

## ENVIRONMENTAL PRODUCT DECLARATION

# BOLYU & AQUA MODULAR CARPET TILE

NEXTERRA PET BACKING SYSTEM WITH NYLON FACE FIBER



*Nexterra room scene with Illumination and Streamline*



### Mission:

Beaulieu Commercial's mission is to build a company of outstanding integrity that goes beyond traditional business values to reflect our shared beliefs about the value of healthy, happy and productive people. We believe in nurturing a healthy environment that will sustainably provide abundant resources, growth, wealth and equal opportunity to meet today's objectives and for future generations that will benefit from our environmental investments.

### Guiding Environmental Principles:

- Use materials, resources and processes that reduce or eliminate the risk of pollution and return waste to raw material use.
- Ensure continuous compliance with all environmental laws and regulations and measure progress on annual targets.
- Seek sustainable growth
- Make sustainability everyone's job
- Verify environmental marketing claims and make the information transparent
- Plan for generations
- Change the world, not just the copy





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PET Backing System with Nylon Face Fiber

According to ISO 14025

## Product Definition

### Product Classification & Descriptions

Carpet tile with polyethylene terephthalate (PET) based backing chemistry. Carpet face composition may include either Nylon 6 or Nylon 6,6 fibers. All Nexterra products contain 100% post consumer recycled glass filler, 100% post consumer recycled PET polymer and 80+% pre-consumer recycled content primary and secondary backings. Nexterra products with Nylon 6 face fiber may include up to 25% pre-consumer recycled fiber content. Products included in this EPD have a face fiber weight range of 14-34 ounces per square yard.

Facilities that manufacture this product are located in the United States of America.

### Range of Applications

Product is intended for use as a soft floor covering in medium to high traffic commercial applications

### Third-Party Certifications



NSF140 Platinum



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## Product Standards & Approvals

Test	Result
AATCC <sup>2</sup> Test Method 134-2011 Electrostatic Propensity	≥ 3.5 kV
AATCC <sup>2</sup> Test Method 16-2004 Colorfastness to Light	Minimum grade of 4 after 40 AFU
ASTM <sup>6</sup> E648 Standard Test Method for Critical Radiant Flux of Floor-Covering Systems	Class 1 (Avg CRF ≥ 0.45 watts/cm <sup>2</sup> )
ASTM <sup>6</sup> E662 Standard Test Method for Specific Optical Density of Smoke	Maximum Specific Optical Density ≤ 450
ASTM <sup>6</sup> D5252 Standard Practice for the Operation of the Hexapod Tumble Drum Tester	Avg. Rating of 3.4
ASTM <sup>6</sup> D7330 Standard Test Method for Assessment of Surface Appearance Change	Avg. Rating of 3.4
ISO <sup>14</sup> 2551/ASTM <sup>6</sup> D7570 Dimensional Stability (Modular Tiles Only)	Maximum + or – 0.027"

## Product Characteristics

Characteristic	Description	
Type of Manufacture	Carpet Tile	
Yarn Type	Nylon	
Additional characteristics according to NSF/ANSI 140	NSF140 Platinum	
VOC emissions test method	Green Label Plus, ID number 8595	
Characteristic	Nominal Value	Unit
Total thickness	.180-.300	inch
Product weight	66-104	oz/yd <sup>2</sup>
Surface pile thickness	.050-.175	Inch
Number of tufts or loops	14,110-23,850	Per ft <sup>2</sup>
Surface pile weight	14-34	oz/yd <sup>2</sup>
Pile fiber composition	100% Nylon	%
Secondary backing	100% PET	%



