



# Standard Terminology for Sustainability Relative to the Performance of Buildings<sup>1</sup>

This standard is issued under the fixed designation E2114; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon ( $\epsilon$ ) indicates an editorial change since the last revision or reapproval.

## 1. Scope\*

1.1 This terminology<sup>2</sup> consists of terms and definitions pertaining to sustainable development and, in particular, to sustainability relative to the performance of buildings.

1.2 The purpose of this terminology is to provide meanings and explanations of terms applicable to sustainable development. In the interest of common understanding and standardization, consistent word usage is encouraged to help eliminate the major barrier to effective technical communication.

1.3 It is recommended that terms used only within an individual standard, and having a meaning unique to that standard, be defined or explained in the terminology section of that individual standard.

1.4 Certain standard definitions herein are adopted from other sources. Each is an exact copy. The source is identified at the right margin following the definition and is listed in Section 2.

1.5 Terms are listed in alphabetical sequence. Compound terms appear in the natural spoken order.

## 2. Referenced Documents

### 2.1 ASTM Standards:<sup>3</sup>

- D1356 Terminology Relating to Sampling and Analysis of Atmospheres
- E631 Terminology of Building Constructions
- E833 Terminology of Building Economics
- E943 Terminology Relating to Biological Effects and Environmental Fate
- E1705 Terminology Relating to Biotechnology

<sup>1</sup> This terminology is under the jurisdiction of ASTM Committee E60 on Sustainability and is the direct responsibility of Subcommittee E60.01 on Buildings and Construction.

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<sup>2</sup> Boldfaced terms are defined in this terminology.

<sup>3</sup> For referenced ASTM standards, visit the ASTM website, [www.astm.org](http://www.astm.org), or contact ASTM Customer Service at [service@astm.org](mailto:service@astm.org). For *Annual Book of ASTM Standards* volume information, refer to the standard's Document Summary page on the ASTM website.

### 2.2 ISO Standard:<sup>4</sup>

ISO 14040 Life Cycle Assessment—Principles and Framework

## 3. Terminology

### 3.1 Definitions:

**alternative agricultural products**, *n*—bio-based industrial products (non-food, non-feed) manufactured from agricultural materials and animal by-products.

*alternative energy*, *n*—see **renewable energy**.

**bioaccumulation**, *n*—the net accumulation of a substance by an organism as a result of uptake from all environmental sources. (E943)

**biobased products**, *n*—products fabricated from alternative agricultural materials and forestry materials, or both.

**biodegradable**, *adj*—capable of decomposing under natural conditions into elements found in nature.

**biodiversity**, *n*—the variability among living organisms from all sources including: terrestrial, marine, and other aquatic ecosystems and the ecological complexes of which they are a part; this includes diversity within species, between species and of ecosystems.

**biological control agents**, *n*—living organisms used to eliminate or regulate the population of other living organisms.

*biological diversity*, *n*—see **biodiversity**.

**biomagnification**, *n*—the increase in tissue concentration of poorly depurated materials in organisms along a series of predator-prey associations, primarily through the mechanism of dietary accumulation. (E943)

**biomass**, *n*—(1) All living material in a given area. (2) Any material which is or was a living organism or excreted from a microorganism.

DISCUSSION—It often refers to vegetation.

**building**, *n*—(1) A shelter comprising a partially or totally enclosed space, erected by means of a planned process of

<sup>4</sup> Available from American National Standards Institute (ANSI), 25 W. 43rd St., 4th Floor, New York, NY 10036, <http://www.ansi.org>.

forming and combining materials. (2) The act or process of constructing. **(E631)**

**building performance**, *n*—the behavior in service of construction as a whole, or of the building components. **(E631)**

**building related illness, BRI**, *n*—diagnosable illness of which cause and symptoms can be directly attributed to a specific pollutant source within a building (for example, Legionnaire's disease, hypersensitivity, pneumonitis). BRI differs from sick building syndrome (SBS) conditions because the symptoms of the disease persist after leaving the building, unlike SBS where the occupant experiences relief shortly after leaving the building.

**carrying capacity**, *n*—The theoretical maximum population of a biological organism that an ecosystem can sustain indefinitely.

DISCUSSION—While the existence of a carrying capacity for a given species in a given ecosystem is commonly recognized, the specific number or range established as the carrying capacity is often debated.

**cogeneration**, *n*—the simultaneous production of electrical or mechanical energy (power) and useful thermal energy from a single energy stream, such as oil, coal, natural or liquefied gas, biomass, or solar.

