



THE MARK OF ENVIRONMENTAL RESPONSIBILITY

# GS-20

GREEN SEAL™ STANDARD FOR  
**ENVIRONMENTAL INNOVATION:  
PRODUCTS, SERVICES,  
PROCESSES, AND TECHNOLOGIES**

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Green Seal, Inc. • 1001 Connecticut Ave. NW, Ste 827 • Washington, DC USA 20036-5525  
(202) 872-6400 • FAX (202) 872-4324 • [www.greenseal.org](http://www.greenseal.org)

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## GREEN SEAL

Green Seal is a non-profit organization whose mission is to use science-based programs to empower consumers, purchasers, and companies to create a more sustainable world. Green Seal sets leadership standards that aim to reduce, to the extent technologically and economically feasible, the environmental, health, and social impacts throughout the life-cycle of products, services, and companies. The standards may be used for conformity assessment, purchaser specifications, and public education.

Green Seal offers certification of products, services, and companies in conformance with its standards. For additional information on Green Seal or any of its programs, contact:

Green Seal  
1001 Connecticut Avenue, NW, Suite 827  
Washington, DC 20036-5525  
(202) 872-6400 • FAX (202) 872-4324  
greenseal@greenseal.org  
www.greenseal.org

**GREEN SEAL STANDARD FOR ENVIRONMENTAL INNOVATION, GS-20**

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## FOREWORD

**Edition.** This version is Edition 1.0 from December 23, 2014.

**General.** The final issued standard was developed in an open and transparent process with stakeholder input that included producers, users, and general interests.

The requirements in the standard are based on an assessment of the environmental, health, or social impacts associated with the products, services, processes, or technologies covered in the scope of the standard. These requirements are subject to revision, and generally cover aspects above and beyond regulatory compliance. This standard neither modifies nor supersedes laws and regulations. Any conformity assessment to this standard requires compliance with all applicable laws and regulations for their manufacturing, provision, and marketing.

Provisions for safety have not been included in this standard, since they are supervised by regulatory agencies. Adequate safeguards for personnel and property should be employed for all stages of production, and for all tests that involve safety considerations.

Normative references (e.g., other standards) in this standard intend to refer to the most recent edition of the normative reference. Test methods may be required for product evaluation. Unless explicitly stated that a specified method is the only acceptable one, the intent of the standard is that an equivalent test method may be accepted at Green Seal's sole discretion.

Certification or validation based on this standard shall be awarded only by Green Seal, or, with Green Seal's explicit written permission, by a third-party certification program conducting on-site audits.

**Disclaimer of Liability.** Green Seal, as the developer of this standard, shall not incur any obligations or liability for any loss or damages, including, without limitation, indirect, consequential, special, or incidental damages, arising out of or in connection with the interpretation or adoption of, reliance upon, or any other use of this Standard by any party. Green Seal makes no express or implied warranty of merchantability or fitness for a particular purpose, nor any other express or implied warranty with respect to this Standard.

## ACRONYMS AND ABBREVIATIONS

**ISO.** International Organization for Standardization

**LCA.** Life Cycle Analysis

## GREEN SEAL STANDARD FOR ENVIRONMENTAL INNOVATION, GS-20

Green Seal believes that innovative approaches and breakthrough technologies are necessary in order to further our mission of increasing the sustainability of the economy. Environmentally innovative initiatives, which are not yet implemented widely in their market sector, can promote this goal, enabling necessary economic activities while improving human and environmental health. Credible verification of these benefits identifies these initiatives clearly so that they can be preferred over alternatives.

Many organizations have requested certification from Green Seal for various products, services, processes, and technologies they claim to be innovative or to provide environmental benefits. However, certification has not been possible for those products and services that are not included in the scope of Green Seal's existing standards. Many environmentally innovative initiatives cannot be recognized because credible, objective, and feasible frameworks are currently lacking. Although formal life-cycle analyses (LCAs) can sometimes provide this kind of recognition, they are complex and expensive, take a long time to complete, are challenging to do correctly, and are often not feasible due to lack of information or limited budgets. This Standard for Environmental Innovation is intended to fill that gap by providing a credible science-based framework for verifying the significant contributions to human and environmental health that are provided by these innovative products and services.