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## Material Content

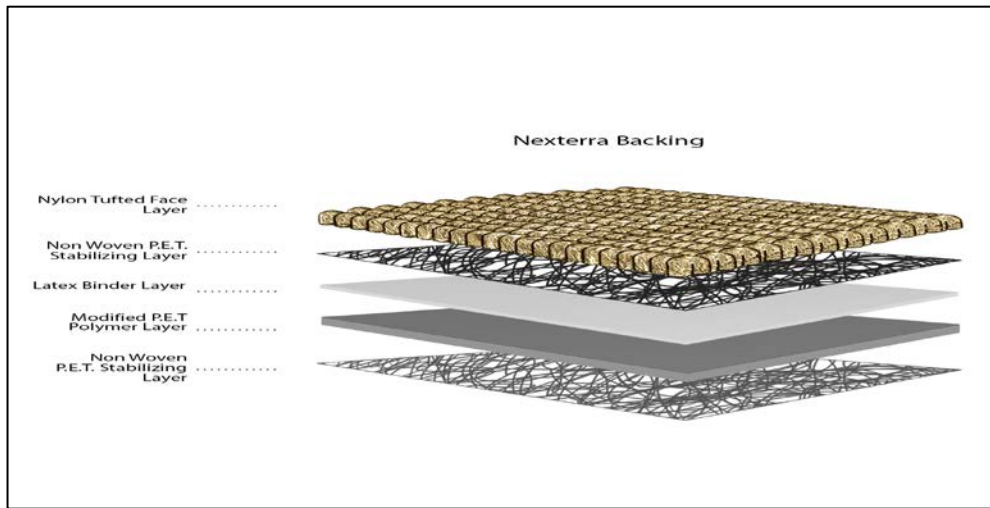


Figure 1: Diagram of Material Content

Product Layer	Material	Mass %	Availability	Recycled Content	Origin
Nylon Tufted Face Layer	Nylon 6 or 6,6	24%	Fossil Resource, limited	N6 option has 25% recycled content	US
Non Woven Stabilizing Layer	PET	4%	Fossil resource, limited	80+% recycled content	US
Latex Binder Layer	SBR Latex	6%	Fossil resource, limited	No Recycled Content	US
Modified P.E.T Polymer Layer	Main PET Polymer	21%	Fossil resource, limited	100% post-consumer recycled content	US
	Proprietary Copolymer	16%	Fossil resource, limited	No Recycled Content	US
	Glass Cullet Filler	24%	Mineral resource, abundant	100% post-consumer recycled content	US
Non Woven Stabilizing Layer	PET	5%	Fossil resource, limited	80+% recycled content	US



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## Product Manufacturing

### Production of Main Materials

**Nylon 6:** Nylon 6 is synthesized by ring opening polymerization of caprolactam.

**Nylon 6,6:** Nylon 6-6 is synthesised by polycondensation of hexamethylenediamine and adipic acid.

**Polyethylene terephthalate (PET):** Polyethylene terephthalate is produced from ethylene glycol and dimethyl terephthalate or terephthalic acid.

**Styrene-butadiene Polymer (SBR):** Class of synthetic rubber that is derived from styrene and butadiene.

**Glass Cullet:** Finely ground recycled glass from Post-consumer sources such as bottles.

### Manufacture of Product

The manufacturing process involves the extrusion of nylon fiber. The fiber (nylon 6 and nylon 6,6) is then tufted onto the primary backing. This tufted intermediary is then coated with backing materials using electrical and thermal energy and the materials listed above. The final coated product is then cut into carpet tiles and packaged for shipping to customer.

### Health, safety, and Environmental Aspects During Production

Beaulieu Commercial operates under the **BLAST** corporate safety program. **BLAST** is a customized, worker-driven process to systematically:

1. FOCUS - Identify the precautions (Blind Spots) critical to prevent accidents
2. INFLUENCE - Observe workers and provide positive feedback
3. LISTEN – Get insight into why risks occur
4. MEASURE – Develop a metric of these precautions and manage it proactively as leading indicators of accidents

**BLAST**-based safety encourages safe precautions and tries to understand and reduce risk, rather than waiting for an accident to occur.





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## Production Waste Management

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Beaulieu Commercial strives to minimize waste throughout the manufacturing process. The majority of waste that is created is recycled through various means. Based on production weights, Beaulieu Commercial operates on a 2% waste to landfill percentage.

## Delivery and Installation

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### Packaging

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Prior to shipping, carpet tiles are protected in plastic bags and packaged in cardboard boxes that contain recycled content. Boxes are stacked and shipped on wooden pallets. The boxes are secured to the pallet with thin film plastic wrap (LLDPE). All materials are recyclable through local recycling options.

