Environmental Product Declaration

Global GreenTag^{CertTM} EPD Program

Compliant to ISO 14025

Waste & Recycling eDiverter

This Environmental Product Declaration (EPD) discloses potential environmental outcomes compliant with ISO 14025 for business to business communication. The declared Waste & Recycling eDiverter product was made by Elephants Foot in Australia in 2015 for sale with a 12 months warranty for applications in residential sectors.

The Elephants Foot e-Diverter operates with a single garbage chute, manufactured in either galvanised steel or recycled LLDPE plastic.

Each building level has a disposal chute door electronically connected to an easy-to-operate LED control panel.

The resident selects a recycling or waste function to deposit the material into the correct chute.

This selection moves a mechanism guiding recyclable or waste into the correct collection bin.

Bins are located in the building's waste room typically near ground level.

All Elephants Foot chutes are noise insulated and fire rated to Australian standards.

Installation of a single use chute door for both a waste and recycling disposal provides building owners with significant savings in labour, energy and floor space.

The eDiverter increases recycling rates by promoting recycling and making it easier for residents to dispose of their recyclables.

Elephants Foot operates under Quality Management System Certified to ISO 9001 and a basic Environmental Management System in line with ISO 14001.

Their Product Stewardship in place is in line with the Product Stewardship Act 2011.

More information is available at http://www.elephantsfoot.com.au/

Figure 1 Waste & Recycling eDiverter

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Different program EPDs may not be comparable as e.g. Australian transport is more than elsewhere. **Further explanatory information is found at** http://www.globalgreentag.com/ or contact: certification1@globalgreentag.com

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1. Details of This Declaration

Program Operator	GreenTag Global Pty Ltd hereafter called Global GreenTag noted at www.globalgreentag.com
EPD Number	EFW-001-V3-2015
Date issue	29th March 2017
Validity	29th March 2020
Reference PCR	Compliant with PCR:SWD 2016
Time	Made in and sold from 2015 for 60 years use
Geography	Made in Australia. Uses are assumed as for Australasia.
Application	Residential high-rise buildings
Functional unit	60 year eDiverter use avoiding waste of floor space and recyclables cradle to fate

2. Product Characterisation

Definition	Waste & Recycling eDiverter by Elephants Foot used by 128 occupants of 8 storey high rise in 2 bedroom apartments 8 per floor
Space Saving	Equivalent floor space saved by not needing a room for recycling bins near each elevator on each floor was modelled pro rata from LCA of an 8 story 5 Green Star Green Building Council of Australia's (GBCA) residential tower in Australia.
Diverted from landfill	Improved recyclables recovery was modelled on the current types and rates reported for residential towers with separated chute collection for recycling in Australian State Capitals compared to towers a room for recycling bins near each elevator on each floor but no chute reported in state capitals in Australia.
Standard	AS 1530 Part 4 – 2005 "Methods for Fire Tests on Building Materials, Components and Structures". Part 4: "Fire-Resistance Tests of Elements of Construction".

3. Green Star® Certified Credits

Products are relevant to the Green Building Council of Australia's (GBCA) Green Star® scheme. If required this EPD is evidence the declared product meets the following Green Star® credits. It may be used as evidence in Green Star® submissions for those credits.

The product is certified by GBCA recognised Global GreenTag GreenRate to meet Green Star® credits internally including:

- Design and As Built V1: Sustainable Product
- Interiors V1.1: Sustainable Products
- Performance V1: Refurbishment Materials

GBCA Disclaimer

Green Star® is a registered mark of the Green Building Council of Australia (GBCA). Assessments shall not be reproduced in part at any time. Rating Tools and Technical Manuals are subject to change by the GBCA. This EPD provides Technical Opinion and as such is not endorsed by the GBCA or its agents. Green Star® Technical Manuals give technical details of credit requirements.

