Verifying Environmental Sustainability in the Electronics Marketplace

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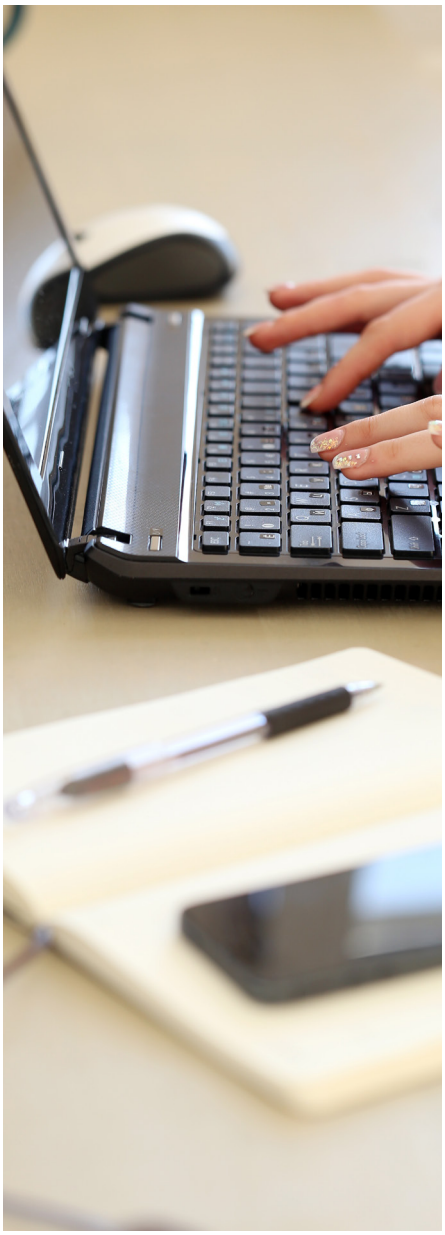
Environmental sustainability can be a marketplace differentiator for manufacturers of a wide range of electronic products, including desktop, laptop and tablet computers, computer and television monitors, and imaging products. Corporate environmental sustainability initiatives are expected to directly impact the shipment of more than 100 billion units of electronic products worldwide by 2015.[1] This across-the-board demand for sustainable electronic products is being driven by government procurement policies and corporate policy initiatives, as well as increased efforts by companies and consumers to reduce their environmental impact.



At the same time, consumers and corporate buyers are raising their expectations regarding environmental sustainability. Instead of focusing only on product-specific characteristics, many buyers now seek information about the broader environmental impact of products throughout their entire lifecycle, from initial design and material sourcing through end-of-life considerations. In some cases, this broader view of sustainability also includes an assessment of a producer's overall operations and business practices, as buyers increasingly seek to do business with companies that demonstrate a genuine commitment to environmental leadership.

In this context, selecting an appropriate strategy for verifying product environmental sustainability has become an increasingly complicated process for manufacturers in the electronics marketplace. This UL white paper provides details on the sustainability verification options available to electronics manufacturers. Beginning with an overview of the market for sustainable electronic products, the paper then identifies the spectrum of product sustainability concerns. It then discusses various verification pathways available to manufacturers, and the role of sustainability standards in that process. The paper concludes with some considerations for electronics manufacturers seeking to demonstrate their commitment to sustainable practices.

The Drive for Sustainable Electronic Products

The sale of electronic products has grown exponentially over the past decade. The U.S. Environmental Protection Agency (EPA) estimated that the number of electronic products sold annually in the U.S. doubled in just a little over 10 years to nearly 450 million units annually.[2] In large part, this growth is being driven by a nine-fold increase in the sale of mobile devices. However, it's also being driven by a continuous stream of new and innovative electronic devices offering increased functionality and ease of use. According to one estimate, the average American household now owns about 24 different electronic products.[3]

Of course, the continued growth in the sales of electronic products also means an increase in the number of used electronic products slated for disposal. The U.S. EPA also projects that more than 200 million computers, televisions and mobile devices were "ready for end-of-life management" in 2009, representing approximately 2.4 million tons of electronic waste. Unfortunately, only about 25 percent of all end-of-life electronic products were collected for recycling, resulting in approximately 1.8 million tons of electronic waste disposed through normal waste channels, such as landfills.