### 1.0 SCOPE

Green Seal's Standard for Environmental Innovation establishes a process for evaluating commercially available products, services, technologies, or processes<sup>1</sup>, comparing them with mainstream offerings that provide the same function, and verifying that they provide significant overall environmental benefits<sup>2</sup>. This verification is based on a multi-attribute evaluation of environmental aspects, which addresses both benefits and drawbacks across key life-cycle stages. Green Seal's third-party recognition will confirm that a product provides significant, non-trivial benefits for human and environmental health compared to most other products in its class.

Recognition of products under this Standard is intended for significant benefits that do not cause transference of environmental burdens to another life-cycle stage or environmental attribute, unless it is clearly shown that significant overall benefits are achieved.

Two types of recognition are available from Green Seal under this Standard:

1. Innovative initiatives may be granted Certification to this Standard.
2. Initiatives that are not considered innovative may receive a Validation<sup>3</sup> of their specific environmental benefits using the framework defined by this Standard.

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<sup>1</sup> For simplicity, the use of the terms "product" or "initiative" in this Standard refer to products, services, technologies, and processes.

<sup>2</sup> For simplicity, the use of the term "environmental" refers to effects on both human health and the environment. Moreover, the term "benefits" is meant in a relative sense compared to other initiatives that provide the same function and have greater environmental impacts.

<sup>3</sup> This is a Validation of specific benefits claimed by the applicant, and does not constitute a Certification.

The environmental and human health impacts will be assessed across multiple attributes for the key stages of the life-cycle of each product. These will then be compared to the equivalent impacts from other products that provide the same function. The reduced impacts on human health and the environment will be considered against the major tradeoffs that may arise, to ensure that the net environmental benefits are significant.

The intent is not to conduct an exhaustive quantitative Life Cycle Analysis, but rather to use a feasible, cost-effective approach identifying the key environmental issues associated with a product, compared with other products that perform the same function. The benefits will be compared based on objective and verified scientific information. The transparency of the certification will be ensured by publishing explicitly all key aspects that were considered, the assumptions that were included, and the requirements that were used in the evaluation. Data that are specific to each individual application will remain confidential.

Environmental benefits<sup>4</sup> may include:

- Improved performance or increased environmental value that is achieved in a way that is unusual for the market category.
- Improved technical or environmental efficiency of a product, either providing the same value with fewer resources or less environmental impact, or providing more value, quantity, or output with the same resources and impacts. Also included are innovations that enable users to achieve things that were not previously possible.
- Alternatives to existing practice that avoid, reduce, or eliminate hazards to human health and environment, reduce the use of limited resources (e.g., energy, water, land), or reduce or eliminate waste and pollution discharges.
- Converting waste materials into valuable resources, or creating a useful resource in a way that is different from common practice.
- Combining technologies or processes in innovative ways in order to solve a problem without increasing environmental impacts.

**Outside the scope of this certification:**

- Full verification of the performance of a technology or proof of concept.
- Comparisons that are too complex, or for which there is insufficient information.
- Recognition of products that are excessively hazardous to human health or the environment.
- Safety benefits

**Limitations of the Scope:** This Standard is limited to products that are commercially available and not covered by existing Green Seal standards or by other Type I Ecolabel standards available in the United States.

Green Seal has sole discretion over what is to be certified or validated, and over decisions regarding conformance to the requirements of this Standard. Green Seal reserves the right to decline certification for any reason, such as benefits that are unclear or insignificant, the existence of significant environmental hazards, complexity of the evaluation, etc.

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<sup>4</sup> These considerations are detailed in Section 2.0.

