

# COMPARISON OF SELECTED END-OF-LIFE ELECTRONICS PROCESSING PROGRAMS WITH THE REQUIREMENTS IN THE IEEE 1680 SERIES OF STANDARDS FOR END-OF-LIFE ELECTRONICS PROCESSING

SUMMARY REPORT TO INFORM THE IEEE 1680.1 REVISION WORKING GROUP



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Report prepared by Libby Chaplin, Arcadian Solutions, 2012.

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Sarah Westervelt, Basel Action Network  
Shelagh Kerr, Electronics Product Stewardship Canada  
Sean De Vries, Electronic Products Recycling Association  
Corey Dehmey, R2 Solutions

#### **CONTACTS**

For further information contact:

Libby Chaplin, Arcadian Solutions  
E: [libby.chaplin@arcadiansolutions.com](mailto:libby.chaplin@arcadiansolutions.com)  
T: (347) 277 5553  
W: [www.arcadiansolutions.com](http://www.arcadiansolutions.com)

Wayne Rifer, Green Electronics Council  
E: [WRifer@greenelectronicscouncil.org](mailto:WRifer@greenelectronicscouncil.org)  
T: (503) 644-0294  
W: [www.epeat.net](http://www.epeat.net)

Anne Peters, Gracestone, Inc.  
E: [annep@indra.com](mailto:annep@indra.com)  
T: 303.494.4934  
W: [www.gracestoneinc.com](http://www.gracestoneinc.com)



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## EXECUTIVE SUMMARY

The IEEE 1680 series of standards was established to provide a clear and consistent set of environmental performance criteria for personal computer products (1680.1), imaging equipment products (1680.2), and televisions (1680.3). These standards provide the verification requirements for the EPEAT<sup>®1</sup> green electronics rating program established to identify greener computers and other electronic equipment by focusing on product design, performance, and end-of-life management. In particular, the recently released 1680.2 and 1680.3 standards include requirements for end-of-life (EOL) management of registered products (sections 4.6.2.1), specifying that end-of-life processing facilities be certified to a qualified recycling standard.

### PURPOSE OF THE REPORT

The International Sustainable Development Foundation has commissioned this report in order to better understand the extent to which the leading certification programs meet the requirements for end-of-life management in 1680.2 and 1680.3 to inform discussions regarding the revision of 1680.1.

### STANDARDS REVIEWED

The summary report reviews a number of the leading voluntary standards for end-of-life electronics processing that EPEAT subscribers may encounter and reviews the extent to which they meet the end-of-life management criteria contained in 1680.2 and 1680.3. It is a snapshot in time – the landscape for managing EOL electronics processing is dynamic. The standards included in this review are:

- ▶ Canadian Verification Program, including:
  - ▶ Recycler Qualification Program for End-Of-Life Electronics Recycling (RQP), and
  - ▶ Electronics Reuse & Refurbishing Program (ERRS),
- ▶ Responsible Recycling (R2) Practices for Use in Accredited Certification Programs for Electronics Recyclers (R2),
- ▶ e-Stewards<sup>®</sup> Standard for Responsible Recycling & Reuse of Electronic Equipment<sup>®</sup> (e-Stewards), and
- ▶ WEEELABEX Standards (WEEELABEX), including:
  - ▶ WEEELABEX Standard on Collection,
  - ▶ WEEELABEX Standard on Logistics, and
  - ▶ WEEELABEX Standard on Treatment.

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<sup>1</sup> Electronic Product Environmental Assessment Tool



#### EVOLUTION OF THE STANDARDS

The 1680 series of standards were established in a dynamic market and regulatory environment. Both R2 and e-Stewards standards are currently under review, with revisions expected in the near term (as of November 2012). It is thus recommended that this report be used as a snapshot in time rather than a definitive work as aspects of the findings may become out of date. It will still be useful even in this context to inform policy-level discussions regarding the requirements of the 1680.1 revision, especially if used with the current drafts of each of the standards.

It should also be noted that additional standards are in development, for example the Australia/New Zealand standard "[AS/NZ 5377](#) Collection, Storage, Transport and Treatment of Used Electrical and Electronic Equipment". This standard is not included in this report as it is still in draft form as of November 2012 and is yet to be implemented.

#### METHODOLOGY

A small working group of the Green Electronics Council provided the author with a number of topics to address, including all of the requirements for end-of-life processing in IEEE 1680.2 and 1680.3 Section 4.6.2.1 and additional topics thought to be pertinent. The review included a comparison of each of the identified standards against the topics provided by the Green Electronics Council. It is important to view this report as a snapshot in time as most of the standards are currently in an active review process. Topics used for review included as:

- ▶ Contextual information, and
- ▶ A comparison of each standard against:
  - ▶ The criteria required for end-of-life processing in IEEE standards 1680.2 and 1680.3 Sections 4.6.2.1, and
  - ▶ A number of additional topics e.g. ISO 14001, to provide a broad review that will better inform the revision process for 1680.1. Additional topics are shaded in the matrix for clarity purposes.

This comparison did not include an analysis of the guidance documents associated with each standards, as these are not the standard themselves and do not constitute requirements.

Each of the standards' owners were provided with a draft of this report and invited to give feedback to ensure accuracy and their feedback has been incorporated into the final report.

## OVERVIEW OF FINDINGS

The table below provides a summary of the findings. It is important to view this table with the understanding that it is provided to give a high-level snapshot and thus it is important to use it a reference only. Details are provided on each of these sections in the more comprehensive Comparison Matrix, found below the summary table.

SUMMARY OF FINDINGS IN COMPARISON OF STANDARDS TO EPEAT EOL PROCESSING REQUIREMENTS				
APPLICABLE 1680.2 SECTION NUMBER	WEEELABEX	E-STEWARDS	R2	RQP/ERRS
4.6.2.1 Accredited certification program	No	Yes	Yes	No
4.6.2.1 IAF accredited Certification	No	Yes	Yes	No
4.6.2.1(b) Legal requirements	Yes	Yes	Yes	Yes
4.6.2.1(c) Definition of covered equipment	Yes	Yes	Yes	Partial
4.6.2.1(c) Definition of materials of concern	Yes	Yes	Yes	Yes
4.6.2.1(c) Written management plan for Materials of Concern to protect EH&S	Partial	Partial	Yes	Partial
4.6.2.1(d) EH&S Management System	Yes	Yes	Yes	Yes
ISO 14001	No	Yes	No	No
OHSAS 18001	No	No	No	No
Prevention of Prison labor	No	Yes	No	Yes
Proof of Liability & Environmental Insurance	Yes	Yes	Yes	Yes
EH&S Controls	Yes	Yes	Yes	Yes
Environmental, health and safety Training	Yes	Yes	Yes	Yes
Site Closure Plan	Partial	Yes	Yes	Yes
Records retention & documentation	Yes	Yes	Yes	Yes
4.6.2.1(e) Export Controls	Yes	Yes	Partial	Yes
4.6.2.1(f) Testing equipment/ components going for reuse, repair or refurbishment prior to export	Yes	Yes	Partial	Yes
4.6.2.1(g)a Disallowance of Incineration / waste-to-energy facilities for materials containing mercury, halogenated compounds, and beryllium	No	Yes	Partial	Partial
4.6.2.1(g)b Disallowance of non-hazardous disposal facilities for disposal of “materials of concern”, except as required by law.	Partial	Partial	Partial	Yes
4.6.2.1(h) Tracking Throughput	Yes	Yes	Yes	Yes
Mass Balance	Yes	Yes	No	No
4.6.2.1(i) Tracking Materials Of Concern to Final Disposition	Yes	Yes	Yes	Yes

Note: Shaded rows indicate topics that go beyond the IEEE standards 1680.2 and 1680.3 section 4.6.2.1 requirements - GEC requested these be included in order to provide a broad review that will better inform the revision process for 1680.1.

