

MODEL

DESIGN-FOR-ENVIRONMENT ASSESSMENT TOOLS

WEPSI MARKET DRIVERS SUBGROUP

This document summarizes the characteristics of several assessment tools that measure the environmental design characteristics of products, mostly electronic products, but one addresses green buildings. The structural characteristics of each tool are described, that is, the organizational and institutional structures, funding mechanisms, and the tools applicability and use. Key learnings for the WEPSI Market Drivers Subgroup are also summarized.

Tools Addressed

- **Energy Star**
- **Leadership in Energy and Environmental Design (LEED)**
- **European Computer Manufacturers Association (ECMA)
Product-Related Environmental Attributes Technical Report**
- **TCO '99, The Swedish Confederation of Professional Employees
Environmental Label**
- **European Union Eco-Label**
- **Japan Green PC Label**

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ENERGY STAR

Sponsoring Organization: Environmental Protection Agency and the Department of Energy, United State Federal Government.

Source of Information: <http://www.energystar.gov>, Craig Hershberger, US EPA. Energy Star program.

Purpose of Tool: The Energy Star program wants to enlarge its mission beyond information just about particular products to providing a total energy solutions package. They have undertaken a new national campaign. Their byline now is "ENERGY STAR provides businesses and consumers with energy-efficient solutions that save money while protecting the environment for future generations."

Background and Characteristics: Energy Star is a federal government program that establishes energy efficiency standards for appliances and electronic products. The program works with manufacturers to establish the standard and then partners with retailers and electric utilities to promote products meeting the standard to consumers and businesses. The program currently provides energy information on about 35-40 product categories with upwards of 20,000 individual products currently labeled with the Energy Star.

The program began with an effort to achieve energy savings in computers. The goal was to migrate the energy saving technology that was being employed in laptop computers to desktop computers. The program has continued the general approach with other products. (The program also includes efficiency labeling for buildings. This is not discussed here.)

The electronics and appliance program begins by assessing whether significant aggregate energy savings would be achieved if all makes of a particular type of product could achieve the same levels as the most efficient on the market. ("Most efficient" is generally considered as the top 25%.) The program then looks at engineering factors to ensure there are multiple technologies available to manufacturers to achieve such results. The program does not attempt to label products where the technology is inherently very efficient and manufacturers are already all generally employing it. Cellular phones were cited as an example.

The federal agency then meets with industry representatives and trade organizations to formalize a standard. Once agreed upon, promotion and education efforts are undertaken.

Institutional Structure: The standards set by the program are, in effect, government standards. In order to have their products labeled with the Energy Star, manufacturers submit information to the government and agree to program rules. The government provides rules and testing guidelines for determining energy efficiencies but the program primarily relies on self-certification. However, the government occasionally spot checks products on the market, and manufacturers may check on each other's products.

How the Cost Structure Works: As the labeling is self-certified there is no charge to the manufacturer. The EPA program staff is about 100; DOE has about 10 staff; engineering consulting contracts employ another 50-75 persons. The promotion campaigns are partnered with retailers and utilities - relative contributions unknown at this time.

Breath of Applicability and Use: The program now covers most products where major energy savings could be achieved. (Some older standards are being revisited in light of technology changes.) Partnerships with utilities represent coverage to about 50% of residential electrical consumers in the country. Other nations including the European Union are looking to the program to provide product energy standards. It may become the de facto global energy efficiency standard.

Applicability to WEPSI Market Driver Subgroup: Several characteristics that have interest as a model include:

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- Energy Star is an up and coming consumer environmental standard.
- While the Energy Star program would not want to lose its focus, there appears willingness to explore broader DfE issues like EOL management.
- Labeling under the program is voluntary
- Standards are set at a high enough level to provide results but remain achievable under currently available technologies. However, raising the standards remains an option over time.
- Program is designed with the consumer in mind. Partnering with others on promotion and outreach are key components to the program.

