

UNDERSTANDING THE CERTIFICATION PROCESS FOR END-OF-LIFE ELECTRONICS

SUMMARY REPORT TO INFORM THE IEEE 1680.1 WORKING GROUP



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ENVIRONMENTAL ASSESSMENT OF ELECTRONICS PRODUCTS

The IEEE 1680 series of standards was established to provide a clear and consistent set of environmental performance criteria for the design of personal computer products (1680.1), imaging equipment products (1680.2), and televisions (1680.3).

The recently adopted 1680.2 and 1680.3 standards include requirements for end-of-life processing (section 4.6.2.1 in both) which require that end-of-life processing facilities be certified by an accredited certification body to a qualified recycling standard. Thus, the integrity of qualified recycling standards and their certification programs are essential to ensuring that the 1680 series of standards achieve their stated goals.

This summary document has been prepared to explain the role and credibility of certification programs in general, and to describe how certification programs are established and operate. It is intended to assist decision makers in the EPEAT standards revision/development process to better understand how certification works.

USEFUL TERMS & DEFINITIONS

TERM	DEFINITION
Accreditation Body	Organization providing 3rd-party attestation that a conformity assessment organization (i.e. certification body) is competent to carry out specific conformity assessment tasks for specific standards
Certification Body	3rd-party organization contracted to evaluate (including audit) an organization's conformance to the requirements of specific standards
Registration	The process of issuing a formal certificate of certification (often used interchangeably with the word 'certification')
3 rd -party audit	Conducted by external, independent auditing organizations such as those providing registration or certification of conformity to a standard ⁱ
2 nd -party audit	Conducted by parties having an interest in the organization such as customers, or by other persons on their behalf ⁱ
1 st -party audit	Conducted by or on behalf of the organization itself

Table 1 Useful terms and definitions



THE ROLE AND CREDIBILITY OF CERTIFICATION PROGRAMS

Certification programs provide a formal process to assure interested parties that an organization (or product) conforms to a standard or set of criteria that has been established to meet specific objectives; for EPEAT stakeholders, the focus is on environmental, health and safety objectives. Common examples of standards include ISO 9001 (quality) or ISO 14001 (environment).

A number of certification programs have emerged in numerous jurisdictions for end-of-life electronics (EOL) to ensure environmental, health and safety, and export criteria are met. Examples include:

- Responsible Recycling ("R2") Practices for Use in Accredited Certification Programs for Electronics Recyclers
- e-Stewards® Standard for Responsible Recycling & Reuse of Electronic Equipment®,
- Recycler Qualification Program for end-of-life Electronics Recycling (RQP), and
- WEEELABEX.

CORE ELEMENTS OF CERTIFICATION & VERIFICATION

Approaches to end-of-life electronics certification vary; however, most programs exhibit core elements that have been established to demonstrate the credibility of their programs (see Figure 1).

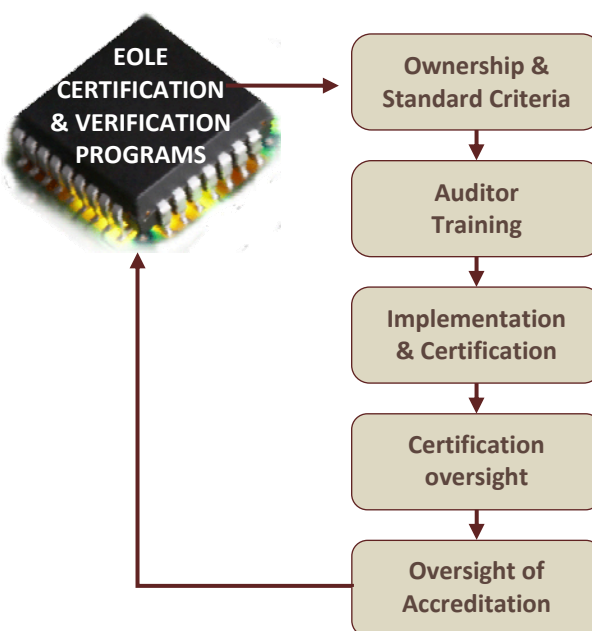


Figure 1 Core elements of a credible program

Each of the elements identified in Figure 1 is described in more detail in the following sections.