**compost**, *n*—the stable humus material that is produced from a composting process.

**composting**, *v*—the controlled biological decomposition of organic material in the presence of air to form a humus.

**contaminant**, *n*—a physical, chemical, biological, or radiological substance or matter that has an adverse effect on air, water, or soil.

**criterion**, *n*—an established precedent, rule, measure, norm, or code upon which a decision may be based. **(E631)**

**deconstruction**, *n*—disassembly of buildings for the purpose of recovering materials.

**ecological impact**, *n*—the effect that an activity has on living organisms, their non-living (abiotic) environment, and the ecosystem.

**ecological indicator**, *n*—a characteristic of an ecosystem that is related to, or derived from, a measure of biotic or abiotic variable, that can provide quantitative information on ecological structure and function.

DISCUSSION—An indicator can contribute to a measure of integrity and sustainability.

**ecosystem**, *n*—a community of biological organisms and their physical environment, functioning together as an interdependent unit within a defined area.

DISCUSSION—For the purposes of this definition, human, animals, plants, and microorganisms are individually all considered biological organisms.

**electromagnetic spectrum**, *n*—a continuum of electric and magnetic radiation, encompassing all wavelengths from electricity, radio and microwaves, at the low-frequency end to infrared, visible light, and ultraviolet light in the midrange, to X-rays and gamma rays at the high frequency end of the spectrum. (As defined by the Institute of Electrical

and Electronic Engineers, Inc. (IEEE),<sup>5</sup> the spectrum of electromagnetic radiation consists of gamma rays, wavelengths shorter than 0.0006 nm; X-rays, 0.0006–5 nm; ultraviolet rays, 5 nm–0.4 μm; visible light, 0.4–0.7 μm; infrared, 0.7 μm–0.1 mm; radio, greater than 0.1 mm.)

**embodied energy**, *n*—the energy used through the life cycle of a material or product to extract, refine, process, fabricate, transport, install, commission, utilize, maintain, remove, and ultimately recycle or dispose of the substances comprising the item.

DISCUSSION—The total energy which a product may be said to “contain,” including all energy used in, *inter alia*, growing, extracting, transporting, and manufacturing. The embodied energy of a structure or system includes the embodied energy of its components plus the energy used in construction.

**endangered species**, *n*—a species that is in danger of extinction throughout all or a significant portion of its habitat range, as determined by the governmental entity having jurisdiction.

**end-of-the-pipe technologies**, *n*—technologies that reduce emissions of pollutants after they have formed.

DISCUSSION—An example is scrubbers on a smokestack.

**energy recovery**, *n*—obtaining usable energy by consuming waste through a variety of processes.

**environmental indicator**, *n*—a measurement, statistic or value that provides a proximate gauge or evidence of the effects of environmental management programs or of the state or condition of the environment in a given area.

**exotic species**, *n*—an introduced species not native or indigenous to the area where it is found.

**exposure**, *n*—contact with a physical, chemical, biological, or radiological agent.

**flush out**, *v*—the process of reducing or removing volatile organic compounds (VOCs) and other airborne contaminants from a building.

**green building**, *n*—a building that provides the specified building performance requirements while minimizing disturbance to and improving the functioning of local, regional, and global ecosystems both during and after its construction and specified service life.

DISCUSSION—A green building optimizes efficiencies in resource management and operational performance; and, minimizes risks to human health and the environment.

**habitat**, *n*—the place where a population of organisms lives and their surroundings, both living and non-living.

**habitat indicator**, *n*—a physical attribute of the environment measured to characterize conditions necessary to support an organism, population, or community.

**hazard**, *n*—the adverse effect(s) that may result from exposure(s). **(E943)**

*heat island effect*, *n*—see **urban heat island**.

<sup>5</sup> Available from Institute of Electrical and Electronics Engineers, Inc. (IEEE), 445 Hoes Ln., P.O. Box 1331, Piscataway, NJ 08854-1331, <http://www.ieee.org>.

**indicator, *n***—quantitative value or qualitative information derived from a set of parameters that provides information about the state of a phenomenon.

DISCUSSION—It is used for reference or comparative purposes for decision-making at a specified level.

**indigenous species, *n***—a species that is likely, due to historical presence, to occur at a specified site for some portion of its life span. (E943)

DISCUSSION—An indigenous species is one having originated in and being produced, growing, living, or occurring naturally in a particular region or environment as opposed to cultivated, domesticated, or exotic.

**indoor air pollution, *n***—the level of air pollution in an enclosed environment.

DISCUSSION—Based on the definition of air pollution in Terminology D1356, indoor air pollution relates to the levels of unwanted material in the air.

