Environmental Product Declaration

In accordance with ISO 14025 for:

EcoWorx®

Shaw Contract (Shaw Europe Ltd)

Programme:	The International EPD® System www.environdec.com
Programme operator:	EPD International AB
EPD registration number:	S-P-01241
ECO Platform reg. number:	00000719
Issue date:	29th May 2018
Validity date:	24th May 2023 *An EPD should provide current information and may be updated if conditions change. The stated validity is therefore subject to the continued registration and publication at www.environdec.com.*
Geographical scope:	Europe

shaw contract®

1. Background

Guided by Cradle to Cradle philosophies, Shaw Contract's approach to sustainability focuses on transparency, material health, material reutilisation, efficient use of resources and social responsibility.

We employ sustainable practices throughout the lifecycle of our products. We use materials and resources efficiently. We use alternative and renewable energy sources when possible and we design and operate our facilities and manufacturing processes in accordance with widely recognised sustainability and safety standards.

This Environmental Product Declarations (EPD) of EcoWorx® carpet tiles allow all stakeholders to select products and materials based upon a full understanding of their environmental impact.

1.1. Commissioner and Author

This Life Cycle Assessment has been commissioned by Shaw Europe Ltd and is authored by Alan Best (Alan Best Sustainability Ltd, Cumbrae House, 2 Penwortham Court, Penwortham, Preston, Lancashire PR1 9YX, UK)

The LCA report is dated 8th November 2017 and complies to the requirements set in the ISO 14040 [1], ISO 14044 [2], ISO 14025 [3] and, in case of construction materials, the EN 15804 [4].

EcoChain version 2.10 has been used in the preparation of this report [5].

1.2. Publisher / program operator, name, address

EPD International AB, Box 210 60 SE -100 31, Stockholm, Sweden

1.3. Name of declared product

EcoWorx® Carpet Tiles (CPC-code 27230 - Carpets and other textile flooring, tufted)

1.4. Declaration owner

Shaw Europe Ltd, 33 Great Sutton Street, London, EC1V 0DX. A wholly owned subsidiary of the manufacturer: Shaw Industries Group Inc., 616 Walnut Avenue Dalton Georgia 30721-4409 USA.

1.5. Variability for average declaration

Based on the production and specification of products in the EcoWorx® range with face fibre weights of 450 gsm to 1,358 gsm with a weighted average of 625 gsm. The weighted average total tile weight including the EcoWorx® backing system is 3,400 gsm.

1.6. Product composition

The product is a carpet tile comprising EcoSolution Q ® polyamide 6 nylon face fibre on the EcoWorx® backing system consisting of polyolefin compound, recycled materials, and a fibreglass reinforcement layer.

2. Programme-related information and verification

The EPD owner has the sole ownership, liability, and responsibility for the EPD. EPDs within the same product category but from different programmes may not be comparable. EPDs of construction products may not be comparable if they do not comply with EN 15804.

Programme:	The International EPD® System EPD International AB Box 210 60 SE-100 31 Stockholm Sweden www.environdec.com info@environdec.com
EPD registration number:	S-P-01241
Published:	2018-05-29
Valid until:	2023-05-24
Product Category Rules:	PCR 2012:01. The International EPD® System PCR for Construction Products and Construction Services. Version 2.2.
Product group classification:	UN CPC 27230
Reference year for data:	2016
Geographical scope:	Europe

CEN standard EN 15804 serves as the Core Product Category Rules (PCR)
Product category rules (PCR): PCR 2012:01 Construction products and Construction services, Version 2.2, 2017-05-30
PCR review was conducted by: The Technical Committee of the International EPD® System. Chair: Massimo Marino, Contact via info@environdec.com
Independent verification of the declaration and data, according to ISO 14025:2006:
☐ EPD Process Certification (internal) ☑ EPD Verification (external)
Third party verifier*:* *Simon Gandy, Ricardo Energy and Environment* Accredited by: *Approved by the International EPD System*
Procedure for follow-up of data during EPD validity involves third party verifier:
☐ Yes ☑ No

3. Scope and reference unit

The LCA is based upon production data from the period January – September 2016 in the production of EcoWorx® at Shaw Industries Carpet Tile Plants 15 and 13 in Cartersville, Georgia, USA.

