

**Green Products:
Terratex**

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Interface Carpets is no stranger to sustainability. Under the guidance of chairman and founder Ray Anderson, the global corporation began its commitment to industrial ecology in 1996, with a goal of complete sustainability by 2020. In the past decade, the corporation has made great strides, while still being extremely profitable, and has served as a model for others who want to follow a similar path. The book Mid-Course Correction: Toward a Sustainable Enterprise: The Interface Model outlines this journey and demonstrates the financial success that sustainability can yield.³ Since 1996, the company has reduced greenhouse gas emissions by 46 percent, has increased renewable energy sources to 12 percent, has improved efficiency and eliminated material and energy waste, and has launched a number of innovative products and initiatives. The transformation of this company is ongoing, and one-such innovation is the development of the Terratex brand, the industry's first post-consumer recycled polyester and renewable material commercial fabric brand.

Products

The Terratex brand is a line of products produced from 100% recyclable or renewable material, and has recently added the first fabric for commercial interiors made from 100% polylactic acid, a bio-based plastic. The recycled material is comprised of both post-consumer and post-industrial recycled polyester. The renewable materials are made with polylactic acid polymers (PLAs); these are derived from natural, renewable resources, like corn, rice or beets. This brand is providing a powerful example of sustainability in action at the consumer-industrial level. Terratex products are manufactured using increasingly sustainable processes, are designed to meet or exceed industry standards for quality and performance, and are 100% recyclable or biodegradable/compostable at the end of their useful life. These designs in addition to being earth-friendly, are technically superior, visually appealing and price-competitive. Terratex products provide services in panel and vertical surfaces, upholstery and seating, ceiling tiles, acoustical applications, and window treatments, and more products are currently in development.

Lifecycle

The lifecycle of these products has been considered in depth, and is laudable. While fabrics are relatively simple products with few components, the process of manufacturing fabrics consumes liberal resources.⁵ Fabric manufacturing requires large amounts of energy and water, with most energy being used to heat the process water. Thus, reductions in water usage yield a dual benefit.⁵ Interface conducted a series of environmental impact tests, such as 28 day biodegradability and aquatic toxicity tests, to find areas of damage and remedy them. Ultimately,

lifecycle assessments (LCA) considered characteristics such as: embodied energy, embodied mass, water used, global warming potential, ozone depletion potential, eutrophication potential, acidification potential, photochemical oxidant potential, aquatic ecotoxicity potential, human toxicity potential, terrestrial ecotoxicity potential, and the resource index. These results and comparisons were verified by a third party agency to ensure their validity.

Using the company initiative, Ecometrics, Interface measures all component and process factors involved in the production of Terratex fabrics. Compliance with these measurements is compulsory for all Interface plant sites, and corporate centers have other sets of measured goals and guidelines to which they must adhere. Suppliers, vendors, and partners that service Interface must also conduct their business using specifically outlined processes that are relevant to their respective products.¹

All Terratex products also comply with Interface's Dye and Chemical Protocol (DCP). The DCP acknowledges that although dyes and chemicals are just 1% of the total content of the fabric, these components can have negative impacts. This protocol ensures that dyes and chemicals meet the highest environmental standards possible. In order to do this, Interface has leveraged its purchasing power to require all suppliers to disclose all ingredients contained in their products. This is detailed and confidential information that greatly exceeds the transparency compliance required by the Federal Government.

Terratex fabrics under the polyester classification come in three forms: 100% post-consumer polyester, typically fabrics constructed from spun yarns derived from recycled soda pop (PET) bottles, 100% post-industrial polyester, fabrics woven with filament yarns extruded from industrial PET waste, and combinations of the previous, usually in the range of 50% post consumer and 50% post industrial. Notably, the cost premium for the recycled fiber and yarn is approximately 15%, and raw material can be 30% to 50% of the total cost to produce a fabric, conveying a 4.5% to 7.5% cost disadvantage at the mill level. In order to offset that cost, waste reduction efforts, significant energy and water use reduction projects, and process optimization in those areas requiring chemical use have been implemented.⁵ Polyester is a petroleum derived product, so the use of these recycled materials reduced waste and consumption of petroleum.

In fact, when compared to virgin polyester an LCA analysis of the recycled polyester used between 1996 and 2001, over 50 million pounds, revealed energy savings equivalent to 484,150 barrels of fuel oil. This is approximately equivalent to the amount of energy needed to heat 22,382 U.S. homes per year. Additionally, using this recycled polyester required 74 million gallons of water less than if virgin polyester had been used.

