Environmental Product Declaration

Global GreenTag® EPD Program

Compliant to ISO 14025

SDX Tufted Miraclebac Carpet®

Figure 1 Belgotex Carpet Tiles

Belgotex Floors is a South African manufacturer serving a worldwide soft flooring export market.

They have a strong focus on innovation, quality and environmental imperatives.

The company is ISO 9001 and ISO 14001 certified continuously improving and monitoring its energy and water use, waste flows and carbon emissions.

About 5% of total annual energy needs are generated on site using solar PV panels.

The waste management applies Reduce, Reuse and Recycle hierarchy. It continuously works to reduce water by recycling and processes needing less water.

The Belgotex' sustainability report is in line with Level C GRI 3.1 format.

The company supports SCI initiatives plus the Wildlands: Conservation Trust Project Rhino KZN and "Green-preneurs" entrepreneurial social lift scheme.

The company is committed to the recruitment and development of employees drawn from the communities surrounding its factories and has initiated a Learnership intake focused on African born females.

Belgotex Floors is a certified Level 6 B-BBEE contributor.

The company puts health and safety before profit or production.

More information is at http://www.belgotex.co.za

This Environmental Product Declaration (EPD) discloses potential environmental outcomes compliant with ISO 14025 for business to business communication. The declared product, Belgotex SDX Tufted Miraclebac Broadloom Carpet was made by Belgotex Floors in Pietermaritzburg, South Africa in 2014 for sale and flooring application in commercial sectors with a 15 year warranty.

Belgotex floors®
A WORLD OF CHOICE

SDX Tufted Miraclebac Carpet®

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Different program EPDs may not be comparable as e.g. South African transport may be different from 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.

SDX Tufted Miraclebac Carpet®

1. Details of This Declaration

Program Operator	GreenTag Global Pty Ltd hereafter called Global GreenTag noted at www.globalgreentag.com	**EPD Number**	BELCT001-C-2015
		Date issue	5th February 2016
		Validity	5th February 2019
Reference PCR	Compliant with PCR:FP Building Floor Covering 2014		
Time	Made in 2014, sold from 2014 or 2015 for 20 years use		
Geography	Made in South Africa. Uses assumed as for South Africa.		
Application	Commercial building floor covering		
Declared unit	Belgotex Floors® carpet tiles/m^2		
Functional unit	Product manufacture use and disposition over 20 years		
Ecolabel Global GreenTag®	LCARate™ Silver Streamlined		
	GreenRate™ Level A		

2. Product Characterisation

Definition	SDX Tufted Miraclebac Broadloom Carpet by Belgotex Floors used in commercial buildings for floor coverings
Standards	Product complies with South African Bureau of Standards:
	SANS 1375 Ed. 3.02 (2012) Textile Floor Coverings: Pile Construction
	SANS 10177 Ed. 1.03 (2005) Part 4 Floor Covering Surface Fire Index (SFI)
	SANS 10361 Ed. 2 (2015) Textile Floor Coverings Appearance Retention (AR)

3. Base Material Origin and Detail

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

Table 1 Base Material

Function	Component	Production	Origin	Amount %
SDN Yarn	Nylon 6 Resin	Drill, Refine, Polymerise, Dye, Spin	Belgium	>50 <60.0
Filler	Limestone	Mine, Crush, Sieve & Haul	South Africa	>20 <30.0
Precoat	SBR Latex	Drill, Farm, Extract, Polymerise	Germany	>10 <20.0
PP Yarn	Polypropylene	Drill, Refine, Polymerise, Dye, Spin	South Africa	>4.0 <10
Pigments	Inks & Paste	Drill, Extract, Polymerise, Mill,	South Africa	>0 <0.2
	White Titania	Mine, Digest, Precipitate, Mill, Coat	South Africa	>0 <0.2
	Carbon black	Drill, Extract, Sieve, Mill, Blend	Germany	>0 <0.2
Thickener	Polyacrylate	Drill, Farm, Extract, Polymerise	South Africa	>0 <0.2
Stabiliser	SAS[1]	Mine, Farm, Extract, Polymerise	Germany	>0 <0.2
Spin Finish	Glycine	Acquire, React, Precipitate, Mill	South Africa	>0 <0.2
Biocide	Silver Salts	Mine, Refine, Mill Colloidal Blend	South Africa	>0 <0.2

[1] Sodium Alkyl Sulphate

4. Packaging, Installation, Use & Disposal

Packaging	Cardboard boxes & plastic wrap on reused pallets.
Service life	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 recycling.
Cleaning & Maintenance	The recommended cleaning and maintenance raises no ecosystem or human health concerns. Care and maintenance guides are on company websites.
Scenario	Weekly vacuum cleaning, twice yearly deep steam cleaning.
Recycling	Home mill, fabrication and installation scrap is reworked into new product.
Re-use	After 20 years service 60% product is assumed reusable for 40 more years.
Disposal	The fate is assumed recycled or donated. Incineration is rare in South Africa.