### COMPARATIVE ANALYSIS OF END-OF-LIFE PROCESSING STANDARDS (2012) AND THEIR CONFORMITY TO THE 1680.2 CRITERIA: MATRIX

ISSUE OR APPLICABLE 1680.2 SECTION NUMBER	WEELABEX: 2011 (WT=TREATMENT STANDARD, WL=LOGISTICS STANDARD, & WC = COLLECTORS STANDARD)	E-STEWARDS® STANDARD FOR RESPONSIBLE RECYCLING & REUSE OF ELECTRONIC EQUIPMENT: 2009	RESPONSIBLE RECYCLING (“R2”) PRACTICES FOR USE IN ACCREDITED CERTIFICATION PROGRAMS FOR ELECTRONICS RECYCLERS: 2008	RECYCLER QUALIFICATION PROGRAM FOR EOLE RECYCLING (2010) (RQP) & ELECTRONICS REUSE & REFURBISHING STANDARD (2012) (ERRS)
<i>Summary information is provided to highlight relevant criteria, and is not comprehensive. IT IS IMPORTANT THAT IT BE READ IN CONJUNCTION WITH THE ACTUAL LANGUAGE IN EACH STANDARD. Section numbers cited are specific to the standard in each column.</i>				
<b>CONTEXTUAL INFORMATION</b>				
<b>Program Owner</b>	<a href="#">WEEE Forum</a> <sup>ii</sup>	<a href="#">Basel Action Network</a> <sup>iii</sup>	<a href="#">R2 Solutions</a> <sup>iv</sup>	<a href="#">Electronics Product Stewardship Canada</a> <sup>v</sup> <a href="#">Electronic Products Recycling Association</a> <sup>vi</sup>
<b>Status</b>	<ul style="list-style-type: none"> <li>▶ Standard(s) complete</li> <li>▶ <a href="#">Governance</a> process is described online<sup>vii</sup></li> <li>▶ <a href="#">Available free online</a></li> <li>▶ A transition period expires on Dec 31, 2014 at which time the WEELABEX requirements will be fully incorporated in the contracts of WEEE systems (compliance schemes) with operators.</li> </ul>	<ul style="list-style-type: none"> <li>▶ Version 1 has been regularly updated with Sanctioned Interpretations – a formal mechanism to change requirements to the standard</li> <li>▶ ISO 14001 is an integral part of the Standard. <a href="#">A free excerpted version is available online</a></li> <li>▶ Version 1 fully incorporated the open source document: “R2: 2008” into its requirements.</li> <li>▶ Version 2 (first formal revision) of the standard is to be released late 2012/early 2013</li> </ul>	<ul style="list-style-type: none"> <li>▶ <a href="#">Available free online</a></li> <li>▶ Currently under review for first formal revision</li> <li>▶ Version 2 of the standard is currently being finalized</li> </ul>	<ul style="list-style-type: none"> <li>▶ <a href="#">RQP available free online</a></li> <li>▶ <a href="#">ERRS available free online</a></li> </ul>
<b>Purpose of the Standard</b>	<ul style="list-style-type: none"> <li>▶ A set of European standards with respect to the collection, sorting, storage, transportation, preparation for re-use, treatment, processing and disposal of all kinds of WEEE<sup>viii</sup>.</li> <li>▶ A unique feature of WEELABEX is that it goes beyond just processing to include three standards:               <ul style="list-style-type: none"> <li>▶ WEELABEX Collection (<b>WC</b>)</li> <li>▶ WEELABEX Treatment (<b>WT</b>)</li> <li>▶ WEELABEX Logistics (<b>WL</b>)</li> </ul> </li> <li>▶ Produces requirements to be integrated into contracts of WEEE systems with operators.</li> </ul>	<ul style="list-style-type: none"> <li>▶ To set appropriately rigorous, yet practical operational criteria for globally responsible practices for the electronics recycling and refurbishment industries in conjunction with the e-Stewards’ accredited and independently audited certification program.</li> </ul>	<ul style="list-style-type: none"> <li>▶ Sets responsible recycling (“R2”) practices for use in accredited certification programs that assess electronics recyclers’ environmental, safety, and security practices</li> <li>▶ The <i>Responsible Recycling (“R2”) Practices for Use in Accredited Certification Programs for Electronics Recyclers: 2008</i> is an open source document which can be used by any accredited electronics recycling certification program. There are currently multiple programs using the R2 Practices document, which has no owner.</li> </ul>	<ul style="list-style-type: none"> <li>▶ <b>RQP:</b> Defines the minimum requirements for EOLE Recyclers to be considered for use under the provincial electronics Recycling Stewardship Program</li> <li>▶ <b>RQP:</b> Intent is to ensure that EOLE Products are managed in an environmentally sound manner that safeguards worker safety, and the environment from the point of primary processing to the point of final disposition.</li> <li>▶ <b>ERRS:</b> Intent is to foster responsible environmental, safety and social management practices for the reuse and refurbishing of electronics, providing assurance that products reused through an organization recognized under this program are handled in a responsible manner, thus facilitating the extended use of electronic products before disposition into an end-of-life recycling program.</li> </ul>

Common acronyms: EH&S: Environment, Health, & Safety, OHS: Occupational Health and Safety, H&S: Health and Safety

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Shaded rows indicate topics go beyond the IEEE standards 1680.2 and 1680.3 section 4.6.2.1 requirements - GEC requested these be included in order to provide a broad review that will better inform the revision process for 1680.1.