OWNERSHIP & STANDARD CRITERIA

Standards are the foundation of assurance programs as they provide the criteria by which the performance of an organization (or a product) can be assessed, assured, and certified. This said, standards are written for many purposes, and not all standards have associated certification. The oversight process may vary from:

- Self declaration by an organization that they meet specific criteria,
- Industry-led or non-profit verification that an organization meets specific criteria, and/or
- IAF Accredited Certification, which provides a widely accepted global norm for assuring that an organization conforms to a standard.

STANDARD CONTROL & INTERPRETATION

Typically, but not always, a standard is owned and controlled by an entity responsible for releasing only one version at a time, and providing clarifications when questions arise regarding the intent or meaning of the standard. These questions may arise from auditors, their clients, or accreditation bodies, if applicable.

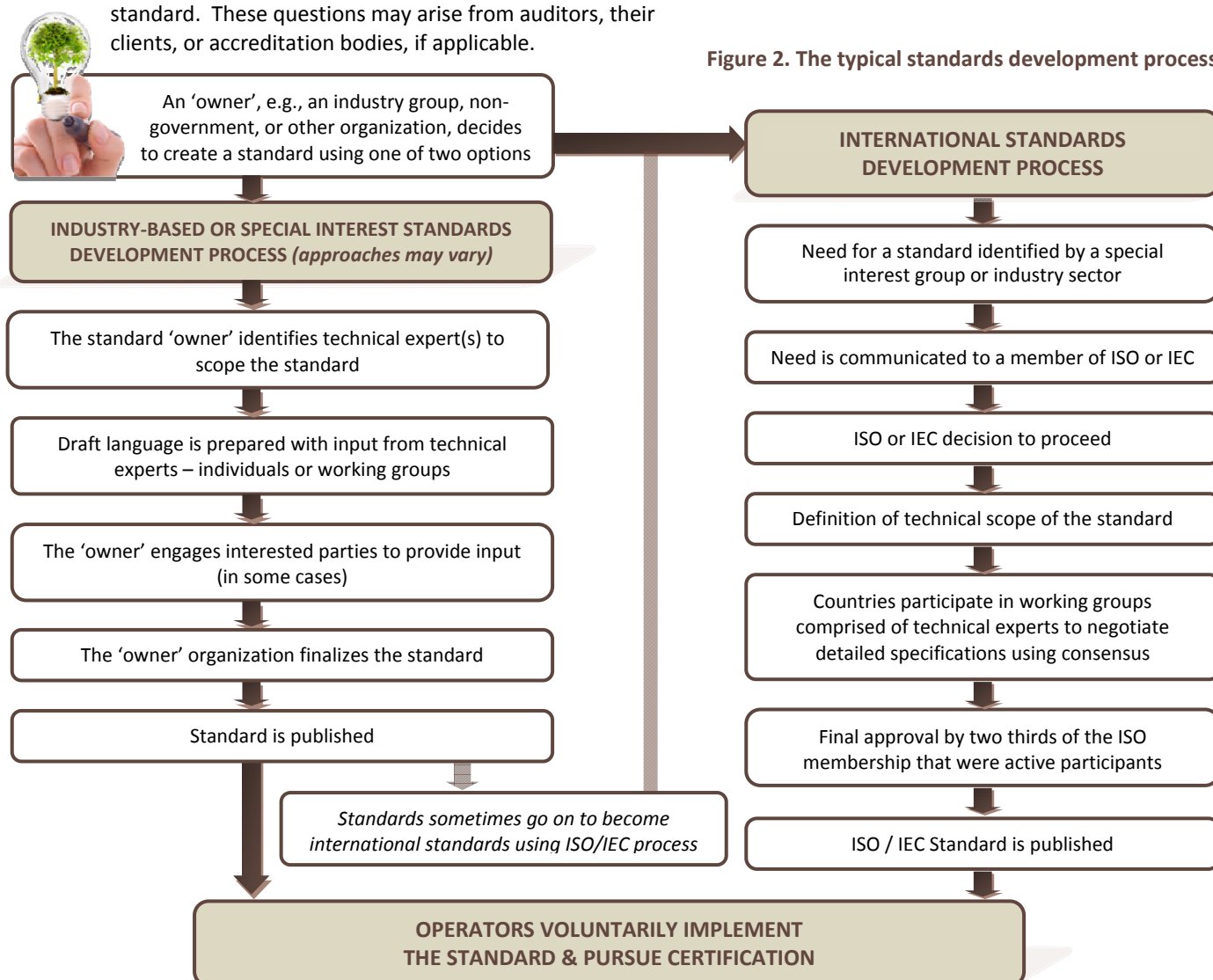
STANDARD MAINTENANCE

International standards are typically reviewed and possibly revised every 3-5 years, in order to ensure they remain pertinent in the marketplace, and keep up with changing realities. Some programs include a formal mechanism, called Sanctioned Interpretations, for making small changes to a standard between formal revisions, while others issue communications and informal guidance that usually become part of subsequent versions of a standard.

THE STANDARD DEVELOPMENT PROCESS

Credibility of certification programs is enhanced when the process used to develop the standard's criteria involves broad representation, e.g., from industry, government & environmental groups. Figure 2 provides an overview of two common approaches to standards development.

Figure 2. The typical standards development process



AUDITOR TRAINING & QUALIFICATION

Competent auditors and the correct interpretation of a standard are also fundamental to the integrity of a program; auditors use the standard 'on the ground' to measure an organization's performance in relation to the standard's criteria. Thus, the provision of effective auditor training is essential and enhances consistent application of the standard's criteria and requirements.