**indoor air quality, IAQ, *n***—the composition and characteristics of the air in an enclosed space that affect the occupants of that space.

DISCUSSION—The indoor air quality of a space refers to the relative quality of air in a building with respect to contaminants and hazards and is determined by the level of indoor air pollution and other characteristics of the air, including those that impact thermal comfort such as air temperature, relative humidity, and air speed.

**indoor environmental quality, IEQ, *n***—the condition or state of the indoor environment.

DISCUSSION—Aspects of IEQ include but are not limited to characteristics of the thermal, air, luminous and acoustic environment. Primary areas of concern in considering the IEQ usually relate to the health, comfort and productivity of the occupants within the indoor environment, but may also relate to potential damage to property, such as sensitive equipment or artifacts.

**integrated pest management, IPM, *n***—(1) The judicious use and integration of various pest control tactics of the associated environment of the pest in ways that complement and facilitate the biological and other natural controls of pests to meet economic, public health, and environmental goals. (2) An environmentally sound system of controlling landscape pests, which includes understanding of the pest's life cycle and well-timed non-toxic treatments.

**invasive species, *n***—an exotic species that alters the native ecosystem and negatively impacts native species, resulting in habitat loss, water-table modification, or other disruptions.

DISCUSSION—Typically the exotic species adapt to conducive or similar growing conditions as those found in the region from which it was exported. Because such a species usually has no natural enemies (pests, diseases, or grazers), it flourishes so strongly that the disruption readily occurs.

**key species, *n***—a species of special concern for ecological reasons. (E943)

**life-cycle, *n***—(1) in *economic impact management*, the length

of time over which an investment is analyzed. (E833)

(2) in *environmental impact management*, consecutive and interlinked stages of a product system, from raw material acquisition or generation from natural resources to final disposal. (ISO 14040)

DISCUSSION—Refer to the distinction between life-cycle assessment (LCA) and life-cycle cost (LCC) method.

**life-cycle assessment, LCA, *n***—a method of evaluating a product by reviewing the ecological impact over the life of the product.

DISCUSSION—At each stage, the product and its components are evaluated based upon materials and energy consumed, and the pollution and waste produced. Life stages include extraction of raw materials, processing and fabrication, transportation, installation, use and maintenance, and reuse/recycling/disposal. ISO 14040 defines LCA as the compilation and evaluation of the inputs, outputs and the potential environmental impacts of a product system throughout its life cycle.

**life-cycle cost (LCC) method, *n***—a technique of economic evaluation that sums over a given study period the costs of initial investment (less resale value), replacements, operations (including energy use), and maintenance and repair of an investment decision (expressed in present or annual value terms).

DISCUSSION—LCC method is distinct from LCA in that LCA is an environmental review methodology and LCC method is an economic review methodology.

**microclimate, *n***—uniform localized climate conditions within a given area.

**multiple chemical sensitivity, MCS, *n***—a diagnostic label for people who suffer multi-symptom illnesses as a result of contact with, or proximity to, a variety of airborne agents and other substances.

**native species, *n***—(1) A species that is indigenous in a specified area for all or part of its life span. (2) A plant whose presence and survival in a specific region is not due to human intervention.

DISCUSSION—Certain experts argue that plants imported to a region by prehistoric peoples should be considered native. The term for plants which are imported and then adapt to survive without human cultivation is “naturalized.”

**non-point sources, *n***—diffuse pollution sources (that is, without a single point of origin or not introduced into a receiving stream from a specific outlet).

DISCUSSION—Water pollutants are generally carried off the land by storm water. Common non-point sources are agriculture, forestry, urban, mining, construction, dams, channels, land disposal, saltwater intrusion, and city streets. Air pollution from non-point sources include automobile exhaust.

**non-renewable resource, *n***—resource that exists in a fixed amount that cannot be replenished on a human time scale.

DISCUSSION—Non-renewable resources have the potential for renewal only by geological, physical, and chemical processes taking place over

hundreds of millions of years. Non-renewable resources exist in various places in the earth's crust. Examples include: iron ore, coal, and oil.

*offgas*, *v*—see **outgas**.

**outgas**, *v*—a process of evaporation or chemical decomposition through which vapors are released from materials.

**perpetual resource**, *n*—a resource that is virtually inexhaustible on a human time scale.

DISCUSSION—Examples include solar energy, tidal energy, and wind energy.

**point source**, *n*—a single, stationary location or fixed facility from which pollutants are discharged; any single identifiable source of pollution.

**post-consumer**, *adj*—refers to materials that are reclaimed from products that have already served their intended end-use as consumer item.

