भारतीय मानक

Indian Standard

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इलेक्ट्रिकल और इलेक्ट्रॉनिक उत्पादों के लिए पर्यावरणीय प्रदर्शन मानदंडों का सामंजस्य — व्यवहार्यता अध्ययन

Harmonization of Environmental Performance Criteria for Electrical and Electronic Products — Feasibility Study

ICS 13.020.01; 19.040

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NATIONAL FOREWORD

This Indian Standard which is identical to IEC TR 63212 : 2020 ‘Harmonization of environmental performance criteria for electrical and electronic products — Feasibility study’ issued by the International Electrotechnical Commission (IEC) was adopted by the Bureau of Indian Standards on the recommendation of the Standardization of Environmental Aspects for Electrical and Electronics Products Sectional Committee and approval of the Electrotechnical Division Council..

The text of IEC standard has been approved as suitable for publication as an Indian Standard without deviations. Certain terminologies and conventions are, however, not identical to thoseused in Indian Standards. Attention is particularly drawn to the following:

a) Wherever the words ‘International Standard’ appear referring to this standard, they should be read as ‘Indian Standard’; and

b) Comma (,) has been used as a decimal marker, while in Indian Standards the current practice is to use a point (.) as the decimal marker.

Only the English language text has been retained while adopting it in this Indian Standard, and as such, the page numbers given here are not the same as in the IEC publication.

For the purpose of deciding whether a particular requirement of this standard is complied with the final value, observed or calculated expressing the result of a test or analysis shall be rounded off in accordance with IS 2 : 2022 ‘Rules for rounding of numerical values (*second revision*)’. The number of significant places retained in the rounded off value should be the same as that of the specified value in this standard.

CONTENTS

INTRODUCTION

Environmental issues have become more and more important globally, especially regarding the impact on ecosystems, climate change, energy and natural resource depletion and impact on human health. In the electrotechnical industry specifically, the exponential growth in the use of electronic devices is another key factor in the need to address the environmental issues with these devices.

The users of electrical and electronic equipment (EEE) products are becoming more aware of these emerging issues and the purchasing of products is no longer based only on preference or technical quality. There is a significant growth for governments, institutions and consumers to also base their decision on the environmental performance of such products.

In response to these trends, we are seeing exponential growth of policies and initiatives aiming to provide information to users about one or more aspects of the environmental performance of a product or service. This is often done through the creation of ecolabels that are bound to a certification procedure by the ecolabel operator. The exact meaning of such ecolabels and their criteria are not well understood by the users. Furthermore, the differences in definitions and certification requirements may hinder trans-regional trade.

Ecolabel programmes that cover a broad range of products operate in countries and regions around the world. Today over 80 ecolabels applying to EEE exist, all focusing on similar types of criteria, but often with slight differences in definitions, levels of ambitions associated with the criteria, and ways to show compliance.

This document assesses the feasibility to harmonize the criteria associated with environmental performance of EEE and provides recommendations. It also includes potential hurdles and challenges of such a harmonization.

This document contains the learnings and outcomes (geographical and eco-benefits) from the review of several prominent ecolabel standards. The conclusions and recommendations are also based on perspectives and opinions provided by outreach discussions with internal and external stakeholders, including ecolabel operators, government bodies, national standards development organizations.

It is important to note that a potential future standard on environmental performance criteria is not intended as an ecolabel standard but is intended to harmonize the criteria that are used for creating such an ecolabel standard. As such, the content of the harmonized criteria should be supportive to ecolabel operators (public or private) and product technical committees wishing to develop or revise an environmental performance standard for a specific product or product group, and is not intended to compete with or replace them.

Indian Standard

HARMONIZATION OF ENVIRONMENTAL PERFORMANCE CRITERIA FOR ELECTRICAL AND ELECTRONIC PRODUCTS — FEASIBILITY STUDY

1 Scope

This document provides a feasibility assessment to determine if harmonization of environmental performance criteria is possible and would benefit the electrotechnical industry.

This document is intended as a feasibility study report rather than a standard. It reports the possibility/opportunity to harmonize environmental performance criteria and, with it, the feasibility for future development of an international standard on environmental performance criteria. The learnings and recommendations of this document are based on the review of a number of prominent ecolabel standards available worldwide as well as outreach discussions with internal and external stakeholders.

To enable users of this document to visualize and better evaluate what such a future standard could look like, a concept for an international standard on harmonized criteria for environmental performance assessment of electrotechnical products has been proposed in Clause 8. It is not intended as a final proposal but rather a vision of how such a standard would be structured and how it could be implemented to meet the specific requirements that were identified in the study.

Once again, it is important to emphasize that the potential IEC standard on environmental performance criteria is not intended as an ecolabel standard, but it is intended to be a means for harmonization of the criteria (including the verification requirements of them) that are needed for creating such an ecolabel standard.

2 Normative references

There are no normative references in this document.

3 Terms and definitions

No terms and definitions are listed in this document.

ISO and IEC maintain terminological databases for use in standardization at the following addresses:

- IEC Electropedia: available at http://www.electropedia.org/
- ISO Online browsing platform: available at http://www.iso.org/obp

4 Background

4.1 Benefits of the use of ecolabels in general

4.1.1 Ecological benefits

The primary objective of ecolabel programmes is to contribute to a reduction in the environmental impacts associated with products.

In general, the ecolabel programmes are defined by and operate according to ISO 14020 and ISO 14024, considering the entire life cycle of the products. An ecolabel mark can be attached to products after strict examination (certification).

By getting certified to one or more of the ecolabel programmes and, with manufacturers committing to reduce the targeted environmental impacts throughout the entire life cycle of the products, products can benefit by differentiating themselves from similar products which do not adhere to such ecolabel requirements.

For EEE products, the intent of the various ecolabel programmes is to accomplish one or more of the following improvements in the environment:

- Energy conservation/low or less energy consumption: EEE products bearing an ecolabel consume less energy during their use than similar products in the market that do not bear an ecolabel.
- Avoidance/reduction of materials hazardous to the environment: EEE products bearing an ecolabel have to meet strict criteria for the reduction of hazardous substances used in their components, their package and during their manufacture, to avoid harm to the environment or human health.
- Material efficiency/conservation: EEE products bearing an ecolabel use less non-renewable resources by improving design for recyclability or by using recycled materials.
- Improvement of product durability/longevity: EEE products bearing an ecolabel are designed to be repairable and upgradable, and to be supplied with spare parts and consumables, hence they could be used for a longer time.
- Relatively low emissions and waste: EEE products bearing an ecolabel are required to generate low emissions to the water and air, to limit noise emissions and to produce less solid waste in their end-of-life.

Most ecolabel programmes which exist for EEE are for office equipment (e.g. printers), ICT equipment (e.g. computers), consumer products (e.g. home theatre), and household appliances (e.g. washing machines).

4.1.2 Economic benefits

Governments, businesses and consumers have been raising their concern on the environmental impacts of products and, because of this, to bear an ecolabel could be a market advantage for a product. For instance, governments often adopt ecolabel requirements as a tool for encouraging environmental practices through "green procurement". In such cases, an ecolabel could be a vital aspect to open up new public business. Likewise, when consumers are consciously looking for products that pose less impact on the environment, a visible and widely-recognized ecolabel could give them more confidence and encouragement in the purchase choice.

NOTE The term "green procurement" is used by organizations (especially governments) to describe their purchasing policies and practices of reducing environmental impacts of product procurement.

4.2 Problem definition and reason to perform this study

As mentioned earlier, over 80 ecolabels applying to EEE currently exist. Although the ecolabels represent environmental and economic benefits for manufacturers and the users of products, they may also represent a burden because of their large number, diversity, and sometimes, conflicting requirements.