This assessment covers the production phase with demolition and waste processing ('cradle-to-gate with options') as defined in EN15804:2012 = A1 2013.

The functional unit has been defined as follows: the production of 1m^2 of EcoWorx® carpet tile.

4. Product Description

EcoWorx® is a commercial carpet tile, for use as a floor covering in accordance with manufacturer's guidelines.

This declaration covers all products in the EcoWorx® tile range and which feature the EcoWorx® backing system together with EcoSolution Q ® nylon face fibre.

Each tile in the EcoWorx® range comprises Shaw's unique face fibre, EcoSolution Q® which is nylon 6 manufactured with a high percentage of recycled material on the EcoWorx® backing system which is a polyolefin compound, together with recycled materials and a fibreglass reinforcement layer.

The EcoSolution Q face fibre is tufted into a primary backing sheet containing recycled content. Latex is added to anchor the fibre and the EcoWorx® backing system is then applied.

EcoWorx® is suitable for use in all commercial settings. It has a life span of 15 years and it comes with a lifetime warranty (subject only to installation and maintenance being carried out in line with manufacturer's guidelines).

The product meets both internal and external performance standards including those established in the EU under EN 1307 and EN 10874 for a product suitable for heavy and general commercial installations.

An end of life product collection and recycling scheme is in operation and details may be obtained at www.shawcontract.com

4.1. Product Manufacturing

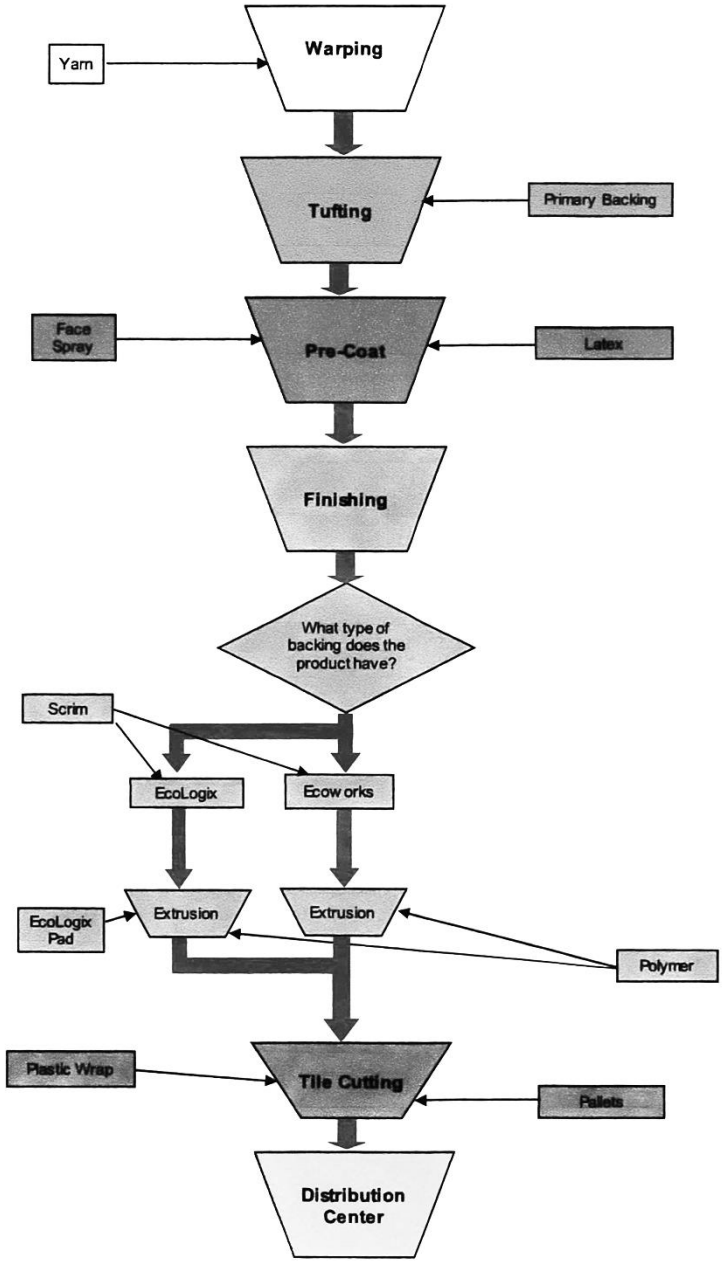
EcoWorx® is manufactured in the USA in ISO 9001 and ISO 14001 certified facilities or equivalent. Raw materials are responsibly sourced through supply chain, raw materials and waste management programmes.