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<p><b>CONTEXTUAL INFORMATION</b></p>				
<p><b>Eligible organizations</b></p>	<ul style="list-style-type: none"> <li>▶ Collection sites, logistics sites, transporters, and facilities involved in dismantling, de-pollution, and preparation for re-use, disposal and recycling.</li> <li>▶ The three standards have different target audiences:                             <ul style="list-style-type: none"> <li>▶ <b>WC:</b> Operators performing collection of WEEE,</li> <li>▶ <b>WL:</b> Logistics operators, and</li> <li>▶ <b>WT:</b> Treatment operators.</li> </ul> </li> <li>▶ The program has been transferred to CENELEC to become a formal European Standard in 2014</li> </ul>	<ul style="list-style-type: none"> <li>▶ Recyclers, refurbishers, asset managers, refiners, processors, and re-deployment companies, but not brokers or transportation companies, or those who solely engage in collection of e-waste.</li> </ul>	<ul style="list-style-type: none"> <li>▶ Recyclers include but need not be limited to electronics resellers, refurbishers, recyclers, demanufacturers, asset recoverers, &amp; brokers, as well as leasing companies that engage in these activities.</li> </ul>	<ul style="list-style-type: none"> <li>▶ <b>RQP:</b> Processors and Recyclers, referred to jointly as ‘Recyclers’</li> <li>▶ <b>ERRS:</b> Organizations performing reuse and/or refurbishing functions and seeking to be recognized by the Stewardship Program. Under this standard:                             <ul style="list-style-type: none"> <li>▶ Non-useable equipment and materials generated by the Reuse/Refurbishing organization will be responsibly recycled through a Recycler approved by the Stewardship Program.</li> </ul> </li> </ul>
<p><b>Support Tools &amp; Auditing Protocols</b></p>	<ul style="list-style-type: none"> <li>▶ Uniform conformity verification procedures.</li> <li>▶ Audit reporting tools, such as manuals and audit checklist.</li> <li>▶ A pool of WEEELABEX auditors, familiar with WEEE processing technologies, trained to perform audits in accordance with the standard.</li> <li>▶ A visual identifier (or mark or quality label) to identify sites that are in conformity with the standards.</li> <li>▶ WEEELABEX auditor training plus requirements for auditor knowledge of processing and handling methods.</li> </ul>	<ul style="list-style-type: none"> <li>▶ <b>Appendix A</b> Guidance Document for the e-Stewards Standard for Responsible Recycling and Reuse of Electronic Equipment.</li> <li>▶ <b>Appendix B</b> Rules for e-Stewards Certification Bodies.</li> <li>▶ <b>Appendix C</b> Tools for e-Stewards Recyclers.</li> <li>▶ Sanctioned Interpretations – Formal interpretations/clarifications of the Standard between formal revisions of the Standard.</li> <li>▶ Auditor certification training.</li> <li>▶ Internal auditor training.</li> <li>▶ System Implementation training.</li> <li>▶ Witness audits of Certification Body auditing.</li> </ul>	<ul style="list-style-type: none"> <li>▶ The R2 Guidance document is available on the R2 Solutions website and provides additional guidance on how to apply the standard.</li> <li>▶ The guidance is not intended to extend or confer any new provisions or requirements outside of the existing R2 Standard but to clarify the existing provisions.</li> <li>▶ Audit Checklist is provided on the R2 Solutions website.</li> <li>▶ R2 Auditor certification training.</li> <li>▶ Outreach and education to the public and interested parties.</li> <li>▶ A monthly newsletter is published called the “R2 Update”, including a section on conformity review in each issue.</li> </ul>	<ul style="list-style-type: none"> <li>▶ Both the <b>RQP</b> and the <b>ERRS</b> standards include an Implementation Guide &amp; Assessment Process Flow &amp; Audit Report Form.</li> <li>▶ Online ‘In Focus’ training documents for key elements of the standard.</li> <li>▶ <b>RQP:</b> Audit Checklist.</li> <li>▶ <b>RQP:</b> Recycler Assessment &amp; Approval Process: Defines the steps for initiating and conducting Recycler assessments.</li> </ul>
<p><b>Relationship between regulations and standards</b></p>	<ul style="list-style-type: none"> <li>▶ The standards do not replace an organization’s legal obligations.</li> <li>▶ The requirements laid down in the standard are embedded in legislative requirements of Directive 2002/96/EC and its transposing legislation.</li> </ul>	<ul style="list-style-type: none"> <li>▶ Does not replace an organization’s responsibility to comply with legal requirements.</li> </ul>	<ul style="list-style-type: none"> <li>▶ Does not replace an organization’s responsibility to comply with legal requirements.</li> </ul>	<ul style="list-style-type: none"> <li>▶ <b>RQP &amp; ERRS:</b> Do not replace an organization’s responsibility to comply with legal requirements.</li> </ul>
<p><b>Process for providing interpretation of requirements</b></p>	<ul style="list-style-type: none"> <li>▶ The WEEELABEX Office acts as the secretariat that provides clarification concerning the interpretation of applicable WEEELABEX requirements.</li> </ul>	<ul style="list-style-type: none"> <li>▶ The program administrator provides official Sanctioned Interpretations, on an on-going basis, that are formally adopted and become part of the requirements, responds to additional interpretation questions as they arise.</li> </ul>	<ul style="list-style-type: none"> <li>▶ Guidance has been provided, although this does not constitute a formal interpretation of the standard that then becomes a requirement. The latter is done via revision of the standard, the first of which is due for release in early 2013.</li> </ul>	<ul style="list-style-type: none"> <li>▶ Interpretation provided via the Recycler Qualification Office. Substantive changes are incorporated into subsequent versions<sup>ix</sup>.</li> <li>▶ ‘Technical Bulletins’ may be issued, but as yet only general communication and training have been provided.</li> </ul>

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<p><b>COMPARISON OF STANDARDS AGAINST 1680.2 &amp; .3 END-OF-LIFE PROCESSING REQUIREMENTS</b></p>				
<p><b>Section 4.6.2.1 End-of-life processing</b> <i>Ensure all equipment is managed by initial service providers that are certified to a qualified recycling standard.</i></p>	<ul style="list-style-type: none"> <li>▶ <b>No</b></li> <li>▶ WEEELABEX provides auditing activities of standards owned by the WEEELABEX systems and which leads to conformity verification with WEEELABEX or equivalent requirements of processes (of a [potential] supplier).</li> <li>▶ Conformity verification is conducted by auditors that have undergone WEEELABEX training, use WEEELABEX reporting tools and provide documented objective evidence that audited processes conform to WEEELABEX or equivalent</li> </ul>	<ul style="list-style-type: none"> <li>▶ <b>Yes</b></li> <li>▶ QMI-SAI Global, Orion, &amp; NSF International are current Certifying Bodies trained and accredited to certify to this standard.</li> </ul>	<ul style="list-style-type: none"> <li>▶ <b>Yes</b></li> <li>▶ QMI-SAI Global, Orion, NSF International, Perry Johnson, SGS, &amp; TÜV SÜD America Inc. are current Certifying Bodies trained and accredited to certify to this standard.</li> </ul>	<ul style="list-style-type: none"> <li>▶ <b>No</b>, however it does include a third-party audit commissioned for the Stewardship Program, without additional oversight of an accreditation body</li> <li>▶ Limited to the confirmation of approval for use by the Stewardship Program</li> <li>▶ Verification does not constitute certification, and third-parties are instructed to not rely on this recognition as such certification</li> </ul>
<p><b>Section 4.6.2.1 Accredited Certification Bodies</b> <i>Certification bodies shall be accredited by an International Accreditation Forum member accreditation body</i></p>	<ul style="list-style-type: none"> <li>▶ <b>No</b>, the WEEELABEX Office issues an attestation confirming conformity verification on the basis of audits conducted by WEEELABEX auditors.</li> <li>▶ Consequently, the processes/ facilities/ operators that have undergone a successful Conformity Verification are listed as WEEELABEX processes/ facilities/ operators.</li> </ul>	<ul style="list-style-type: none"> <li>▶ <b>Yes</b></li> <li>▶ ANAB is an IAF member accreditation body</li> </ul>	<ul style="list-style-type: none"> <li>▶ <b>Yes</b></li> <li>▶ ANAB is an IAF member accreditation body</li> </ul>	<ul style="list-style-type: none"> <li>▶ <b>No</b></li> <li>▶ Verification conducted by the Electronic Products Recycling Association (EPRA)</li> </ul>
<p><b>Section 4.6.2.1(a) Applicable Countries</b> <i>The The country (or region) being declared</i></p>	<ul style="list-style-type: none"> <li>▶ The territory of the member states of the European Union and EFTA.</li> </ul>	<ul style="list-style-type: none"> <li>▶ Available in member countries of the OECD, EU, and EFTA, plus additional pilot program launching in limited number of developing countries. Standard written for international use.</li> </ul>	<ul style="list-style-type: none"> <li>▶ In use globally – certifications in the USA, Mexico, Canada, UK, Germany, New Zealand, Australia, Malaysia, India, and China.</li> </ul>	<ul style="list-style-type: none"> <li>▶ Canada</li> </ul>
<p><b>Section 4.6.2.1(b) Adherence to legal requirements</b> <i>If a requirement of the standard conflicts with applicable legal requirements, the initial service provider shall adhere to the legal requirements.</i></p>	<ul style="list-style-type: none"> <li>▶ <b>Yes</b></li> <li>▶ <b>WT, WL &amp; WC Section 4.1.1</b> Compliance with European Community legislation and its corresponding transposition</li> </ul>	<ul style="list-style-type: none"> <li>▶ <b>Yes</b></li> <li>▶ <b>Section 4.1</b> Policy commitment to legal compliance.</li> <li>▶ <b>Section 4.3.2</b> requires implementation of a procedure for conformity with domestic, importing, transit &amp; exporting laws &amp; requirements, throughout the recycling chain.</li> <li>▶ <b>Section 4.5.2</b> requires a procedure to regularly evaluate legal compliance with EH&amp;S laws.</li> </ul>	<ul style="list-style-type: none"> <li>▶ <b>Yes</b></li> <li>▶ <b>Section 3</b> General Principle: Compliance with all applicable EH&amp;S legal requirements and shall only export equipment and components containing Focus Materials (FMs) to countries that legally accept them.</li> </ul>	<ul style="list-style-type: none"> <li>▶ <b>Yes</b></li> <li>▶ <b>RQP &amp; ERRS: Section 2</b> Legal and other requirements. Organizations shall identify and comply with all applicable legal and other requirements.</li> </ul>