5. Whole of life Performance

Health Protection	The product does not contain levels of carcinogenic, toxic or hazardous substances that warrant ecological or human health concern cradle to grave. It passed the Ecospecifier Cautionary Assessment Process (ESCAP) and no issues or red light concerns existed for product human or ecological toxicity.
Effluent	The LCI results and ESCAP raised no red light concerns in emissions to water[2].
Waste	Cradle to grave waste to landfill was <0.01% hazardous in fuel supply chains.
Environmental Protection	Continuous improvement under the maker's certified ISO14001 EMS aims to avoid toxics, waste and pollution plus reduce their material and energy use.
Environmental Health Effects	Installed products are certified as having VOC's compliant with Green Star® IEQ VOC credits for indoor environment[3] quality credits. No other potential in-use impacts on environment or health are known.

6. Green Star SA™ Certified Credits

Products are relevant to the Green Building Council of South Africa's (GBCSA) Green Star SA™ scheme. If required this EPD is evidence the declared product meets the following Green Star SA™ credits. It may be used as evidence in Green Star SA™ submissions for those credits. The product is certified by GBCSA recognised Global GreenTag GreenRate™ to meet the following credits of Green Star SA™:

- Interiors Version 1 (V1): MAT-4: Flooring

GBCSA Disclaimer

Green Star SA™ is a registered mark of the Green Building Council of South Africa (GBCSA). Assessments shall not be reproduced in part at any time. For detailed technical information about Credit requirements refer to Green Star SA™ Technical Manuals. Rating Tools and Technical Manuals are subject to change by the GBCSA, and any decision regarding the award of credits towards a Green Star SA™ Rating is at the sole discretion of the GBCSA.

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

7. Results

Table 2 shows the product Life Cycle Assessment (LCA) Eco-Indicator 99 results for 20 years of use.

Table 2 Potential Impact Results

Evaluation Category	Unit	Result
Product mass	kg/item	2.31
EcoIndicator 99	ecopoint	1.24
Embodied Water	kl	136
Carbon Dioxide Equivalent Emissions[4]	kg CO_{2e}	20.1
Gross Energy and Feedstock	MJ	298
Renewable Primary Energy	MJ	5.03
Ecosystem Quality Damages	PDF*m^2*yr	9.88E-05
Human Health Damages	DALY	0.00168
Ozone Depletion	kg $R11_e$	3.04E-10
Acidification	kg SO_{2e}	0.490
Eutrophication	kg $PO_4^{3-}{}_e$	0.00874
Fossil Fuel Depletion	$MJ_{surplus}$	20.4
Mineral Resource	$MJ_{surplus}$	0.00414

Table 3 lists product Global GreenTag Sustainability Assessment Criteria (SAC) scores prior to weighting and then used to determine the GreenTag EcoPOINT[5]. Lower scores show greater environmental and social outcome benefits with fewer impacts and damages for sustainability. SAC scores are normalised against products that perform the same function and results with:

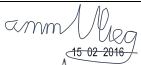
- 1.0 = worst base business as usual (BAU)
- 0.0 = neutral no improvement and
- -1.0= net positive benefit

Table 3 Normalised GreenTag EcoPOINT & SAC Scores

Category Potential	Results (-1 to +1)
Building Synergy	1.00
Health & Ecotoxicity	0.50
Biodiversity	0.64
LCA Score	0.91
Greenhouse Emission	0.85
Social Responsibility	0.40
GreenTag EcoPOINT	0.69

8. Verification of this Declaration

This EPD was approved on 03 02 2015 according to requirements of ISO14025 8.1.3b.