The growth in the number of electronic devices has also resulted in an increase in the use of electrical energy required to power such devices. To illustrate, the U.S. Energy Information Administration (EIA) reports that the share of residential electricity used by appliances and other electronic products in U.S. homes has nearly doubled over the past 30 years, from 17 percent to 31 percent. The size of this change may actually be understated, since EIA research also suggests that the increased use of consumer electronics has partially offset the energy efficiency gains in major appliances.[4]

These and other consequences illustrate just a fraction of the environmental impact stemming from the expanded number and use of electronic devices, and serve as the foundation for the growing demand from consumers and business-to-business buyers for electronic products that are more environmentally sustainable. Other factors behind the growth in sustainable electronics include:

- **Regulations —** The European Union's directive on the restriction of the use of certain hazardous substances in electrical and electronic equipment (2002/95/EC, also known as the RoHS Directive) came into force in EU Member States in July 2006 and the recast (2011/65/EU) came into effect January 2013. The RoHS Directive restricts the use of a number of hazardous substances, including cadmium, lead, mercury, hexavalent chromium and others. The impact of the EU's RoHS Directive on the global electronics industry has been significant, as many jurisdictions have implemented identical or similar requirements. As a result, many electronic products sold today throughout the world are RoHS-compliant.
- **Government procurement policies —** Government procurement policies have also driven the development of electronic products that are more environmentally sustainable. For example, the U.S. Federal Government is using its massive purchasing power to support the procurement of "environmentally sound" goods, including electronic products. Presidential Executive Order 13514 encourages U.S. federal agencies to purchase electronic products registered with the Electronic Product Environmental Assessment Tool (EPEAT) rating system.[5] With annual expenditures approaching nearly $6 trillion, federal buying requirements can single-handedly drive the development of more environmentally sustainable electronic products by private industry.
- **Industry initiatives —** The electronics industry itself has supported the drive for more sustainable electronic products. In 2012, for example, the Consumer Electronics Association (CEA), the National Cable & Telecommunications Association (NCTA) and a number of leading cable system device manufacturers signed the Set-Top Box Energy Conservation Agreement. Under the agreement, at least 90 percent of all new set-top boxes sold or deployed by 2014 will meet or exceed U.S.

ENERGY STAR 3.0 efficiency levels. The agreement will reportedly result in residential electricity savings of more than $1.5 billion annually.[6]

- **Corporate product development policies —** Electronic manufacturers are at the forefront of efforts that envision environmentally sustainable products as a reflection of broader corporate values. One Korean electronics company, for example, has the expansion of the number of products it offers with so-called green features as one of its stated corporate objectives. More than 75 percent of its electronics products have achieved the company's own internal energy efficiency standard, which exceeds U.S. ENERGY STAR requirements.[7] Another major electronics manufacturer has developed its own company-wide initiative to bring more environmentally sustainable products and technologies to market.[8] These and similar programs transform the drive for sustainability from product-focused initiatives to organization-wide efforts in which sustainable products and practices support the achievement of corporate mission and values
- **Non-government organizations and advocacy groups —** Non-government organizations and advocacy groups – Because of the chemicals and energy used in the manufacture of most electronics, environmental advocacy groups have had an interest in electronics manufacturers and the end of life of electronics for many years. Examples include standards developed by Responsible Recycling (R2) and e-Stewards that detail proper methods of handling electronics products at the end of their useful life. These independently developed standards are intended to foster the recycling of electronics in an environmentally responsible manner and the reuse of materials whenever possible.
- **Consumer demands and expectations —** Finally, many consumers and business-to-business buyers are increasingly conscious about the environmental profile of the products they buy and the environmental values of the companies that make them. Electronics manufacturers recognize that these environmentally conscious consumers represent an important marketplace constituency, and are quickly developing new products and strategies to address the expectations of this target market.

The Spectrum of Sustainability Attributes

In the electronics marketplace today, the term "sustainability" is used and interpreted in a number of different ways by both buyers and sellers. However, the term sustainability most often focuses

on attributes that address the impact on people and the planet. Some examples of attribute categories include:

