

Carpet Tile: Graphlar[®], Needlefelt

Interface

Modular Carpet with Graphlar[®] Backing & Needlefelt

Interface[®]

Interface is the world's largest manufacturer of commercial carpet tile. For nearly 40 years, the company has consistently led the industry through innovation and now leads the industry in environmental sustainability.

Interface is setting the pace for development of modular carpet using materials and processes that take less from the environment, and is well along the path to "Mission Zero[®]," the company's promise to eliminate any negative impact it has on the environment by the year 2020.

Interface's worldwide carpet manufacturing facilities maintain third party registration to the ISO 14001 Environmental Management System standard, and the company obtained the first-ever Environmental Product Declaration (EPD) for the commercial floor covering industry in North America. The company is recognized globally for its commitment to build environmental considerations into its business decisions.

For more information visit
www.interface.com

ENVIRONMENTAL PRODUCT DECLARATION

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Modular Carpet with Graphlar® & Needlefelt

According to ISO 14025

This declaration is an environmental product declaration in accordance with ISO 14025 that describes the environmental characteristics of the aforementioned product. It promotes the development of sustainable products. This is a certified declaration and all relevant environmental information is disclosed.



PROGRAM OPERATOR	UL Environment
DECLARATION HOLDER	Interface
DECLARATION NUMBER	110919.11CA29311.122.1
DECLARED PRODUCT	Modular carpet with needlefelt on Graphlar® backing manufactured for export to the US by Interface in Scherpenzeel, Netherlands.
REFERENCE PCR	PCR-Floorcoverings Harmonised Rules for Textile, Laminate and Resilient Floor Coverings

DATE OF ISSUE	January 16, 2013
PERIOD OF VALIDITY	5 years

CONTENTS OF THE DECLARATION	Product definition and information about building physics Information about basic material and the material's origin Description of the product's manufacture Indication of product processing Information about the in-use conditions Life cycle assessment results Testing results and verifications
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The PCR review was conducted by:	Insitut Bauen und Umwelt e.V
	Accepted by the Advisory board
	Rheinufer 108 53639 Königswinter Germany info@bau-umwelt.com

This declaration was independently verified in accordance with ISO 14025 by Underwriters Laboratories <input type="checkbox"/> INTERNAL <input checked="" type="checkbox"/> EXTERNAL	
	Loretta Tam

This life cycle assessment was independently verified in accordance with ISO 14044 and the reference PCR by:	
	Eva Schmincke



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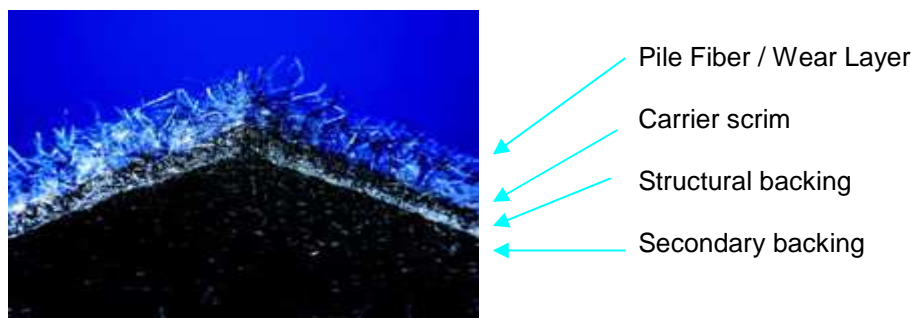
Product Definition

Modular carpet with a needelfelt of blended fibers combined with Graphlar® backing. The products are manufactured by Interface in Scherpenzeel, Netherlands.

Product Classification and Description

This declaration covers the styles Flor and Super Flor. The variation between products is mainly fiber weight and fiber composition. The impact data is for an average of these styles.

