

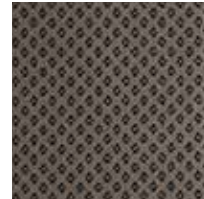
Serengeti.



Mabula



Mamba



Phinda



River Sand



Tembe



Wild Cheetah

Serengeti | River Sand

Serengeti is the perfect option for those projects requiring a touch of African flavour. The distinctive paw-print pattern evokes memories of Africa's unique natural heritage.

Product Information

Serengeti is a plush cut-pile carpet that is ideally suited to heavy-commercial use. The Stainproof SDX (Solution Dyed Nylon) fibres that make up a Serengeti carpet provide superior colour fastness and resistance to

stains and soiling. Serengeti carpets are extremely durable and easy to maintain. The Serengeti range is available in a variety of contemporary colourways that reflect the current décor trends.

BILL OF QUANTITIES:

- Belgotex SERENGETI 4m broadloom is manufactured from Stainproof SDX & Stainproof Eco SDX Blend (Solution Dyed Nylon).
- This product is to be laid in accordance with the SANS 10186 fitting code of practice.
- Belgotex recommends the use of carpet protector mats where castor wheels are used.

Extended Specifications



Construction	Tufted Patterned Cut Pile
Product Description	Heavy Commercial, SDN, Tufted Broadloom
Yarn Type	Stainproof SDX & Stainproof Eco SDX (Solution Dyed Nylon)
Yarn Mass	1200g/m ²
Recycled Content	Pile Yarn (Certain Colours Only)
Use Classification	Heavy Commercial
Pile Height	7mm (±0.5mm)
Total Thickness	9.5mm (±0.5mm)
Total Mass	±2365g/m ² **
Width	4m
Machine Gauge	1/10"
Pattern Repeat	±25mm x ±25mm (W x L)
Stitches/10cm	44
Fire Index	2 (SANS 10177-IV)
Colour fastness to:	
(i) Light	7 (ISO 105-B02)
(ii) Rubbing	(a) Wet 4-5 (ISO 105-X12)
Rubbing	(b) Dry 4-5 (ISO 105-X12)
(iii) Water	4-5 (ISO 105-E01)
Electrostatic Propensity	Less than 2.0kV (ISO 6356 & EN1307)
Static Control	Permanent
VOC Tested	Passed



Belgotex

20 Chesterfield Road, Pietermaritzburg, 3201, South Africa

This is to Certify that the following Product/s have been found in conformance with the Global GreenTag Scheme Standard for the Tier and Level noted herein:

SDX Tufted Broadloom Carpet [LCARate EcoPOINT 0.44], GBCSA Level A

GreenStar SA[®] 'Interiors v1' Credits:

MAT: Flooring, Credit IEQ-6: Reduced Exposure to Air Pollutants

WELL v1.0 Features - IWBI

Feature 04: VOC Reduction, Feature 11: Fundamental Material Safe Part 1c and 5b, Feature 25: Toxic Material Reduction Part 1 Perfluorinated Compound Limitation, Feature 26: Enhanced Material Safety, Feature 97: Material Transparency

WELL v2.0 Features - IWBI

X10: Volatile Compound Reduction, X11: Long-Term Emission Control, X13: Enhanced Material Precaution, X14: Material Transparency

Licensed Sites:

Pietermaritzburg, South Africa

Licence No.:

BEL-003-v1-2019

Licence Date:

28 August 2019

Latest Revision Date:

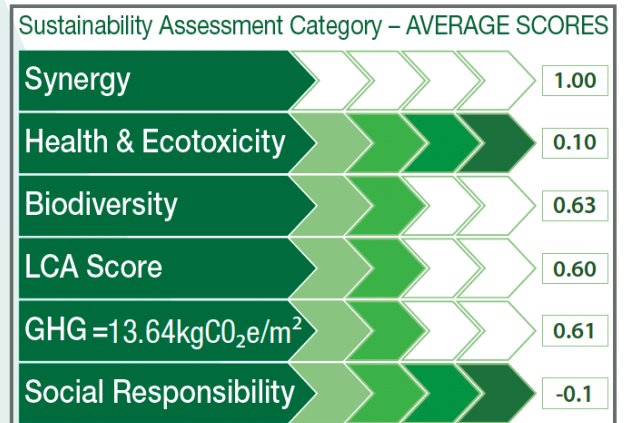
02 October 2019

Valid to:

28 August 2020

GreenTag Standard:

Standard Version 4.0



Range: -1.00 to +1.00. The smaller the number, the better!



www.globalgreentag.co.za

David Baggs
Chief Executive Officer
Global GreenTag[®] Program Director



Conditions of Licence

The conditions of licence are contained in full in the Ecospecifier Global GreenTag Standard, Terms and Conditions, and Rules for the Use of the Mark Documents as sighted and/or executed by the Licensee.