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<p><b>COMPARISON OF STANDARDS AGAINST 1680.2 &amp; .3 END-OF-LIFE PROCESSING REQUIREMENTS</b></p>				
<p><b>Section 4.6.2.1(c) Covered equipment</b> <i>Requires definitions of types of equipment covered</i></p>	<ul style="list-style-type: none"> <li>▶ <b>Yes</b></li> <li>▶ <b>Definitions WT: 3.31, WC &amp; WL: 3.14</b>, Covers all WEEE (Waste Electrical and Electronic Equipment) electrical or electronic equipment which is waste, including all components, subassemblies and consumables as described in ANNEX IA of the WEEE Directive.</li> <li>▶ In Europe WEEE essentially includes everything with a plug.</li> <li>▶ Categories from ANNEX IA of the WEEE Directive include:               <ul style="list-style-type: none"> <li>▶ Large household appliances; small household appliances, IT and telecommunications equipment, consumer equipment, lighting equipment, electrical and electronic tools (with the exception of large-scale stationary industrial tools), toys, leisure and sports equipment, medical devices, and monitoring and control instruments, and automatic dispensers.</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>▶ <b>Yes</b></li> <li>▶ <b>Definitions:</b> Electronic Equipment or Equipment and Components dependent on electric currents or electromagnetic fields in order to fulfill their primary function, and have never contained ozone depleting substances, combustible fuels, or gasses.</li> <li>▶ Categories include computers, central processing units (CPU's), laptops, and their peripheral equipment:               <ul style="list-style-type: none"> <li>▶ Monitors, display devices, printers, keyboards, scanners, storage devices, servers, copiers, fax machines, control boxes, networking &amp; imaging systems.</li> </ul> </li> <li>▶ Communications equipment such as telephones, mobile phones, PDAs telecommunications equipment, and</li> <li>▶ Consumer electronic devices, such as TVs, recorders, DVD players, camcorders, cameras, stereos, CD players, radios, calculators, organizers, game systems &amp; accessories, peripheral hardware, digital, cable and satellite receiving equipment, inverters &amp; solar panel power controllers, solar panels with circuit boards, audio equipment, microwave ovens, &amp; vacuum cleaners.</li> </ul>	<ul style="list-style-type: none"> <li>▶ <b>Yes</b></li> <li>▶ <b>Definitions:</b> Electronic equipment or equipment and components are defined.</li> <li>▶ Categories include computers and peripheral equipment – central processing units (CPU's), monitors, printers, keyboards, scanners, storage devices, servers, networking systems; copiers; fax machines; imaging systems; printing systems; telephones; televisions; video cassette recorders; camcorders; digital cameras; control boxes; stereo systems; compact disc players, radios, cell phones; pagers; personal digital assistants (PDAs); calculators; organizers; and game systems and their accessories. It includes any other or new (future) types of equipment designed primarily to store or convey information electronically, and any new accessories to such equipment.</li> </ul>	<ul style="list-style-type: none"> <li>▶ <b>Partial</b></li> <li>▶ <b>RQP &amp; ERRS Definition:</b> <ul style="list-style-type: none"> <li>▶ Includes unwanted or discarded electronic equipment obligated under the Stewardship Program that is designated for recycling.</li> <li>▶ Obligated under Stewardship Program" means any electronic products that are designated for recycling in a provincial stewardship program.</li> </ul> </li> </ul>

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COMPARISON OF STANDARDS AGAINST 1680.2 & .3 END-OF-LIFE PROCESSING REQUIREMENTS

<p><b>Section 4.6.2.1(c) Materials of Concern</b></p> <p>Requires definition of materials of concern or equivalent</p>	<p>► <b>Yes</b></p> <p>► <b>Definitions WT: 3.14</b> Hazardous Waste - the properties of which are described in <a href="#">Annex III of Directive 2008/98/EC</a>.</p>	<p>► <b>Yes</b></p> <p>► <b>Definition: 3.43</b> Hazardous Electronic Equipment (HEE) –Electronic equipment, parts, &amp; materials with unknown constituents, or those that consist of, contain, or are derived from the following/or exceed threshold levels of specified toxins:</p> <ul style="list-style-type: none"> <li>► Components or assemblies containing intentional inputs of mercury</li> <li>► Components or assemblies that exceed the stated thresholds (in a TCLP<sup>x</sup>) for following substances:           <ul style="list-style-type: none"> <li>► Antimony 1.0 mg/L</li> <li>► Arsenic 5.0 mg/L</li> <li>► Barium 100 mg/L</li> <li>► Beryllium 0.007 mg/L</li> <li>► Cadmium 1.0 mg/L</li> <li>► Chromium 5.0 mg/L</li> <li>► Lead 5.0 mg/L</li> <li>► Selenium 1.0 mg/L</li> </ul> </li> <li>► Materials with <i>actual</i> concentrations of polychlorinated biphenyls &gt; 50 mg/kg</li> <li>► CRTs, CRT glass, frit, phosphors, and leaded display glass</li> <li>► Batteries with intentional inputs of lead, mercury, cadmium; unsorted/ unknown batteries; &amp; lithium-ion batteries</li> <li>► Printer or copy drums containing selenium and/or arsenic</li> <li>► Radioactive substances.</li> <li>► Excludes non-hazardous materials (e.g. those in Basel Convention Annex IX), unless they exceed threshold test levels.</li> <li>► 3.44 Hazardous Electronic Waste: HEE destined for materials, disposal, or energy recovery.</li> <li>► 3.51 Problematic Components or Materials: BFR plastics, inks &amp; toners, glycolant coolants, &amp; alkaline batteries.</li> <li>► NOTE: no ‘de minimus’ amounts are exempted, based on Basel Convention definitions of hazardous waste.</li> </ul>	<p>► <b>Yes</b></p> <p>► <b>Section 5 R2 Focus Materials<sup>xi</sup> (FMs)</b> - defined as materials in end-of-life electronic equipment that warrant greater care during recycling, refurbishing, materials recovery, energy recovery, incineration, and/or disposal due to their toxicity or other potential adverse worker safety, public health, or environmental effects that can arise if the materials are managed without appropriate safeguards.</p> <ul style="list-style-type: none"> <li>► Section 5 (1) Items containing polychlorinated biphenyls (PCBs),</li> <li>► Section 5 (2) Items containing mercury,</li> <li>► Section 5 (3) CRTs and CRT glass,</li> <li>► Section 5 (4) Batteries</li> <li>► Section 5 (5) Whole and shredded circuit boards (Except for whole and shredded circuit boards that do not contain lead solder, and have undergone safe and effective mechanical processing, or manual dismantling, to remove mercury and batteries.)</li> </ul> <p>► However, equipment, components, or materials (whole or shredded) that have undergone safe and effective mechanical processing or manual dismantling to remove FMs, yet still retain de minimus amounts of FMs, are not subject to the R2 requirements that are triggered by the presence of FMs.</p> <p>► Note: De-minimus is not defined in the standard although it is discussed at length in the R2 Guidance Document and essentially describes it as “the amount one would reasonably expect to remain following the utilization of “safe and effective mechanical processing or manual dismantling”. This will vary based on the technology employed.</p>	<p>► <b>Yes</b></p> <p>► <b>RQP: Section 4.5</b> defines substances of concern:</p> <ul style="list-style-type: none"> <li>► Materials or components making up EOLE products that in their normal state and under normal conditions of handling by a consumer pose little or no risk to human health or the environment but when handled and processed at a recycling facility merit special environmental and safety controls, and may be subject to specific regulatory requirements.</li> <li>► These materials include: CRT tubes and other leaded glass; phosphor powder; ethylene glycol; mercury and mercury bearing materials; batteries; and ink and toner cartridges.</li> <li>► Also defines ‘electronic scrap’ (circuit boards, wires/cables, etc.) exists with specialized handling requirements.</li> </ul> <p>► <b>ERRS: Section 5</b> established requirements for storage and handling, but does not define them within the standard, however non-useable equipment and materials generated by the Reuse/Refurbishing organization will be responsibly recycled through a Recycler approved by the Stewardship Program.</p>
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<p><b>Section 4.6.2.1(c) Materials of Concern</b> <i>Written management plan for Materials of Concern to protect health &amp; the environment</i></p>	<p>▶ <b>Partial</b> ▶ WEEELABEX does not explicitly call for a management plan, however <b>WT: Section 4.3.1</b> does require a documented risk management process that includes identification of hazards, assessment of risk and where appropriate elimination or reduction of risk.</p>	<p>▶ <b>Partial</b> ▶ <b>Section 4.4.6.1 d)</b> Requires organization to create and implement a plan for managing materials it accepts based in part on requirements for Hazardous e-Wastes. Also requires a risk assessment process, creation of written objectives, targets and programs: however it does not explicitly state that it must be a written plan. ▶ <b>Section 4.4.6</b> requires the organization to identify and plan those operations that are associated with the identified significant environmental aspects and safety H&amp;S risks consistent with its EH&amp;S policy, objectives and targets, in order to ensure that they are carried out under specified conditions.</p>	<p>▶ <b>Yes</b> ▶ <b>Section 5:</b> Development and Adherence to an Focus Materials Management Plan for management onsite and throughout the recycling chain.</p>	<p>▶ <b>Partial</b> ▶ <b>RQP:</b> Does not explicitly call for a management plan, however <b>Section 3</b> includes a risk assessment process and <b>Section 4</b> requires: ▶ Consideration of risk assessment results, sampling, audits, inspections, worker accident/incident reports, fines or regulatory orders, and other key indicators, to establish controls to prevent unapproved releases. ▶ Documented procedures for manual removal of any materials prior to mechanical processing, such as mercury bearing lamps, ink and toner cartridges, and batteries, where suitable processing controls to prevent exposure to hazardous substances and other releases to the environment do not exist. ▶ A documented procedure for the safe handling of substances of concern, and any hazardous materials and wastes. ▶ A current inventory with storage limits, with maximum acceptable quantity of materials and maximum permitted length of time in storage, for any substances of concern and other hazardous materials or wastes. ▶ Processing requirements EOLE and materials. ▶ <b>ERRS: Section 3</b> includes a risk assessment process and a risk mitigation plan.</p>
<p><b>Section 4.6.2.1(d) EH&amp;S Management System (MS)</b> <i>Develop, document, fully implement, review annually, and update an EH&amp;S MS</i></p>	<p>▶ <b>Yes</b> ▶ <b>WT: Section 4.2.1</b> requires a health, safety, environment and quality management system.</p>	<p>▶ <b>Yes</b> ▶ <b>Section 4.1</b> requires an environmental management system certified to ISO 14001. ▶ <b>Section 4.1.1</b> requires the system to include or reference an occupational H&amp;S system.</p>	<p>▶ <b>Yes</b> ▶ <b>Section 1</b> requires an EH&amp;S system defined by the recycler.</p>	<p>▶ <b>RQP: Section 1</b> requires an EH&amp;S management system. ▶ <b>ERRS:</b> Does not require a EH&amp;S management system, although it does includes some elements of a management system.</p>
<p><b>Prison labor and social accountability</b></p>		<p>▶ <b>Yes</b> ▶ <b>Section 4.2</b></p>	<p>▶ <b>No</b></p>	<p>▶ <b>Yes</b> ▶ <b>Section 2.6</b></p>
<p><b>ISO 14001</b> - As a method for achieving environmental criteria 4.6.2.1 (d)</p>	<p>▶ <b>No</b></p>	<p>▶ <b>Yes</b></p>	<p>▶ <b>No</b></p>	<p>▶ <b>No</b></p>