Figure 3 provides an overview of the types of issues generally covered in auditor certification training programs.

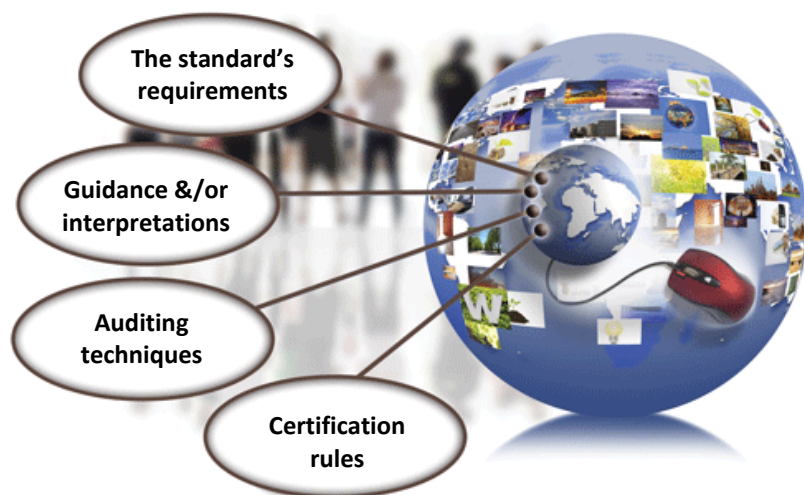


Figure 3 Typical auditor certification training topics

Requirements for auditor training and qualification may be established and enforced by:

- ▶ The verification program or standard owner – who may set the requirements and contract another entity to provide auditor training, or conduct the training itself.
- ▶ Certification Bodies – who establish and implement procedures to ensure the competency and training of their auditors. This process is also audited by Accreditation Bodies.



IMPLEMENTATION & CERTIFICATION

The approach taken by organizations wishing to assure that an organization (e.g. a recycler) conforms to a specific standard varies as can be seen from Table 2.

PROGRAM TYPE	ASSURANCE PROCESS
Certification	<ul style="list-style-type: none"> ▶ Managed by accredited certification bodies (CBs) ▶ Use of accredited 3rd-party audits and certification
Verification	<ul style="list-style-type: none"> ▶ Usually managed by industry or non-profit organizations ▶ Use a 3rd party unaccredited verification process conducted by qualified 3rd party auditors
Self Declaration	<ul style="list-style-type: none"> ▶ Allow 'self-declaration' with either no independent conformity assurance or verification conducted after the declaration

Table 2 Assurance methods

Certification programs come into play when an organization (e.g., a recycler) implements a standard to improve performance or to demonstrate to customers that specific requirements are being met.

Companies may implement the standard using internal resources; however it is also common practice to engage consultants who have hands-on experience implementing systems that conform to a standard.

Once a standard is implemented, if a company chooses to become certified, it will engage a Certification Body to certify its operation (or products) to a specific standard.

