

Exhibit 4-1. Commonly Used Life Cycle Impact Categories

Impact Category	Scale	Examples of LCI Data (i.e. classification)	Common Possible Characterization Factor	Description of Characterization Factor
Global Warming	Global	Carbon Dioxide (CO ₂) Nitrogen Dioxide (NO ₂) Methane (CH ₄) Chlorofluorocarbons (CFCs) Hydrochlorofluorocarbons (HCFCs) Methyl Bromide (CH ₃ Br)	Global Warming Potential	Converts LCI data to carbon dioxide (CO ₂) equivalents Note: global warming potentials can be 50, 100, or 500 year potentials.
Stratospheric Ozone Depletion	Global	Chlorofluorocarbons (CFCs) Hydrochlorofluorocarbons (HCFCs) Halons Methyl Bromide (CH ₃ Br)	Ozone Depleting Potential	Converts LCI data to trichlorofluoromethane (CFC-11) equivalents.
Acidification	Regional Local	Sulfur Oxides (SO _x) Nitrogen Oxides (NO _x) Hydrochloric Acid (HCL) Hydroflouric Acid (HF) Ammonia (NH ₄)	Acidification Potential	Converts LCI data to hydrogen (H ⁺) ion equivalents.
Eutrophication	Local	Phosphate (PO ₄) Nitrogen Oxide (NO) Nitrogen Dioxide (NO ₂) Nitrates Ammonia (NH ₄)	Eutrophication Potential	Converts LCI data to phosphate (PO ₄) equivalents.
Photochemical Smog	Local	Non-methane hydrocarbon (NMHC)	Photochemical Oxident Creation Potential	Converts LCI data to ethane (C ₂ H ₆) equivalents.
Terrestrial Toxicity	Local	Toxic chemicals with a reported lethal concentration to rodents	LC ₅₀	Converts LC ₅₀ data to equivalents; uses multi-media modeling, exposure pathways.
Aquatic Toxicity	Local	Toxic chemicals with a reported lethal concentration to fish	LC ₅₀	Converts LC ₅₀ data to equivalents; uses multi-media modeling, exposure pathways.
Human Health	Global Regional Local	Total releases to air, water, and soil.	LC ₅₀	Converts LC ₅₀ data to equivalents; uses multi-media modeling, exposure pathways.
Resource Depletion	Global Regional Local	Quantity of minerals used Quantity of fossil fuels used	Resource Depletion Potential	Converts LCI data to a ratio of quantity of resource used versus quantity of resource left in reserve.
Land Use	Global Regional Local	Quantity disposed of in a landfill or other land modifications	Land Availability	Converts mass of solid waste into volume using an estimated density.
Water Use	Regional Local	Water used or consumed	Water Shortage Potential	Converts LCI data to a ratio of quantity of water used versus quantity of resource left in reserve.

Impact Categories and Associated Endpoints

The following is a list of several impact categories and endpoints that identify the impacts.

Global Impacts

Global Warming - polar melt, soil moisture loss, longer seasons, forest loss/change, and change in wind and ocean patterns.

Ozone Depletion - increased ultraviolet radiation.

Resource Depletion - decreased resources for future generations.

Regional Impacts

Photochemical Smog - "smog," decreased visibility, eye irritation, respiratory tract and lung irritation, and vegetation damage.

Acidification - building corrosion, water body acidification, vegetation effects, and soil effects.

Local Impacts

Human Health - increased morbidity and mortality.

Terrestrial Toxicity - decreased production and biodiversity and decreased wildlife for hunting or viewing.

Aquatic Toxicity - decreased aquatic plant and insect production and biodiversity and decreased commercial or recreational fishing.

Eutrophication – nutrients (phosphorous and nitrogen) enter water bodies, such as lakes, estuaries and slow-moving streams, causing excessive plant growth and oxygen depletion.

Land Use - loss of terrestrial habitat for wildlife and decreased landfill space.

Water Use - loss of available water from groundwater and surface water sources.