



Greenstuf® Acoustic Insulation

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

The declared GreenStuf Acoustic Insulation product was made by Autex Industries in New Zealand in 2016 for sale with a 50 year warranty for commercial and residential sector applications.

Autex Industries, known in Australia as Autex, is a manufacturer of thermal and acoustic insulation and of interior acoustic fabrics and panels.

Their products are made of Polyethylene Terephthalate (PET) commonly called Polyester.

The polyester comes from virgin sources plus post-consumer recyclates and post-industrial 'home' scrap.

The vision of Autex is to achieve positive economic, social and ecological outcomes for the benefit of stakeholders and the environment.

Autex is ISO 9001 and ISO 14001 certified with continual improvement programmes in place to reduce their environmental impact.

They offer product stewardship for their thermal and acoustic insulation.

The company plans to publish a GRI G4 sustainability report in 2017.

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



Figure 1 GreenStuf® Acoustic Insulation



Greenstuf® Acoustic Insulation

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 Inventory Results | 6 |
| 11. Life Cycle Impact Results | 6 |
| 12. Life Cycle Benefit Potential | 6 |
| 13. Supply Chain Modelling | 7 |
| 14. Life Cycle Assessment Method..... | 8 |
| 15. Data Sources Representativeness and Quality | 9 |
| 16. Supply Chain Modelling Assumptions..... | 10 |
| 17. References for this LCA & EPD | 11 |
| 18. 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.



Greenstuf® Acoustic Insulation

1. Details of This Declaration

| | |
|-------------------------|--|
| Program Operator | GreenTag Global Pty Ltd hereafter called Global GreenTag noted at www.globalgreentag.com |
| EPD Number | AUT-007-2017 |
| Date issue | 26 October 2017 |
| Validity | 26 October 2020 |
| Reference PCR | Compliant with PCR AIN: 2017 Acoustic Insulation |
| Time | Made in and sold from 2016 for 60 years use |
| Geography | Made in New Zealand. Uses are assumed as for Australasia. |
| Application | Commercial and residential building interiors |
| Functional unit | The 60 year use of GreenStuf® Acoustic Insulation /m ² cradle to fate |

2. Product Characterisation

| | |
|-------------------|--|
| Definition | GreenStuf® Acoustic Insulation made by Autex Industries for commercial and residential buildings |
| Standard | ISO 354-2003 Measurement of Sound Absorption in a reverberation room. |

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 V1.2: Sustainable Product, Indoor Pollutants
- Interiors V1.2 Sustainable Products, Indoor Pollutants
- Performance V1.1: 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.



Greenstuf® Acoustic Insulation

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 | 0.75 |
| Health & Ecotoxicity | 0.10 |
| Biodiversity | 0.07 |
| LCA Score | 0.61 |
| Greenhouse Emission | 0.06 |
| Social Responsibility | 0.50 |
| GreenTag EcoPOINT | 0.29 |

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

Global GreenTag^{Cert™} Gold PLUS GreenRate Level A



6. Verification of this Declaration

This EPD was approved on 26 10 2017 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> 26/10/2017 |
| LCI Developer | Delwyn Jones | The Evah Institute CEO | <i>Delwyn Jones</i> 07/11/2017 |
| LCIA, LCA Rate & EPD developer | Mathilde Vlieg | Global GreenTag Researcher | <i>Mathilde Vlieg</i> 08/11/2017 |
| Internal LCA Audit | Shloka Ashar | Global GreenTag Lead Auditor LCI Verifier | <i>Shloka Ashar</i> 14/11/2017 |
| Internal EPD Audit | David Baggs | Global GreenTag CEO & Program Director | <i>David Baggs</i> |

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



Greenstuf® Acoustic Insulation

7. Packaging, Installation, Use & Disposal

| | |
|--|---|
| Packaging | Plastic wrap & strapping on reused pallets. |
| Service life | Residential and commercial refits vary but 60 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. No installation scrap assumed. |
| Cleaning & Maintenance | No cleaning and maintenance required. |
| Recycling | Home mill, fabrication and installation scrap is reworked into new product. |
| Re-use | This study assumes product stays in use for lifetime of the building. |
| Disposal | It assumes 100% 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 Waste | The LCI results and ESCAP raised no red light concerns in emissions to water ² . 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® Indoor Pollutants credits for indoor environment ³ 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 % mass share.