A certification body (CB) then evaluates and verifies an organization's conformity to a standard using documentation and onsite audits (this is the 3rd-party audit).

In the event that a criterion or standard requirement has not been implemented, the company will be required to take corrective action to come into conformity before certification (also called registration) is awarded.

Certification bodies also apply their own procedures to ensure:

- ▶ Independence is maintained,
- ▶ Auditors are trained, qualified, and competent, and
- ▶ Audits are conducted according to requirements such as ISO 19011:2002 auditing guidelines.

CERTIFICATION BODY (CB) ACCREDITATION

While some programs do not require their CBs to be accredited to certify clients to a standard, additional credibility is offered in certification programs that do require accreditation of certification bodies (CBs).

Traditionally, accreditation is a voluntary process by which CBs apply and may then become accredited by an Accreditation Body. The Accreditation Body (AB) then evaluates each CB to assure conformity to audit procedures, auditor competency requirements, and quality control processes. The Accreditation Body can then accredit the CB for the selected standard. Figure 4 provides a description of the CB accreditation process.

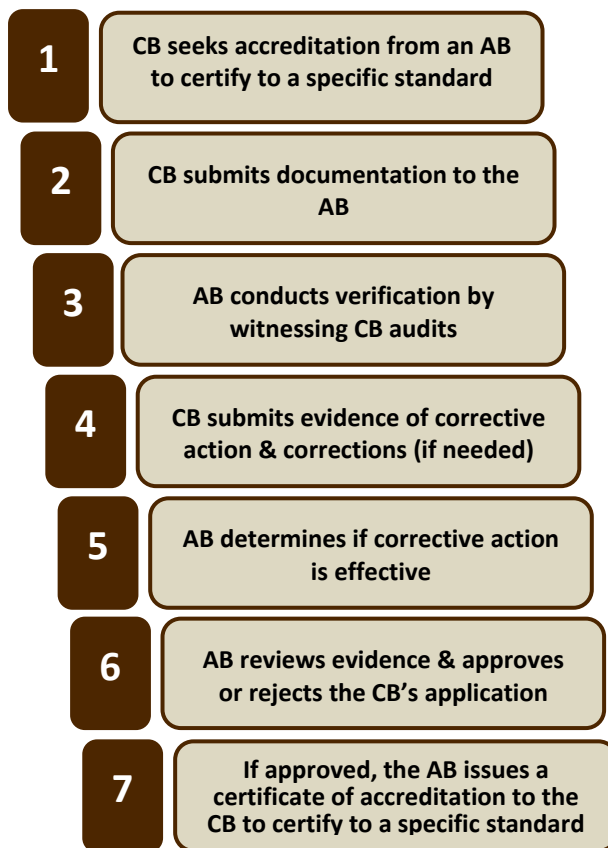
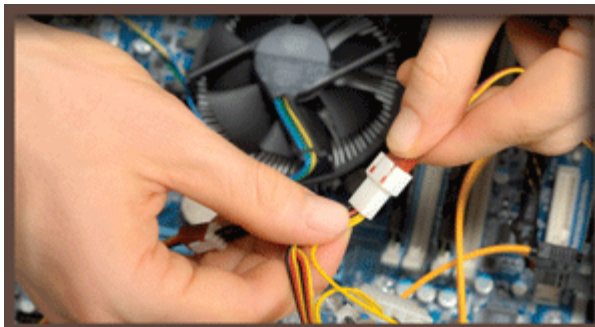


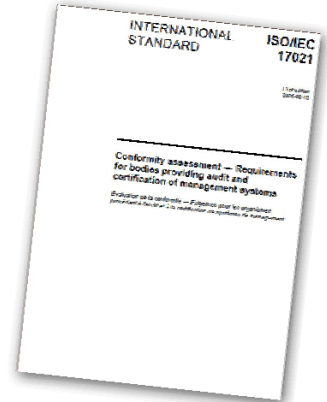
Figure 4 Steps in the Certification Body accreditation process



CERTIFICATION PROCEDURES

The foundational standard by which certification bodies are accredited globally (in the area of EOLE certification) is ISO 17021ⁱⁱ.

