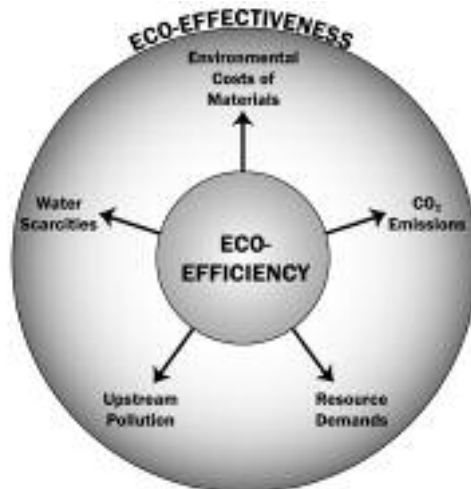


Eco-efficiency and Eco-effectiveness

Architect and sustainable design expert William McDonough exhorts green building designers not to be content with just “doing less-bad” designs that put off the day of reckoning for excessive energy and water use, but to design buildings and cities that are “positively good.” When our focus is primarily on “eco-efficiency,” that is, reducing our negative impacts, we are not likely to achieve design breakthroughs. For example, saving 20% of the energy of a standard building is a virtue, but energy use still creates lots of carbon dioxide emissions and pollution from electric power production. If we save 30% of the water use of a standard building, we are still using far more water than the building receives as rainfall.

Some experts tell us that our environmental impacts have to be reduced 90% or more to begin to reverse the decline in the Earth’s supportive ecosystems and to relieve the stress on energy and water resources. Such a “Factor 10” building is a long way from our current focus on “Factor 1.5” buildings that might reduce impacts of building construction and operations by 33% on average. (At this time, a good LEED-certified building reduces water use by about 30% and energy use by 30% to 50%, compared with the average of all buildings.)



Eco-effectiveness considerations force us to include all the various environmental and social effects of our design, construction, operations and development decisions.

Economists have long analyzed the “externalities” of modern life, wherein a factory, for example, is more profitable when it is able to unload its pollution and resource depletion on the environment, without having to pay for all the consequences. One can think of the past 30 years of pollution control regulations as an attempt to make business and government “internalize” the full external costs of their pollution, so that they would decide not to create it in the first place.

In an “eco-effective” analysis, one would “internalize the externalities,” for example, by performing a life-cycle analysis of all materials produced, including their upstream (cost of materials, cost of transportation, type of labor) and downstream (recyclability, reusability) environmental and social costs. The figure above shows how this approach might look conceptually. Sustainability implies that, together, we have to agree to live primarily on “natural capital” (renewable resources and biodiversity) for a long period of time, using non-renewable resources at a much slower rate, perhaps eventually not at all.



Ecological Footprint

The concept of the “ecological footprint” was introduced in the early 1990s by a Canadian researcher, William Rees, and popularized by his Swiss colleague, Mathis Wackernagel.⁴³ In an elegant conceptual leap, they looked at all human activity and asked the simple question: How many Planet Earths would it take to support human activity at current levels of consumption, pollution and resource depletion? The answer for 2003 was 1.25 Earths. That created an immediate conceptual problem, because we only have one Earth to work with for the foreseeable future. The ecological footprint of the average American would occupy the resources of about five to ten Earths, the average Canadian about four to eight Earths.⁴⁴

According to the Global Footprint Network:

Humanity’s *Ecological Footprint* is over 23% larger than what the planet can regenerate. In other words, it now takes more than one year and two months for the Earth to regenerate what we use in a single year. We maintain this *overshoot* by liquidating the planet’s ecological resources.⁴⁵