Environmental Product Declaration

Global GreenTag^{CertTM} EPD Program

Compliant to ISO 14025

Porcelanosa Floor Tiles®

This Environmental Product Declaration (EPD) discloses potential environmental outcomes compliant with ISO 14025 for business to business communication. The declared product Porcelanosa Floor Tiles was made by Porcelanosa in Spain in 2015 for sale with a 10 year warranty for applications in commercial and residential sectors.

Earp Bros Tiles, a distributor of premium ceramic tiles in Australasia, is committed to decreasing their environmental impact.

Their testing ensures materials are used to their potential, along with accelerated wear assessment.

Slip resistance is a key focus for improving occupational health and safety.

Earp Bros support the low impact life cycle of tiles in building projects.

They facilitate recycling of tile scrap re-use in road base and have relocated their warehousing to use rail not road.

Earp Bros imports products from companies committed to international practice in sustainable manufacturing sources such as Porcelanosa Group.

Porcelanosa is committed to quality, innovation and the environment with strict testing and quality controls.

Their manufacturing is certified to ISO 14001 in Environmental Management and ISO 9001 in Quality Management.

Heat from natural gas fired kilns is used in spray driers and boilers powering turbines to cogenerate electricity for use in the Porcelanosa tile factory at Castellón in Spain.

Tiles incorporate 6% post-industrial scrap recaptured from the factory. Also tiles are delivered in recyclable cardboard packaging and are recyclable at the end of life.

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

Figure 1 Porcelanosa Floor Tiles

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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	EAR-001-2016
Date issue	28th November 2016
Validity	28th November 2019
Reference PCR	Compliant with PCR:FP 2014 Building Floor Covering Products
Time	Made in and sold from 2015 for 10 years use
Geography	Made in Spain. Uses are assumed as for Australasia.
Application	Commercial and residential building interiors
Functional unit	Porcelanosa Floor Tiles® kg/m^2 20 year use cradle to fate

2. Product Characterisation

Definition	Porcelanosa Floor Tiles by Earp Bros used in commercial & residential interiors
Standard	ISO 10545 Standard Specification for Ceramic Tiles Slip Resistance ANZ/NZS 4586: 2004 Classification V

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 the following credits of Green Star®:

- Design and As Built V1: Sustainable Product, Indoor Pollutants
- Interiors V1: Sustainable Products, Indoor Pollutants
- Performance V1: Procurement and Purchasing: Refurbishment Materials
- Legacy Tools: MAT: Flooring, FIT: Flooring, IEQ: Volatile Organic Compounds (VOC)

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.

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4. Sustainability Assessment Scores

Table 4 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 4 Normalised GreenTag EcoPOINT & SAC Scores

Category Potential	Results (-1 to +1)
Building Synergy	1.00
Health & Ecotoxicity	0.00
Biodiversity	0.42
LCA Score	0.63
Greenhouse Emission	0.56
Social Responsibility	0.40
GreenTag EcoPOINT	0.45

5. Type 1 Ecolabel

The declared product Type 1 Ecolabel achieved

Global GreenTag[CertTM] Gold PLUS GreenRate Level A

6. Verification of this Declaration

This EPD was approved on 28 11 2016 according to requirements of ISO14025 8.1.3b.

Role	Name	Position	Signature
PCR Review Chair	Murray Jones	Ecquate Pty Ltd CEO	28 11 2116
LCI Developer	Delwyn Jones	Evah Institute CEO	
LCIA Analyst	Mathilde Vlieg	Global GreenTag Researcher	
EPD Developer	Mathilde Vlieg	Global GreenTag Researcher	
3rd Party LCA Verifier	Shloka Ashar	Global GreenTag Lead Auditor	
Internal EPD Audit	David Baggs	Global GreenTag CEO & Program Director	Date: 2016.12.16 12:49:35 +10'00'

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

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7. Packaging, Installation, Use & Disposal

Packaging	Cardboard forms & cartons, plastic wrap & strapping on reused pallets.
Service life	Residential and 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 landfill.
Cleaning & Maintenance	The recommended cleaning and maintenance raises no ecosystem or human health concerns. Care and maintenance guides are on company websites.
Scenario	Weekly detergent spray, light mop, monthly wet machine scrub and cloth dry.
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	It assumes 30% is recycled.

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 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[3] quality credits. No other potential in-use impacts on environment or health are known.

