

Soy-Based Materials for Green Building Construction

Soy materials for building construction are renewable, environmentally friendly and ideal for green building design and construction. Many applications demonstrate improved carbon footprint, low VOC emissions, and even performance benefits vs. alternative petro-based materials. Understanding the attributes of soy-based materials gives architects and construction managers a better understanding of why soy derivatives are beneficial to use in a wide range of building products and infrastructure applications.

The USGBC's LEED certification system can reward the use of soy-based materials, including solvents, coatings, adhesives, polyurethane and other materials

Renewable Resource

Soy is renewable and abundantly available. In 2022, U.S. production levels of soy were 256 B pounds per year¹. New uses for construction and building materials are growing rapidly, with minimal impact on the supply of soybean derivatives for food uses.

The USDA BioPreferred® Program designates categories for federal purchasing as well as identifies certification categories for the voluntary labeling initiative. Many soy-based building materials are included on these lists.

Low Toxicity

Soy-based products tend to be low in volatile organic compounds (VOCs) and soy helps replace materials with chemicals such as formaldehyde in wood products. It also replaces other petro-based materials which are safer for manufacturers, the installers and the consumer. UL's GREENGUARD signifies that your building materials meet some of the world's most rigorous chemical emissions criteria.

Environmental Contribution

Life-cycle studies show that soybeans remove greenhouse gases from the atmosphere and reduce fossil fuel use. Since 1980, U.S. farmers increased energy efficiency by 45% and improved greenhouse gas emissions efficiency by 42%. U.S. farmers produce higher yields, use minimal fertilizer and operate efficient machinery, all of which help to minimize U.S. Soy's carbon footprint².

Second, as a renewable, low-toxicity resource that contributes to indoor environmental quality (IEQ), soy contributes to meeting the requirements for new International Green Construction Code (IGCC) and U.S. Green Building Council's LEED certification system.

Third, the use of soy-based materials can help achieve LEED credits in a variety of categories including Materials & Resources (MR), Indoor environmental quality (IEQ), and in some cases, Innovation in Design.

More Benefits for the Building Team

The advantages of using soy-based materials go far beyond LEED certification. Improved indoor air quality (IAQ) and reduction of 'chemicals of concern' and material off gassing are major themes for building industry. The increased use of Health Product Declarations (HPDs) detail the product's material makeup and how the material impacts human health while Environmental Product Declarations (EPDs) describe the life-cycle environmental characteristics of products.

References:

<https://www.nass.usda.gov/Newsroom/2023/03-31-2023.php> March 31, 2023
<https://ussoy.org/wp-content/uploads/2022/03/USBCSR030222.pdf>
<https://www.biopreferred.gov/BioPreferred/faces/pages/ProductCategories.xhtml>
<https://www.ul.com/ul-greenguard-certification-building-materials>

Applications of Soy-based Materials in Construction



Recent projects using soy-derived building materials include the Center for Soy Innovation (CFSI), a building dedicated to showcasing Missouri's number one crop, and the Heifer International headquarters in Little Rock Arkansas, which earned platinum certification under LEED-NC, and was selected as a Top Ten Green Project by the AIA Committee on the Environment for use of soy-based spray foam for insulation and barrier protection. Another example is a 15,000 ft² military office at Fort Lee, VA, where the cabinets were constructed with soy-based formaldehyde-free adhesives. Methods and materials are becoming more abundant for applying soy-derived products in construction, including with multiple advantages over petro-based materials. Examples of these products are outlined below.

Engineered Wood Products

Commercially available, environmentally friendly hardwood engineered wood products can be manufactured with soy film adhesives containing up to 90% biobased content. There are many types of soy-based wood composites for a variety of applications: Particleboard, Oriented Strand Board (OSB), Medium Density Fiberboard (MDF), Hardboard (high-density fiberboard), and Plywood.



Solenis' Soyad™ Adhesive Technology is a patented, bio-based, formaldehyde-free adhesive system for plywood, composite particleboard and MDF. Wood products containing soy-based adhesives include **Columbia Forest Products PureBond®**, **Specialty Organics' BreezeBond™**, **States Industries' SoyStrong** veneer core panels, and **Fibonacci's HempWood®**

Polyurethane Products

Soy polyols are used in many applications including polyurethane foam and composites.

Applications include:

Carpet backing: **Universal Textiles and Technologies BioCel™** and **EnviroCel™**, **EcoPath's EcoNax**.

Spray Insulation: **Huntsman's Heatlok Soy 200 Plus®**

Pultruded Window Profiles: **Deceuninck Innergy®**

Solid Surface Countertops: **MCM Countertops**

Artificial Turf and Playground Surfaces: **SYNLawn EnviroLoc™**



Coatings and Adhesives

Architectural Coatings: Both **Rust-Oleum** and **Sherwin-Williams** has a long track record of commercialization of soy-based coatings with many soy-based products including Rust-Oleum's extensive line of Verathane® Wood Stains and Watco Wood Oils and Sherwin William's ProMar® 200 and ProClassic®. Other coatings suppliers include **EcoProCoat**, **Aexcel**, **EcoSafety Products**, and **Timber Ox**, in addition to adhesive and paint strippers from **EcoSafety Products**, **Franmar Chemical**, **Natural Soy Product**, **Soy Technologies**, **Vertec Bio** and **Twin Chemical**.

Adhesives: **Taylor** is a leader in elastomeric floor adhesives including Resolute®, Aspen®, Ridgeline®, and Ironwood®.

Infrastructure:

Concrete: Poreshield® by **Crafco** is a durability enhancer for concrete, extending the life of concrete. Concrete sealers, stains and curing agents include **Cresset Chemical**, **EcoProCote**, **Natural Soy Products** with many others offering concrete release agents.

Asphalt: Recycled asphalt pavement rejuvenators and fog sealers including **BioRestor®**, **RePlay™** and **Colorbiotics' Invigorate® MacroLei BioMag®** is a polymer modifier for asphalt pavement.

Cargill's Anova™ Asphalt Solutions provide a wide range of benefits in asphalt applications.



Soy New Uses



Architects Go Sustainable



Soy Biobased

Whether you're developing a new product, moving into a new market, or are faced with a new opportunity...TALK WITH US.

This document was prepared by Omni Tech International on behalf of the United Soybean Board and US Soy. For more information, contact the Omni Tech commercialization team at info@omnitechintl.com, or visit OmniTechintl.com.



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