



Polysafe Verona PUR

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

The declared product Polysafe Verona PUR was made by Polyflor in UK in 2015 for sale with a 10 year warranty for safety flooring applications in commercial and residential sectors.

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.

Their factories are ISO 14001 Environmental Management Systems certified.

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



Figure 1 Polysafe Verona PUR



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



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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	PLF-017-2017
Date issue	27 th September 2018
Validity	27 th September 2021
Reference PCR	Compliant with PCR: FC 2017
Time	Made in and sold from 2015 for 20 years use
Geography	Made in UK. Uses are assumed as for Australasia.
Application	Commercial and Residential building interiors flooring
Functional unit	Cradle to fate Polysafe Verona PUR 2.62kg/m ² flooring 20-year use

2. Product Characterisation

Definition	Polysafe Verona PUR by Polyflor Ltd for use in heavy duty commercial and residential applications
Standard	ISO BS EN 13845: 2017 Resilient floor coverings. Polyvinyl chloride floor coverings with particle based enhanced slip resistance. Specification.

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.



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4. Verification of this Declaration

This EPD was approved on 27th September 2018 according to requirements of ISO14025 8.1.3b.

Role	Name	Position	Signature
PCR Review Chair	Murray Jones	Ecquate Pty Ltd CEO	
LCI, LCIA & EPD Developer	Delwyn Jones	The Evah Institute CEO	
3rd Party LCI Verifier	Shloka Ashar	Sustainability Studio Director	
Internal EPD Audit	David Baggs	Global GreenTag CEO & Program Director	

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 raise 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. 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. No issues or red-light concerns existed for product human or ecological toxicity.
Effluent	The LCI results raised no red-light concerns in emissions to water ¹ .
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 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



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9. Base Material Origin and Detail

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

Table 2 Base Material

Function	Component	Production	Origin	% mass
Backing	EPVC	Drill, Extract, Chlorinate Polymerise	Europe ³	>43<48
Filler	Dolomite	Mine, Crush, Sieve, Hold & Haul	UK	>25<30
Plasticiser	Diocetyl Terephthalate	Drill, Distil, Extract, Polymerise	Europe ⁴	>20 <25
Wear	Colour Quartz	Collect, Clean, Crush, Blend, Grade	Germany	>7.0 <10
Wear Layer	SPVC	Drill, Extract, Chlorinate Polymerise	Europe ⁵	>3.0 <8.0
Carrier	Fibreglass PVA	Mine, Refine, Fuse, Spin, Lay	UK	>2.5 <3.0
Antislip	Aluminium Oxide	Mine, Digest, Precipitate, Coat	UK	>1.5 <2.0
Stabiliser	ESBO ⁶	Farm, Press, Extract, Refine, Mill	UK	>1.0 <2.0
Colour	Pigment paste	Drill, Distil, Extract, Polymerise, Mill	UK	>1.0 <1.5
Antislip	Alumina & Glass	Collect, Clean, Crush, Fire, Blend	UK	>0.5 <1.0
Decore	Granules	Drill, Extract, Mill, Polymerise	UK	>0.5 <1.0
Stabiliser	Barium Zinc Soap	Farm, Press, Extract, Refine, Mill	UK	>0.5 <0.6
Coating	Polyurethane	Farm, Drill, Extract, Polymerise	UK	>0.3 <0.5

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	2.62
Carbon Dioxide Emissions	kg CO _{2eq} ⁷	12.5
Depletion of Stratospheric Ozone layer	kg R11 _{eq}	3.5E-09
Damage to Ecosystem Quality	PDF*m ² *yr	1.7E-04
Damage to Human Health	DALY	1.5E-03
Acidification of Land and Water	kg SO _{2eq}	0.15
Eutrophication of Water	kg PO ₄ ³⁻ _{eq}	0.010
Abiotic Depletion of Resources: Fossil Fuel	MJ _{surplus}	13
Abiotic Depletion of Resources: Minerals	MJ _{surplus}	0.40
Abiotic Depletion of Resources: Elements	kg Sb _{eq}	1.1E-02

³ Germany, Belgium, Portugal, Spain, Sweden

⁴ Netherlands, France

⁵ Germany, Belgium, Portugal, Spain, Sweden

⁶ Epoxidised Soybean Oil

⁷ Stocker et al (eds.) Climate Change 2013: The Physical Science Basis, CH8, IPCC AR5, Cambridge U Press, UK.



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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.