Nylon 6 face fibre is produced internally by Shaw Industries in the USA through polymerisation of caprolactam. The EcoSolution® Q fibre is then passed through extrusion and finishing processes to produce yarn with the required functional and aesthetic qualities.

Waste from these processes is collected and reprocessed and blended with virgin material to give EcoSolution® Q yarn an average 25% post-industrial content.

The yarn is tufted into the primary backing layer, after which a performance latex pre-coat is applied to assure maximum tuft bind. A first layer of EcoWorx® polyolefin compound coating is then applied, followed by the application of a fibreglass reinforcement layer providing dimensional stability. A final layer of EcoWorx® backing completes the process. The tiles are then die-cut and packaged for distribution.

Figure 1 - EcoWorx® Manufacturing Process



No co-products are produced by the manufacturing of EcoWorx®
Some 'green energy' is used in the manufacture of EcoWorx®, deriving from solar panels on the factory roof.

5. Life Cycle Inventory Analysis

5.1. System boundaries and cut-off criteria

The processes and life cycle modules that are included in this study are defined by system boundaries. In this LCA of EcoWorx ® Carpet tile the following stages are covered:

- Raw material supply, transport and manufacturing (A1-A3)

- Transport to and installation at the building site (A4-A5)
- De-construction, transport, waste processing and disposal (C1-C4)
- An end of life product collection and recycling scheme is in operation (details may be obtained at www.shawcontract.com). However, the products are new to market and so the scheme has not yet processed sufficient material to produce meaningful data to declare against module D at this stage

The system boundary for the purposes of this study begins with raw material supply. The system boundary with nature occur in the manufacturing of raw materials, the principal ones (nylon 6 and polyolefin) being fossil fuel derivatives.

All relevant inputs and outputs - like emissions, energy and materials - have been considered in this LCA and (in accordance with EN15804) the total neglected input flows per module do not exceed 5% of energy usage and mass.

No secondary materials or secondary fuels as raw materials are allocated.

The life cycle inventory comprises of data gathering and calculation procedures to quantify all relevant environmental impacts (inputs and outputs) of the product system. In this analysis, the following impacts are included:

- Emissions to air when using thermal energy of CO_2, CO, NOx (NO_2 and N_2O), SO_2, C_2H_2 and particulate matter (PM10: particles < 10 µm);
- Emissions to water of Chemical Oxygen Demand (COD), Biochemical Oxygen Demand (BOD), P-total, N-total and solid matter (PM10: particles < 10 µm);
- Emissions to the soil of Polycyclic Aromatic Hydrocarbons (PAHs) and heavy metals.

5.2. Data collection procedures

Primary production data gathered during an audit by BRE in 2016 has been used, and this remains representative of production processes. Where electricity use was not sub-metered for the individual extrusion and finishing processes, they were allocated based on estimates by industry experts. As such, these are the only instances where value decision or expert opinion may have influenced project outcomes.

The LCA data collected does not specifically include data from the use or end of line stages of the EcoWorx® lifecycle but any assumptions made are clearly stated.

All suppliers to Shaw Contract have been requested to send environmentally-relevant product information for this assessment. All suppliers have, in case it was present, delivered this data in the shape of an EPD, safety data sheets, certification and energy documentation. Based on this information, representative background data (process sheets) have been selected.