Manufacturers often face requirements for certification in accordance with multiple ecolabel programmes, sometimes even within a single country/region. This can represent significant costs, sometimes with limited revenue opportunity. Ecolabel standards can potentially also lead to diverging design requirements or contain unnecessary differences that create design or verification conflicts. Consumers and governments are faced with a broad variety of products claiming a better performance in some environmental aspects and bearing different ecolabels for which they do not understand the meaning.

Likewise, each ecolabel operator is faced with significant costs and burden to develop basic criteria addressed in such schemes. This represents n-times duplication of similar work in each of the 80 schemes.

The study presented in this document is carried out to compare and analyse a selected number of such ecolabel programmes, and to provide recommendations, including a concept proposal on a possible international standard, on the potential for harmonization of environmental criteria.

Ecolabel programmes are typically operated as voluntary initiatives, although some programmes may be referenced in Green Public Procurement (GPP) requirements of a country or region. The study for this document was carried out holding a neutral position to such voluntary initiatives of any ecolabel scheme and not intending to be related to any regulatory scheme.

4.3 Benefits from harmonizing environmental performance criteria

4.3.1 Potential benefits for regulators and ecolabel operators

- Harmonized criteria adopted by different countries will ensure that their environmental goals are met based on the same requirements.
- Programmes with standards containing different requirements may make international trade cumbersome, as lack of harmonization could potentially have a negative effect on importing and exporting of products. The clearly defined, harmonized and regularly monitored criteria could ensure barriers to international trade are minimized.
- Products that display different ecolabels may not be recognized as providing comparable environmental performance which can create an undue burden by requiring unnecessary and repeated testing and certification.
- Harmonized criteria will improve mutual recognition of ecolabels between countries and regions.
- Harmonized criteria will significantly reduce the effort and resources of individual operators to develop criteria and the respective verification methods.

4.3.2 Potential benefits for standards development organizations (SDOs) and product technical committees (TCs)

- By leveraging the expertise of a global team of environmental assessment experts, product TCs and other SDOs can maintain a set of criteria which provide a best in class environmental performance target for their EEE products and markets.
- It can reduce effort/cost in developing ecolabel standards by leveraging existing harmonized criteria where appropriate.
- It focuses efforts on specific criteria that provides differentiation for various product types.

4.3.3 Potential benefits for product users/consumers

- Harmonized criteria and unified ecolabels will help consumers to recognize "eco-designed" products more easily, so as to increase the choice for such products.
- It will help to promote consumption with less environmental impacts by applying harmonized criteria.
- It will help to identify higher level eco-designed products as they become available and accepted in the market.

4.3.4 Potential benefits for manufacturers and designers

- Harmonized criteria will provide a benchmark for the manufacturers and designers with consistent requirements to enhance resource/energy conservation and ensure environmental protection is considered throughout the life cycle of the product.
- Cost reductions may be realized through consistent requirements for design and manufacturing.

- Enhancing the supply chain understanding around harmonized requirements will support global commerce.
- It will be easier to compare different products by harmonized criteria.

4.3.5 Potential benefits for industry

- Harmonized criteria will contribute to the promotion of technology development in eco-design and manufacturing worldwide.
- An international standard on harmonized environmental performance criteria developed by global professionals will offer an easier and unified way to achieve the balance of environmental performance, safety and functionality, which would also motivate the manufacturers to enhance the technology so that their products could satisfy the standard and expand their presence within the market.
- Harmonized criteria will improve the efficiency of applying the technology to future innovations, reduce the conflicts between ecolabel programmes and promote the further development of technologies with reduced environmental impacts.
- Harmonized criteria will help drive consistent requirements and messages for environmental improvement into a supply chain that typically supports a broad range of EEE products. Inconsistent requirements may create conflicts in design choices, whereas harmonized requirements allow all types of products to leverage eco-design benefits.

5 Selection and review of ecolabel programmes

5.1 Structure of the study

This study was carried out by the following steps focusing on the applied evaluation criteria of Type I Ecolabels (according to ISO 14024) operated in major countries and regions:

STEP 1: Selection and review of a number of ecolabel programmes ensuring product and geographical distribution (Clause 5) and interviews of stakeholders (Clause 6).

STEP 2: Feasibility analysis of the potential for harmonization (Clause 7) including recommendations from internal and external stakeholders (Clause 6).

STEP 3: Concept proposal for possible international standard and potential added value for the stakeholders (Clause 8).

STEP 4: Final conclusion and recommendations (Clause 9).

5.2 Ecolabel programmes review

Among the wide range of ecolabel standards worldwide, this study focused on the most influential ecolabels available in Europe, Asia, and North America. Seven ecolabel programmes[1] that are applicable to EEE, covering the different geographies worldwide, were reviewed and are listed below:

- China Environmental Labelling (China);
- EU Ecolabel (Ecoflower, Europe);
- The Blue Angel Ecolabel (Germany, Europe);
- Nordic Environmental Label - the Swan (Nordic countries, Europe);
- TCO Certified (International);
- EPEAT™ (International);
- Eco Mark labelling scheme (Japan).

[1] The trademarks and trade names mentioned in this document are given for the convenience of users of this document. This information does not constitute an endorsement by IEC of the products named.

NOTE The EPEAT™ ecolabel utilizes external standards for environmental performance criteria including IEEE 1680.1, IEEE 1680.2, IEEE 1680.3, UL110 and NSF 426.

Table 1 and Table 2 summarize the general criteria applied by the different ecolabels as well as the specificity of the criteria group per ecolabel. At this level of granularity, most ecolabels are covering the same environmental-related aspects, with a few differences being observed between the ecolabels. A more detailed level of granularity is presented for a selection of products in Clause 7.

Table 1 – Ecolabel programmes under review and applied evaluation criteria

Environmental criteria	Ecolabel programmes						
	China Environmental Labelling	EU Ecolabel (Ecoflower)	The Blue Angel Ecolabel	Nordic Environmental Label - the Swan	TCO Certified	EPEAT™	Eco Mark labelling scheme
Energy consumption	×	×	×	×	×	×	×
Material source					×	×	×
Controlled substances used for components and package	×	×	×	×	×	×	×
Material used in manufacturing				×		×	×
Reused material						×	×
Ease of material recycling	×	×	×	×	×	×	×
Design for end-of-life	×					×	×
Pollution limitation	×	×	×	×	×	×	×
Noise limitation	×	×	×	×	×		×
GHG emission or carbon footprint				×		×	
Ability to upgrade and repair	×	×	×	×	×	×	×
Better durability of product			×	×	×	×	
Provision of information to users	×	×	×	×		×	
Contain information on the label		×		x		×	
Establishment of environment management system					×	×	
Commitment on the manufacturer's social responsibility				×	×	×	
Implementation of LCA						×	

Table 2 – Specificity of the criteria group per ecolabel scheme

Specificity of the criteria group	Product-type	Ecolabel	Environmental criteria
Common to all ecolabel standards	Generic to: • ICT equipment • Household appliances	• China Environmental Label • EU Ecolabel • Blue Angel • Nordic Swan • TCO Certified • EPEAT™ • Japan Eco Mark	• Energy consumption • Controlled substances used for components and package, such as – reduction of hazardous substances – special requirements on plastics • Ease of material recycling • Pollution limitation • Ability to upgrade and repair
Ecolabel specific	ICT equipment and/or Household appliances		• Material source • Material used in manufacturing • Efficient use of materials, such as – Reused material – Design for end-of-life – Better durability of product • Implementation of LCA • Noise limitation • Carbon footprint • Provision of information to users/on the label • Establishment of environment management system • Commitment on the manufacturer's social responsibility
Product specific	Printers	All applicable	• VOC emissions
	Refrigerators	All applicable	• GHG emission limitation

Analysis of the criteria in the standards listed in Table 1 shows that:

- Ecolabel product standards set not only product criteria (e.g. reduction of hazardous substances, higher energy efficiency) but also corporate criteria (e.g. management system requirements).
- Criteria can be qualitative (e.g. disassembly) or quantitative (e.g. recyclability rate).
- Some criteria, such as reduction of hazardous substances (e.g. EU RoHS) are common to nearly all the standards.
- As most of the ecolabel programmes are initiated by governments or under the supervision of governments, they are making use of criteria that reflect certain regulatory requirements.
- The standards as well as their criteria used in the ecolabel programmes are developed or adopted by the scheme owners.
- The primary environmental criteria for EEE are related to the primary characteristic of this product group, namely energy consumption.

