacturer specifications, maintenance, safety, installation and other information and tables product functional and end-use characteristics.

Characteristics		**BQ 01**	**BQ 02**
Current Rating (Amperes)	**10A**		10A904105
	15A	904100	15A 904107
	20A	904180	20A 904187
Height (cm)		34	34
Length (cm)		46.5	46.5
Width (cm)		31.5	31.5
Dispenser Mass (kg)		26.8	27.5
Output types		Filtered, boiling and chilled water dispenser	
AS/NZ Classification		Certified to AS/NZ 3498 and AS/NZ 4020	
Building Council of Australia		Compliant to Section J6.6 Boiling water and chilled water storage units	
Technical information		https://www.billi.com.au/technical-documents/	
Performance		Watermark WM-021525	
HACCP[1]		PE-872-WAT-1-02	

[1] Hazard Analysis Critical Control Points (HACCP)

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.

Product %w/w	Component	Cradle	BQ01	BQ+02
Chassis and cover	Colorsteel	Australia	>20 <30	>20 <30
Gas compressor	Compressor	Korea	>20 <30	>20 <30
Tank	Stainless steel	Australia	>7.0 <10	>7.0 <10
Taps	Zincalume	Australia	>5.0 <7.0	>7.0 <10
Tubing	Copper	Australia	>5.0 <7.0	>5.0 <7.0
Nuts and fittings	Brass	Australia	>2.0 <4.0	>3.0 <5.0
Panels and moulding	Acrylonitrile Butadiene Styrene	Australia	>3.0 <5.0	>3.0 <5.0
Screws	Galvanised steel	Australia	>3.0 <5.0	>3.0 <5.0
Electronics	Printed Circuit Board	Australia	>3.0 <5.0	>2.0 <4.0
Water filter	Carbon filter	Australia	>2.0 <4.0	>2.0 <4.0
Temp / water sensors	Sensor	Australia	>0.2<0.5	>2.0 <4.0
Cables	Power cable	Australia	>1.0 <2.0	>1.0 <2.0
Heating element	Nichrome	Australia	1.0 <2.0	1.0 <2.0
Insulation	Expanded Polypropylene	Australia	1.0 <2.0	1.0 <2.0
Motor	Pump	Korea	1.0 <2.0	1.0 <2.0
Solenoids	Solenoid	Slovenia	1.0 <2.0	1.0 <2.0
Tubes	Silicone	Australia	1.0 <2.0	1.0 <2.0
Tap plating	Chrome	Australia	>0.1<0.2	>0.1<0.2
Gasket, caps, tubes	ethylene propylene diene	Australia	>0.1<0.2	>0.1<0.2
Magnet	Ferrit iron	Australia	>0.8<1.0	>0.8<1.0
Assemblies	Glass	Australia	>0.5<0.7	>0.5<0.7
Clips	Spring steel	Australia	>0.4<0.6	>0.4<0.6
Assemblies	Polypropylene	Australia	>0.2<0.5	>0.2<0.5
Insulation	Expanded Polystyrene	Australia	>0.2<0.5	>0.2<0.5
Assemblies	Zeolite clay	Australia	>0.1<0.2	>0.1<0.2
Cable ties	Nylon	Australia	>0.1<0.2	>0.1<0.2
Hose	Polyester	Australia	>0.1<0.2	>0.1<0.2
Refrigerant	propane	Australia	>0.1<0.2	>0.1<0.2
Assemblies	Glass, Steels, Polymers	Australia	<0.03	<0.05
Packaging				
Packing	Cardboard	Australia	>5.0 <8.0	
Manual	Paper	Australia	>0.4 <0.6	
Filling	Polystyrene	global	>0.1 <0.2	
Staples	Steel	Australia	>0.05 < 0.1	
Straps	Polypropylene	global	>0.01 < 0.02	

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.

