

BioPreserve SoyGuard Wood Sealer

Product Selection and Description

Produced by BioPreserve in Erie, Pennsylvania, SoyGuard Premium Water Repellent & Wood Sealer is a biobased, non-toxic exterior wood coating with a weak odor and low VOC. It can be applied to new, old, and pressure-treated wood surfaces that are exposed to moisture and weather, such as outdoor decks, siding, furniture, fences, and doors. SoyGuard contains methyl soyate, a natural solvent derived from soybean oil that penetrates the wood surface and encapsulates wood cells with a protective polymer resin made from recycled polystyrene.

For the BEES system, the functional unit for the sealer and coating category is sealing or coating 9.29 m² (100 ft²) of surface. At an application rate of 23.2 m² (250 ft²) per gal and a density of 3.4 kg (7.5 lb) per gal, this amounts to use of 1.36 kg (3 lb) of SoyGuard per application.

Flow Diagram

The flow diagram below shows the major elements of the production of this product as it is modeled for BEES.

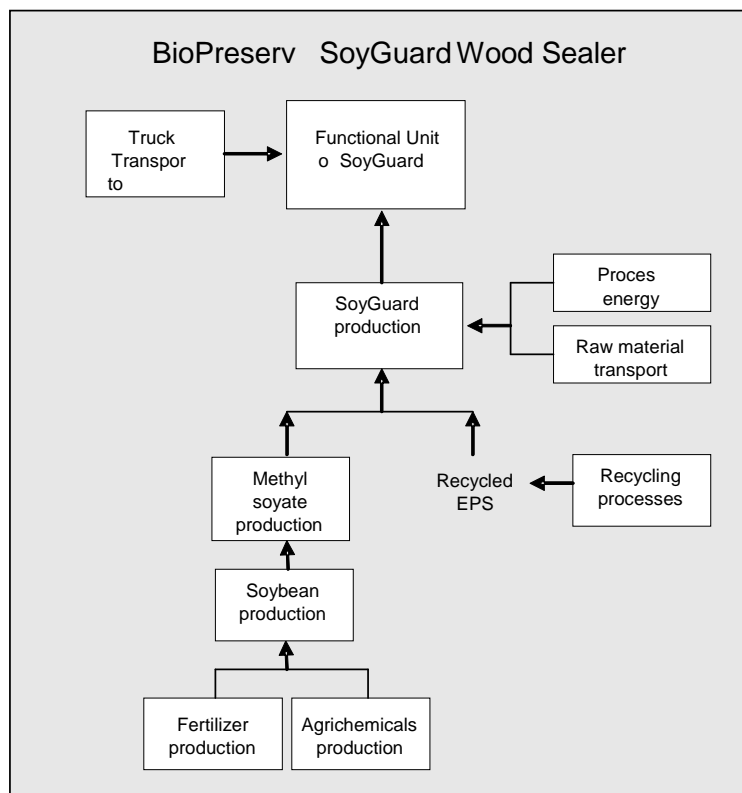


Figure 1: SoyGuard System Boundaries

Raw Materials

The SoyGuard constituents are used in the following proportions.

Table 1: SoyGuard Constituents

<i>Constituent</i>	<i>Mass Fraction (%)</i>
Methyl Soyate	92
Recycled expanded polystyrene (EPS)	8

Methyl soyate production data comes from the life cycle data for biodiesel production developed for a U.S.

Department of Agriculture (USDA) study that compared petroleum-based diesel fuel to biodiesel.¹ Data for soybean production comes from the U.S. LCI Database.

The production of virgin extruded polystyrene (EPS) is not accounted for since recycled EPS is used in the product, but data for recycling the EPS is included and encompasses the following subprocesses: collection at end of life, shredding and grinding, milling, separation, and granulation. This data is 1990s European data on mixed polymers and comes from the SimaPro database. Transportation of the recycled EPS to the BioPreserve plant is included.

Manufacturing

Energy Requirements. Data to heat and mix the materials into the final product is calculated using the energy consumed and quantity produced in an 8-h shift, and amounts to 0.0022 kWh/kg (0.001 kWh/lb) of product. Electricity is modeled using the U.S. average electricity grid from the U.S. LCI Database. A small amount of volatile organic compounds (VOC) and particulate emissions are released during the process: 1.4 E-5 kg (3.0 E-5 lb) of VOC and 1.4 E-6 kg (3.0 E-6 lb) of particulates per lb of SoyGuard produced. A small amount of solid waste is generated as well: 4.5 E-7 kg (1.0 E-6 lb) of filtered solid particles from recycled EPS per lb of SoyGuard produced. All of these outputs are accounted for in the BEES product model.

Transportation. Methyl soyate is transported approximately 1368 km (850 mi) to the plant, while the EPS comes from only 8 km (5 mi) away. Materials are transported by diesel truck, which is modeled based on the U.S. LCI Database.

Transportation

As a default, product transport to the customer is assumed to average 563 km (350 mi) by diesel truck, modeled based on the U.S. LCI Database. The BEES user is free to change the default transportation distance.

Installation and Use

SoyGuard requires that one thin coat be applied with a brush, roller, or power sprayer, but for the product to be fully effective it must be applied only at a rate the surface can absorb. For BEES, SoyGuard is modeled as being manually applied. One application lasts approximately 2 years. As with all BEES products, re-application over the 50-year use period—a total of 25 applications in all—is accounted for in the model.

End of Life

No end-of-life is modeled since the product is fully consumed during the use phase.

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.

Sheehan, J. et al., *Life Cycle Inventory of Biodiesel and Petroleum Diesel for Use in an Urban Bus*,

NREL/SR-580-24089 (Washington, DC: U.S. Department of Agriculture and U.S. Department of Energy, May 1998).

BioPreserve, *SoyGuard Wood Protection Premium Water Repellent and Sealer: Product Information and Application Instructions*. Found at: <http://www.biopreserve.com>.

Industry Contacts

Brad Davis, BioPreserve (January 2006)

¹ Sheehan, J. et al., NREL/SR-580-24089 (Washington, DC: US Department of Agriculture and US Department of Energy, May 1998).