When this input from suppliers was not available, the data for the upstream supply chain derives from Ecoinvent (version 3.2) and, when possible, are modelled according to the EN15804 in the EcoChain application. According to the Ecoinvent standards, the background process data ("Process charts") includes infrastructure and capital goods.

5.3. Data sources

The data of products, by-products and the waste in this report were derived from energy and resource administrations at the production site. Primary production data from the year 2016 has been used. Emissions to air, water and soil and other environmental impacts associated with the production of EcoWorx® Carpet tile were derived from emission registrations.

5.4. Inventory and allocation

In this section the quantity, quality and allocation of various materials, energy streams and emissions by processes and products are outlined. The system boundaries that have been adopted are in accordance with modular approach of EN 15804.

5.5. Materials (Module A1)

All relevant resources, materials and services in production phase A1 have been included in this study. The composition of EcoWorx® Carpet tile per sq. metre is given in the table below. The compositions are based on the Bills of Materials supplied by Shaw Contract manufactured in 2016.

Table 1: The composition of the product per declared unit.

Material	**Weight of material in EcoWorx®, 1 m^2**
Alumina Trihydrate	0.134 kg
Calcium Carbonate	1.638 kg
Penetrant	0.001 kg
Thickener	0.002 kg
Latex	0.358 kg
Tackifier	0.138 kg
Eco Solution Q nylon 6 face fibre	0.538 kg
Stain retardant	0.001 kg
Glass Cullet	0.029 kg
Latex stabiliser emulsifier	0.001 kg
Stain blocker	0.009 kg
LLDPE (Linear Low-Density Polyethylene)	0.015 kg
Fibreglass scrim	0.055 kg
Non-Woven Primary Backing	0.085 kg
Thickener	0.003 kg
Froth aid	0.003 kg
Paraffinic oil	0.017 kg
Dispersion agent	0.021 kg
Total cardboard	0.137 kg
Total pallets	0.115 kg
Total Regrind Usage	0.169 kg
Total stretch wrap/cling film	0.020 kg
VAE binder	0.161 kg
Acrylate resin	0.032 kg

5.6. Transport (Module A2)

All relevant transport to Shaw Contract's production plant has been included in this study.

The materials of EcoWorx® Carpet Tile are transported from various locations to the main tile manufacturing sites in Cartersville, GA. Transport distances are always calculated from the origin of the material. Whenever

materials are transported via distribution centres, then transport between those distribution centres are also included.

The distances, as entered in EcoChain, are used as the basis of the calculation of impact by EcoChain. This applies to freight per truck, as well as cargo per container ship or other transportation method.

5.7. Production (Module A3)

The production processes are modelled using specific values from primary data collection at the production site.

All relevant production processes in module A3, such as packaging and production losses, have been included in this assessment. Table 2 illustrates which processes are present at the production site of Shaw Contract. In addition, it is illustrated how the total energy usage on the site is distributed over the individual production processes.

Primary production data from the period January – September 2016 has been used.

Table 2: Utilities usage of the processes at Shaw Contract

	LPG	**Electricity mix**	**Green Power**	**Water supply**	**Water treatment**	**Natural Gas**
		Low voltage US - Average	Average			Global
	litres	MWh	MWh	m^3	m^3	GJ
Transport	510,844	0	0	0	0	0
Plant 15	0	41,443	1,152	46,771	46,771	91,357
Plant 13	0	6,162	0	45,360	45,360	57,394
Total	*510,844*	*47,605*	*1,152*	*92,131*	*92,131*	*148,752*

Where electricity use was not sub-metered for the individual extrusion and finishing processes, they were allocated based on estimates by industry experts. The electricity that is used for the office building, which is also on the production site, is perceived as overhead and omitted form this study.

The production site does not have any dangerous waste streams.

All other substances and emissions that are released during the production process are included in this assessment.

5.8. Transport to and installation at the building site (Modules A4-A5)

The module A4 impact of an EcoWorx® carpet tile derives from three factors.