## 2.0 REQUIREMENTS

Applications must meet all requirements in sections 2.1 – 2.4 to be certified for Environmental Innovation. Applications that meet the requirements in section 2.1, 2.3, and 2.4, but do not meet 2.2, cannot be certified for Environmental Innovation, but their environmental benefits can be validated by Green Seal.

Two main types of environmental benefits are possible for evaluating the application: either providing significant environmental improvements for a baseline level of performance, or providing significant improvement in performance for a baseline level of environmental impact. Each of these is specified in the requirements listed below.

### 2.1 Prerequisites

The applicant shall comply with all legal requirements (laws, regulations, etc.) relevant to the product/service, and all environmental, labor, and safety legal requirements<sup>5</sup>.

### 2.2 Evaluation: Environmental Innovation

Innovation is finding a better way of doing something by developing more effective products, services, processes, or technologies<sup>6</sup> that are readily available to society. Environmentally innovative products are those that provide enhanced functional or environmental value, and are not yet implemented widely in their market sector. Innovative initiatives can include new, groundbreaking developments, as well as significant improvements to existing practice.

**2.2.1** In order for a product to be considered innovative, it must demonstrate significant achievements under at least one of the following categories:

**2.2.1.1 Unusual for the Market Category** – creating increased value for better performance or environmental impacts, in ways that are different from common practice in a specific market category.

**2.2.1.2 Technical or Environmental Efficiency** – increasing the efficiency of a product, either providing the same value with fewer resources or less environmental impact, or providing more value, quantity, or output with the same resources and impacts. These also include innovations that enable users to do things that were not possible previously.

**2.2.1.3 Beneficial Alternatives to Existing Practice** – avoiding, reducing, or eliminating hazards to human health and environment, reducing the use of limited resources (energy, water, land, etc.), reducing or eliminating waste and pollution, etc.

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<sup>5</sup> A Declaration to this effect will be required from the applicant.

<sup>6</sup> For simplicity, the use of the terms “product” or “initiative” refers to products, services, technologies, and processes.

**2.2.1.4 Waste to Resource** – converting a waste material into a valuable resource, or creating a useful resource in a way that is different from common practice.

**2.2.1.5 Combining Technologies or Processes** in an innovative way in order to solve a problem without increasing environmental impacts, even if the technologies or processes being combined are themselves not unique or innovative.

**2.2.2** A product can be considered innovative if the applicant can demonstrate that it is not implemented widely in the market sector. This threshold of implementation will be established on a case-by-case basis, since it will vary for different categories of products.

### **2.3 Evaluation: Functional Performance / Fitness for Purpose**

**2.3.1** The product shall be commercially available, with established business applications, results, and customers.

**2.3.2** Using well established methods, the key performance aspects of the product shall be compared with other products that provide the same function and are available on the market.

**2.3.2.1** For an initiative claiming improved human health or environmental impacts for equivalent performance, the initiative shall demonstrate that it provides **equivalent** performance to others in its class:

- It shall meet existing performance standards for the product (for example, industry standards, American National Standards, ASTM, ISO, or others)  
OR
- It shall demonstrate equivalent performance compared to other products in the market that provide the same function, addressing the key performance aspects<sup>7</sup>.

**2.3.2.2** For an initiative claiming to deliver better performance for the same human health or environmental impact, the initiative shall demonstrate that it provides **significantly better** performance than others in its class.

- It shall significantly exceed existing performance standards for the product class (for example, industry standards, American National Standards, ASTM, ISO, or others)  
OR
- It shall show significantly better performance compared to other products in the market that provide the same function, addressing all key performance

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<sup>7</sup> The specifics of the comparison will be determined during the development of the specifications and based on common industry practice and existing performance standards.



aspects<sup>8</sup>. Actual specifications will be established on a case-by-case basis during Stage I of the evaluation process<sup>9</sup>, because changes that are considered significant will vary among categories. For quantitative measures, an expected baseline of 30% improvement for one key area, and 20% in each of two or more, will serve as a guideline. These values may be modified if a different value is shown to be more appropriate, taking into account circumstances that are specific to a product or category.