green product certification trust brands

In summary it is the responsibility of the licensee in particular to:

1. always comply with the relevant provisions of the GreenTag certification program;
2. make all necessary arrangements for the conduct of the future evaluation, including provision for examining documentation and access to all areas, records (including internal audit reports) and personnel for the purposes of evaluation (e.g. testing, inspection, assessment surveillance, reassessment) and resolution of complaints;
3. make claims regarding certification only in respect of the scope for which certification has been granted;
4. not use its product certification in such a manner as to bring the GreenTag into disrepute and not make any statement regarding its product certification which the certification body may consider misleading or unauthorized;
5. upon suspension or cancellation of certification, discontinue its use of all advertising matter that contains any reference thereto and returns any certification documents as required by GreenTag;
6. use certification only to indicate that products are certified as being in conformity with specified GreenTag standards;
7. endeavour to ensure that no certificate or report nor any part thereof is used in a misleading manner;
8. make comment or inclusions solely in accordance with license requirements in making reference to its product certification in communication media such as online, emails, documents, brochures or advertising;
9. Inform GreenTag of any change in the Certified product or manufacturing process that is likely to significantly affect the product's design or specification, or changes in the ownership, structure or management of the Licensee, if relevant, or any other information that indicates the product may no longer comply with the requirements of this Standard;
10. In the event of GreenTag determining changes have been made to product or supplier details and not notified to GreenTag, the Licensee will, on receipt of a GreenTag 'Notice to Rectify', immediately provide GreenTag with the required details and any fees necessary to allow recertification. Failure to do so may result in the withdrawal of the Licence. If the product Licence is withdrawn, the Licensee must, within 7 days, cease to further promulgate all product marketing, packaging, advertising or other material carrying the logo. Furthermore all material carrying the Certification Mark/s must be withdrawn within 90 days.

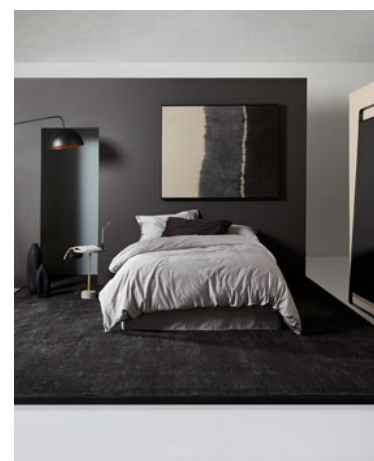
Revision date	Certificate number	Notes
28 August 2019	BEL-003-v1-2019	Products re-certified to GreenTag Standard v4.0



Belgotex SDX Tufted Broadloom Carpet

SDX Broadloom Commercial Carpet is a solution dyed Nylon Tufted Commercial Broadloom Carpet in an array of colors and designs.

Products/Ranges:	SDX Tufted Broadloom Carpet
Product Stages Assessed:	Manufacturing and in-use
CSI Masterformat:	096816
Licensed Site/s:	Pietermaritzburg, South Africa
Licence Number:	BEL-003-v1-2019
Licence Date:	28th August 2019
Valid To:	28th August 2020
Standard:	GGT International v4.0
Screening Date:	29th October 2019
PHD URL:	globalgreentag.com/xxxxxxx



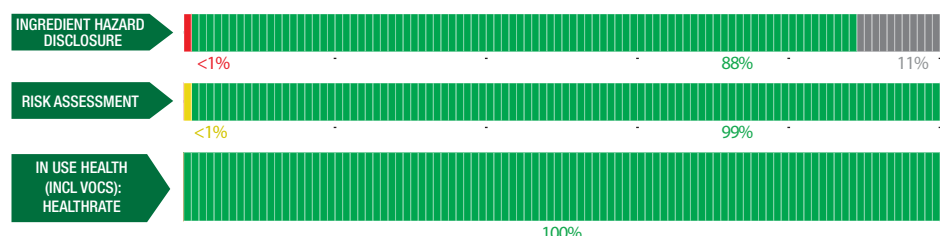
This PHD ceases currency when original GreenTag GreenRate/LCARate certification expires or is revoked. Please check www.globalgreentag.com for currency. [Note disclaimer over.](#)

PHD Summary Percentage Assessed: 100%	Inventory Threshold: 100ppm Product Level	Inventory Method: Nested Materials
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- GreenTag Banned List Compliant
- Meets WELL™ Building Standard: Feature 04 VOC Reduction Part 3: Flooring, X10 Volatile Compound Reduction
- Meets WELL™ Building Standard: Feature 11 Fundamental Material Safety Part 1c and 5b
- Meets WELL™ Building Standard: Feature 25: Toxic Material Reduction
- Meets WELL™ Building Standard: Feature 26 Part 1: Precautionary Material Selection, X13 Enhanced Material Precaution 1
- Meets WELL™ Building Standard: Feature 97: Material Transparency, Feature X14: Material Transparency Part 1
- No worker exposure to Mutagens, Reproductive Toxicant or Endocrine Disruptors
- No user exposure to Carcinogens, Mutagens, Reproductive Toxicant or Endocrine Disruptors
- No environmental exposure to Carcinogens, Mutagens, Reproductive Toxicant or Endocrine Disruptors

INGREDIENT HAZARD DISCLOSURE, RISK ASSESSMENT, & IN USE HEALTH, % by mass.