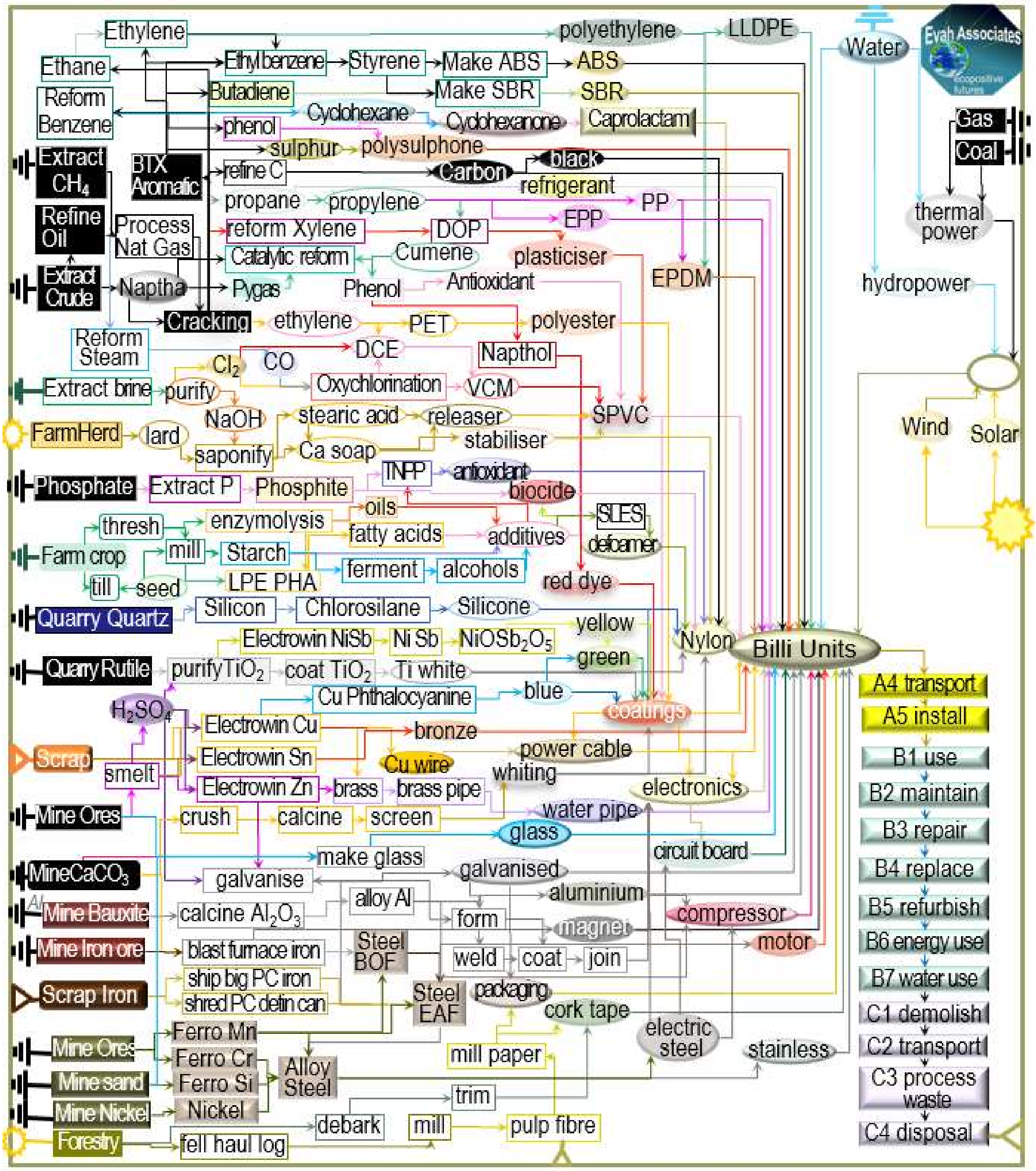

Figure 2. Product Process Flow Chart

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Scenarios for Modules/Declared Unit

Stages A1 to A3 model actual operations for existing market demand or purposes deemed compliant with technical requirements and legal guidelines. This section defines scenarios A4 to D3.

Phase	Operation	Type specified	Amount	Type specified	Amount
A4 Transport	Transport to Install	10t semi-trailer	10km	85% Capacity	Full back load
	Long distance road	25t semi-trailer	50km	85% Capacity	Full back load
	Continental freight rail	Diesel train	200km	85% Capacity	Full back load
	Container shipping	Factory to CBD	830km	85% Capacity	Full back load
	Volume capacity (<1≥1)	Utilisation factor	1	Uncompressed	Un-nested
A5 Construct & Install	Ancillaries	Steel, silicon	0.17kg	Installation kit	In LCA report
	Packing Incl Fate	Cardboard, paper, plastic, staples	2.4kg	To landfill & recycler	In LCA report
	Water & Energy	Town water	0.5litre	Grid power	0.00025 MJ
	Waste on site	Refrigerant loss	1%	Loss during install	0.5g
	Scrap collection & route	25t semi-trailer	25km	to landfill	Full back load
B1 Use	Fugitive emissions	Refrigerant	0.3%pa	Propane to air	2.9g
B2 Maintain	Maker's specification	Replace filter	Yearly	Charcoal filter	872g
B3 Repair	Maker's specification	Damaged PCB	6%/20y	Damages sensors	6%/20y
		Freight to site	As A5	Packaging	As A5
B4 Replace	Typical office practice	Replace Billi Unit	90%/20y	Transport & Pack	As A5
B6 Energy	Typical office practice	0.1kWh/l	1.08MWh	Use Vic NSW QLD	78GJ
B7 Water	Typical office practice	30 people 1.5l water/day 240 days	0.108Ml/y		0.22Ml
C1 Dismantle	Typical practice	Degas refrigerant	1%	losses	0.5g
C2 Transport	Relocate Billi	For reuse	10km	Private car	No back load
	To tip or recycle	21T tipper	20km	85% capacity	No back load
C3 Waste Treatment	Collection process	Clean and dust	19kg/Unit	25%/20y	19kg/Unit
C4 Dispose	Typical practice	metal & polymer	25%/20y	Metals & HDPE	7.4kg/Unit
D1 Reuse	Typical practice	Same as declared	65%/20y	Same & other	
D2 Recover	Typical practice	metal, refrigerant	25%/20y	metal, propane	2kg/Unit
D3 Recycle	Typical practice	metal & HDPE	25%/20y	Metal & HDPE	7.4kg/Unit