Table 3 presents the main EEE product categories covered by each ecolabel programme. It is clear that the highest number of ecolabel programmes cover ICT products, office equipment and household appliances. However, not all the EEE product categories listed in Table 3 and their related environmental criteria are analysed in this study.

Table 3 – EEE product categories covered by ecolabel programmes under review

EEE product category	Ecolabel programmes						
	China Environmental Labelling	EU Ecolabel (Ecoflower)	The Blue Angel Ecolabel	Nordic Environmental Label – the Swan	TCO Certified	EPEAT™	Eco Mark labelling scheme
ICT products	×	×	×	×	×	×	×
Office equipment	×		×	×		×	×
Household appliances	×	×	×	×			×
Lamps	×		×				×
Batteries	×			×			
Machines for parks and gardens	×			×			
Other EEE products	×						×

5.3 Geographical distribution of the ecolabel programmes

Although most ecolabel programmes are originally established (and applied) for certain national/regional markets, it is important to note that in practice the location where an ecolabel scheme is established and where it is used are not always the same, due to the globalization of the markets. Consequently, if a product is to be sold to a certain market, the manufacturer would need to assess and distinguish between the different schemes as required in that country/region. In such cases, it might be difficult to determine which one should be applied to achieve the best economic benefits.

An ecolabel programme being utilized by markets other than the one originally intended could be due to adoption by purchasers from that market or a mutual recognition agreement with another programme. Table 4 shows the geographical distribution of the studied ecolabels, the intended markets, and the way they are either assimilated (adopted) by other non-intended markets or recognized by other ecolabel programmes.

Table 4 – Geographical distribution of the ecolabel programmes

Ecolabel programmes	Where it is established	Which market it is originally intended	Which market(s) it is adopted or recognized
China Environmental Labelling	China	China	Mutual recognition agreements have been signed with Blue Angel (Germany), Korea and Japan.
EU Ecolabel (Ecoflower)	Europe	All member states of the EU, Norway, Liechtenstein and Iceland	
The Blue Angel Ecolabel	Germany	Germany	Mutual recognition agreements have been signed with Australia, China, Korea and Japan.
Nordic Environmental Label - the Swan	Denmark, Finland, Iceland, Norway, Sweden	Denmark, Finland, Iceland, Norway, Sweden	
TCO Certified	Sweden	Many countries worldwide	
EPEAT™	USA	33 countries including USA, Canada, EU countries, Australia, New Zealand, China, Japan, India	
Eco Mark labelling scheme	Japan	Japan	Mutual recognition agreements have been signed with Nordic countries, Korea, China, New Zealand, Thailand, North America (Canada), Germany, Hong Kong and Singapore.

6 Outreach and feedback from stakeholders

6.1 Background

As part of this assessment, outreach discussions were initiated with global stakeholders, including non-governmental organizations (NGOs) and organizations representing consumers (e.g. ANEC in Europe), ecolabel operators, SDOs, government procurement agencies, product manufacturers and IEC product technical committees. This outreach was considered important by IEC TC 111 given that governments, ecolabel operators, product TCs and SDOs are important stakeholders in ecolabel requirements and potential customers of the future international standard with harmonized environmental assessment criteria.

IEC TC 111 had successful meetings and received feedback from many of these stakeholder groups. The feedback received to date highlights the need to continue these discussions and involve additional stakeholders

Perspectives and opinions were solicited from the following regions/entities: Canada, China, European Commission, France, Japan, Netherlands, and USA.

NOTE In addition, the Global Ecolabelling Network (GEN), a non-profit association of organizations that provide environmental performance recognition, certification and labelling, was also contacted, but due to the way it is organized, no clear feedback about this study could be obtained.

6.2 China

IEC TC 111 representatives talked with the Ministry of Industry and Information Technology (MIIT) of China, which is in charge of the Green Manufacturing Engineering and green(eco) design product[2] standard development, about the task and expected outcomes of the work carried out by IEC TC 111: the development of a technical report as a first step and the development of a harmonized environmental performance criteria international standard as a second step. The government officers gave positive response to the future international standard, which they regarded as a standard that would promote mutual recognition of green(eco) design product in the international market. However, they also said that the characteristics of made-in-China products, the Chinese regulatory requirements and the demands of domestic consumers would be noticed and kept if the international standard were adopted in China.

6.3 European Commission (EC)

A meeting between the Directorate General for Environment (DG ENV) of the European Commission[3] (EC) and an IEC TC 111 representative took place in Brussels on 22 May 2018.

The motivation to start such a study, the background, and possible outline for the harmonized standard (see Clause 8) was shared with the EC representatives. The outcome of the discussion is summarized below:

- The topic of discussion is seen as important, and the EC seemed generally positive towards the initiative.
- Referring to the content of the standard, strong advice against the inclusion of the ambition (limits) in relation to the criteria in the standard was given because:
  - it is an aspect that is specific for the ecolabel in question and should, therefore, be determined by the ecolabel operator itself;
  - it could generate conflict of interests within the industry driving the standard; and

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2 "Green Manufacturing Engineering" and "green(eco) design product" are terms used by MIIT, in which "green" has the same meaning as "with environmental consideration".

3 DG ENV, Unit on Sustainable Production, Products and Consumption.

  - sometimes, the limits are not based on science and technology, but could be the outcome of consensus after discussions of a political nature.
- It could be acceptable/useful, however, to include limits that are based on the most stringent available requirement or best in class available, as long as it is possible to identify them.
- The EC encouraged, instead, for the standard to be focused on the development of a very clear/sharp definition for the criteria themselves, which is something that leads to discussion and/or failure, especially in respect to conformity assessment.
- Likewise, IEC TC 111 was strongly encouraged to focus on the identification of testing and conformity assessment methods for the different criteria defined; linked to the conformity assessments, aspects like self-assessment could be useful.
- The EC sees positively the flexibility of creating a validation team (VT) and a database for the criteria so that these can be updated regularly without needing to go through the process of a formal update of a full standard. However, they advised that these standard and database should be flexible/easy to use to ensure that ecolabel operators would keep their interest.
- The EC questions the broad "usability" of this standard by including EEE only.
- Terminology is an important aspect when approaching ecolabel operators. For instance, what is called a standard containing criteria is called a "set of criteria" document.
- In the near future it is the intention of the European Commission to link product environment footprint (PEF) to its European ecolabel.
- Last, in order to overcome a gap in credibility towards this standard, considering that it will be driven strongly from the industry perspective, it was advised to include representatives of NGOs and consumer organizations in the VT.

6.4 France

The French ecolabels are not focused on EEE and engagement with the French government would not be useful at this time.

6.5 Japan

In the activities of Eco Mark, development of mutual certification and harmonization for common criteria are recognized as an important issue within Japan. The specific needs are different depending on product type and market situation. They are currently biased towards certain products.

The Eco Mark office may have expectations for the utilization of consistent standards such as IEC standards. However, the possibility for mutual collaboration using an IEC standard in the future is at early stages of the discussion and additional, more-detailed discussions are needed.