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<p><b>OHSAS 18001</b> - As a method for achieving health and safety criteria 4.6.2.1 (d)</p>	<p>▶ <b>No</b></p>	<p>▶ <b>No</b></p>	<p>▶ <b>No</b></p>	<p>▶ <b>No</b></p>
<p><b>Section 4.6.2.1(d) EH&amp;S Management System</b> <i>EH&amp;S Controls – a common element of an EH&amp;S Management System</i></p>	<p>▶ <b>Yes</b></p> <p>▶ <b>WT: Part I Section 5</b> - technical requirements (i.e. controls) for handling, storage de-pollution, de-pollution monitoring, treatment, storage of fractions and components, recycling and recovery, disposal of fractions</p> <p>▶ <b>Normative Annexes:</b></p> <ul style="list-style-type: none"> <li>▶ <b>A</b> - De-pollution guidelines</li> <li>▶ <b>B</b> - De-pollution monitoring</li> <li>▶ <b>C</b> - Requirements concerning batches</li> </ul> <p>▶ <b>WT: Section 5</b> Additional specific technical requirements for separation processes, cleaning processes and recycling and recovery processes for:</p> <ul style="list-style-type: none"> <li>▶ CRT display appliances</li> <li>▶ Flat Panel Displays</li> <li>▶ Lamps</li> <li>▶ Household Cooling and Freezing Appliances containing CFC<sup>xii</sup>, HCFC<sup>xiii</sup> or HFC<sup>xiv</sup></li> <li>▶ Cooling and Freezing Appliances containing Hydrocarbons (HC)</li> </ul> <p>▶ <b>WL &amp; WC: Section 5</b> Technical requirements includes controls for safe handling, storage, collection &amp; sorting, including requirements for particular equipment e.g. temperature exchange equipment, CRT devices, flat panel displays, lamps, smoke detectors, appliances containing oil or other liquids, or internal circuit as part of the appliance or capacitors containing oil to avoid spillages and other emissions, and asbestos containing appliances.</p>	<p>▶ <b>Yes</b></p> <p>▶ <b>Section 4.4.6.1</b> includes:</p> <ul style="list-style-type: none"> <li>▶ A full occupational H&amp;S evaluation at least every 3 years.</li> <li>▶ Information to ascertain what hazardous substances may be present in the EOLE</li> <li>▶ A plan for managing specific e-waste to reduce / eliminate exposures &amp; hazards</li> <li>▶ Ergonomic evaluation.</li> </ul> <p>▶ <b>Section 4.4.6.1.1 H&amp;S</b> requirements if Potentially Hazardous Processing Technologies (PHPTs) are used:</p> <ul style="list-style-type: none"> <li>▶ Understanding hazards prior to recycling activities or PHPTs are used</li> <li>▶ Baseline and regular air monitoring</li> <li>▶ Using results to identify high risk areas</li> <li>▶ Semi-annual air monitoring of high risk areas &amp; specified hazardous equipment</li> <li>▶ Control measures if limits are exceeded</li> <li>▶ Sharing of monitoring results with workers</li> <li>▶ An injury and illness prevention program</li> <li>▶ A H&amp;S committee &amp; encouragement of two-way communication without fear of reprisal</li> <li>▶ Formal process for investigation and resolution of H&amp;S complaints</li> <li>▶ Assessing hazards &amp; risks for injury or illness &amp; management and control of possible worker exposures &amp; hazards</li> <li>▶ Procedures for emergency response</li> <li>▶ Consult with designated occupational health provider (e.g. implementation of bio-monitoring recommendations &amp; confidentiality of worker information).</li> </ul>	<p>▶ <b>Yes</b></p> <p>▶ <b>Section 4</b> On-Site EH&amp;S includes a principle that the recycler utilize practices at their facilities that protect worker H&amp;S and the environment, plus a some specific controls:</p> <ul style="list-style-type: none"> <li>▶ Housekeeping,</li> <li>▶ Hazards identification and assessment,</li> <li>▶ Implementation of controls,</li> <li>▶ Use of monitoring and sampling protocols to provide assurances controls are effectively and continuously managing the risks.</li> </ul> <p>▶ Designation of a qualified employee or consultant to coordinate its efforts to promote worker H&amp;S, who will coordinate two way communication.</p>	<p>▶ <b>Yes</b></p> <p>▶ <b>Section 3</b> includes specific safety and Environmental Controls</p> <p>▶ <b>Section 4</b> Environmental Controls requires the recycler to implement and maintain adequate environmental controls to prevent unapproved releases to the environment. Controls Cover:</p> <p>▶ <b>Section 4.1</b> Identification and communication of controls to prevent exposure to hazardous substances and other releases to the environment.</p> <p>▶ <b>Section 4.2</b> Procedures for the manual removal of any materials prior to mechanical processing</p> <p>▶ <b>Section 4.3</b> Safe handling of substances of concern, and any hazardous materials and wastes, including labeling and storage requirements.</p> <p>▶ <b>Section 4.4</b> Inventory with associated storage limits for any substances of concern and other hazardous materials or wastes.</p> <p>▶ <b>Section 4.5</b> Processing in accordance with Material Disposition Hierarchy.</p> <p>▶ <b>RQP Section 5.0</b> includes Health and Safety Controls.</p>