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}

Results for Module A1 to A5 Cradle to Site

Table 1 shows A1 Resource 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	-5.6	-2.4E-4	-4.1E-3
Climate Change luluc	5.8E-4	3.6E-7	1.5E-6
Climate Change fossil	173	0.54	2.1
Climate Change total	167	0.54	2.1
Stratospheric Ozone Depletion	5.0E-6	2.8E-12	2.9E-9
Photochemical Ozone Creation	0.83	4.6E-3	3.8E-3
Acidification Potential	0.29	4.2E-4	1.3E-3
Eutrophication Freshwater	7.8E-5	1.1E-8	2.0E-8
Eutrophication Marine	5.1E-2	7.3E-5	2.5E-4
Eutrophication Terrestrial	0.28	3.1E-4	9.6E-4
Mineral and Metal Depletion	0.20	2.6E-4	2.6E-4
Fossil Depletion	113	0.57	0.55
Water Scarcity Depletion	0.29	6.4E-5	2.1E-3
Net Fresh Water Use	1.8	3.9E-4	1.3E-2
Secondary Material	10	5.4E-4	0.20
Secondary Renewable Fuel	72	1.6E-3	8.2E-3
Primary Renewable Material	5.1	4.1E-2	2.7E-3
Primary Energy Renewable Not Feedstock	107	8.1E-2	0.41
Primary Energy Renewable Total	112	0.12	0.42
Secondary Non-renewable Fuel	6.4	1.2E-2	1.5E-2
Primary Energy Non-renewable Material	400	2.6	1.6
Primary Non-renewable Energy Not Feedstock	1667	5.0	8.5
Primary Energy Non-renewable Total	2067	7.7	10
Hazardous Waste Disposed	4.0	8.8E-4	2.5E-2
Non-hazardous Waste Disposed	9.3	7.8E-3	0.35
Radioactive Waste Disposed	3.9E-15	0	4.4E-17
Components For Reuse	0	0	0
Material For Recycling	3.3	8.4E-4	2.0
Material For Energy Recovery	8.2E-3	3.8E-6	3.1E-5
Exported Energy Electrical	0	0	0
Exported Energy Thermal	0	0	0

Results for 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	-2.3	-4.7E-3	-5.0	0	-102	-0.14
Climate Change luluc	0	4.4E-5	1.7E-6	5.3E-4	0	9.0E-2	8.7E-8
Climate Change fossil	5.8E-5	16	0.55	159	0	31157	121
Climate Change total	5.8E-5	14	0.55	154	0	31055	120
Stratospheric Ozone Depletion	0	6.2E-7	7.1E-9	4.5E-6	0	9.9E-10	1.4E-9
Photochemical Ozone Creation	8.6E-4	0.12	3.3E-3	0.75	0	155	0.92
Acidification Potential	0	6.9E-2	1.5E-3	0.26	0	72	0.36
Eutrophication Freshwater	0	4.0E-6	5.7E-7	7.0E-5	0	3.9E-6	7.7E-9
Eutrophication Marine	0	7.8E-3	2.1E-4	4.6E-2	0	14	6.4E-2
Eutrophication Terrestrial	0	2.9E-2	9.3E-4	0.25	0	121	0.21
Mineral and Metal Depletion	0	3.6E-2	1.3E-2	0.18	0	4.1E-4	6.0E-6
Fossil Depletion	0	16	0.32	102	0	16098	63
Water Scarcity Depletion	0	6.0E-2	4.5E-4	0.26	0	1.9	50
Net Fresh Water Use	0	0.37	2.8E-3	1.6	0	12	306
Secondary Material	0	227	3.4E-2	9.3	0	700	2.7
Secondary Renewable Fuel	0	-223	2.7E-2	65	0	919	0.19
Primary Renewable Material	0	0.88	3.1E-2	4.7	0	0.10	5.0E-4
Primary Energy Renewable Not Feedstock	0	12	0.34	96	0	1.1E4	4.6
Primary Energy Renewable Total	0	12	0.37	101	0	1.1E4	4.6
Secondary Non-renewable Fuel	0	3.5	8.1E-2	5.8	0	3.0E-2	4.3E-2
Primary Energy Non-renewable Material	0	157	1.8	364	0	2264	3.2
Primary Non-renewable Energy Not Feedstock	0	164	5.1	1512	0	300137	1266
Primary Energy Non-renewable Total	0	321	6.9	1877	0	302401	1269
Hazardous Waste Disposed	0	2.2E-2	5.2E-4	3.7	0	0.29	1.1E-3
Non-hazardous Waste Disposed	0	13	0.10	8.9	0	76	5.3
Radioactive Waste Disposed	0	1.1E-15	2.7E-18	3.6E-15	0	0	0
Components For Reuse	0	0	0	0	0	0	0
Material For Recycling	0	4.4	1.3E-2	6.6	0	507	0.41
Material For Energy Recovery	0	1.6E-4	6.9E-5	7.4E-3	0	9.2E-6	4.7E-8
Exported Energy Electrical	0	0	0	0	0	0	0
Exported Energy Thermal	0	0	0	0	0	0	0

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Billi Filtered boiling and Chilled Water Dispenser