1. Transport by truck from the Shaw production facility to port (542 km) by truck. Calculated as Ecoinvent v 3.4 Cut-off - transport, freight, lorry, unspecified//[GLO] market for transport, freight, lorry, unspecified
2. Transport by ship from Savannah, GA USA to Southampton, UK (6643 km). Calculated as Ecoinvent v 3.4 Cut-off: transport, freight, sea, transoceanic ship//[GLO] market for transport, freight, sea, transoceanic ship
3. The average distance EcoWorx® carpet tile travels from the ports of arrival to installation sites is 200 km by road to the use site. The assumed means of transport is a generic truck (Ecoinvent v 3.4 Cut-off: transport, freight, lorry, unspecified//[GLO] market for transport, freight, lorry, unspecified).

This process assumes a load factor of 50%. In other words, the truck is assumed to be fully loaded on the way to the construction site and empty upon return

No energy use is allocated to the installation process because the fitting of EcoWorx® on site is manual work. During the installation process approximately 90ml of adhesive is used per unit.

5.9. Use of the installed product (Module B1)

The applied materials do not cause significant emissions in use.

5.10. Maintenance (Module B2)

This EPD includes impacts associated with the cleaning of a EcoWorx™ carpet tile across its 15-year lifetime. Actual cleaning regimes will vary according to use, but for the purposes of the calculations it is assumed that each tile will be vacuum-cleaned 208 times per year and wet-cleaned 1.5 times per year. This adds up to yearly total per m^2 of tile of 0.314 kWh for vacuum-cleaning. The yearly total of wet-cleaning requires 4 kg of water, 0.09 kg of cleaning agent and 0.004 m^3 of waste water treatment. The cleaning agent is a non-ionic surfactant diluted to 1:25 with water.

5.11. In use energy and water use (Module B3 – B7)

There is no in-use energy or water consumption by the product

5.12. Demolition and waste processing phases (Module C1-C4)

The demolition and waste processing stages C1-C4 of EcoWorx® Carpet tile are considered in the study.

These phases encompass demolition (C1), transport to the waste processing site (C2), waste processing (until waste status is lost; C3) and waste disposal (C4).

It is assumed that no materials or energy is used for de-constructing EcoWorx®. Removal of tiles is a manual process requiring no energy or chemical use as a release bond adhesive or loose lay is the normal installation method.

To model a representative scenario, it is assumed that 100% will go to landfill and that the transport distance is 250km by road.

5.13. Environmental loads and benefits of recycling and product reuse (Module D)

The product was introduced to the EU market in 2008 and given the life span of the product (15 years), no meaningful data is yet available on collection and post-consumer recycling. However, an end of life product collection and recycling scheme is in operation (details may be obtained at www.shawcontract.com)

6. Life Cycle Impact Assessment Results and Interpretation

The LCA profile of EcoWorx® Carpet tile is presented in **Table 4**.

All environmental emissions from the inventory are multiplied by the characterisation factors from the CML-VLCA impact assessment method, after which these values are added up to provide the total environmental impact per impact category. These LCA results are relative expressions and do not predict impacts on category endpoints, the exceeding of thresholds, safety margins or risks.