DISCUSSION—Waste from industrial processes are not considered post-consumer. Post-consumer materials are a subset of recovered materials.

**pre-consumer**, *adj*—refers to materials that are reclaimed from manufacturing and other industrial processes, and products which have not served their intended end-use as a consumer item.

DISCUSSION—Pre-consumer materials include: culls, trimmed materials, print overruns, overissue publications, and obsolete inventories.

**rainwater harvesting**, *n*—the practice of collecting, storing, and using precipitation from a catchment area such as a roof.

**recovered materials**, *n*—waste material and by-products which have been recovered or diverted from the waste stream, but such term does not include those materials and by-products generated from, and commonly used within, an original manufacturer process.

**recycle**, *v*—recovering or reprocessing materials for use in the form of raw materials in the manufacture of new products other than fuel for producing heat or power by combustion.

**recycled content products**, *n*—products that contain pre-consumer or post-consumer materials as all or part of their feedstock.

**renewable energy**, *n*—energy obtained from renewable or perpetual resources, including wind, solar, ocean (including tidal, wave, current, and thermal), geothermal, biomass, and hydroelectric energy resources.

DISCUSSION—Adapted from the definition of *renewable energy resources* in Terminology E1705.

**renewable resource**, *n*—a resource that is grown, naturally replenished or replaced at a rate that exceeds depletion of the useable supply of that resource.

DISCUSSION—A renewable resource can be exhausted if improperly managed. However, a renewable resource can last indefinitely with proper stewardship. Examples include: trees in forests, grasses in grasslands, and fertile soil.

**reuse**, *v*—using a material, product or component of the waste stream in its original form more than once.

**sick building syndrome**, **SBS**, *n*—condition in which a

building's occupants experience health or comfort effects, or both, that appear to be linked to time spent therein, but where no specific illness or cause can be identified. Condition may be localized in a particular room or zone, or may spread throughout the building.

**sink**, *n*—as used in reference to indoor air quality, refers to a surface or material which absorbs, stores and releases energy or matter.

DISCUSSION—In regard to air, sinks are surfaces which tend to capture VOCs and other contaminants from the air and then release them later. Carpets, gypsum board, ceiling tile, and upholstery may all be sinks. In regard to energy, sinks are masses that absorb heat and release the energy later. Trombe walls are heat sinks.

*sustainable building*, *n*—see **green building**.

**sustainable communities**, *n*—communities that are founded in sustainable development practices.

**sustainable development**, *n*—development that meets the needs of the present without compromising the ability of future generations to meet their own needs.

**sustainability**, *n*—the maintenance of ecosystem components and functions for future generations.

**threatened species**, *n*—a species that is likely to become endangered within the foreseeable future throughout all or a significant portion of its habitat as determined by the governmental entity have jurisdiction.

**toxicity**, *n*—the property of a material, or combination of materials, to adversely affect organisms, tissues, or cells.

(E943)

**urban heat island**, *n*—an urban area that, due to denuded landscape, impermeable surfaces, surfaces with low albedo, massive buildings, heat-generating cars and machines, and pollutants, is measurably hotter than surrounding rural areas.

**urban sprawl**, *n*—physical pattern of expansion of urban areas into rural or agricultural areas.

**Xeriscape**<sup>6</sup>, *n*—refers to water-efficient choices in planting and irrigation design. It refers to seven basic principles to conserve water and protect the environment, including: planning and designing; use of well-adapted plants; soil analysis; practical turf areas; use of mulches; appropriate maintenance; and efficient irrigation.

3.2 Abbreviations:

**BRI**, *n*—see **building related illness**.

**EMF**, *n*—electric and magnetic fields, see **electromagnetic spectrum**.

**IAQ**, *n*—see **indoor air quality**.

**IEQ**, *n*—see **indoor environmental quality**.

**IPM**, *n*—see **integrated pest management**.

**LCA**, *n*—see **life-cycle assessment**.

**MCS**, *n*—see **multiple chemical sensitivity**.

**SBS**, *n*—see **sick building syndrome**.

## 4. Keywords

4.1 building; building performance; definitions; sustainability; sustainable development; terminology

<sup>6</sup> The term "Xeriscape" and the Xeriscape logo are trademarks of the National Xeriscape Council, Inc., P.O. Box 767936, Roswell, GA 30076.

## SUMMARY OF CHANGES

Committee E06 has identified the location of selected changes to this standard since the last issue (E2114 – 06a) that may impact its use. (Approved Nov. 1, 2008.)

(I) Revised definition for **renewable energy**.

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