Quadra

Results for Module C: End-of-life

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

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

Result	C1	C2	C3	C4
Climate Change biogenic	0	-1.1E-3	-3.2E-5	-8.2E-7
Climate Change luluc	0	1.7E-6	4.8E-8	1.2E-9
Climate Change fossil	1.0E-5	3.3	9.3E-3	1.2E-2
Climate Change total	1.0E-5	3.3	9.2E-2	1.2E-2
Stratospheric Ozone Depletion	0	2.1E-11	3.3E-16	1.9E-13
Photochemical Ozone Creation	1.5E-4	2.7E-2	3.6E-5	7.1E-5
Acidification Potential	0	2.3E-3	1.7E-5	8.8E-6
Eutrophication Freshwater	0	7.1E-8	1.9E-12	6.0E-4
Eutrophication Marine	0	4.2E-4	3.0E-6	1.8E-6
Eutrophication Terrestrial	0	1.7E-3	2.0E-5	4.6E-5
Mineral and Metal Depletion	0	9.7E-6	2.7E-11	7.6E-6
Fossil Depletion	0	3.3	4.4E-3	1.4E-2
Water Scarcity Depletion	0	4.0E-4	4.1E-7	2.5E-6
Net Fresh Water Use	0	2.5E-3	2.5E-6	1.5E-5
Secondary Material	0	2.6E-3	7.1E-5	3.0E-6
Secondary Renewable Fuel	0	7.5E-3	2.1E-4	7.2E-6
Primary Renewable Material	0	0.31	6.1E-9	2.6E-3
Primary Energy Renewable Not Feedstock	0	0.40	1.1E-2	4.4E-4
Primary Energy Renewable Total	0	0.71	1.1E-2	3.1E-3
Secondary Non-renewable Fuel	0	9.5E-2	1.8	8.0E-4
Primary Energy Non-renewable Material	0	18	1.2E-3	6.8E-2
Primary Non-renewable Energy Not Feedstock	0	29	7.8E-2	0.12
Primary Energy Non-renewable Total	0	47	7.9E-2	0.18
Hazardous Waste Disposed	0	4.7E-3	3.5E-7	0.48
Non-hazardous Waste Disposed	0	4.0E-2	2.1E-5	1.1
Radioactive Waste Disposed	0	0	0	2.5E-22
Components For Reuse	0	0	1.2E-2	0
Material For Recycling	0	4.2E-3	4.8	6.4E-6
Material For Energy Recovery	0	2.9E-5	5.6E-13	2.4E-7
Exported Energy Electrical	0	0	0	0
Exported Energy Thermal	0	0	0	0

Results for Module D: Beyond System Boundaries

Table 4 shows results for C1 demolish, C2 Transport C3 Waste Processing, C4 Disposal, D1 reuse, D2 recovery and D3 recycling.

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

Result	D1	D2	D3
Climate Change biogenic	9.2	2.2E-2	1.1E-2
Climate Change luluc	-9.7E-4	-1.0E-5	-1.0E-5
Climate Change fossil	-285	-9.4	-11
Climate Change total	-275	-9.4	-11
Stratospheric Ozone Depletion	-8.3E-6	-1.7E-7	-1.3E-8
Photochemical Ozone Creation	-1.4	-3.4E-2	-4.2E-2
Acidification Potential	-0.48	-1.2E-2	-1.2E-2
Eutrophication Freshwater	-1.3E-4	-1.5E-6	-9.2E-8
Eutrophication Marine	-8.4E-2	-2.2E-3	-2.1E-3
Eutrophication Terrestrial	-0.46	-8.3E-3	-7.8E-3
Mineral and Metal Depletion	-0.34	-1.4E-3	-9.2E-4
Fossil Depletion	-186	-5.0	-7.4
Water Scarcity Depletion	-0.48	-1.9E-2	-1.5E-2
Net Fresh Water Use	-3.0	-0.12	-9.2E-2
Secondary Material	-17	-0.73	-1.1
Secondary Renewable Fuel	-119	-7.1E-2	-5.4E-2
Primary Renewable Material	-8.5	-3.2E-3	-2.0E-2
Primary Energy Renewable Not Feedstock	-176	-3.3	-2.4
Primary Energy Renewable Total	-184	-3.3	-2.5
Secondary Non-renewable Fuel	-11	-0.13	-4.0E-2
Primary Energy Non-renewable Material	-661	-8.0	-6.6
Primary Non-renewable Energy Not Feedstock	-2750	-80	-126
Primary Energy Non-renewable Total	-3411	-88	-132
Hazardous Waste Disposed	-6.7	-0.89	-0.10
Non-hazardous Waste Disposed	-15	-1.0	-0.39
Radioactive Waste Disposed	-6.5E-15	-3.0E-16	-2.5E-16
Components For Reuse	0	0	0
Material For Recycling	-5.5	-9.3E-2	-0.20
Material For Energy Recovery	-1.4E-2	-2.3E-4	-4.9E-5
Exported Energy Electrical	0	0	0
Exported Energy Thermal	0	0	0

Results for Module A1 to A5 Results 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	-5.6	-2.4E-4	-4.1E-3
Climate Change luluc	6.0E-4	3.6E-7	1.5E-6
Climate Change fossil	179	0.55	2.1
Climate Change total	173	0.55	2.1
Stratospheric Ozone Depletion	5.2E-6	2.9E-12	2.9E-9
Photochemical Ozone Creation	0.85	4.7E-3	3.8E-3
Acidification Potential	0.30	4.3E-4	1.3E-3
Eutrophication Freshwater	7.4E-5	1.1E-8	2.0E-8
Eutrophication Marine	5.2E-2	7.5E-5	2.5E-4
Eutrophication Terrestrial	0.29	3.2E-4	9.6E-4
Mineral and Metal Depletion	0.20	2.7E-4	2.6E-4
Fossil Depletion	115	0.58	0.55
Water Scarcity Depletion	0.30	6.5E-5	2.1E-3
Net Fresh Water Use	1.9	4.0E-4	1.3E-2
Secondary Material	10	5.5E-4	0.20
Secondary Renewable Fuel	72	1.6E-3	8.2E-3
Primary Renewable Material	5.2	4.2E-2	2.7E-3
Primary Energy Renewable Not Feedstock	109	8.3E-2	0.41
Primary Energy Renewable Total	114	0.13	0.42
Secondary Non-renewable Fuel	6.0	1.3E-2	1.5E-2
Primary Energy Non-renewable Material	393	2.7	1.6
Primary Non-renewable Energy Not Feedstock	1713	5.2	8.5
Primary Energy Non-renewable Total	2106	7.9	10
Hazardous Waste Disposed	4.4	9.1E-4	2.5E-2
Non-hazardous Waste Disposed	11	8.0E-3	0.35
Radioactive Waste Disposed	4.1E-15	0	4.4E-17
Components For Reuse	0	0	0
Material For Recycling	3.9	8.6E-4	2.0
Material For Energy Recovery	8.0E-3	3.9E-6	3.1E-5
Exported Energy Electrical	0	0	0
Exported Energy Thermal	0	0	0