6.6 The Netherlands

The topic was discussed with a representative of the Dutch ministry of Infrastructure and Water Management, the government body that is responsible for environmental matters in the Netherlands. The outcome of the discussion can be summarized as follows:

- in general, positive and supportive of the initiative;
- advise strongly against the inclusion of the ambition (limits) to the criteria; it should be left to the label operator to do so.

6.7 USA

Green Electronics Council (GEC)

IEC TC 111 discussed the concept proposal with the Green Electronics Council (GEC) – GEC operates the EPEAT™ ecolabel programme. The following initial comments and questions were provided:

- GEC is in agreement that common criteria for ecolabels are needed and that such criteria will be beneficial to simplify ecolabel standards development and implementation. This will provide better consistency and simplify assessment across criteria that can be easily harmonized, such as corporate criteria. GEC is planning to launch its own harmonization effort across the various ecolabel standards used by the EPEAT™ ecolabel.
- Some governments require ecolabel standards used for public purchasing to be freely available. The financial model for the use of harmonized criteria will need to be considered in more detail with regard to this requirement.
- Common criteria will need to be developed such that they establish a baseline for credible sustainable initiatives.
- The question was raised as to whether the harmonized criteria in an IEC standard will be impactful with regard to environmental performance? To be accepted by many stakeholders, the criteria need to demonstrate leadership in environmental performance and be impactful.
- The GEC representative expressed an interest in continuing to follow the next steps in developing an IEC standard and may be interested in participating in the development.

USA Environmental Protection Agency (EPA)

A web meeting between the US Environmental Protection Agency (EPA) in Washington, DC and IEC TC 111 took place on 16 July 2018. In the meeting, the EPA was represented by the Senior Advisor of the Environmentally Preferable Purchasing Program. It was clarified that the member was representing their own observations only and were not an official record of the EPA position.

- It was mentioned that the EPA provided the "seed" funding for the formation of the Green Electronics Council, managers of the EPEAT™ ecolabel. The Green Electronics Council became self-sustaining in 2008. The EPA has also participated in the development and/or update of the product sustainability standards that form the basis of EPEAT™. US federal purchasers are required to procure EPEAT™ registered products.
- The mission of the EPA Environmentally Preferable Purchasing Program is to help federal agencies procure environmentally preferable products and services. They do this by coordinating EPA engagement in the development of product sustainability standards, assessing and recommending product sustainability standards and ecolabels for use in federal procurement, providing technical assistance to US Federal Agencies (General Services Administration, Department of Defence, etc.), and measuring the economic and environmental benefits of federal sustainable procurement.
- The member expressed interest in gaining a better understanding of the process involving governmental agencies, NGOs, etc. in IEC standard development efforts as well as how stakeholder balance is developed and maintained.

Comments for consideration by IEC TC 111:

- The EPA "Recommendations of Specification, Standards, and Ecolabels for Use in Federal Procurement" recommends procurement of EPEAT™ registered products for computers, imaging equipment, televisions, and mobile phones. The need for "common" criteria to provide clarity/harmonization for the electronics base should be expanded.
- It is suggested that more participation of governmental agencies, NGOs and other stakeholders participate in the USNC TAG process. Resources and funding would need to be understood. Currently, US stakeholders are engaged to participate in EPEAT™ and

IEC TC 111 would need to verify that they would be able to participate in the IEC development process and maintenance of this standard.

- The way that each region develops environmental criteria is different. For example, one region may use a consensus/manufacturing-based model (USA), while another might be a more centralized model by governments/NGOs (Europe).
- In the USA, GEC/EPEAT™ has attempted to "line up" various ecolabel criteria to generate the development or update of IT product sustainability standards used by EPEAT™. An exploration of key common criteria involving representatives from many different countries may be helpful to increase awareness across ecolabels addressing IT products.

Questions that will need to be addressed by IEC TC 111, prior to gaining a wide-range of stakeholder support for such a standard:

- How will this standard be utilized?
- Will IEC have the active participation and inputs from the various regional ecolabel operators? Will they engage?
- Will this be an "open/consensus" or "centralized" process for developing the criteria for the ecolabels?
- How does IEC ensure balance across stakeholder categories in their standard development activities?
- How can IEC TC 111 most effectively work collectively/internationally? (Each region develops criteria differently.)
- How does IEC TC 111 best coordinate with GEC/EPEAT™ or other USA-based ecolabel development activities for electrical and electronic products?

7 Feasibility analysis of the harmonization of criteria of different ecolabel standards

7.1 Choice of products and relevant ecolabels

Today, computers and mobile phones are two of the most widely used electronic products in the world. For personal computers, in particular, there are mature standards globally for assessing product environmental performance. In addition, although computer types (e.g. laptop, desktop) differ in terms of form factors and the configurations, the product modules are similar and not easily exchanged. The development of mobile phones is rapid, with billions of products put on the market every year.

Based on the large quantity of products on the market and sufficient information of environmental performance globally, the project team chose to demonstrate the feasibility of standardization of environmental performance criteria by focusing on these two products, personal computer and mobile phone:

- For personal computers, the following standards were analysed: EU Ecolabel, Nordic Swan, Blue Angel, TCO Certified, IEEE 1680.1 (used by EPEAT™), Japan Eco Mark, Korea Ecolabel and China Environmental Labelling.
- For mobile phones, as the number of ecolabel standards available is more limited, Blue Angel, TCO Certified, and UL110 (EPEAT™) standards were compared.

7.2 Outcome of the assessment of ecolabels for personal computers

7.2.1 General

Each standard assesses the product across multiple environmental aspects. Among them, the use of hazardous substances in products and other material-related criteria are the most extensive parts in most ecolabel standards. Many mandatory and voluntary regulations and standards are focusing on the material-related content of products, and therefore, it is likely to represent a key part of the performance criteria lists.

Additionally, aspects like recyclability of the product and recycled material content are also among important criteria, as they are represented across numerous ecolabels. Design for recycling is becoming more and more popular among manufacturers. Aspects related to product lifetime extension and the efficient use of resources and energy, like repairability and upgradability are covered by multiple ecolabels. Also organization-related criteria are included in many ecolabels and could be included in the common criteria.

Table 5 to Table 11 exemplify how different ecolabels have set the numerous environmental criteria for personal computers. Aspects that are common across four or more ecolabels were highlighted in the table to facilitate their identification (see footnote).

Table 5 – Personal computers – Comparison of criteria of different ecolabels – Hazardous substances in products

Hazardous substances in products	EU Ecolabel	Nordic Swan	Blue Angel	TCO Certified	IEEE 1680.1	Japan Eco Mark	Korea Ecolabel	China ENV Label
EU RoHS directive conformity [a]	Legislation	Reduction	Reduction	Reduction	Reduction	Reduction	Reduction	Reduction
Cadmium exemptions					Reduction			
Mercury in light sources [a]	Reduction	Reduction			Reduction	Reduction		Reduction
Beryllium					Reduction			
Substances with risk-phrases or CRMs	Reduction		Reduction			Reduction		
Bromine content [a] – in plastic parts > 25 g – in plastic materials				Reduction	Reduction	Reduction		Reduction
Chlorine content [a] – in plastic parts > 25 g – in plastic materials – > 50 % w/w in plastic part	Reduction	Reduction		Reduction	Reduction	Reduction	Reduction	Reduction
BFRs/CFRs [a] – in plastic/ rubber > 25g – HBCDD, TCEP, TBBPA		Reduction	Reduction	Reduction	Optional	Reduction		Reduction
Halogens – in polymers – plastic cases > 25 g			Reduction	Reduction			Reduction	
Nickel in metal (in skin contact)	Reduction	Reduction						
REACH Authorization list substances					Reduction			
REACH Candidate List [a] – any part – Parts > 25g	Reduction		Reduction		Reduction	Reduction		
Plasticizers [a] – DNOP, DINP, DIDP – DEHP, DBP, BBP, DIBP – Power cables (20+)	Reduction	Reduction		Reduction	Optional	Reduction		Reduction
Biocides (different requirements)	Reduction		Reduction			Reduction		
Nano materials (e.g. nano silver) in product surface		Reduction						
VOCs product emissions						Reduction		
BaP < 25 mg/kg								Reduction
PAHs (16) < 200 mg/kg in accessible parts								Reduction
"Detachable" Hazardous materials parts							Required	
EU battery directive conformity [a]	Legislation		Conformity		Conformity	Conformity	conformity	conformity

[a] The aspects are common across four or more ecolabels.

