

# CEMENT



<http://law.scu.edu/blog/sierra-leone->

## Important Facts

- **Use:** binding material, concrete, grout, stucco siding, floors
- **Key structural benefits:** Hardens quickly, strong physical and thermal seal, low maintenance, fire-resistant

## Solar Decathlon 2013

Past competitions have utilized cementitious siding. In 2007, the team used a combination of sand and wood fiber in their cement mix to sustainably capture thermal energy during the daytime. In 2009, the team used reclaimed redwood siding.

After much debate, the team decided to use steel siding, but cement will still play a role in the construction process since it is a necessary component of concrete and mortar.

Cement will also likely be used in the floors of the home because a cement design allows for easy installation of the under-floor air distribution system and creates a good thermal seal.

## Ethical Issues Raised

Cement is the main glue of the construction industry. Most commonly used as mortar and as the base for concrete, it is crucial to holding buildings together.

Despite the ubiquity of cement, the labor-intensive production process raises many ethical issues. The components are mined by using explosives at quarries to blast away rock, breaking down limestone and clay. Pieces of the rock are sent through a series of chutes to be mechanically crushed and combined to achieve the correct proportion of lime, alumina, iron oxide, and silica. This mixture is fully homogenized by a grinding process that reduces it to a fine powder. The powder is moved to rotating kilns that heat it to a high temperature to reduce moisture and remove excess carbon dioxide in a process called calcination. After further grinding, gypsum is added to increase the time it takes for the cement to set.

The environmental impact of cement production is substantial. The mining process destroys hillsides and releases dust and other pollutants from the explosion process. The calcination process releases a high amount of carbon dioxide, and combined with transportation and extraction emissions, it is estimated that the production of 1000 kg of cement cause the release of 900 kg of carbon dioxide, in addition to volatile heavy metal compounds that pollute the air and endanger those who live nearby.

Cement also raises several safety issues for those involved in construction. As a dry powder, it can irritate the eyes and lungs. It is highly basic, meaning that it is capable of burning unprotected skin because it also releases a substantial amount of heat in the setting process. Most of these dangers are easily avoidable, so as long as the team follows proper safety procedures, this should not be a concern to the construction crew.

Despite the environmental concerns, progress is being made. Dust and exhaust capture equipment is coming into use and efforts have increased to restore the quarries after limestone mining ceases. New types of cement are designed to recapture carbon dioxide once incorporated into buildings, and as shown in the 2007 house, SCU has made an effort to seek out these sustainable technologies.