ISO 17021 specifies requirements for ensuring that certification bodies operate management system certification in a competent, consistent and impartial manner, thereby facilitating the recognition of such bodies and the acceptance of their certifications on a national and international basis.



If an organization's processes and or management system (a requirement in some standards) is determined to be in conformity with the standard, the Certification Body will register the organization as "certified". The terms certification and registration are used interchangeably, to refer to this certification.

OVERSIGHT OF ACCREDITATION

An additional layer of assurance is provided in some certification programs by organizations which oversee signatories or member accreditation bodies, e.g.:

- The International Accreditation Forum (IAF) which oversees Accreditation Bodies for certification of management systems, products, services, personnel and other similar programs of conformity assessment accreditation, and
- The International Laboratory Accreditation Cooperation (ILAC) which oversees accreditation of laboratory and inspection accreditation.

These oversight organizations have been established to verify conformity assessment and assure that accredited certificates may be relied upon from country to country. The intent is to provide additional assurances of the competence and impartiality of national accreditation bodies.

Member accreditation bodies are required to meet the oversight organization's rules for consistent application of the accreditation process. Members are then subjected to a formal peer review process designed to assure that they meet the stated rules and procedures.

HOW DOES THE CERTIFICATION/ACCREDITATION PROCESS WORK?

The world of certification and accreditation has been operating for many decades in many industries and arenas and the process and procedures are mature and well defined globally. There is some variation depending on the organization involved; however, generally the approach is quite consistent. Figure 4 on the following page depicts an overview of how this process of checks and balances functions for end-of-life electronics.

