Headwaters Stucco Finish Application

Product Selection and Description

Headquartered in Salt Lake City, Utah, Headwaters, Inc. is a supplier of materials to products as diverse as ready-mix concrete, precast concrete, roofing, carpeting, mortar, and stucco. Three Headwaters products are included in BEES

- Masonry Cement Type S. Meets ASTM C91 Type S standard for masonry cement.
- Scratch & Brown Stucco Cement. Meets ASTM C1328 Type S standard for plastic (stucco) cement. Used as a replacement for job-site-mixed stuccos (usually portland and lime or portland and masonry cement) under ASTM C926.
- FRS. Produced and sold under ICBO Evaluation Report No. 4776 and ICC Legacy Evaluation Report 459. At this time there are no ASTM standards for this class of products.

BEES data for these products are based on 2005 data from the manufacturer's San Antonio, Texas plant, with an annual production of 27 945 metric tons (30 804 short tons). These cementitious products are incorporated in different stucco finishes in BEES as shown in the Table below:

Table 1: Headwaters Cement Products

BEES Exterior Wall Finish Alternative	***Headwaters Product***	***Specifications***
Headwaters Masonry Cement Type S-based Stucco	Masonry Cement Type S	1 kg (2.2 lb) of Masonry Cement Type S produced by Headwaters replaces 1 kg (2.2 lb) of traditional Masonry Cement Type S used in generic stucco. Fully 100 % of the traditional cement is replaced by Headwaters' Masonry Cement.
Headwaters Scratch & Brown Stucco Cement Type S	Scratch & Brown Stucco Cement Type S	1 kg (2.2 lb) of Scratch & Brown Stucco Cement Type S produced by Headwaters replaces 1 kg (2.2 lb) of traditional Masonry Cement Type S used in generic stucco. Fully 100 % of the traditional cement is replaced by Headwaters' Scratch and Brown Stucco Cement.
Headwaters FRS-based Stucco	FRS	1 kg (2.2 lb) of FRS produced by Headwaters replaces 2 kg (4.4 lb) of traditional Masonry Cement. Fully 100 % of the traditional cement is replaced by Headwaters' FRS. The metallic lath weighs either 0.95 kg/m^2 (1.75 lb/yd^2) or 1.36 kg/m^2 (2.50 lb/yd^2). The lighter-weight lath is used in 60 % of the applications.