Role	Signature	Name	Position
LCA & EPD		Mathilde Vlieg	Vlieg LCA Consultant
LCA Review		Shloka Ashar	Global GreenTag Lead Auditor
PCR Review Chair		Delwyn Jones	Evah Institute CEO & Assessment Director
Internal EPD Review		David Baggs	Global GreenTag CEO & Program Director

[4] Stocker et al (eds.) Climate Change 2013: The Physical Science Basis, CH8, IPCC AR5, Cambridge U Press, UK.
[5] http://www.ecospecifier.com.au/knowledge-green/glossary.aspx#greentagecopoint

9. Life Cycle Assessment Method

LCA Author	Mathilde Vlieg of Vlieg LCA
LCA Provider	The Evah Institute as described at www.evah.com.au
Study Period	Factory data was collected from 2013 to 2015
Scope	Cradle to grave
LCA Method	Compliant with ISO 14040 and ISO 14044 Standards
LCIA method	EcoIndicator 99 Life Cycle Impact (LCIA) Assessment
System Boundaries	The LCA covers all operations in the system boundary depicted in Figure 2. It includes water, waste and emissions for all intermediates used to make and pack product as well as after sale delivery. Some background operations are not shown but all known operations were tracked to the cradle and included.
Phases	The study covered all known stages and phases including resource acquisition, fuel use, power generation, scrap recovery, manufacture, packing, freight, installation, use, disposal plus dispatch for reuse, recycling, landfill and recovery.
Processes	All known processes are included for water, fuel & energy use, resource acquisition, power generation, manufacture, transport, installation and landfill. All waste and emissions for depicted product intermediates and supply chain operations shown in Figure 3 are included.
Scenarios	Use, cleaning, maintenance plus disposition and re-use were scenario-based using Facility Management Association denoted and published typical operations.
Assumptions	Use is to typical South African Facility Management professional practice.

10. LCA System Phases

All cradle to grave phases and stages that the LCA covered are depicted in Figure 2.

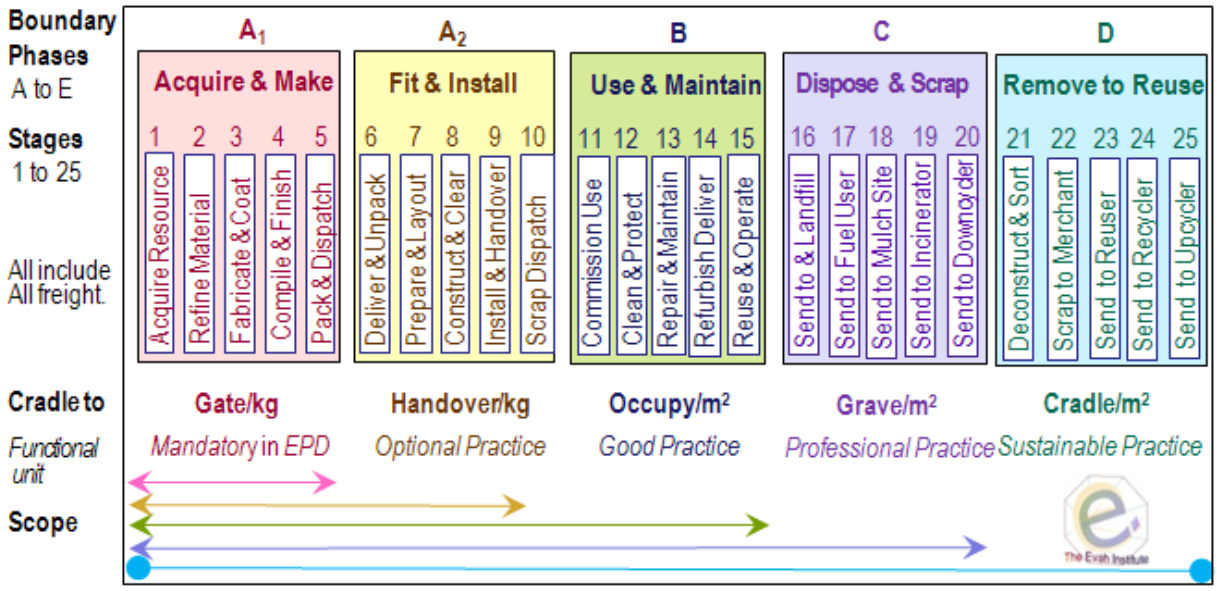


Figure 2 Phases and Stages Cradle to Grave

11. Supply Chain Modelling

Industry supply chain databases cover all known domestic and global scope 1 and 2 operations. 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.