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

9. Base Material Origin and Detail

Table 1 lists key components by function, type, key operation, source and mass share.

Table 1 Base Material

Function	Component	Production	Origin	Amount %
Ceramic	Clay	Quarry, Crush, Blend, Wet Mill	UK, Ukraine	>40<50
Flux	Feldspar	Quarry, Crush, Mill, Mesh, Blend	Turkey	>40<50
Coalescent	Sand	Quarry, Crush, Mesh, Blend	Spain	>6<10
Filler	Scrap	Quarry, Mill, Mesh, Dry, Kiln, Crush	Spain	>6<10

10. Life Cycle Impact Results

Table 3 shows Life Cycle Assessment (LCA) Eco-Indicator 99 results for 20 years of product use.

Table 3 Potential Impact Results

Evaluation Category	Unit	Result
Product mass	kg/m^2	26
EcoIndicator 99	ecopoint	1.18
Embodied Water	kl	243
Carbon Dioxide Equivalent Emissions[4]	kg CO_{2e}	21.6
Gross Energy and Feedstock	MJ	347
Renewable Primary Energy	MJ	23.5
Ecosystem Quality Damages	$PDF*m^2*yr$	1.31E-04
Human Health Damages	DALY	1.53E-03
Ozone Depletion	kg $R11_e$	2.31E-10
Acidification	kg SO_{2e}	0.62
Eutrophication	kg $PO_4^{3-}{}_e$	0.11
Fossil Fuel Depletion	$MJ_{surplus}$	19.3
Mineral Resource	$MJ_{surplus}$	0.29

11. 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, re-use 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.

[4] Stocker et al (eds.) Climate Change 2013: The Physical Science Basis, CH8, IPCC AR5, Cambridge U Press, UK.

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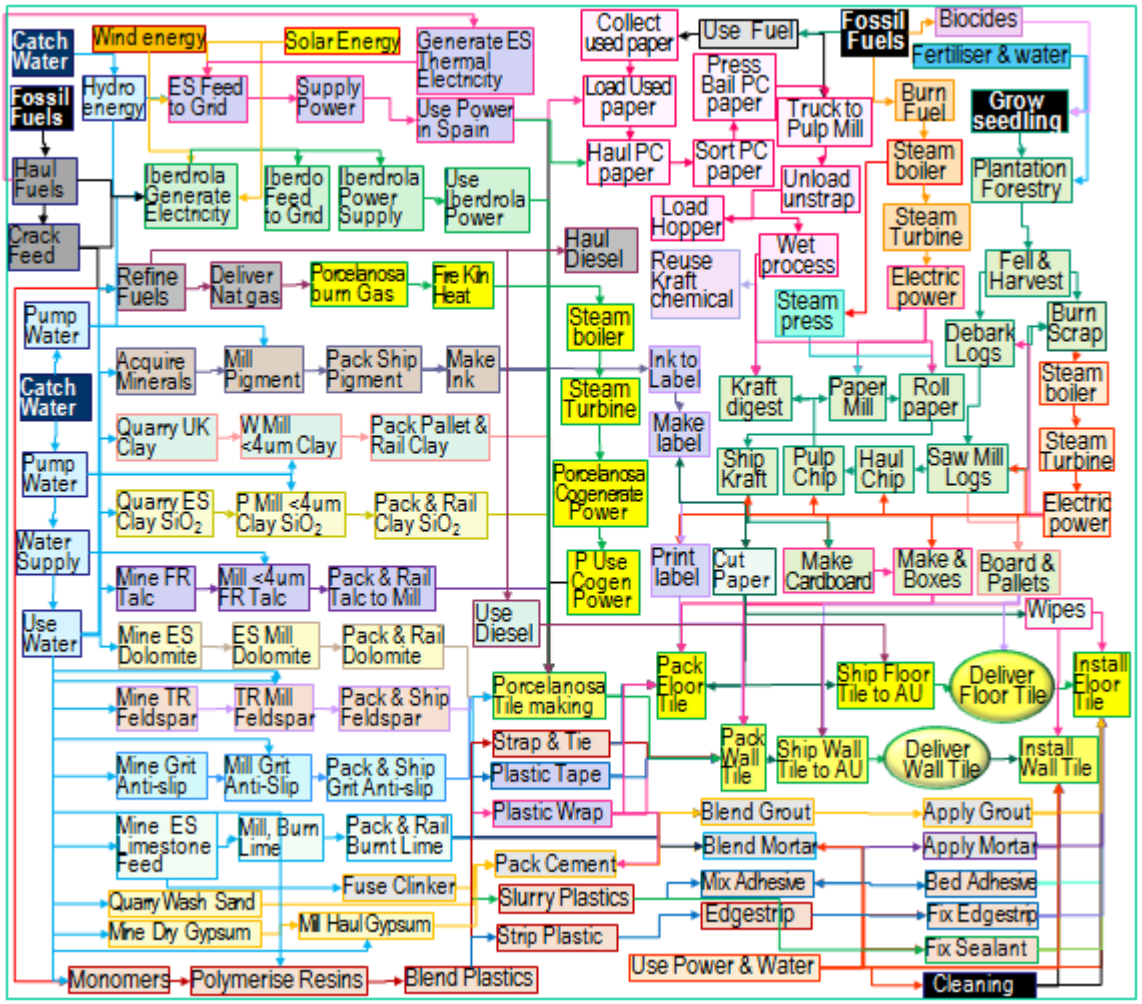