### Delivery

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Bolyu & Aqua products are sold in both the domestic and international marketplace. Domestic shipments are typically completed by truck, whereas international shipments utilize ocean freight as well as truck. Average domestic shipment to project site, as modeled in LCA, is 577 miles. This value was calculated using a weighted average based on total square yards sent to customers in calendar year 2013.

### Installation

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Installation should be accomplished through the use of Bolyu Pressure Sensitive Carpet Tile Adhesive. Detailed installation instructions are provided with all orders. Additionally, instructions can be downloaded from <http://www.bolyu.com/pdf/NexterraInstallationInstructions.pdf>

### Installation Waste

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Packaging waste generated during the installation phase can be recycled with local recycling options.

### Health, Safety & Environmental Impacts During Installation

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Adhesives used during installation meet the requirements of California South Coast Air Quality Management District Rule #1168 or are in accordance with the emissions requirements in California Department of Public Health Standard Method for the Testing and Evaluation of Volatile Organic Chemical Emissions from Indoor Sources Using Environmental Chambers, Version 1.1, February 2010 (also known as CA 01350 or may be referenced as FloorScore or Green Label Plus approved).



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## Use Stage

### Reference Service Life of Floor Covering

The reference service life of Bolyu & Aqua products is 15 years. Flooring may be replaced sooner based on customer discretion.

### Cleaning and Maintenance

The LCA was modeled with the following Use Phase scenerios.

Cleaning Process	Frequency	Energy and Resources Used
Vacuum Cleaning	Daily	Electrical Energy
Interim Cleaning	Quarterly	Electrical Energy, Water
Deep Cleaning (extraction)	2 times / year	Electrical Energy, Water, cleaning

The above was based on a moderate use scenario. Additional details on the appropriate way to clean and maintain Bolyu & Aqua products can be viewed in the Bolyu Total Carpet Care Guide, available at [www.beaulieucommercial.com](http://www.beaulieucommercial.com)

### Structural Damage

Interior floor covering should not be installed until any and all structural damage has been adequately repaired and determined to be code compliant

## End-of-Life

### Recycling

REACT – Beaulieu Commercial’s Carpet Reclamation Program

Beaulieu Commercial partners with Carpet America Recovery Effort (CARE) to ensure that when our customer is ready to replace their carpeting we have a network of recyclers who are ready to step in and keep their carpet out of the landfill. By working through CARE’s network, we can easily locate nearby CARE certified recyclers. This allows us to not only be certain that we are using approved recyclers but also recyclers that are close to the jobsite. By using local recyclers we are able to help reduce the cost and carbon footprint of the recycle project. In 2012, CARE’s network of recyclers diverted 351 million lbs of carpet. Your REACT contact at the mill is Shawn McGill -- office: 800 451 1250 x2635 email: [shawn.mcgill@beaulieugroup.com](mailto:shawn.mcgill@beaulieugroup.com)





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## Disposal

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Recycling of Bolyu & Aqua products is recommended. However, flooring can be disposed of in municipal landfills or sent to waste-to-energy facilities (subject to local regulations). To maintain a conservative LCA approach, end of life options included landfill disposal, waste-to-energy, and reclamation/recycling. Rates of each option were based on research and reporting of the Carpet America Recovery Effort (CARE).

## Life Cycle Assessment Results

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### General

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A cradle-to-grave life cycle assessment (LCA) was conducted in accordance to the ISO14040/14044 series of standards. Additionally, external third parties critically reviewed the LCA study. The LCA assessed the sourcing and extraction, manufacturing, delivery and installation, use and end of life stages of the product's life cycle.

### Functional Unit

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The functional unit is 1 square meter of flooring over one year of use.

### Cut-Off Criteria

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Excluded materials met the following criteria:

- Less than 1% of total mass of the final product
- Less than 1% of total energy flows
- Total excluded materials must not exceed 5% of final product.

Materials that fell below the stated 1% threshold were also identified as not having disproportionately high environmental impacts.