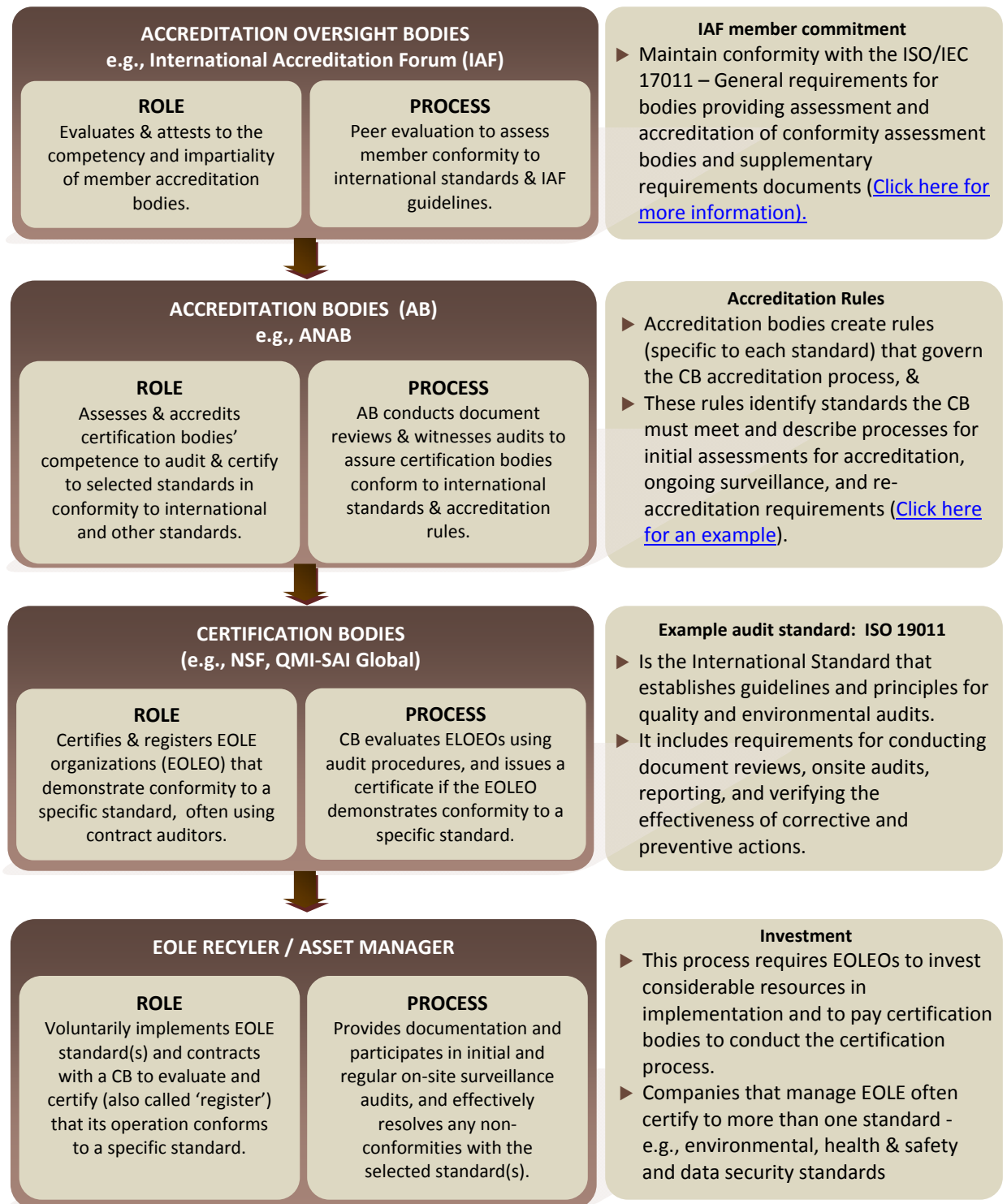


Figure 5 Certification oversight process



CERTIFICATION IN PRACTICE

The following sections provide a snapshot of the certification world for end-of-life electronics, including:

- ▶ Examples of standards development organizations
- ▶ Examples of EOLE certification/verification programs
- ▶ Examples of accreditation bodies
- ▶ An overview of how the process operates

EXAMPLES OF STANDARD DEVELOPMENT ORGANIZATIONS (SDOs)

The organizations shown in Table 3 are involved in standards development. They represent two distinct groups, the first being organizations who specialize in developing standards across a wide range of issues. These organizations are typically members of the International Accreditation Forum (IAF). The second group includes organizations in industry or non-government organizations that have a particular interest in enhancing corporate performance, demonstrating corporate responsibility or achieving industry-wide improvement in quality, environment, or health and safety.

ORGANIZATION	ROLE	AFFILIATIONS/COMMENTS
STANDARDS ORGANIZATIONS		
UL	▶ Develops safety research, scientific expertise and quality standards.	▶ Standards organization since 1890.
CENELEC	▶ CENELEC is the European Committee for Electrotechnical Standardization responsible for standards development	▶ Standards organization since 1973
American National Standards Institute (ANSI)	▶ Responsible for creating U.S. standards and conformity assessment systems	▶ Standards organization since 1928 ▶ Member of IAF
Standards Australia	▶ National and International Standards Information and Coordination ▶ Accreditation of Standards Organizations ▶ Standards Development	▶ Standards organization since 1922 ▶ Member of IAF
Standards Council of Canada (SCC)	▶ Standards development with ISO, IEC, and regional standards organizations	▶ Standards organization since 1964 ▶ Member of IAF
Institute of Electrical & Electronics Engineers (IEEE)	▶ A professional association that provides publications and standards	▶ Standards organization since 1884 ▶ Focuses on EE issues
INDUSTRY OR NON-GOVERNMENT ORGANIZATIONS		
Electronics Product Stewardship Canada (EPSC)	▶ EPSC is a not-for-profit founded in 2003. Its membership is comprised of over 20 leading electronics manufacturers.	▶ Developed the Electronics Recycling Standard, which has been used since 2004
WEEE Forum	▶ A European association of 41 electrical and electronic waste collection and recovery systems.	▶ Owner of the WEEELABEX Standards ▶ Working with CENELEC to transition WEEELABEX standards to a European Standard
Basel Action Network (BAN)	▶ A non-profit established to prevent the globalization of the toxic chemical crisis.	▶ Owner of the e-Stewards Standard
R2 Solutions	▶ A non-profit organization established to house and revises the R2 Practices.	▶ Manager of the R2 Standard

Table 3 Examples of standard development organizations

EXAMPLES OF EOLE CERTIFICATION/VERIFICATION PROGRAMS

Verification of conformity to EOLE management standards occurs through verification by managing organizations or certification by approved certification bodies. The end-of-life processing standards shown in Table 4 are examples of those managed by Certification Bodies/registrars or by program specific verification organizations. CBs and verification organizations listed here are accurate as of November 2012.

