

Environmental Product Declaration





Pictured above: Fabrica Wanderlust made with Envision® Nylon

Residential Broadloom with Synthetic Fiber Face Yarn



**Certified
Environmental
Product Declaration**
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EPD Information			
Program Operator		NSF-I www.nsf.org	
Declaration Holder		The Dixie Group	
Product: Broadloom Carpet	Date of Issue: 03/16/2026 Date of Update:	Valid Until: 03/16/2031	Declaration Number: EPD11226
<p>This EPD was independently verified by NSF International per ISO 14025 (2006) and ISO 21930 (2017):</p> <p>Internal <input checked="" type="checkbox"/> External</p>			
<p>This life cycle assessment was independently verified by Ecoform per ISO 14044 and the reference PCR: NSF Program Operator Rules/Instructions, 31 Aug. 2023.</p>			
LCA Information			
Basis LCA		Lifecycle Analysis of The Dixie Group Residential Broadloom Carpets with Synthetic Face Fibers	
LCA Preparer		Evan Griffing & Michael Overcash Environmental Clarity, Inc. www.environmentalclarity.com	
This life cycle assessment was critically reviewed per ISO 14044 by:			
PCR Information			
Program Operator		NSF	
Reference PCR		Flooring: Carpet, Resilient, Laminate, Ceramic, Wood Version 2, ISO 14025 (2006), and ISO 21930 (2017)	
Sub-category PCR		UL (2018a) Product Category Rule (PCR) Guidance for Building-Related Products and Services, Part B: Flooring EPD Requirements	
PCR review was conducted by:		Evan Griffing & Michael Overcash Environmental Clarity www.environmentalclarity.com mrovercash@earthlink.net	

PRODUCT DEFINITIONS AND INFORMATION

Company Name and Location

This Environmental Product Declaration was prepared for:

The Dixie Group, LLC
475 Reed Road
Dalton, GA 30720
USA

Company Description

The Dixie Group began in 1920 as the Dixie Mercerizing Company headquartered in Chattanooga, Tennessee. At that time, mercerized cotton was not widely used in the United States, which allowed Dixie to enter the textile business.

The company's business philosophy of manufacturing specialized products for select market segments drove The Dixie Group's business strategy. Specialized apparel and industrial yarns soon made room for Dixie's entry into the high-volume tufting yarn market, and a new name change for the company in 1965 to Dixie Yarns Inc.

In the late eighties, the textile industry was facing its toughest times due to stiff foreign competition, changing markets and the requirements for heavy investment in modernization of facilities. Dixie initiated a restructuring plan that involved selling, closing, or merging those facilities that did not align with its strategic plan. In conjunction with the restructuring plan, Dixie began diversifying into the carpet industry and made its first major carpet acquisition, Carriage Carpets, in 1993. In 1999, Dixie sold its remaining traditional textile operations and began operating solely as a floorcovering company. Over the next 10 years The Dixie Group acquired the brands Masland, Fabrica and launched Dixie Home. These three brands focus on the higher-end segments of the soft floor covering market.

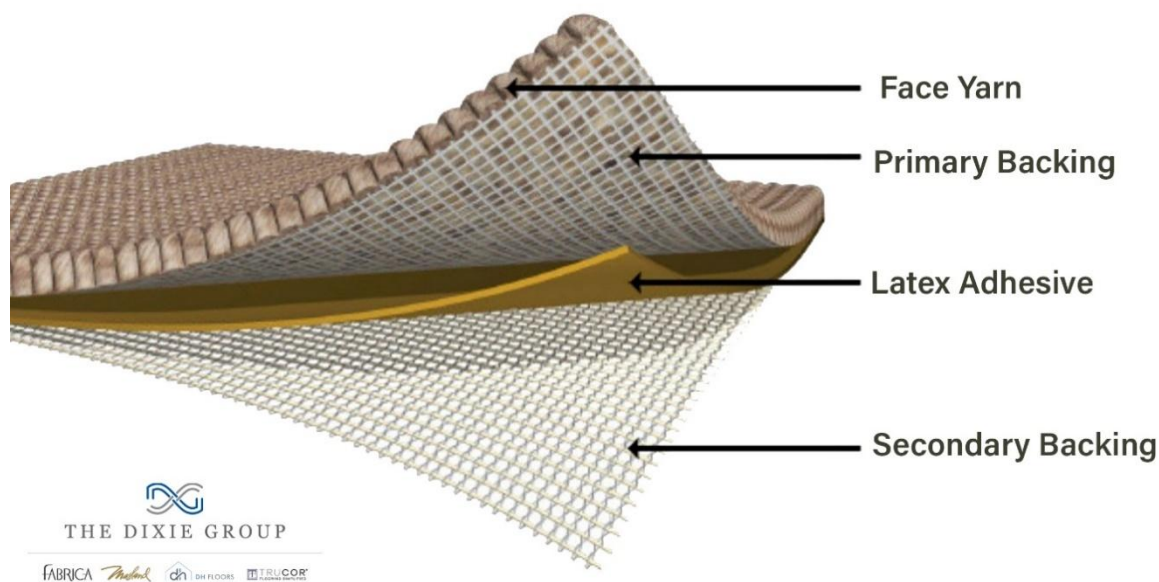
Product Description

This EPD covers three carpet categories based on the face fibers used, which are nylon 6, nylon 6,6, and polyethylene terephthalate (PET). All these carpets use the same backing architecture to complete the final carpet in terms of materials and mass. The face fiber is tufted onto a primary backing that is woven polypropylene (PP). The backing system uses an adhesive layer including styrene butadiene rubber (SBR)

with calcium carbonate filler. The SBR is applied to the primary backing, and then a second woven PP backing (secondary backing) is applied with additional SBR compound. The materials and market weighted average masses of each layer per square meter (m²) are given in **Error! Reference source not found..** The backing systems are all nominally similar in mass and composition with up to 2% variation.

Products included in the study include carpets made by The Dixie Group including DH Floors, Fabrica, TruCor and Masland Carpets. A representative product was chosen from the combined products as the basis for this report. **All products in this report are manufactured in the United States.**

Figure 1: Product Construction for Synthetic Fibers



Primary and secondary backings are woven polypropylene.

The Dixie Group Synthetic Fiber Broadloom Carpets are intended to be used for residential housing applications. **The market focus of all these products is the United States.** Additional information about the products and their uses may be found at thedixiegroup.com by clicking one of the brands at the top of the website. **There are no regulated materials contained in these products.** The architecture for the products covered by this report is listed in Table 1. The production representativeness is 100%.

Table 1: Carpet Architectures, using market weighted average face fiber weights.

	Nylon 6	Nylon 6,6	PET
Face fiber, kg / m2	1.74	1.68	1.55
Total PP backings ¹ , kg / m2	0.27	0.27	0.27
Primary backing, kg / m2	0.14	0.14	0.14
Secondary backing, kg / m2	0.13	0.13	0.13
Total SBL/CaCO ₃ , kg / m2	1.11	1.11	1.11
SBL, kg / m2	0.23	0.23	0.23
CaCO ₃ , kg / m2	0.88	0.88	0.88
Total carpet, kg / m2	3.12	3.05	2.93
Total carpet, oz / square yard (SY)	91.8	89.9	86.2

Product Properties and Test Results

This EPD for Dixie Group Synthetic Fiber Products covers all synthetic fiber products manufactured by Dixie with face weights of 1.55 – 1.74 kg/m². The production representativeness is 100%.

Table 2: Product Properties

Aspect	Value
Roll Width	12 feet
Yarn Type	Nylon 6; Nylon 6,6; or PET
Primary Backing Type	Polypropylene
Secondary Backing Type	Polypropylene
Pile Weight	1.55-1.74 Kg/m ² (Weighted Average)
Primary Backing Weight	0.14 Kg/m ²
S/CaCO ₃ Weight	1.11 Kg/m ²
Secondary Backing Weight	0,13 Kg/m ²
Surface Pile Thickness	0.275 cm – 1.8 cm
Total Thickness	1.18 cm – 2.42 cm
Product Weight	2.93-3.12 Kg/m ² (Weighted Average)

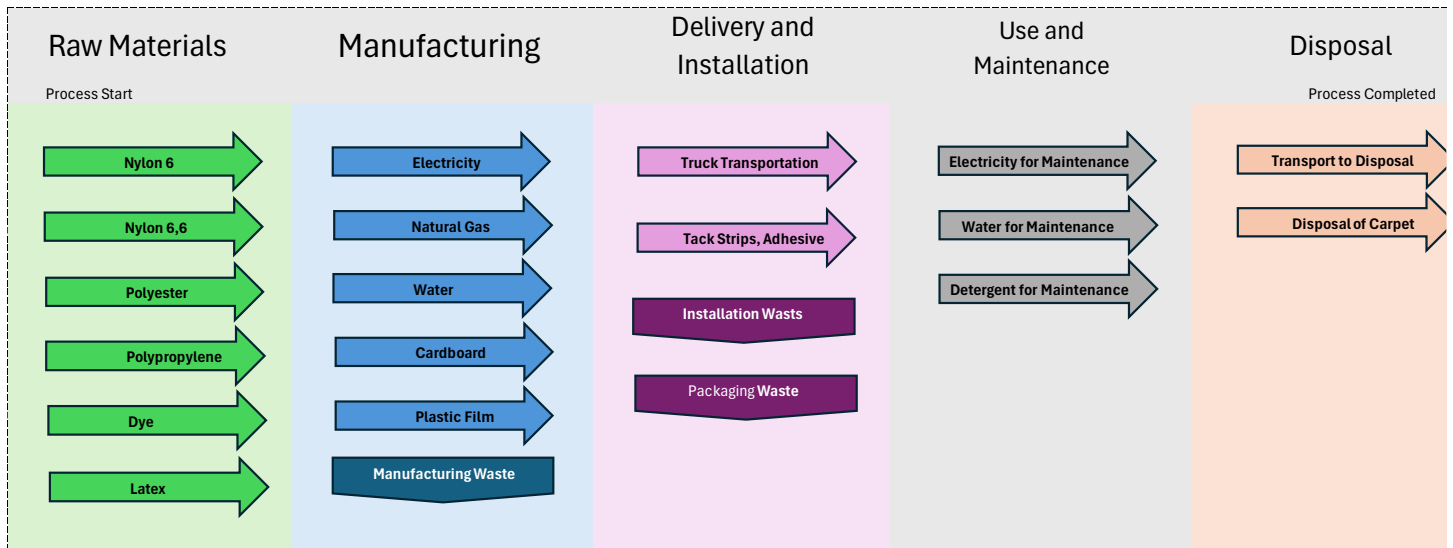
Table 3: Performance Testing

	Standard	Value
Surface Flammability	ASTM D 2859	Pass
Delamination Strength	ASTM D3936	3.4 lbs./in.
Tuft Bind	ASTM D1335	12.2 lbs.
Vetterman Drum	ASTM D5417	4.0 Rating
Accelerated Soiling	ASTM D6540	3.0 Rating
Resistance to Staining	Proprietary	4.5 Rating
Green Label Plus	CRI	Pass
CRI Rating	CRI	N/A*

*CRI rating is not performed on residential products.

Material Flow and System Boundary

Table 4: Material Flow and System Boundary.



Manufacturing and Packaging

The Dixie Group manufactures products in the United States. All the raw materials for the products in this report are sourced from suppliers in the United States.

Manufacturing begins with fiber production. This process takes virgin and recycled content nylon or PET feedstock and extrudes fiber. This fiber is then combined with other fibers to create the typical fibers used for residential carpeting. As part of the yarn making process the yarns are twisted and heatset to ensure consistency. Next, the yarn is tufted into a primary backing consisting of polypropylene. After this step a coating of SBR latex with calcium carbonate is applied to the tufted substrate and the secondary backing of polypropylene is attached.

Dyeing of the carpet utilizes several methods. A method with *de minimus* impact on energy and carbon emissions is Solution Dyeing. Skein dyeing is utilized for dyeing yarn before it is tufted into carpet. Beck dyeing is used to dye tufted carpet. All carpet in this report is dyed. Dixie Carpets primarily are made with a mix of these dyeing methods.

The final processes in the manufacture and packaging of carpet are inspection, cutting, and packaging of the finished product for shipment to the customer.

Figure 2: Product Flow



Table 5: Product Components by Percentage

	Nylon 6	Nylon 6,6	PET
Face fiber	55.9	54.9	53.0
Primary backing	4.4	4.4	4.6
SBL/CaCO3	35.6	36.4	37.9
Secondary backing	4.1	4.2	4.4
Total carpet	100.0	100.0	100.0

The architecture for each weighted average product in this EPD is similar in the % finished weight for each component.

Table 6: Packaging Materials by Weight

Material	Weight per Yd ²
Cardboard	1.63oz.
Plastic Wrap	0.10oz.

Transportation

The assumption is that all products are distributed by diesel-powered semi-trailer trucks. Transportation of raw materials from their source to the manufacturing facility and between facilities within The Dixie Group was calculated for each material using primary data. The average distance of transportation from The Dixie Group warehouse to the installation site was estimated to be 500 miles in accordance with the PCR. Transportation at the end of life of the carpet is to move carpet to the landfill. Based on the PCR this is assumed to be 100 miles.

Product Installation

Product installation instructions are available at: <https://www.fabrica.com/pages/warranty-installation>; <https://www.maslandcarpets.com/pages/warranty-installation>; <https://www.dixie-home.com/pages/warranty-and-installation>. Installation tools are required but not included in the study as the impacts per unit declared are considered negligible. Carpets may be installed over a pad or directly glued on the floor depending on the intended usage and customer preference. Installation typically utilizes tack strips to hold the carpet to the floor, and the tack strips are included in the LCA. Carpet installed over a pad normally has better appearance retention over time. Waste in this phase is assumed to be 2%.

Use and Maintenance

Detailed maintenance instructions are provided on the brand websites: <https://www.fabrica.com/pages/warranty-installation>; <https://www.maslandcarpets.com/pages/warranty-installation>; <https://www.dixie-home.com/pages/warranty-and-installation>.

The total frequency for vacuuming and cleaning is provided in Table 7.

Table 7: Maintenance and Use

Process	Occurrences
Vacuum	52/year
Clean	1/year

Reference Service Life

The life of the residential broadloom products is assumed to be 15 years with recommended installation and maintenance. With an estimated building life of 75 years. There will be 4 replacement cycles over the life of the building.