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<p><b>Section 4.6.2.1(d) EH&amp;S Management System</b> <i>Training – a common element of an EH&amp;S Management System</i></p>	<ul style="list-style-type: none"> <li>▶ <b>Yes</b></li> <li>▶ <b>WT &amp; WL: 4.4</b> includes a variety of training:                             <ul style="list-style-type: none"> <li>▶ Familiarity with the EH&amp;S policy of the facility.</li> <li>▶ Training and instruction for employees and contractors for assigned tasks.</li> <li>▶ Emergency response planning, OHS measures, and training for relevant operations. Includes checking of training effectiveness and suitability &amp; delivery at a level suitable to the trainee in form, manner &amp; language.</li> <li>▶ Availability &amp; easy access at all times of training materials and information at the work place.</li> </ul> </li> <li>▶ <b>WC 4.3</b> requires                             <ul style="list-style-type: none"> <li>▶ All employees to be familiar with the EH&amp;S risks of the facility, especially when working with CRT displays, flat panel displays, temperature exchange equipment, and broken or damaged lamps. Employees and contractors involved in operations must be trained &amp; instructed to perform assigned tasks</li> <li>▶ Training materials and information be available at the work place or be easily accessible to employees at all times. Materials and information shall document specific risks inherent to CRT display appliances, flat panel displays, temperature exchange equipment and lamps.</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>▶ <b>Yes</b></li> <li>▶ <b>Section 4.4.2</b> requires that any person(s) performing tasks for it or on its behalf are competent on the basis of appropriate education, training or experience, and shall retain associated records, including:                             <ul style="list-style-type: none"> <li>▶ Importance of conformity with the EH&amp;S policy and procedures and with the requirements of the system,</li> <li>▶ Significant environmental aspects and hazards, and benefits of improved personal performance,</li> <li>▶ Export requirements</li> <li>▶ Roles and responsibilities in achieving conformity with the requirements of the system, and</li> <li>▶ Potential consequences of departure from specified procedures.</li> </ul> </li> <li>▶ <b>Section 4.4.6.1.1</b> (for companies using Potentially Hazardous Processing Technologies) requires training for workers including orientation for new workers and training for workers as new hazards are identified, new processes or materials are implemented, and new methods of protection are instituted.</li> </ul>	<ul style="list-style-type: none"> <li>▶ <b>Yes</b></li> <li>▶ <b>Section 4(d)(2)</b> requires:                             <ul style="list-style-type: none"> <li>▶ Regular, documented H&amp;S training that covers information from the hazards assessment,</li> <li>▶ Safe management handling, spill prevention, engineering controls, equipment safety, and</li> <li>▶ Use and care of personal protection equipment; with training for new hires and refresher courses for all employees that is understandable to them given language and level-of-education considerations.</li> </ul> </li> <li>▶ <b>Section 8(c)</b> requires Employees involved in data destruction shall receive appropriate training on a regular basis.</li> </ul>	<ul style="list-style-type: none"> <li>▶ <b>Yes</b></li> <li>▶ <b>RQP: Section 1</b> requires EHS training including new hire training, annual worker refresher training, and contractor training including:                             <ul style="list-style-type: none"> <li>▶ Potential EHS risks and controls associated with job responsibilities,</li> <li>▶ Safe material handling and storage,</li> <li>▶ Spill prevention,</li> <li>▶ Equipment safety,</li> <li>▶ Proper use and care of personal protective equipment,</li> <li>▶ Emergency response.</li> </ul> </li> <li>▶ <b>ERRS: Section 9</b> requires training on all job functions to ensure the protection of employees and the environment; product quality; and conformance to the ERRS. It specifies:                             <ul style="list-style-type: none"> <li>▶ Document the training needs,</li> <li>▶ Information security procedures,</li> <li>▶ Proper handling, storage and disposal of end-of-life equipment,</li> <li>▶ Responding to accidents, emergencies and environmental releases.</li> </ul> </li> </ul>

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<p><b>Section 4.6.2.1(d) EH&amp;S Management System continued</b> <i>Proof of Liability &amp; Environmental Insurance - a common element of an EH&amp;S Management System</i></p>	<p>▶ <b>Yes</b></p> <p>▶ <b>WT &amp; WL: 4.3.5</b> Insurance coverage or other financial resources including minimum cover for risks and liabilities of:</p> <ul style="list-style-type: none"> <li>▶ Bodily injury,</li> <li>▶ Damages to neighboring facilities,</li> <li>▶ Damages due to accidental pollutant release where the owner of the property is liable,</li> <li>▶ Facility closure &amp; cleanup.</li> </ul>	<p>▶ <b>Yes</b></p> <p>▶ <b>Section 4.4.8</b> includes insurance requirements adequate to cover the potential risks and liabilities of its operations, commensurate with the nature and size of its operations and the indemnification offered to the e-Steward's customers (if any), i.e., its aggregate liability, including liability for data destruction and environmental risks, as well as legal and financial assurances for the proper closure of its facilities.</p> <p>▶ It also requires that the e-Stewards recycler:</p> <ul style="list-style-type: none"> <li>▶ Clearly specify to customers what indemnification is or is not offered to customers</li> <li>▶ If indemnification is offered, retain appropriate insurance to underwrite such indemnification</li> <li>▶ Retain Pollution Liability Insurance if Potentially Hazardous Processing Technologies are used.</li> </ul>	<p>▶ <b>Yes</b></p> <p>▶ <b>Section 11 (a)</b> requires adequate Comprehensive or Commercial General Liability Insurance including coverage for bodily injury, property damage, pollutant releases, accidents and other emergencies.</p>	<p>▶ <b>Yes</b></p> <p>▶ <b>RQP Section 2.4.</b> requires Comprehensive or Commercial General Liability Insurance including coverage for bodily injury, property damage, complete operations and contractual liability with combined single limits of not less than \$2 000 000 per occurrence, \$2 000 000 general aggregate.</p> <ul style="list-style-type: none"> <li>▶ <b>Section 11.5</b> requires evidence of transporters insurance.</li> <li>▶ <b>Section 12.3</b> requires evidence of Downstream Recycler's insurance coverage.</li> </ul> <p>▶ <b>ERRS Section 1.5</b> requires the same as <b>RQP section 2.4</b> above.</p>
<p><b>Section 4.6.2.1(d) EH&amp;S Management System continued</b> <i>Site Closure Plan – a common element of an EH&amp;S Management System</i></p>	<p>▶ <b>Partial</b></p> <p>▶ <b>WT: 4.3.5</b> Minimum insurance coverage for risks and liabilities of facility closure assuring proper cleanup of the site and any WEEE.</p> <p>▶ Does not actually require a site closure plan to be prepared.</p>	<p>▶ <b>Yes</b></p> <p>▶ <b>Section 4.4.6.8</b> requires a site closure plan which stipulates:</p> <ul style="list-style-type: none"> <li>▶ How all electronic equipment will be properly managed at the time of site closure</li> <li>▶ Facilities that have used Potentially Hazardous Processing Technologies (PHPTs) indoors must conduct indoor dust sampling for a number of toxins / heavy metals.</li> <li>▶ Remediation of any contamination above established levels for workplace dust.</li> <li>▶ Soil &amp; ground water testing if PHPTs were used or EOLE were stored or managed outside of fully contained, impermeably floored buildings.</li> <li>▶ Provision for a third party to conduct all testing and analysis, and sign an affidavit asserting that nothing remaining on the site indoors or out exceeds either the threshold levels listed in <b>definition 3.43(b)</b> or other occupational limits.</li> </ul>	<p>▶ <b>Yes</b></p> <p>▶ <b>Section 11</b> requires a written plan and a financial instrument for proper closure of the facility and /or abandonment of any electronics recycling products, components, or materials.</p>	<p>▶ <b>Yes</b></p> <p>▶ <b>Section 6.10</b> Documented closure plan that at a minimum identifies the financial requirements upon closure of the facility to remove, transport and process all materials under the ownership of the Recycler in accordance with the requirements of the ERS, and further provides the financial mechanism for ensuring the availability of such funds.</p>