### Allocation

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Background data used in the LCA model may contain some allocation. Primary data based on production of Bolyu & Aqua products was not allocated.

### Background Data

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The LCA was modeled using the GaBi 6 software platform. Background data was typically sourced from PE International datasets.

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## Data Quality

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**Time Related Coverage:** All gate-to-gate manufacturing data was sourced from Beaulieu Commercial records for calendar year 2013. The time coverage of background data is adopted from the specific datasets utilized in the model. Priority was given to the most up-to-date dataset available at the time the model was created. No background data is more than 10 years old.

**Geographical Coverage:** All gate-to-gate manufacturing data are specific to Beaulieu Commercial locations in Chatsworth, GA, Adairsville, GA and Bridgeport, AL. The data quality of background data is adopted through the use of the specific datasets utilized in the model. In general, domestic data was preferred, however the absence of US specific data required some international data to be utilized.

**Technology coverage:** Data utilized in the model represents manufacturing technology that is currently in use.

## System Boundaries

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The LCA of 1 M<sup>2</sup> of Bolyu & Aqua products includes:

- **Sourcing/extraction stage:** Supply chain impacts to source raw materials, including transportation and packaging of these materials.
- **Manufacturing Stage:** Includes all gate-to-gate processes required to produce flooring from sourced raw materials.
- **Delivery and Installation Stage:** Includes packaging of finished flooring product, shipping of finished flooring product and the installation of flooring at the customer's project site.
- **Use Stage:** Includes cleaning and maintenance of flooring over time.
- **End of Life Stage:** Includes end of life options such as disposal in landfill, waste-to-energy and reclamation.

## Notes on Use Stage

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Beaulieu Commercial has assumed a 15-year service life in the LCA model. However, the actual lifetime of the flooring is contingent on several factors, including changing style preference and building traffic. Results are presented for a single year of use, as well as for a 60-year reference service life of a building, as required by the Product Category Rules for Flooring. The 60-year building reference service life leads to four replacement periods of the installed flooring.

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## Life Cycle Inventory

The following table discloses primary energy, material resources, and waste flows for the 1-year study, as mandated by the product category rules for flooring.

Life Cycle Inventory						
<b>Primary Energy of non-renewable Resources</b>						
<b>Total Mega joules (MJ)</b>	170.99					
	Lignite	1%	Natural Gas	31%	Nuclear	5%
	Mineral Coal	11%	Oil	51%		
<b>Primary Energy of renewable Resources</b>						
<b>Total Mega joules (MJ)</b>	8.9					
	Hydropower	19%	Solar Power	34%		
	Wind Power	57%	Geothermic	2%		
<b>Secondary fuels specified (MJ)</b>						
<b>Total Mega joules (MJ)</b>	0					
<b>Non-renewable material sources (KG)</b>						
	8.4					
<b>Waste Flows (KG)</b>						
<b>Non-hazardous waste</b>	10.6					
<b>Hazardous waste</b>	0					



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## Life Cycle Impact Assessment

The following tables disclose life cycle environmental impacts for one year of product use, as well as, impacts over an assumed building lifetime of 60 years. The 60 year period includes four replacement cycles of flooring and 60 years worth of flooring maintenance. As required by the product category rules for flooring, total impacts are broken out across the five key life cycle stages. Results are presented in both CML2001 and TRACI 2.0 methodologies. The following results are for an average face fiber weight of 21 oz/yd<sup>2</sup>. Results for additional face fiber weight options are presented on the last page of this EPD.

