

	SURFACE VEHICLE RECOMMENDED PRACTICE	 J2965 JUN2013
		Issued 2013-06
Glossary of Terms in Use in Green Innovation and Sustainable Practices in the Automotive Industry		

RATIONALE

This document has been developed as an initial effort to provide terms and definitions of interest to the automotive industry for the Green Technology Steering Committee and other interested committees at SAE International. There is no existing document that references terms and definitions for green technology and sustainability in the automotive industry.

FOREWORD

This document is an ongoing effort to provide the technical community with terminology used most frequently in the automotive industry for technology and practices that can be considered green and sustainable. Since some of the terminology may have broad application, in the case of more than one definition, all will be included if they are applicable to the auto sector and/or geographically specific in regulatory or legal terms. Concepts described in this document are evolving as green and sustainable practices develop and mature. In some cases, concepts can be conflicting or data gathering and analysis may not be complete or provide a total picture of a process or product. It anticipated that this Glossary will be ever-green and address such issues as practices become universal and standardized.

1. SCOPE

1.1 PURPOSE

Develop terminology and definitions specifically for the automotive industry that defines greener and more sustainable materials and practices. The document will provide information and context for how and where the terms are used in the auto sector. In some cases, there may be more than one definition provided as some terms have different meanings in different countries.

1.2 FIELD OF APPLICATION

This SAE Information Report pertains to the broad area of sustainable technologies and practices of particular interest to the automotive industry, and also includes the concepts of green chemistry and engineering.

1.3 PRODUCT CLASSIFICATION

Information Report

1.4 PRODUCT DESCRIPTION

The SAE Information Report contains commonly used terms in sustainability and green technology relevant to the automotive industry

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2. REFERENCES

2.1 Applicable references, citations, and publications

The following references, citations, and publications form a part of this specification to the extent specified herein. Unless otherwise indicated, the latest versions shall apply.

2.1.1 US Federal and State Government

2.1.1.1 California Air Resources Board, California Environmental Protection Agency, 1001 I St., P.O. Box 2815, Sacramento, CA 95812, Tel. 916-322-2990, <http://www.arb.ca.gov>, <http://www.arb.ca.gov/msprog/levprog/levprog.htm>, <http://driveclean.ca.gov>

2.1.1.1.1 California 2015 and Subsequent Model Criteria Pollutant Exhaust Emission Standards and Test Procedures and 2017 and Subsequent Model Greenhouse Gas Exhaust Emission Standards and Test Procedures for Passenger Cars, Light Duty Trucks, and Medium Duty Vehicles," as of December 31, 2012 (last amended December 6, 2012) incorporated by reference in Section 1961.2(d), Title 13, CCR

2.1.1.2 Consumer Product Consumer Product Safety Commission: Federal Hazardous Substances Act; <http://www.cpsc.gov/>, <http://www.cpsc.gov/BUSINFO/regsumfhhsa.pdf>

2.1.1.3 Code of Federal Regulations (CFR) 40 Definition of Solid Waste Compendium

2.1.1.4 Department of Agriculture, BioPreferred Program <http://www.biopreferred.gov/>

2.1.1.5 Department of Energy <http://www1.eere.energy.gov/biomass/glossary.html>

2.1.1.6 Department of Interior, Bureau of Reclamation <http://www.usbr.gov>

2.1.1.7 Environmental Protection Agency: Ariel Rios Building, 1200 Pennsylvania Ave. N.W., Washington DC 20460, Tel. 202-272-0167; <http://www.epa.gov>

2.1.1.7.1 EPA Design for the Environment

http://www.epa.gov/dfe/alternative_assessments.html,

http://www.epa.gov/dfe/multimedia/recognizedforsaferchemistry/dfe_video_popup.html

<http://www.epa.gov/OCEPAterms/cterm.html>

2.1.1.7.2 EPA Green Chemistry; <http://www.epa.gov/greenchemistry/>

2.1.1.7.3 EPA Green House Gas Emissions: <http://www.epa.gov/climatechange/emissions/index.html>

2.1.1.7.4 EPA Green Vehicle Guide

Available from Compliance and Innovation Strategies Division, National Vehicle and Fuel Emissions Laboratory, 2000 Traverwood Drive, Ann Arbor, MI 48105, Tel. 734-214-4200, <http://www.epa.gov>