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LEED Leadership in Energy and Environmental Design A Green Building Rating System

Sponsoring Organization: U.S Green Building Council, a national non-profit organization of professionals in the building design and construction industry and other interested stakeholders. They are the developer and administrative authority of LEED.

Sources of Information: www.usgbc.org; LEED Training Workshop Manual, hard copy available from wriifer@concentric.net; interviews, including with Rob Watson, NRDC, co-chair of LEED Steering Committee

Purpose of Tool: To accelerate the implementation of green building policies, programs, technologies, standards, and design practices.

Background and Characteristics: USGBC began development of LEED in 1995 in response US market demand for a definition of “green building”. The standard was developed by USGBC volunteer members, with funding from US Department of Energy. It is now in version LEED 2.0 and a revision is in the works.

LEED is a system of green building rating standards, employing a whole-building approach, awards points for pre-defined elements of building design. In basics it has seven prerequisites (basic requirements), 64 voluntary points, 4 points for innovation, and one for green design expertise. The voluntary points are awarded in 5 design categories:

1. Sustainable sites
2. Water efficiency
3. Energy and atmosphere
4. Materials and resources
5. Indoor environmental quality

Points in different categories are applied for at the applicant’s choice. Depending on the points awarded, buildings can achieve one of four certification levels:

1. LEED certified
2. Silver
3. Gold
4. Platinum

The LEED system is self-assessing by the applicant, and third-party verified. In order to register a project for intent to be certified, and application and required documents are submitted, including stamped drawings, to the USGBC. Sometimes an applicant will register a project long before the building is completed in order to send a signal to the market. The documents are reviewed by staff and consultants. Certification, a decision made ultimately by the LEED Steering Committee, can come in 2 weeks if documentation is complete and there are no appeals. This occurs when the building is complete. No site audits are conducted, though this is being considered for the future. A 200-page reference guide provides documentation and advice.

Institutional Structures: USGBC has volunteer committees (over 200 volunteers) working on development of new standards and approval of applications. Seven staff are currently employed, and a consultant is under contract.

How the Cost Structure Works: The applicant pays all costs for the certification process. The applicant pays \$500 (\$350 for USGBC members) when the application is submitted and the project is registered. Certification costs an additional \$1500 (\$1200 for USGBC members). A fee increase is expected since costs are not now fully covered.

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Breadth of Applicability and Use: LEED applies to commercial and high-rise residential. Standards are being developed to include residential. LEED, though still under development, is rapidly becoming the standard for green building in the U.S. Though only 17 buildings have been certified, over 300 are now in the pipeline. Other systems are in use in other countries.

Applicability to WEPSI Market Driver Subgroup: LEED has several characteristics that may have interest as a model:

- It has a voluntary application process with applicants choosing areas they wish to excel in.
- It encourages and assigns points for innovation.
- It is well documented including a manual to training sessions to aid designers achieve.
- The standards are developed through and overseen by a multi-stakeholder process.
- Decisions are made based on a self-assessing application form, backed up by stamped drawings. Site verification audits are not currently performed.

An interviewee commented on the tricky balance between rigorous, prescriptive standards, which provide greater objectivity, and flexible, performance-based standards, which are less objective and more subject to interpretation. LEED has opted for the flexible, performance-based approach, possibly resulting in more challenges of decisions.

European Computer Manufacturers Association (ECMA) Product-Related Environmental Attributes

Sponsoring Organization: European Computer Manufacturers Association, specifically ECMA Technical Committee 38

Source of Information: ECMA Technical Report 70 available at www.ecma.ch.

Purpose of Tool: The purpose of ECMA is to standardize information and communications systems. The Technical Report is intended to provide a catalogue of parameters that are related to the environment for inclusion in product data declarations and specifications. Its chief purpose is to define the information that should be provided to customers in a supplier declaration, not to be a standard to be applied for any specific purpose.

Background and Characteristics: “The increased interest of public and institutional customers in environmental information stimulated the setting up of an ECMA Technical Committee working on the definition of product-related environmental standards. ECMA TC38 was established by the ECMA General Assembly in December 1995. It includes experts from information technology, telecommunications and consumer electronics companies and organizations.” This second edition of the Technical Report was issued in June 1999.