They exclude scope 3 burdens from:

- Building capital facilities, churn updates and equipment; Noise and dehydration as well as
- Incidental activities and travel of employees engaged on-site in production facilities.

A flow chart in Figure 3 shows key product supply chain operations from cradle to disposition.

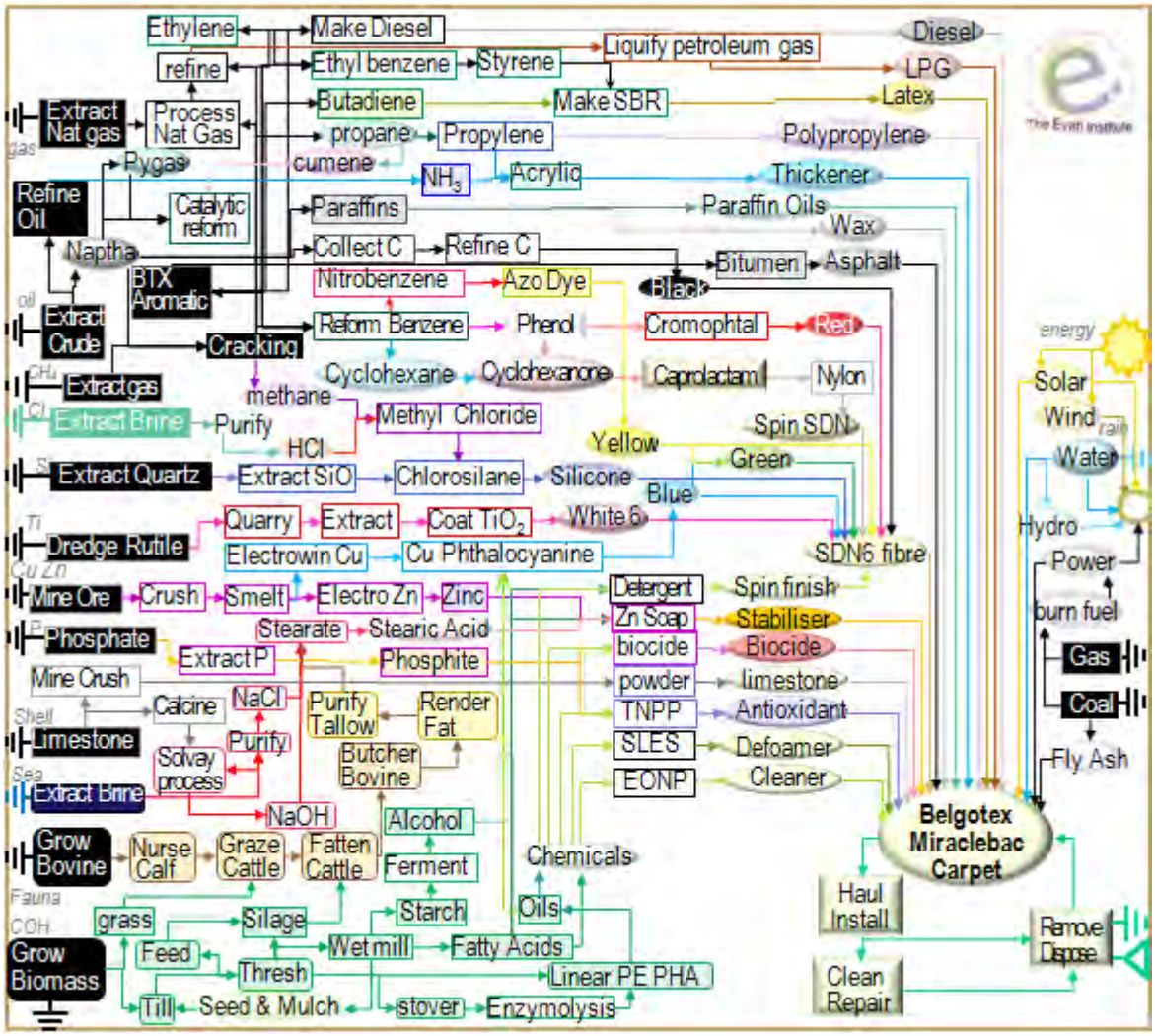


Figure 3 Major Product Operations

12. Data Sources Representativeness and Quality

Metadata on corporate locations, logistics and technology used is documented along with market share, management systems, standards and commitment to improved environmental performance. The data employed for modelling the state of art of each operation including all known process:

- 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 has been sourced from clients, their Annual Reports and research papers since 1995. 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 about manufacturers' operations is also sourced from:

- Supply chain mills, their technical manuals, corporate annual reports and sector experts;
- Manufacturers development license applications, specifications, websites;
- Library, document, NPI and web searches, review papers, building manuals and
- Global Industry Association and Government reports on Best Available Technology (BAT).