- **Product attributes —** Product attributes are those directly related to the nature of the materials used in the fabrication of a product or its packaging. Some product attributes include the energy used by the product, whether the material comes from a renewable resource, or if it includes recycled content. Other product attributes might indicate the durability of a material or its chemical content, i.e., low levels of volatile organic compounds (VOCs) or materials with a low potential for adverse health impacts.
- **Process-specific attributes —** Process-specific attributes focus on the environmental impact resulting from how the product is produced and distributed. For example, is the manufacturing process powered by renewable energy sources such as solar or wind? Other product-specific aspects might address whether the production process creates hazardous by products or produces greenhouse gas emissions. Still other process attributes might be related to the storage and transportation of finished goods.
- **Life-cycle attributes —** This "cradle-to-grave" set of attributes covers each stage in a product's entire lifecycle. It includes attributes related to initial product design and material sourcing, product manufacturer, product packaging, warehousing and distribution, product use and maintenance issues, and end-of-life considerations including recycling, recovery and waste management.
- **Corporate-specific attributes —** Corporate-specific attributes broaden the sustainability scope beyond the product itself to include a manufacturer's values, policies and actions in support of a genuine corporate sustainability mission. Corporate attributes include ongoing commitments to environmental sustainability as evidenced by the adoption of a formal environmental management system, and mechanisms for engaging employees, customers, the local community and other stakeholders in environmental stewardship issues.

In addition to attributes in the above categories, the term sustainability commonly includes human health considerations (for both employees and consumers), supply chain labor practices (such as employee working conditions and compensation), and general environmental health and safety policies.

Given the range of possible meanings regarding the use of the term sustainability in connection with environmental claims, clarity is essential. Aside from creating confusion among buyers, vague or misleading claims can lead to charges of "greenwashing," possible regulatory enforcement or other legal actions. These consequences can undermine legitimate efforts to market otherwise environmentally preferable products.

Pathways for Verification of Environmental Sustainability

Electronics manufacturers can avail themselves of a number of compliance pathways to verify the environmental sustainability of their products. The options range from certification of product-specific sustainability attributes and environmental claims validation to environmental product declarations (EPDs), which disclose a product's overall environmental impact. The following sections discuss these and other options in greater detail.

Eco-Label Product Certification

Eco-labels have long been used as a method of communicating environmental sustainability claims, and there are an estimated 440 different eco-labels currently in use around the world.[9] Legitimate eco-labels connote a product's compliance with the requirements identified in a specific standard. However, not all eco-labels are equal since standards on which eco-labels are based can differ, and eco-label programs can take divergent approaches in their evaluation and validation of products. The most important differences include:

- **Type of standard —** Eco-labels can be based on a standard that addresses a single sustainability attribute or multiple attributes that cover the lifecycle of the product. Single attribute standards can be helpful in identifying products with a specific environmental attribute such as recycled content. Multiple -attribute standards, on the other hand, cover multiple sustainability attributes, and are likely to provide a more thorough characterization of a product's overall environmental sustainability.

- **The standard-setting process —** Standards developed and regularly reviewed and updated through an open process can provide an important level of science-based objectivity. An open standards development process also allows for greater public transparency and a more complete understanding of a standard's sustainability criteria.
- **The process of verifying compliance with the standard —** Verifying compliance with the requirements of a standard range from a company's self-declaration of environmental attributes to third-party certification that may include on-site and/or post-certification audits. Third-party verification and certification generally provides greater assurances regarding the objectivity of the assessment process.

For these reasons, an eco-label certification program based on multiple-attribute open standards and that uses independent third parties to evaluate compliance can be more likely to provide buyers with the broadest possible assurances regarding a product's environmental sustainability.

Environmental Product Declarations

An EPD is a single, comprehensive disclosure of a product's environmental impact throughout its entire lifecycle that has often been validated by an independent third-party. An EPD reports the results of a product's lifecycle assessment (LCA), as well as any other information relevant to a product's sustainability profile. For example, an EPD will include information on a product's carbon footprint, and its potential impact on global warming, ozone depletion, water pollution and the acidification of land and water. An EPD can also include information on other pertinent environmental and health-related impacts that may be deemed relevant to buyers.

EPDs are categorized as a Type III eco-label as defined under ISO 14025. Type III eco-labels are succinct, fact-based documents that provide specific information by category. Unlike Type I eco-labels that connote compliance with a specific environmental standard, or Type II labels, which are self-declarations sometimes used to claim an environmental benefit related to the product or its use, Type III eco-labels requires independent validation of a product's environmental impact. As such, EPDs promote greater transparency of important sustainability considerations and ease buyers' efforts to make objective comparisons among similar products.