Table 8. Reference service life

Name	Value	Unit
RSL	15	Years
Declared product properties	All Dixie carpets, see descriptions	
Design application parameters	Installed as recommended	
Assumed quality of work	Industry standard installation	
Outdoor environment	Not applicable	
Indoor environment	Normal residential conditions	
Use conditions	Residential use, normal conditions	
Maintenance	18 months maximum	Between hot water extractions

Product End of Life

The Dixie Group encourages consumers to reuse or recycle carpet when it is replaced. There are no products of concern contained within the carpets produced by The Dixie Group family of brands. Therefore, all these products qualify for all carpet recycling programs. The products may be landfilled or sent to waste-to-energy facilities where recycling is not available.

For purposes of this study, the product is considered to be 100% landfilled as specified in the Life Cycle Assessment Calculation Rules and Report Requirements from UL Environment (2018), version 4, Sections 2.8.5 and 2.8.6 of Part A version 4.

LIFE CYCLE ASSESSMENT BACKGROUND INFORMATION

Overview

This document summarizes the LCA report for three carpet EPDs using synthetic fibers for The Dixie Group (Dixie, 2025), which comprises carpets by DH Floors, Masland, Fabrica, and TruCOR. The LCA results are based on manufacturing data from 2024, and the EPDs are to be published in 2025. Details about the LCA, reference standards, and carpet categories (EPDs) are given in Table .

Table 9: Report information standards

LCA authors	Evan Griffing and Michael Overcash, Environmental Clarity, Inc.
Report Date	October 6, 2025
Client	The Dixie Group
Carpet categories	Nylon 6 face fiber Nylon 6,6 face fiber PET face fiber
EPD Program Operator	NSF International
Standards	ISO 14025 (2006) and ISO 21930 (2017)
Core PCR	UL (2018) Product Category Rules for Building-Related Products and Services Part A version 4: Life Cycle Assessment Calculation Rules and Report Requirements, NSF Program Operator Rules/Instructions, 31 Aug. 2023.
Sub-category PCR	UL (2018a) Product Category Rule (PCR) Guidance for Building-Related Products and Services, Part B: Flooring EPD Requirements

Product Descriptions

This report covers three carpet categories based on the synthetic face fibers used, which are nylon 6, nylon 6,6, and polyethylene terephthalate (PET). All the carpets use the same backing architecture in terms of materials and mass. The face fiber is tufted onto a primary backing that is woven polypropylene (PP). The backing system uses an adhesive layer including styrene butadiene rubber (SBR) with calcium carbonate filler. The SBR is applied to the primary backing, and then a second woven PP backing (secondary backing) is applied with additional SBR compound. The materials and market-weighted average masses of each layer per m² are given in **Error! Reference source not found.**. The backing systems are all nominally similar in mass and composition with up to 2% variation.

All Dixie brand carpets with Nylon 6 face fiber sold in the marketplace have a face weight of between 25 and 126 oz / SY (0.849 – 4.28 kg / m²). The total area (SY) of carpet produced for each face weight was provided by Dixie. The total mass of Nylon 6 face fiber used for carpets produced in 2024 was divided by the total area of Nylon 6 carpet produced in 2024 to calculate the **market weighted average face fiber weight** (51.3 oz / SY). This same procedure was used to calculate the market-weighted average face weight for Nylon 6,6 and PET carpets.

There are no hazardous materials involved in the manufacture of these carpets.

Table 10: Carpet architectures, using weighted average face fiber weights.

	Nylon 6	Nylon 6,6	PET
Face fiber, kg / m ²	1.74	1.68	1.55
Total PP backings ¹ , kg / m ²	0.27	0.27	0.27
Primary backing, kg / m ²	0.14	0.14	0.14
Secondary backing, kg / m ²	0.13	0.13	0.13
Total SBL/CaCO ₃ , kg / m ²	1.11	1.11	1.11
SBL, kg / m ²	0.23	0.23	0.23
CaCO ₃ , kg / m ²	0.88	0.88	0.88
Total carpet, kg / m ²	3.12	3.05	2.93
Total carpet, oz / SY	91.8	89.9	86.2

Primary and secondary backings are woven polypropylene.

SCOPE

PRODUCT SYSTEMS

This EPD covers three carpet product types. These carpets are:

- 1) Nylon 6 face fiber carpets
- 2) Nylon 6,6 face fiber carpets
- 3) PET face fiber carpets

The architecture of these carpets is shown in

and

Table . The face fiber and total carpet weights are given as the market weighted average and as a range from the lowest face weight carpet to the highest face weight carpet. The backings are all substantially similar. The primary backing varies by as much as 10%, but it is a small mass relative to the overall carpet mass (about 4%). Thus, the variability in overall carpet mass due to this variation is < 0.5%. The SBR/CaCO₃ layer can vary by as much as 1.3%. Thus, the overall variability in backing materials is <2%.

FUNCTIONS

Carpets provide a variety of functions in residential applications including aesthetics, thermal insulation, comfort, safety, and noise reduction in. For the purposes of this LCA, the function will be to provide floor covering.

FUNCTIONAL UNIT, REFERENCE SERVICE LIFE, AND BUILDING SERVICE LIFE

The functional unit is 1 square meter for a period of 75 years, which is the estimated service life of a building as specified in PCR Part B. Each carpet is assumed to last for 15 years (reference service life of product). This service life was chosen, based on a general agreement between carpet manufacturers. This is consistent with the Dixie Group manufacturer's warranties on the synthetic polymer face fiber carpets. Thus, over 75 years, each carpet will be installed once and then replaced 4 times for a total of 5 carpet installations. As required, the mass of each carpet is shown per yd² in Table 11 and M² as shown in Table 12.

Table 11: Carpet architecture in oz / SY

	Nylon 6	Nylon 6,6	PET
Face fiber, oz / SY	51.3 (25-126)	49.4 (25-130)	45.7 (32-75)
Primary backing, oz / SY	4.0	4.0	4.0
SBL/CaCO ₃ , oz / SY	32.7	32.7	32.7
Secondary backing, oz / SY	3.8	3.8	3.8
Total carpet, oz / SY	91.8 (65.5-167)	89.9 (65.5-171)	86.2 (72.5-116)

Table 12: Carpet architecture in kg / m²

	Nylon 6	Nylon 6,6	PET
Face fiber, kg / m ²	1.74 (0.849-4.28)	1.68 (0.849-4.42)	1.55 (1.09-2.55)
Primary backing, kg / m ²	0.14	0.14	0.14
SBL/CaCO ₃ , kg / m ²	1.11	1.11	1.11
Secondary backing, kg / m ²	0.13	0.13	0.13
Total carpet, kg / m ²	3.12 (2.23-5.66)	3.05 (2.23-5.79)	2.93 (2.46-3.92)

SYSTEM BOUNDARIES

This LCA is cradle to grave. Capital goods and infrastructure used in the manufacture of carpets do not significantly impact the results and conclusions of the LCA. These are excluded from the calculations, as per the PCR part B. However, capital goods are included in the supply chain datasets from Ecoinvent. Overhead energy used for lighting, heating, ventilation, and air conditioning are included

Results are presented according to the life cycle stages listed in ISO 21930 (2017). These stages are:

A1: extraction and upstream processing (or processing of secondary materials)

A2: transport to factory (includes internal transport)

A3: manufacturing

Modules A1-A3 may be presented in aggregate. Each module includes the full supply chain and emissions associated with energy use throughout. For example, manufacturing includes raw material use and emissions associated with energy use in the manufacturing stage. Wastes from processes in A1-A3 that are recovered for secondary use shall be treated as a waste and no burdens shall be allocated to these flows.

A4: Transport to site (transport to warehouse if applicable and subsequently to the installation site)

A5: installation (Includes product waste and transport to site) Based on our understanding of ISO 21930, the CTG manufacturer of all the carpets that ends up as waste in the installation phase is included in this phase. In this report, landfill of packaging and scrap carpet is included in A5,

Modules A4 and A5 shall include all materials and energy used as well as disposal of residues from these stages.

B1: Use of installed products. Generally, other EPDs do not include emissions in this category. There may be emissions of volatile organic compounds (VOCs) from new carpets or adhesives. These are not included in this study, and B1 is excluded from results and reported as not applicable (NA).

B2: Maintenance, vacuum and / or wash, cleaning agents, transport of cleaning materials, eol of waste materials (i.e. wwtp of cleaning wastewater). This includes water use. This is for use for one expected service life (15 yrs in this study).

B3: Repair (not applicable, and excluded from results)

B4 Replacement (new carpet replacement(s) after reference service life). The impact of each replacement includes A1-A5 plus B2 plus C2+C4. In this EPD the values in B4 are for 4 replacement cycles that are required to achieve 75 years.

B5: Refurbishment (NA)

B6: Operation energy (NA). All maintenance energy use is included in B2.

B7: Operational water use (NA). All maintenance water use is included in B2.

C1: Deconstruction/demolition (NA).

C2: Transport to waste processing/disposal (i.e. to landfill) This includes the mass of the installed product (excluding scrap and packaging).

C3: Waste processing (for recovery, NA)

C4: Disposal (management of disposal site, i.e. landfill). C1-C4 includes the end of life from each installation of the installed carpet (1 m² times the total number of installations). This includes the mass of the installed product and tack strips used in the installation process (excluding carpet scrap and packaging, the disposal of which is included in A5). In this GTG, we assume that all of the installed carpet is sent to landfill, and the values in C2 and C4 are for disposal of 1 m² of carpet and associated tack strips.

D: Reuse, recovery, recycling potential

The LCA for one carpet use is the total of all columns except for B4. The impact over 75 years while assuming that each carpet will be in place for 15 years is calculated by summing all columns.

There are no impacts for Categories B3, B5, B6, B7, C1, C3, and D.

Table 13: Life Cycle Stages Included in Study

Production			Construction		Use							End of Life				Benefits & Loads Beyond System Boundaries
Raw Material Supply	Transport	Manufacturing	Transport to Site	Assembly/Install	Use	Maintenance	Repair	Replacement	Refurbishment	Operational Energy Use	Operational Water Use	Deconstruction	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	NA	X	NA	X	NA	NA	NA	NA	X	ND	X	ND

X = Module Included, ND= Module Not Applicable

IMPACT ASSESSMENT METHODOLOGY AND METRICS

PCR part A (Section 4) prescribes a list of life cycle impact assessment metrics and some additional metrics for natural resource use, waste flows, biogenic carbon flows, and land use change impacts.

RESOURCE CONSUMPTION

The resource consumption parameters and definitions are copied directly from PCR part A, except for the freshwater description, which is summarized. Renewable energy sources enter the life cycle through purchased electricity. The cardboard used for packaging is assumed to be from renewable sources. To be consistent with ISO 21930, renewable sources. To be consistent with ISO 21930, recovered energy was considered waste and no allocation was used.

Table 14: Impact assessment metrics that must be included in the assessment, reproduced from PCR part A.

Parameter	Description	Units
Parameter Description Unit RPRE: Renewable primary resources used as energy carrier (fuel)	(First use) bio-based materials used as an energy source. Hydropower, solar and wind power used in the technosphere are also included in this indicator	[MJ]
RPRM: Renewable primary resources with energy content used as material	(First use) biobased materials used as materials (e.g., wood, hemp, etc.).	[MJ]
NRPRE: Non-renewable primary resources used as an energy carrier (fuel)	(First use) materials such as peat, oil, gas, coal, and uranium are used as an energy source.	[MJ]
NRPRM: Non-renewable primary resources with energy content used as material	(First use) primary resources such as oil, gas and coal, used for products (e.g., plastic-based products).	[MJ]
SM: Secondary materials	Materials recycled from previous use or waste (e.g., scrap metal, broken concrete, broken glass, plastic, and wood) that are used as a material input from another product system. These include both renewable and non-renewable resources, with or without energy content, depending on the status of the material when it was originally extracted from the environment	[kg]
RSF: Renewable secondary fuels	Renewable materials with energy content that have crossed the system boundary between product systems and are used as fuel input (energy source) in another product system (e.g., biomass residue pellets, chipped waste wood)	[MJ]
NRSF: Non-renewable secondary fuels	Non-renewable materials with energy content that have crossed the system boundary between product systems and are used as fuel input (energy source) in another product system (e.g., processed solvents, shredded tyres).	[MJ]
RE: Recovered energy	Energy recovered from disposal of waste in previous systems, such as energy recovery from combustion of landfill gas or energy recovered from other systems using energy sources.	[MJ]
FW: Use of net freshwater resources See Section	Calculated according to ISO 14046. Evaporation (e.g., cooling towers), evapotranspiration (evaporation of irrigated water), embedded freshwater (concrete), drainage of freshwater into the ocean. See also ISO 21930 section 7.2.13.	m ³

OpenLCA has radioactive waste, but they don't separate high level and intermediate/low level waste in the LCIA results. These values were obtained from the LCI data.

In addition to these metrics, waste metrics that must be included are included in

Table. Additional notes provide examples of some of these wastes. For example, high level radioactive waste refers to spent fuel from nuclear reactors.

Table15: Waste flows that must be included in the results, reproduced from PCR part A.

Parameter	Description	Unit
HWD	hazardous waste disposed	kg
NHWD	Non-hazardous waste disposed	kg
HLRW	High-level radioactive waste, conditioned, to final repository	kg or m3
ILLRW	Intermediate- and low-level radioactive waste, conditioned, to final repository	kg or m3
CRU	Components for reuse	kg
MR	Materials for recycling	kg
MER	materials for energy recovery	kg
EE	Recovered energy exported from the product system	MJ LHV

BIOGENIC CARBON UPTAKE AND EMISSIONS

Rules are taken from ISO 21930 Section 7.2.7. Biogenic carbon in packaging materials (e.g., cardboard) was included in scenario information in module A5. In the CTG of cardboard, there is a small amount of carbon that is absorbed. The amount absorbed does not reflect the amount of carbon in the cardboard, because most of the cardboard is assumed to be recycled. We assume that at the end of life, 75% of the core board is recycled, 20% is landfilled, and 5% is incinerated. When materials are recycled, we assume that the biogenic carbon that was absorbed is emitted. When it is incinerated, the biogenic carbon is again emitted. During landfill, some of the biogenic carbon is sequestered, and this produces an exceedingly small net sequestration of biogenic carbon. However, we do not include this sequestration in biogenic carbon accounting.

Calcium carbonate is used as a backing material. The C in this is already fully oxidized and does not lead to any CO₂ being exchanged during the life cycle of the product.

Other than packaging and energy, the other biogenic material within the scope of this LCA report is wool for the wool face fiber carpets and wood for tack strips.

The use of wood in tack strips also results in temporary sequestration. In addition, a sizable portion of wood remains in the landfill after 100 years. However, this wood is not considered to be from sustainably managed forests, and thus this carbon flow is excluded from the report.

The carbon flows associated with biological processes, calcination, carbonation, and waste handling are discussed in Table 16.