**Table A: LCIA Results for 1-Year Study, Average Product with a Face Weight of 21 oz/sy.**

CML 2001, (Nov 2010)							
Impact Category	Unit	Total	Sourcing & Extraction	Manufacturing	Delivery & Installation	Use	End-of-Life
Global Warming	kg CO <sub>2</sub> eq.	11.92	9.24	0.73	1.45	0.10	0.40
Acidification	kg SO <sub>2</sub> eq.	2.72E-02	1.84E-02	3.17E-03	2.71E-03	3.54E-04	2.51E-03
Ozone Depletion	kg R11 eq.	1.43E-08	1.92E-09	1.11E-08	4.74E-11	3.62E-11	1.15E-09
Smog	kg C <sub>2</sub> H <sub>4</sub> eq.	4.30E-03	2.59E-03	2.65E-04	4.56E-04	2.16E-05	9.70E-04
Eutrophication	kg PO <sub>4</sub> <sup>3-</sup> eq.	4.75E-03	2.82E-03	2.88E-04	4.47E-04	1.89E-05	1.18E-03
Abiotic Depletion	kg Sb eq.	1.23E-05	1.11E-05	3.67E-07	8.14E-07	1.30E-08	-5.52E-08

Traci 2.0							
Impact Category	Unit	Total	Sourcing & Extraction	Manufacturing	Delivery & Installation	Use	End-of-Life
Global Warming	kg CO <sub>2</sub> eq.	11.92	9.24	0.73	1.45	0.10	0.40
Acidification	kg SO <sub>2</sub> eq.	2.99E-02	2.01E-02	3.09E-03	3.08E-03	3.30E-04	3.30E-03
Ozone Depletion	kg CFC-11 eq.	1.71E-08	2.21E-09	1.35E-08	5.05E-11	3.85E-11	1.25E-09
Smog	kg O <sub>3</sub> eq.	5.11E-01	3.36E-01	3.52E-02	7.02E-02	2.82E-03	6.67E-02
Eutrophication	kg N eq.	1.83E-02	1.56E-02	2.89E-04	1.36E-03	1.62E-05	1.03E-03



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**Table B: LCIA Results for 60-Year Study, Average Product with a Face Weight of 21 oz/sy.**

CML 2001, (Nov 2010)							
Impact Category	Unit	Total	Sourcing & Extraction	Manufacturing	Delivery & Installation	Use	End-of-Life
Global Warming	kg CO <sub>2</sub> eq.	53.55	36.97	2.92	5.79	6.28	1.60
Acidification	kg SO <sub>2</sub> eq.	1.28E-01	7.37E-02	1.27E-02	1.09E-02	2.12E-02	1.00E-02
Ozone Depletion	kg R11 eq.	5.91E-08	7.67E-09	4.45E-08	1.90E-10	2.17E-09	4.60E-09
Smog	kg C <sub>2</sub> H <sub>4</sub> eq.	1.84E-02	1.04E-02	1.06E-03	1.82E-03	1.30E-03	3.88E-03
Eutrophication	kg PO <sub>4</sub> <sup>3-</sup> eq.	2.01E-02	1.13E-02	1.15E-03	1.79E-03	1.13E-03	4.71E-03
Abiotic Depletion	kg Sb eq.	4.98E-05	4.46E-05	1.47E-06	3.26E-06	7.81E-07	-2.21E-07

Traci 2.0							
Impact Category	Unit	Total	Sourcing & Extraction	Manufacturing	Delivery & Installation	Use	End-of-Life
Global Warming	kg CO <sub>2</sub> eq.	53.55	36.97	2.92	5.79	6.28	1.60
Acidification	kg SO <sub>2</sub> eq.	1.38E-01	8.04E-02	1.24E-02	1.23E-02	1.98E-02	1.32E-02
Ozone Depletion	kg CFC-11 eq.	7.05E-08	8.84E-09	5.41E-08	2.02E-10	2.31E-09	5.02E-09
Smog	kg O <sub>3</sub> eq.	2.20E+00	1.34E+00	1.41E-01	2.81E-01	1.69E-01	2.67E-01
Eutrophication	kg N eq.	7.42E-02	6.25E-02	1.16E-03	5.44E-03	9.74E-04	4.11E-03



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## Interpretation

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The vast majority of environmental impacts associated with Bolyu & Aqua products can be attributed to the supply chain. Nylon (both N6 and N6,6) are significant contributors to the overall environmental profile of carpet products. Additionally, the copolymer present in the carpet's backing is also a significant impact source.

Recycled content significantly decreases life-cycle environmental impacts in all layers of carpet.

