EPD™

Environmental Product Declaration

Global GreenTag EPD Program:
Compliant to ISO14025

POLYFLOR™
COVERING THE WORLD

Luxury Vinyl Tile Safety Flooring

Polyflor Ltd., Guangdong Province, China

Luxury Vinyl Tile
Safety Flooring

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This Environmental Product Declaration (EPD) discloses potential environmental outcomes compliant with ISO 14025 for business-to-business communication. 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: certification@globalgreentag.com

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1. Details of This Declaration

The declared Luxury Vinyl Tile floorcovering was made by Polyflor Ltd in Guangdong, China in 2018 for sale with a 10-year warranty. It is depicted inset and on the cover. More detail is at www.polyflor.com.au

Program Operator	GreenTag Global Pty Ltd hereafter called Global GreenTag
EPD Number	PFL:LV03:2021
Date issue	9th February 2022
Validity	9th February 2025
Reference PCR	Compliant with PCR IF:2021 Floorcoverings
Time	Made in and sold from 2017 for 20 years use
Geography	Made in mainland China. Uses are assumed as for Australasia
Application	Luxury Vinyl Tile flooring for enhanced wear, durability, cleanability and safety
Functional units	Safety heavy duty Luxury Vinyl Tile per square metre 20y use cradle to grave

2. Product Characterisation

Definition	PUR coated Luxury Vinyl Tile flooring made by Polyflor Ltd for enhanced safety, resilience, durability and cleanability in heavy wear areas of all sector buildings.
Standard	BS EN ISO 10581: 2013 Resilient floor coverings – Homogeneous polyvinylchloride floor covering - Specifications

3. Verification of this Declaration

This EPD was approved on 27th April 2021 according to requirements of ISO14025 8.1.3b.

Role	Name	Position	Signature
PCR Review Chair	Murray Jones	Ecquate Pty Ltd CEO	27-04-2021
LCA & EPD Developer	Delwyn Jones	The Evah Institute CEO	27 04 2021
3rd Party LCA Verifier	Shloka Ashar	Sustainability Consultant	4th May 2021
Internal EPD Audit	David Baggs	Global GreenTag CEO & Program Director	9.2.2022

4. 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®:

- Interiors V1.3: Sustainable Products
- Design and As Built V1.3: Sustainable Product
- Performance V1.2: 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.

5. Base Material Origin and Detail

Table 1 lists key components by function, type, source and mass grams per kg of product output. All components to <0.001% were modelled but only content >1% is declared to protect intellectual property.

Table 1 Product Base Material

Function	Component	Source	Expona Control Wood or Stone PUR
Filler	Limestone	Mainland China	>47 <51
Binder	Polyvinylchloride	Mainland China & Taiwan	>18 <21
Wear	Polyvinylchloride	Mainland China & Taiwan	>20 <22
Plasticiser	Dioctyl Terephthalate	Mainland China	>5 <9
Decor	Polyvinylchloride	Mainland China & Taiwan	>1 <3
Grip	Alumina	Mainland China	>1 <3
Various	Pigment, Coating	Mainland China & Taiwan	<1

6. Life Cycle Impact Results

Table 2 shows Life Cycle Inventory and Impact Assessment potential results for 20 years product use/m^2.

Table 2 Cradle to Grave LCI and LCIA Results/ m^2 Functional Unit

Inventory Totals	Unit	Expona Control Wood or Stone PUR
Product Mass	kg	4.29
Embodied Water	kl	0.80
Gross Primary Energy	MJ	273
Impact Potential Totals		
Global Warming	kg $CO_{2e\ 100}$	12
Stratospheric Ozone Loss	kg $R11_e$	2.6E-09
Acidification Land & Water	kg SO_{2e}	3.2E-02
Eutrophication of Water	kg $PO_4^{3-}{}_e$	6.1E-03
Ecosystem Quality Damage	PDF*m^2*yr	1.3E-04
Human Health Damages	DALY	1.7E-03
Depletion of Fossil Fuel	$MJ_{surplus}$	11
Depletion of Minerals	$MJ_{surplus}$	0.28

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 reclaimed. Installation scrap of 5% is assumed to landfill.
Maintenance	The recommended cleaning and maintenance raise 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. 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 water1.
Waste	Cradle to grave waste to landfill was 1% hazardous and 99% non-hazardous.
Environmental Protection	Continuous improvement under the maker's ISO14001 EMS aims to avoid toxics, waste and pollution plus reduce their material and energy use.
Environmental Health Effects	Installed products have been tested to international standards as having low VOC emissions. 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)

