

Interface Carpet

Product Selection and Description

Based in Atlanta, Georgia, Interface is active in the global commercial interiors market, offering modular and broadloom carpets, fabrics, interior architectural products, and specialty chemicals. Nine Interface carpet products are included in BEES.

Some of Interface's products are "climate neutral" under its Cool Carpet program. Climate neutral refers to products whose greenhouse gas (GHG) emissions over their life cycles are offset or balanced. The GHGs of IFC carpets under the Cool Carpet program are offset by 16.1 kg (35.4 lb) CO₂-equivalents/yd², while Bentley Prince Street products' GHGs are offset by 22.0 kg (48.4 lb) CO₂-equivalents/yd². These values are based upon internal Interface LCAs. Because these values are greater than those in the life cycle inventories compiled for BEES, the BEES Global Warming Potential results for Cool Carpets are set to zero. Entropy, Sabi, and Transformation carpet tiles are always Cool Carpets, while for the other Interface products offered in BEES, the customer has the choice of purchasing the Cool Carpet option for an additional cost per square unit. All these options are offered in BEES.

Flow Diagram

The flow diagram below shows the major elements of the production of these products as they are currently modeled for BEES.

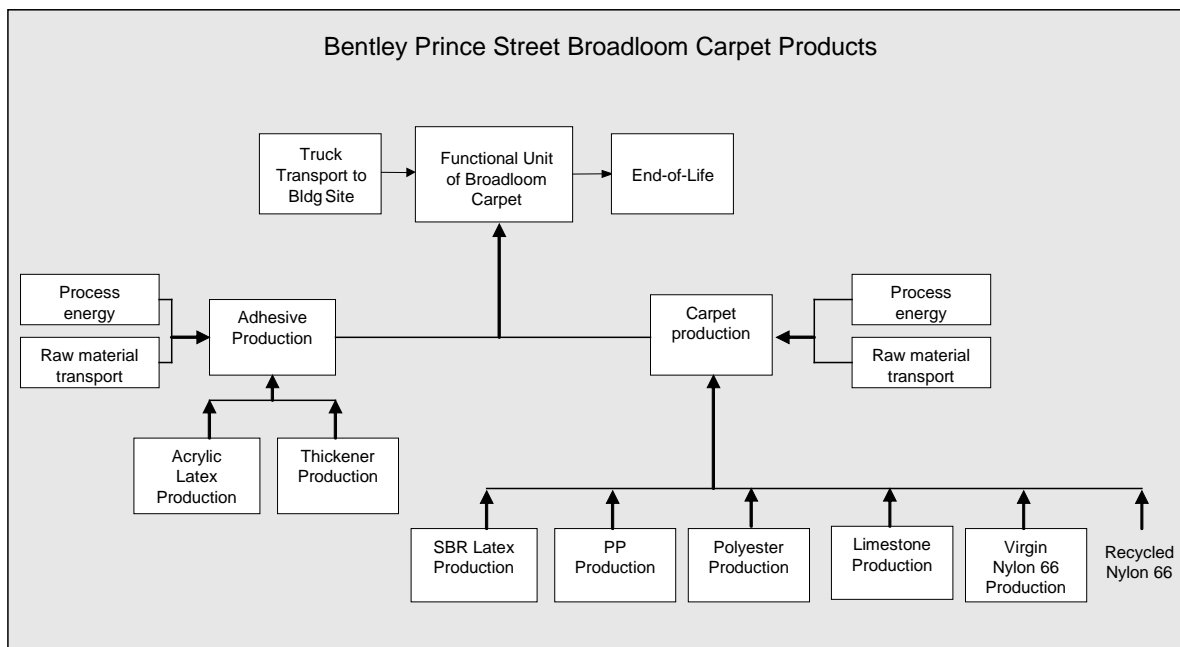


Figure 1: Bentley Prince Street Broadloom Carpets System Boundaries

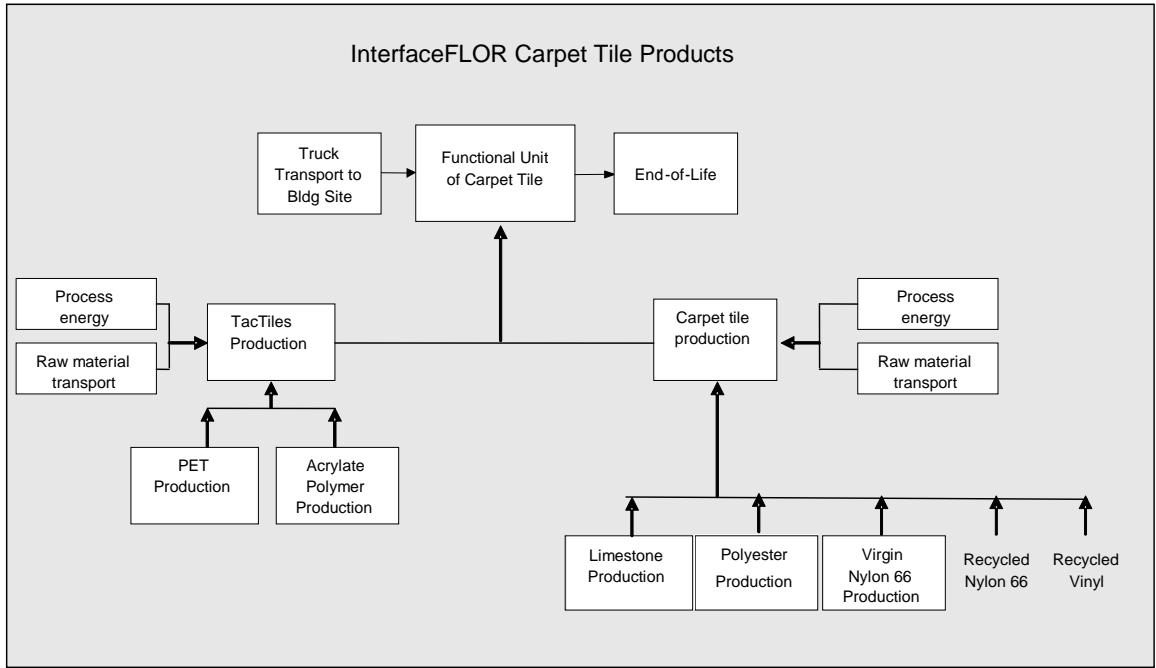


Figure 2: InterfaceFLOR Carpet Tiles System Boundaries

Raw Materials

Interface’s two carpet divisions produce like mixes of materials, as shown in the tables below.