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<p><b>Section 4.6.2.1(d) EH&amp;S Management System continued</b> <i>Records retention &amp; documentation – a common element of an EH&amp;S Management System</i></p>	<ul style="list-style-type: none"> <li>▶ <b>Yes</b></li> <li>▶ Documentation requirements stipulates documentation and records:               <ul style="list-style-type: none"> <li>▶ <b>WT: Section 1.5</b> Annual data reporting</li> <li>▶ <b>WL &amp; WC: Section 4.1.2</b> Compliance</li> <li>▶ <b>WC: Section 4.4.1</b> Downstream logistic chain and proper processing</li> <li>▶ <b>WT: Section 4.4.4</b> Accidents or dangerous occurrences</li> <li>▶ <b>WT: Section 5.5.1</b> Destinations of each fraction and the fraction's use/application</li> <li>▶ <b>WL: Section 5.5.4</b> Transporters legally required documents &amp; records</li> <li>▶ <b>WL &amp; WT: Section 4.6.1</b> Re-use</li> <li>▶ <b>WC: Section 5.5</b> Quantity of WEEE collected and forwarded</li> </ul> </li> <li>▶ Records retention /control:               <ul style="list-style-type: none"> <li>▶ <b>WC &amp; WL: 5.5.2</b> requires retention for least 3 years, unless authorities, WEEE take-back organizations or customers stipulate a longer period.</li> <li>▶ <b>WT: 5.9.3</b> requires retention necessary to demonstrate conformity - 5 year retention unless legislation or authorities stipulate a longer period.</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>▶ <b>Yes</b></li> <li>▶ <b>Section 4.4.4</b> specifies documentation               <ul style="list-style-type: none"> <li>▶ EH&amp;S policy, objectives and targets,</li> <li>▶ Scope of the system,</li> <li>▶ Description of the main elements of the system, their interaction, &amp; reference to related documents,</li> <li>▶ Documents, including records, required by the Standard, and</li> <li>▶ Other documents and records, necessary to ensure the effective planning, operation and control of processes that relate to its significant environmental aspects, data security, export requirements, and H&amp;S risks.</li> </ul> </li> <li>▶ <b>Section 4.5.4</b> requires 5 years retention.</li> </ul>	<ul style="list-style-type: none"> <li>▶ <b>Yes</b></li> <li>▶ While the standard does not include a records control system, <b>Section 7a</b> requires the recycler to maintain for at least three years commercial contracts, bills of lading, or other commercially-accepted documentation for all transfers of equipment, components and materials into and out of its facility, as well as for any brokering transactions., but it does not require other system records to be retained.</li> <li>▶ <b>Section 13</b> requires a recycler to maintain in a single location each piece of documentation necessary to show conformity to each requirement of this document.</li> </ul>	<ul style="list-style-type: none"> <li>▶ <b>Yes</b></li> <li>▶ <b>RQP: Section 1</b> requires a documented EH&amp;S management system.</li> <li>▶ <b>RQP: Section 1.5.</b> requires retention of all records required by the standard for a minimum of three years, including training records; worker accident/incident reports; EHSMS annual review minutes; EHS sampling and inspection results; and waste records including the chain of custody of all EOLE and materials processed.</li> <li>▶ <b>Partial</b></li> <li>▶ <b>ERRS:</b> requires a documented risk assessment process to identify and control any potential EH&amp;S hazards associated with the organization's operations. It also requires some records, but does not require a records retention process.</li> </ul>

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<p><b>COMPARISON OF STANDARDS AGAINST 1680.2 &amp; .3 END-OF-LIFE PROCESSING REQUIREMENTS</b></p>				
<p><b>Section 4.6.2.1(e) Export Controls</b> <i>Only allows hazardous waste as defined by the importing country(s) or used and new electrical equipment to be exported by any vendor in the recycling chain to countries that legally accept them, as determined by the competent authority of the importing countries.</i></p>	<ul style="list-style-type: none"> <li>▶ <b>Yes</b></li> <li>▶ <b>WT: Section 4.7.3</b> WEEE, components, and fractions thereof which contain radioactive wastes shall not be exported outside the European Union and EFTA territory.</li> <li>▶ <b>WT: Section 5.3.6</b> Export of un-cleaned CRT glass from EU and EFTA is prohibited.</li> <li>▶ <b>WT: Section 5.3.6</b> Export of cleaned CRT glass outside the EU and EFTA territory only permitted for recycling or recovery.</li> </ul>	<ul style="list-style-type: none"> <li>▶ <b>Yes</b></li> <li>▶ <b>Section 4.4.6.7</b> Only permits export of Hazardous Electronic Wastes consistent with the decisions and agreements of the OECD<sup>xv</sup>, the Basel Convention, the Amendment to the Basel Convention, and other applicable national and international laws regarding such trade. This requirement applies throughout the recycling chain, including Intermediaries. It requires:             <ul style="list-style-type: none"> <li>▶ Hazardous Electronic Waste can be exported from OECD/EU countries and Liechtenstein to and through other countries in that same group</li> <li>▶ Hazardous Electronic Waste may not be traded between any Basel Party and the US or any other non-Party to the Basel Convention (non-Party/Party prohibition) unless all countries concerned are Member states of the OECD or have concluded a special bilateral or multi-lateral agreement.</li> <li>▶ Export not prohibited as above is acceptable if approved by the “competent authority” of the importing and transit countries and only accomplished in full conformity with OECD Decisions, the Basel Convention or other international agreements or national legislation implementing these agreements.</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>▶ <b>Partial.</b> Does include export controls, however obtaining a determination by the competent authority is not an absolute requirement.</li> <li>▶ <b>Section 3.</b> Legal Requirements requires an organization to have a plan for ... assuring it only exports equipment and components containing Focus Materials to countries that legally accept them.</li> <li>▶ It further requires organizations to identify and document the legality of all international shipments. Options for documentation of export requirements include all of the following, only one of which (#2 below) meets the export requirements in 1680.2             <ol style="list-style-type: none"> <li>1. A copy of the relevant information from the US EPA, or</li> <li>2. Documentation<sup>6</sup> from the country’s Competent Authority stating that the country legally accepts such imports, or</li> <li>3. A copy of a law or court ruling from the importing country that demonstrates the legality of the import.</li> </ol> </li> </ul>	<ul style="list-style-type: none"> <li>▶ <b>RQP: Yes</b></li> <li>▶ <b>Section 4.5.4</b> Export is only permitted to downstream vendors located in a country legally permitted to accept the material or component as determined by the authority of the importing country.</li> <li>▶ <b>Section 4.5.5</b> Allows export of clean material, including to a non-OECD/EU country, as a raw material feedstock in a manufacturing process if the material:             <ul style="list-style-type: none"> <li>▶ Has been cleaned in the OECD/EU</li> <li>▶ Is fully consumed in manufacturing</li> <li>▶ Does not require any additional pre-processing in a non-OECD/EU country.</li> </ul>             Where applicable, the destination country has provided prior informed consent for the import of the material.           </li> <li>▶ <b>ERRS: Yes</b>, indirectly because:             <ul style="list-style-type: none"> <li>▶ <b>Section 1.2</b> requires remarketed materials to be dispensed for final use within the province.</li> <li>▶ <b>Section 5.2</b> requires testing and inspection to ensure they are in working condition and functioning as designed &amp; intended, prior to being remarketed.</li> <li>▶ <b>Section 5.4</b> requires EOLE to be processed through an approved Stewardship Program recycler.</li> <li>▶ The audit checklist includes a provision of a copy of their policy regarding the prevention of the export of program materials or components.</li> </ul> </li> </ul>

