Natural Cork®

USGBC LEED® – BEES®

USFloors is an import-manufacturing distributor of quality floor and wall-surfacing materials composed of environmentally responsible and sustainable resources. Our flooring brand product Natural Cork® underwent evaluation under the federally sponsored BEES (Building Environmental and Economic Sustainability) analytical program, which positions well with the USGBC LEED®. Both programs encourage collaboration between building product manufacturers and those who work as purchasers and specifies in the construction field. While BEES looks at the environmental and economic impact or lifecycle analysis of an individual product, U.S. Green Building Council (USGBC®) is a government-sponsored third party organization encouraging commercial building project stakeholders to incorporate green and sustainable design through the LEED® rating system. Natural Cork® flooring products may contribute points in the following USGBC LEED® categories:

Materials & Resources

MR 4.1 - Recycled Content 10%
MR 4.2 - Recycled Content 20%

- Intent: Increase demand for building products that have incorporated recycled content materials, therefore reducing the impact resulting from the extraction of new materials.
- Requirement: Specify building materials that contain a particular amount of post-consumer or post-industrial recycled content.
- Contribution: Natural Cork® direct glue tiles contain 95% pre-consumer material. Natural Cork® floating floor plank contain 65% pre-consumer content.

EP opportunity

*MR 1.1 - Building Reuse 75% existing
*MR 1.2 - Building Reuse 95% existing

- Intent: Extend the life cycle of buildings, conserve resources, and cultivate less waste, less manufacturing and transport.
- Requirement: Maintain 75%/95% based on surface area
- Contribution: The manufacturing and design of Natural Cork® floating products encourage reuse by unlocking the installed flooring and relocking/installing it in another space with minimal waste. If preserved and reused in a major remodeling project, these products may contribute to MR 1.

*MR 3.1 - Materials Reuse 5%existing [floating floor products only]
*MR 3.2 - Materials Reuse 10% existing [floating floor products only]

- Intent: Reduce demand for virgin materials, and reduce waste.
- Requirement: Use salvaged refurbished materials
- Contribution: The manufacturing and design of Natural Cork® floating products encourage reuse by unlocking the installed flooring and relocking/installing it in another space with minimal waste. If removed from a building and reused in another, as could be easily accomplished with the Clic planks and tiles, these products may contribute to MR 3.

*MR 5.1 - Regional Materials 10%
*MR 5.2 - Regional Materials 20%

- Intent: Increase demand for local goods, indigenous resources and reduce transport
- Requirement: Salvaged or reclaimed materials used within a 500 mile radius
- Contribution: The manufacturing and design of Natural Cork® floating products encourage reuse by unlocking the installed flooring and relocking/installing it in another space with minimal waste. If removed from a building and reused in another, as could be easily accomplished with the Clic planks and tiles, and transported less than 50 miles these products may contribute to MR 5.

MR 6.0 - Rapidly Renewable Materials

- Intent: Reduce the use and depletion of finite raw, and long-cycle renewable materials by replacing them with rapidly renewable materials.
- Requirement: Specify rapidly renewable building materials for 5% of total building materials.
- Contribution: The managed harvesting of cork oak bark for Natural Cork® is every 9-11 years without harm to the trees.

Indoor Environmental Quality

EQ 4.4 - Low-emitting Materials Composite wood and Agrifiber

- Intent: Reduce the quantity of indoor air contaminants that are odorous or potentially irritating to provide installer and occupant health and comfort.
- Requirement: Composite wood or Agrifiber products must contain no added urea-formaldehyde resins.
- Contribution: Exterior-grade fiberboard core contains no added formaldehyde – E0 standard. Natural Cork® carries the GreenGuard certification.

***EQ 4.1 - Low-emitting Materials Adhesives and Sealants**

- Intent: Reduce the quantity of indoor air contaminants that are odorous or potentially irritating to provide installer and occupant health and comfort.
- Requirement: Adhesives and coatings must meet or exceed specific VOC limits.
- Contribution: Natural Cork® uses adhesives and coatings that emit no VOC's.

Innovation in Design

***ID 1.1 – Gain Points for exceptional performance**

- Intent: Double the credit requirements or next incremental threshold.
- Contribution: [EP MR4.2] Natural Cork® Parquet tile contains 95% pre-consumer material, which supersedes the threshold requirements.