Table 3: System Boundary

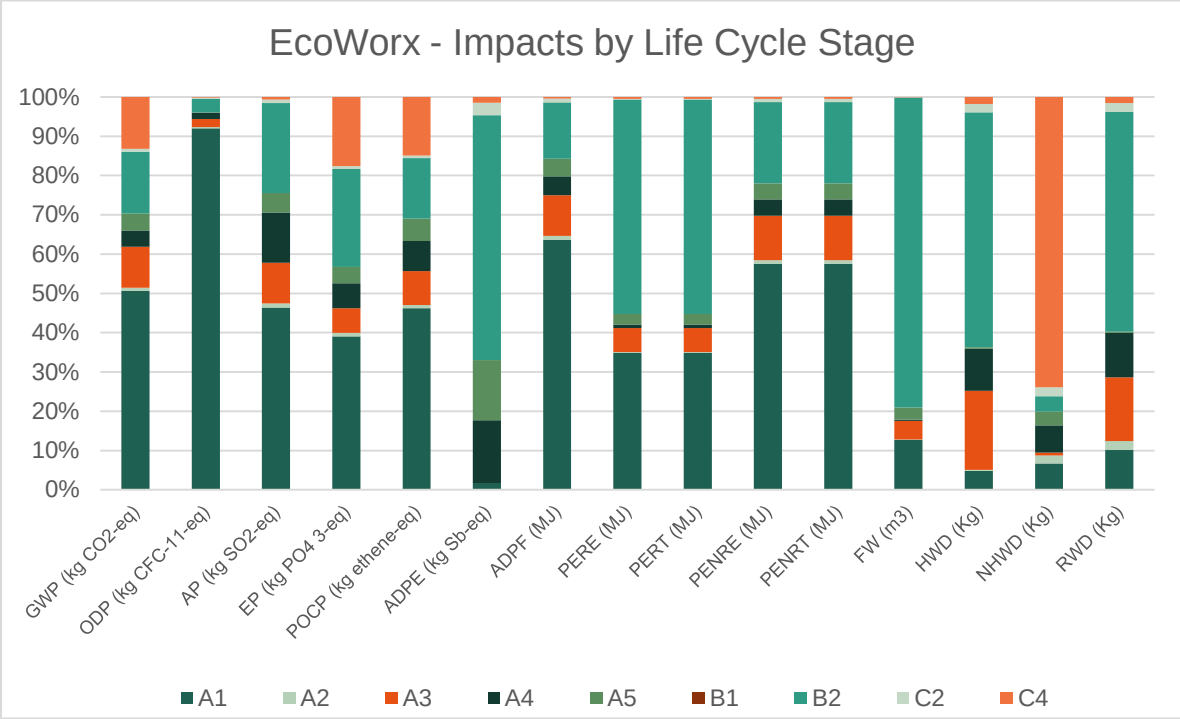
Description of the system boundary (X = Included in LCA; MND = Module Not declared)																
Product stage			Construction process stage		Use Stage							End of life stage				Benefits and loads beyond the system boundaries
Raw material supply	Transport	Manufacturing	Transport	Construction installation process	Use	Maintenance	Repair	Replacement	Refurbishment	Operational energy use	Operational water use	De-construction demolition	Transport	Waste processing	Disposal	Reuse-Recovery-recycling-potential
A1	A2	A3	A4	A5	B1	B2	B3	B4	B5	B6	B7	C1	C2	C3	C4	D
X	X	X	X	X	MND	X	MND	MND	MND	MND	MND	MND	X	MND	X	MND