**2.3.3** If the product claims to provide innovative performance, the applicant shall demonstrate which existing achievement can be accomplished in a new way, or what can be accomplished that was not previously achievable or available.

## **2.4 Evaluation: Environmental<sup>10</sup> and Human Health Benefits**

The applicant shall demonstrate that the product provides significant net environmental benefits compared to other products that provide the same function when the key attributes are considered across the life-cycle of the product. The following requirements shall be documented:

**2.4.1** For environmental benefits that are new or that this technology has contributed, the applicant shall demonstrate which existing achievement can be accomplished in a new way, or what can be accomplished that was not previously achievable or available.

**2.4.2** The primary environmental and human health issues that are affected by the applicant product, and those affected by the comparison products. These issues shall be identified based on a multi-attribute, life-cycle evaluation following the principles in §4.1 “Principles of LCA” in ISO 14040 (see Appendix 3: ISO Standards).<sup>11</sup>

**2.4.3** Any differences in primary environmental issues between the product and other products that perform the same function.

**2.4.4** For the primary aspects identified in (2.4.2), the significant environmental benefits achieved (if the product provides equivalent function), or any overall burden that is added (if the product delivers improved function).

**2.4.5** Any increases in environmental or human health burdens that this technology may incur, and evidence that the overall benefits outweigh the burdens significantly.

**2.4.6** Environmental benefits may be considered significant if any of the following can be shown:

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<sup>8</sup> The specifics of the comparison will be determined during the development of the specifications and based on common industry practice and existing performance standards.

<sup>9</sup> See Section 3.1.

<sup>10</sup> For simplicity, the use of the term “environmental” refers to effects on both human health and the environment.

<sup>11</sup> A framework will be developed for each case according to the guidelines of ISO 14001:2004 Appendix A.3.1, ISO 14044:2006 Appendix B, or a similar standard. See ANALYSIS MATRIX in Annex 1.

**2.4.6.1** For quantitative measures, an expected baseline of 30% improvement for one key area, or 20% in each of two or more key areas, will serve as a guideline. These values may be modified if a different value is shown to be more appropriate, taking into account circumstances that are specific to a category.

**2.4.6.2** Elimination of a significant hazard while providing the same function (for example, a hazardous chemical that is widely used as a functional ingredient, e.g., chlorine-based chemicals, corrosive chemicals, endocrine disruptors, probable carcinogens).

**2.4.6.3** Another qualitative measure of the benefits may be used, as appropriate for the sector, and taking into account circumstances specific to a category.

### **3.0 PROCESS OF EVALUATION**

#### **3.1 STAGE I: Establishing Criteria**

**3.1.1** Applicant submits request to Green Seal for Validation/Certification. The application shall include details about the product<sup>12</sup>, a comparison with other products that provide the same function, and substantiation for the claims of innovation and environmental benefits<sup>13</sup>.

**3.1.2** Green Seal reviews the information provided by the applicant and conducts additional research as needed. The results of this review will be reported to the applicant.

**3.1.3** Green Seal's Science & Standards Department develops specifications that are unique to each application, setting requirements to determine performance and any environmental benefits and drawbacks.

**3.1.4** These criteria are published for comment from any interested party for a relevant period.

**3.1.5** Green Seal presents the applicant with the evaluation process, the requirements to be met, and timetable; or declines to evaluate and provides an explanation.

#### **3.2 STAGE II: Reviewing Conformance to Criteria**

**3.2.1** Applicant provides all necessary information to demonstrate conformance to the requirements.

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<sup>12</sup> For simplicity, the use of the terms "product" or "initiative" refer to products, services, technologies and processes.

<sup>13</sup> Requirements for applications are listed in Annex 2.

**3.2.2** Green Seal's Certification Department reviews the information and determines whether the established specifications for Certification/Validation have been met.

**3.2.3** Certification is issued to the applicant, with a Statement of Basis for Certification and the requirements that were evaluated during the review. Each Certification, the specifications, and any assumptions will also be published on Green Seal's website, detailing the requirements that were met by the product. For products that are not innovative, a Validation of specific benefits is issued instead of Certification.