Other exemplary performance attributes may apply depending upon the scope of the project i.e. acoustics

*Other LEED synergies with Natural Cork®

BEES Please Product Summary

Natural Cork® Parquet Tile and Floating Floor Plank (2005)

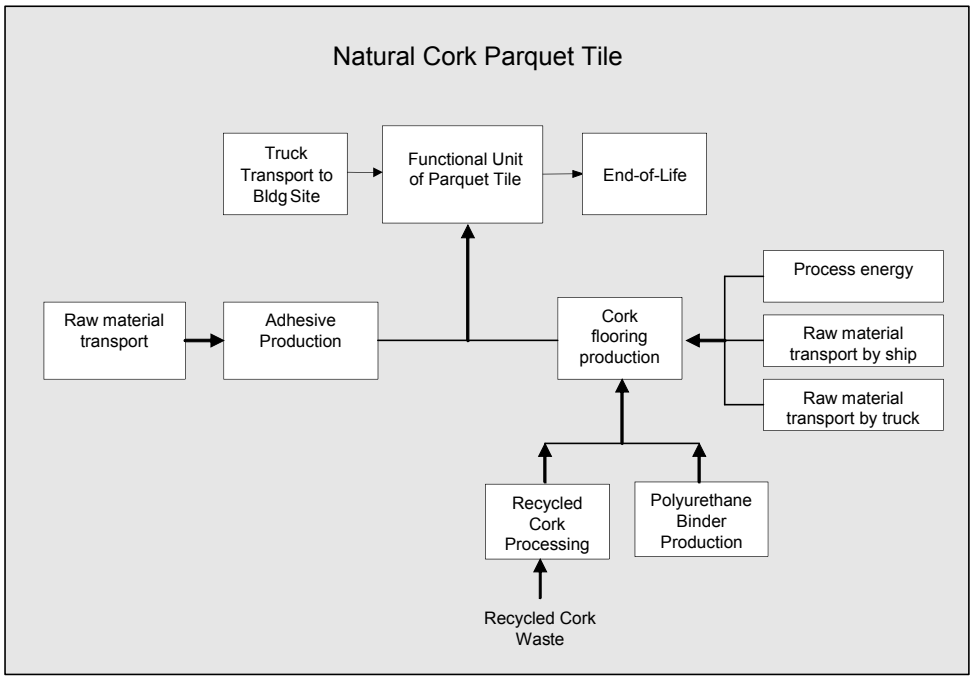
Product Selection and Description

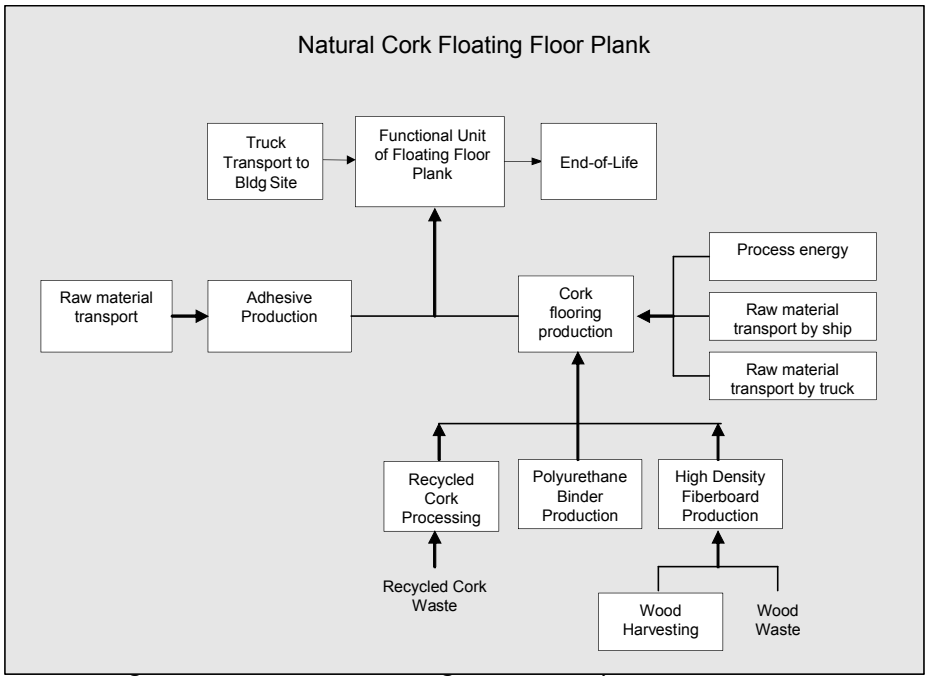
Natural Cork® is a U.S. supplier of cork flooring and wall coverings. It distributes products manufactured by Granorte, a Portuguese company that recycles cork waste from the production of cork bottle stoppers. The energy used to produce the cork tiles comes mainly from waste cork powder. Natural Cork® provided data on two of its products: cork parquet tile and cork floating floor plank. The detailed environmental performance data for these products may be viewed by opening the following files under the File/Open menu item in the BEES software:

- C3020HH.DBF—Natural Cork® Parquet Floor Tile
- C3020II.DBF—Natural Cork® Floating Floor Plank

Flow Diagram

The flow diagrams below show the major elements of the production of these products as they are modeled for BEES.