Figure 2 Major Product Operations

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12. 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
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 re-use 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 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 & 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[5] per dataset checked and updated; Consistency to Evah guidelines[6] 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 a nnually.

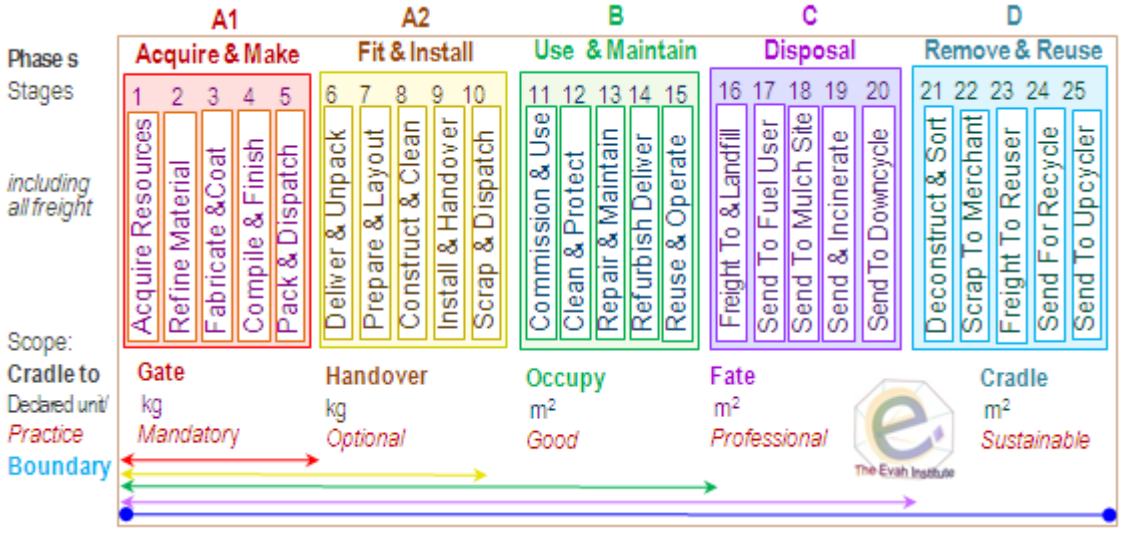

Figure 3 Phases and Stages Cradle to Grave

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

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13. 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 5[7]. No data set with >±30% uncertainty is used without notation in the LCA as well as the EPD.

Table 5 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
Cut-off 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

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

14. 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 6.

Table 6 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

15. References for this LCA & EPD

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

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

Boustead (2014) Model 6 LCI database http://www.boustead-consulting.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/greentag-epd-program

Jones D., Mitchell. P. & Watson P. (2004) LCI Database for Australian Commercial Building Material: Report 2001-006-B-15, 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 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

ISO 15686-8:2008 Buildings & constructed assets SL planning Part 8: Reference & estimation

ISO 21929-1:2011 Sustainability in building construction Sustainability indicators Part 1: Framework

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

ISO/TS 21931-1:2010 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/plastics-sustainability/eco-profiles.aspx

Pre (2016) SimaPro 8 Software, The Netherlands http://www.pre-sustainability.com/simapro-manuals

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) Life-Cycle 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 1-38, 6-9, 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. √

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Further and explanatory information is found at

http://www.globalgreentag.com/

or contact:

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