Table 16: Biogenic carbon flows accounting. Parameter and description are from PCR part A. Comments include activities that might directly contribute to the results in this project. We do not include all of the potential flows in the supply chain.

Parameter	Description	Comments
BCRP	Biogenic carbon removal from product	
BCEP	Biogenic carbon emission from product	Excludes biogenic CH ⁴
BCRK	Biogenic carbon removal from packaging	Growth of wood for cardboard
BCEK	Biogenic carbon emission from packaging	Decomposition of cardboard
BCEW	Biogenic carbon emission from combustion of waste from renewable sources used in production processes	There is no direct combustion of waste. The combustion of methane generated when wool decomposes in the landfill (biogas) was excluded from this indicator, as recommended by the ACLCA guidance document (2019). However, it was included as CO ₂ in the LCA results.
CCE	Calcination carbon emissions	
CCR	Carbonation carbon removals	
CWNR	Carbon emissions from combustion of waste from non-renewable sources used in production processes.	

In the Ecoinvent 15804 inventory dataset, there are several resource inputs that are associated with carbon tracking for biogenic carbon flows. These are described in Table 1. The flows for carbon in soil as

a natural resource are not included in the biogenic CO₂ flows. There are two flows of CO₂ from soil to air or in the other direction in Table 2.

Table 1. Resource flows for biogenic CO₂ in the Ecoinvent 15804 database

Resource name	Description	Impact factor for biogenic carbon accounting
Carbon dioxide, in air	CO ₂ that is absorbed from the air, such as that absorbed by a plant during growth.	-1
Carbon dioxide, non-fossil, resource correction	This is also CO ₂ that is absorbed during plant growth, but this is a correction for CO ₂ that was allocated to another product. This is used to make sure that the carbon absorbed is equal to the carbon that is within the biological product.	-1
Carbon, in organic matter, in soil	This is carbon from CO ₂ absorbed by the plant and converted to plant matter (e.g. leaves), and then later incorporated into the soil on decomposition. This carbon has to be expected to stay in the soil for > 100 years.	0 ^a
Carbon, organic, increase in soil or biomass stock	Reflects changes in biomass stock in the forests used to make products. Also has >100-year qualification.	0 ^a

a. While these flows are non-zero, these are not included in this life cycle.

Table 2. Emission flows relating to biogenic CO₂ in Ecoinvent 15804 database that are included in the TRACI GWP method.

Emission	Impact in TRACI	Comments
Carbon dioxide, from soil or biomass stock	1.0	To air, CO ₂ from soil converted to CO ₂ in air
Carbon dioxide, to soil or biomass stock	-1.0	CO ₂ that is stored in soil as C

LAND USE CHANGE ACCOUNTING

When significant, land use change emissions must be reported separately. Land use change emissions result from a change in activities within the last 20 years. These impacts are not included in this report on synthetic carpet products.

Life cycle impact assessment metrics

For US markets, the Tool for the Reduction and Assessment of Chemical and Other Environmental Impacts (TRACI) is the basis for LCIA metrics. The PCR, Part A prescribes a subset of this impact methodology as a minimum for reporting, as described in

Table . In the most recent version of TRACI (2.1).

“LCIA results are relative expressions and do not predict impacts on category endpoints, the exceeding of thresholds, safety margins or risks.”

“These six impact categories are globally deemed mature enough to be included in Type III environmental declarations. Other categories are being developed and defined and LCA should continue making advances in their development. However, the EPD users shall not use additional measures for comparative purposes.”

Table 19: LCIA metrics that must be included in the EPD.

Acronym	Metric	Units
GWP 100	Global warming potential	kg CO2 eq
ODP	Ozone Depletion Potential	kg CFC 11 eq
AP	Acidification Potential	kg SO2 eq
EP	Eutrophication Potential	kg N eq
SFP	Smog Formation Potential	kg O3 eq
ADP _{fossil}	Abiotic Resource Depletion Potential of Non-renewable (fossil) Energy	MJ, LHV

In this report, we do not include the other TRACI LCIA impact categories, which should not be for any comparative purposes. The Abiotic depletion potential included in TRACI has units of MJ surplus, but this is not a heat value.

The PCR prescribes use of CML-IA version 4.2 with conformance to EN 15804 for European markets. Additional metrics are prescribed for use outside of the US and Europe. This LCA and the associated EPDS are for use in the US market, and we do not include any of these metrics in the results.

There are no hazardous materials used in these products.

PRODUCT USE PHASE

During the use phase, carpets are typically vacuumed on a regular basis, and a deeper cleaning such as a hot water extraction is used on a less frequent basis. This LCA is for a consumer carpet used in a

typical USA household which requires a less strenuous maintenance program than used for commercial carpets. Thus, in this project we used estimates for residential carpets.

Most experts suggest that households steam clean carpets every 6-12 months for high traffic areas and 12 to 18 months of use for lower traffic areas. This is most often done with hot water extraction (USA Today, 2015; Daltonflooringcenter.com). The Carpet and Rug Institute suggests cleaning the carpet as needed, but at a minimum of every 24 months. We assume that the carpet is steam cleaned once every 12 months.

In residential areas, carpets are vacuumed at varying frequencies. CRI recommends vacuuming once or twice a week in high use areas and once a week in general areas (CRI, 2025). People with pets, children, or allergies may vacuum more frequently, and some may vacuum much less frequently. We used a frequency of 1 vacuum event per week.

Residential spaces typically contain more furniture and irregular layouts compared to commercial spaces, resulting in longer cleaning times and higher energy per event, therefore we use 1 MJ / 1000 SF / event for vacuum. The energy is calculated in Table .

Table 20. Maintenance (B2)

Name	Value	Unit
Vacuum cycles	52	Cycles / yr
Vacuum cycles	780	Cycles / RSL
Hot water extraction	1	Cycles / yr
Hot water extraction	15	Cycles / RSL
Net freshwater consumption	0.35	Kg / m ² / yr (Left on carpet to evaporate)
Detergent active ingredient	0.002 (excluded based on cut-off)	Kg / m ² / yr
Other ancillary inputs	0	Kg
Extraction energy	4.3E-2	MJ/m ² / event
Vacuum energy	1.1E-2	MJ/m ² / event
Blue water consumption	0.35	Kg/m ² /extraction
Direct emissions to air	0	kg

Table 21: Electricity use in use phase.

	MJ / 1000 SF	MJ / m ²	# times
Hot water extraction per event	4	0.043	
Vacuum per event	1	0.011	
Hot water extraction per year		0.043	1

Vacuum per year		0.560	52
Total electricity / yr		0.603	

Repair (B3) and refurbishment (B5) are not included in this LCA. These activities are typically not done for residential carpets. There is no operational energy use (B6) or operational water use (B7), and these are excluded. Tables for stages B3 through B7 follow.

Table 3. Repair (B3)

Name	Value	Unit
Repair process information	Product not typically repaired during use	
Inspection process information	Product not typically inspected during use	
Repair cycle	0	Cycles / RSL
Repair cycle	0	Cycles / ESL
Net freshwater	0	m3
Ancillary materials	0	kg
Energy input	0	MJ
Waste materials	0	Kg
Direct emissions to air	0	Kg
Further assumptions	NA	

Table 23. Replacement schedule (B4)

Name	Value	Unit
Reference service life, RSL	15	Years
Replacement cycle	4	(ESL/RSL)-1
Energy input	0	MJ
Net freshwater	0	m ³
Ancillary materials	9.8e-2	kg tack strips
Replacement of worn parts	NA	
Direct emissions to ambient air, soil, and water	0	Kg
Further assumptions	NA	

Table 24. Refurbishment (B5)

Name	Value	Unit
Refurbishment process description	Product typically not refurbished during use	
Replacement cycle	0	# / RSL
Replacement cycle	0	# / ESL
Energy input	0	MJ
Net freshwater consumption specified by water source and fate	0	m ³
Material inputs for refurbishment, including ancillary materials	0	kg
Waste materials generated	0	kg
Direct emissions to ambient air, soil, and water	0	kg
Further assumptions	NA	

Table 4. Operational energy use (B6) and water use (B7)

Name	Value	Unit
Net freshwater consumption	0	m ³
Ancillary materials	0	Kg
Energy input, specified by activity, type, and amount	0	MJ
Equipment power output	0	kW
Characteristic performance	NA	
Direct emissions	0	
Further assumptions for scenario development	NA	

UNITS

SI units and their derivatives (e.g., kg, m², and MJ) are used to report all results. Commonly used units such as lbs./sy are included separately for certain parameters to facilitate review by carpet industry personnel.

ESTIMATES AND ASSUMPTIONS

The biggest sources of variation in the product are in the face fiber weights, which vary from product to product. The impact of this on the GWP is shown in an additional set of results for each carpet type. The biggest potential sources of error in the LCIA values for any given carpet type and face fiber weight are from (1) the background LCI data and (2) the LCIA impact assessment factors.

The background data were mostly from Ecoinvent as specified in the PCR, and this will be specified in detail in the relevant section of this report.

For LCIA assessment factors, some categories, such as global warming, have established impact factors. In the GWP category, certain assumptions—such as the selected period—are inherent; for instance, using a 100-year time horizon influences the comparative impacts of methane and CO₂. In other categories, methods may include incomplete or less clearly defined impact factors.

TRANSPORTATION ASSUMPTIONS

The PCR states that the transportation distance of the carpet from the point of purchase to the installation point is 800 km (500 miles) by diesel-powered truck/trailer. We assume that this means the point of manufacture to the point of installation. This is roughly consistent with logistics for Dixie, where carpets are typically shipped from Dalton GA to the eastern half of the US and from the Los Angeles area in CA to points on the west half of the country. Shipment from the installation site to waste disposal is specified by the PCR to be 161 km (100 miles).

Table 26. Transport to building site.

Name	Value	Unit
Distance, from production to installation	800	Km
Truck type	Diesel-powered truck/trailer	
Material transported	3.33	Kg / m2
Total transport	2.66	tkm

Table 27. Transport to end of life (sorting facility, incineration, and landfill)

Name	Value	Unit
Distance transported	161	Km

INSTALLATION ASSUMPTIONS

During installation, tack strips are used to secure the carpet to the flooring. On a m² basis, 0.098 kg tack strips are used. These are comprised of 0.08 kg wood and 0.018 kg of steel. There is, 0.05 m² of carpet scrap produced per m² installed. This is 5% of the installed carpet lost in the installation phase.

Table 5. Installation into the building

Name	Value	Unit
Ancillary materials: tack strips	9.8E-2	kg
Freshwater	0	
Other resources	0	
Electricity	0	
Other energy	0	
Product loss per functional unit	5	%
Packaging: cardboard cores	5.4E-2	Kg / m2
Packaging: LDPE wrap	3.3E-3	Kg / m2
Biogenic carbon in packaging	1.78E-2	Kg CO2eq / m2
Direct emissions to air	0	
VOC emissions	0	

END OF LIFE ASSUMPTIONS

The end-of-life assumptions for carpet and packaging are specified in the PCR, part A. All carpet is assumed to be sent to the landfill. Polymeric packaging is assumed to use a mix of recycling (15%), landfill (68%), and incineration (17%). Cardboard packaging is assumed to be a mix of recycling (75%), landfill (20%), and incineration (5%). All tack strips are landfilled at their end of life. Transportation to the recycling center is included and is assumed to be equal in terms of distance to the transport to the landfill. Details on mass flows are given in the Supply Chain and Installation Data section.

Table 6. End of life (C1-C4) for synthetic carpets, 1 m² = 3.12 kg for Nylon 6, 3.05 kg for Nylon 6,6, and 2.93 kg for PET face fiber carpets.

Name		Value	Units
Assumptions for scenario development		Product is manually removed	
Collection process	Collected separately	0	m ²
	Collected with mixed waste	1	m ²
Recovery	Reuse	0	m ²
	Recycling	0	m ²
	Landfill	1	m ²
	Incineration	0	m ²
	Incineration with energy recovery	0	m ²
	Energy recovery efficiency	NA	
Disposal	Product or material for disposal	1	m ²
Removal of biogenic carbon (excluding packaging)		0	kg CO ₂

CUT-OFF RULES

All known material and energy flows to the carpet manufacturing stage are included. In the supply chain, cut-off criteria were < 1% of total energy or mass per flow, and < 5% cumulative cut-off for all omissions. All the primary inputs (face fiber, primary and secondary backings, and SBR/CaCO₃ layer) were included in the calculations. A sample dye was also included, although the impact was small in all categories. Additional chemicals used insignificant amounts for stain resistance / soil release, and these are not known to have a significant impact, and a proxy chemical was used to estimate the impact. Thus, no materials more than 1% by mass were excluded, and no excluded chemicals were known to have any

significant environmental impact. No PFAs are used in the stain resist / soil release products. **No known flows are deliberately excluded from this EPD.**

DATA SOURCES

Foreground data related to carpet manufacturing was systematically collected by Dixie personnel. The various stages of production occur at several sites, with some facilities located in California and others situated near Dalton, GA. At each facility, comprehensive utility usage—including energy, water, and waste disposal—was tracked throughout an entire year (2024) and attributed to specific unit operations such as yarn production, twisting and heat setting, tufting, dyeing, and finishing. One plant opened in 2024, so data was based on March 2024 through February 2025 for that location. For each unit operation, a weighted average of energy consumption per kilogram of processed material was determined. Energy consumed for heating, ventilation, air conditioning, and lighting was included in the total metered energy; these overhead requirements were proportionally allocated to each unit operation rather than itemized separately. As a result, the reported energy figures encompass both direct and overhead energy demands.

A gate-to-gate (GTG) model was developed for each face fiber type. These GTGs cover production of carpet based on the energy values for each step in the process, and the materials processed. In addition to different masses of material processed, the different face fibers had different ratios of dyeing methods. Thus, the GTG energy was slightly different for carpets with different face fibers. However, the weighted average energy was the same as the metered energy per square meter. Transportation between facilities was included within the carpet production gtg.

Packaging is used to take the carpet from Dixie manufacturing sites to a distribution center and on to customers. Additionally, packaging is used within Dixie to move material from plant to plant. The carpet is wrapped around cardboard cores, and then an LDPE plastic wrap is used to protect the carpet and keep it together. The total packaging used was based on purchases in 2024, and this included packaging for internal use as well as shipment of final product.

Inputs to the manufacturing gtg were polymer pellets. In some cases, extrusion of fiber, and twisting and heat setting were done by 3rd party. In these gtgs, we assumed that the energy used in the 3rd party facilities was the same as that metered by Dixie. The primary and secondary backings are woven polypropylene fibers, and these are purchased from vendors. The extrusion into fiber and weaving energy for these backing materials are based on the Environmental Clarity model for these operations.

