



Expona Design LVT

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

The declared product Expona Design heterogeneous luxury vinyl tile and plank (LVT) flooring was made by Polyflor Australia in China in 2017 for sale with a 15 year residential warranty and 10 year commercial warranty.

Polyflor is recognised globally as a leading manufacturer of high quality vinyl floor coverings.

It specialises in stylish, durable and low maintenance vinyl flooring that is available in sheet, planks and tiles.

In collaboration with industry partners, Polyflor is working on developing new products and technologies.

They continually evaluate new ideas or alternatives that minimise environmental impacts.

The company strives to be an environmentally and economically sustainable business.

It reports annually on progress in key areas including energy efficiency, recycling, air quality, freight and packaging.

Low emissions of Volatile Organic Compounds (VOC) also enable a healthy indoor environment.

Polyflor is the founding member of Recofloor the vinyl flooring take-back scheme where used vinyl is collected and diverted from landfill to be recycled.

Socially aware, Polyflor has commitments to continuously improve life quality of their workforce and families as well as the larger community.

Polyflor's factories are ISO 14001 Environmental Management Systems certified.

More information is at <http://www.polyflor.com.au>



Figure 1 Expona Design LVT



Expona Design LVT

Table of Contents

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

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 © This EPD remains the property of Global GreenTag Pty Ltd.

**Expona Design LVT****1. Details of This Declaration**

Program Operator	GreenTag Global Pty Ltd hereafter called Global GreenTag noted at www.globalgreentag.com
EPD Number	PLF-020-2017
Date issue	17 th September 2018
Validity	17 th September 2021
Reference PCR	Compliant with PCR: FC 2017
Time	Made in and sold from 2017 for 20 years use
Geography	Made in China. Uses are assumed as for Australasia.
Application	Commercial and residential interior flooring of luxury vinyl tiles and planks
Functional unit	Polyflor Expona Design LVT 5.1kg/m ² 20 year use cradle to fate

2. Product Characterisation

Definition	Polyflor Expona Design LVT by Polyflor Ltd for use in commercial and residential building interiors
Standard	EN ISO 10582 Resilient floor coverings – Heterogeneous poly(vinyl chloride) floor coverings - Specifications

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®:

- Performance V1.1: Refurbishment Materials
- Interiors V1.2: Sustainable Products
- Design and As Built V1.2: Sustainable Products

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.



Expona Design LVT

4. Sustainability Assessment Scores

Table 1 lists Global GreenTag Sustainability Assessment Criteria (SAC) scores prior to weighting and then used to determine the GreenTag EcoPOINT¹.

Table 1 Normalised GreenTag EcoPOINT & SAC Scores

Category Potential	Results (-1 to +1)
Building Synergy	1.00
Health & Ecotoxicity	0.25
Biodiversity	0.62
LCA Score	0.62
Greenhouse Gas Emissions CO _{2eq} ²	0.42
Social Responsibility	0.20
GreenTag EcoPOINT	0.48

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

5. Type 1 Ecolabel

The declared product Type 1 Ecolabel achieved



Gold PLUS GreenRate Level A



6. Verification of this Declaration

This EPD was approved on 17th September 2018 according to requirements of ISO14025 8.1.3b.

Role	Name	Position	Signature
PCR Review Chair	Murray Jones	Ecquate Pty Ltd CEO	<i>Murray Jones</i> 17/09/2018
LCI & EPD Developer	Delwyn Jones	The Evah Institute CEO	<i>Delwyn Jones</i> 17/09/2018
LCARate & LCIA Developer	Judy Luo	Global GreenTag Assessor	<i>Judy Luo</i> 8/10/2018
3 rd Party LCI Verifier	Shloka Ashar	Global GreenTag Lead Auditor LCI Verifier	<i>Shloka Ashar</i> 18/10/18
Internal EPD Audit	David Baggs	Global GreenTag CEO & Program Director	<i>David Baggs</i> 18/10/18

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

² Stocker et al (eds.) Climate Change 2013: The Physical Science Basis, CH8, IPCC AR5, Cambridge U Press, UK.