Figure 1. Diagram of product construction



Definitions

- **Pile Fiber / Wear Layer** – a needelfelt cloth of recycled and virgin polyester, Nylon 6, polypropylene, and natural fibers (Flor styles only)
- **Carrier scrim** - polyester fabric
- **Structural Backing** – bitumen based backing containing post industrial recycled content which gives structure and dimensional stability to the modular carpet.
- **Secondary Backing** – nonwoven polypropylene fabric

Range of Applications

Modular installation of textile floor covering in commercial buildings

Product Standards and Approvals

- | | |
|-----------------------------|-----------------|
| • ASTM E-648 Radiant Panel | Class 1 |
| • ASTM E-662 Smoke Density | ≤ 450 |
| • AATCC -134 Static | < 3.0 KV |
| • AATCC 16-E Light fastness | ≥ 4.0 @ 60 AFUs |

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Accreditation

- ISO9001 Quality Management System
- ISO14001 Environmental Management System

Delivery Status

Figure 2. Specification of product construction

Characteristics	Nominal values		Unit
	Flor	Super Flor	
Type of manufacture	Needlefelt nonwoven wear layer		
Pile fiber composition	Blend of nylon 6, polyester, polypropylene, and natural fibers (Flor styles only)		100%
Carrier	Polyester		100%
Backing	Graphlar® with 60% recycled material		100%
Secondary backing	Polypropylene		100%
	Flor	Super Flor	Unit
Surface pile weight	1460	1435	g/m ²
Total Carpet Weight	4505	4480	g/m ²



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Material Content

Material Content of the Product

Layer	Component	Material (CAS #)	Availability	Mass %		Origin
				Flor	Super Flor	
Wear Layer	Face Cloth/Yarn	Nylon 6 (25038-54-4)	Fossil resource, limited	11.3%	16.3%	Europe
		Natural fibers (Mixture)	Renewable material, abundant	5.7%	0.0%	Europe
		Polyester (25038-59-9)	Fossil resource, limited	11.0%	10.6%	Europe
		Polypropylene	Fossil resource, limited	3.0%	4.7%	Europe
		Recycled Polyester (25038-59-9)	Recycled material, abundant	2.2%	1.3%	Europe
Carrier	Scrim	Polyester (25038-59-9)	Fossil resource, limited	1.3%	1.3%	Europe
Structural Backing	Backing	Bitumen (8052-42-4)	Fossil resource, limited	64.6%	64.9%	Europe
		SBS (9003-55-8)	Fossil resource, limited			
		Recycled Limestone (1317-65-3)	Recycled material, abundant			
Secondary	Nonwoven fabric	Polypropylene	Fossil resource, limited	0.9%	0.9%	Europe

Production of Main Materials

Polypropylene – thermoplastic material that is formed by polymerization of propene

Polyester - polymers containing ester functional groups. The term is used for a large family of polyester materials. They type of polyester used in this product is polyethylene terephthalate.

Recycled polyester – recycled from post consumer PET bottles

Nylon 6 - thermoplastic formed through ring opening polymerization of caprolactam

Natural fibers – from shearing of yaks and cashmere goats



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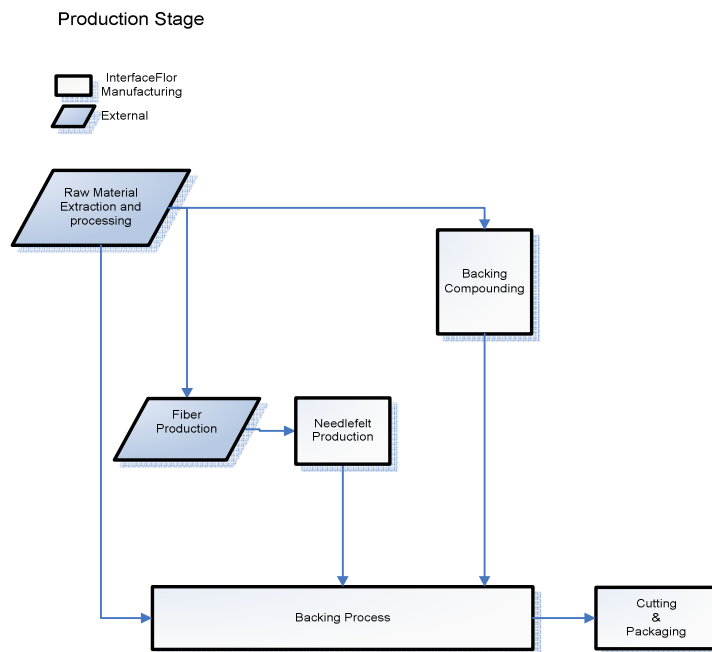
Bitumen – visco-elastic material, consisting of hydrocarbons and their derivatives. It is obtain by refinery processes of petroleum.