4. Sustainability Assessment Scores

Table 1 lists Global GreenTag Sustainability Assessment Criteria (SAC) scores prior to weighting and then used to determine the GreenTag EcoPOINT[1]. SAC scores are normalised against business as usual (BAU) product performing comparable functions under the same category rules. Lower scores show better environmental and social benefits with fewer impacts and damages. Considering sustainability:

- worst case BAU results = 1.0;
- neutral = 0.0 and
- net positive benefit = -1.0

Table 1 Normalised GreenTag EcoPOINT & SAC Scores

Category Potential	Results (-1 to +1)
Building Synergy	0.50
Health &	0.25
Biodiversity	0.54
LCA Score	-56.3
Greenhouse	-29.8
Social	0.50
GreenTag	-1.00

5. Type 1 Ecolabel

The declared product Type 1 Ecolabel achieved

Global GreenTag[CertTM]	GreenRate Level A LCARate Gold Streamlined*

*Note: Despite LCARate Platinum worthy long term benefits, under the Global GreenTag standard V3.2 a minimum Level 1 chemical with short term impact limits the award to Gold certification.

6. Verification of this Declaration

This EPD was approved on 29 March 2017 according to requirements of ISO14025 8.1.3b.

Role	Name	Position	Signature
PCR Review Chair	Murray Jones	Ecquate Pty Ltd CEO	29-03-2017
LCI Developer	Mathilde Vlieg	Vlieg LCA	16-5-2017
LCIA Analyst	Dr. Judy Luo	Global GreenTag Researcher	12th April 2017
LCA Review	Delwyn Jones	Evah Institute CEO & Director	29/03/2017
EPD Developer	Mathilde Vlieg	Vlieg LCA	16-5-2017
3rd Party LCI Verifier	Shloka Ashar	Global GreenTag Lead Auditor	
Internal EPD Audit	David Baggs	Global GreenTag Program Director	

[1] http://www.ecospecifier.com.au/knowledge-green/glossary.aspx#greentagecopoint

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7. Packaging, Installation, Use & Disposal

Packaging	Cardboard cartons, plastic wrap & strapping for hopper door only.
Service life	Residential refits vary but 60 year life is assumed typical.
Operations	Power use for the extractor fan and testing the fire extinguishers is assumed.
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 not reused. No installation scrap was assumed.
Cleaning & Maintenance	The recommended cleaning and maintenance raises no ecosystem or human health concerns. Care and maintenance will be done by professionals.
Scenario	Daily water spray, continuous ventilation, weekly municipal waste truck.
Recycling	Home mill, fabrication and installation scrap is reworked into new product.
Re-use	The product is not assumed to be reused, but stays in building during lifetime.
Disposal	It assumes 100% recycled. Incineration is rare in Australia so none is modelled.

8. 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	The LCI results and ESCAP raised no red light concerns in emissions to water[2].
Waste	Cradle to grave waste to landfill was 100% non-hazardous.
Environmental Protection	Continuous improvement under the maker's basic EMS aims to avoid toxics, waste and pollution plus reduce their material and energy use.
Environmental Health Effects	No potential in-use impacts on environment or health are known.

9. Base Material Origin and Detail

Table 2 lists key components by function, type, key operation, source and mass share.

Table 2 Base Material

Function	Component	Production	Origin	Amount %
Chute	Galv Steel	Mine, Smelt, Refine, Roll, Coat	Australia	>70 <80
Wiring	Copper/PVC	Mine/Recycle, Smelt, Refine, Form	Australia	>7 <10
Insulation	Rockwool	Mine, Refine, Fuse, Spin, Weave	Australia	>5 <7
Hinge/Handle	Stainless Steel	Recycle, Melt, Form, Finish	Australia	>2 <5
Shock Buffer	ABS[3]	Drill, Refine, Polymerise, Form	Australia	>2 <5
Wiring	Copper	Mine/Recycle, Smelt, Refine, Form	Australia	>0.5 <1
Fire Wall	Plasterboard	Mine, Crush, Sieve	Australia	>0.5 <1
Piping	Brass	Recycle, Electrolysis, Reform	Australia	>0.1 <0.5
Electronics	Circuit Board	Mine, Smelt, Refine, Form	Australia	<0.10
Screws	Electrical Steel	Mine, Smelt, Refine, Roll, Coat	Australia	<0.01
Fusible Link	Glass	Mine, Refine, Form	Australia	<0.01

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

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10. Life Cycle Inventory Results

Life Cycle Inventory results for 60 years E-Diverter use include avoided waste of 1.4Mt of recyclables collected for reuse plus landfill freight and emissions over the E-Diverter's 60 year service life. Also included is the 14.6m^2 recycling bin storage room floor space on every level in 8 storey buildings. Typical fossil, recycled and renewable content was used for all components of the E-Diverter and recyclables recovered from the waste stream.