ASSESSMENT:



Declared by:
Global GreenTag
International Pty Ltd

David Baggs
CEO & Program Director
Verified compliant with:
ISO 14024 & ISO 17065

1.0 Scope

The Global GreenTag International (GGT) Product Health Declaration (PHD) has been designed to provide an additional level of service to the green product sector in facilitating an easier understanding of both the hazard and risk associated with any certified products and is intended to indicate:

- Chemical hazards of both finished product and unique ingredients to a minimum level of 100ppm for each homogeneous ingredient throughout the product life cycle, (including any VOC or other gaseous emissions);
- An assessment of exposure or risk associated with ingredient handling, product use, and disposal in relation to established mitigation and management processes;

It is not intended to assess:

- substances used or created during the manufacturing process unless they remain in the final product; or
- substances created after the product is delivered for end use (e.g., if the product unusually degrades, combusts or otherwise changes chemical composition).

GGT PHDs are only issued to products that have passed GGT Standards' certification requirements. The Level of Assessment (BronzeHEALTH, SilverHEALTH GoldHEALTH or PlatinumHEALTH) rating relates ONLY to GGT Standard Sustainability Assessment Criteria 3, and is declared separately to the overall Bronze, Silver Gold or Platinum Green Tag Certification Mark Tier Levels.

1.2 Preparing an PHD

GGT PHDs are prepared using Hazard Classifications from the UN Globally Harmonised System of Classification and Labelling of Chemicals (GHS) and as an outcome of a successful Application for Certification. Assessments are undertaken by GGT Qualified Exemplar Global Lead Auditors and subsequently accepted for Certification by the GGT Program Director (also a Qualified Exemplar Global Lead Auditor) under the GGT International Standard v4.0, Personal Products Standard v1.0, and Cleaning Products Standard v1.0 and above Program Rules.

1.3 External Peer Review

Every GGT PHD is independently peer reviewed by an external Consultant Toxicologist and Member of the Australian College of Toxicology & Risk Assessment.

2.0 Declaration of Ingredients

Where a manufacturer wishes recognition under a rating program that requires transparency of ingredients such as LEED v4.0, Living Building Challenge, Estidama etc., the following information is declared from audit:

Colour	Ingredient Name
Green	Ideal- Low No Comment required
Yellow	Medium to Low No Comment, or 'Issue of Concern' required depending on % of ingredient.
Orange	Moderate 'Issue of Concern' or 'Red Light' Comment depending on % of ingredient. Limit 10%
Red	Problematic (Red): Target for Phase 'Issue of Concern' or 'Red Light' Comment depending on % of ingredient. Strict Upper Limit of 1%
Grey	Uncategorised Not able to be categorised due to lack of toxicity impact information.
Black	Banned Ingredients POPs, SVHCs plus a wide range of compounds depending on specific Standard requirements

Global GreenTag International Pty Ltd (Global GreenTag) is not a medical professional organisation. Global GreenTag does not purport to provide medical advice, and makes no warranty, representation, or guarantee regarding the declaration that it provides in relation to any allergies, chemical sensitivities or any other medical condition, nor does Global GreenTag assume any liability whatsoever arising out of the application or use of any product or piece of equipment that has been chemically assessed by Global GreenTag.

The chemical assessments carried out provide transparent information peer reviewed by a consultant toxicologist regarding the chemical make-up and ingredients of certain materials and products, but such assessments are not to be taken as any form of medical assessment or health advice and are not targeted towards providing specific solutions to allergenic conditions or any other type of medical concerns.

Users must carry out their own investigations if they are concerned about specific medical conditions and the impact of certain products or ingredients in relation to specific medical concerns.

Global GreenTag takes no responsibility and is not liable in any way with respect to any medical or health issues arising from a person's use of materials or products that have been chemically assessed by Global GreenTag. Global GreenTag shall not be liable for any direct, indirect, punitive, incidental, special or consequential damages to property or life whatsoever, arising out of or connected with the use or misuse of any materials or products that have been assessed by Global GreenTag.