9. Supply Chain Modelling

Processes to acquire, refine, transport, fabricate, coat, use, clean, repair, reuse and dispose of metal, masonry, ceramic, timber, glass, plastic and composites are modelled from cradle to grave. The study excludes scope 3 burdens from building capital facilities, churn, equipment; noise and dehydration as well as incidental activities and travel of production employees. Figure 1 shows system operations including:

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

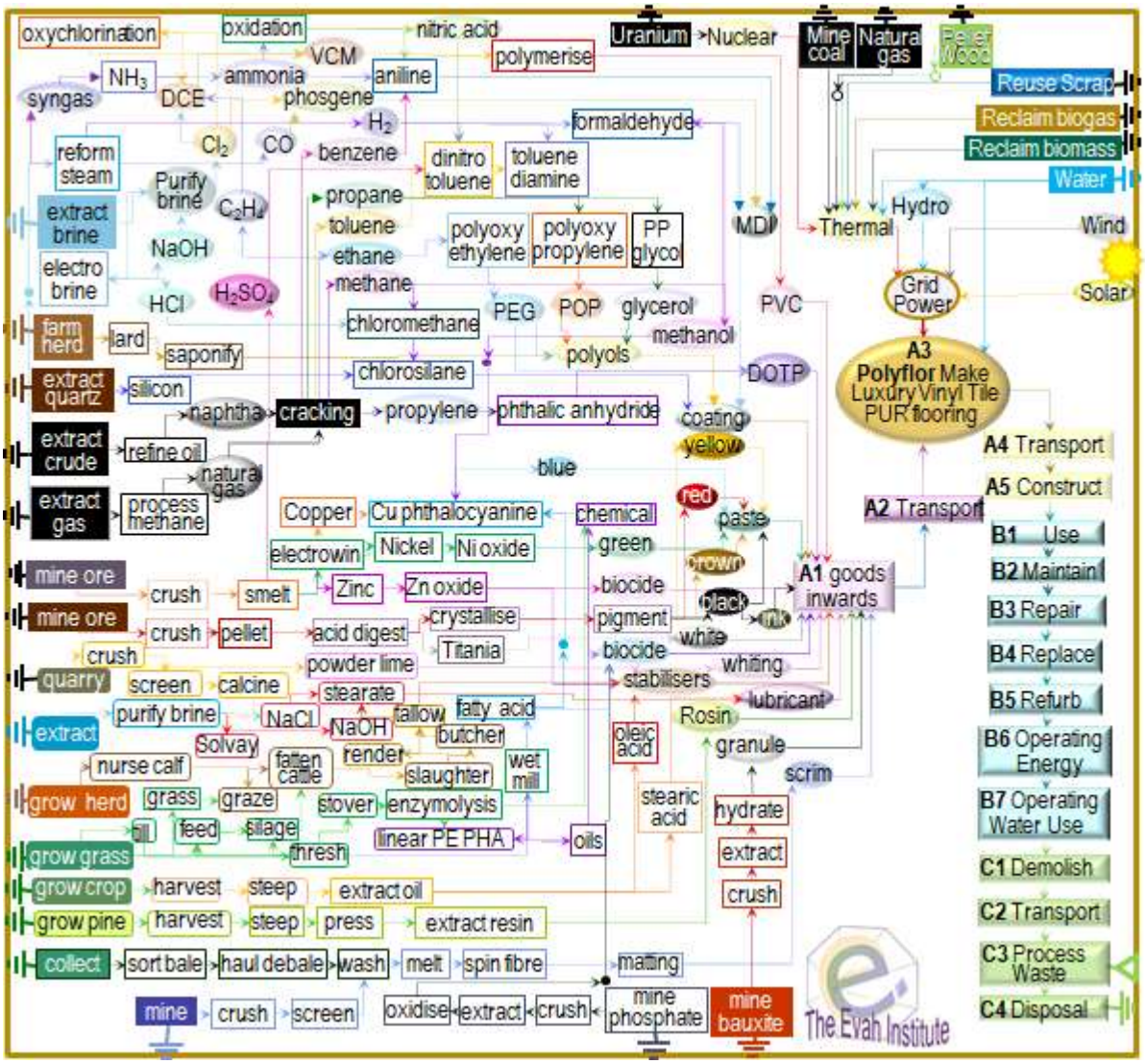

Figure 1 Major Product Operations

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10. 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 a.
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 a 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 and goods inwards packaging are included cradle to gate. Cradle to Grave scope includes packing and dispatch as well as installation, use, maintenance, landfill waste and emission flows from all supply chain operations involved to make, pack and install repair and demolish product.