Table 2 Base Material

| Function | Component | Production | Origin | % |
|----------------|----------------------------|---------------------------------------|-------------|----------|
| Scrap Fibre | PI rPET | Collect, Clean, Chip, Spin | Pacific Rim | >35<50 |
| Recycled Fibre | PC rPET | Collect, Clean, Chip, Spin | Pacific Rim | >25<40 |
| Lo Melt Fibre | CHDM ⁴ | Drill, Refine, Polymerise, Chip, Spin | Pacific Rim | >15<25 |
| Primary Fibre | PET, virgin | Drill, Refine, Polymerise, Chip, Spin | Pacific Rim | >3.0<7.0 |
| White Pigment | Titania | Mine, Digest, Precipitate, Coat | China | <1.0 |
| Colours | Organic Dye | Mine, Digest, Precipitate, Coat | China | <1.0 |
| Stabiliser | Lankromark | Farm, Press, Extract, Refine | China | <0.1 |
| Fire Retard | Al(OH) ₂ | Mine, Crush, Extract, Refine, Mill | China | <0.1 |
| Biocide | Biocide ⁵ | Farm, Drill, Extract, Press, Refine | Australia | <0.1 |
| Lubricant | Silicone PDMS ⁶ | Mine, Drill, Refine, Polymerise, Pack | China | <0.1 |

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

³ in accordance with national standards and practice

⁴ Cyclohexanedimethanol

⁵ AOX, CIT and VOC free biocide for wet state protection of products. US EPA Registration No. 67071-29

⁶ Polydimethylsiloxane (PDMS)



Greenstuf® Acoustic Insulation

10. Life Cycle Inventory Results

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

- cradle to gate including supply, manufacture and upstream;
- design and construction from delivery to site and installation;
- use and operation including maintenance, repair, replacement refurbishment and
- end-of-life from deconstruction, reuse, demolition, recycling and disposal.

Table 3 Inventory of Flows/ Functional Unit

| Total Input use of | Unit | NRC0.6 R0.56 Acoustic Blanket | NRC0.55 R0.7 Acoustic Blanket | R2.5 Sound Solution Pads | NRC1.1 R2.94 Acoustic Blanket |
|--------------------|---------|--|--|-----------------------------------|--|
| Product mass | kg/item | 0.5 | 1.0 | 1.22 | 4.8 |
| Embodied Water | kl | 23.2 | 42.6 | 53.1 | 197 |
| Recycled Material | kg | 0.17 | 0.34 | 0.41 | 1.63 |
| Fuel + Feedstock | MJ | 60.0 | 112 | 139 | 522 |

11. Life Cycle Impact Results

Table 4 shows Life Cycle Assessment (LCA) Eco-Indicator 99 results for 60 years of product use.

Table 4 Potential Impact Results/ Functional Unit

| Evaluation Category | Unit | NRC0.6 R0.56 Acoustic Blanket | NRC0.55 R0.7 Acoustic Blanket | R2.5 Sound Solution Pads | NRC1.1 R2.94 Acoustic Blanket |
|---------------------------------------|------------------------|--|--|-----------------------------------|--|
| EcoIndicator 99 | ecopoint | 0.19 | 0.36 | 0.45 | 1.69 |
| Greenhouses Gas Emission ⁷ | kg CO _{2e} | 3.4 | 6.4 | 7.90 | 29.9 |
| Ecosystem Quality Damages | PDF*m ² *yr | 2.1E-05 | 4.0E-05 | 5.0E-05 | 1.9E-04 |
| Human Health Damages | DALY | 2.4E-04 | 4.5E-04 | 5.6E-04 | 2.1E-03 |
| Ozone Depletion | kg R11 _e | 4.2E-10 | 4.7E-10 | 6.8E-10 | 1.5E-09 |
| Acidification | kg SO _{2e} | 0.090 | 0.17 | 0.21 | 0.77 |
| Fossil Fuel Depletion | MJ _{surplus} | 3.3 | 6.1 | 7.6 | 28.5 |
| Mineral Resource Depletion | MJ _{surplus} | 0.028 | 0.021 | 0.036 | 0.032 |

12. Life Cycle Benefit Potential

Manufacturers' details confirm that for each declared unit the product has:

- 34% post consumer scrap that saves resources and avoids climate change and landfill waste;

Design for reuse avoids issues and offers OH&S benefits at demolition as:

- Potential end-of-life recycling and reuse avoids wasted resources, climate change and landfill;
- Recycling benefits supply avoiding health and traffic issues in disposal and landfill.

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



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13. Supply Chain Modelling

Processes to acquire, refine, transport, fabricate, coat, use, clean, repair, reuse and dispose of metal, masonry, ceramic, timber, glass, plastic and composites are modelled.

These include those of:

- Mining, extracting and refining resources to make commodities and packaging;
- Acquiring, cultivating, harvesting, extracting, refining produce and biomass;
- Fuel production to supply power and process energy and freight;
- Chemicals use in processing resources, intermediates and ancillaries;
- Process energy, fuel and freight of resources, intermediates and ancillaries;
- Use, cleaning, recoating, repair, recycling, 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.