Table 1: Bentley Prince Street Commercial Carpet Constituents

<i>Constituent</i>	<i>UPC Mass Fraction (%)</i>	<i>Scan Mass Fraction (%)</i>	<i>Capri Mass Fraction (%)</i>
Virgin Nylon 6,6	34	34	30
Recycled Nylon 6,6 (pre-consumer)	6	6	10
Polypropylene or Polyester primary backing	5	5	5
SBR Latex backing	11	11	11
Limestone	31	31	31
Other Additives	13	13	13

Table 2: InterfaceFLOR Commercial Carpet Constituents

<i>Constituent</i>	<i>Entropy Mass Fraction (%)</i>	<i>Sabi Mass Fraction (%)</i>	<i>Transformation Mass Fraction (%)</i>
Virgin Nylon 6,6	9	5	6
Recycled Nylon 6,6 (pre-consumer)	5	5	6
Polyester primary backing	2	2	2
Recycled vinyl backing (pre-consumer)	22	23	23
Recycled vinyl backing (post-consumer)	39	41	40
Limestone (filler)	14	15	14
Other Additives	9	9	9

Data for Nylon 6,6 come from EcoInvent, whose data are based on those from Eco-profiles of the European plastics industry (PlasticsEurope). Interface provided the energy required to spin the nylon into yarn (approximately 1.7 MJ/kg yarn). The nylon 6,6 and vinyl used in these carpet products have significant recycled content. These recycled materials carry no environmental burdens from the production of the virgin materials. However, they do carry impacts from transport after leaving the waste stream as well as the subsequent processing. For example, the electricity used to grind down post-industrial and post-consumer material to a usable size is assigned to the recycled materials. These data were provided by Interface as part of the manufacturing energy inputs described in the next section.