In general, over the one-year period, use and maintenance contributes little (average of less than 2% across all impact categories), however use and maintenance becomes significant when one considers the full lifetime of a building, increasing to 20% of the total GHG footprint of the product over a 60 year period.

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## Supplemental Materials

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### Additional Environmental Information

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**Elimination of Manufacturing Waste** - Beaulieu Commercial has a target to be landfill free by 2015.

**Water Harvesting** - At the company's Chatsworth Plant, Beaulieu Commercial harvests rainwater and grey water and utilizes the collection in the mixing of their latex compound. In 2013, over 130,000 gallons of water was collected and harvested.

**End of Life Reclamation** - Beaulieu Commercial is a Corporate Sustaining Partner of the Carpet America Recovery Effort (CARE).



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## Results Across Face Fiber Weight Options

CML 2001, (Nov 2010)												
Impact Category	Unit	Face Fiber Weight, oz/yd <sup>2</sup>										
		14	15	16	17	18	19	20	21	22	23	24
Global Warming	kg CO <sub>2</sub> eq.	10.19	10.43	10.68	10.93	10.93	11.18	11.67	11.92	12.17	12.42	12.67
Acidification	kg SO <sub>2</sub> eq.	2.33E-02	2.39E-02	2.44E-02	2.50E-02	2.50E-02	2.55E-02	2.66E-02	2.72E-02	2.77E-02	2.82E-02	2.88E-02
Ozone Depletion	kg R11 eq.	1.41E-08	1.41E-08	1.42E-08	1.42E-08	1.42E-08	1.42E-08	1.43E-08	1.43E-08	1.43E-08	1.43E-08	1.44E-08
Smog	kg C <sub>2</sub> H <sub>4</sub> eq.	3.79E-03	3.86E-03	3.93E-03	4.01E-03	4.01E-03	4.08E-03	4.23E-03	4.30E-03	4.38E-03	4.45E-03	4.52E-03
Eutrophication	kg PO <sub>4</sub> <sup>3-</sup> eq.	4.11E-03	4.20E-03	4.29E-03	4.38E-03	4.38E-03	4.47E-03	4.66E-03	4.75E-03	4.84E-03	4.94E-03	5.03E-03
Abiotic Depletion	kg Sb eq.	1.15E-05	1.16E-05	1.17E-05	1.18E-05	1.18E-05	1.20E-05	1.22E-05	1.23E-05	1.24E-05	1.25E-05	1.26E-05
CML 2001, (Nov 2010)												
Impact Category	Unit	Face Fiber Weight, oz/yd <sup>2</sup>										
		25	26	27	28	29	30	31	32	33	34	
Global Warming	kg CO <sub>2</sub> eq.	12.92	13.16	13.41	13.66	13.91	14.16	14.40	14.65	14.90	15.15	12.92
Acidification	kg SO <sub>2</sub> eq.	2.93E-02	2.99E-02	3.04E-02	3.10E-02	3.15E-02	3.21E-02	3.26E-02	3.32E-02	3.37E-02	3.42E-02	2.93E-02
Ozone Depletion	kg R11 eq.	1.44E-08	1.44E-08	1.44E-08	1.45E-08	1.45E-08	1.45E-08	1.45E-08	1.46E-08	1.46E-08	1.46E-08	1.44E-08
Smog	kg C <sub>2</sub> H <sub>4</sub> eq.	4.60E-03	4.67E-03	4.75E-03	4.82E-03	4.89E-03	4.97E-03	5.04E-03	5.12E-03	5.19E-03	5.26E-03	4.60E-03
Eutrophication	kg PO <sub>4</sub> <sup>3-</sup> eq.	5.12E-03	5.21E-03	5.30E-03	5.40E-03	5.49E-03	5.58E-03	5.67E-03	5.77E-03	5.86E-03	5.95E-03	5.12E-03
Abiotic Depletion	kg Sb eq.	1.28E-05	1.29E-05	1.30E-05	1.31E-05	1.32E-05	1.33E-05	1.35E-05	1.36E-05	1.37E-05	1.38E-05	1.28E-05





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