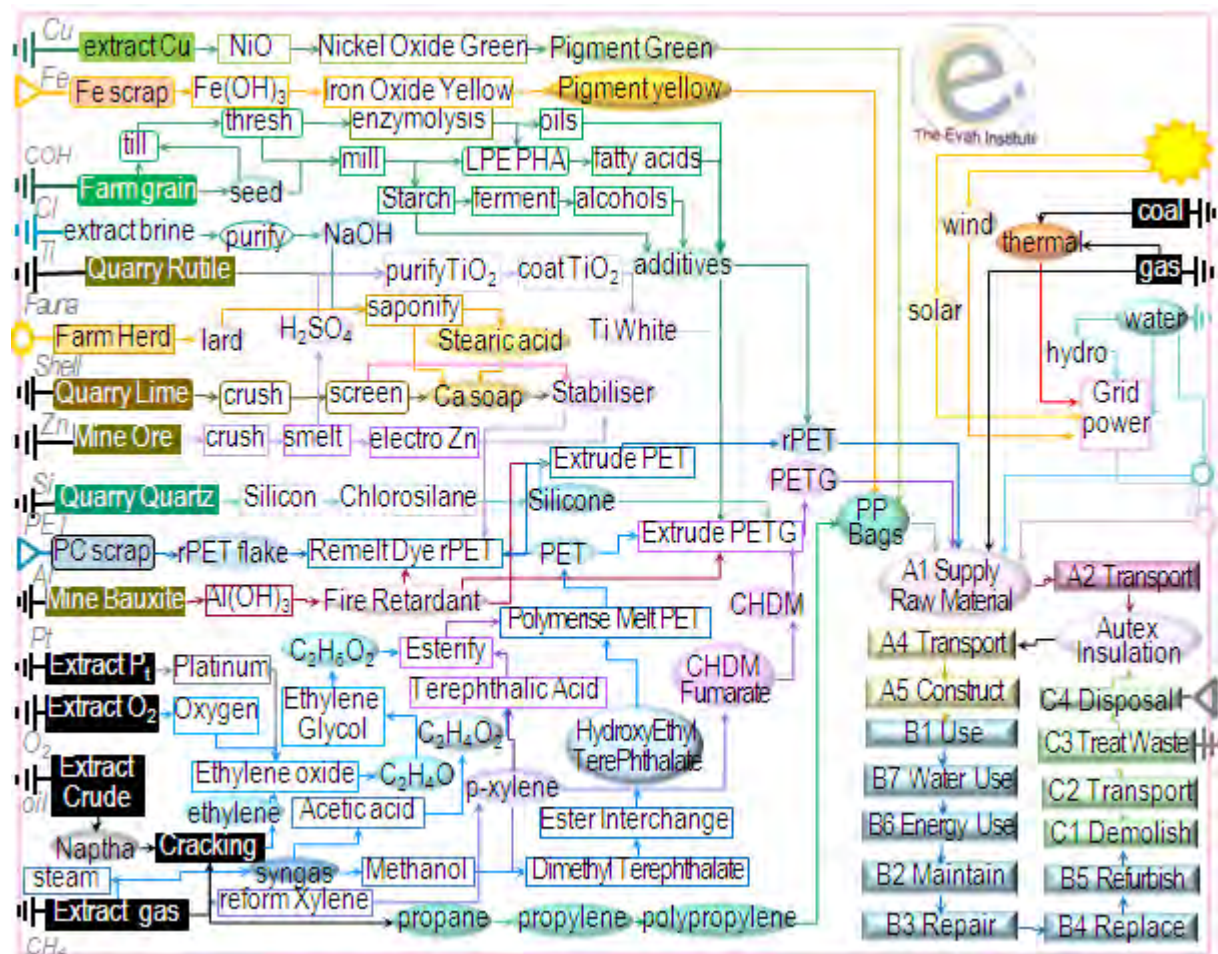


Figure 2 Major Product Operations



Greenstuf® Acoustic Insulation

14. Life Cycle Assessment Method

- LCA Author** The Evah Institute as described at www.evah.com.au
- Study Period** Factory data was collected from 2012 to 2014
- LCA Method** Compliant with ISO 14040 and ISO 14044 Standards
- LCIA method** EcoIndicator 99 Life Cycle Impact (LCIA) Assessment
- 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.