Data relevant to end-of-life management have been moved to a separate report that is not yet available.

The information that should be provided in a supplier declaration is defined in 13 categories:

- Product description
- Extension of product life
- Power consumption
- Radio frequency emissions
- ELF/VLF emissions from VDUs
- Acoustical noise
- Chemical emissions
- Materials
- Disassembly
- Batteries
- Product packaging
- Other take back information
- Documentation

Some details and examples of types of information are provided for each category. An appendix provides templates for several different product types which are intended to be helpful examples.

Institutional Structures: The ECMA is a professional trade organization for the European electronics industry and the environmental attributes are defined volunteer members.

How the Cost Structure Works: N/A

Breadth of Applicability and Use: Not known.

Applicability to WEPSI Market Driver Subgroup: The attributes included can help if we decide to identify specific contents of a DfE assessment methodology. The separate report on end-of-life management will be especially useful when it is available.

TCO'99 Certification

Sponsoring Organization: TCO is the Swedish Confederation of Professional Employees

Sources of Information: TCO'99 Certification – Requirements and Test Methods for Environmental Labeling, Ecology for Displays, Portable Computers, System Units and Keyboards, Report No. 5, Edition 2, hard copy available from wriifer@concentric.net. Also www.tcodevelopment.com. Information provided by the U.S. TCO representative: Kristina Bergstrand, 310/444-0132, and Clare Hobby, 312/781-6223.

Purpose of Tool: To create a safe and healthy working environment for office professionals, and to develop quality and environmental labeling systems for electronic office equipment.

Background and Characteristics: TCO Certification requirements were first begun in the early '80s in response to concerns about electromagnetic emissions from CRTs, and were expanded to address a broader range of worker safety and ergonomic issues. Since 1995 they have included:

- Ergonomics – luminance level, noise, and keyboard design
- Emissions – electromagnetic and X-ray
- Environmental (ecology) – see below
- Energy efficiency.

TCO involves a number of different parties in the process of developing the standards. The goal of the standards is to be “tough, though not impossible”. They explicitly wish to push technology development with tough standards. In energy efficiency, for instance, they are more rigorous than Energy Star.

The ecology requirements include standards related to:

- General – environmental policy and management system, documentation, etc.
- Manufacturing processes – Ozone depleting substances and chlorinated solvents
- Environmental hazards – toxic substances in products
- Preparation for Recycling – plastics recyclability, use of recycled glass and cooperation with a recycler

Though the recycling standards are the most extensive amongst the four, they do not include several topics identified by other standards.

Each specific standard identifies the products to which it applies. Each standard includes information requirements, and may include a mandate and clarifications or exceptions. For each standard a form or “template” is provided that must be filled in with a signature that “guarantees” the accuracy of the information provided.

Applicants fill out an extensive set of forms and send a sample product for lab testing. In addition to pre-certification testing, TCO performs some after market spot checks to assure that products continue to meet the initial standards. They note, however, that competitors are actually the best source of information since they keep close track of each other products. They have had very few problems with products deviating from the standard. ISO or EMAS certification is part of the TCO certification requirements, and those management systems provide a degree of quality assurance over time.

Mobile phone standards are being added this year – the new standards have just been released – and an overall revision of all the standards is slated to have a draft out in early 2002.

Discussions are apparently ongoing about the possibility of harmonizing the TCO standard with Energy Star. TCO is gaining more prominence in the U.S market and likewise Energy Star is gaining prominence in Europe.

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Institutional Structures: The standards are developed by the non-profit, TCO organization in Sweden, in cooperation with The Swedish Society for Nature Conservation. TCO development, the for-profit arm owned by TCO, does the product certification and promotion of the label. The standards are developed in cooperation with users, manufacturers, experts and scientists. SEMKO, an independent testing body, performs pre and post-certification testing on TCO-labeled products. Their testing labs are in Sweden and Norway.