SBS – styrene butadiene styrene made through the polymerization of styrene and butadiene

Limestone – calcium carbonate from pulverized limestone rock

Production of the Floor Covering

Figure 3. Diagram of production process



Health, Safety, and Environmental Aspects During Production

Manufacture of the product complies with the applicable basic EU regulations and any stricter national-law provisions at the place of manufacture.

Delivery and Installation of the Floor Covering

Delivery

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The product is most commonly transported by sea from Europe to the US and then by truck. For the life cycle assessment, an average transportation of 5860 kilometers by sea and 805 kilometers by truck (34-40 tonne truck with 85% utilization of its payload) to the place of installation is assumed.

Installation

Installation of this product does not require adhesive application, but is done using TacTiles® preventing damage to the subfloor, increasing ease of removal and recycling, and installation during occupancy. For full installation instructions, see the Interface Installation Guide.



Health, Safety, and Environmental Aspects During Installation

The VOCs associated with traditional flooring adhesives are avoided for both the installers and the building occupants by TacTiles® installation method. Carpet tile does not require a foam cushion underlayment used in traditional broadloom carpet installations. The TacTiles® method creates a floating floor, preventing damage to the subfloor and simplifying removal at end of life.

Waste

Waste is minimized by the modular aspect of the carpet tile. While installation waste can be sent to landfill or incineration, the preferred method is recycling through Interface's ReEntry® 2.0 take back program. Contact Interface ReEntry® 2.0 at 888-733-6873 (US) or 866-398-3191 (Canada).

Packaging

Carpet tiles are packaged in recycled cardboard boxes (100% post consumer recycled content cardboard). Packaging waste should be recycled through local cardboard recycling.

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Use Stage

The product is warranted for a service life of 15 years of heavy use. However carpets are often replaced before their service life expires due to fashion. Carpet and Rug Institute Carpet Maintenance Guidelines for Commercial Applications, recommends regular vacuuming and intermittent extraction cleaning. <http://carpet-rug.com/commercial-customers/cleaning-and-maintenance/index.cfm>

Cleaning and Maintenance

Figure 4. Cleaning and maintenance

Level of Use	Cleaning Process	Cleaning Frequency	Consumption of energy and resources
Commercial (heavy traffic)	Vacuuming	Daily	Electric energy
	Extraction cleaning	Twice per year	Electric energy Water Detergent

Prevention of Structural Damage

See section on Mechanical Damage

Health Aspects During Usage

The emissions meet the requirements of GUT test criteria for VOC emissions. For further information see www.gut-ev.de.

Singular Effects

Fire

Radiant Panel: Class 1 (ASTM E-648)

Smoke Density: ≤ 450 (ASTM E-662)

Water Damage

The product backing is impervious to moisture protecting the subfloor from leaks and spills. Exposure to flooding for long periods may result in damage to the product.

Mechanical Damage

Product is intended for commercial applications with heavy wear (CRI Test Method 101 appearance Retention Rating



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<http://www.carpet-rug.org/commercial-customers/selecting-the-right-carpet/quality-and-performance/retention-rating-scales.cfm>). Product should be installed according to Interface installation guidelines

End of Life Stage

Recycling or Reuse

Product should be recycled through Interface's ReEntry® 2.0 process by contacting Interface ReEntry® 2.0 at 888-733-6873 (US) or 866-398-3191 (Canada).

Disposal

Recycling of the product through Interface's ReEntry® 2.0 process is strongly recommended, but disposal in municipal landfill or commercial incineration facilities is permissible in compliance with local regulations.

Life Cycle Assessment

General

A total Life Cycle Assessment was completed in accordance with ISO 14040 / ISO 14044.

