Building construction and operations make up half of the total annual energy consumption in the US. Within that measure, 15% percent of that energy is embodied in the materials that make up buildings. Building material (and so current and future building waste) represents an enormous amount of extracted natural resources—60% of total non-food or fuel US resource consumption annually. The design of sustainable buildings must take into account the fundamental interconnection between the manufacture of the materials of the buildings and the ecological context of their extraction/production. The environmental impacts of these building materials can be measured in terms of embodied energy and water, acidification, global warming potential, human health respiratory effects, ozone depletion, smog, aquatic eutrophication, and (in positive terms) carbon sequestration or material upcycling.

Course topics

What are critical factors in the lifecycle environmental impacts of the major materials of building construction (concrete, steel, timber)? What are ways of quantifying environmental impacts of building materials and of accounting for these impacts in the design of new buildings? What can we learn about the industrial ecology of these materials from their local/regional production?

Course structure

This is a research seminar. Course meetings will alternate between industry visits, guest lectures, reading discussion, and student presentations of research. Field trip transportation will be up to the students—carpooling—and trips will occasionally extend beyond the scheduled course period.