The energy for each carpet was then calculated based on the mass per square meter of carpet. In this way, the total energy was equal to that metered at the facilities.

Secondary data from Ecoinvent 3.11 were used when available (Ecoinvent version 3.11, <https://ecoinvent.org/ecoinvent-v3-11/> Ecoinvent, 8005 Technoparkstrasse 1, Zurich, Switzerland)

LCIA calculations were performed by OpenLCA version 2.4.1, using the EN15804 extension produced by the OpenLCA team. The EN15804 extension was developed to make sure that the datasets were consistent with EN15804 and ISO 21930. The impact assessment method used was TRACI 2.1 version 03.11.00 from the EPD methods category.

Therefore, outside of information in the upstream processes, these are zero, and these are zero for all of the LCAs in this report.

DATA QUALITY

Manufacturing data collected by Dixie were from 12 months during calendar year 2024 except for one plant opened in 2024, so data were based on March 2024 through February 2025 for this location. This data is consistent with technology. The synthetic polymers data are from a widely used database (Plastics Europe) via Ecoinvent. The ages of the data (temporal quality) are acceptable. Proper geographic representation was achieved as the reference database allowed selection of appropriate regions and energy sources. The data completeness was good as specified data were available for all components with significant contributions to the total impacts. Data quality was assessed for each material input to the carpets in the Supply chain section.

ALLOCATION

Attributional allocation was used when allocation was needed in this report and performed by Environmental Clarity. “Micro-allocation” of energy and water was used to assign the metered energy of some carpet facilities to each of the primary steps of carpet production. The micro-allocation was done based on expert judgement of Dixie personnel based on technical knowledge of the processes, motor sizes, and energy use during various campaigns. ISO 14044 states that micro-allocation (dividing the unit process to be allocated into two or more sub-processes and collecting the input and output data related to these sub-processes) should be done wherever possible. Most plants only cover a partial subset of carpet manufacturing. In the case of Dixie plant organization, micro-allocation provides a much more accurate result than simply allocating all plants by area or mass, because some carpets do not utilize all unit processes of each facility. For example, some carpets utilize the dyeing process, and some do not. Simply allocating the full plant energy by area or mass would produce misleading results.

In the supply chain datasets, the EN15804 version was used. This dataset uses the allocation cut-off by classification. This is the version of datasets within Ecoinvent that was developed to make the allocation

as consistent as possible with EPDs whether EN15804 or 21930. Within the polymer datasets used by carpets there may be embedded allocations that were not managed consistently by Ecoinvent. Figuring out all these allocation issues is beyond the scope of this report, and these datasets, with any embedded allocation issues, are explicitly endorsed for use within the relevant PCRs. The polymeric face fibers and primary backing (Nylon 6, Nylon 6,6, PET, and PP) come from Plastics Europe. According to Plastics Europe documentation (Plastics Europe, 2019), allocation is first by system expansion when a dominant identifiable displaced product is produced. After that, the allocation methods are by mass or energy (depending on causal relationships), followed by stoichiometric allocation (NaCl is allocated to NaOH and Cl by the amount of Na and Cl in the products instead of the total mass of products), and then economic allocation. While system expansion is considered avoiding allocation it is typically used in the consequential framework. Thus, while we used attributional allocation when we were given a choice, we recognize that the supply chain data have embedded allocation methods that are more consistent with the consequential approach.

CARPET MANUFACTURING FOR DIXIE RESIDENTIAL CARPETS

Dixie produces carpets at two sites: the Susan Street facility in Santa Ana, operates tufting, dyeing, and finishing, while the Eton facility in Dalton, GA performs tufting, with nearby joint ventures completing finishing and various dyeing methods. Some carpets also use solution-dyed fibers from external suppliers. This report covers all synthetic face fiber residential carpet produced by The Dixie Group. All products in this report are produced in the United States.

There are no hazardous materials in any of the carpets in this EPD.

Table 30. Dixie and 3rd party facilities performing each step in carpet production.

Processing step	Dixie facilities	3 rd party facilities	Comments
Extrusion	Calhoun, GA	Several vendors	Data based on Calhoun, GA plant
Twisting and heat setting	Porterville, CA and Roanoke, AL		Not applied to all carpets. Average of 2 plants used.
Tufting	Santa Ana, CA Eton, GA		Average of two plants is used for all carpets. Santa Ana is also referred to as Susan St.
Finishing	Santa Ana, CA	Vendor in GA	CA facility was used to collect data, and these values were used for all carpets.
Dyeing, Beck	Santa Ana, CA		Santa Ana is sometimes referred to as Susan St. These data were used
Dyeing, Continuous		JV, US, East coast	Primary data from JV were used.
Dyeing, Skein		JV, US, East coast	Primary data from JV were used.
Dyeing, Space		JV, US, East coast	Primary data from JV were used.
Dyeing, Solution		3 rd parties providing fiber and compounded pellets	See data in supply chain section.

MANUFACTURING STEPS AND PROCESS LOGISTICS

The carpet manufacturing process that begins with polymer pellets is divided into the following stages within Dixie operations: (1) extrusion into fiber, (2) twisting and heat setting, (3) tufting, (4) finishing, and (5) dyeing. Polymer pellets are used as inputs for extrusion. The tufting and finishing operations use primary and secondary backing, latex solution, packaging materials, dyes, and topicals.

This document outlines these operations and calculates the energy for each group of processes. When Dixie owns and operates the plants, material and energy inputs are supplied by Dixie as required by the PCR. Some of these processes were conducted by a joint venture, and primary energy values were sourced from those facilities accordingly. Generic data was only used for solution dyeing, which represents a minor portion of energy input. Electricity consumption at Dixie facilities was reported in kWh and converted to MJ for a common base of comparison. Natural gas usage was reported in therms (considered as higher heating value) and converted to MJ HHV for consistency in reporting. The Santa Ana plant and a dyeing plant performed multiple sets of operations, and micro-allocation was used to split the energy needs by type of unit operation.

EXTRUSION

Some of the yarn used in Dixie carpets is manufactured by Dixie, but the majority is purchased from vendors.

The extrusion process includes melting the polymer, extrusion where colorants are added, drawing the fibers, cooling, and winding. In the joint venture operation used by Dixie, the energy inputs were a mix of electricity and natural gas. Based on monthly fluctuations, about 1/3 of the gas appeared to be used for heating. No net water use is reported for extrusion.

TWISTING AND HEAT SETTING

There are two twisting and heat setting plants (Porterville, CA and Roanoke, AL). All the nylon twisting and heat setting done by the Dixie group is in these facilities. All PET carpets use twisting and heat setting processes, which are performed off-site since the PET carpets are produced from purchased yarn that has already undergone these treatments.

Table 31. Twisting and heat setting energy, including overhead

	Electricity	Natural gas (HHV of gas)	Steam	Blue water (excluding energy)	Water
Porterville, MJ / kg face fiber	9,471	6,821	0	0	6,161
Roanoke, MJ / kg face fiber	9,809	5,488	0	0	66.2
Weighted average, MJ / kg face fiber	9,733	5,787	0	0	1,431

TUFTING

Dixie has tufting operations at Santa Ana (CA) and Eton (GA). The Eton plant primarily operates tufting with little other activities. This gives us a measure of the energy consumed by the equipment in that plant. The Santa Ana plant (Susan St.) also operates finishing and dyeing operations, and the metered energy in the Santa Ana plant was allocated by Dixie personnel using technical information and expert judgement. The electricity use was consistent between the two facilities, and it was with the range of data seen on other carpet projects. The natural gas use in the Eton facility was for heating, and there did not appear to be significant cooling overhead energy use.

Tufting comprises preparing the yarns for the tufting machine and operation of the tufting machines themselves. The total energy includes warping, tufting, material handling, and setup/inventory. The tufting process alone was estimated to use 80% of the energy. Natural gas use is for heating.

Table 32. Tufting energy in Dixie facilities.

	Electricity	natural gas (HV of gas)	Steam	Blue water	Water
Eton, MJ / kg face fiber tufted	1,557	394	0	0	0
Susan St, MJ / kg face fiber tufted	1,650		0	0	29.1
Weighted average, MJ / kg extruded	1,577	309	0	0.0	6

FINISHING

Dixie finishes carpets in their own facility in Santa Ana, California. The east coast operations utilize a 3rd party facility in Georgia. The California facility utilities were allocated to the different carpet production stages. Energy from the California facilities was used as a guide to estimate the energy from all Dixie finishing operations.

Dixie currently uses water-based topicals. Application of topicals is done as part of the finishing process, and the small amount of additional energy required to evaporate the water is thus included in the finishing energy measurements. A proxy (acrylic copolymer) was used to estimate the small impact from manufacture of topicals. We estimate the active ingredient to be less than 0.1% of the total carpet weight.

DYEING

Dixie used a combination of dyeing techniques listed in Table . The Beck dyeing data came from the Susan St. plant. Continuous dyeing was done in a joint venture facility on the east coast, and this plant provided data. Skein dyeing and space dyeing were done in another facility on the east coast, and these utilities were allocated by Dixie personnel to each dyeing method. Dixie does not do Solution dyeing in-house, and generic data were used for this dyeing method. Beck dyeing blue water consumption was estimated by the amount of water removed from the dryer. The other blue water values were based on metered water and sewage usage.

Table 33: Dyeing types by carpet fiber

	Nylon 6, % of total m2	Nylon 6,6, % of total m2	Polyester, % of total m2
Piece dyed (Beck)	17	43	0
Continuous dyed	36	56	0
Solution dyed	47	1	100
Yarn dyed - Skein	0	0	0
Yarn dyed Space	0	0	0
Total	100	100	100

Table 34. Dyeing utility and blue water measurements at Dixie facilities

Dyeing method	Electricity, MJ/1000kg FF	Natural gas, MJ HHV/1000kg FF	Total water use, kg / 1000 kg FF	Blue water, kg / 1000 kg FF
Continuous dyeing	2,866	21,349	178	7
Skein (yarn)	7,355	24,144	998	40
Space (yarn)	6,005	19,714	815	33

Due to the difference in the dyeing methods used and to a lesser degree to the face fiber weight, the dyeing energy is quite different for the different face fiber carpets.

Table 7 Dyeing energy per 1000 kg of face fiber for each face fiber type, based on dyeing methods.

	Nylon 6	Nylon 6,6	Polyester
Electricity, MJ/1000 kg FF	1,604	3,014	32
Natural gas, MJ/1000 kg FF	15,438	31,565	0
Blue water, kg / 1000 kg FF	173	434	0
Metered water, kg / 1000 kg FF	5,253	13,224	0

Table 8 Dyeing energy per m2 of face fiber (based on market average face fiber weight).

	Nylon 6	Nylon 6,6	Polyester
Electricity, MJ / m2	2.79	5.06	0.05
Natural gas, MJ / m2	26.9	53.0	0
Blue water, kg / m2	0.30	0.73	0
Metered water, kg / m2	9.14	22.2	0

YIELD AND WASTE

Dixie measured several categories of waste flows. These measurements were used to calculate the amount of yarn inputs to the manufacture of carpets.

The waste is categorized as soft waste (yarn) and hard waste (finished carpet). The soft waste was about 25% obsolete yarn, and the remainder was waste mostly from the tufting operations. The hard waste includes carpets found to be damaged by a variety of issues.

WATER USE

Process blue water is dominated by water evaporation in the fiber drying processes and is linked to the dyeing methods. Minimal amounts of water are used in the other manufacturing processes. The water used is recovered, treated, and returned to the same water supply source from which it originated, thereby no blue water remains for these other components.

INTERNAL TRANSPORT

Dixie provided the transport energy (gallons of diesel consumption) for each of their locations allowing us to calculate the total transport energy for 2024. The emissions and LCIA for this transport were modeled by a generic module for transport using a combination truck of over 32,000kg. Diesel consumption was distributed evenly per unit area of carpet.

PACKAGING

Packaging is used to protect the carpet while being transported from Dixie manufacturing sites to a distribution center and on to customers. Additionally, packaging is used within Dixie to move material from plant to plant. The carpet is wrapped around cardboard cores and then covered with an LDPE plastic wrap to protect the carpet. The total packaging used was based on purchases in 2024, and this included packaging for internal use as well as shipment of final product.

The LDPE consumption was 0.20% of the face fiber mass in finished carpet and the total consumption of cardboard cores was 3.3% of the face fiber mass in finished carpet.

We assumed that the packaging is the same per unit area regardless of the fiber weight of the carpet. Any variation in packaging for different face-weight fibers will be insignificant compared to the overall impact of the carpets.

CALCULATION OF LCIA FOR VARYING FACE WEIGHTS

The energy for each carpet step is either a function of face fiber weight or carpet area. Yarn mass input and hard waste is a function of face fiber weight. The backing material inputs are constant per m² of carpet. OpenLCA was used to calculate impacts for each of the carpet inputs and energy consumptions. These were used to calculate the environmental impacts for each carpet as a function of face weight.

SUPPLY CHAIN AND INSTALLATION DATA

Secondary data for the supply chain from Ecoinvent 3.11 was used when available. When these data were incomplete or not available, data from Environmental Clarity were used to supplement.

In general, datasets were often available for Europe (RER) and for the rest of world (RoW). In addition, datasets are available as a market. The market version may contain multiple production technologies or a single technology, and it typically contains transport of the products to a regional distribution center. In general, the allocation methods available in Ecoinvent are (1) allocation cut-off by classification (2) allocation at the point of substitution (3) substitution, consequential, long-term. The EN15804 version incorporates cut-off by classification, and that is what is used in this study. The cut-off method makes the recyclable products ‘burden-free’ at the point of production (source). Transport is assigned to the recycling system and subsequent products.

Although the EN15804 database is largely compatible with 21930, there are some modifications that were made to be consistent with the accounting rules.

Table 9. Data modules used for inputs into the carpet manufacturing gate.

Material	Data module	Source	Comments
Nylon 6 pellets	Market for nylon 6 nylon 6 EN15804GD, U – ROW	Ecoinvent 3.11	1,2
Nylon 6,6 pellets	Market for nylon 6-6 nylon 6-6 EN15804GD, U – ROW	Ecoinvent 3.11	1,2
PET pellets	Market for polyethylene terephthalate resin, granulate polyethylene terephthalate granulates, amorphous EN15804GD, U – GLO	Ecoinvent 3.11	GLO is global, only version available
Polypropylene, woven, for primary and secondary backings	1) Market for polypropylene, granulate polypropylene, granulate EN15804GD, U – GLO 2) <Fiber production> 3) Weaving of synthetic fiber, for industrial use, weaving, synthetic fiber EN15804GD, U - GLO	(1) Ecoinvent 3.11 (2) Environmental Clarity (3) Ecoinvent 3.11	We did not find a module from Ecoinvent for extrusion of synthetic polymers to create fibers. Thus, data from Environmental Clarity were used.
Styrene butadiene latex	market for latex latex EN15804GD, U – RoW	Ecoinvent 3.11	There was also an RER version, so this is global excluding Europe.
Calcium carbonate	limestone production, milled, loose limestone, milled, loose EN15804GD, U - ROW	Ecoinvent 3.11	There was also an RER version, so this is global excluding Europe.

