

Explanation of the impacts corresponding to the various categories of a comparable LCA:

Acidification is caused by the release of acid gases, mostly from the burning of fossil fuels. Acid rain is a major problem wherever the soils are naturally acidic. The acids dissolve aluminum and other metals from soils to the level at which they become toxic to plants and to aquatic organisms. Acidic rain dissolves cement and minerals in the built environment.

Climate Change/Global Warming: refers to the addition of greenhouse gases to the atmosphere through burning of fossil fuels, agricultural practices and certain industrial practices leads to major changes in the earth's climate system. The overall temperature of the earth rises, more energy goes into storm systems, and desertification increases and at the range of tropical diseases increases. Arctic and Antarctic areas are significantly affected, leading to the melting of the polar ice caps and major changes in the marine ecologies.

Ecological toxicity refers to the effects of toxic substances on plants, animals and other biota in the natural environment. A typical method to measure ecotoxicity is exposing organisms to a chemical and determining how much of the chemical is required to kill the organisms.

Habitat alteration refers to the physical modification of habitat. Natural ecosystems are destroyed to provide for agriculture, roads and urban growth. Habitat alteration is the primary cause of the loss of biodiversity on the planet.

Human toxicity refers to the release of substances into the environment that have toxic effects on human health. Some of the health impacts are cancer causing (carcinogenic) and damage human health in other ways. In order for damage to occur, a person must be exposed to the substance, the substance must be assimilated in the person's body and the received dose to the individual must exceed the body's ability to detoxify it. Potential toxic effects from exposure to industrial and natural substances can include transient irritation, permanent disability and/or death.

Indoor air pollution Indoor air pollution can have significant health effects. U.S. EPA studies of human exposure to air pollutants indicate that indoor levels of pollutants (such as volatile organic compounds (VOC's)) may be 2-5 times, and occasionally more than 100 times, higher than outdoor levels. These levels of indoor air pollutants may be of particular concern because most people spend about 90% of their time indoors.

Photochemical smog is caused by the emissions of oxides of nitrogen and volatile organic substances generating ground level ozone in the presence of sunshine. Smog has a direct effect on human health, increasing the incidence of asthma. It also damages plants by reducing their ability to photosynthesize

Resource depletion refers to the elimination of resources by converting them to a form that is irrecoverable. The burning of fossil fuels is the most obvious form of resource depletion. One often separates resource depletion into depletion of fuels, minerals and water. Resource depletion is a function of the existing technologies for extraction and recycling, as well as the total amount of certain resources on the earth. With the exception of water depletion, resource depletion has no immediate effect on the ecosystem.

Stratospheric ozone depletion is caused by emissions of halogenated hydrocarbons such as Freon and other ozone depleting compounds. Ozone in the upper atmosphere is destroyed, leading to "ozone holes" in the high altitudes. The stratospheric ozone layer acts as a sunscreen as well as a greenhouse gas. Its loss increases the ultra-violet (UV) light falling on the earth leading to cancers and cataracts. The UV light also reduces the productivity of plants, affects marine algae and affects the biota in high latitudes. Loss of stratospheric ozone also affects the climate system in ways that are not fully understood.

Water Eutrophication is caused by the addition of excess nutrients to water leading to reduction of available oxygen in the water. Nitrogen and phosphorous compounds are primarily from municipal wastewater and agricultural discharges that enter surface waters. This results in algal blooms that lower the quantity of dissolved oxygen. When Eutrophication removes the oxygen from the water, it kills fish and other organisms. Harmful algal blooms such as red tides affect humans exposed to the toxic algae, or by eating shellfish that have consumed the toxic algae. An extreme example of this is the "dead zone" covering 20,000 square kilometers of the Gulf of Mexico.

Secondary impacts not directly addressed in the above 10 LCA Impact Categories:

Solid and Hazardous wastes measures the amount of *non-hazardous, mining* and *hazardous* waste generated by the entire supply chain to produce the final product. Damage to the environment by both of these wastes takes many forms: poisoning of groundwater from the leachate escaping through the lining of the municipal landfill and its leachate collection systems, global warming gases created by the decomposition of the materials in the landfill, toxification of the air by incineration and toxification of the water from the release of toxic metals from mining operations. Solid and hazardous wastes are measured in kilograms/unit produced and includes the solid and hazardous content of the final product as well as the per-product waste generated in the product life cycle chain of supply.