Ingredient Name	CAS Number OR Function	Proportion in finished product	GHS, IARC & Endocrine Category	Ingredient Assessment (Raw)	Whole Of Life Assessment	In Use Health Assessment	Comment
Material: Textile							
Nylon	25038-54-04	50-60%	IARC 3, Skin Irrit. 2, Eye Irrit. 2				The hazard of Skin Irrit. 2 and Eye Irrit. 2 relate to the polymer monomer, which is usually converted in the polymerisation process. It is possible that extremely small quantities of unreacted monomer may remain but as a Level 3 Hazard, users are highly unlikely to be exposed to even minor risk. Recycled Content: Pre-consumer Nanomaterials: Yes
Declaration	Additive	0-5%	None				Recycled Content: Unknown Nanomaterials: Unknown
Declaration	Finish	0-5%	None				Recycled Content: Unknown Nanomaterials: Unknown

Material: Primary Backing							
Polypropylene	9003-07-0	0-5%	IARC 3				Recycled Content: None Nanomaterials: Yes
Declaration	Additive	0-1%	None				Recycled Content: Unknown Nanomaterials: Unknown
Material: Secondary Backing							
Polypropylene	9003-07-0	0-5%	IARC 3				Recycled Content: None Nanomaterials: Yes
Declaration	Lubricant	0-1%	None				Recycled Content: Unknown Nanomaterials: Unknown
Polyethylene	9002-88-4	0-1%	IARC 3				Recycled Content: None Nanomaterials: Yes
Declaration	Stabiliser	0-1%	None				Recycled Content: Unknown Nanomaterials: Unknown
Declaration	Filler	0-1%	None				Recycled Content: Unknown Nanomaterials: Unknown
Declaration	Pigment	0-1%	None				Recycled Content: Unknown Nanomaterials: Unknown
Material: Precoat							
Declaration	Thickener	0-1%	None				Recycled Content: Unknown Nanomaterials: Unknown
Material: Latex							
Declaration	Additive	5-10%	IARC 3				Recycled Content: Unknown Nanomaterials: Unknown
Water	7732-18-5	5-10%	None				Recycled Content: None Nanomaterials: None
Calcium Carbonate	471-34-1	20-25%	None				Recycled Content: None Nanomaterials: None
Magnesium Carbonate	546-93-0	0-5%	None				Recycled Content: None Nanomaterials: None
Declaration	Filler	0-5%	None				Recycled Content: Unknown Nanomaterials: Unknown
Declaration	Dispersion	0-1%	None				Recycled Content: Unknown Nanomaterials: Unknown
Sulfuric acid, mono-C10-16-alkylesters, sodium salts	68585-47-7	0-1%	Acute Tox. 4, Skin Irrit. 2, eye Dam. 1				Sulfuric acid, mono-C10-16-alkylesters, sodium salts can be harmful when it directly contacts to skin and eyes, and it is harmful when it is swallowed. However, the ingredient is embedded in the product during the manufacturing process. The hazards will not be presented in the final product. Therefore it is not expected to be harmful to the end user. Recycled Content: None Nanomaterials: None
Declaration	Solution	0-1%	None				Recycled Content: Unknown Nanomaterials: Unknown
Water	7732-18-5	0-1%	None				Recycled Content: None Nanomaterials: None

Comments:

VOC emissions: Global GreenTag International Program Standard v4.0 Formaldehyde Content Supplementary Standard in accordance with requirements of the Green Building Council of Australia and LEED v4, as updated from time to time.

VOC content: TVOC mg/m2/hr for product applied on site is <500 µg/m2/hr measured using Test method ASTM D5116 "Standard Guide for Small-Scale Environmental Chamber Determinations of Organic Emissions from Indoor Material/Products". Sample tested in August 2009 at FORAY Laboratories - ISO 17025 Accredited. Test approved by CETEC.

This Environmental Product Declaration (EPD) discloses potential environmental outcomes compliant with ISO 14025 for business to business communication.

The declared SDX Tufted Miraclebac Broadloom Carpet was made by Belgotex in South Africa in 2017. In South Africa it is sold with a 15 year warranty for flooring application in commercial sectors.

Belgotex is a South African manufacturer serving a worldwide soft flooring export market.

They have a strong focus on innovation, quality, and environmental imperatives.

The company is ISO 14001 certified and monitors its energy and water use, waste flows and carbon emissions.

About 10% of their manufacturing energy needs are generated from renewable energy.

Their waste management applies Reduce, Reuse and Recycle hierarchy.

It continuously works to reduce water by recycling and their processes needing less water.

The company is committed to the recruitment and development of employees drawn from the communities surrounding its factories.

It has initiated a Learnership intake focused on African born females.

Belgotex is a certified Level 7 B-BBEEE contributor.