For the broadloom applications, the nylon yarn is back-coated with styrene butadiene rubber (SBR) to provide stability. Both styrene and butadiene production data come from the Plastics Division of the American Chemistry Council,¹ as do the data for the polypropylene and polyester (polyethylene terephthalate, or PET). For the carpet tiles, ethylene vinyl acetate (EVA) is used to bind the nylon to the primary substrate. Data representing this process come from EcoInvent. Data for limestone filler are from the U.S. LCI Database.

Manufacturing

Energy Requirements and Emissions. The manufacturing process for the UPC, Scan, and Capri carpets essentially consists of weaving the nylon yarn, applying the precoat compound, and joining the yarn to the backing. This process requires both purchased electricity and natural gas. The production of a ft² of UPC, Scan, or Capri carpet requires approximately 0.24 MJ (0.07 kWh) of electricity and 2.1 MJ (0.58 kWh) from natural gas.

The manufacturing process for Entropy, Sabi, and Transformation carpet tile products consists of tufting the nylon yarn, applying the EVA adhesive, and joining the yarn to the backing. Producing 0.09 m² (1 ft²) of each of these carpet tiles requires approximately 0.59 MJ (0.16 kWh) of electricity and 0.40 MJ (0.11 kWh) from natural gas. All energy production and consumption data come from the U.S. LCI Database.

Waste. A small amount of manufacturing waste, as reported by Interface, is included in each of its BEES carpet products.

Transportation. Manufacturer-reported transportation distances for shipment of the raw materials from the suppliers to the Interface plants are accounted for through diesel truck modeling based on the U.S. LCI Database.

¹ Franklin Associates, a Division of ERG, for the Plastics Division of the American Chemistry Council: *Cradle-to-Gate Life Cycle Inventory of Nine Plastic Resins and Four Polyurethane Precursors* (Prairie Village, KS, 2010).

Transportation

The transportation distance for diesel trucking from the Interface manufacturing plant in Georgia or California to the building site is modeled as a variable in BEES. The quantity of transportation emissions allocated to each product depends on the overall mass of the product, as given in the Table below.

Table 3: Interface Carpet Density

<i>Product</i>	<i>Mass kg/m² (lb/ft²)</i>	<i>Density kg/m³ (lb/ft³)</i>
Scan	2.6 (0.53)	343 (21.4)
UPC	2.6 (0.53)	343 (21.4)
Capri	2.4 (0.49)	318 (19.9)
Entropy	4.4 (0.90)	616 (38.5)
Sabi	4.2 (0.86)	608 (38.0)
Transformation	4.3 (0.88)	602 (37.6)

Installation

The Interface carpet products evaluated by BEES are installed using a contact adhesive. The low-VOC TacTiles material, consisting of PET and acrylate polymer, is a tape that is applied between IFC carpet tiles at installation. A low-VOC glue is used for Bentley Prince Street installations. The following installation waste percentages are incorporated into the BEES models: UPC and Scan, 3 %; Capri, 5 %; and Entropy, Sabi, and Transformation, 1 %.

Use

With lifetimes of 15 years, the Entropy, Sabi, UPC, and Transformation carpet tiles are replaced 3 times over the 50-year BEES use period. The broadloom carpets, Scan and Capri, have 11-year lives, requiring 4 replacements over the use period. As with all BEES products, life cycle environmental burdens from these replacements are included in the inventory data.

End of Life

According to the manufacturer, at end of life, the Entropy, Sabi, and Transformation carpet tiles are recycled in a closed loop process, avoiding disposal in a landfill. At end of life for Capri, UPC, and Scan products, an average of 12.5 % is reclaimed.

References

Life Cycle Data

National Renewable Energy Laboratory (NREL): *U.S. Life-Cycle Inventory Database*. 2005. Golden, CO.

Found at: <http://www.nrel.gov/lci/database>.

PRé Consultants: *SimaPro 7.0 LCA Software*. 2005. The Netherlands.

EcoInvent Centre: *EcoInvent data v2.0* (Dübendorf: Swiss Centre for Life Cycle Inventories, 2007). Found at: www.ecoinvent.org.

Franklin Associates, a Division of ERG, for the Plastics Division of the American Chemistry Council: *Cradle-to-Gate Life Cycle Inventory of Nine Plastic Resins and Four Polyurethane Precursors* (Prairie Village, KS, 2010).

Industry Contacts

John Jewell and Paul Firth, Interface (July 2006)