**3.2.4** All supporting information presented to Green Seal by the applicant for the application and for the review will remain confidential, unless approved in writing for disclosure by the applicant. The specifications, the assumptions made during the evaluation process, and general identifying information about the product will be made public.

### **3.3 Ongoing Recognition**

**3.3.1** Green Seal will conduct periodic reviews of the specifications developed for the product to ensure that it (1) continues to provide significant environmental/functional benefits and innovation compared to products that provide the same function, and (2) has not become mainstream.

**3.3.2** If the review determines that the product no longer provides significant environmental benefits, the applicant will have 12 months to re-apply for Certification/Validation under new requirements, or lose the Green Seal Certification/Validation.

**3.3.3** If the review determines that the product is no longer innovative, the applicant may choose to change the recognition from Certification to Validation.

**3.3.4** If Green Seal develops a standard for this category in the future, the applicant will be invited to participate as a stakeholder. When a new standard is issued, they will have 12 months from the issuance to become certified under the new standard.

## **4.0 CERTIFICATION AND LABELING REQUIREMENTS**

**4.1 Certification Mark.** The Green Seal® Certification Mark may appear only in conjunction with the certified product, service, process, or technology, and any promotional materials, as approved in writing in advance by Green Seal. Use of the Mark must be in accordance with rules governing the use of the Green Seal Certification Mark<sup>14</sup>. The Green Seal Certification Mark shall not be used in conjunction with any modifying terms, phrases, or graphic images that might mislead consumers as to the

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<sup>14</sup> <http://www.green seal.org/RulesGoverningtheUseofMark.aspx>

extent or nature of the certification. Green Seal must review all uses of the Certification Mark prior to printing or publishing.

**4.2 Use With Other Claims.** The Green Seal Certification Mark shall not appear in conjunction with any human health or environmental claims unless verified and approved in writing by Green Seal.

**4.3 Statement of Basis for Certification.** Wherever the Green Seal Certification Mark appears, it shall be accompanied by a description of the basis for certification. The description shall be in a location, style, and typeface that are easily readable. If online space is limited, a link to the basis of certification may be used.

A statement of basis for certification shall be developed for each product category as part of the criteria established in Stage I of the evaluation. The statement shall be approved in writing by Green Seal, and may be similar to the following example:

“[Name of product, service, process, or technology] is certified by Green Seal™ for Environmental Innovation based on reduced environmental toxicity, waste minimization, use of verified environmentally-preferable products, and conservation of energy and water. GreenSeal.org”

**4.4 Validation.** The Green Seal® Certification Mark may not appear in conjunction with a product, service, process, or technology that has been validated under this standard, or with any promotional materials. An appropriate graphic will be provided by Green Seal for use with the validation.

Any reference to a Green Seal validation of the benefits provided by a product, service, process, or technology under this standard, shall refer only to those benefits explicitly included in the validation. The same holds for any and all promotional materials. The Green Seal statement of validation shall not be used in conjunction with any modifying terms, phrases, or graphic images that might mislead consumers as to the extent or nature of the validation.

A statement of validation shall be developed for each product category as part of the criteria established in Stage I of the evaluation. The statement shall be approved in writing by Green Seal, and may be similar to the following example:

“Green Seal™ has validated these environmental benefits provided by [Name of product, service, process, or technology] compared to mainstream alternatives: reduced environmental toxicity, waste minimization, use of verified environmentally-preferable products, and conservation of energy and water. GreenSeal.org”

**ANNEX 1: LIFE CYCLE EVALUATION OF ENVIRONMENTAL ASPECTS**

**Example Analysis Matrix for products:** for identifying differences, establishing significant aspects, assessing benefits and drawbacks/burdens.