The company aims for good and fair labour practices and a safe working environment, and furthermore they are OHSAS 18001 certified.

Belgotex 100 000 m² manufacturing facility is 6 Green Star certified demonstrating world leadership for green buildings.

The <http://www.belgotex.co.za/> site offers more information.



Figure 1 SDX Tufted Miraclebac Carpet

Table of Contents

Heading	Page
1. Details of This Declaration.....	3
2. Product Characterisation	3
3. Verification of this Declaration	3
4. Base Material Origin and Detail.....	4
5. Packaging, Installation, Use & Disposal	4
6. Whole of life Performance	4
7. Life Cycle Inventory Results	5
8. Life Cycle Impact Potential Results	5
9. Supply Chain Modelling	6
10. Life Cycle Assessment Method	7
11. Data Sources Representativeness and Quality.....	8
12. Supply Chain Modelling Assumptions	9
13. References for this LCA & EPD.....	10
14. Reviewers Report Conclusions	11

Different program EPDs may not be comparable as e.g. South African transport may be different from elsewhere. **Further explanatory information is found at <http://www.globalgreentag.com/>** or contact: certification1@globalgreentag.com © This EPD remains the property of Global GreenTag Pty Ltd.

1. Details of This Declaration

Program Operator	GreenTag Global Pty Ltd hereafter called Global GreenTag noted at www.globalgreentag.com
EPD Number	BEL-003-2019
Date issue	05 July 2019
Validity	05 July 2022
Reference PCR	Compliant with PCR FC: 2017 Floor Coverings
Time	Made in and sold from 2017 for 20 years use
Geography	Made in South Africa. Uses are assumed as for South Africa.
Application	Function in Commercial buildings
Declared Unit	SDX Tufted Miraclebac Broadloom Carpet/m ² cradle to gate
Functional unit	SDX Tufted Miraclebac Broadloom Carpet kg/m ² flooring 20 year use cradle to fate

2. Product Characterisation

Definition	SDX Tufted Miraclebac Broadloom Carpet by Belgotex used for floor covering in commercial buildings
Standard	SANS 1375 Ed. 3.02 (2012) Textile Floor Covering: Pile Construction SANS 10177 Ed. 1.03 (2005) Part 4 Floor Covering Surface Fire Index (SFI) SANS 10361 Ed. 2 (2015) Textile Floor Coverings Appearance Retention (AR)

3. Verification of this Declaration

This EPD was approved on 5th July 2019 according to requirements of ISO14025 8.1.3b.

Role	Name	Position	Signature
PCR Review Chair	Murray Jones	Ecquate Pty Ltd CEO	 05-07-2019
LCA & EPD Review	Delwyn Jones	The Evah Institute	 05-07-2019
LCI, LCIA, LCARate & EPD Developer	Mathilde Vlieg	VliegLCA Consultant	 05-07-2019
Internal EPD Audit	David Baggs	Global GreenTag CEO & Program Director	 05-07-2019

4. Base Material Origin and Detail

Table 1 lists key components by sources, function, type, key operations and % mass amounts.

Table 1 Base Material

Function	Component	Production	Origin	%
SDN Yarn	Nylon 6 Resin	Drill, Refine, Polymerise, Dye, Spin	South Africa	>45<60
Filler	Limestone	Mine, Crush, Sieve, Haul	South Africa	>20<30
Binder	SBR Latex	Drill, Farm, Extract, Polymerise	Germany	>10<20
PP Yarn	Polypropylene	Drill, Refine, Polymerise, Dye, Spin	South Africa	>5<10
Thickener	Polyacrylate	Rill, Farm, Extract, Polymerise	South Africa	<0.5
Stabiliser	Sodium Alkyl Sulphate	Mine, Farm, Extract, Polymerise	Germany	<0.5
Pigments	Inks & Paste	Drill, Extract, Mill, Polymerise	South Africa	<0.5
	White Titania	Mine, Digest, Precipitate, Coat	South Africa	<0.5
	Carbon Black	Drill, Extract, Sieve, Mill, Blend	Germany	<0.5

5. Packaging, Installation, Use & Disposal

Packaging	Cardboard boxes & plastic wrap on reused pallets.
Service life	Commercial refits vary but 20 year life is assumed typical.
Health Safety & Environment	Apart from compliance to occupational and workplace health safety and environmental laws no additional personal protection is considered essential.
Residual Scrap	Mill off-cuts are reused. Installation scrap of 5% is assumed to recycling.
Maintenance & Cleaning	The recommended cleaning and maintenance raises no ecosystem or human health concerns. Care and maintenance guides are on company websites.
Scenario	Weekly vacuum cleaning, twice yearly deep steam cleaning.
Recycling	Home mill, fabrication and installation scrap is reworked into new product.
Re-use	This study assumes 60% product is serviceable for reuse over 40 more years.
Disposal	The fate is assumed recycled or donated. Incineration is rare in South Africa.