Terratex fabrics which are made of renewable, bio-based materials are composed of polylactic acid (PLA). This polymer is created using the starches produced by agricultural plants such as corn, rice, and beets. The starch is converted into sugar and fermented to produce lactic acid which is then polymerized into PLA. The production of PLA uses a comparatively low

amount of resources, less than 0.2% of the total U.S. corn production, and is #2 non food-grade corn. The fibers used in Terratex products are produced by Cargill Dow and are sold as Ingeo fibers. Ingeo is a thermoplastic fiber with similar performance characteristics as oil-based polyester. In contrast to oil-based polyester, the Ingeo PLA fibers do not use antimony, a heavy metal, in their production and they require less water usage. They also require 20-50% less fossil fuel resources, and resultant greenhouse gas emissions, than polyesters, and are completely biodegradable into lactic acid at the end of their lifetime. PLA products satisfy the Federal Procurement Program guidelines for bio-based products as well.

These 'carbohydrate' resources are easily replenished, and easily recycled. Under the right composting conditions, moisture and heat break the polylactic acid polymer down into lactic acid which is then metabolized by microorganisms in the soil. This entire process represents a closed loop system which is the ultimate goal of Interface.

Again, all Terratex products are 100% recyclable or biodegradable/compostable. This is consistent with Interface's 3-R mode: reduce, re-use, restore. ReSKU is the newly announced textile reclamation initiative from Interface Fabrics which seeks to foster the realization of this potential. ReSKU attempts to close the loop in a way that emulates nature by taking waste fabrics and turning them into materials that will continue to feed diverse applications.⁴ It is notable that recycling effectiveness will always rely on the customer, which is a substantial barrier. In an effort to minimize transportation costs, ReSKU will develop regional collection centers at effective locations. The company is also pursuing further research into its composting method with the assistance of Michigan State University and the State of Michigan. Currently decomposition times are down to a few weeks to a few months.

The company purchases green tags to offset the energy requirements of the production plants. The 2.5million kilo-watts which have been purchased will save approximately 4.1 million pounds of CO2 emissions annually, the equivalent of 410 cars off the road per year. Biomass power is also purchased, which raises the amount of green energy in use. These efforts meet the standards of the non-profit Center for Resource Solutions Green-e Program. Green-e is the nation's leading independent certification and verification program for renewable energy products.⁶ Green-e also promotes and facilitates the purchase of renewable energy and tradable renewable certificates (TRCs).⁶ All Terratex products bear the Green-e logo which signifies that 100% of the electricity used to make these products has been matched by Renewable Energy Certificates.

Lifestyle Impacts

There is tremendous potential for these products and the processes and ideas that they represent to have resounding effects in the marketplace and among consumers. Currently,

Interface is monitoring the progress that LEED is making with its "green" rating system with respect to the commercial interiors market. This self-assessing, consensus-based, market-driven rating system may well provide an increased demand for green furnishings that Interface could readily fill. Indeed, "InterfaceFABRIC looks forward to our industry-specific guidelines coming online and are at the ready to act upon them." Terratex products are suitable and in demand in a number of facility types. Corporate offices, [GSA](#) (government services administration), healthcare, hospitality, residential, educational, and institutional locations are all opportune customers.

The use of Terratex products is encouraged by four Executive Orders which direct the Federal Government to reduce the environmental impact of its operations, demonstrate leadership in environmental excellence, and use the purchasing power of the Federal Government to leverage for change at the industry level. This implementation is influenced by Ray Anderson's time as Co-chair of the President's Council on Sustainable Development. These four orders are listed in the attached appendix.

A specific program that Interface has developed also has the potential to fundamentally change the form of consumption at the consumer level. The Evergreen Service Agreement is a system that sells the service provided by Interface's products, while Interface retains the ownership and responsibility for recycling the products themselves. Revolutionary strategies such as these are indicative of a company which is truly committed to accelerating sustainability.

There is substantial market demand for Terratex. Terratex products have recently been added to the catalog of HBF Textiles and Haworth. Haworth is a leader in product and service solutions for adaptable workspaces with sales of \$1.26 billion in 2004. There are also projects in development with Herman Miller. The acquisition of Terratex products by industry leaders validates the potential for these products to provide a catalytic change in the market as well as to be profitable for Interface.^{7,8}

Prospects for Improvement

There are several opportunities for improvement within the Terratex brand. While the corn-PLA-conversion process does not involve the modified portions of the corn plant, the feedstock for PLA synthesis may come from corn that has been genetically modified. The combination of involvement in the bio-based business cycle at such an early stage and the purchasing power of Interface provides the opportunity to leverage this position to influence the market toward more sustainable practices such as organic farming. Perhaps the by-product of fermentation, alcohol, which is necessary for PLA production could be diverted into a fuel to increase the efficiency of this process. Also, agriculture is notably high in petroleum consumption, pollution, and the use of non-environmentally friendly compounds and practices. Agricultural suppliers should be selected that comply with environmentally sound practices. PLA

can also be used in other products such as clothing, cups, food containers, and candy wrappers, so Interface should foster the development of these products as well. The rapid composting technology is impressive, but there are certainly obstacle to implementation such as the creation of an infrastructure to recover post-consumer products. There are widespread issues of collection, education gaps, inconsistent PLA production quality, and the need for a consistent market-availability of bio-based feedstocks. However, Interface is making strides to overcome these obstacles.⁹ Interface is still exploring the possibilities for marketing the compost that is derived from PLA, which is suitable as a high quality soil amendment.