Flow Diagram

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

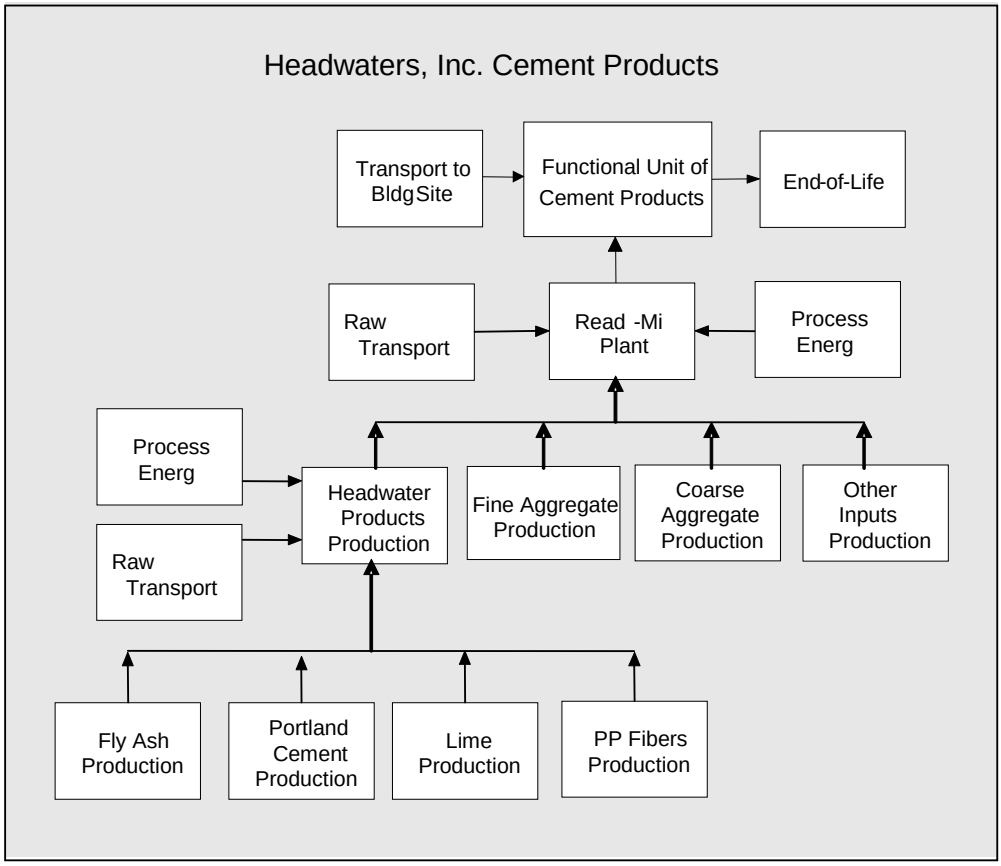

Figure 1: Headwaters Cement Products System Boundaries

Raw Materials

The three Headwaters products are comprised of the raw materials given in the Table below.

Table 2: Headwaters Cement Constituents

Constituent	*Masonry Cement Type S*	*Scratch & Brown Stucco Cement*	*FRS*
Fly Ash (class F)	Yes	Yes	Yes
Portland Cement (gray, type I)	Yes	Yes	Yes
Hydrated Lime (type S)	Yes	Yes	Yes
Polypropylene Fibers	No	No	Yes

Portland cement. The BEES generic portland cement data are used for the portland cement constituent, and comes from the Portland Cement Association LCA database, which is documented under Generic Portland Cement Concrete Products.

Fly Ash. Fly ash comes from coal-fired, electricity-generating power plants. These power plants grind coal to a fine powder before it is burned. Fly ash – the mineral residue produced by burning coal – is captured from the power plant's exhaust gases and collected for use. Fly ash particles are nearly spherical in shape, allowing them to flow and blend freely in mixtures, one of the properties making fly ash a desirable admixture for concrete. In LCA terms, this waste byproduct from coal combustion is assumed to be an environmentally "free" input material.[1] Transport of the fly ash from the production site is included in the product modeling.

Lime and Polypropylene. Data for hydrated lime production takes into account limestone extraction, crushing and calcination, and quick lime hydration, and comes from the U.S. LCI Database. Data for polypropylene production comes from the U.S. LCI Database.

Manufacturing

Energy Requirements and Emissions. Raw materials are brought to the cement plant in 18-wheel tankers and blown into silos. Material drops from the silos to a weigh-batcher, a blender, and a bagger. Only one product is produced at a time for at least a full day. Since all gray (fly ash-containing) products are related, changing products consists of tapping the system down and bagging the last of the product in the system. Allocation of the resources is based on the number of bags of each product produced. Energy consumed on site is mostly electricity (87 %) and diesel fuel oil. The site produces solid waste (1 % of production) and emits particulates. All energy and electricity data is based on the U.S. LCI Database.

Transportation. The transportation distance of raw materials from the supplier to the manufacturer was provided by Headwaters and ranges from 16 km (10 mi) for the polypropylene fibers, to 48 km (30 mi) for the portland cement and lime, to 660 km (410 mi) for the fly ash. Materials are transported by diesel truck, with burdens modeled using the U.S. LCI Database.

Transportation

Transportation of finished products to the building site is evaluated based on the same parameters given for the generic counterparts to Headwaters' products, and all products are shipped by diesel truck. Emissions from transportation allocated to each product depend on the overall weight of the product. Diesel truck transportation is based on the U.S. LCI Database.

Installation and Use

While sheathing, weather resistive barriers, and other ancillary materials may be required to complete the exterior wall system, these materials are not included in the system boundaries for BEES exterior wall finishes. Maintenance for Headwaters' exterior stucco products will vary depending on weather conditions, but usually consists of minimal repairs that can be done by hand. Maintenance is not included in the system boundaries for this product.

End of Life

With general maintenance, exterior stucco wall finishes will generally last more than 100 years. This is a performance-based lifetime.

References

Life Cycle Data

National Renewable Energy Laboratory (NREL): *U.S. Life-Cycle Inventory Database*. 2005. Golden, CO.

[1] The environmental burdens associated with the production of waste materials are typically allocated to the intended product(s) of the process from which the waste results.

Found at: http://www.nrel.gov/lci/database.
PRé Consultants: *SimaPro 6.0 LCA Software*. 2005. The Netherlands.

Industry Reference

Herb Nordmeyer, Headwaters, Inc. (2006)