6. Whole of life Performance

Health Protection	The product does not contain levels of carcinogenic, toxic or hazardous substances that warrant ecological or human health concern cradle to grave. It passed the Ecospecifier Cautionary Assessment Process (ESCAP) and no issues or red light concerns existed for product human or ecological toxicity.
Effluent Waste	The LCI results and ESCAP raised no red light concerns in emissions to water ¹ . Cradle to grave waste to landfill was non-hazardous.
Environmental Protection	Continuous improvement under the maker's certified ISO14001 EMS aims to avoid toxics, waste and pollution plus reduce their material and energy use.
Environmental Health Effects	Installed products are certified as having VOC's compliant with Green Star [®] IEQ VOC credits for indoor environment ² quality credits. No other potential in-use impacts on environment or health are known.

¹ According with national standards in ANZECC Guideline For Fresh & Marine Water Quality (2000)

² in accordance with national standards and practice

7. Life Cycle Inventory Results

Table 2 lists material and energy resources use per functional unit. Figure 3 depicts the phases:

- Production including supply manufacture with transport cradle to gate then upstream;
- Construction with transport to site, installation and commissioning;
- Use and operation including maintenance, repair, replacement, refurbishment with transport, and
- End-of-life from deconstruction, demolition, reuse, recycling and disposal with transport.

Table 2 Cradle to Grave Inventory of Flows/ Functional Unit

Total Input use of	Unit	Result
Product Mass	kg	2.3
Embodied Water	kl	146
Fuel + Feedstock	MJ	235

8. Life Cycle Impact Potential Results

Table 3 shows Life Cycle Impact Assessment (LCIA) results for product use cradle to grave.

Table 3 Cradle to Grave Potential Impact Results/Functional Unit

Evaluation Category	Unit	Result
Global warming Potential	kg CO _{2e}	14.0
Ozone Depletion	kg R11 _e	3.1E-10
Acidification	kg SO _{2e}	0.32
Ecosystem Quality Damages	PDF*m ² *yr	6.4E-05
Human Health Damages	DALY	1.1E-03
Fossil Fuel Depletion	MJ _{surplus}	14.0
Mineral Resource	MJ _{surplus}	4.2E-03
EcoIndicator 99	ecopoint	0.82

9. Supply Chain Modelling

Processes to acquire, refine, transport, fabricate, coat, use, clean, repair, reuse and dispose of metal, masonry, ceramic, timber, glass, plastic and composites are modelled. A flow chart in Figure 2 shows key product supply chain operations from cradle to fate including those of:

- Mining, extracting and refining resources to make commodities and packaging;
- Acquiring, cultivating, harvesting, extracting, refining produce and biomass;
- Fuel production to supply power and process energy and freight;
- Chemicals use in processing resources, intermediates and ancillaries;
- Process energy, fuel and freight of resources, intermediates and ancillaries;
- Use, cleaning, recoating, repair, recycling, re-use and landfill, as well as
- Infrastructure process energy transformed and material wear loss e.g. tyres.