Life Cycle Stages assessed:

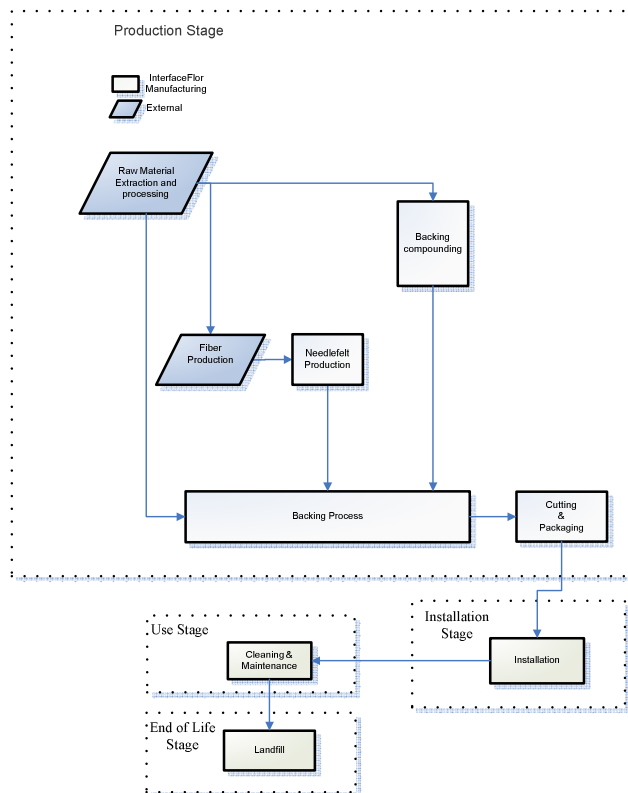
- Production Stage
- Installation Stage
- Use Stage
- End of Life Stage



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Figure 5. Life cycle stages diagram



Description of the Declared or Functional Unit

One square meter of installed modular carpet for heavy use. The use stage is considered for one year of service life. The reference flow is one square meter of modular carpet.

Cut-off Criteria

The cut-off criteria established for the study include or exclude materials, energy and emissions data. For the purposes of this study, the criteria are as follows:

- Mass – If a flow is less than 1% of the mass of the modelled product it may be excluded, providing its environmental relevance is not a concern.
- Energy – If a flow is less than 1% of the cumulative energy of the model it may be excluded, providing its environmental relevance is not a concern.
- Environmental relevance – If a flow meets the above criteria for exclusion, yet is thought to potentially have a significant environmental impact, it will be included.

The total excluded flows do not exceed 5% of overall life cycle.



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Allocation

Where relevant, the background data incorporates some allocation as in the power mix, where possible appropriate geographical grid mixes were used. No upstream impacts were allocated to recycled materials. End of life burdens of recycled materials were allocated to the input of those materials in the production stage.

Background Data

GaBi 5 software system was used for modeling the life cycle of the modular carpet.

Data Quality

For the data used in this LCA, the data quality is considered to be “good to high” quality. The definition of this quality range stems from the following descriptions. The data and data sets cover all relevant process steps and technologies over the supply chain of the represented carpet products. The LCIs from the GaBi 5 database and Plastics Europe are mainly based on industry data and are completed, where necessary, by secondary data. The operations data is representative of a sufficient sampling over an adequate period of time. The temporal correlation falls under a three year window for the vast majority of data considered. The geographical correlation is slightly challenging as there is very little life cycle information available that is country specific in every facet. For Interface, there is a reliance on data produced from European sources with country specific considerations during the LCI creation. Given that the data is from similar production conditions and representative of the technology and production paths used by Interface’s direct suppliers, this is acceptable to Interface and deemed to have an appropriate level of quality.

System Boundaries

The Life Cycle Assessment includes all relevant cradle-to-grave environmental information for one square meter of carpet. The system boundaries include raw material production and processing, carpet manufacturing, energy production, packaging, transportation, carpet installation, use and maintenance, as well as the end-of-life options (recycling, incineration or landfill disposal).

Notes on the Use Stage:

The warranted service life of the product is 15 years. The use stage includes both vacuuming and extraction cleaning according to the maintenance guidelines of the Carpet & Rug Institute and accounts for the electricity, water, and cleaning agents consumed. The use stage impacts have been annualized.

Results of the Assessment

The LCA results are documented separately for the stages:

- Production Stage
- Installation Stage
- Use Stage
- End of Life Stage

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Life Cycle Inventory Analysis

The total primary energy for the product can be separated into life cycle stages and the energy for the production stage can be further separated into the energy from primary (virgin) materials, secondary (recycled) materials, and process energy.