1. Data was available for Europe (RER) and rest of world (ROW). ROW was selected.
2. Originally from Plastics Europe
3. Biogenic carbon flow was modified to close carbon balance. See separate sections on biogenic carbon flow.

FACE FIBERS

The nylon 6 and nylon 6,6 are based on the market systems with the RoW geography, which is based on the full world with the exclusion of Europe. PET is based on global production, including Europe. The documentation states that it is 100% from virgin material, but the data source is not stated (PET in Ecoinvent, 2025).

BACKING MATERIALS

The primary and secondary backings are purchased as a woven polypropylene textile. We used Ecoinvent data for polypropylene granulate. This is converted to a yarn using the primary data that was collected from Dixie for fiber production.

Ecoinvent also has a database for styrene butadiene latex. Ecoinvent does not specify the solids content, but the solids content of latex is typically 45-50% by weight.

Calcium carbonate is a product acquired locally and typically has a low environmental impact.

Table 10. Additional inputs for the wool cleaning and processing gtgs, propylene extrusion gtgs, and packaging

Material	Data module	Source	Comments
Electricity	electricity voltage transformation from medium to low voltage electricity, low voltage EN15804GD, U - NZ	Ecoinvent 3.11	Low voltage is below 1 kV.
Heat, from natural gas	heat production, natural gas, at industrial furnace >100kW heat, district or industrial, natural gas EN15804GD, U - ROW	Ecoinvent 3.11	Small amount of heat needed for yarn processing gtg.
Sulfuric acid	market for sulfuric acid sulfuric acid EN15804GD, U - RoW	Ecoinvent 3.11	Small amount used to treat wool in yarn production
Weaving, synthetic fiber	weaving synthetic fiber, for industrial use weaving, synthetic fiber EN15804GD, U - GLO	Ecoinvent 3.11	Used for weaving polypropylene backing
LDPE pallet wrap	market for packaging film, low density polyethylene packaging film, low density polyethylene EN15804GD, U - GLO	Ecoinvent 3.11	This is for the extruded wrap

ENERGY MODULES

Electricity modules for electricity in the US were based on fuel consumption mixes in eGrid. The PCR (part A) states that preference should be given to subnational consumption mixes that account for power trade between regions. However, eGrid is a production-based resource, and consumption mixes are not included. In this work, we use the production-based generation fuel mix from eGrid 2023 rev 2.

Electricity modules were then created in openLCA combining electricity by fuel mix with eGrid data on the electricity fuel mix. The east coast plants are in the South subregion inside of the SERC grid (SRSO). The west coast plants are in the CAMX region of the WECC grid. The electricity mix by fuel for these as well as the US average grid are given in Table 11. We used this data to build a grid by fuel type. Other fossils and other unknown were entered as natural gas.

Regarding consumption mixes compared to production mixes, a recent study (Sharma et al., 2023) provided results for the production-based grid and a calculated consumption-based grid. The difference in these grids was typically small (<5%) for CO₂, SO_x, NO_x, and methane. There are a few exceptions for emissions from several grids.

For carpet manufacturing, electricity was from a mix of the SRSO grid and the CAMX grid, which apply for Georgia and California locations. For other operations, such as the use phase and end of life, electricity was from the US average grid. Within Ecoinvent, heat from natural gas has an assumed 90% efficiency factor based on lower heating value. Natural gas is sold in the US based on higher heating value, which is about 10% higher (in MJ) than the lower heating value. Thus, when metered heat was given, 1 MJ of metered heat was multiplied by 0.8 to calculate the amount of heat by natural gas used in the process.

For electricity modules by fuel type, we used USLCI when available for electricity and natural gas and Ecoinvent when USLCI data were not available as shown in

Table . These modules were for power at the power plants. Thus, each module was converted to power delivered using a 6% transmission and conversion loss. Other energy modules are given in Table . It is important to use US data when available for some fuels such as coal and hydro power because the coal mixes and hydro dams are significantly different in the US and Europe.

The USLCI database uses FEDEFL naming convention, which is incompatible with the naming convention used by Ecoinvent. The implementations of TRACI 2.1 that are distributed with OpenLCA that are meant to be used with the Ecoinvent naming conventions. Thus, we used a version (TRACI_2.1_json_v1.1.3) from the Federal LCA commons that uses these conventions. We utilized this methodology for the electricity modules from the USLCI database.

Table 11. Electricity generation by fuel mix in relevant grids

	CAMX	SRSO	US mix
Coal	2.1%	14.5%	16.1%
Oil	0.0%	0.1%	0.5%
Gas	42.9%	55.4%	43.2%
Nuclear	8.0%	20.4%	18.5%
Hydro	14.1%	2.4%	5.7%
Biomass	2.2%	3.6%	1.1%
Wind	6.6%	0.0%	10.0%
Solar	20.1%	3.6%	3.9%
Geothermal	3.6%	0.0%	0.4%
Other fossil	0.7%	0.0%	0.5%
Other unknown	-0.3%	0.0%	0.1%
Total	100.0%	100.0%	100.0%

Table 40. Modules used for electricity

	Type	Database	Module
Coal	Bituminous (92% coal mix)	USLCI	Electricity, bituminous coal, at power plant
	Lignite (8% of coal mix)	USLCI	Electricity, lignite coal, at power plant
Oil	Only one type listed	USLCI	electricity production, oil electricity, high voltage EN15804GD, U, US-WECC
Gas	No differentiation in database between combined cycle and single	USLCI	Electricity, natural gas, at power plant
Nuclear	USLCI has only one type of nuclear plant for US (not subdivided by type)	USLCI	electricity production, nuclear, boiling water reactor electricity, high voltage EN15804GD, U, US-WECC
Hydro	Used reservoir model, because vast majority of production in US is from a reservoir. USLCI has hydro data by plant, but does not have a general hydro across whole grid	Ecoinvent	electricity production, hydro, reservoir, alpine region electricity, high voltage EN15804GD, U
Biomass		USLCI	USLCI: Electricity, biomass, at power plant
Wind	Most is onshore, and about ½ of current installed base is >3MW. All new is >3MW	Ecoinvent	electricity production, wind, >3MW turbine, onshore electricity, high voltage EN15804GD, U
Solar	This size represents industrial installations	USLCI	electricity production, photovoltaic, 570kWp open ground installation, multi-Si electricity, low voltage EN15804GD, U - US-WECC
Geothermal		Ecoinvent	electricity production, deep geothermal electricity, high voltage EN15804GD, U

Table 41. Other Energy modules used.

Type of energy	Modules (from Ecoinvent 3.11)		Comments
Heat by natural gas	heat production, natural gas, at industrial furnace >100kW heat, district, or industrial, natural gas EN15804GD, U - RoW		This includes a 90% efficiency of generation of heat. Thus, 1 MJ of metered gas is equal to 0.9 MJ of heat production, natural gas....

TRANSPORT

Transport occurs in 3 areas. First, trucks are used to transport materials between facilities. Dixie reported the gallons of diesel fuel consumed for this transport. This is considered to be transport within the carpet manufacturing gtg. Second, transport of products to the installation site which is specified in metric tons transported per 1 km. Based upon the PCR standard, this is assumed to be 800 km (500 miles). Third, transport is used at the end of the useful life of the carpet for disposal in the landfill. The PCR states this to be 161 km (100 miles). Parameters for transport are in Table 42.

Table 42. Transport to building site.

Name	Value		Unit
Fuel type	Diesel		
Liters of fuel	Not specified in documentation		l/100km
Vehicle type	Articulated trailer > 32 tons		
Transport distance	800		km
Capacity utilization	53		%
Gross density	Not applicable ¹		Kg/m ³
Weight of products	Not applicable		Kg
Volume of products	Not applicable		M ³
Capacity utilization volume factor (factor: =1 or <1 or _ 1 for compressed or nested packaging products)	Not applicable		-

1- These are not applicable to Ecoinvent Transport Models which is based on mass and distance as an input, and is based on generic values for gross utilization factors.

INSTALLATION (A5)

During the installation phase (A5) tack strips are consumable materials used to hold the carpet in place. Tools used to install the carpet are excluded from the LCA. There are several small nails for attaching the strip to the floor and over 100 thin angled nails pointing up that hold the carpet in place. An estimate was made of the amount of wood and metal used per m² of carpet.

In addition, the impact of carpet scrap from the installation process is recorded in this section. It is assumed that 5% loss of material occurs during the installation. The end-of-life product waste and all packaging is included in this phase.

After installation, the cardboard, polymeric wrap (LDPE), and tack strips are treated with the end-of-life methods specified in the end-of-life section. Impacts from these activities are included in A5.

Parameters for installation are given in Table .

Table 43. Installation into the building

Name	Value	Unit
Ancillary materials, tack strips wood	0.08	Kg
Ancillary materials, tack strips nails (steel)	0.015	kg
Net freshwater consumption specified by water source and fate (e.g., X m3 river water evaporated, X m3 city water disposed to sewer)	0	M3
Other resources	Not applicable	
Electricity consumption	Not applicable	kWhr
Other energy carriers	Not applicable	
Product loss per functional unit ²	0.05	M2
Waste materials at the construction site before waste processing	0.095+0.057=0.15	Kg
Output materials from onsite processing	Not applicable	
Mass of packaging waste		
Cardboard Core	0.054	Kg
LDPE wrap	0.0033	kg
Biogenic carbon in the packaging ¹ = 0.45 kg C / kg core board	0.09	Kg CO2
Direct emissions to ambient air, soil and water	Not applicable	
VOC emissions	Not applicable for tack strip installation	

1. This is based on the total carbon content of core board.

2. Product loss is 5% of installed area. The mass depends on the mass of the carpet.

END OF LIFE DATA

The end-of-life activities are given by mass for each synthetic carpet in Table . As discussed, 100% of the carpet goes to the landfill. The core board packaging is split between recycling (75%), landfill (20%), and incineration (5%). The LDPE packaging is split between recycling 15%, landfill, 68%, and incineration (17%). The tack strips are an ancillary installation material, and these are assumed to be landfilled 100% of the time. For the tack strips, wood is 50% carbon by weight, and 10% degrades over 100 years.

Table 44. End-of-life scenario details for synthetic carpet.

Name	EOL activity	Nylon 6	Nylon 66	PET	Unit
Carpet waste (C2/C4)	Landfill	3.12	3.05	2.93	kg / m2
Carpet scrap (A5)	Landfill	0.156	0.153	0.147	kg / m2
Packaging waste, LDPE wrap	Total	3.30E-03	3.30E-03	3.30E-03	kg / m2
	Recycling	4.95E-04	4.95E-04	4.95E-04	kg / m2
	Landfill	2.24E-03	2.24E-03	2.24E-03	kg / m2
	Incineration	5.61E-04	5.61E-04	5.61E-04	kg / m2
Packaging waste, cardboard core wrap	Total	5.40E-02	5.40E-02	5.40E-02	kg / m2
	Recycling	4.05E-02	4.05E-02	4.05E-02	kg / m2
	Landfill	1.08E-02	1.08E-02	1.08E-02	kg / m2
	Incineration	2.70E-03	2.70E-03	2.70E-03	kg / m2
Tack strips	Total	9.8E-02	9.8E-02	9.8E-02	kg / m2
	Landfill	9.8E-02	9.8E-02	9.8E-02	kg / m2
Biogenic CO2 content in packaging (cardboard core)	0.5 kg C / kg core-board	8.91E-02	8.91E-02	8.91E-02	kg CO2eq / m2

WASTE PROCESSING IN LANDFILL

The PCR specifies that all the carpet is disposed of in the landfill. Ecoinvent has several modules for landfill treatment. These were supplemented with the Environmental Clarity module for carbon decomposition because there was no similar module in Ecoinvent that transparently showed the fate of decomposed carbon in the landfill.

Inert material in landfill has no emissions from the material in the landfill but does account for emissions from construction and operation of the landfill. Landfill of polymeric material included 1% degradation of carbon. Landfill of tack strips was included in the C4 stage, though it is not part of the product.

Table 45. Waste treatment modules used to model disposal of carpets in the landfill.

Item	Data module	Source	Comments
Transport of carpet to landfill	Transport, freight, lorry, 7.5-16 metric ton, diesel, Euro 6, ROW And Transport, freight, lorry, 16-32 metric tons, diesel, Euro 6, ROW	Ecoinvent 3.11	Smaller lorry is 10 km to transfer station and larger for 151 km to landfill.
Landfill of inert materials (non-polymer)	Treatment of inert waste, inert material landfill inert waste, for final disposal EN15804GD, U-RoW	Ecoinvent 3.11	Used for CaCO ₃ portion of carpet and for the operations energy for wool face fiber.
Landfill of polymeric materials	Treatment of waste plastic, mixture, sanitary landfill waste plastic, mixture EN15804GD, U-RoW	Ecoinvent 3.11	Used for polymeric face fiber, backing layers, and SBL polymer. Includes 1% degradation in landfill
Landfill of tack strips, emissions associated with decomposition	LF disp, C decomp	Environmental Clarity	Assumed that 10% of the carbon decomposes (IPCC)
Landfill of core board, emissions associated with decomposition	LF disp, C decomp	Environmental Clarity	Assumed that 100% of carbon decomposes to be consistent with the PCR, although the IPCC states that 50% is typically decomposed.

BIOGENIC CARBON TRACKING

The cardboard used in packaging and wood tack strips used in installation result in a significant uptake and emissions of biogenic carbon. To compensate for the mass balances of individual components in the LCA during the allocation process, the Ecoinvent database resource flow called “Carbon dioxide, non-fossil, resource correction” was utilized.

Since cardboard is assumed to be recycled, the cutoff method is used. In reference to the 21930 standards, we assumed the carbon content of packaging will result in an emission of CO₂ equal to that sequestered in the ctg production of the cardboard.

For tack strips, we assume that 10% of the carbon contained in the strips degrades in the landfill and the rest is sequestered (IPCC, 2019). This significantly affects the biogenic carbon balance for the life cycle of polymeric fiber carpets. These CO₂ flows were entered as product.