Table 6 – Personal computers – Comparison of criteria of different ecolabels – Materials in products

Materials in products	EU Ecolabel	Nordic Swan	Blue Angel	TCO Certified	IEEE 1680.1	Japan Eco Mark	Korea Ecolabel	China ENV Label
Plastic parts > 25 g composed by single plastic (4 max.) [a]	Required		Required		Required	Optional		Required
Post-consumer recycled plastic content [a]	10 %	Declare %	Optional (%)	Required	Required	10 %		
Bio-based synthetic polymer content					Optional	10 %.		
Use of recycled magnesium alloy						Optional		
Recyclability rate of materials from products [a]		90%	90%		Required	90 %	65 %	80 % to 85 %
Reuse of parts						Optional	65 %	
Paint/metallization of plastic parts > 25 g		Elimination	Elimination		Required			
Material Coding on plastic parts > 25 g (ISO 11469 and ISO 1043 (all parts))		Required		Required	Required			
[a] The aspects are common across four or more ecolabels.								

Table 7 – Personal computers – Comparison of criteria of different ecolabels – Materials in package

Materials in package	EU Ecolabel	Nordic Swan	Blue Angel	TCO Certified	IEEE 1680.1	Japan Eco Mark	Korea Ecolabel	China ENV Label
Recycled content to be used in cardboards [a]	80 %	50 %			80 %	70 %		
Recycled content to be used in plastic bags / wrapping material [a]	75 %				75 %	40 %	50 %	
Must be recyclable				Required				
Haz Subs (Pb, Cd, Hg, Cr6+) < 100 mg/kg				Reduction	Reduction			Reduction
Halogens in polymers						Reduction		
Chlorine as a bleaching agent					Reduction			
Ozone depletion potential (ODP) foaming in EPS, EPE and EPP and HCFCs as foam agent						Reduction	Reduction	Reduction
Shock-absorbing materials certified according to EL 606							Required	
Package to be labelled (GB/T 18455, recycling mark)								Required
Non-reusable packaging components > 25 g easy to separate without tools				Required	Required			
[a] The aspects are common across four or more ecolabels.								

Table 8 – Personal computers – Comparison of criteria of different ecolabels – Materials in manufacturing

Materials used in manufacturing	EU Ecolabel	Nordic Swan	Blue Angel	TCO Certified	IEEE 1680.1	Japan Eco Mark	Korea Ecolabel	China ENV Label
NF_3/SF_6 emissions (LCD production)		Reduction			Optional			
HCFCs and other fluoro-chloro compounds and emissions from – final assembly – parts manufacturing					Optional	Reduction		Reduction
Phosphorous-based degreasing and coating agent used in pre-treatment								Reduction
Compliance with ENV Laws, etc. > 5 years from the date of application						Required		

Table 9 – Personal computers – Comparison of criteria of different ecolabels – Materials efficiency aspects

Materials efficiency aspects	EU Eco label	Nordic Swan	Blue Angel	TCO Certified	IEEE 1680.1	Japan Eco Mark	Korea Eco label	China ENV Label
Easy disassembly (e.g. common tool and single person) [a]	Required	Required	Required		Required	Required	Required	Required
Reparability [a]	Required		Required	Optional	Optional	Required		
Spare parts availability (5 years) [a]	Required			Required	Required 3 years	Required		
Upgradability of major components [a]	Required	Required	Required		Optional		Required	Required
Modular design	–	Required					Required	
Battery replacement / removal			Required		Required			
Product durability / Minimum service life			15 000 h					500 h
Long life rechargeable battery			500 cycles		Optional			
Instructions / Service information	Required				Optional	Required		

[a] The aspects are common across four or more ecolabels.

Table 10 – Personal computers – Comparison of criteria of different ecolabels – Other product technical requirements

Other product technical requirements	EU Eco label	Nordic Swan	Blue Angel	TCO Certified	IEEE 1680.1	Japan Eco Mark	Korea Eco label	China ENV Label
Noise	Required	Required	Required	Required			Required	Required
Energy usage (use-phase)	Required	Required	Required	Required	Required [a]	Required	Required	Required
Energy usage (stand-by)	Required	Required	Required	Required				

[a] The product shall conform to the ENERGY STAR® product specification (computers or displays) that is applied at the time of application.

Table 11 – Personal computers – comparison of criteria of different ecolabels – Organization aspects

Organization aspects	EU Eco label	Nordic Swan	Blue Angel	TCO Certified	IEEE 1680.1	Japan Eco Mark	Korea Eco label	China ENV Label
ENV management system (Manufacturer sites) – ISO 14001/EMAS – Third party certified				Required	Required			
ENV management system (Supplier)					Optional			
Corporate ENV performance report (OHSAS, EMAS, etc.)				Required	Required			
Report CO2 footprint, GHG emissions					Optional			
Code of conduct (human rights, labour ENV protection and anticorruption)		Required			Optional			
Traceability (ISO 9001)		Required						
Socially Responsible Manufacturing / Cleaner production				Required	Optional			Required
Conflict Minerals due diligence				Required	Optional			

7.2.2 Conclusions from the analysis of personal computer standards

The criteria in the standards listed in Table 5 to Table 11 were evaluated and general conclusions per region were collected in Table 12.

Table 12 – Personal computers – Summary and conclusions

Aspects	Criteria	Comments
Material	Conformity to EU RoHS	All standards require EU RoHS compliance.
	Eliminate mercury or its compound in display.	EU Ecolabel, Nordic Swan, TCO Certified, IEEE 1680.1. Japan Eco Mark and Korea Ecolabel do not allow mercury in the display panel backlight. China Environmental Labelling allows the use in the display panel backlight not exceeding 3 mg.
	Reduction or elimination of bromine and chlorine content in plastic parts > 25 g.	All standards have at least one halogen-related criteria.
	Packaging should contain certain ratio recycled material or Be recyclable and eliminate ODP foaming agent.	EU Ecolabel, IEEE 1680.1 and Japan EcoMark pay more effort on recycled material and recyclability. Korea Ecolabel and China Environmental Labelling focus on ODP.
	Eliminate HCFCs materials (ODP).	Japan Eco Mark and China Environmental Labelling include the criteria.
	Use recycled plastic.	EU Ecolabel, IEEE 1680.1 and Japan Eco Mark include the criteria.
	Product shall be easily disassembled by common tool and single person.	EU Ecolabel, Japan Eco Mark, Korea Ecolabel and China Environmental Labelling include the criteria about tool and personnel.
Material efficiency	Product upgradeability and reparability.	All mentioned about the upgradeability and reparability.
	Design for recycling.	Criteria might be different but the key is design for recycling.
Organization	Third party certificated EMS/ISO 14001.	IEEE 1680.1 and EU Ecolabel include the requirement.