Figure 6. Use of total primary energy for the all life cycle stages from renewable and nonrenewable resources

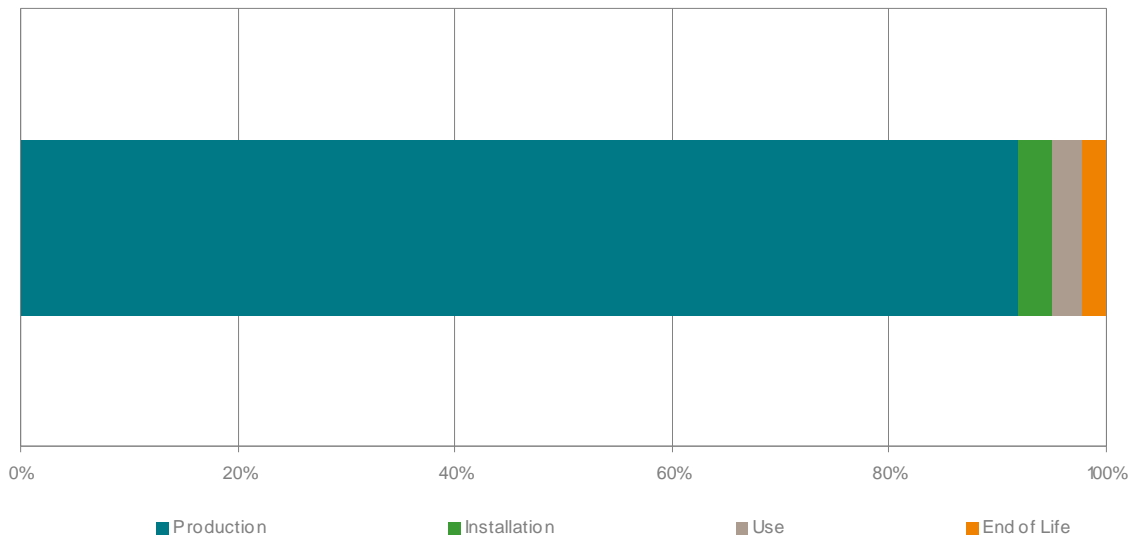
Unit	Total Life Cycle	Production			Installation	Use*	End of Life
MJ	238.00	219.00			7.73	6.56	5.21
		Primary material	Secondary material	Internal Processing			
		209.28	0.53	9.19			

* service life of 1 year

Over ninety percent of the primary energy is in the production stage of the life cycle with very small contributions from the installation, use, and end of life stages as seen in Figure 7.

Figure 7. Relative total primary energy by life cycle stage

Total Primary Energy per Life Cycle Stage



The primary energy can be further separated into renewable and non-renewable resources as shown in Figure 9.



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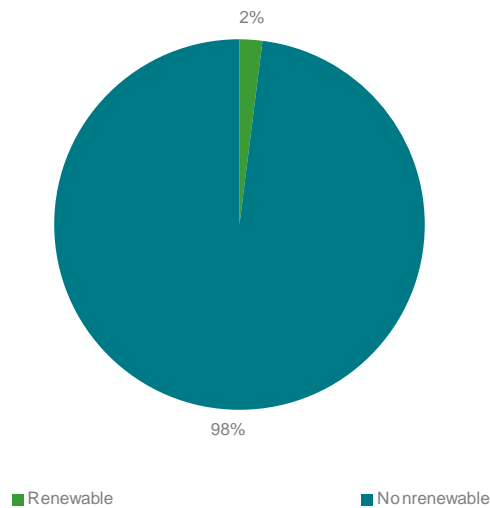
Figure 8. Primary energy of all life cycle stages separated into nonrenewable and renewable resources by source type

Non- renewable Primary energy by resources	Unit	Total Life Cycle	Production	Installation	Use*	End of Life
Total nonrenewable primary energy	MJ	233.29	214.33	7.70	6.28	4.99
Crude oil	MJ	108.70	99.87	6.83	0.58	1.42
Hard coal	MJ	22.37	19.12	0.08	2.82	0.36
Lignite	MJ	2.36	2.02	0.01	0.04	0.28
Natural gas	MJ	88.71	83.80	0.71	1.48	2.71
Uranium	MJ	11.14	9.51	0.05	1.35	0.22
Renewable primary energy by resources	Unit	Total Life Cycle	Production	Installation	Use*	End of Life
Total renewable primary energy	MJ	4.71	4.18	0.03	0.28	0.22
Hydropower	MJ	1.16	0.94	0.01	0.16	0.05
Wind / Wave Power	MJ	1.63	1.46	0.00	0.12	0.05
Solar Energy / Biomass/ Renewable Fuel	MJ	1.89	1.75	0.02	0.00	0.12
Geothermal	MJ	0.03	0.03	0.00	0.00	0.00