How the Cost Structure Works: There is a certification fee and a licensing fee charged for each product. Though TCO Development is a for profit businesses, their main emphasis, as a part of the Swedish labor organization, has been to get the standard into the marketplace. They have therefore kept the fees as low as possible. For example, a monitor costs approximately \$3000 to certify.

Breadth of Applicability and Use: Standards have been developed for CRTs and LCDs, system units, keyboards, and portable computers. The certification system is used widely in Europe. TCO labels are on half of all CRTs sold worldwide, and are being used widely for EPP. They report that 28-30% of products sold in the U.S. are TCO certified.

Applicability to WEPSI Market Driver Subgroup: TCO is broadly accepted and could be looked to as a model for specific standards. Like LEED, the approval process relies on review of submitted paperwork, backed up by a signature guarantee by a top official of the applicant company. However, unlike LEED a product lab test is performed for each certification.

European Union Eco-Label

Sponsoring Organization: The European Commission

Source of Information: <http://europa.eu.int/environment/ecolabel/description/scheme.htm>

Purpose of Tool: To promote design to reduce environmental impacts and to provide information to consumers. The label is a means to determine the specific products within a product group that have the least environmental impact, cradle to grave.

Background and Characteristics: The Eco-label uses a life cycle assessment approach to identify the most important environmental impacts in order to set criteria. There is a 6 step process in setting product criteria for a specific product group:

1. Preliminary feasibility analysis
2. Market study
3. LCA: Goal and scope and inventory analysis
4. LCA: Impact assessment and proposals for criteria
5. Setting criteria
6. Draft proposals for a Commission decision

The Eco-label for person computers addresses the following broad characteristics:

- Reduced energy consumption during use and standby
- Limited use of substances harmful for the environment and health
- Reduced use of natural resources by encouraging recycling
- Increased product durability through upgrades
- Reduced solid waste production through take-back policy

Each of these categories has a number of criteria.

When a company submits an application to receive a label for a specific product, they must submit verification tests by an independent testing body.

Institutional Structures: Standards are developed by the European Commission with label awards provided by “Eco-label Competent Bodies” which are designated by the member states to implement the scheme, e.g. the Nordic Swan is the competent body for the Nordic countries.

How the Cost Structure Works: Costs are established by the competent bodies in member states.

Breadth of Applicability and Use: ?

Applicability to WEPSI Market Driver Subgroup: The European Eco-label is an example of a system whereby a common set of standards are set by a single body, which are implemented by independent agencies in different member states. Thus the standards are harmonized across countries.

The criteria for recycling, product durability and reduction of solid waste may provide guidance for an E.O.L Assessment methodology.

Japan PC Green Label System

Sponsoring Organization: Japan Electronics and Information Technology Industries Association

Source of Information: “PC Green Label System” electronic file available from wrifer@concentric.net.

Purpose of Tool: To raise the environmental standards for the entire industry rather than produce a top runner.

Background and Characteristics: The system for PC labeling corresponds to and compliments the requirements of the Japanese law for computer recycling. However, it provides a more comprehensive environmental assessment. It is based on assessment of the corporation relative to implementation of an environmental management system, environmental design procedures and eol recovery systems. It also includes a product assessment process.

It is a self declaration system with the company disclosing environmental information by means of a checklist that is evaluated by the PC Green Label Management Committee.

The assessment standards relate to environmental management and to the hierarchy of computer reduction, reuse and recycling.

Institutional Structures: The program is a unit of the Association with a committee structure that is responsible for development of standards, examination of the company and the product, and maintenance of the system. The committees apparently consist to a large degree of respected academics and other neutral parties.

How the Cost Structure Works: ?

Breadth of Applicability and Use: Currently the system applies only to computers from industrial or commercial use. When government regulates recycling of computers from residences, it will also apply to them.

Applicability to WEPSI Market Driver Subgroup: The self declaration system through means of a checklist may be a good model.

The use of the waste management hierarchy (reduce, reuse, recycle) may also be a good model.