	Emissions to air	Releases to water, land	Human Health	Use of energy	Use of water	Waste	Use of raw materials	Use of HazMat	Radiation, noise	Performance
Design										
Raw materials										
Manufacture										
Packaging										
Transport										
In use										
Disposal										
End of life										

As needed, each of these general topics can be broken down into sub-topics for the necessary level of analysis, based on the differences between the product being evaluated, and the comparison group.

For example:

- **Emissions to Air** can be separated into NO<sub>x</sub>, SO<sub>x</sub>, CO, CO<sub>2</sub>, GHG, GWP, PM, VOC, Ozone precursors, ozone depleting chemicals, etc.
- **Releases to Water** can be separated into Aquatic Toxicity (Acute/Chronic), Eutrophication, Acidic/Basic, BOD/COD, etc.

**Example Analysis Matrix for services:** for identifying differences, establishing significant aspects, assessing benefits and drawbacks/burdens.

	Emissions to air	Releases to water, land	Human Health	Use of energy	Use of water	Waste	Use of raw materials	Use of HazMat	Radiation, noise	Performance
Planning										
Process										
Materials										
Transport										
Disposal										
End of life										

## ANNEX 2: APPLICATION PROCESS

### For Stage I described in Section 3.1, the applicant will provide

**Declaration of Compliance** with all legal requirements (laws, regulations, etc.) relevant to the product/service, and all environmental, labor, and safety legal requirements. This declaration will be signed by an individual with legal binding authority on behalf of the applicant.

**Written description** of the product, service, process or technology; the functions it is intended to provide; components, ingredients, and other materials used; marketing specifications; commercial availability, and technical drawings or photographs. In addition, any management systems and quality assurance procedures that ensure that the products meet the specifications, performance requirements, and environmental impacts.

**Market and Sector:** Description of the relevant market in the U.S. or North America<sup>15</sup>, providing all necessary information to substantiate the comparison with products that provide the same function: e.g., information about market size, similar products that make up the majority of the market, top performers in the market, and their specifications for function and human/environmental health.

**Functional Performance / Fitness for Purpose:** Identification of the relevant performance criteria for the product, referencing any relevant standards (international, national, or industry) or performance specifications (from customers, regulators, or purchasers) for this class of products.

**Key Environmental Aspects:** To the best of their ability, the applicants will provide an evaluation of the key environmental issues for the life cycle stages of the product, and justify why their product should be certified as Environmentally Innovative, or the environmental benefits that are submitted for validation.<sup>16</sup> The applicant will be requested to describe (1) the environmental issues associated with their product, and (2) the benefits or burdens associated with their product, compared with the other products that provide the same function: \* resource inputs to the process, \* raw materials and ingredients, \* manufacturing process, \* distribution, \* use phase of the product, and \* end-of-life stage of the product. Similar questions will be phrased for services, processes, and technologies.

**Differentiation:** The differentiation between the applicant product and the other products that provide the same function, including comparisons for each of the key performance criteria and for each of the key environmental issues.

### For Stage II described in Section 3.2, the applicant will provide

Documentation to support each of the specifications developed in Stage I. The documentation requirements will be included in the Stage I specifications or the verification checklists, as appropriate.

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<sup>15</sup> If the product is sold or provided outside of the U.S. or North America, a description of the relevant sector or market in that country or countries shall be provided.

<sup>16</sup> As stated in the scope section, the intent is not for a formal LCA, but for the applicant to consider and evaluate the environmental issues, and to make a case why their product is environmentally innovative. When establishing the specifications in Stage I, Green Seal will conduct an independent review of the application to confirm or refute these claims.

## APPENDIX 1: SOURCES

Good Environmental Choice Australia, Standard for Environmentally Innovative Products  
[http://www.geca.org.au/media/medialibrary/2012/08/GECA\\_08-2007\\_-\\_Environmentally\\_Innovative\\_May\\_2012.pdf](http://www.geca.org.au/media/medialibrary/2012/08/GECA_08-2007_-_Environmentally_Innovative_May_2012.pdf)

Environmental Choice New Zealand, Standard for Environmental Leadership Products and Services  
<http://www.environmentalchoice.org.nz/docs/publishedspecifications/ec3408environmentalleadership.pdf>

Green Seal: Guidance on Evaluating Products for the Development of Environmental Specifications, 2002. Written for the State of California's Procurement Division.