*service life of 1 year

Figure 9. Primary energy of all life cycle stages separated into nonrenewable and renewable resources

Total Primary Energy Renewable and Non-Renewable



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Figure 10. Contribution of different resources to nonrenewable primary energy

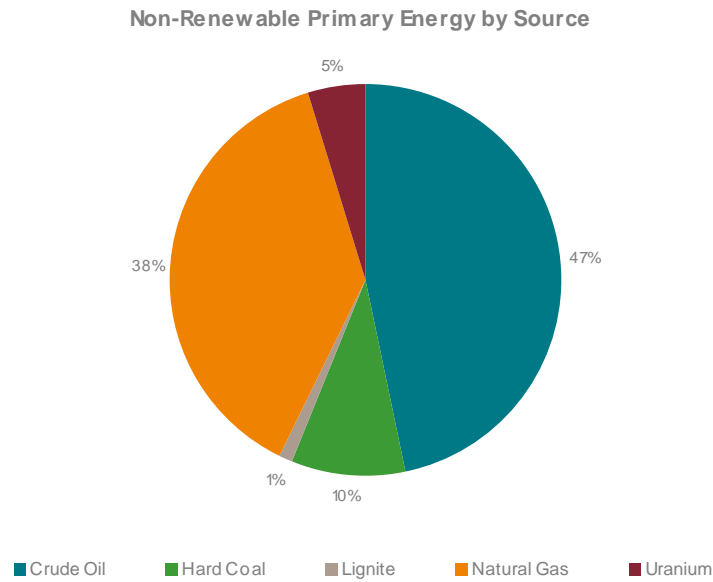
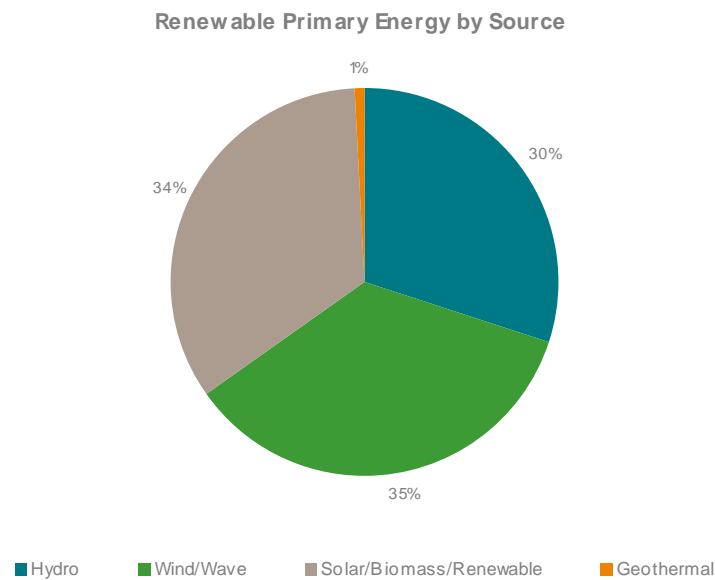


Figure 11. Contribution of different resources to renewable primary energy



Non-renewable material resources, water consumption and wastes



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The life cycle of the product consumes non-renewable resources and water while producing non-hazardous, hazardous, and radioactive wastes. The quantities, separated into contribution per life cycle stage, are shown in Figure 12 for a medium yarn weight product.