Table 3 shows lists resource use per functional unit, with transport as defined in Figure 2, across four phases:

- cradle to gate including supply, E-Diverter manufacture and recyclables recovered from waste;
- design and construction from delivery to site and installation
- operation including maintenance, repair, replacement and refurbishment plus
- end-of-life from deconstruction, reuse, demolition, recycling and disposal

Table 3 Inventory of E-Diverter Energy Use Burden Versus Gains from Avoided Waste

Total Input use of	Unit	Burden of E-Diverter	Gains from Avoiding Wasted		
			Recyclables	Space	Gross
Fossil Fuels[4]	GJ	643	67712	101	67,170
Nuclear Energy	GJ	1.8	294	2.1	295
Hydrogen Energy	GJ	0.0	33	0.1	33
Recovered Energy	GJ	-0.3	-202	-0.2	-202
Hydro Energy	GJ	18	667	1.4	650
Biomass Energy	GJ	2.1	24197	8.3	24,203
Renewable Energy	GJ	1.9	153	0.2	151
Recoverable Feedstock[5]	GJ	20	29597	14	29,591
Energy less feedstock	GJ	647	63257	99	62,709
Recovered Fuel + Feedstock	GJ	667	92854	113	92,299

11. Life Cycle Impact Results

Table 4 shows Life Cycle Impact Assessment (LCA) EcoIndicator 99 results for E-Diverter service.

Table 4 Potential Impact Results in E-Diverter Use Versus Avoided Impacts and Waste

Evaluation Category	Unit	Impact of E-Diverter	Avoided Impacts and Waste		
			Recyclables	Space	Gross
Product mass	t/item	0.82	1,400		1,399
EcoIndicator 99	ecopoint	3,448	306,582	497	303,631
Carbon Dioxide	$tCO_{2e\ 100}$[6]	66.4	3,811	8.8	3,753
Ecosystem Quality	PDF*m^2*y	0.4	35	0.06	35
Human Health Damages	DALY	6.8	457	0.9	451
Ozone Depletion	kg $R11_e$	<0.01	0.014	<0.01	0.014
Resource Depletion	$MJ_{surplus}$	6.0	760	1.0	756
Fossil Fuel Depletion	$GJ_{surplus}$	33.7	4,125	5.9	4,097
Water Use Embodied	kl	55	64,877	75	64,897
Mineral Resource	$MJ_{surplus}$	1,775	401,197	482	399,905

[4] Peat, Lignite, Coal, Gas, Oil, Sulphur, Hydrogen and Unspecified sources
[5] Available for recovery in the end of life
[6] Where e= equivalent as in Stocker et al (eds.) Climate Change 2013: The Physical Science Basis, CH8, IPCC AR5, Cambridge U Press, UK.

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12. Potential Life Cycle Benefit Results

As well as reducing loads on its finite carrying capacity a sustainable world needs inhabitants to apply operations that benefit and grow natural capital and repair the earth's finite carrying capacity.

Many tools for measuring unsustainable development include Life Cycle Assessment (LCA), the International Standards Organisation Environmental Management System method designed to reduce industrial pollution and resource depletion. These are negative burdens rather than positive benefits.

LCA has no methodology for analysis or assessment of systems' ecopositive outcomes such as capacity for oxygen generation, fresh and ground water sorption, ecosystem and species richness and habitat recovery.

Instead LCA may consider oxygen depletion, water consumption, ecosystem depletion and habitat loss. Counting that moves away from loss to gain is outside the current scope of LCA because it lacks the reach to assess moves beyond zero into and across positive domains.

The Evah 2020 ecopositive LCA methodology[7] was developed to extend the reach of negative Life Cycle Impact Assessment (LCIA) by adding Life Cycle Benefit Assessment of gains beyond zero loss. This offers reaches beyond nothing lost or gained to count positive benefits of viability of supply, years of hale human health and regeneration of ecosystem quality.

Practitioners can go beyond LCA that ends at no net gain to objectively measure ecopositive outcomes however tiny or large.