Table 4: Results for 1 m^2 EcoWorx® Carpet tile

Impact Category	Unit	A1-A3	A4	A5	B2	C2	C4	Total
Global warming potential	kg CO_2-eq	9.61	0.64	0.68	2.44	0.12	2.05	**15.53**
Ozone depletion	kg CFC-11-eq	6.39E-06	1.10E-07	6.23E-09	2.31E-07	2.24E-08	1.12E-08	**6.77E-06**
Acidification	kg SO_2-eq	0.03	7.37E-03	2.86E-03	0.01	5.25E-04	3.88E-04	**0.06**
Eutrophication potential	kg PO_4^{3-}-eq	5.74E-03	7.90E-04	5.13E-04	3.10E-03	9.65E-05	2.18E-03	**0.01**
Tropospheric ozone photochemical oxidants	kg ethene-eq	1.83E-03	2.51E-04	1.87E-04	5.04E-04	2.12E-05	4.90E-04	**3.28E-03**
Abiotic depletion – non-fossil	kg Sb-eq	4.88E-04	4.57E-03	4.37E-03	0.02	8.95E-04	4.30E-04	**0.03**
Abiotic depletion – fossil	MJ	153.34	9.85	9.08	29.30	1.96	0.93	**204.46**
RESOURCES USED								
Primary renewable energy (resource)	MJ	8.28	0.17	0.55	10.97	0.03	0.10	**20.10**
Primary renewable energy (material)	MJ	0	0	0	0	0	0	**0**
Primary renewable energy (total)	MJ	8.28	0.17	0.55	10.97	0.03	0.10	**20.10**
Primary non-renewable energy (resource)	MJ	168.62	10.12	9.76	50.14	1.99	1.16	**241.79**
Primary non-renewable energy (material)	MJ	0	0	0	0	0	0	**0**
Primary non-renewable energy (total)	MJ	168.62	10.12	9.76	50.14	1.99	1.16	**241.79**
Use of secondary material	kg	0	0	0	0	0	0	**0**
Use of fresh water	m^3	0.03	6.17E-04	5.17E-03	0.13	1.08E-04	1.63E-04	**0.17**
Use of renewable secondary fuels	MJ	0	0	0	0	0	0	**0**
Use of non-renewable secondary fuels	MJ	0	0	0	0	0	0	**0**
OUTPUT FLOWS AND WASTE								
Hazardous waste	kg	1.63E-04	6.91E-05	2.75E-06	3.87E-04	1.38E-05	1.17E-05	**6.47E-04**
Non-hazardous waste	kg	0.47	0.35	0.18	0.20	0.11	3.69	**4.99**
Radioactive waste	kg	1.60E-04	6.33E-05	1.88E-06	3.13E-04	1.26E-05	8.54E-06	**5.59E-04**

All wastes are assumed to go to landfill, so there are no components for re-use, materials for recycling or recovery, or exported energy to report.

7. Interpretation Table



GWP = Global warming potential; ODP = Depletion potential of the stratospheric ozone layer; AP = Acidification potential of land and water; EP = Eutrophication potential; POCP = Formation potential of tropospheric ozone photochemical oxidants; ADPE = Abiotic depletion potential for non-fossil resources; ADPF = Abiotic depletion potential for fossil resources

PERE = Use of renewable primary energy excluding renewable primary energy resources used as raw materials; PERM = Use of renewable primary energy resources used as raw materials; PERT = Total use of renewable primary energy resources; PENRE = Use of non-renewable primary energy excluding non-renewable primary energy resources used as raw materials; PENRM = Use of non-renewable primary energy resources used as raw materials; PENRT = Total use of non-renewable primary energy resources; SM = Use of secondary material; RSF = Use of renewable secondary fuels; NRSF = Use of non-renewable secondary fuels; FW = Use of net fresh water

HWD = Hazardous waste disposed; NHWD = Non-hazardous waste disposed; RWD = Radioactive waste disposed

The following table provides an identification of the most significant contributors to a selection of the parameters presented above:

Impact category	**Most significant contributor**
Global Warming Potential	The manufacturing phase (A1-A3) accounts for the largest single contribution of greenhouse gases of an EcoWorx® tile, with >50% (4.95 kg CO_2 eq) of the manufacturing impact deriving from the production of EcoSolution® Q. However, it should be noted that the use of 25% of recycled material in this process makes a significant reduction to a conventionally manufactured Nylon 6.
Total Primary Renewable Energy (PERT)	The assessment of electricity used during the maintenance of EcoWorx® over its useful life time is based upon Ecoinvent v3.4 Cut-off, 'low voltage//[RER] market group for electricity, low voltage'. Given this, the principal impact derives from the routine vacuum cleaning.

8. References

[1] 'ISO 14040: Environmental management - Life cycle assessment – Principles and Framework', International Organization for Standardization, ISO14040:2006.

[2] 'ISO 14044: Environmental management - Life cycle assessment - Requirements and guidelines', International Organization for Standardization, ISO14044:2006.

[3] 'ISO 14025: Environmental labels and declarations -- Type III environmental declarations -- Principles and procedures', International Organization for Standardization, ISO14025:2006.

[4] 'NEN-EN 15804: Sustainability of construction works - Environmental product declarations - Core rules for the product category of construction products', NEN-EN 15804:2012+A1:2013.

[5] EcoChain, 2017, web: http://app.ecochain.com.