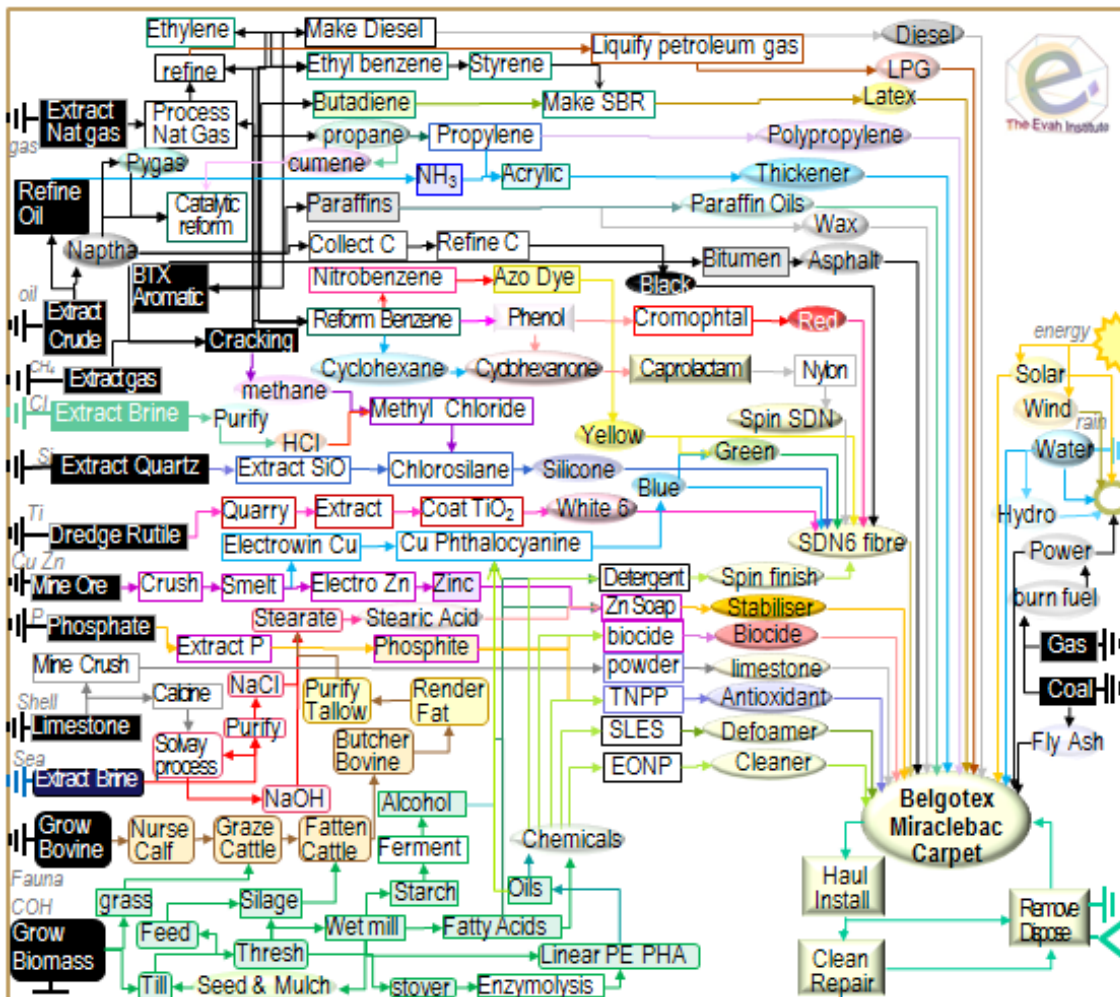


Figure 2 Major Product Operations

10. Life Cycle Assessment Method

LCA Author The Evah Institute as described at www.evah.com.au

Study Period Factory data was collected from 2017 to 2018

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 depicted in Figure 2.

Phases The LCA covered all known flows in all known stages cradle to end of life fate.

Assumptions Typical use is to 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 system boundary depicted in Figure 3 includes all operations A1-A3 production with upstream supply & transport; A4 package & deliver & A5 construct; B1 use with cleaning, B2 maintain, B3 repair³ B5 refurbish, C1 demolish, C2 transport and C4 disposal.

Processes All significant resource acquisition, water, fuel & energy use, power generation & distribution, freight, refining, intermediates, manufacture, scrap re-use, packing and dispatch, installation, use, maintenance, landfill waste and emission flows from all supply chain operations involved to make, pack and install the product are included.



	Actual		Scenarios					Potential													
	Produce			Construct		Building Fabric & Operation					End of life				Beyond Boundary						
	A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	C1	C2	C3	C4	D 1, 2, 3						
Unit Operations	Resource supply	Transport	Manufacturing	Transport	Construction	Use	Maintain	Repair	Replace	Refurbish	Demolish	Transport	Process	Waste	Disposal	Reuse	Recovery	Recycling			
						B6 Operating Energy use															
						B7 Operating Water use															
Cradle to Grave	Mandatory			Mandatory for each and every phase															Optional		
Cradle to Gate+options	Mandatory each phase			Optional for each and every phase															Optional		
Cradle to Gate	Mandatory each phase			Optional for each and every phase															Optional		

Figure 3 Phases and Stages Cradle to Grave

Evah industry databases cover all known domestic and global scope 1 and 2 operations. They exclude scope 3 burdens from capital facilities, equipment churn, noise and dehydration as well as incidental activities and employee commuting. The databases exist in top zones of commercial global modelling and calculating engines. Electricity supply models in active databases are updated annually. As each project is modelled and new data is available the databases are updated and audited by external Type 1 ecolabel certifiers. Quality control methods are applied to ensure:

- Coverage of place in time with all information⁴ for each dataset noted, checked and updated;
- Consistency to Evah guidelines⁵ for all process technology, transport and energy demand;
- Completeness of modeling based on in-house 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.

³ No activities are assumed to occur in B4, B6 or B7 or C4 waste processing.

⁴ Jones D G (2004) LCI Database for Commercial Building Report 2001-006-B-15 Icon.net, Australia

⁵ Evah Tools, Databases and Methodology Queensland, Australia at <http://www.evah.com.au/tools.html>

11. 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.

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 licensed applications.