Results for Module B: Building Fabric and Operations

Table 6 shows 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

Results	B1	B2	B3	B4	B5	B6	B7
Climate Change biogenic	0	-2.3	-4.4E-3	-5.1	0	-102	-0.14
Climate Change luluc	0	4.4E-5	1.5E-6	5.4E-4	0	9.0E-2	8.7E-8
Climate Change fossil	5.8E-5	16	0.53	164	0	31157	121
Climate Change total	5.8E-5	14	0.52	159	0	31055	120
Stratospheric Ozone Depletion	0	6.2E-7	5.3E-9	4.7E-6	0	9.9E-10	1.4E-9
Photochemical Ozone Creation	8.6E-4	0.12	3.2E-3	0.77	0	155	0.92
Acidification Potential	0	6.9E-2	1.2E-3	0.27	0	72	0.36
Eutrophication Freshwater	0	4.0E-6	4.2E-7	6.7E-5	0	3.9E-6	7.7E-9
Eutrophication Marine	0	7.8E-3	2.0E-4	4.7E-2	0	14	6.4E-2
Eutrophication Terrestrial	0	2.9E-2	8.2E-4	0.26	0	121	0.21
Mineral and Metal Depletion	0	3.6E-2	1.4E-2	0.18	0	4.1E-4	6.0E-6
Fossil Depletion	0	16	0.31	105	0	16098	63
Water Scarcity Depletion	0	6.0E-2	7.1E-4	0.28	0	1.9	50
Net Fresh Water Use	0	0.37	4.4E-3	1.7	0	12	306
Secondary Material	0	227	4.7E-2	9.4	0	700	2.7
Secondary Renewable Fuel	0	-223	2.2E-2	65	0	919	0.19
Primary Renewable Material	0	0.88	3.7E-2	4.7	0	0.10	5.0E-4
Primary Energy Renewable Not Feedstock	0	12	0.31	98	0	11480	4.6
Primary Energy Renewable Total	0	12	0.35	103	0	11480	4.6
Secondary Non-renewable Fuel	0	3.5	5.8E-2	5.4	0	3.0E-2	4.3E-2
Primary Energy Non-renewable Material	0	157	1.6	357	0	2264	3.2
Primary Non-renewable Energy Not Feedstock	0	164	4.9	1554	0	300137	1266
Primary Energy Non-renewable Total	0	321	6.5	1912	0	302401	1269
Hazardous Waste Disposed	0	2.2E-2	6.7E-4	4.0	0	0.29	1.1E-3
Non-hazardous Waste Disposed	0	13	0.11	10	0	76	5.3
Radioactive Waste Disposed	0	1.1E-15	1.1E-17	3.7E-15	0	0	0
Components For Reuse	0	0	0	0	0	0	0
Material For Recycling	0	4.4	3.9E-2	7.1	0	507	0.41
Material For Energy Recovery	0	1.6E-4	6.5E-5	7.2E-3	0	9.2E-6	4.7E-8
Exported Energy Electrical	0	0	0	0	0	0	0
Exported Energy Thermal	0	0	0	0	0	0	0

Compliant to EN 15804+A2

Billi Filtered boiling and Chilled Water Dispenser

Quadra Plus

Results for End-of-life and Module C

Table 7 shows results for C1 demolish, C2 Transport C3 Waste Processing, C4 Disposal, D1 reuse, D2 recovery and D3 recycling.