STANDARD	CERTIFICATION BODY OR VERIFICATION ORGANIZATION	CERTIFICATION OR VERIFICATION
e-Stewards ® Standard for Responsible Recycling & Reuse of Electronic Equipment® (USA/OECD)	QMI-SAI Global, Orion, & NSF International	IAF Accredited Certification
Responsible Recycling (R2) Practices for Use in Accredited Certification Programs	QMI-SAI Global, Orion, & NSF International, Perry Johnson, SGS, & TÜV SÜD America Inc.	IAF Accredited Certification
Recycler Qualification Program for end-of-life Electronics Recycling (Canada)	Verification conducted by the Electronic Products Recycling Association	Un-accredited verification
WEEELABEX	WEEELABEX Systems	Un-accredited verification

Table 4 Examples of EOLE certification bodies / registrars & verification organizations

EXAMPLES OF ACCREDITATION BODIES

The Accreditation Bodies shown in Table 5 are examples of organizations that oversee Certification Bodies in various regions of the world. Accreditation by these bodies demonstrates the competence and independence of certification bodies and more.

ORGANIZATION	ROLE
ANSI-ASQ National Accreditation Board (ANAB)	► Accredits conformity assessment bodies, such as testing and calibration laboratories, inspection and certification bodies to recognized standards
Standards Council of Canada (SCC)	► Accredits conformity assessment bodies, such as testing laboratories and product certification bodies, to internationally recognized standards.
Joint Accreditation System of Australia and New Zealand (JAS-ANZ)	► The government-appointed accreditation body for Australia and New Zealand responsible for providing accreditation of conformity assessment bodies (CABs) in the fields of certification and inspection. [Moved above]

Table 5 Examples of accreditation bodies

EXAMPLES OF ACCREDITATION OVERSIGHT ORGANIZATIONS

Accreditation Bodies may also become members of international organizations established to standardize the process and assure quality control of Accreditation Bodies. Examples of this international oversight are provided in Table 6.

ORGANIZATION	ROLE
International Accreditation Forum (IAF)	Exists to ensure that its accreditation body members only accredit certification bodies that are competent to do the work they undertake and are not subject to conflicts of interest.
International Laboratory Accreditation Cooperation (ILAC)	Established in 1977 to develop international cooperation and establish a network of mutual recognition agreements among accreditation bodies for certification of laboratories

Table 6 Examples of accreditation oversight organizations

PURPOSE & SCOPE OF CORE VOLUNTARY STANDARDS FOR END-OF-LIFE ELECTRONICS

The key voluntary standards for End-of-Life Electronics are shown in Table 7 below. A number of these standards are due to be revised in late 2012/early 2013, so it is recommended that the information be reviewed in this context. Other standards not covered here include AN NZ 5377ⁱⁱⁱ and the Australian Interim Standard - Collection, transport and recycling of end-of-life (EOL) televisions and computers^{iv}.