Table 5 shows Life Cycle Benefit Assessment (LCBA) results in product manufacture and 60 years product use cradle to cradle (C_2C) as depicted in Figures 2 and 3 overleaf.

Table 5 Potential Gross Benefit Results

Evah 2020 Benefits	Outcomes Security for	Units	E-Diverter	Waste Avoided		Gross Benefit
				Recyclable	Space	
Outcomes	Positive Score	Points	3,448	306,582	497	303,631
Supply Energy & Resource Viability (SERV*MJ)	Energy Recovery	GJ surplus	667	93530	110	92,974
	Water Recovery	Ml Reuse	55	64877	76	64,899
	Fuel Recovery	GJ surplus	337	4125	5.9	4,097
	Mineral Recovery	GJ surplus	1.8	401	0.49	400
	Resource Recovery	MJsurplus	6.0	760	1.0	755
Hale Human Health Adjusted Life Years (HALY*)	Human Wellness	HALY	6.8	457	0.9	451
	Dust Avoidance	kg PM_{10}	0.09	6.28	0.02	6
	Healthy Airshed	g $1,4DB_e$	0.01	7	0.011	10
	Organic Safe Air	g NM VOC	0.03	7.8	0.02	10
	Ozone Layer Repair	g $R11_e$	0.01	14	0.011	10
Positive Ecosystem Replenishment Fraction (PERF*)	Climate Brake CO_{2e}	kt CO_{2e100}	0.07	3.8	0.01	3.8
	Water Clarification	T $PO_{4\,e}$	2.0	159	0.3	157
	Ecotoxicity Avoided	t $1,4DB_e$	0.15	21	0.03	21
	Ecosystem Recovery	PRF*m^2*yr	0.43	35.0	0.06	35
	Habitat Recovery	PRF*m^2*yr	0.01	0.77	0.001	0.8

[7] As described at http://www.evah.com.au/elcap.html. Evah2020 extends e.g. Traci, EI99 and ReCiPe algorithms >0.0

13. 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. These include 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, reuse and landfill, as well as
- Infrastructure process energy transformed and material wear loss e.g. tyres.

A flow chart in Figure 2 shows key product supply chain operations from cradle to fate. While all known operations are included not all are shown.