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

Results	C1	C2	C3	C4
Climate Change biogenic	0	-1.1E-3	-3.3E-5	-8.1E-7
Climate Change luluc	0	1.7E-6	4.9E-8	1.1E-9
Climate Change fossil	1.0E-5	3.3	9.6E-3	1.1E-2
Climate Change total	1.0E-5	3.3	9.6E-2	1.1E-2
Stratospheric Ozone Depletion	0	2.1E-11	3.4E-16	1.9E-13
Photochemical Ozone Creation	1.5E-4	2.7E-2	3.8E-5	7.0E-5
Acidification Potential	0	2.3E-3	1.7E-5	8.6E-6
Eutrophication Freshwater	0	7.1E-8	2.0E-12	5.8E-4
Eutrophication Marine	0	4.2E-4	3.2E-6	1.7E-6
Eutrophication Terrestrial	0	1.7E-3	2.0E-5	4.5E-5
Mineral and Metal Depletion	0	9.7E-6	2.8E-11	7.4E-6
Fossil Depletion	0	3.3	4.5E-3	1.3E-2
Water Scarcity Depletion	0	4.0E-4	4.2E-7	2.4E-6
Net Fresh Water Use	0	2.5E-3	2.6E-6	1.5E-5
Secondary Material	0	2.6E-3	7.4E-5	3.0E-6
Secondary Renewable Fuel	0	7.5E-3	2.1E-4	7.1E-6
Primary Renewable Material	0	0.31	6.3E-9	2.6E-3
Primary Energy Renewable Not Feedstock	0	0.40	1.1E-2	4.2E-4
Primary Energy Renewable Total	0	0.71	1.1E-2	3.0E-3
Secondary Non-renewable Fuel	0	9.5E-2	1.9	7.8E-4
Primary Energy Non-renewable Material	0	18	1.2E-3	6.7E-2
Primary Non-renewable Energy Not Feedstock	0	29	8.1E-2	0.11
Primary Energy Non-renewable Total	0	47	8.2E-2	0.18
Hazardous Waste Disposed	0	4.7E-3	3.6E-7	0.51
Non-hazardous Waste Disposed	0	4.0E-2	2.1E-5	1.0
Radioactive Waste Disposed	0	0	0	2.5E-22
Components For Reuse	0	0	1.1E-2	0
Material For Recycling	0	4.2E-3	4.9	6.2E-6
Material For Energy Recovery	0	2.9E-5	5.8E-13	2.4E-7
Exported Energy Electrical	0	0	0	0
Exported Energy Thermal	0	0	0	0

Results for Module D: Beyond System Boundaries

Table 8 shows results for C1 demolish, C2 Transport C3 Waste Processing, C4 Disposal, D1 reuse, D2 recovery and D3 recycling.

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

Results	D1	D2	D3
Climate Change biogenic	9.3	2.5E-2	1.1E-2
Climate Change luluc	-9.8E-4	-1.3E-5	-1.1E-5
Climate Change fossil	-295	-11	-11
Climate Change total	-286	-11	-11
Stratospheric Ozone Depletion	-8.5E-6	-2.4E-7	-1.3E-8
Photochemical Ozone Creation	-1.4	-4.1E-2	-4.2E-2
Acidification Potential	-0.49	-1.4E-2	-1.2E-2
Eutrophication Freshwater	-1.2E-4	-1.5E-6	-9.1E-8
Eutrophication Marine	-8.6E-2	-2.6E-3	-2.1E-3
Eutrophication Terrestrial	-0.47	-1.0E-2	-7.9E-3
Mineral and Metal Depletion	-0.33	-1.6E-3	-9.3E-4
Fossil Depletion	-190	-5.9	-7.3
Water Scarcity Depletion	-0.50	-2.2E-2	-1.5E-2
Net Fresh Water Use	-3.1	-0.13	-9.3E-2
Secondary Material	-17	-0.73	-1.1
Secondary Renewable Fuel	-119	-9.1E-2	-5.5E-2
Primary Renewable Material	-8.5	-4.8E-3	-2.0E-2
Primary Energy Renewable Not Feedstock	-179	-4.0	-2.5
Primary Energy Renewable Total	-188	-4.0	-2.5
Secondary Non-renewable Fuel	-10	-0.13	-3.9E-2
Primary Energy Non-renewable Material	-648	-8.7	-6.6
Primary Non-renewable Energy Not Feedstock	-2.8E2	-94	-125
Primary Energy Non-renewable Total	-3.5E2	-103	-132
Hazardous Waste Disposed	-7.2	-0.99	-0.10
Non-hazardous Waste Disposed	-18	-1.3	-0.43
Radioactive Waste Disposed	-6.7E-15	-2.9E-16	-2.4E-16
Components For Reuse	0	0	0
Material For Recycling	-6.4	-0.12	-0.19
Material For Energy Recovery	-1.3E-2	-2.2E-4	-4.8E-5
Exported Energy Electrical	0	0	0
Exported Energy Thermal	0	0	0

Interpretation LCIA Cradle to Gate A1 to A3

The first interpretation section discusses results cradle to gate A1 to A3 for the components with a share over 3%. Figure 3 charts material component mass kg/functional unit. Figure 4 charts input of material (kg) versus GWP (kg)/ functional unit.