STANDARD	PURPOSE	SCOPE	CREATION PROCESS
e-Stewards^v (2009)	To set appropriately rigorous, yet practical operational criteria for globally responsible practices for the electronics recycling and refurbishment industries for use in the e-Stewards' accredited and independently audited certification program.	<p>Geographical: OECD, EU, and EFTA (developed) countries. Pilot program starting in limited developing countries.</p> <p>Organizational: Certification is awarded to the entire company and is required to encompass all eligible facilities.</p> <p>Operational: Recyclers, refurbishers, asset managers, refiners, & re-deployment companies.</p>	<ul style="list-style-type: none"> ▶ BAN (see Table 3) was a full participant in the R2 standards development process, but withdrew after 2.5 years when it was decided to field test the draft R2 standard which would violate international laws for trade in hazardous waste^{vi}. ▶ BAN subsequently was asked by industry leaders to create a new certification program to assure full conformance with international laws and best practices in environment, health and safety, and data security, via a multi-stakeholder process of leaders^{vii}.
Electronics Reuse and Refurbishing Standard (ERRS) (2012)	Foster responsible environmental, safety and social management practices related to the reuse and refurbishing of electronics to provide a level of assurance that products reused through an organization recognized under the program are handled in a responsible manner, thus facilitating the extended use of electronic products before their disposition into an end-of-life recycling program.	<p>Geographical: Canada.</p> <p>Organizational: Verification under the ERRS is site specific and does not constitute a corporate-wide certificate.</p> <p>Operational: Reuse/Refurbishing organizations.</p>	<ul style="list-style-type: none"> ▶ In March 2007, Electronics Product Stewardship Canada (EPSC) released its Guidelines for Electronics Reuse and Refurbishing ▶ Various consultations on these guidelines were undertaken by the industry-led provincial stewardship programs with diverse stakeholder groups, including regulators, recyclers, reuse organizations and NGOs ▶ In March 2010 the ERRS was finalized and incorporated into the broader Electronics Reuse and Refurbishing Program (ERRP), including the Standard along with a detailed Implementation Guide; the Assessment and Approval Process; the Audit Protocols; and other related application and assessment information
R2^{viii} (2008)	The R2 Standard sets forth requirements relating to environmental, health, safety, and security aspects of electronics recycling (R2 Solutions).	<p>Geographical: Written for use in the US, implemented internationally</p> <p>Organizational: Certification is awarded to a facility and does not constitute a corporate-wide certificate.</p> <p>Operational: .</p>	<ul style="list-style-type: none"> ▶ "Development of the standard occurred through a transparent, balanced, consensus-based process. The multi-stakeholder group included representatives from: <ul style="list-style-type: none"> ♦ The U.S. EPA and regulators from state agencies, ♦ Electronics recyclers, refurbishers, and their trade associations ♦ OEMs/ electronics recycling customers, ♦ Non-governmental organizations (NGOs). ▶ Representatives from environmental justice organizations participated actively in the development process, but withdrew towards the end"^{ix}

STANDARD	PURPOSE	SCOPE	CREATION PROCESS
RQP for end-of-life Electronics Recycling (2010)	To ensure that end-of-life electronic products are managed in an environmentally sound manner that safeguards worker health and safety, and the environment from the point of primary processing to the point of final disposition.	Geographical: Canada Organizational: Verification under the RQP is site specific. Operational: Recyclers	<ul style="list-style-type: none"> First developed in 2004 by Electronics Product Stewardship Canada (EPSC). It was developed by the electronics brand owners through EPSC but it was vetted through and included the comments of various regulators, recyclers and NGOs. It is used as the basis for the development of the provincial stewardship programs and by electronics brand owners.
WEEELABEX^x (2011)	The protection of the environment and human health and safety through the prevention and mitigation of the adverse impacts of treatment of waste electrical and electronic equipment (WEEE).	Geographical: European countries Organizational: The level of conformity verification will be by operational process. One facility may have a conformant process for one material stream but not for another. Operational: Collection, sorting, storage, transportation, preparation for re-use, treatment, processing and disposal of all WEEE.	<ul style="list-style-type: none"> It includes three standards (Collection, Logistics, & Treatment) Established by the WEEE Forum in co-operation with stakeholders from the producers' community and the processing industry. The process involved approximately 100 technical managers and managing directors representing WEEE systems and stakeholders (EERA, CECED, DIGITALEUROPE and ELC)^{xi}

Table 7 Purpose & scope of core voluntary standards for end-of-life electronics

ENDNOTES

ⁱ ISO 19011:2002 Guidelines for quality and/or environmental management systems auditing

ⁱⁱ ISO 17021:2011 Conformity assessment -- Requirements for bodies providing audit and certification of management systems

ⁱⁱⁱ AN NZ 5377 – Draft Standard for the Collection, storage, transport and treatment of used electrical and electronic equipment (Due for release later in 2012)

^{iv} AIIA E-SIG / PSA Interim Industry Standard Collection, transport and recycling of end-of-life (EOL) televisions and computers May 2011

^v e-Stewards® Standard for Responsible Recycling & Reuse of Electronic Equipment® (USA/OECD): 2009

^{vi} Quoted from Sarah Westervelt, Basel Action Network

^{vii} Quoted from Sarah Westervelt, Basel Action Network

^{viii} Responsible Recycling (R2) Practices for Use in Accredited Certification Programs for Electronics Recyclers: 2008

^{ix} www.r2solutions.org

^x WEEELABEX Standard on Collection; WEEELABEX Standard on Logistics; and WEEELABEX Standard on Treatment

^{xi} WEEE Forum Annual Report 2011