Environmental Dust Control Dustlock

Product Selection and Description

The roadway dust suppressant category includes products aimed at eliminating or reducing the spread of dust associated with gravel roads and other sources of high dust levels such as construction. Dustlock, produced by Environmental Dust Control, Inc. in Minnesota, is a biobased dust suppressant produced from by-products of the vegetable oil refining process. When applied, Dustlock penetrates into the bed of the material generating the dust and "bonds" to make a barrier that is naturally biodegradable. The bond keeps Dustlock in place, preventing the exposure of any material underneath. The manufacturer reports that Dustlock also reduces erosion of surface material (e.g., gravel) and the appearance of mud.

The functional unit for this category in BEES is dust control for 92.9 m^2 (1 000 ft^2) of surface area. One gal of Dustlock covers approximately 3.4 m^2 (37 ft^2), so 102 L (27 gal) of Dustlock are modeled for the BEES application.

Flow Diagram

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

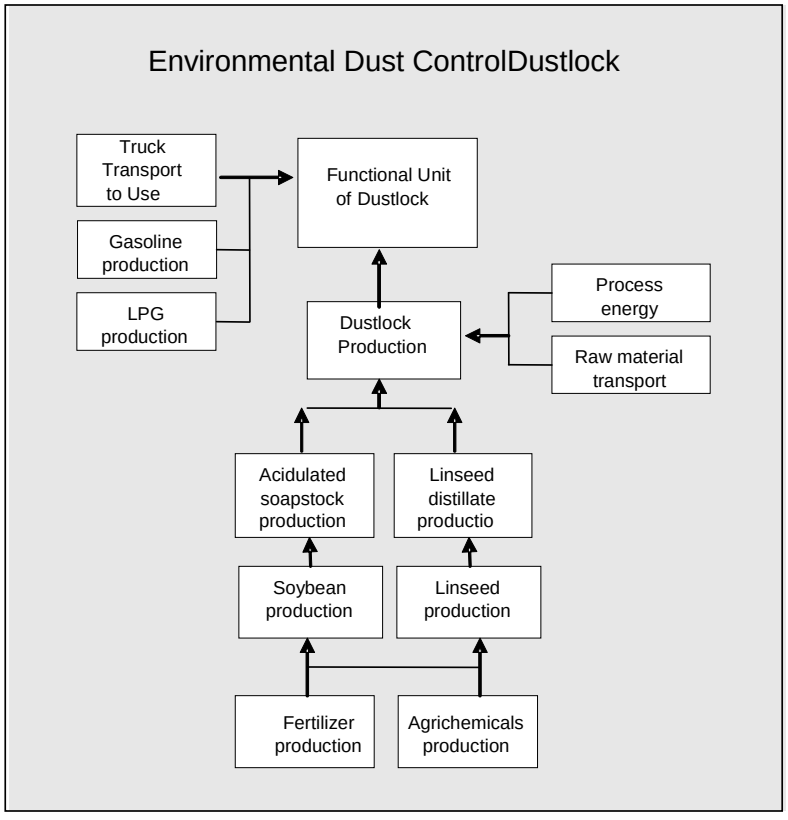

Figure 1: Dustlock System Boundaries

Raw Materials
Dustlock is comprised of acidulated soapstock and linseed distillate. The acidulated soapstock may be any combination of sunflower, canola, or soybean soapstock. Since BEES data for soybean production and processing is the most comprehensive, soybean-based soapstock is modeled for this product. Acidulated soapstock is a co-product of the soybean crushing process involved in biodiesel production; data for this process comes from biodiesel life cycle data developed for the U.S. Department of Agriculture that was used to compare petroleum-based diesel fuel to soy-based biodiesel.[1] The allocation among biodiesel and its coproducts is mass-based, with acidulated soapstock amounting to 0.1 % of the total output. Data for soybean production comes from the U.S. LCI Database.

Energy requirements and emissions for linseed oil production involve fuel oil and steam, and are allocated on an economic basis between linseed oil (87 %) and linseed cake (13 %). The cultivation of linseed is based on a modified version of wheat production data from the U.S. LCI Database.

Manufacturing
Energy Requirements and Emissions. Electric motors and pumps are used to blend the product and pump it in and out of tanks; these consume 1.5 J (4.3 E-4 kWh) per kg of Dustlock. Electricity is modeled using the U.S. average electric grid from the U.S. LCI Database.

Transportation. Raw materials are transported to the manufacturing site by diesel truck: soapstock travels 451 km (280 mi) and linseed oil 1086 km (675 mi). Diesel trucking is modeled using the U.S. LCI Database.

Transportation
Product transport to customers is assumed to average 805 km (500 mi) by diesel truck, and is modeled based on the U.S. LCI Database.

Installation
Dustlock requires heating before application when outside air or ground temperature is below 16 °C (60 °F) at night. For the BEES model, the heating is done with liquefied petroleum gas (LPG). Gasoline-powered equipment is used to spray the Dustlock™ onto the surface area. The energy requirements follow.

Table 1: Dustlock Installation Energy Requirements

Energy Carrier	*Quantity MJ/kg (kWh/lb)*
Liquid petroleum gas	0.14 (0.02)
Gasoline	0.004 (0.001)

Dustlock is applied at a rate of 3.4 m^2 (37 ft^2) per gal, or 102 L (27 gal) for a 92.9 m^2 (1 000 ft^2) application. At a density of 3.4 kg (7.5 lb) per gal, 93 kg (205 lb) of Dustlock are used for the application.

End of Life
No end of life burdens are modeled since the product is consumed during use.

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.

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

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).

Industry Contacts

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