From Table 5 to Table 12, therefore, it can be concluded that:

- Ecolabel product standards set not only product criteria (e.g. reduction of hazardous substances, higher energy efficiency) but also corporate criteria (e.g. management system requirements).
- Criteria can be qualitative (e.g. disassembly) or quantitative (e.g. recyclability rate).
- There is a strong focus by all ecolabels on the elimination of hazardous substances from products. For instance, reduction of RoHS substances is a criterion adopted by all standards reviewed across different EEE product types. These are criteria expected to be very easy to harmonize.
- Some specific topics, for example the management of halogens in products, are adopted by nearly all ecolabels. However, the exact definition of those criteria is variable for different ecolabels: some will seek to eliminate individual halogens from plastics (e.g. chlorine or bromine), others will focus on materials like PVC or brominated and chlorinated flame retardants. The last group will focus on all halogens. This would make the harmonization of such topics a bit more challenging.

- Some criteria seem to be unique to specific ecolabels, region or product type (e.g. auxiliary materials used in manufacturing). These are possibly more difficult to harmonize across all the standards.
- For packaging material, requirements to use recycled content of both cardboards and plastics seem to be a global requirement by different ecolabels. However, variation exists in the ambition level (content in per cent) set by the different ecolabels. This suggests that the criteria itself is likely to be easy to harmonize, but the ambition (target in per cent) may be more difficult to harmonize.
- In general, most ecolabels treat aspects on material or resource efficiency equally, with special focus on repair, upgrade and management of spare parts.
- Most ecolabels address other technical aspects like noise reduction and energy efficiency of the product.

7.3 Outcome of the assessment of ecolabels for mobile phones

Table 13 below shows the summary of the environmental performance criteria of different ecolabels for mobile phones:

Table 13 – Mobile phones – Summary and conclusions

Aspects	Criteria	Comments
Material	REACH Regulation RoHS Directive Battery Directive	Some of the standards assessed require material to comply with the EU REACH Regulation, RoHS Directive and the battery shall meet the Battery Directive.
	Engagement in conflict minerals	Complying with the OECD Due Diligence Guidance for Responsible Supply Chains of Minerals from Conflict-Affected and High-Risk Areas.
	Reduction or elimination of bromine and chlorine content in plastic parts > 25 g	All standards have at least one flame retardant related criteria.
	Packaging should use a certain ratio of recycled material or be recyclable	Packaging should use some ratio recycled material or be recyclable. US restricted expanded polystyrene packaging (EPS) and chlorine in packaging materials.
	Use recycled plastics	Use recycled plastics.
	Ability to disassembly	Product shall be easily disassembled by common tool and single person.
	Replaceability of the battery	Product specific requirement: The mobile phone shall be designed so as to allow the user to replace the rechargeable battery without special expert knowledge and without damaging the telephone.
Material efficiency	Product upgradeability and reparability	All mentioned about the upgradeability and reparability.
	Design for recycling.	Criteria might be different but the key is design for recycling.
Organization	Third party certificated EMS/ISO 14001	US and EU criteria include the requirement.

It can be concluded that:

- Some criteria are generic and found to be similar across product categories, for example RoHS, REACH. Other criteria are product specific for example EU Battery Directive.
- Ecolabel product standards set not only product criteria (e.g. reduction of hazardous substances, higher energy efficiency) but also corporate criteria (e.g. management system requirements).

- Criteria can be qualitative (e.g. disassembly) or quantitative (e.g. recyclability rate).
- There is a strong focus by all ecolabels on the elimination of hazardous substances from products. For instance, elimination of RoHS substances is a criterion adopted by most standards as well as across different product types. These are criteria expected to be very easy to harmonize.
- Some specific topics, for example, the use of recycled material or reused components, are adopted by nearly all ecolabels, suggesting that the criteria itself is likely to be easy to harmonize. However, the ambition (target in per cent) may be more difficult to harmonize.
- In general, most ecolabels treat aspects on material or resource efficiency equally, with special focus on repairing, upgrade and management of spare parts.

7.4 Considerations for criteria harmonization

7.4.1 General

Based on the analysis and comparison of various ecolabel standards in Clause 5 and 7.2 and 7.3, it was identified in this study that some criteria have very similar requirements and should be easy to harmonize while other criteria are less consistent and may pose additional challenges in harmonization. In some cases, similar criteria in different ecolabel standards are using different definitions or high-level requirements that do not need to be different and could be harmonized without changing the environmental benefit.

The study also found that there were specific detailed requirements (such as level of performance) that may need to vary across products or possibly geographies. For example, in the outreach activities, some stakeholders indicated that the level of performance is politically driven. These factors would need to be considered if a harmonization effort is to be successful.

Subclause 7.4 examines two examples of criteria for potential harmonization: (1) a criterion that should be easy to harmonize across a broad range of EEE products (example 1 on the reduction of RoHS substances) and (2) a criterion that has traditionally raised many subtle practical implementation issues and geographic variation which may be more difficult to harmonize (example 2 on the use of recycled plastic content).

7.4.2 Example 1 – Reduction of RoHS substances

Most of the ecolabel standards reviewed here include a criterion that restricts lead, mercury, cadmium, and hexavalent chromium and their compounds and PBB and PBDE substances as per the threshold levels listed in the EU RoHS Directive. This includes the standards/ecolabels IEEE 1680.1, Japan Eco Mark, Korea Ecolabel, and the China Environmental Labelling. The predominantly EU ecolabels (EU Ecolabel, Nordic Swan, and TCO Certified) already benefit from a regulatory requirement for EU RoHS, so the restrictions are somewhat redundant. Nevertheless, TCO Certified includes the RoHS substance restriction for completeness.

Some standards also limit the use of specific RoHS exemptions such as mercury in display panel backlights, lead in solder and cadmium exemptions.

Harmonization opportunity: overall, product substance restrictions based on the EU RoHS Directive would be relatively easy to harmonize as a common criterion for a very broad range of electrotechnical products. The substances that are restricted and the thresholds that are used are consistent.

With regard to substance use exemptions, the IEC 62474 database will include (going forward) lists of substance exemptions that have been implemented in regulations; these exemption lists can be referenced to indicate exactly which exemptions are permitted by the ecolabel.

An option would be, for instance, to set the elimination of the use of some exemptions mandatory or optional.

7.4.3 Example 2 – Use of recycled plastic content

This example looks at the technical aspects that need to be considered to achieve a harmonized criterion on the recycled plastic content in electrotechnical products.

Most ecolabel standards reviewed include requirements related to post-consumer recycled plastic content in the product. Requirements include declaration of the recycled content, a minimum recycled plastic content and/or optional points for achieving higher levels of recycled plastic content.

Harmonization opportunity: The development of recycled plastic content criteria has often been challenging for a broad variety of reasons:

- unclear definition of what exactly qualifies as recycled plastic content;
- difficult to determine which plastic parts are eligible for consideration;
- decision on the application of a "de minimis mass" for plastic parts that need to be considered versus the total plastic mass in the product might be more appropriate to be made by the ecolabel operator;
- some plastic materials and/or parts should be excluded for performance, safety or practical reasons (e.g. labels, adhesives, coatings, ESD components, ruggedized plastic parts);
- supply of recycled plastic may be insufficient in a given geography;
- the possible level of recycled plastic content usually varies with the type of product, quantity of plastic in the product, and/or availability of recycled plastic.

Despite the challenges, many aspects of a recycled plastic content criterion could be harmonized, such as:

- the definition of recycled plastic content (leveraging international standards wherever possible);
- the equation and assumptions used to calculate the percentage (or total mass) of recycled plastic content, for example, that the required recycled plastic content is an average across all the plastic parts in the product and not that each plastic part contains recycled plastic;
- a baseline list of parts/materials that are excluded from the requirement (e.g. labels, adhesives, coatings, ESD components) that are relevant to all EEE products; additional exclusions may need to be added based on the product type;
- a default de minimis mass of the plastic parts that need to be considered. This could assist harmonization (the de minimis mass may need to be adjusted for specific products or applications).