Figure 12. Non-renewable material resources and water consumption per square meter of product and by life cycle stages

	Unit/ m ² *	Total Life Cycle	Production	Installation	Use	End of Life
Resources						
Nonrenewable resources	kg	5.16	3.26	0.05	0.59	1.26
Water	m ³	2.10	1.91	0.02	0.00	0.17
Wastes						
Non-hazardous waste	kg	8.62	3.17	0.13	0.54	4.80
Hazardous waste	kg	0.0042	0.0041	0.0001	0.0000	0.0000
Radioactive waste	kg	0.0020	0.0014	0.0000	0.0005	0.0001

*resource or waste amount per square meter of product





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Life Cycle Impact Assessment

Figure 13. The potential impacts per life cycle stage

	Production	Installation	Use	End of Life	Units/sq meter
US TRACI 2.1					
TRACI, Acidification Air	0.034	0.013	0.003	0.001	kg SO ₂ -Equiv.
TRACI, Eutrophication	0.0030	0.0000	0.0002	0.0005	kg N-Equiv.
TRACI, Global Warming Air	10.20	0.58	0.52	0.33	kg CO ₂ -Equiv.
TRACI, Ozone Depletion Air	2.15E-08	8.22E-10	4.24E-08	1.76E-10	kg CFC 11-Equiv.
TRACI, Smog Air	0.37	0.26	0.02	0.02	kg O ₃ -Equiv.
CML					
CML, Abiotic Depletion (ADP elements)	3.60E-05	3.47E-08	1.81E-07	6.27E-08	kg Sb-Equiv.
CML, Acidification Potential (AP)	0.037	0.012	0.003	0.001	kg SO ₂ -Equiv.
CML, Eutrophication Potential (EP)	0.0051	0.0014	0.0002	0.0012	kg Phosphate-Equiv.
CML, Global Warming Potential (GWP 100 years)	10.60	0.59	0.52	0.34	kg CO ₂ -Equiv.
CML, Ozone Layer Depletion Potential (ODP, steady state)	1.87E-08	6.31E-10	3.89E-08	1.66E-10	kg R11-Equiv.
CML, Photochem. Ozone Creation Potential (POCP)	0.0040	0.0008	0.0002	0.0002	kg Ethene-Equiv.



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Figure 14. Total potential impacts for one square meter

	Yarn	Units
	1238	grams/square meter
	38	ounces/square yard
PCR Impact Category	Impact	Units
US TRACI 2.1		
TRACI, Acidification Air	0.050	kg SO ₂ -Equiv.
TRACI, Eutrophication	0.0038	kg N-Equiv.
TRACI, Global Warming Air	11.70	kg CO ₂ -Equiv.
TRACI, Ozone Depletion Air	6.49E-08	kg CFC 11-Equiv.
TRACI, Smog Air	0.67	kg O ₃ -Equiv.
CML		
CML, Abiotic Depletion (ADP elements)	3.62E-05	kg Sb-Equiv.
CML, Acidification Potential (AP)	0.053	kg SO ₂ -Equiv.
CML, Eutrophication Potential (EP)	0.0079	kg Phosphate-Equiv.
CML, Global Warming Potential (GWP 100 years)	12.10	kg CO ₂ -Equiv.
CML, Ozone Layer Depletion Potential (ODP, steady state)	5.84E-08	kg R11-Equiv.
CML, Photochem. Ozone Creation Potential (POCP)	0.0051	kg Ethene-Equiv.



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Figure 15. Life cycle stages as a percentage of total CML impacts