2.1.1.7.5 EPA Life Cycle Assessment <http://www.epa.gov/nrmrl/std/lca/lca.html>

2.1.1.7.6 EPA Toxic Substances Control Act <http://www.epa.gov/oppt/newchems/pubs/mixtures.txt>

2.1.1.7.7 EPA Solid Waste <http://www.epa.gov/osw/hazard/dsw/compendium.htm>

<http://www.epa.gov/osw/index.htm>

<http://www.epa.gov/osw/nonhaz/index.htm>

- 2.1.1.7.8 EPA Ozone Depleting Compounds: <http://www.epa.gov/ozone/science/ods/>
- 2.1.1.8 Federal Trade Commission 600 Pennsylvania Ave. N.W., Washington DC 20580, Tel. 202-326-2222, <http://www.ftc.gov>
- 2.1.1.8.1 FTC Green Guides http://www.ftc.gov/bcp/edu/microsites/energy/about_guides.shtml
- 2.1.1.9 General Services Administration <http://www.gsa.gov/portal/category/100000>
- 2.1.1.10 Occupational Safety and Health Administration (OSHA)
<http://www.osha.gov/dsg/hazcom/ghs.html>
- 2.1.2 International Governments and Organizations
- 2.1.2.1 Canadian Government <http://www.biobasics.gc.ca/english/view.asp?x=790>
- 2.1.2.2 British Columbia's Ministry of Environment; <http://www.env.gov.bc.ca/cas/resources/glossary.html>
- 2.1.2.3 European Commission, Environment DG, B-1049 Brussels, Belgium Tel. 00 800 6 7 91011
<http://eur-lex.europa.eu>
<http://europa.eu>
http://europa.eu/legislation_summaries/index_en.htm
- 2.1.2.4 European Parliament and Council on the Restrictions of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment (COM(2008)0809-66-0471/2008-2008/0242(COD))
- 2.1.2.5 European Union (EU)
- 2.1.2.5.1 Directive 2000/53/EC of the European Parliament and of the Council on end-of life vehicles, Art. 2.1. and 2.2.
- 2.1.2.5.2 Directive 70/156/EEC, Directive 92/61/EEC, and Directive 75/442/EEC;
- 2.1.2.6 International Agency for Research on Cancer <http://www.iarc.fr/>
- 2.1.2.7 United Nations
- 2.1.2.7.1 Brundtland Commission, formally the World Commission on Environment and Development, 1987
- 2.1.2.7.2 United Nations Environment Programme; <http://www.unep.org/climateneutral/About/tabid/95/Default.aspx>
- 2.1.2.7.3 United Nations Economic Commission for Europe (ECOSOC) Committee of Experts on the Transport of Dangerous Goods (TDG) and on the Globally Harmonized System for Classification and Labelling of Chemicals (GHS)
<http://www.unece.org/trans/main/dgdb/dgcomm/ac10rep.html>
http://www.unece.org/trans/danger/publi/ghs/ghs_rev04/04files_e.html
- 2.2 Other Related References, Citations, and Publications
- 2.2.1 American Chemical Society Publication <http://www.acs.org>

Available from ACS 1155 16th St., Washington D.C. 20036, Tel: 800-333-9511, Anastas, P.T. and Zimmerman, J.B., "Design through the Twelve Principles of Green Engineering", Environmental Science & Technology, 37,5,94A-101A, 2003

2.2.2 American Chemistry Council Publication

Available from American Chemistry Council 700 2nd St. NE, Washington D.C. 20002 Tel: 202-249-7000 "2009 Chemistry and Light Vehicle Report"

2.2.3 Answers <http://www.answers.com/topic/natural-fiber-1>

2.2.4 Consumer Reports Eco-Label Center:

<http://www.greenerchoices.org/eco-labels/eco-home.cfm?redirect=1>

2.2.5 Cornell Law School <http://www.law.cornell.edu>

2.2.6 Forum for the Future <http://www.forumforthefuture.org>

2.2.7 Free Dictionary <http://encyclopedia2.thefreedictionary.com/thermoset>

2.2.8 Global Automotive Substances List <http://www.gadsl.org/>

2.2.9 Green Technology <http://www.green-technology.org>

2.2.10 Greener Cars <http://www.greencars.org>

2.2.11 International Material Data System <http://www.mdsystem.com>

2.2.12 International Standards Organization Publications <http://www.iso.org/iso/home.html>

ISO Publications Available from ISO at 1, ch. de la Voie-Creuse, CP 56, CH-1211 Geneva 20, Switzerland Tel: +41 22 749 01 11,