Raw Materials

Both Natural Cork® floor tile products use a cork sheet made from a combination of recycled cork waste and urethane binder. The floating floor plank also includes a layer of High Density Fiberboard (HDF) cut into a tongue-and-groove pattern. The mixture of the main constituents of each floor tile is listed in the table below.

Constituent	***Parquet Floor Mass Fraction***	***Floating Floor Mass Fraction***
Recycled Cork Waste	93 %	58 %
Binder	7 %	3 %
High Density Fiberboard (HDF)	--	39 %

Table 1: Natural Cork® Flooring Constituents

Since the cork constituent is a waste product, the environmental burdens from virgin production of the cork are not included. The energy used to grind the cork, however, is included, as is its transportation to the manufacturing facility. HDF is produced mostly from recovered wood waste – only 14 % of the wood going into HDF is harvested directly. As proxy data, HDF manufacturing is based on the oriented strand board (OSB) data provided by the US LCI database and described in more detail in the OSB sheathing chapter of BEES.

The binder for Natural Cork® flooring is a moisture-cured urethane, produced from a reaction between polyisocyanate and moisture present in the atmosphere. Isocyanate production data is based on publicly available plastics data in the US LCI database.

Manufacturing

Energy Requirement: The manufacturing processes for the two cork floor products are essentially the same. Cork waste is ground and blended with the urethane binder, then cured. For the floating floor plank, the HDF is sandwiched between two layers of cork sheet and then cured.

Electricity and an on-site boiler are used to blend and cure both products. The boiler uses cork powder generated during the production process to produce steam and electricity. Manufacturing the parquet flooring requires about 0.8 MJ (0.02 kWh) of both thermal and electrical energy per unit produced (0.09 m^2 or 1 ft^2); the floating floor plank requires about 1 MJ (0.28 kWh) of electricity and 0.9 MJ (0.25 kWh) of thermal energy per unit. Water is also used in the production process, but it is recycled and recovered by the plant. Producing each unit of product generates about 1 kg (2.2 lb) of waste, 94 % of

which is used to produce energy and 3 % of which is recycled. The recycled material is accounted for in the BEES life cycle inventory.

Transportation: Natural Cork® provided Transportation distances for shipment of the raw materials from the suppliers to the manufacturing plant. The materials were transported by diesel truck, based on the US LCI database.
The finished cork products are shipped first from the manufacturing facility in Portugal to the Natural Cork® warehouse in Georgia–a distance of about 6 437 km (4 000 mi). Environmental burdens from this leg of the journey are built into the manufacturing portion of the BEES life-cycle inventory and are evaluated based on transport by ocean tanker using fuel oil. The transportation distance from the Natural Cork® warehouse in Augusta, Georgia to the building site is modeled as a variable in BEES. Both products are shipped from Augusta by diesel truck; the quantity of transportation emissions allocated to each product depends on the overall mass of the products, as given in the table below.

Table 2: Natural Cork® Flooring Density

Product	***Mass per Applied Area in kg/m^2 (lb/ft^2)***	***Density in kg/ m^3 (lb/ft^3)***
Cork Parquet Tile	2.56 (0.51)	516.67 (34.18)
Cork Floating Floor	7.44 (1.48)	563.33 (37.26)

Installation

Natural Cork® parquet tile is installed using a water-based contact adhesive. The average application requires about 0.009 kg (0.020 lb) of adhesive per unit of flooring (0.09 m^2 or 1 ft^2). The Natural Cork® floating floor requires only a minimal amount of tongue-and-groove adhesive to bond the individual planks together. On average, 5 % of the adhesive is wasted during installation, but none of the flooring is lost.