While there is certainly room for improvement, Interface acknowledges this. They note that while the “current technologies and processes used to create bio-based products may not be the final answer in our quest for renewable technologies, we do think they are a long step in the right direction.” The Terratex brand represents more than a step in the right direction for Interface. It is an industry shift that will have resounding impact across the marketplace.

Appendix:

Executive Order 13101 - Greening the Government through Waste Prevention, Recycling and Federal Acquisition

This executive order states that each executive agency shall incorporate waste prevention and recycling into the agency's daily operations and requires them to increase and expand markets for recovered materials through greater Federal Government preference and demand. Pollution is to be prevented and when it cannot be prevented, recycling should occur, making disposal of materials a last resort.

Executive Order 13123 - Greening the Government through Efficient Energy Management

This Executive Order states that the Federal Government shall significantly improve its energy management in order to save taxpayer dollars and to reduce emissions that contribute to air pollution and global climate change. The Federal Government should promote energy efficiency, water conservation, decreased petroleum dependency and use of renewable energy products to help foster markets for emerging technologies.

Executive Order 13134 - Greening the Government - Developing and Promoting Biobased Products and Bioenergy

This Executive Order stimulates the creation and early adoption of technologies needed to make biobased products and bioenergy cost competitive in large national and international markets. It recognizes that biobased products and technologies have the potential to make renewable farm and forestry resources major sources of affordable electricity, fuel, chemicals, pharmaceuticals and other materials, while reducing the Nation's dependence on foreign oil, improving air and water quality and flood control, decreasing erosion and minimizing net production of greenhouse gases.

Executive Order 13148 - Greening the Government through Leadership in Environmental Management

This Executive Order directs each Federal agency to implement formal environmental management systems (EMS) of their own design or based on ISO 14001, and to use Life Cycle Assessment as a guide to decision making. It also requires the reduction of use of selected toxic chemicals, hazardous substances and pollutants. [2](#)

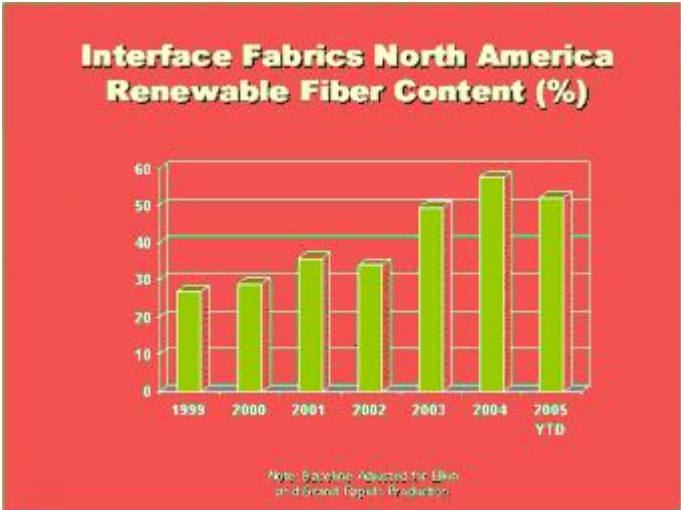


Figure 1 Renewable Fiber Content.²



Figure 2 The ReSKU Logo.⁴



Figure 3 The Green-e Logo.⁶

References

Unless otherwise referenced, information was provided by the Terratex website.

1 Terratex: Econometrics: <http://www.terratex.com/ecometrics.html>

2 Terratex Website: <http://www.terratex.com>

3 Anderson, Ray. Mid-Course Correction: Toward a Sustainable Enterprise: The Interface Model. 1999.

4 ReSKU Website: <http://www.resku.net>

5 TerraTex FAQ: <http://www.terratex.com/faqs.html#q1>

6 Green-e Website: http://www.green-e.org/what_is/what_is_index.html

7 Haworth Introduces New Terratex Panel Fabrics. <http://www.terratex.com>

8 HBF Textiles Introduces New Terratex Fabric. <http://www.terratex.com>

9 Hensler, Connie. Biobased Fabric Composting Trial. *Biocycle*. May 2006, Vol. 47, No. 5, p. 50.