Expona Design LVT

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 Scenario	The recommended cleaning and maintenance raises no ecosystem or human health concerns. Care and maintenance guides are on company websites. 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. 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 ³ .
Waste	Cradle to grave waste to landfill was 1% hazardous and 99% 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 ⁴ quality credits. No other 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 amount.

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

⁴ in accordance with national standards and practice



Expona Design LVT

Table 2 Base Material

Function	Component	Production	Origin	% mass
Filler	Limestone	Mine, Crush, Sieve, Haul	China ⁵	>55 <60
Binder	SPVC	Drill, Refine, Chlorinate, Polymerise	China & Taiwan	>20 <25
Wear layer	SPVC DOTP	Plasticise, Stabilise & Extrude	China & Taiwan	>10 <15
Plasticiser	DOTP	Drill, Refine, Extract, Polymerise	China	>7.0 <9
Print film	PVC DOTP Dye	Plasticise, Stabilise, Dye, Extrude	China & Taiwan	>2.0 <3
Stabiliser	CaZn Soap	Farm, Press, Extract, Refine, Mill	China	<0.4
Black	Carbon Black	Mine, Drill, Refine, Extract, Mill	China	<0.3
Coating	Polyurethane	Farm, Drill, Extract, Polymerise	China	<0.2
Thickener	Gum Rosin	Forestry, Tap, Extract & Refine	China	<0.2
Colour	Pigment	Mine, Digest, Precipitate, Mill	China	<0.1
Printing	Ink	Drill, Distil, Extract, Mill,	China	<0.1

10. Life Cycle Impact Results

Table 3 shows Life Cycle Impact Assessment (LCIA) results for 20 years of product use.

Table 3 Potential Impact Results

Evaluation Category	Unit	Result
Product mass	kg/m ²	5.10
Ecolindicator 99	ecopoint	0.83
Carbon Dioxide Equivalent Emissions ⁶	kg CO _{2e}	11.24
Renewable Primary Energy	MJ	21.49
Ecosystem Quality Damages	PDF*m ² *yr	8.0E-05
Human Health Damages	DALY	1.4E-03
Ozone Depletion	kg R11 _e	1.9E-09
Acidification	kg SO _{2e}	0.34
Eutrophication	kg PO ₄ ³⁻ _e	6.4E-03
Fossil Fuel Depletion	MJ _{surplus}	10.47
Mineral Resource	MJ _{surplus}	0.27

⁵ Mainland China

⁶ Stocker et al (eds.) Climate Change 2013: The Physical Science Basis, CH8, IPCC AR5, Cambridge U Press, UK.



Expona Design LVT

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.