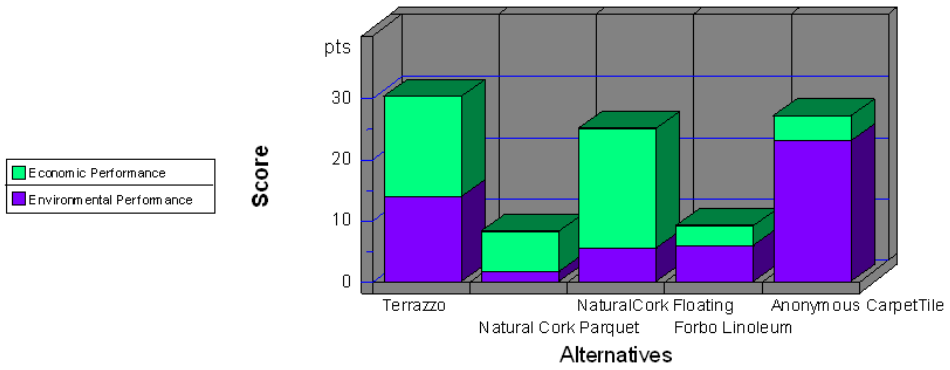
Use Phase

Based on information from Natural Cork®, its flooring does not require replacement over the 50-year BEES study period.

End-of-Life

At the end of 50 years, the used flooring is sent to a landfill, since according to the manufacturer none is currently being recycled.

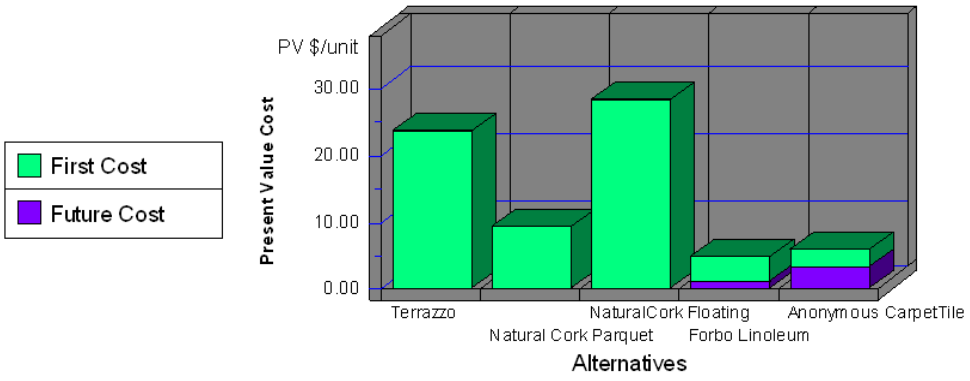
Overall Performance



Note: Lower values are better

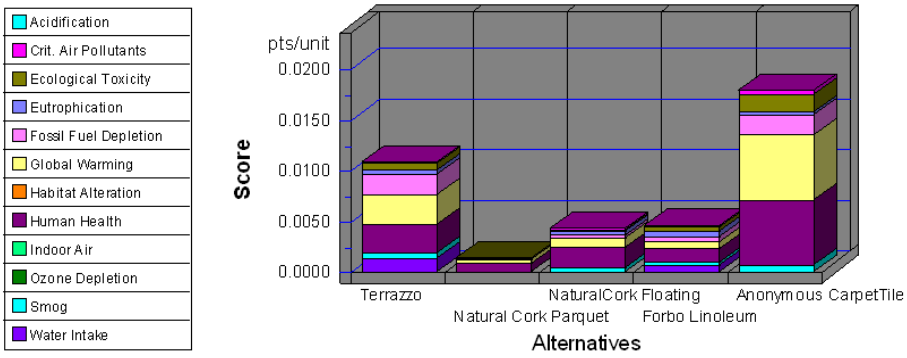
Category	Terrazzo	NC Parquet	NCFloating	ForboLinol	AnonCTile
Economic Perform.--50%	16.4	6.5	19.6	3.3	4.1
Environ. Perform.--50 %	13.9	1.8	5.5	5.9	22.9
Sum	30.3	8.3	25.1	9.2	27.0

Economic Performance



Category	Terrazzo	NC Parquet	NCFloating	ForboLinol	AnonCTile
First Cost	23.59	9.36	28.20	3.58	2.75
Future Cost– 3.0%	0.00	0.00	0.00	1.20	3.21
Sum	23.59	9.36	28.20	4.78	5.96

Environmental Performance



Note: Lower values are better

Category	Terrazzo	NC Parquet	NCFloating	ForboLinol	AnonCTile
Acidification--3%	0.0000	0.0000	0.0000	0.0000	0.0000
Crit. Air Pollutants--9%	0.0002	0.0000	0.0001	0.0001	0.0004
Ecolog. Toxicity--7%	0.0006	0.0001	0.0002	0.0004	0.0017
Eutrophication--6%	0.0005	0.0000	0.0003	0.0006	0.0003

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 6.0 LCA Software*. 2005. The Netherlands.

Industry Contacts

Philippe Erramuzpe, Natural Cork® (2002)