In the TRACI GWP results, there is no impact for “Carbon dioxide, non-fossil” or for the biogenic carbon dioxide resource inputs. We present the TRACI impacts without biogenic carbon and the TRACI impacts with biogenic carbon as required by the PCR. A verification of this modification was EN15804 EF 3.1 methodology which reports biogenic carbon flows separately. Over the full life cycle, the calculations with and without biogenic flows should be identical except for any stated carbon sequestration.

RESULTS FOR MARKET AVERAGE FACE WEIGHT CARPETS

LCA results for the metrics and life cycle stages specified by the PCR are given per m² of installed carpet. Except for B4, other stages are for 1 carpet. The carpet reference lifespan is 15 years. For a building with a reference life of 75 years, the carpet will need to be replaced 4 times. Stage B4 is the impact of these 4 carpet replacements (full CTG impact). These LCIA results are relative and do not predict impacts on category endpoints, the exceeding of thresholds, safety margins or risks. Most of the impact of carpet production is the CTG phase. A sizable portion of this is from manufacturing (including the CTG of energy production for the manufacturing GTG).

Results are given by stage for the nylon 6 market weighted average face fiber weight (1.74 kg / m²) in Table 46. LCIA and resource flow results, nylon 6, (1.74 kg face fiber/m²)

	A1-A3	A4	A5	B2	B4	C2	C4
<i>TRACI 2.1 indicators (GWP with and without biogenic credit)</i>							
GWP 100 with biogenic, kg CO ₂ eq	2.56E+01	2.92E-01	1.49E+00	1.38E+00	1.16E+02	9.97E-02	1.88E-01
GWP 100 without biogenic, kg CO ₂ eq	2.57E+01	2.92E-01	1.47E+00	1.38E+00	1.16E+02	9.97E-02	1.88E-01
ODP, kg CFC-11eq	6.99E-08	4.22E-09	5.04E-09	1.06E-09	3.30E-07	1.44E-09	8.15E-10
AP, kg SO ₂ eq	8.79E-02	9.28E-04	5.31E-03	5.38E-03	4.00E-01	2.13E-04	2.08E-04
EP, kg Neq	2.38E-02	4.30E-04	8.59E-03	2.38E-04	5.31E-01	1.41E-04	9.96E-02
SFP, kg O ₃ eq	1.48E+00	2.28E-02	9.45E-02	7.60E-02	6.74E+00	3.98E-03	5.46E-03
ADP fossil, MJ surplus	3.83E+01	5.73E-01	2.09E+00	1.34E-02	1.64E+02	1.88E-01	0.00E+00
<i>Resources</i>							
RPRE, MJ	9.13E+00	5.87E-02	4.84E+00	2.30E+00	6.54E+01	1.97E-02	8.79E-03
RPRM, MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NRPRE, MJ	3.06E+02	4.24E+00	1.73E+01	1.71E-01	1.32E+03	1.40E+00	6.81E-01
NRPRM, MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
SM, kg	8.31E-02	3.14E-03	1.25E-02	1.13E-03	4.05E-01	1.02E-03	4.41E-04
RSF, MJ	1.06E-02	4.10E-04	1.02E-03	1.92E-04	4.96E-02	1.20E-04	7.13E-05
NRSF, MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RE, MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
FW, m ³	1.80E-01	6.26E-04	1.17E-02	9.96E-03	7.76E-01	1.92E-04	-8.14E-03

and Table 46. LCIA and resource flow results, nylon 6, (1.74 kg face fiber/m²)

	A1-A3	A4	A5	B2	B4	C2	C4
<i>TRACI 2.1 indicators (GWP with and without biogenic credit)</i>							
GWP 100 with biogenic, kg CO ₂ eq	2.56E+01	2.92E-01	1.49E+00	1.38E+00	1.16E+02	9.97E-02	1.88E-01
GWP 100 without biogenic, kg CO ₂ eq	2.57E+01	2.92E-01	1.47E+00	1.38E+00	1.16E+02	9.97E-02	1.88E-01
ODP, kg CFC-11eq	6.99E-08	4.22E-09	5.04E-09	1.06E-09	3.30E-07	1.44E-09	8.15E-10
AP, kg SO ₂ eq	8.79E-02	9.28E-04	5.31E-03	5.38E-03	4.00E-01	2.13E-04	2.08E-04
EP, kg Neq	2.38E-02	4.30E-04	8.59E-03	2.38E-04	5.31E-01	1.41E-04	9.96E-02
SFP, kg O ₃ eq	1.48E+00	2.28E-02	9.45E-02	7.60E-02	6.74E+00	3.98E-03	5.46E-03
ADP fossil, MJ surplus	3.83E+01	5.73E-01	2.09E+00	1.34E-02	1.64E+02	1.88E-01	0.00E+00
<i>Resources</i>							
RPRE, MJ	9.13E+00	5.87E-02	4.84E+00	2.30E+00	6.54E+01	1.97E-02	8.79E-03
RPRM, MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NRPRE, MJ	3.06E+02	4.24E+00	1.73E+01	1.71E-01	1.32E+03	1.40E+00	6.81E-01
NRPRM, MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
SM, kg	8.31E-02	3.14E-03	1.25E-02	1.13E-03	4.05E-01	1.02E-03	4.41E-04
RSF, MJ	1.06E-02	4.10E-04	1.02E-03	1.92E-04	4.96E-02	1.20E-04	7.13E-05
NRSF, MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RE, MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
FW, m ³	1.80E-01	6.26E-04	1.17E-02	9.96E-03	7.76E-01	1.92E-04	-8.14E-03

Table 46. LCIA and resource flow results, nylon 6, (1.74 kg face fiber/m2)

	A1-A3	A4	A5	B2	B4	C2	C4
<i>TRACI 2.1 indicators (GWP with and without biogenic credit)</i>							
GWP 100 with biogenic, kg CO2eq	2.56E+01	2.92E-01	1.49E+00	1.38E+00	1.16E+02	9.97E-02	1.88E-01
GWP 100 without biogenic, kg CO2eq	2.57E+01	2.92E-01	1.47E+00	1.38E+00	1.16E+02	9.97E-02	1.88E-01
ODP, kg CFC-11eq	6.99E-08	4.22E-09	5.04E-09	1.06E-09	3.30E-07	1.44E-09	8.15E-10
AP, kg SO2eq	8.79E-02	9.28E-04	5.31E-03	5.38E-03	4.00E-01	2.13E-04	2.08E-04
EP, kg Neq	2.38E-02	4.30E-04	8.59E-03	2.38E-04	5.31E-01	1.41E-04	9.96E-02
SFP, kg O3 eq	1.48E+00	2.28E-02	9.45E-02	7.60E-02	6.74E+00	3.98E-03	5.46E-03
ADP fossil, MJ surplus	3.83E+01	5.73E-01	2.09E+00	1.34E-02	1.64E+02	1.88E-01	0.00E+00
<i>Resources</i>							
RPRE, MJ	9.13E+00	5.87E-02	4.84E+00	2.30E+00	6.54E+01	1.97E-02	8.79E-03
RPRM, MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NRPRE, MJ	3.06E+02	4.24E+00	1.73E+01	1.71E-01	1.32E+03	1.40E+00	6.81E-01
NRPRM, MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
SM, kg	8.31E-02	3.14E-03	1.25E-02	1.13E-03	4.05E-01	1.02E-03	4.41E-04
RSF, MJ	1.06E-02	4.10E-04	1.02E-03	1.92E-04	4.96E-02	1.20E-04	7.13E-05
NRSF, MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RE, MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
FW, m3	1.80E-01	6.26E-04	1.17E-02	9.96E-03	7.76E-01	1.92E-04	-8.14E-03

Table 47: Waste parameters and unique carbon emissions/uptake, nylon 6, (1.74 kg face fiber/m²)

	A1-A3	A4	A5	B2	B4	C2	C4
<i>Waste parameters and output flows</i>							
HWD, kg	2.29E-01	6.92E-03	1.95E-02	1.77E-03	1.04E+00	2.36E-03	7.83E-04
NHWD, kg	2.95E+00	3.78E-02	5.04E-01	1.56E-02	3.77E+01	1.36E-02	5.90E+00
HLRW, kg	5.62E-06	2.59E-07	8.40E-07	6.51E-08	2.75E-05	8.19E-08	5.66E-09
ILLRW, kg	1.54E-05	6.36E-07	2.01E-06	1.60E-07	7.35E-05	1.97E-07	1.40E-08
CRU, kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MR, kg	3.37E-02	2.62E-03	3.43E-03	1.44E-03	1.69E-01	8.98E-04	3.16E-04
MER, kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
EE, kg	1.23E-02	8.17E-04	1.66E-03	1.73E-04	6.17E-02	3.16E-04	1.21E-04
<i>Carbon emissions and uptake</i>							
BCRP, kg CO ₂	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
BCEP, kg CO ₂	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
BCRK, kg CO ₂	1.78E-02	0.00E+00	0.00E+00	0.00E+00	7.13E-02	0.00E+00	0.00E+00
BCEK, kg CO ₂	0.00E+00	0.00E+00	1.78E-02	0.00E+00	7.13E-02	0.00E+00	0.00E+00
BCEW, kg CO ₂	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CCE, kg CO ₂	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CCR, kg CO ₂	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CWNR, kg CO ₂	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

The results for nylon 6,6 are given in **Error! Not a valid bookmark self-reference.** and Table . Relative to the nylon 6 carpet, the impacts are slightly lower on the CTG basis.

Table 48: LCIA and resource flow results, nylon 6,6 carpet, (1.68 kg face fiber/m²)

	A1-A3	A4	A5	B2	B4	C2	C4
<i>TRACI 2.1 indicators (GWP with and without biogenic credit)</i>							
GWP 100 with biogenic, kg CO ₂ eq	2.38E+01	2.87E-01	1.40E+00	1.38E+00	1.09E+02	9.77E-02	1.83E-01
GWP 100 without biogenic, kg CO ₂ eq	2.38E+01	2.87E-01	1.38E+00	1.38E+00	1.09E+02	9.77E-02	1.83E-01
ODP, kg CFC-11eq	8.25E-08	4.14E-09	5.67E-09	1.06E-09	3.82E-07	1.41E-09	7.97E-10
AP, kg SO ₂ eq	8.18E-02	9.10E-04	5.00E-03	5.38E-03	3.74E-01	2.09E-04	2.03E-04
EP, kg Neq	3.78E-02	4.22E-04	9.16E-03	2.38E-04	5.79E-01	1.38E-04	9.69E-02
SFP, kg O ₃ eq	1.22E+00	2.24E-02	8.15E-02	7.60E-02	5.64E+00	3.90E-03	5.34E-03
ADP fossil, MJ surplus	3.86E+01	5.62E-01	2.10E+00	1.34E-02	1.66E+02	1.84E-01	0.00E+00
<i>Resources</i>							
RPRE, MJ	1.08E+01	5.76E-02	4.92E+00	2.30E+00	7.25E+01	1.94E-02	8.59E-03
RPRM, MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NRPRE, MJ	3.35E+02	4.16E+00	1.88E+01	1.71E-01	1.44E+03	1.37E+00	6.66E-01
NRPRM, MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
SM, kg	8.53E-02	3.08E-03	1.26E-02	1.13E-03	4.14E-01	9.98E-04	4.30E-04
RSF, MJ	1.07E-02	4.02E-04	1.03E-03	1.92E-04	5.01E-02	1.18E-04	6.97E-05
NRSF, MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RE, MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
FW, m ³	4.50E-01	6.14E-04	2.52E-02	9.78E-03	1.91E+00	1.88E-04	-7.92E-03

Table 49: Waste parameters and unique carbon emissions/uptake, nylon 6,6 (1.68 kg face fiber/m²)

	A1-A3	A4	A5	B2	B4	C2	C4
<i>Waste parameters and output flows</i>							
HWD, kg	2.33E-01	6.79E-03	1.97E-02	1.77E-03	1.06E+00	2.31E-03	7.65E-04
NHWD, kg	2.99E+00	3.71E-02	4.98E-01	1.56E-02	3.72E+01	1.34E-02	5.75E+00
HLRW, kg	6.01E-06	2.55E-07	8.59E-07	6.51E-08	2.91E-05	8.03E-08	5.66E-09
ILLRW, kg	1.53E-05	6.24E-07	2.00E-06	1.60E-07	7.31E-05	1.93E-07	1.40E-08
CRU, kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MR, kg	3.56E-02	2.57E-03	3.52E-03	1.44E-03	1.77E-01	8.80E-04	3.09E-04
MER, kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
EE, kg	1.28E-02	8.02E-04	1.69E-03	1.73E-04	6.37E-02	3.10E-04	1.18E-04
<i>Carbon emissions and uptake</i>							
BCRP, kg CO2	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
BCEP, kg CO2	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
BCRK, kg CO2	1.78E-02	0.00E+00	0.00E+00	0.00E+00	7.13E-02	0.00E+00	0.00E+00
BCEK, kg CO2	0.00E+00	0.00E+00	1.78E-02	0.00E+00	7.13E-02	0.00E+00	0.00E+00
BCEW, kg CO2	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CCE, kg CO2	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CCR, kg CO2	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CWNR, kg CO2	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Results for PET face fiber carpets are given in Table and Table . Relative to the nylon 6 carpet, the GWP, AP, and SFP impacts are significantly lower on the CTG basis.