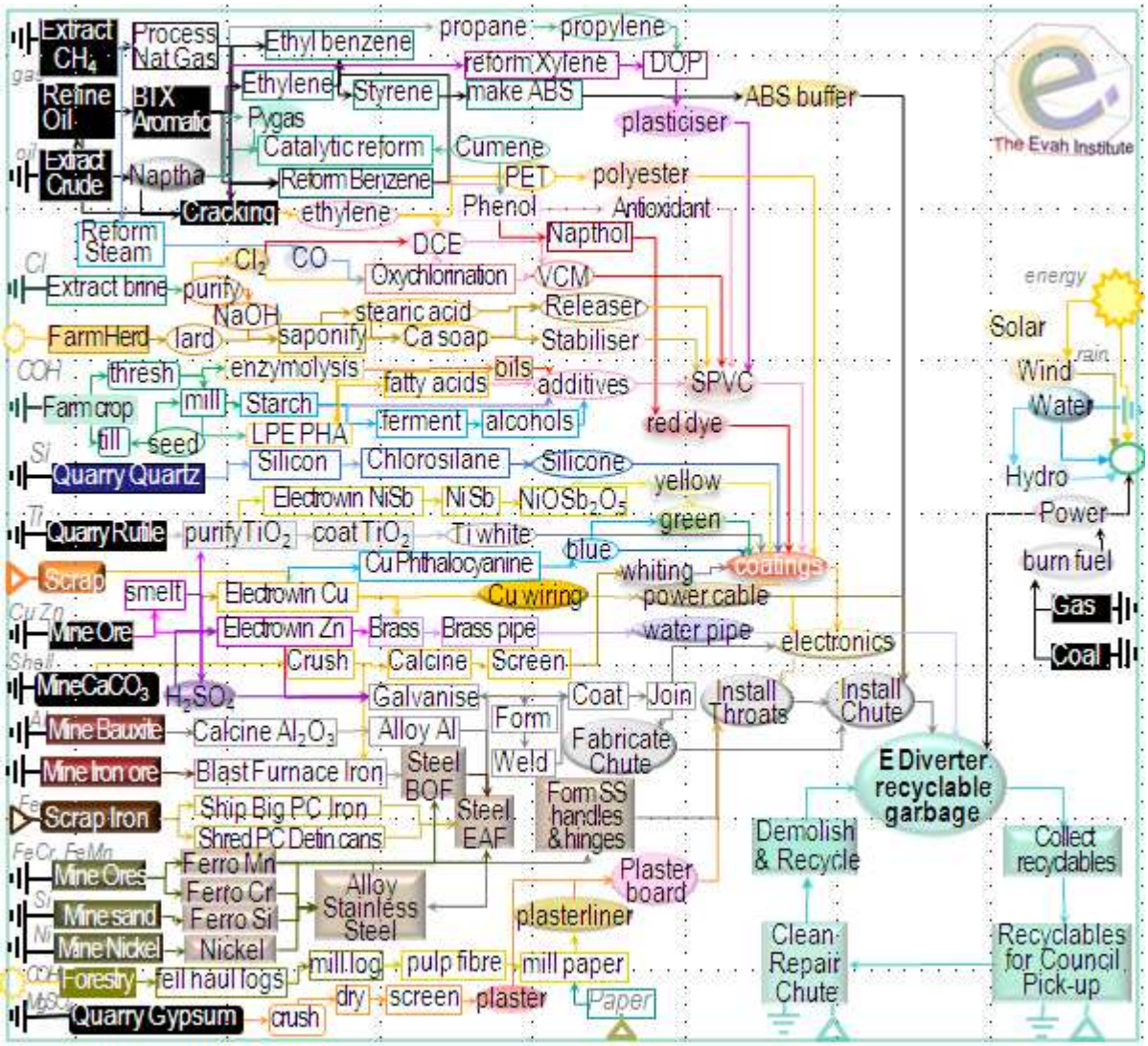

Figure 2 Major Product Operations

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14. Life Cycle Assessment Method

LCA Author	The Evah Institute as described at www.evah.com.au
Study Period	Factory data was collected from 2012 to 2014
LCA Method	Compliant with ISO 14040 and ISO 14044 Standards
LCIA method	EcoIndicator 99 Life Cycle Impact (LCIA) Assessment
LCBA method	Evah 2020 Life Cycle Benefit Assessment[8]
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	Use is to typical Australian Facility Management professional practice.
Scenarios	Use, cleaning, maintenance plus disposal and reuse were scenario based using Facility Management Association denoted and published typical operations.
System Processes	The LCA covers all operations in the system boundary depicted in Figure 3. All known processes are included from resource acquisition, water, fuel & energy use, power generation & distribution, freight, refining, intermediates, manufacture, scrap reuse, packing and dispatch, installation, use, maintenance and landfill. All significant flows from all supply chain operations involved are included.
Inclusions & Exclusions	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.
Quality Control	The databases exist in top zones of commercial global modelling and calculating engines. Quality control methods are applied to ensure: • Coverage of place in time with all information[9] per dataset checked and updated; • Consistency to Evah guidelines[10] for all process technology, transport and energy; • Completeness of modelling based on literature and industry reviews; • Plausibility in 2 way checks of LCI in output flows of data checked for validity, plus • Mathematical correctness of calculations in mass & energy balance cross checks. New project data compiled in active databases is audited by external Type 1 product certifiers. Global and local fuel and power supply is updated annually.