Criteria for 2014 Environmental Innovation Map published by the US Chamber of Commerce Foundation, and the Business Civic Leadership Center. Developed jointly by Corporate Citizenship Center and Green Plus.  
<http://bccl.uschamber.com/document/environmental-innovation-map-criteria>.  
[http://www.uschamberfoundation.org/sites/default/files/publication/ccc/Environmental\\_Innovation\\_Map\\_General\\_Final.pdf](http://www.uschamberfoundation.org/sites/default/files/publication/ccc/Environmental_Innovation_Map_General_Final.pdf)

ISO 14001:2004

ISO 14040:2006

ISO 14044:2006

SCS Global Services, Environmentally Preferable Product certification,  
<http://www.scsglobalservices.com/environmentally-preferable-product>

SCS Standard for TYPE III LCAs, LEO-SCS-002, Life Cycle Impact Assessment Framework and Guidance for Establishing Public Declarations and Claims. For: Environmental Declarations for Products and Systems, Environmentally Preferable Product Claims, Carbon Footprint Profiles  
[http://www.leonardoacademy.org/images/lcstandard\\_draft\\_020912.pdf](http://www.leonardoacademy.org/images/lcstandard_draft_020912.pdf)

## APPENDIX 2: ISO STANDARDS FOR LCA AND ENVIRONMENTAL ASPECTS

**ISO 14040:2006 4.1 Principles of LCA:** This summary of Section 4.1 is presented for informational purposes; the determining language shall be that of the ISO standard itself.

### 4.1 Principles of LCA

**4.1.1 General.** ISO 14040 provides fundamental principles that should guide the planning and implementation of an LCA.

**4.1.2 Life cycle perspective.** An LCA should cover the entire life cycle, and identify any transfer of environmental burden from one stage to another, so that it can be avoided if possible.

**4.1.3 Environmental focus.** An LCA should focus on the environmental aspects and impacts, and normally excludes economic and social issues.

**4.1.4 Relative approach and functional unit.** An LCA is based on a comparison of products relative to a baseline functional unit, which defines what is being studied, and all inputs and outputs for the process.

**4.1.5 Iterative approach.** LCA is an iterative technique, which uses results from one phase of an LCA as input for the analyses of other phases.

**4.1.6 Transparency.** All assumptions, processes, and definitions included in the LCA should be disclosed, so that this complex process can be interpreted consistently and appropriately.

**4.1.7 Comprehensiveness.** The scope of an LCA should include multiple attributes that affect environmental and human health, as well as resources. This approach will identify any transfer of burden from one attribute or media to another, so that it can be avoided if possible.

**4.1.8 Priority of scientific approach.** The analyses and conclusions of an LCA should be science-based as much as possible. Natural sciences are the top priority, followed by social sciences, international conventions, and finally value judgments in order of descending priority.

**ISO 14001:2004 Appendix A:** This summary of Section 4.1 is presented for informational purposes; the determining language shall be that of the ISO standard itself.

### A.3.1 Environmental aspects

This section of Appendix A of ISO 14001 explains the process by which an organization should identify in which ways (aspects) the organization can affect the environment, and determine which of them are significant enough to be included in the scope of their environmental management system. Examples of the issues that should be considered are given in detail, covering the inputs and outputs for activities, products, and services in the past, present, and future. Normal, abnormal, and emergency conditions should be considered. An example approach is presented, where the organization could consider emissions to various media, generation of waste, and the use or consumption of various resources.

The guidelines include consideration of processes that the organization can control, as well as those it can influence, e.g., raw material extraction, design, manufacture, packaging, transportation, actions taken by suppliers, resource and waste management, and end-of-life considerations.

In summary, an organization should conduct a comprehensive evaluation of the ways in which its activities can interact with the environment, and identify those aspects that have a significant effect.