| Phases A-D Stages 1-20 | A Produce | | | A Construct | | B Use Built Fabric Operate | | | | | | C End of life | | | | D Fate | | | | |
|---------------------------|-------------------------------------|-------------------------------------|----------------------------------|------------------------------------|--|----------------------------|------------------|----------------|-----------------|-------------------|------------------|-----------------|--------------------|--------------------|---------------|----------------------|--------------------|-----------------|-------------------|--------------------|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | 20 |
| Operation Modules 1-20 | Acquire Resources & refine material | Dispatch, Transport, Ship & deliver | Fabricate, Finish & Pack product | Deliver, Unpack & dispatch packing | Prep, Build, Install, Scrap & Dispatch | Product Use | Clean & Maintain | Repair Product | Replace Product | Refurbish Product | Operating Energy | Operating Water | Deconstruct & Sort | Transport to Depot | Process Scrap | Disposal in Landfill | Potential Recovery | Potential Reuse | Potential Recycle | Potential Upcycled |
| Scope | Mandatory 1,2,3 | | | Usual 4,5 | | Usual 6 to 10 | | | | Optional | | Usual 13-16 | | | | Optional 17-20 | | | | |
| C ₂ Gate | Mandatory 1,2,3 | | | Usual 4,5 | | Mandatory 6 to 10 | | | | Mandatory | | Mandatory 13-16 | | | | Optional 17-20 | | | | |
| C ₂ Gate + | Mandatory 1,2,3 | | | Mandatory 4,5 | | Mandatory 6 to 10 | | | | Mandatory | | Mandatory 13-16 | | | | Optional 17-20 | | | | |
| C ₂ Grave | Mandatory 1,2,3 | | | Mandatory 4,5 | | Mandatory 6 to 10 | | | | Mandatory | | Mandatory 13-16 | | | | Optional 17-20 | | | | |

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.

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 information⁸ for each dataset noted, checked and updated;
- Consistency to Evah guidelines⁹ for all process technology, transport and energy demand;
- Completeness of modelling 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.

⁸ Jones D G (2004) LCI Database for Commercial Building Report 2001-006-B-15 Icon.net, Australia

⁹ Evah Tools, Databases and Methodology Queensland, Australia at <http://www.evah.com.au/tools.html>



Greenstuf® Acoustic Insulation

15. Data Sources Representativeness and Quality

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

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

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

- Supply chain mills, their technical manuals, corporate annual reports and sector experts, and
- Manufacturing specifications websites and factory site development license applications.

Background data is sourced from the International Energy Agency, IBISWorld, USGS Minerals, Franklin Associates, Boustead 6, Plastics Europe, CML2, Simapro 8, EcoInvent 3 and NREL USLCI model databases. Information on operations is also sourced from:

- Library, document, NPI and web searches, review papers, building manuals and
- Global Industry Association and Government reports on Best Available Technology (BAT).

For benchmarking, comparison and integrity checks inventory data is developed to represent BAT, business as usual and worst practice options with operations covering industry sector supply and infrastructure in Australia and overseas.

Such technology, performance and license conditions were modelled and evaluated across mining, farming, forestry, freight, infrastructure and manufacturing and building industry sectors since 1995.

As most sources do not provide estimates of accuracy, a pedigree matrix of uncertainty estimates to 95% confidence levels of Geometric Standard Deviation² (σ_g) is used to define quality as in Table 5¹⁰.

Table 5 Data Quality Uncertainty (U) for 2017

| Metric σ_g | U ± 0.01 | U ± 0.05 | U ± 0.10 | U ± 0.20 | U ± 0.30 |
|-------------------|--------------|---------------|---------------|---------------|-----------------|
| Temporal | Post 2015 | Post 2011 | Post 2007 | Post 2002 | Pre 2002 |
| 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 | $< \pm 0.05$ | $< \pm 0.10$ | $< \pm 0.20$ | $< \pm 0.30$ |
| Reproducible | >98% | >95% | >90% | >80% | <70% |
| Certainty | Very High | High | Typical | Poor | $\geq \pm 0.30$ |

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

¹⁰ Evah Institute data quality control system accords with UNEP SETAC Global LCI Database Quality 2010 Guidelines



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16. Supply Chain Modelling Assumptions

Australian building 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 2017, GGT 2017, Boustead 2013, Simapro 2016, IBIS 2017, EcoInvent 2016 |
| Data mix | Power grid and renewable shares updated to latest IEA 2017 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 2017; Global Green Tag Researchers 2017 |
| Data Generator | Manufacturers, Evah Institute 2017; GGT 2017; Meta: IBIS 2017, Other pre 2017 |
| 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 |

**Greenstuf® Acoustic Insulation****17. 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
- EcolInvent (2016) LCI Model 3 database <http://www.ecoinvent.ch/> EcolInvent, Switzerland
- Evah (2016) LCA Tools, Databases & Methodology at <http://www.evah.com.au/tools.html>
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- GreenTag™ Certification (2016) http://www2.ecospecifier.org/services_offered/greentag_certification
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- 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



Greenstuf® Acoustic Insulation

18. Reviewers Report Conclusions

The independent LCA reviewer's report by Shloka Ashar 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 given ISO Standard requirements 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. ✓



Greenstuf® Acoustic Insulation

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:

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Global GreenTagCert™ EPD Program

Environmental Product Declaration

Compliant to ISO 14025

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