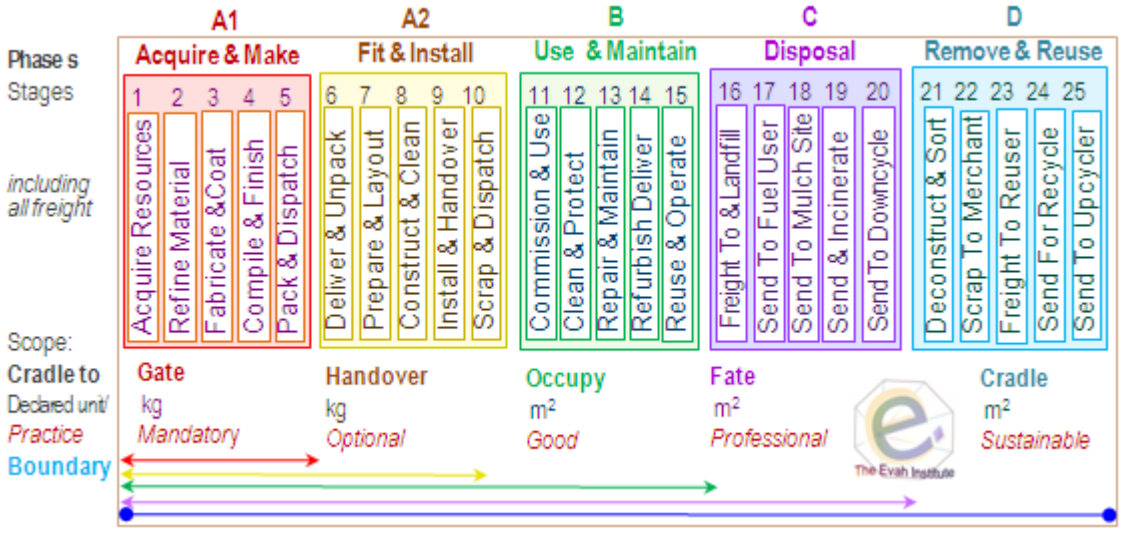

Figure 3 Phases and Stages Cradle to Grave

[8] As described at http://www.evah.com.au/elcap.html. Evah2020 extends Traci, EI99 and ReCiPe algorithms >0.0
[9] Jones D G (2004) LCI Database for Commercial Building Report 2001-006-B-15 Icon.net, Australia
[10] Evah Tools, Databases and Methodology Queensland, Australia at http://www.evah.com.au/tools.html

15. 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 license 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 Deviation[2] (σ_g) is used to define quality as in Table 6[11]. No data set with >±30% uncertainty is used without notation in the LCA as well as the EPD.

Table 6 Data Quality Uncertainty (U) for 2016

Metric σ_g	U ±0.01	U ±0.05	U ±0.10	U ±0.20	U ±0.30
Temporal	Post 2015	Post 2010	Post 2005	Post 2000	Pre 2000
Duration	>3yr	3yr	2yr	1yr	<1yr
Data Source	Process	Line	Plant	Corporate	Sector
Technology	Actual	Comparable	Within Class	Conventional	Within Sector
Reliability on	Site Audit	Expert verify	Region Report	Sector Report	Academic
Precision to	Process	Line	Plant	Company	Industry
Geography	Process	Line	Plant	Nation	Continent
True of the	Process	Mill	Company	Group	Industry
Sites cover of	>50%	>25%	>10%	>5%	<5%
Sample size	>66% trend	>25% trend	>10% batch	>5% batch	Academic
Cutoff mass	0.01%	0.05%	0.1%	0.5%	1%
Consistent to	±0.01	<±0.05	<±0.10	<±0.20	<±0.30
Reproducible	>98% confidence	>95%	>90%	>80%	<70%
Certainty	Very High	High	Typical	Poor	>±0.30 unused

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

16. Supply Chain Modelling Assumptions

For BAT, business as usual and worst practice operations in Australia and overseas industry sector rules and Evah assumptions applied are defined in Table 7.

Table 7 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 2014 to 2016
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 2014 to 2016
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 2016, GGT 2016, Boustead 2013, Simapro 2016, IBIS 2016, EcoInvent 2016
Data mix	Power grid and renewable shares updated to latest IEA 2016 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 2016; Global Green Tag Researchers 2016
Data Generator	Manufacturers, Evah Institute 2016; GGT 2016; Meta: IBIS 2016, Other pre 2016
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 stocksΔ, industry stockpilesΔ, capital wear Δ, system losses and use
Arid Practice	Dry technology adopted, Water use is factored by 0.1 as for e.g. Mining
Australian Freight	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

17. References for this LCA & EPD

Australian & New Zealand (ANZECC) Guidelines For Fresh & Marine Water Quality (2000) http://www.environment.gov.au/water/quality/nationalwaterqualitymanagementstrategy

Basel Convention (2011) Control of Transboundary Movement of Hazardous Waste & Disposal http://www.basel.int/portals/4/basel%20convention/docs/text/baselconventiontexte.pdf