Environmental Claims Validation

In some cases, manufacturers may require independent validation of a specific sustainability claim not expressly addressed by an existing eco-label certification program. The claim validation may be required as a condition of procurement by some buyers. In other cases, an independently validated claim may serve as a proactive defense against charges of vague or unsubstantiated sustainability claims.

Sustainability claims that can be independently validated include a range of product content characteristics, as well as product and manufacturer performance-related factors. Product content-related claims include the amount of recycled content in a product or product packaging, the recyclability

of a product or product packaging, or the levels of VOCs found in a product. Product performance-related claims could include a product's resistance to mold or mildew, while manufacturer performance claims might address post-use reclamation efforts.

Environmental claims validation is typically based on product testing or periodic performance auditing by a qualified third-party. Some third-party testing organizations can also establish protocols for validating non-standard or innovative sustainability claims, such as recycled or bio-based content, or landfill waste diversion. In either case, environmental claims validation represents an important pathway for verifying environmental sustainability.

Other Verification Pathways

In addition to the pathways discussed above, the Electronic Product Environmental Assessment Tool (EPEAT) rating system evaluates the sustainability of electronic products throughout their entire lifecycle. Product evaluations are conducted by selected product registration entities (PREs) against the requirements of specific environmental standards. Currently, the EPEAT rating system uses the IEEE 1680 family of Environmental Assessment Standards to assess and register products, including televisions, desktop and laptop computers, computer monitors and imaging equipment such as printers, copiers and scanners. The registration of additional product categories that meet the requirements of other sustainability standards is expected in the future.

Originally established under a grant from the U.S. EPA, the EPEAT program is now maintained by the Green Electronics Council (GEC), and has gained widespread acceptance as a reference source for sustainable electronic products. Importantly, U.S. federal agencies are encouraged to purchase EPEAT-registered electronic products under the terms of Executive Order 13423. Other national, state and local government entities, as well as educational and healthcare systems and multinational corporations, use the EPEAT registry to identify sustainable electronic products.

Considerations for Manufacturers of Electronic Products

The range of environmental sustainability attributes and the availability of numerous pathways to verify claims of environmental sustainability provide electronics manufacturers with a number of options for verifying the sustainability of their products. In evaluating these options, manufacturers should thoroughly investigate the advantages and consequences of each approach. An experienced third-party can provide important information and guidance in selecting a verification pathway appropriate to a manufacturer's products and market position, as well as expertise in facilitating the product verification process.

From a larger perspective, the electronics marketplace today is characterized by the rapid introduction of new and innovative products, ever-shorter product lifecycles and intense price competition. Driven by regulation, corporate sustainability practices and consumer preferences, the growing demand for sustainable electronic products adds further complexity to this highly dynamic industry. Even successful manufacturers can find themselves challenged to develop corporate sustainability strategies that not only meet market demands but that also achieve financial performance objectives.

Manufacturers wishing to remain competitive in the electronic products industry can benefit from looking more broadly at the issue of sustainability. Indeed, developing sustainable electronic products is about more than just meeting regulations or marketplace demand. Instead, it can also help manufacturers drive innovation both internally and externally, improve production workflow efficiencies and better engage employees and strengthen their commitment.

The demand for sustainable products also provides a manufacturer with an opportunity to strategically transform its business in a way that more closely aligns its daily activities with the organization's larger purpose. This expanded view of sustainability is more than about selling more products than the competition, but about making a genuine commitment to environmental stewardship with sustainable products and practices. By taking this approach, electronics manufacturers can not only build an active base of loyal customers but can also improve the lives of customers, employees and the global community.

Summary and Conclusion

As demand grows for environmentally sustainable electronic products, so too does the need for legitimate verification of sustainability claims by manufacturers. Although the verification challenge is complicated by the wide and varied use of the term sustainability, there are a number of pathways available to manufacturers seeking to substantiate the sustainable qualities of their products, including eco-label product certification, EPDs, environmental claims validation and others. Electronics manufacturers can benefit from the counsel of an experienced third-party when evaluating verification options most appropriate for their products and markets.

UL offers a number of certification, validation and testing services to support manufacturers of sustainable electronic products, including ECOLOGO and GREENGUARD product certification. UL's environmental product declarations and environmental claim validation services serve to affirm single-attribute environmental claims to meet regulatory requirements or buyer specifications. Finally, UL offers corporate sustainability certification and advisory services in support of company-wide sustainability programs.

For more information about these and other environmental and sustainability services, visit www.ul.com/environment.

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