ISO/CD 14067 carbon footprint ISO/WD TR 14069GHG standard ISO 14021

2.2.13 International Chemical Secretariat, Box 7005, 402 31 Goteberg, Sweden

<http://www.chemsec.org/list/sin-database>

2.2.14 Investopedia <http://www.investopedia.com>

2.2.15 Kirk-Othmer Encyclopedia of Chemical Technology: Biobased Materials section by Mary Ann Curran/U.S. EPA that was published online on 12 MAR 2010 (DOI: 10.1002/0471238961.biobcurr.a01)

<http://onlinelibrary.wiley.com/doi/10.1002/0471238961.biobcurr.a01/full>

2.2.16 McDonough Braungart Design Chemistry (MBDC) <http://www.mbdc.com/c2c/>

2.2.17 Online Dictionary

Available from Wordnik 195 E. 4th St., 2nd Floor, San Mateo, CA 94010 <http://www.wordnik.com>

2.2.18 Oxford University Press Publication

Available from Oxford University Press 198 Madison Avenue, New York, NY 10016 Phone: 212-726-6000 Anastas, P.T. and Warner, J.C., "Green Chemistry: Theory and Practice" 1998

2.2.19 Plastics Engineering Handbook

Available from Society of the Plastics Industry 1667 K St. NW, Suite 1000, Washington D.C., 2006, Tel: 202-974-5002

2.2.20 Prentice Hall Publication

Brent Strong (2006). Plastics: Materials and Processing, Third Edition. New Jersey: Pearson Education

2.2.21 Sustainability Dictionary: <http://www.sustainabilitydictionary.com>

2.2.22 SAE Publication

Beattie, P., Henry, C. J., and Bradburn, J. "SAE's Green Technology Systems Group: Focus on Environmental Sustainability for the Automotive Industry, SAE Publications 2011-01-1258

2.2.23 Environmental Trade-offs: <http://certifiablygreenblog.com/?p=1324>

<http://economics.socialsciencedictionary.com/Environmental-Economics-Dictionary/Trade-Off>

2.2.24 UK Carbon Trust <http://www.carbontrust.com/home>

2.2.25 Underwriter's Laboratory, now known as UL <http://www.ul.com>

2.2.26 Windows to the Universe <http://www.windows2universe.org>

2.2.27 Warner Babcock Institute <http://www.warnerbabcock.com>

2.2.28 Zero Waste Strategy: http://www.zerowaste.org/case.htm#what_about

3. GLOSSARY OF TERMS

3.1 ALTERNATIVE ASSESSMENT

Alternative assessment has been defined by EPA to provide a basis for informed decision making by developing an in-depth comparison of potential human health and environmental impacts. This assessment provides the industry with the information needed to choose safer chemicals, as well as avoid unintended consequences of changing to a poorly understood substitute.

3.2 ARTICLE

An article is an object during production given a special shape, surface or design that determines its function to a greater degree than its chemical composition. Examples of articles are steering wheel, door handle, and plastic packaging. This is the definition from the European Union REACH legislation and is similar to that of OSHA and EPA.

3.3 BIOBASED

Commercial or industrial products (other than food or feed) that are composed, in whole or in part, of biological products, renewable agricultural materials (including plant, animal, and marine materials) or forestry materials. The term "biobased materials" should not be confused with "bio-materials," which is used to describe bio-compatible materials used in and adapted to medical applications. Test method ASTM 6866 has been developed to determine the carbon content of biobased content of solid, liquid and gaseous samples using radiocarbon analysis. This test method is used in the USDA BioPreferred Program to verify/validate biobased products. Although "biobased" is not synonymous with "biodegradable," some biobased materials can be designed to biodegrade. One example is polyhydroxy-alkanoates (PHA), which can be degraded in biological media. Some automotive manufacturers are conducting extensive research to try to develop materials that will biodegrade at the end of the vehicle's life.

3.4 BIOCOMPOSITE

Biocomposites are made by combining biobased components with other materials in which either the polymer matrix, the fiber reinforcement, or both come from a natural source.

3.5 BIODEGRADABLE

The Federal Trade Commission defines biodegradable materials as those materials that break down and decompose into elements found in nature when they are exposed to air, moisture, and bacteria or other organisms and that the materials will break down and return to nature within a reasonably short time after customary disposal. Degradable/biodegradable/photodegradable as defined by the Federal Trade Commission requires a claim that a product or package is degradable, biodegradable or photodegradable should be substantiated by competent and reliable scientific evidence that the entire product or package will completely break down and return to nature, i.e., decompose into elements found in nature within a reasonably short period of time after customary disposal. Claims of degradability, biodegradability or photodegradability should be qualified to the extent necessary to avoid consumer deception about:

- (1) The product or package's ability to degrade in the environment where it is customarily disposed; and
- (2) The rate and extent of degradation.