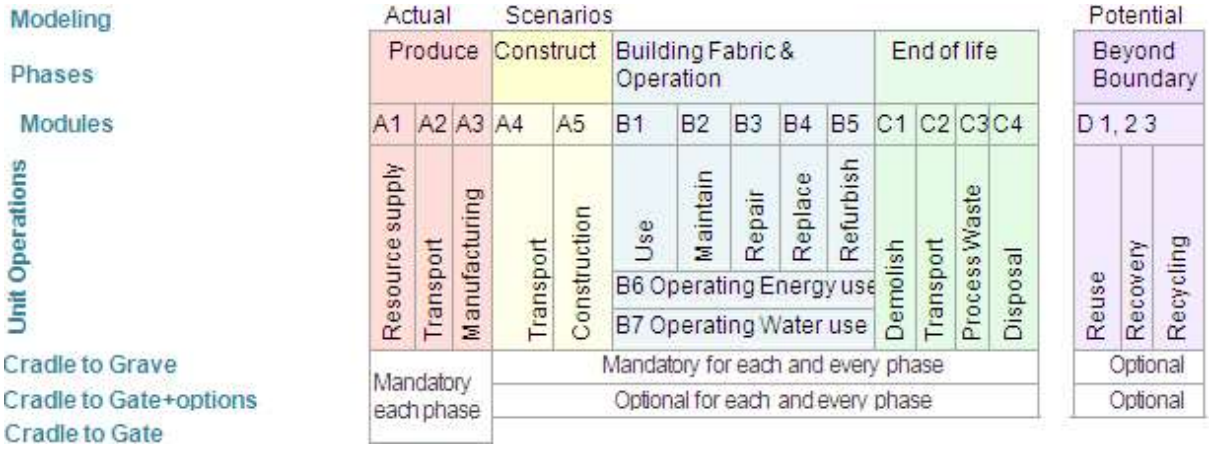

Figure a Phases and Stages Cradle to Grave

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

11. Data Sources Representativeness and Quality

Primary data used for modelling the state of art of each operation includes all known process for:

- Technology sequences;
- Energy and water use;
- Landfill and effluent plus
- Reliance on raw and recycled material;
- High and reduced process emissions;
- Freight and distribution systems.

Primary data is sourced from clients, Annual Reports and their publications on corporate locations, logistics, technology use, market share, management systems, standards and commitment to improved environmental performance. Information on operations is also sourced from client:

- Supply chain mills, their technical manuals, corporate annual reports and sector experts, and
- Manufacturing specifications websites and factory site development 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 a[2].

Table a Data Quality Parameters and Uncertainty (U)

Correlation	Metric σg	U ±0.01	U ±0.05	U ±0.10	U ±0.20	U ±0.30
Reliability	Reporting	Site Audit	Expert verify	Region	Sector	Academic
	Sample	>66% trend	>25% trend	>10% batch	>5% batch	<1% batch
Completion	Including	>50%	>25%	>10%	>5%	<5%
	Cut-off	0.01%w/w	0.05%w/w	0.1%w/w	0.5%w/w	1%w/w
Temporal	Data Age	<3 years	≤5 years	<10 years	<15 years	>16 years
	Duration	>3 years	<3 years	<2 years	1 year	<1 year
Geography	Focus	Process	Line	Plant	Corporate	Sector
	Range	Continent	Nation	Plant	Line	Process
Technology	Typology	Actual	Comparable	In Class	Convention	In Sector

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

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

12. Supply Chain Modelling Assumptions

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

Table b 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 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
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	10th 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	>90% flows are track with a 90:10 rule applied 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

13. 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 (2021) 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 (2021) http://www2.ecospecifier.org/services_offered/greentag_certification

GreenTag™ (2021) 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 (2021) 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 (2021) 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/

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

USLCI (2019) Life-Cycle Inventory Database https://www.lcacommons.gov/nrel/search, USA

U.S. Geological Survey National Minerals (2021) 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

14. Reviewers Report Conclusions

The independent LCA reviewer's report confirmed that the LCA project report and addition information addressed the EPD. The verifier was not involved in developing the LCA or EPD and has no conflict of interests from their organisational position.

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

The Evah Institute, the LCA developer:

a) Recipes of input and output data of unit processes used for LCA calculations √

b) Datasheets of measures, calculations, estimates and emails with sources as in Table a √

e) References to literature and databases from which data was extracted as noted in Table b √

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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