Table 50: LCIA and resource flow results, PET carpet, (1.55 kg face fiber/m²)

	A1-A3	A4	A5	B2	B4	C2	C4
<i>TRACI 2.1 indicators (GWP with and without biogenic credit)</i>							
GWP 100 with biogenic, kg CO ₂ eq	1.31E+01	2.75E-01	8.58E-01	1.38E+00	6.34E+01	9.36E-02	1.72E-01
GWP 100 without biogenic, kg CO ₂ eq	1.31E+01	2.75E-01	8.41E-01	1.38E+00	6.34E+01	9.36E-02	1.72E-01
ODP, kg CFC-11eq	2.16E-05	3.96E-09	1.08E-06	1.06E-09	9.09E-05	1.35E-09	7.59E-10
AP, kg SO ₂ eq	5.45E-02	8.72E-04	3.63E-03	5.38E-03	2.59E-01	2.00E-04	1.93E-04
EP, kg Neq	4.12E-02	4.04E-04	9.04E-03	2.38E-04	5.69E-01	1.33E-04	9.12E-02
SFP, kg O ₃ eq	8.44E-01	2.14E-02	6.26E-02	7.60E-02	4.05E+00	3.74E-03	5.08E-03
ADP fossil, MJ surplus	2.63E+01	5.38E-01	1.49E+00	1.34E-02	1.14E+02	1.77E-01	0.00E+00
<i>Resources</i>							
RPRE, MJ	1.15E+01	5.52E-02	4.96E+00	2.30E+00	7.54E+01	1.85E-02	8.15E-03
RPRM, MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NRPRE, MJ	2.08E+02	3.98E+00	1.24E+01	1.71E-01	9.07E+02	1.31E+00	6.34E-01
NRPRM, MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
SM, kg	1.99E-01	2.95E-03	1.83E-02	1.13E-03	8.92E-01	9.55E-04	4.08E-04
RSF, MJ	6.26E-02	3.85E-04	3.62E-03	1.92E-04	2.68E-01	1.13E-04	6.62E-05
NRSF, MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RE, MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
FW, m ³	8.45E-02	5.89E-04	6.94E-03	9.39E-03	3.77E-01	1.80E-04	-7.44E-03

Table 51: Waste parameters and unique carbon emissions/uptake, PET (1.55 kg face fiber/m²)

	A1-A3	A4	A5	B2	B4	C2	C4
<i>Waste parameters and output flows</i>							
HWD, kg	2.88E-01	6.50E-03	2.24E-02	1.77E-03	1.29E+00	2.21E-03	7.26E-04
NHWD, kg	9.66E+00	3.55E-02	8.14E-01	1.56E-02	6.38E+01	1.28E-02	5.40E+00
HLRW, kg	2.64E-05	2.44E-07	1.88E-06	6.51E-08	1.15E-04	7.69E-08	5.66E-09
ILLRW, kg	6.87E-05	5.98E-07	4.67E-06	1.60E-07	2.97E-04	1.85E-07	1.40E-08
CRU, kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MR, kg	1.43E-01	2.47E-03	8.88E-03	1.44E-03	6.27E-01	8.43E-04	2.93E-04
MER, kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
EE, kg	1.39E-01	7.68E-04	7.97E-03	1.73E-04	5.92E-01	2.97E-04	1.12E-04
<i>Carbon emissions and uptake</i>							
BCRP, kg CO ₂	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
BCEP, kg CO ₂	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
BCRK, kg CO ₂	1.78E-02	0.00E+00	0.00E+00	0.00E+00	7.13E-02	0.00E+00	0.00E+00
BCEK, kg CO ₂	0.00E+00	0.00E+00	1.78E-02	0.00E+00	7.13E-02	0.00E+00	0.00E+00
BCEW, kg CO ₂	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CCE, kg CO ₂	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CCR, kg CO ₂	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CWNR, kg CO ₂	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

RESULTS FOR OTHER FACE WEIGHTS AND DYE METHODS

The PCR (part A) requires that all the carpets covered by each EPD have results that do not differ by more than 10% of the total impact. Face fiber weights in the residential carpet market typically vary by much more than this amount and face fibers tend to make up more than 50% of the cradle to gate impacts of carpets. The face fiber weights vary by a factor of 2 to 3 for PET and a factor of 5 for the nylon product. Therefore, the impacts for the heavier face fiber carpets are much greater than those with lower pile weights.

We quantified the results for several face fiber weights (scenarios) for each fiber type. Face fiber weights for these scenarios were selected so that the results for any given carpet face fiber will be within 10% of one of the scenarios. The results are for the full life cycle of one carpet, which is the sum of all life cycle stages except B4. The results are given for each face fiber type in **Error! Reference source not found.** to **Error! Reference source not found.** These can be used by users of the EPD to determine how a specific face fiber weight performs.

To be transparent about the impact of face weight on the overall result, we provide the cradle to gate of one carpet installed (the sum of all categories except B4) as a function of face weight for each fiber. This provides accurate cradle to grave results for any carpet that is in use for 15 years covered under each of the EPDs.

Table 52: LCIA and resource impacts for one carpet cradle to grave (all stages except B4) as a function of face fiber (FF) for Nylon 6

Face Fiber, kg / m ²	0.849	1.1	1.4	1.74	2.2	2.8	3.6	4.3
<i>TRACI 2.1 indicators (GWP with and without biogenic credit)</i>								
GWP 100 with biogenic, kg CO ₂ eq	1.69E+01	2.03E+01	2.44E+01	2.91E+01	3.54E+01	4.36E+01	5.45E+01	6.41E+01
GWP 100 without biogenic, kg CO ₂ eq	1.69E+01	2.03E+01	2.44E+01	2.91E+01	3.54E+01	4.36E+01	5.45E+01	6.41E+01
ODP, kg CFC-11eq	6.33E-08	6.87E-08	7.51E-08	8.25E-08	9.24E-08	1.05E-07	1.23E-07	1.38E-07
AP, kg SO ₂ eq	6.01E-02	7.13E-02	8.48E-02	1.00E-01	1.21E-01	1.47E-01	1.83E-01	2.15E-01
EP, kg Neq	8.50E-02	9.85E-02	1.15E-01	1.33E-01	1.57E-01	1.90E-01	2.33E-01	2.70E-01
SFP, kg O ₃ eq	1.01E+00	1.20E+00	1.43E+00	1.68E+00	2.03E+00	2.48E+00	3.08E+00	3.61E+00
ADP _{fossil}	2.58E+01	3.01E+01	3.52E+01	3.52E+01	4.90E+01	5.93E+01	7.30E+01	8.50E+01
<i>Resources</i>								
RPRE, MJ	1.25E+01	1.36E+01	1.49E+01	1.64E+01	1.84E+01	2.10E+01	2.44E+01	2.75E+01
RPRM, MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
NRPRE, MJ	2.04E+02	2.39E+02	2.82E+02	3.29E+02	3.94E+02	4.79E+02	5.91E+02	6.89E+02
NRPRM, MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
SM, kg	9.37E-02	9.58E-02	9.84E-02	1.01E-01	1.05E-01	1.11E-01	1.17E-01	1.24E-01
RSF, MJ	1.14E-02	1.17E-02	1.20E-02	1.24E-02	1.29E-02	1.36E-02	1.45E-02	1.53E-02
NRSF, MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RE, MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
FW, m ³	1.20E-01	1.41E-01	1.66E-01	1.94E-01	2.32E-01	2.82E-01	3.49E-01	4.07E-01

Table 12. Waste and carbon impacts for one carpet cradle to grave (all stages except B4) as a function of face fiber (FF) for Nylon 6

Face Fiber, kg / m ²	0.849	1.1	1.4	1.74	2.2	2.8	3.6	4.3
<i>Waste parameters and output flows</i>								
HWD, kg	1.75E-01	1.99E-01	2.28E-01	2.60E-01	3.04E-01	3.61E-01	4.37E-01	5.04E-01
NHWD, kg	6.84E+00	7.57E+00	8.44E+00	9.43E+00	1.08E+01	1.25E+01	1.48E+01	1.69E+01
HLRW, kg	6.36E-06	6.51E-06	6.68E-06	6.87E-06	7.14E-06	7.48E-06	7.94E-06	8.34E-06
ILLRW, kg	1.71E-05	1.75E-05	1.79E-05	1.84E-05	1.91E-05	1.99E-05	2.11E-05	2.21E-05
CRU, kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MR, kg	3.61E-02	3.79E-02	4.00E-02	4.24E-02	4.56E-02	4.98E-02	5.54E-02	6.03E-02
MER, kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
EE, kg	1.36E-02	1.41E-02	1.47E-02	1.54E-02	1.64E-02	1.76E-02	1.93E-02	2.07E-02
<i>Carbon emissions and uptake</i>								
BCRP, kg CO ₂	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
BCEP, kg CO ₂	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
BCRK, kg CO ₂	1.78E-02	1.78E-02	1.78E-02	1.78E-02	1.78E-02	1.78E-02	1.78E-02	1.78E-02
BCEK, kg CO ₂	1.78E-02	1.78E-02	1.78E-02	1.78E-02	1.78E-02	1.78E-02	1.78E-02	1.78E-02
BCEW, kg CO ₂	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CCE, kg CO ₂	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CCR, kg CO ₂	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CWNR, kg CO ₂	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Table 54: LCIA and resource impacts for one carpet cradle to grave (all stages except B4) as a function of face fiber (FF) for Nylon 6,6

Face Fiber, kg / m ²	0.849	1.10	1.40	1.68	2.40	3.00	3.90	4.40
<i>TRACI 2.1 indicators (GWP with and without biogenic credit)</i>								
GWP 100 with biogenic, kg CO ₂ eq	1.64E+01	1.96E+01	2.35E+01	2.72E+01	3.65E+01	4.43E+01	5.60E+01	5.73E+01
GWP 100 without biogenic, kg CO ₂ eq	1.64E+01	1.96E+01	2.35E+01	2.72E+01	3.65E+01	4.43E+01	5.60E+01	5.73E+01
ODP, kg CFC-11eq	7.05E-08	7.81E-08	8.71E-08	9.56E-08	1.17E-07	1.35E-07	1.62E-07	1.65E-07
AP, kg SO ₂ eq	5.82E-02	6.88E-02	8.16E-02	9.35E-02	1.24E-01	1.50E-01	1.88E-01	1.92E-01
EP, kg Neq	9.26E-02	1.08E-01	1.27E-01	1.45E-01	1.90E-01	2.27E-01	2.84E-01	2.90E-01
SFP, kg O ₃ eq	8.98E-01	1.05E+00	1.24E+00	1.41E+00	1.85E+00	2.22E+00	2.78E+00	2.84E+00
ADP _{fossil}	2.65E+01	3.10E+01	3.64E+01	4.15E+01	5.44E+01	6.52E+01	8.15E+01	8.33E+01
<i>Resources</i>								
RPRE, MJ	1.35E+01	1.49E+01	1.66E+01	1.81E+01	2.21E+01	2.54E+01	3.04E+01	3.10E+01
RPRM, MJ								
NRPRE, MJ	2.24E+02	2.65E+02	3.15E+02	3.61E+02	4.79E+02	5.77E+02	7.25E+02	7.41E+02
NRPRM, MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
SM, kg	9.50E-02	9.76E-02	1.01E-01	1.04E-01	1.11E-01	1.17E-01	1.26E-01	1.27E-01
RSF, MJ	1.15E-02	1.18E-02	1.22E-02	1.25E-02	1.34E-02	1.42E-02	1.53E-02	1.55E-02
NRSF, MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RE, MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
FW, m ³	2.66E-01	3.30E-01	4.06E-01	4.78E-01	6.61E-01	8.14E-01	1.04E+00	1.07E+00

Table 55: Waste and carbon impacts for one carpet cradle to grave (all stages except B4) as a function of face fiber (FF) for Nylon 6,6

Face Fiber, kg / m ²	0.849	1.1	1.4	1.68	2.4	3	3.9	4.4
<i>Waste parameters and output flows</i>								
HWD, kg	1.80E-01	2.06E-01	2.36E-01	2.64E-01	3.37E-01	3.98E-01	4.89E-01	4.99E-01
NHWD, kg	6.86E+00	7.60E+00	8.48E+00	9.30E+00	1.14E+01	1.32E+01	1.58E+01	1.61E+01
HLRW, kg	6.58E-06	6.79E-06	7.04E-06	7.27E-06	7.87E-06	8.37E-06	9.11E-06	9.20E-06
ILLRW, kg	1.71E-05	1.74E-05	1.79E-05	1.83E-05	1.93E-05	2.02E-05	2.15E-05	2.16E-05
CRU, kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MR, kg	3.73E-02	3.94E-02	4.20E-02	4.43E-02	5.04E-02	5.55E-02	6.31E-02	6.39E-02
MER, kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
EE, kg	1.39E-02	1.45E-02	1.52E-02	1.59E-02	1.77E-02	1.91E-02	2.13E-02	2.15E-02
<i>Carbon emissions and uptake</i>								
BCRP, kg CO ₂	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
BCEP, kg CO ₂	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
BCRK, kg CO ₂	1.78E-02	1.78E-02	1.78E-02	1.78E-02	1.78E-02	1.78E-02	1.78E-02	1.78E-02
BCEK, kg CO ₂	1.78E-02	1.78E-02	1.78E-02	1.78E-02	1.78E-02	1.78E-02	1.78E-02	1.78E-02
BCEW, kg CO ₂	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CCE, kg CO ₂	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CCR, kg CO ₂	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CWNR, kg CO ₂	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

Table 56: LCIA and resource impacts for one carpet cradle to grave (all stages except B4) as a function of face fiber (FF) for PET

Face Fiber, kg / m ²	1.1	1.3	1.55	1.8	2.1	2.5
<i>TRACI 2.1 indicators (GWP with and without biogenic credit)</i>						
GWP 100 with biogenic, kg CO ₂ eq	1.28E+01	1.42E+01	1.59E+01	1.76E+01	1.96E+01	2.23E+01
GWP 100 without biogenic, kg CO ₂ eq	1.28E+01	1.42E+01	1.59E+01	1.76E+01	1.96E+01	2.23E+01
ODP, kg CFC-11eq	1.61E-05	1.91E-05	2.27E-05	2.64E-05	3.08E-05	3.66E-05
AP, kg SO ₂ eq	5.24E-02	5.79E-02	6.48E-02	7.17E-02	8.00E-02	9.10E-02
EP, kg Neq	1.12E-01	1.26E-01	1.42E-01	1.59E-01	1.79E-01	2.05E-01
SFP, kg O ₃ eq	8.28E-01	9.10E-01	1.01E+00	1.12E+00	1.24E+00	1.40E+00
ADP _{fossil}	2.35E+01	2.57E+01	2.85E+01	3.13E+01	3.47E+01	3.92E+01
<i>Resources</i>						
RPRE, MJ	1.59E+01	1.72E+01	1.89E+01	2.05E+01	2.24E+01	2.50E+01
RPRM, MJ						
NRPRE, MJ	1.86E+02	2.04E+02	2.27E+02	2.50E+02	2.77E+02	3.14E+02
NRPRM, MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
SM, kg	1.83E-01	2.01E-01	2.23E-01	2.45E-01	2.72E-01	3.07E-01
RSF, MJ	5.05E-02	5.78E-02	6.70E-02	7.61E-02	8.70E-02	1.02E-01
NRSF, MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
RE, MJ	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
FW, m ³	8.11E-02	8.69E-02	9.42E-02	1.01E-01	1.10E-01	1.22E-01

Table 57: Waste and carbon impacts for one carpet cradle to grave (all stages except B4) as a function of face fiber (FF) for PET

Face Fiber, kg / m ²	1.1	1.3	1.55	1.8	2.1	2.5
<i>Waste parameters and output flows</i>						
HWD, kg	2.55E-01	2.85E-01	3.21E-01	3.58E-01	4.02E-01	4.60E-01
NHWD, kg	1.26E+01	1.41E+01	1.59E+01	1.78E+01	2.00E+01	2.30E+01
HLRW, kg	2.21E-05	2.50E-05	2.87E-05	3.24E-05	3.68E-05	4.27E-05
ILLRW, kg	5.74E-05	6.49E-05	7.43E-05	8.38E-05	9.51E-05	1.10E-04
CRU, kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
MR, kg	1.20E-01	1.36E-01	1.57E-01	1.77E-01	2.02E-01	2.34E-01
MER, kg	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
EE, kg	1.08E-01	1.26E-01	1.48E-01	1.70E-01	1.96E-01	2.31E-01
<i>Carbon emissions and uptake</i>						
BCRP, kg CO ₂	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
BCEP, kg CO ₂	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
BCRK, kg CO ₂	1.78E-02	1.78E-02	1.78E-02	1.78E-02	1.78E-02	1.78E-02
BCEK, kg CO ₂	1.78E-02	1.78E-02	1.78E-02	1.78E-02	1.78E-02	1.78E-02
BCEW, kg CO ₂	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CCE, kg CO ₂	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CCR, kg CO ₂	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00
CWNR, kg CO ₂	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00	0.00E+00

The dyeing processes in manufacturing can take a significant amount of energy. To determine the impact of using different dyeing methods, we calculated the results for Nylon 6 with solution, beck (batch), and continuous dyeing. The results for global warming are shown in

Table. The results are less than 10% different from the representative carpet, which was based on the area weighted dyeing method based on 2024 production. The dyeing method will make a similar impact on the results for Nylon 6,6. PET carpets are all solution dyed, and therefore, there is no variation from dyeing method. Wool uses a mix of Beck, Skein, and Space dyeing.

