Defining Sustainability for the Geosynthetics Market

MARCH 2011

WHITEPAPER

Whether a buyer, manufacturer, engineer or contractor, you, like many of us, have probably felt drawn to conform to the sustainability ideal. At every turn, we are pushed to make more sustainable choices. No doubt, however, at some point you've scratched your head and wondered, what exactly does sustainable mean?

A crystal-clear definition of sustainability is elusive. That's because sustainability, in general, is a science that is still maturing. Yet, as we chase the ideal, it is easy to lay claims on sustainability with any enhancement aimed at decreasing the stress of our products on the natural world. But our efforts must go much deeper than that. If sustainability is truly achievable, companies must undertake the quest organization-wide. Sustainability requires that we make conscious choices about resources and the way we use them at every stage of a product's life.

As a manufacturer of geomembrane fabrics, Seaman Corporation is actively engaged in this journey. The intent of this article is to offer our learning as a roadmap for those of you who have a similar destination in mind, but still find yourselves navigating through fog. The following will be our focus:

Section 1: Sustainability - Defining it for the Geosynthetics Market

Section 2: The Stages and Environmental Impacts of a Product's Life Cycle

Section 3: Conclusion

Section 1: Sustainability - Defining it for the Geosynthetics Market

Living sustainably, according to many, requires that we use resources to meet our present needs without compromising the ability of future generations to meet their needs. Living sustainably does not, however, require that we live in thatch huts that periodically biodegrade. In fact, geosynthetic products that won't last are not sustainable at all. Wikipedia agrees. According to the free online encyclopedia, the definition of sustainability is simply "the capacity to endure".

People, resources and the environment are all intertwined. We have an impact on the environment when we extract raw materials, manufacture, install, use and dispose of our products. This is why endurance counts. A longer lasting geosynthetic product delays the repeat of the manufacturing cycle, uses fewer resources, costs less money and causes less stress on the environment.

Section 2: The Stages and Environmental Impacts of a Product's Life Cycle

Stage 1: Design

The design stage covers the design and engineering of each component in a geosynthetic system to meet the market's needs.

Environmental Impact:
Product designers or manufacturers are the first people who can affect the environmental impact of a product. Their product and system-design concepts can influence the sustainable nature of raw material inputs. Raw materials that include recycled content or bio-based materials are examples of more sustainable inputs. Manufacturers can influence production processes, product performance, product longevity and the product's end-of-life options. They also can be involved in product packaging decisions and impact corresponding landfill waste.

Examples of more sustainable product and system designs:

- A more sustainable geomembrane is designed for longevity in a variety of environments.

- A more sustainable system design ensures product longevity with minimal maintenance and need for repairs. If a product is not consistently maintained, leaks may occur, which will compromise the system's ability to reach its performance potential.

Stage 2: Material Inputs
The source of all raw materials used to make any product can always be traced back to the natural environment. In this stage, raw materials are extracted from nature and converted into synthetic materials before manufacturing them into a geosynthetic product.

Environmental Impact:
The natural resources we select for products, the quantities we use and the methods we use to harvest them, impact the environment. Minimizing the amount of resources extracted from nature, especially those that are scarce, makes for a more sustainable product. Creating synthetic raw materials involves manufacturing processes which could include chemicals of concern; those that may be harmful to people and/or the environment. If not handled properly, waste generated by manufacturing can cause pollution of local land, air and waterways.

Examples of more sustainable material inputs:

- The polymers of nearly every geosynthetic membrane are made from nonrenewable fossil fuels. Some products are more dependent on fossil fuel than others. A product that uses less fossil fuel and lasts longer is significantly more sustainable than an alternative product that uses more energy and has a shorter lifespan.

- Companies making a more sustainable product are making conscious selections of raw material inputs and monitoring their supply chain to minimize or eliminate any inputs that include chemicals of concern or create environmentally destructive emissions.

Stage 3: Manufacturing
In the manufacturing stage, all of the natural and synthetic materials are brought together to make the components of a system.

Environmental Impact:
Manufacturing processes generate waste that, if not handled properly, can cause pollution of air, land and waterways. Manufacturing also can consume significant amounts of water and energy and cause stress on non-renewable resources.

Examples of more sustainable manufacturing practices:
Companies striving to achieve sustainability in manufacturing should be able to demonstrate it in numerous ways by doing all or many of the following things:

- Designing and operating manufacturing processes so as to minimize air and water pollution
- Minimizing the disposal of solid and hazardous wastes to the environment (e.g., landfill, incineration) by source reduction, recycling or finding other beneficial uses
- Identifying opportunities for energy-use reduction
- Incorporating sources of renewable energy into manufacturing (e.g., solar, wind, biogas, etc.) when possible
- Putting an environmental management system in place
- Minimizing the use of water
- Minimizing the use of chemicals of concern
- Utilizing raw material suppliers that are achieving a lower environmental profile through these same actions

Stage 4: Transportation
Transportation can occur at any point in a product's life cycle: delivery of the raw materials to the manufacturing site; shipping of the finished product to the point of installation; and the transportation of the expired product to a landfill or recycling plant.

Environmental Impact:
The majority of commercial transportation vehicles consumes non-renewable fossil fuels and emits carbon monoxide. The greater distance between transportation points, the greater the impact on the environment.

Examples of more sustainable transportation:
- Strategically placing stocked warehouses so as to maximize railroads for shipment. Shipping by rail uses significantly less fuel per ton of freight moved.
- Designing the product to achieve the performance requirements with less weight per square foot. Less weight translates into fewer vehicles needed to ship.
- Utilizing suppliers local to manufacturing points for raw materials and suppliers local to installation points for system accessories.

Stage 5: Service Life
The service life is the time period during which a product serves its intended function.

Environmental Impact:
It cannot be overemphasized. The length of a product's service life has significant environmental impact. The shorter the lifespan of a product, the more frequent the need for a repeat of the production cycle; hence, causing greater demand on resources and stress on the environment.

Examples of a more sustainable service life:
Some geosynthetic products use more resources and have a shorter service life. Some use fewer resources and have a longer service life. The latter is more sustainable. Use the following indicators when verifying a product's projected service life:

- The manufacturer can provide documentation of past product performance history in various climates (e.g., hot and humid or hot and dry, as well as cold, temperate climates) and performance specifications for various conditions. (e.g., UV, abrasion, and chemicals, oils and greases)

- The manufacturer has a program to provide technical support for fabricating the products.

Stage 6: End of Life
When a geosynthetic product has reached a point where it is no longer fit for its intended purpose, it has reached the end of its life.

Environmental Impact:
Products that no longer function can turn into landfill waste.

Examples of more sustainable end of life options:
For the past 20 years, companies have experimented with ways to recycle or reuse their products to avoid clogging landfills. Over the past decade, significant advances in research and technology have enabled many companies to do so. For example, recycled fabric products are being transformed and used in complementary applications such as flooring, tiles and walkways. Some products are actually being recycled and reused again as new products.

Section 3: Conclusion
Living in or manufacturing biodegradable thatch huts may, to some, sound environmentally romantic. But, it's really not practical, nor would it make good use of anyone's resources or time. Sustainability requires that there is balance between people, resources and the environment. We must be cognizant of all the variables in our work that impact this balance.

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