In contrast to the general meaning above there are precise meanings given by different standards bodies.

European Standard EN13432,
Japanese Greenpla standard
Australian standard AS 4736-
2006
ISO 14855-1:2005
ASTM D6400-99

All of these standards define biodegradability in respect of a time period of 6 months and each of the named standards sets limits for the amounts of heavy metals that the material may contain.

3.6 BIOENERGY

Energy generated from renewable, biological sources (biomass) such as plants, to be used for heat, electricity, or vehicle fuel.

Any plant-derived organic matter. Biomass available for energy on a sustainable basis includes herbaceous and woody energy crops, agricultural food and feed crops, agricultural crop wastes and residues, wood wastes and residues, aquatic plants, and other waste materials including some municipal wastes. Biomass is a very heterogeneous and chemically complex renewable resource.

3.7 BIOMASS

Biomass is any organic, nonfossil matter available on a renewable or recurring basis (excluding old-growth timber). Biomass includes all biological organisms, dead or alive, and their metabolic by-products that have not been transformed by geological processes into substances such as coal or petroleum. Examples of biomass are forest and mill residues, agricultural crops and wastes, wood and wood wastes, animal wastes, livestock operation residues, aquatic plants, and some municipal and industrial wastes. Biomass also includes the animals that feed on plants (and other animals) as well as a variety of destruents—including bacteria and fungi—which transform plants, animals, and their organic wastes back into water and carbon dioxide (CO₂).

3.8 BIOPOLYMER

Polymers which are present in, or created by, living organisms. These include polymers from renewable resources that can be polymerized to create bioplastics.

3.9 CALIFORNIA VEHICLE EMISSION CATEGORIES

- Low-Emission Vehicle (LEV)
- Transitional Low-Emission Vehicle (TLEV)
- Ultra-Low-Emission Vehicle (ULEV)
- Super-Ultra-Low-Emission Vehicle (SULEV)
- Partial Zero Emission Vehicle (PZEV)
- Advanced Technology Partial Zero Emission Vehicle (AT PZEV)
- Zero Emission Vehicle (ZEV)

The California Air Resources Board (CARB) first adopted Low Emission Vehicle (LEV) standards in 1990. These LEV I standards were in effect from 1994 through 2003. LEV II regulations were in effect from 2004 through 2010.

The LEV standard created major emission categories, each with several targets available depending on vehicle weight and cargo capacity. Vehicles with a test weight up to 14,000 pounds (6,350 kg) were covered by the regulations. The major emission categories were, listed here in order of decreasing emissions:

3.10 TLEV

Transitional Low Emission Vehicle. Emissions rating within California's LEV 1 exhaust emission standards; phased out in 2004.

3.11 LEV 1 LEV

Low Emission Vehicle rating within California's LEV 1 exhaust emission standards. The LEV 1 emission standards apply to cars from 1994-2003. However some cars were still certified as LEV 1 LEVs after 2003.

3.12 LEV 2 LEV

A Low Emission Vehicle emissions rating within California's LEV 2 exhaust emission standards. The LEV 2 emission standards were adopted in 1998 and apply to cars from 2004-2019. However some cars were certified as LEV 2 LEVs before 2004.

3.13 LEV 1 ULEV

An Ultra Low Emission Vehicle is a vehicle emissions rating within California's LEV 1 exhaust emission standards. The LEV 1 emission standards apply to cars from 1994-2003. However some cars were still certified as LEV 1 LEVs after 2003.

3.14 LEV 2 ULEV

An Ultra Low Emission Vehicle emissions rating within California's LEV 2 exhaust emission standards. The LEV 2 emission standards were adopted in 1998 and apply to cars from 2004-2019. However some cars were certified as LEV 2 LEVs before 2004.

3.15 SULEV

Super Ultra Low Emission Vehicle is a vehicle emissions rating within California's LEV 2 exhaust emission standards that meets 0.03 grams per mile of non-methane organic gases and nitrogen oxides. The LEV 2 emission standards were adopted in 1998 and apply to cars from 2004-2019. However, some cars were certified as LEV 2 before 2004.