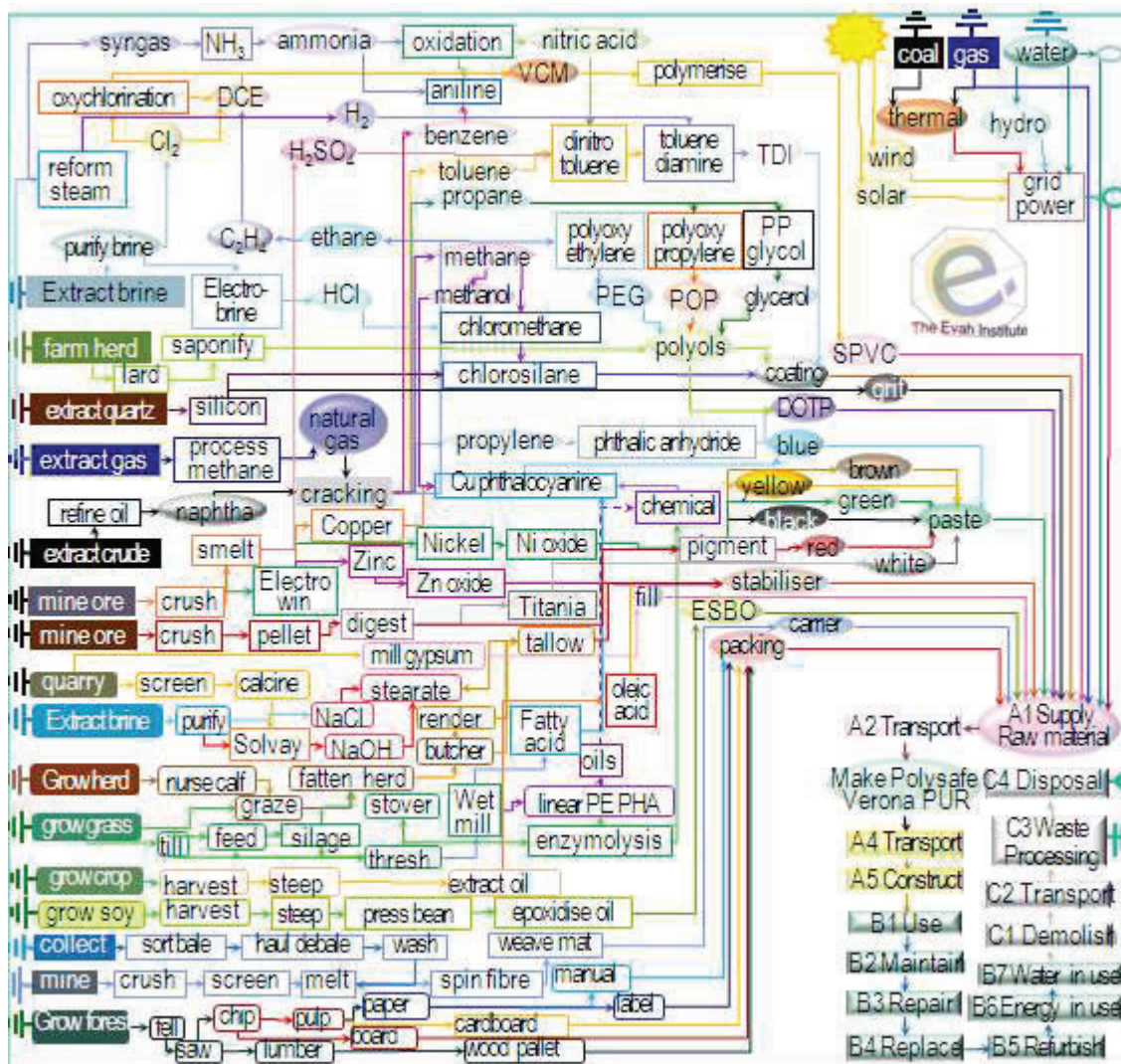


Figure 2 Major Product Operation



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11. 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 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 repair, 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						
Phases	A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	C1	C2	C3	C4	
Modules	Resource supply			Transport		Manufacturing		Transport		Construction		Use		Maintain	
Unit Operations	Transport			Manufacturing		Transport		Construction		Use		Maintain		Repair	
	Resource supply			Transport		Manufacturing		Transport		Construction		Use		Maintain	
Cradle to Grave	Mandatory			Mandatory		Mandatory			Mandatory				Optional		
	each phase			each phase		each phase			each phase				each phase		
Cradle to Gate+options	Optional			Optional		Optional			Optional				Optional		
Cradle to Gate	Optional			Optional		Optional			Optional				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. 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 information for each dataset noted, checked and updated;
- Consistency to Evah guidelines 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.



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12. 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 4⁸.

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 $\geq\pm 30\%$ uncertainty is used without notation in the LCA as well as the EPD.

⁸ Evah Institute data quality control system accords with UNEP SETAC Global LCI Database Quality 2010 Guidelines



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13. 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 & background data was collated 3 years to declaration approval date.
Geography	Designated client, site, regional, national, Pacific Rim then global 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	Typical of global or Pacific Rim supply chain 3 years to declaration approval date.
Functional Unit	Typical product with cleaning & disposal used for declared years' service life/m ²
System Control	
Primary Sources	Clients and supplier mills, publications, websites, specifications & manuals
Other Sources	IEA, USGS Minerals, IBISWorld, Boustead, Government & Industry reports
Data mix	Power grid & renewable shares updated to latest IEA & power generator 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; Global Green Tag Researchers at declaration date.
Data Generator	Manufacturers, Evah Institute; GGT; Meta: IBIS, Other pre-publication date
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, lands & waters are included
Plausibility	Results are checked and benchmarked against BAT, BAU & worst practice
Sensitivity	Calculated U is reported & compared to Bath U RICE & EcoInvent libraries
Validity Checks	Are made versus Plastics Europe, Ecobilan, GaBi & or Industry LCA Literature



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14. 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/baselconvention-text-e.pdf>
- Boustead (2014) Model 6 LCI database <http://www.boustead-consulting.co.uk/publicat.htm> USA & UK
- Ecolnvent (2016) LCI Model 3 database <http://www.ecoinvent.ch/> Ecolnvent, 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
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- 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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15. 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. ✓



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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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