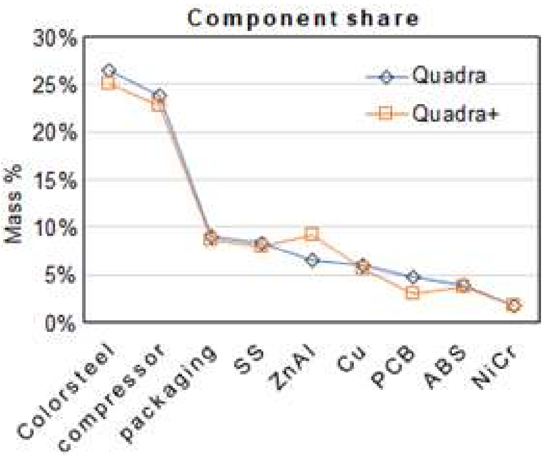

Figure 3 Component Share kg/functional unit

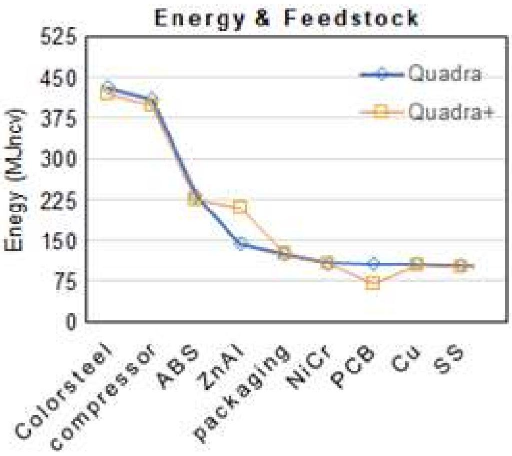

Figure 4 Component Vs CO_{2e} kg/ functional unit

These charts show the main components were Colorsteel (chassis and cover) and the compressor. Components other than these had low to very low mass share. Results show highest sensitivity to Colorsteel and the compressor, as well as to ABS panels and $ZnAl_4$ taps.

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

The next section discusses results cradle to fate A1 to C4 and beyond the system boundary to D1, D2 and D3. Figure 5 charts fossil and renewable energy use, fossil feedstock use and GWP per phase. Figure 6 charts acidification (AP), terrestrial eutrophication (EPT) and freshwater use (FW).

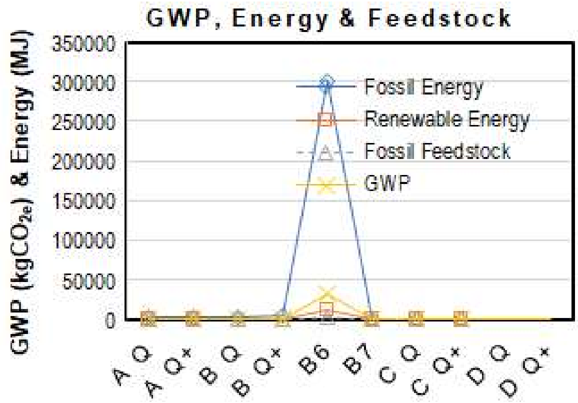

Figure 5 GWP A1 to D3/Declared Unit

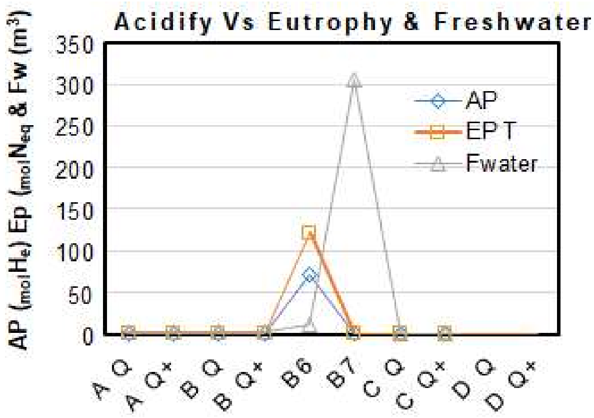

Figure 6 AP, EP & FW A1 to D3/Declared Unit

The chart shows peak emissions during use mostly from electricity use. Acidification and Eutrophication peak in use also because of electricity use, while fresh water peaks due to water use. Compared to the use phase other phases are insignificant.

Life Cycle Assessment Method

LCA Author	The Evah Institute as described at www.evah.com.au
Study Period	Factory data was collected from 2015 to 2018
Study Goal	The attributional LCA was undertaken for ecolabelling
LCA Method	Compliant with ISO 14040 and ISO 14044 Standards
LCIA method	EcoIndicator 99 Life Cycle Impact (LCIA) Assessment
Scope	Cradle to Fate including all supply chain phases and stages
The system	System boundaries are in accordance with EN 15804+A2 modular design
Phases	The LCA covered all known flows in all known stages cradle to end of life fate.
Assumptions	Use is to typical Australian Facility Management professional practice.
Scenarios	Use, cleaning, maintenance plus disposal and re-use were scenario-based using Facility Management Association denoted and published typical operations.
System Boundaries	The LCA covers all operations in the system boundary depicted in Figure 1.
Processes	All known processes are included from resource acquisition, water, fuel & energy use, power generation & distribution, freight, refining, intermediates, manufacture, scrap re-use, packing and dispatch, installation, use, maintenance and landfill. All significant waste and emission flows from all supply chain operations involved to make, pack and install the product are included.
Inclusions	Evah industry databases cover all known domestic and global scope 1 and 2 operations
Exclusions	They exclude scope 3 burdens from capital facilities, equipment churn, noise and dehydration as well as incidental activities and employee commuting
General LCA Report Information	Statement of A2:2019 used for the study and EPD Other independent LCI/LCA data verification is documented EPD states compliance with added EEE construction products demands
Power mix	Power Guarantee of Origin was documented for EPD verification

Primary Data Sources Representativeness and Quality

Primary data used for modelling the state of art of each operation includes all known process for:

- Technology sequences;
- Energy and water use;
- Landfill and effluent plus
- Reliance on raw and recycled material;
- High and reduced process emissions;
- Freight and distribution systems.

Electricity supply models in active databases are updated annually. Primary data is sourced from clients, Annual Reports and their publications on corporate locations, logistics, technology use, market share, management systems, standards and commitment to improved environmental performance.

Information on operations is also sourced from client:

- Supply chain mills, their technical manuals, corporate annual reports and sector experts, and
- Manufacturing specifications websites and factory site development license applications.