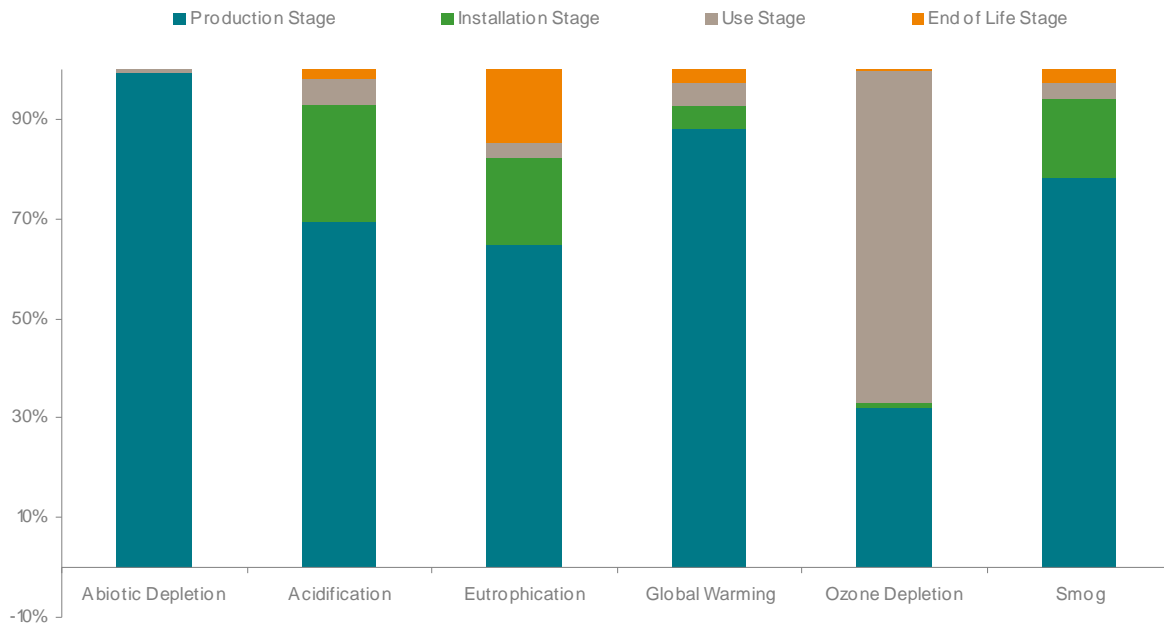


Figure 16. Distribution of the environmental impacts to the different stages of the life cycle

Impact Category	Production Stage	Installation Stage	Use Stage	End of Life Stage
Abiotic Depletion	99%	0%	1%	0%
Acidification	69%	23%	5%	2%
Eutrophication	65%	17%	3%	15%
Global Warming	88%	5%	4%	3%
Ozone Depletion	32%	1%	67%	0%
Smog	79%	15%	3%	3%

Interpretation

The majority (64-99%) of the potential impacts occur in the Production Stage and most of this is from raw material extraction. Over 50% of the Global Warming Potential comes from the yarns in the face of the carpet.

Installation has minimal impact due to the modular nature of carpet tile. Modular carpet tile allows for lower installation waste (2%) as compared to the waste in a broadloom installation. Modular carpet also eliminates the need for cushion underlayment, another contributor to waste and impact in broadloom carpet installations.

The Use Stage is represented in this report for one year of maintenance. The contribution to the life cycle impact is small because carpet requires only regular vacuuming and intermittent extraction cleaning.



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Every effort is made to insure the product is returned to Interface for recycling. The ReEntry® 2.0 carpet reclamation program is an extensive reclamation and recycling program that recovers both yarns and backings from post consumer and post industrial carpet and the program reclaimed over 12,000 tonnes of carpet in 2010. This was on sales of over 15 million square meters of carpet or approximately 32 percent by weight. Because the bulk of carpets in the United States are sent to landfill, the End of Life Stage was modeled as landfill and contributes 3% to GWP.

Interface and its stakeholders share a common concern for the environment with particular interest in mitigating climate change through the elimination of product-related emissions. They have addressed this concern by creating climate neutral products. The total GHG emissions created during the life cycle of the products (raw material acquisition, manufacturing, transportation, 7 year use and maintenance, and end-of-life disposition) are modeled using Life Cycle Assessment methodology. These emissions are then neutralized through the purchase and retirement of an equivalent number of verified emission reduction credits. As a result of this program, these products are climate neutral. This program is verified by SGS.

(http://www.climatechange.sgs.com/home_climatechange_v2/voluntary_activites/cool_carpet_a_climate_neutral_option.htm)

COOL CARPET™ A CLIMATE NEUTRAL OPTION



SGS Verified: Interface Cool Carpet™ Program
Modeling and off-setting the life cycle greenhouse gas emissions of carpet.

SGS successfully verified **Interface's Cool Carpet program** including the modeling of **greenhouse gas (GHG) emissions** associated with the full life cycle of its carpet, and then off-setting those emissions through the retirement of an equivalent number of verified emission reduction credits.



VERIFIED
INTERFACE COOL CARPET Program
Modeling and off-setting of
carpet life cycle GHG emissions
www.sgs.com/climatechange

Additional Information, Evidence, and Test Results

Emissions

The emissions of the textile floor covering on delivery meet the requirements of the GUT test criteria for VOC emissions and contaminants. For further information see www.gut-ev.de.

References

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