Boustead (2014) Model 6 LCI database http://www.bousteadconsulting.co.uk/publicat.htm USA & UK

EcoInvent (2016) LCI Model 3 database http://www.ecoinvent.ch/ EcoInvent, Switzerland

Evah (2016) LCA Tools, Databases & Methodology at http://www.evah.com.au/tools.html

Franklin Associates (2016) US LCI Database http://www.fal.com/index.html Eastern Research Group US

GreenTag™ Certification (2016) http://www2.ecospecifier.org/services_offered/greentag_certification

GreenTag™ (2016) Product Category Rules http://www.globalgreentag.com/greentagepdprogram

Jones D., Mitchell. P. & Watson P. (2004) LCI Database for Australian Commercial Building Material: Report 2001006B15, Sustainable Built Assets, CRC for Construction Innovation

Jones D.G et al. (2009) Chapter 3: Material Environmental LCA in Newton P et al., (eds) Technology, Design & Process Innovation in the Built Environment, Taylor & Francis, UK

IBISWorld (2014) Market Research, http://www.ibisworld.com.au/ IBISWorld Australia

International Energy Agency (2016) Energy Statistics http://www.iea.org/countries/membercountries/

ISO 9001:2008 Quality Management Systems Requirements

ISO 14001:2004 Environmental management systems: Requirements with guidance for use

ISO 14004:2004 EMS: General guidelines on principles, systems & support techniques

ISO 14015:2001 EMS: Environmental assessment of sites & organizations (EASO)

ISO 14020:2000 Environmental labels & declarations — General principles

ISO 14024:2009 Environmental labels & declarations Type I Principles & procedures

ISO 14025:2006 Environmental labelling & declarations Type III EPDs Principles & procedures

ISO 14031:1999 EM: Environmental performance evaluation: Guidelines

ISO 14040:2006 EM: Life cycle assessment (LCA): Principles & framework

ISO 14044:2006 EM: LCA: Requirement & guideline for data review: LCI; LCIA, Interpretation results

ISO 14064:2006 EM: Greenhouse Gases: Organisation & Project reporting, Validation & verification

ISO 15392:2008 Sustainability in building construction General principles

ISO 156861:2011 Buildings & constructed assets Service life planning Part 1: General principles

ISO 156862:2012 Buildings & constructed assets Service life (SL) planning Part 2: prediction

ISO 156868:2008 Buildings & constructed assets SL planning Part 8: Reference & estimation

ISO 219291:2011 Sustainability in building construction Sustainability indicators Part 1: Framework

ISO 21930:2007 Building construction: Sustainability, Environmental declaration of building products

ISO/TS 219311:2010 Sustainability in building construction: Framework for assessment, Part 1:

ISO 21932:2013 Sustainability in buildings and civil engineering works A review of terminology

Plastics Europe (2016) Portal http://www.plasticseurope.org/plasticssustainability/ecoprofiles.aspx

Pre (2016) SimaPro 8 Software, The Netherlands http://www.presustainability.com/simapromanuals

Myhre et al, 2013, Anthropogenic and Natural Radiative Forcing Chapter 8 in Stocker et al (eds.) Climate Change 2013, AR5 of the IPCC, Cambridge U Press UK. http://www.ipcc.ch/report/ar5/wg1/

Roache S. K. (2012) IMF Report WP/12/115 China's Impact on World Commodity Markets http://www.imf.org/external/pubs/ft/wp/2012/wp12115.pdf International Monetary Fund

UNEP (2016) Persistent Organic Pollutants http://www.chem.unep.ch/pops/ The UN

USLCI (2016) LifeCycle Inventory Database https://www.lcacommons.gov/nrel/search, USA

U.S. Geological Survey National Minerals (2016) http://minerals.usgs.gov/minerals/pubs/country/ USA

US EPA (2016) Database of Sources of Environmental Releases of Dioxin like Compounds in U.S http://cfpub.epa.gov/ncea/cfm/recordisplay.cfm?deid=20797 p 138, 69, USA

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Appendix 1. 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 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. √

Waste & Recycling eDiverter

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 GreenTagCertTM EPD Program

Environmental Product Declaration

Compliant to ISO 14025