Background data is sourced from the International Energy Agency, IBISWorld, USGS Minerals, Franklin Associates, Boustead 6, Plastics Europe, CML2, Simapro 8, EcoInvent 3 and NREL USLCI model databases. 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 since 1995.

As most sources do not provide estimates of accuracy, a pedigree matrix of uncertainty estimates to 95% confidence levels of geometric standard deviation² (σ_g) is used to define quality as in Table 4⁶.

Table 4 Data Quality Parameters and Uncertainty (U)

Correlation	Metric σ_g	U ±0.01	U ±0.05	U ±0.10	U ±0.20	U ±0.30
Reliability	Reporting	site audit	expert verify	region	sector	academic
	Sample	>66% trend	>25% trend	>10% batch	>5% batch	<1% batch
Completion	Including	>50%	>25%	>10%	>5%	<5%
	Cut-off	0.01%w/w	0.05%w/w	0.1%w/w	0.5%w/w	1%w/w
Temporal	Data Age	<3 years	≤5 years	<10 years	<15 years	>16 years
	Duration	>3 years	<3 years	<2 years	1 year	<1 year
Geography	Focus	process	line	plant	corporate	sector
	Range	continent	nation	plant	line	process
Technology	Typology	actual	comparable	in class	convention	in sector

No data set with >±30% uncertainty is used without notation in the LCA as well as the EPD.

⁶ Evah Institute data quality control system accords with UNEP SETAC Global LCI Database Quality 2010 Guidelines

12. Supply Chain Modelling Assumptions

Australian building sector rules and Evah assumptions applied are defined in Table 5.

Table 5 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 2017 to 2019
Geography	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 2017 to 2019
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 2019, GGT 2019, Boustead 2013, Simapro 2016, IBIS 2019, EcoInvent 2018
Data mix	Power grid and renewable shares updated to latest IEA 2019 reports
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 2018; Global Green Tag Researchers 2018
Data Generator	Manufacturers, Evah Institute 2019; GGT 2019; Meta: IBIS 2019, Other pre 2019
Data Publisher	The Evah Institute Pty Ltd to Global GreenTag and designated client only
Persons input	All 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	10 th generation study is ± 5 to 15% 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 3.2
Validity Checks	Are made versus Plastics Europe, Ecobilan, GaBi & or Industry LCA Literature

13. References for this LCA & EPD

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- ISO 15686-1:2011 Buildings & constructed assets Service life planning Part 1: General principles
- ISO 15686-2:2012 Buildings & constructed assets Service life (SL) planning Part 2: prediction
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14. Reviewers Report Conclusions

The independent LCA reviewer's report confirmed that the LCA project report and addition information addressed the EPD.

The verifier was not involved in developing the LCA or EPD and has no conflict of interests from their organisational position.

While the report is confidential its conclusions confirmed that documentation according to set ISO Standard requirements was provided including evidence from the:

The Evah Institute, the LCA developer:

- a) Recipes of input and output data of unit processes used for LCA calculations ✓
- b) Datasheets of measures, calculations, estimates and emails with sources as in Table 6 ✓
- e) References to literature and databases from which data was extracted as noted in Table 6 ✓
- g) Notes on supply chain processes and scenarios satisfying requirements of this Standard ✓
- i) Embodied Energy shares as used for sensitivity analyses re ISO 14044:2006, 4.5.3.3 ✓
- j) Proof percentages or figures in calculations in the end of life scenario ✓
- k) Notes on proof of % and allocation calculations ✓
- o) All operations covered Vs criteria and substantiation used to determine system boundaries ✓

Product Manufacturer in:

- c) Specifications used to create the manufacturer's product ✓
- d) Citations, references, specifications or regulations & data showing completeness ✓
- f) Specification demonstrating that the building product can fulfil the intended use ✓

The Certifier Global GreenTag on:

- l) Notes and calculation of averages of different locations yielding generic data ✓
- m) Substantiating additional environmental information ISO 14025:2006, 7.2.4 ✓
- n) Procedures for data collection, questionnaires, instructions, confidentiality deeds ✓

Requiring No Evidence:

As the EPD is cradle to grave as well as PCR compliant the independent reviewer did not need to:

- h) Substantiate a few stages as all stages were substantiated ✓
- p) Substantiate alternatives when no other choices and assumptions were applied ✓
- q) Demonstrate consistency for few stages as the same rules in Tables 5 and 6 applied to all. ✓

This Environmental Product Declaration (EPD) discloses potential environmental outcomes compliant with ISO 14025 for business to business communication.

Further and explanatory information is found at

<http://www.globalgreentag.com/>

or contact:

certification1@globalgreentag.com



Global GreenTag^{Cert™} EPD Program
Environmental Product Declaration
Compliant to ISO 14025

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