Background data Sources Representativeness and Quality

Background data is sourced from the IBISWorld, USGS Minerals, Franklin Associates, Plastics Europe, CML2, Simapro 9.5, EcoInvent 3.9 and NREL USLCI model databases.

Background Power and fuel supply models in active databases are updated annually with data sourced from each power supplier and power station as well as the International Energy Agency.

Information on operations is also sourced from:

- Library, document, NPI and web searches, review papers, building manuals and
- Global Industry Association and Government reports on Best Available Technology (BAT).

For benchmarking, comparison and integrity checks inventory data is developed to represent BAT, business as usual and worst practice options with operations covering industry sector supply and infrastructure in Australia and overseas.

Such technology, performance and license conditions were modelled and evaluated across mining, farming, forestry, freight, infrastructure and manufacturing and building industry sectors by Evah Institute Directors and Associates since 1995.

Quality Assurance

As each project is modelled and new data is available the databases are updated and audited by external Type 1 ecolabel certifiers.

The databases exist in top zones of commercial global inventory modelling and calculating engines and LCIA software including OpenLCA, Australian LCADesign™ as well as Simapro models up to V9.

Quality control methods are applied to ensure:

- Coverage of place in time with all information[2] for each dataset noted, checked and updated;
- Consistency to Evah guidelines[3] for all process technology, transport and energy demand;
- Completeness of modeling based on reports, literature and industry reviews;
- Plausibility in 2 way checks of LCI input and output flows of data checked for validity, plus
- Mathematical correctness of all calculations in mass and energy balance cross checks.

[2] Jones D G (2004) LCI Database for Commercial Building Report 2001-006-B-15 Icon.net, Australia
[3] Evah Tools, Databases and Methodology Queensland, Australia at http://www.evah.com.au/tools.html

Supply Chain Modelling Assumptions

Australian building sector rules and Evah Institute assumptions applied are defined in Table b.

Table b Scope Boundaries Assumptions and Metadata

Quality/Domain	National including Import and Export
Process Model	Typical industry practice with currently most common or best (BAT) technology
Resource flows	Regional data for resource mapping, fuels, energy, electricity and logistics
Temporal	Project data was collated from 2018 to 2019
GE0graphy	Designated client, site, regional, national, Pacific Rim then European jurisdiction
Representation	Designated client, their suppliers and energy supply chains back to the cradle
Consistency	Model all operations by known given operations with closest proximity
Technology	Pacific Rim Industry Supply Chain Technology typical of 2019 to 2022
Functional Unit	Typical product usage with cleaning & disposal/m^2 over the set year service life
System Control	
Primary Sources	Clients and suppliers' mills, publications, websites, specifications & manuals
Other Sources	IEA 2022, GGT 2022, Boustead 2013, Simapro 2016, IBIS 2022, EcoInvent 2018
Data mix	Power grid and renewable shares updated to latest IEA 2022reports
Operational	Company data for process performance, product share, waste and emissions
Logistics	Local data is used for power, fuel mix, water supply, logistics share & capacity
New Data Entry	VliegLCA, Evah Institute 2022; Global Green Tag Researchers 2022
Data Generator	Manufacturers, Evah Institute 2022; GGT 2022; Meta: IBIS 2022, Other pre-2022
Data Publisher	The Evah Institute to Global GreenTag and designated client only
Contributors	All people's contributors cited in Evah & Global GreenTag records or websites
Data Flow & Mix	
System Boundary	Earth's cradle of all resource & emission flows to end of use, fitout or build life
System flows	All known from and to air, land, water and community sources & sinks
Capital inclusions	Natural stocks∆, industry stockpiles∆, capital wear ∆, system losses and use
Arid Practice	Dry technology adopted; Water use is factored by 0.1 as for e.g. Mining
Transportation	Distance >20% than EU; >20% fuel efficient larger vehicles, load & distance
Industrial	Company or industry sector data for manufacturing and minerals involved
Mining	All raw material extraction is based on Australian or Pacific Rim technology
Imported fuel	Mix is from nearest sources is e.g. UAE, SE Asia, Canada or New Zealand
Finishes	Processing inputs with finishing burdens are factored in. If not, that is denoted
Validation	
Accuracy	10th generation study is ± 5 to 10% uncertain due to some background data
Completeness	All significant operations are tracked and documented from the cradle to grave
Precision	Tracking of >90% flows applies a 90:10 rule sequentially to 99.9% and beyond
Allocation	100% to co products on reaction stoichiometry by energetic or mass fraction
Burdens	All resource use from & emissions to community air land, water are included
Plausibility	Results are checked and benchmarked against BAT, BAU & worst practice
Sensitivity	Calculated U is reported & compared to libraries of Bath U RICE & EcoInvent 3.9
Validity Checks	Are made versus Plastics Europe, Ecobilan, GaBi & or Industry LCA Literature

References

[1] EN 15804:2012+A2:2019 Sustainability of construction works - Environmental product declarations - Core rules for the product category of construction products.
[2] GGTI PCR https://www.globalgreentag.com/get/files/1234xyz-sub-pcr-wcl.pdf
[3] GGTI PCR https://www.globalgreentag.com/get/files/5678xyz-sub-pcr-2023-fic.pdf
[4] ISO 14025:2010 Environmental labels and declarations – Type III – environmental declarations - Principles and procedures.
[5] ISO14044:2006 Environmental management – Life cycle assessment (LCA) – Requirements and guidelines.
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or contact:

certification1@globalgreentag.com

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