Harmonization of the above elements would make a significant contribution to reducing the amount of time and effort that it takes to develop a recycled plastic content criterion for an ecolabel standard.

The actual recycled content level would likely still need to be set based on the product type and would therefore be established by a product standards committee or ecolabel operator. For example, even the IEEE 1680.1 standard sets different levels within the single standard for desktop computers, integrated desktop computers, laptops, tablets/slates, and monitors because of inherently different opportunities to use recycled plastic, especially in the external enclosure.

8 Concept proposal for possible international standard

8.1 Introduction and requirements for the concept proposal

Clause 8 proposes a concept for a possible international standard on harmonized criteria for environmental assessment of EEE products. It is not a final proposal but rather a vision of how such a standard could be implemented to meet specific requirements that were identified in the study.

8.2 Scope of a possible international standard

The end result of an IEC standard on harmonized environmental assessment criteria is to establish a set of criteria that could be relevant to a broad range of electrotechnical products and addresses the needs of markets worldwide. The broad applicability is important given that most of the electrotechnical industry uses an intertwined global supply chain that is inevitably pulled into achieving certain environmental performance expectations.

It is not the intention of the IEC standard to suggest or imply that the criteria requirements are appropriate for or should be utilized for all electrotechnical products. An ecolabel operator, product TC, or SDO is in the best position to determine whether an ecolabel standard is appropriate for a given product type and, if so, which harmonized criteria are relevant. For example, ecolabel programmes typically focus on products where there is significant opportunity for environmental improvement. Factors that may be relevant include volume of product sales in the market, product lifecycle and opportunities for reducing environmental impacts based on the material and technologies that are used.

There may also be EEE sectors that are addressing reductions in environmental impacts through means other than ecolabels. An example may be applications in which "self-regulatory initiatives" are used to address unique or specialized product categories. Such products, which are not considered in this study, may not be suitable for harmonized environmental assessment criteria, and, therefore, are recommended to be outside the scope of an international IEC standard.

8.3 Requirements for a possible international standard

The following requirements have been identified as needing to be addressed by an international standard:

a) A methodology to determine what environmental performance requirements (criteria) should be included in the standard and what should not be included.

b) Recognition that there are situations where the detailed requirements of a criterion may need to vary based on product type or based on region. In these cases, it may be necessary to provide flexibility to the users of the standard to specify requirements (such as specific performance values or thresholds that need to be attained).

c) A mechanism to review and maintain the criteria on a regular basis to ensure the requirements represent best in class practices and meet the requirements of stakeholders.

8.4 Structure of a possible international standard

In order to address point c) above, the concept for an international standard includes two parts:

a) a document that specifies how to create and maintain environmental assessment criteria, and

b) an IEC database with the actual criteria.

The use of an IEC database has several benefits, including the opportunity to incrementally develop (new) criteria and to update criteria that are out of date and need to be revised.

A possible outline for the document portion of the standard is:

- Scope
- Normative references
- Terms and definitions
- Framework for developing environmental performance assessment criteria
  - Methodology to determine which criteria should be included
  - Methodology to develop verification requirements
- Guidelines for users developing product specific criteria
  - Note that guidelines are for users that may use this international standard
- Process for continuous maintenance of environmental performance assessment criteria

Subclause 8.7 provides additional information on the contents of the IEC XXXXX database.

8.5 Types of environmental performance assessment criteria

8.5.1 General

The study identified two types of criteria that are commonly used in ecolabel standards:

- corporate criteria: these are requirements that need to be implemented on a corporate level by the product manufacturers (e.g. brand owner) or by supplier organizations;
- product criteria: these are requirements that need to be met by the individual product (e.g. reduction of hazardous substances).

Furthermore, three classes of criteria are envisioned in this proposal in order to address point b) in 8.4:

- common criteria for all product types;
- criteria that may vary by product type;
- criteria that are inherently unique to specific product types.

8.5.2 Common criteria

Common criteria are broad-based requirements that are applied to many different types of EEE products. Examples of possible common criteria identified in the standards reviewed in this study are:

- environmental management system (EMS) for design and manufacturing organizations;
- corporate environmental performance reporting by the manufacturer;
- elimination of RoHS substances.

8.5.3 Criteria that may vary by product type

Criteria that may vary by product type include requirements that are relevant to a broad range of products, but the specific threshold that needs to be met may vary from one product type to another. Examples of such criteria are:

- recycled plastic content;
- reduction of certain substances with hazardous properties;
- energy consumption improvement;
- design for repair and reuse.

Each of these criteria is relevant to most or all EEE products, but the degree of improvement (ambition) cannot be a fixed value across all products. As an example, one of the standards considered in this study, IEEE 1680.1, sets different thresholds for post-consumer recycled plastic content for desktop computers, notebook computers, tablets and monitors. This was done in recognition that each product type had different amounts of plastic that could accommodate recycled content.

However, there is still a benefit in harmonizing other aspects of the criterion such as definitions, calculation methodology, exclusions, verification method. For this class of criteria, the IEC TC 111 standard could specify all aspects of the criterion except specific values or details that need to vary by product (or by region). The specific values could be set by the users of this standard as appropriate. To assist the users in setting these values, the standard should provide guidance or considerations that should be taken into account.

8.5.4 Criteria that are inherently unique to specific product types

Some criteria are inherently unique to specific products and may require specialized technical expertise to develop. Development of the requirements for these criteria may be best left to product TCs or other stakeholders who have the required expertise. However, it may be useful for the IEC TC 111 standard to provide guidelines for a framework and/or verification methodology when developing such criteria for consistency with other criteria.

8.6 Use model for harmonized environmental performance criteria

Figure 1 provides an example of potential users of such a standard (that could be a product TC, a national or international SDO, or ecolabel operators) adopting/adapting criteria from the IEC TC 111 standard. The boxes on the left side of the figure represent the criteria listed in the IEC XXXXX database. The right side of the figure represents a product standard that is adapted by the user for their use.

The organization that is adopting/adapting the criteria will review the criteria in the IEC XXXXX database and decide which of those criteria are relevant to the products and/or regions that they intend to cover.