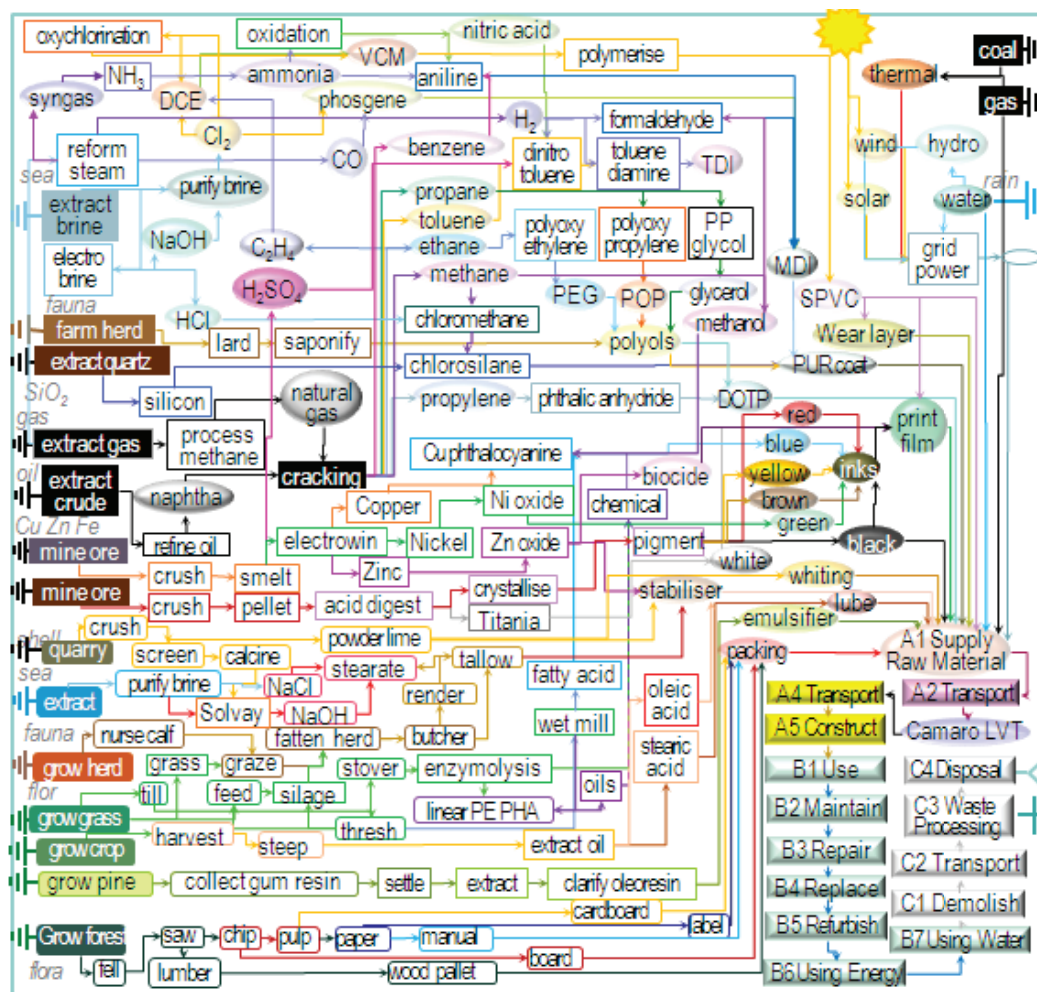


Figure 2 Major Product Operations



Expona Design LVT

12. Life Cycle Assessment Method

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

Study Period Factory data was collected from 2015 to 2018

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 Boundaries The LCA covers all operations in the system boundary depicted in Figure 3.

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



Life Cycle Stages	Product			Construction		Use stage related to the building							End of Life				Beyond system Boundary
	A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
Modules	Raw material supply	Transport	Manufacture	Transport	Construction	Use	Maintenance	Repair	Replacement	Refurbishment	Operational Energy use	Operational water use	Demolition	Transport	Waste Processing	Disposal	Potential Reuse Recovery and Recycling load & benefit
Unit Operations	Actual			Scenarios													
Modeling	M	M	M														
Cradle to Gate	M	M	M	O	O	O	O	O	O	O	O	O	O	O	O	O	O
Cradle to Gate +options	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	O
Cradle to Grave	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	M	O

Figure 3 Phases and Stages Cradle to Grave M: Mandatory O: Optional

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. Quality control methods are applied to ensure:

- Coverage of place in time with all information⁷ for each dataset noted, checked and updated;
- Consistency to Evah guidelines⁸ 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.

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.

⁷ Jones D G (2004) LCI Database for Commercial Building Report 2001-006-B-15 Icon.net, Australia
⁸ Evah Tools, Databases and Methodology Queensland, Australia at <http://www.evah.com.au/tools.html>



Expona Design LVT

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, Ecolnvent 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 4⁹.

Table 4 Data Quality Uncertainty (U) for 2018

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%	>95%	>90%	>80%	<70%
Certainty	Very High	High	Typical	Poor	>±0.30

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

⁹ Evah Institute data quality control system accords with UNEP SETAC Global LCI Database Quality 2010 Guidelines



Expona Design LVT

14. 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 2015 to 2017
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 2015 to 2018
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 2018, GGT 2018, Boustead 2013, Simapro 2016, IBIS 2018, EcoInvent 2018
Data mix	Power grid and renewable shares updated to latest IEA 2018 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 2018; GGT 2018; Meta: IBIS 2018, Other pre 2018
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 Δ , industry stockpiles Δ , capital wear Δ , 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 \pm 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



Expona Design LVT

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>
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- 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
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16. Reviewers Report Conclusions

The independent LCA reviewer's report confirmed that the LCA project report and addition information addressed the EPD. The verifier, Shloka Ashar, 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. ✓



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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 GreenTagCert™ EPD Program
Environmental Product Declaration
Compliant to ISO 14025**

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