Table 58. GWP results for Nylon 6 FF carpets with different dyeing methods.

	GWP	% difference
Solution	2.69E+01	5
Beck	3.04E+01	-8
Continuous	2.89E+01	-2
Baseline	2.82E+01	

INTERPRETATION AND LIMITATIONS

LCIA results are relative expressions and do not predict impacts on category endpoints, the exceeding of thresholds, safety margins or risks. The six impact categories used here are globally deemed mature enough to be included in Type III environmental declarations. Other categories are being developed and defined and LCA may continue making advances in their development. **This study is not intended for comparative assertions.**

For the synthetic fiber carpets, the CTG (A1-A3) for raw material extraction and processing, transportation, and manufacturing represents most (70-90%) of the impacts in most categories. Some exceptions are eutrophication potential and biogenic carbon flows. Additionally, the CTG impact is strongly correlated with face fiber weight. Thus, we have provided a set of results for different face fiber weights. Those were shown for the cradle to grave life cycle of one carpet that is installed for 15 years.

Figure 3. Contribution analysis for Nylon 6 carpets.

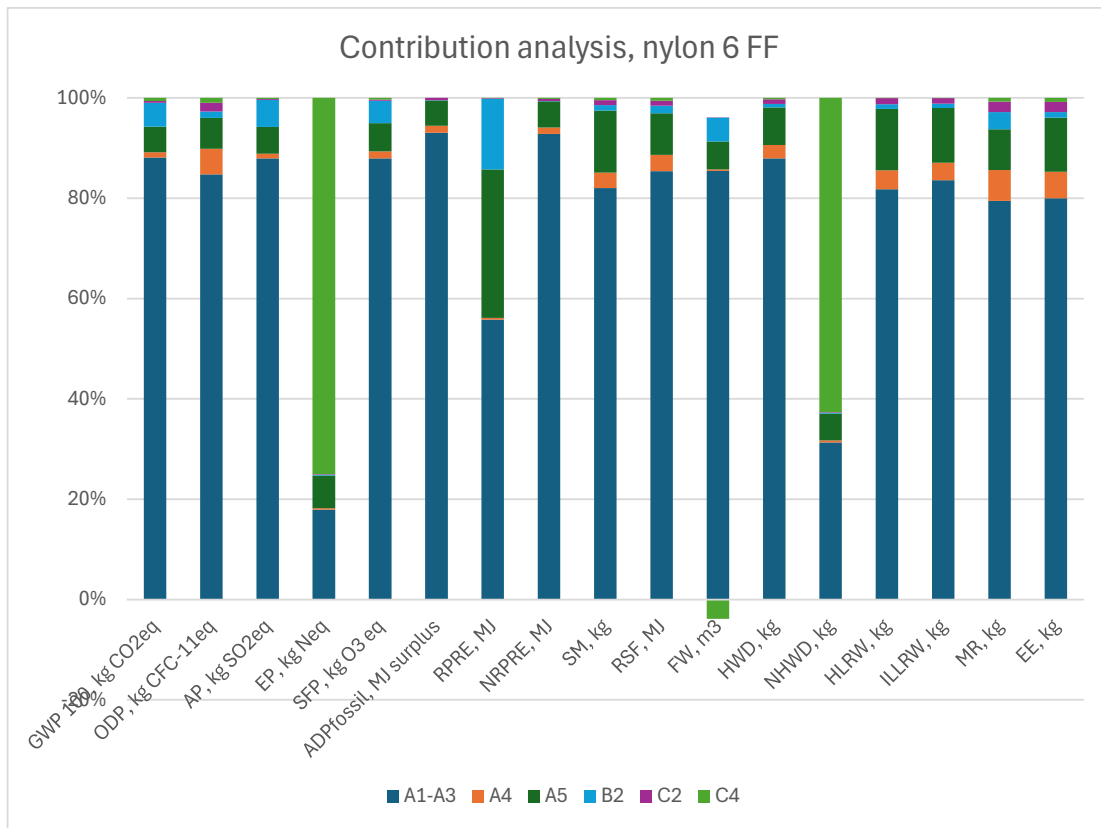


Figure 4. Contribution analysis for Nylon 6,6 carpets.

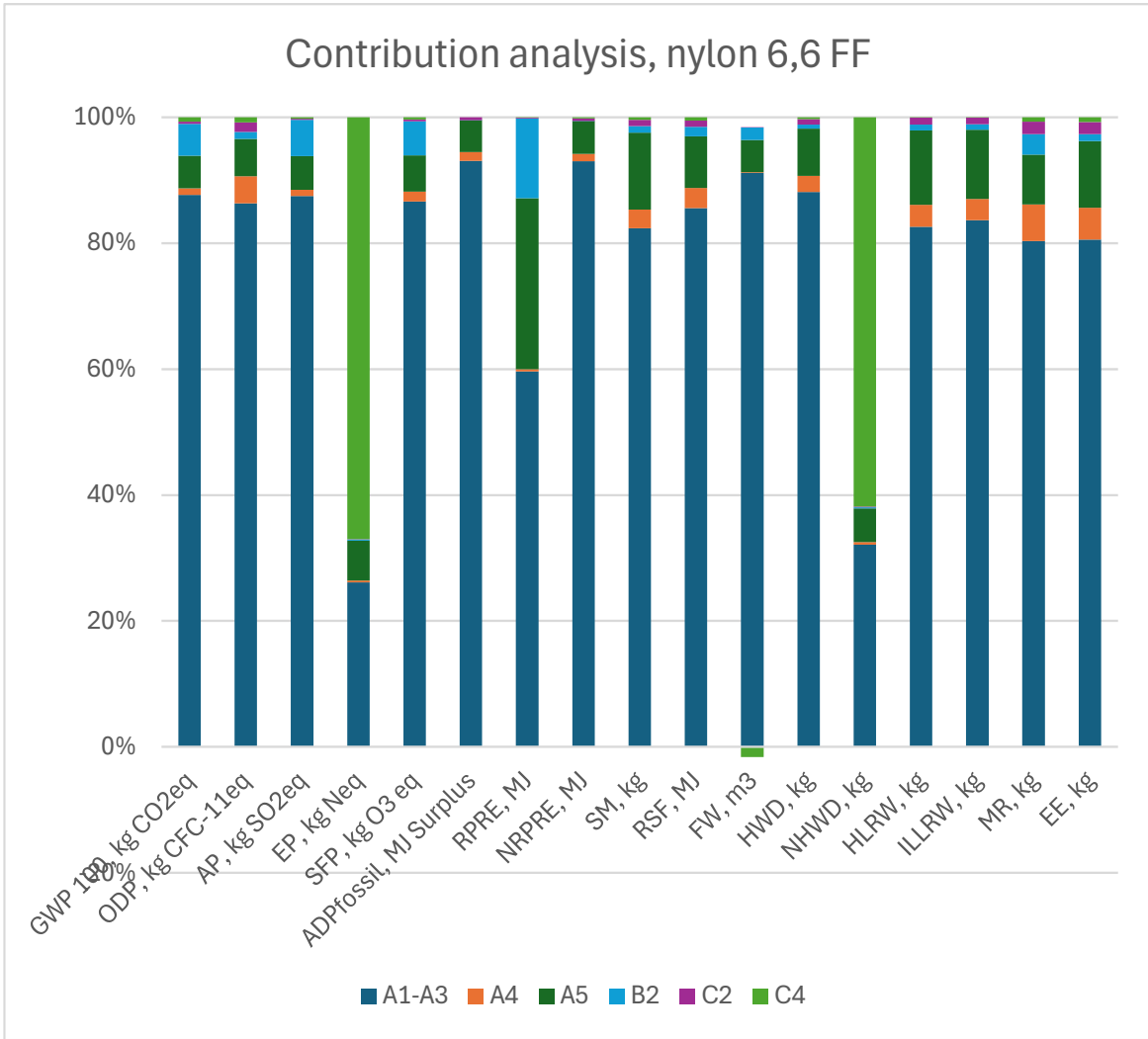
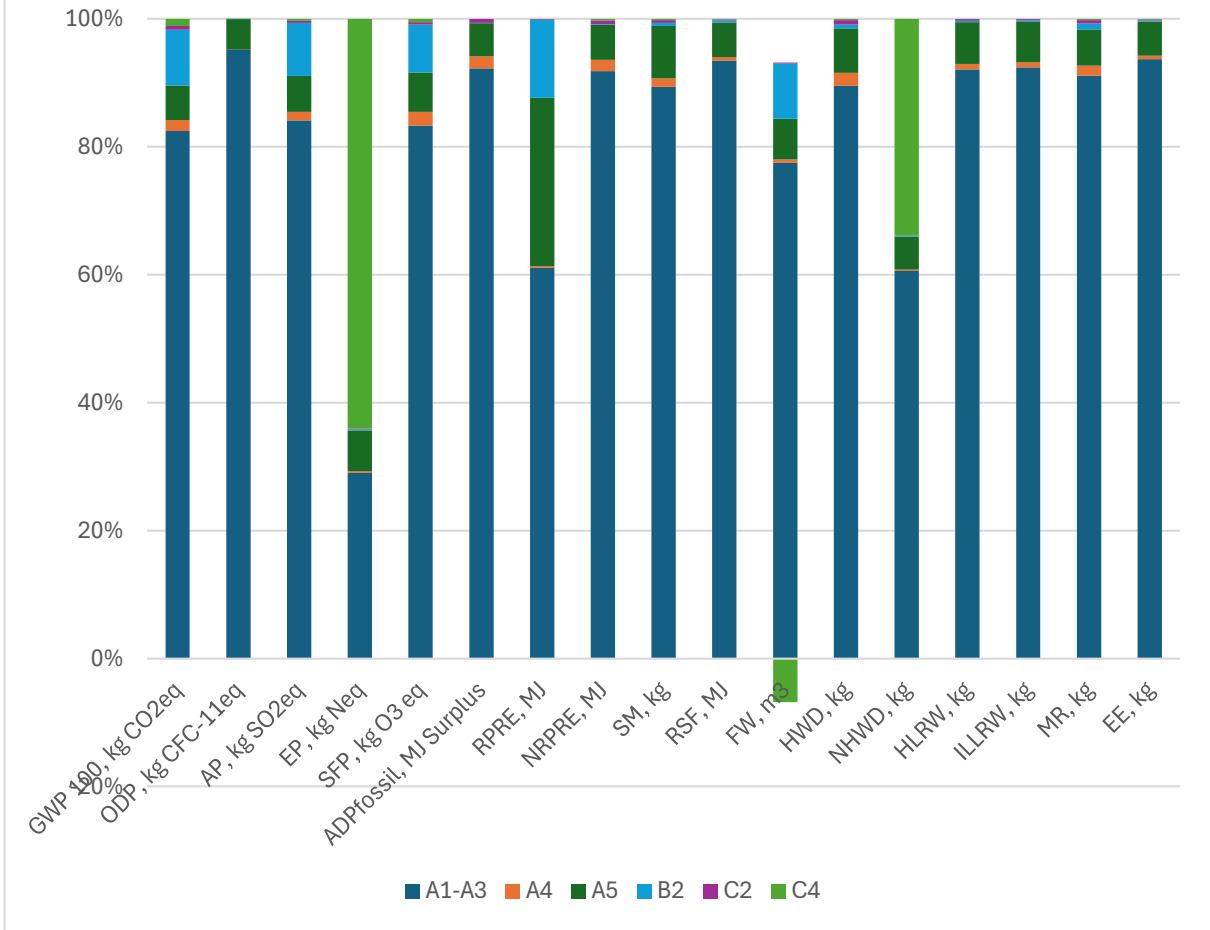


Figure 5. Contribution analysis for PET carpets.

Contribution analysis, PET FF



LIMITATIONS

A variety of implicit and explicit assumptions were made to conduct this LCA. The implicit assumptions are those embedded in the LCI data of the materials used as inputs into the carpet making process. There is a lot of uncertainty in the supply chain of polymers in the synthetic face fibers. However, the data comes from a source that is common to most carpet EPDs. Thus, the results should be based on the same data as other EPDs of these face fibers.

There is a wide range of face weights used in the residential market. If one user uses a particularly light or heavy carpet, this will have a significant impact on the results per m² for their situation.

The use phase impacts were not large (4% of the total), but these were based on weekly vacuum and yearly extractions. If the vacuuming were daily and extractions were every two months, for example, this would increase the impacts by about 25-30% (4% x 7).

The user's location will impact on the type of electricity generation used in the use phase. For example, a user in CA will have lower impacts from electricity use than one in a more fossil fuel intensive region. The results shown in this report are based on the US average grid.

The carpet replacement schedule is especially important because the results mostly result from the non-use phase (production, transport, installation, and disposal), which are the phases that are required for each carpet change. For example, if the carpets were replaced every 5 years, instead of every 15 years, the life cycle impacts would increase by nearly 200%.

Thus, the results here reflect those from a representative user in the US who keeps the carpet for 15 years, vacuums once per week, does a hot water extraction once per year, and uses a carpet with a typical face weight. Any variation in these conditions could result in significantly different impacts.

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