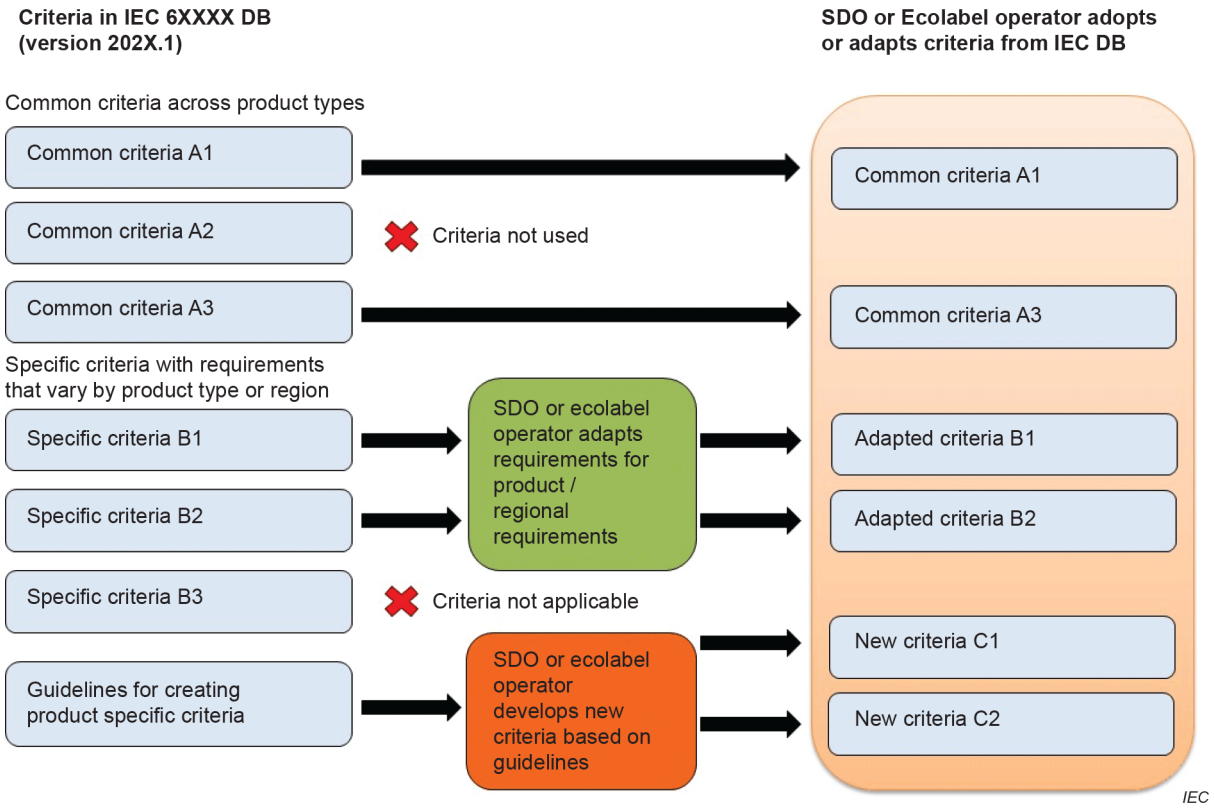

Figure 1 – Use model for environmental criteria

In the example in Figure 1:

- some of the criteria may not be relevant to the adapted standard and therefore are not used – as indicated by the red Xs in the figure;
- the adapted standard on the right side of the figure has adopted two of the common criteria in the IEC XXXXX database (A1 and A3 that it considers relevant) and
- has adapted criteria B1 and B2 by specifying value or thresholds relevant to the product;
- for criteria C1 and C2, guidelines in the IEC XXXXX standard have been used to develop new criteria C1 and C2.

8.7 IEC database for environmental product assessment criteria

In this concept proposal, the IEC database would contain:

- common criteria for all product types;
- criteria that may vary by product type;
- other information/guidelines that may need to be updated on a regular basis.

For the development and continuous maintenance of the criteria, a validation team (VT) should be established and would operate in accordance with the procedures for the maintenance of IEC standards in database format (Annex SL) of the IEC Supplement to the ISO/IEC Directives. The VT would utilize the rules specified in the written standard to develop and maintain the criteria requirements. The process may include:

- an annual maintenance cycle of the database;
- proposals that, at any moment, can be submitted by national committees' members of the VT to update (or delete) criteria that are out of date;
- proposals that may also be submitted for the inclusion of new criteria.

The working group (WG) developing this standard may choose to develop a few initial criteria to populate the first version of the database or it may choose to leave this to the VT.

Advantages to using a database include the following:

- criteria may be added over time instead of all at once in the standard;
- criteria that are out of date can be scheduled for update during an annual maintenance cycle;
- the VT can assess new proposals for environmental benefit (method is needed) and prioritize these new proposals based on environmental benefit;
- the VT can plan work based on available resources to create/update criteria in the database.

When users (product TCs, national SDOs, and ecolabel operators) revise their environmental product assessment standards, they can adopt/adapt the latest set of criteria from the IEC database as appropriate.

8.8 Business model for the standard

Given that the key intellectual property of the standard is primarily embedded in the criteria which are in the database, IEC could implement a subscription requirement for access to the information in the database.

IEC product TCs would have access to the criteria to develop product specific environmental assessment standards. Use of the harmonized criteria wherever possible will significantly reduce the time, effort, and expertise required to develop such standards.

SDOs and ecolabel operators may, in turn, adopt the IEC product specific standards (or use the database criteria directly) using the normal business model for adopting IEC standards as national standards. This will save SDOs and ecolabel operators significant time and effort in deploying ecolabel programmes.

8.9 Potential benefits to stakeholders of the chosen approach

For an international standard on harmonized product environment assessment criteria to be successful it will need to address the requirements of users and stakeholders, including the ecolabel operators.

Potential benefits of this approach for users include the following:

- leverages the expertise of a global team that maintains best in class environmental performance criteria;
- reduces the effort/cost in developing common criteria;
- focuses effort on criteria that provide differentiation for the product type;
- provides improved mutual recognition of ecolabels between regions.

The potential benefits for manufacturers include:

- harmonized criteria in environmental performance areas where there is no justified differentiation;
- consistent requirements for design and manufacturing leading to reduced costs;
- consistency in requirements propagated into supply chains that support multiple product types;
- a roadmap of upcoming environmental performance criteria via the database validation team.

The use of an IEC database for storing and managing the criteria provides inherent benefits in the development of the standard: the criteria can be developed incrementally over time rather than all at once. The written document (pdf file) only contains the methodology and framework for developing the criteria and other guidelines – this can be written and agreed upon much more quickly than the criteria themselves.

9 Conclusion and recommendations

This study was established with the objective to assess if the harmonization of environmental performance criteria used to populate ecolabels applicable to electrical and electronic equipment would be possible. Moreover, its intent was to determine if, to benefit the electrotechnical industry, an IEC International Standard on environmental performance criteria applicable to EEE products would be feasible.

The need for such an IEC standard is predicated on the analysis that there are many ecolabels globally conflicting and/or competing with each other. Governments, test houses, manufacturers and other stakeholders are creating their own procurement documents based on whichever ecolabel standards have done the best job of marketing/selling their criteria. This might not be the best solutions available for EEE products to achieve the balance of performance, safety and what would be best for the environment or public health.

In this study, a series of ecolabel standards covering different geographies globally have been identified and compared. Along with recommendations, this document shows potential hurdles and challenges of generating such an international standard. It also includes a draft framework for a potential new work item proposal (NWIP) for the future IEC International Standard to be developed, along with ideas for the continuous maintenance of the selected criteria.

The overall conclusion of the study is that:

- Harmonization of environmental performance criteria presents different degrees of difficulty, depending on the criteria at hand. It is relatively easy to achieve harmonization of environmental performance attributes that are common across the electrotechnical industry, while product specific criteria or technology specific criteria might be more challenging. In other words, it is technically possible to harmonize environmental performance criteria and thus, it is feasible to develop such an international standard.
- Harmonization of environmental performance criteria is beneficial to various stakeholders and it has support from all relevant stakeholder groups, including external ecolabel operators.
- Ecolabels exist for a range of electrotechnical products based on market need that is driven by attributes such as volume of product sales in the market, product lifecycle and opportunities for reducing environmental impacts given the material and technologies that are used. The scope of an international standard should focus on these segments of the electrotechnical industry.
  - The intention of an international standard would be to globally harmonize environmental assessment criteria across products that are suitable for ecolabels. The study did not assess and does not recommend the harmonized standard for other product categories for which the value of ecolabels has not been demonstrated or the applicability of the harmonized criteria has not been assessed.
  - For the product categories which may not be suitable candidates for ecolabels and/or may be addressing reductions in environmental impacts through other means, it is recommended that they should therefore be outside the scope of an international standard.
- A potential international standard should address not only the methodology to determine environmental performance requirements, but also identify possible exceptions (or exemptions) and propose an effective mechanism to review and maintain the criteria to ensure the requirements represent at all times best in class practices and meet the requirements of stakeholders.

The overall recommendations of IEC TC 111 NCs are:

- to approve and support the initiative to develop an IEC International Standard to harmonize environmental performance criteria;
- to approve and support the initiative to create a database to contain the environmental performance criteria, allowing for fast reaction to changes and new requirements;
- to approve and support the initiative to create a Validation Team needed to maintain the above-mentioned database.

Bibliography

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