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 4[6]. Data sets with uncertainties in any of these qualities greater than >±30% are not used.

Table 4 Data Quality Uncertainty (U) for 2015

Metric σ_g	U ±0.01	U ±0.05	U ±0.10	U ±0.20	U ±0.30
Temporal	Post 2014	Post 2010	Post 2006	Post 2001	Pre 2001
Duration	>3yr	3yr	2yr	1yr	<1yr
Data Source	Process	Line	Plant	Corporate	Sector
Technology	Actual	Comparable	Within Class	Conventional	Within Sector
Reliability on	Site Audit	Expert verify	Region Report	Sector Report	Academic
Precision to	Process	Line	Plant	Company	Industry
Geography	Process	Line	Plant	Nation	Continent
True of the	Process	Mill	Company	Group	Industry
Sites cover of	>50%	>25%	>10%	>5%	<5%
Sample size	>66% trend	>25% trend	>10% batch	>5% batch	Academic
Cut-off mass	0.01%	0.05%	0.1%	0.5%	1%
Consistent to	±0.01	<±0.05	<±0.10	<±0.20	<±0.30
Reproducible	>98% confidence	>95%	>90%	>80%	<70%
Certainty	Very High	High	Typical	Poor	>±0.30 unused

The Evah databases exist in top zones of commercial global modelling and calculating engines. Quality control methods are applied to ensure:

- Coverage of place in time with all information for each dataset noted, checked and updated;
- Consistency to Evah guidelines[7] 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 the active databases are updated annually. As each project is modelled and new data is available the databases are updated and audited by external certifiers.

[6] Evah Institute data quality control system accords with UNEP SETAC Global LCI Database Quality 2010 Guidelines
[7] Evah Tools, Databases and Methodology at http://www.evah.com.au/tools.html

13. Assumptions for Supply Chain Modelling

Industry sector inventory data is also developed to represent business as usual as well as BAT practices with operations covering industry supply chains and infrastructure in South Africa and overseas. Environmental performance is evaluated across sectors by mining, farming, fishery, forestry, freight, infrastructure, manufacture and other process technology type plus their license conditions. South African 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 2012 to 2015
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 2012 to 2015
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 2014, GGT 2014, Boustead 2013, Simapro 2014, IBIS 2013, EcoInvent 2014,
Data mix	Power grid and renewable shares updated to latest IEA 2014 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	Evah Institute 2015; Global Green Tag Researchers 2015;IBIS 2015
Data Generator	Manufacturers, Evah Institute 2015; GGT 2015; Meta: IBIS 2012, Other pre 2015
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 South African technology
Imported fuel	Mix is from nearest sources is e.g. UAE, SE Asia, Canada or New Zealand
Finishes	Processing inputs with finishing burdens are factored in. If not that is denoted
Validation	
Accuracy	10^{th} generation study is ± 5 to 15% uncertain due to some background data
Completeness	All significant operations are tracked and documented from the cradle to grave
Precision	Tracking of >90% flows applies a 90:10 rule sequentially to 99.9% and beyond
Allocation	%100 to co products on reaction stoichiometry by energetic or mass fraction
Burdens	All resource use from & emissions to community air land, water are included
Plausibility	Results are checked and benchmarked against BAT, BAU & worst practice
Sensitivity	Calculated U is reported & compared to libraries of Bath U RICE & EcoInvent 3
Validity Checks	Are made versus Plastics Europe, Ecobilan, GaBi & or Industry LCA Literature

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/baselconventiontext-e.pdf

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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 (2014) Portal http://www.plasticseurope.org/plastics-sustainability/eco-profiles.aspx

Pre (2014) 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 (2014) Persistent Organic Pollutants http://www.chem.unep.ch/pops/ The UN

USLCI (2014) Life-Cycle Inventory Database https://www.lcacommons.gov/nrel/search, USA

U.S. Geological Survey National Minerals http://minerals.usgs.gov/minerals/pubs/country/ USA

US EPA (2014) 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