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<p><b>Section 4.6.2.1(f) Testing equipment/ components going for reuse, repair or refurbishment prior to export</b></p> <p><i>Allows used and new electrical and electronic equipment and components or materials derived from them going for recycling, reuse, repair, refurbishment, remanufacturing and/or disposal, to be exported by any vendor in the recycling chain to countries that legally accept them, as determined by the competent authority of the importing countries.</i></p>	<p>▶ <b>Yes, WT: Section 4.7.4</b> Restrictions on export of WEEE that is not tested and prepared for re-use in accordance with specific requirements, outside the EU and EFTA territory.</p>	<p>▶ <b>Yes</b></p> <p>▶ <b>Section 4.4.6.2</b> Reuse requires:</p> <ul style="list-style-type: none"> <li>▶ Testing to determine full functionality of equipment and components going for reuse.</li> <li>▶ Repair, repurpose, or refurbishment, if needed, to ensure they are fully functional.</li> <li>▶ Data eradication, unless customers have signed waivers for data security services.</li> </ul> <p>▶ Label or list identifying records of all EOLE going for Reuse that is accessible to customers, auditors, and officials. Information must indicate the device, type of testing, results of functionality tests, the e-Stewards refurbisher responsible for functionality and availability of these records without unpacking the EOLE.</p> <p>▶ Packaging of refurbished electronic equipment and components for shipment in a manner that will protect them in transit.</p> <p>▶ Additional requirements to assure that EOLE are destined for Reuse and not Recycling or Final Disposal by providing evidence of reuse markets, including:</p> <ul style="list-style-type: none"> <li>▶ A copy of the invoice or contract stating that the equipment is for Reuse, is Fully Functional, and indicates the customer receiving equipment and parts.</li> <li>▶ Bills of lading with buyer and seller listed and additional information if brokers are involved</li> <li>▶ Specific controls for management of resulting scrap, waste, and materials throughout the Recycling Chain.</li> <li>▶ Mass Balance Accounting.</li> </ul>	<p>▶ <b>Partial</b></p> <p>▶ <b>Section 6 (c)</b> requires that prior to shipment testing to assure functionality in some cases.</p> <p>▶ However there are some exceptions</p> <ul style="list-style-type: none"> <li>▶ <b>Section 6 (c)</b> Testing is not required if: the recipient (in any country) is R2 certified, for new components in original packaging (regardless of functionality).</li> <li>▶ <b>Section 6 (c)</b> States that the recycle need not meet functionality requirements if there are contractual agreements, detailed materials tracking and recordkeeping, and auditing to assure that it: <ul style="list-style-type: none"> <li>▶ Meets the specifications of the recipient vendor.</li> <li>▶ Is being sold for reuse, with the recipient vendors ensuring that key functions are functioning properly, and residual FMs resulting from refurbishing operations are managed in manner that conforms to the R2 Practices.</li> </ul> </li> <li>▶ <b>Section 6 (d)</b> Functionality requirements are waived if the shipment is less than 15 units for sampling purposes.</li> <li>▶ <b>Section 6 (e)</b> Exception to the downstream requirements is given for shipments that satisfy <b>Section (c) or (d)</b>, or are new and in original packaging.</li> <li>▶ <b>Section 6 (f)</b> Exception is given to the export requirements (<b>Section 3 (a) (2)</b>) for shipments that satisfy either the functionality requirement of <b>Section 6 (c) (1)</b> or the unit exemptions of <b>Section 6 (d)</b>, or are new and in their original packaging.</li> </ul>	<p>▶ <b>Yes</b></p> <p>▶ <b>RQP:</b> Does not cover reuse, but export provisions are included and summarized in the row above.</p> <p>▶ <b>ERRS: Section 5.2</b> requires electronics products and/or components be tested and inspected to ensure they are in working condition and functioning as designed and intended, prior to being remarketed.</p>

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<p><b>Section 4.6.2.1(g)a Final Disposition</b>                      Disallowance of:</p> <ul style="list-style-type: none"> <li>▶ <i>Incineration and waste-to-energy facilities for materials that contain mercury, halogenated compounds, and beryllium, at a minimum.</i></li> <li>▶ <i>Non-hazardous disposal facilities for disposing of equipment, components, or materials derived from them, which contain “materials of concern”, except as required by law.</i></li> </ul>	<ul style="list-style-type: none"> <li>▶ <b>Partial</b></li> <li>▶ <b>WT</b> requires that disposition be conducted in conformity with EU Directive 96 EC which states "... the waste hierarchy should be considered so that re-use and material recovery are preferred to energy recycling". Energy recovery (through incineration) and / or landfill may only be considered if applicable law and specific facilities with the correct permits for the materials being sent for recovery and/or disposal exist" and "waste management, and that re-use and material recycling should be preferred to energy recovery from waste, where and insofar as they are the best ecological options. "</li> </ul>	<ul style="list-style-type: none"> <li>▶ <b>Yes</b></li> <li>▶ <b>Section 4.4.6.6</b> specifies acceptable disposition avenues and also specifies that mercury, halogenated materials, and beryllium are not permitted to enter solid waste landfills or incinerators for Final Disposal, throughout the Recycling Chain.</li> </ul>	<ul style="list-style-type: none"> <li>▶ <b>Partial</b></li> <li>▶ <b>Section 5.b (1)</b> requires safe disposal of mercury-containing devices.</li> <li>▶ While <b>Section 5 (d)</b> prohibits use of energy recovery, incineration, or land disposal as a management strategy for FMs or equipment and components containing FMs, exemptions are provided if circumstances beyond the control of the recycler disrupt its normal management of an FM, if legal.</li> <li>▶ <b>Section 5.c (1)</b> requires items containing mercury be processed in a mercury retort facility. <b>Section 5.b (1)</b> includes an exception if the equipment containing mercury is too small to remove safely at reasonable cost, workers are protected from the risks, and the equipment and components are sent to properly licensed materials recovery facilities that use technology designed to safely and effectively manage equipment or components containing such mercury.</li> <li>▶ Halogenated compounds and beryllium are not included in the definition of R2 Focus Materials.</li> </ul>	<ul style="list-style-type: none"> <li>▶ <b>Partial</b></li> <li>▶ <b>RQP: Section 4.5</b> requires that EOLE and materials are processed in accordance with specified destinations.</li> <li>▶ This includes a prohibition of energy-from-waste incineration (use of material as an energy substitute) for leaded glass, washed leaded glass, cullet, mercury lamps, mercury batteries, phosphor powder, substances of concern, and ethylene glycol.</li> <li>▶ While the RQP does not specify treatment for halogenated compounds it does requires circuit boards to be smelted for reclaim of metal, and also permits plastics to be processed through Energy from Waste applications.</li> </ul>

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<p><b>COMPARISON OF STANDARDS AGAINST 1680.2 &amp; .3 END-OF-LIFE PROCESSING REQUIREMENTS</b></p>				
<p><b>Section 4.6.2.1(g)b Final Disposition</b> <i>Disallowance of non-hazardous disposal facilities for disposal of “materials of concern”, except as required by law.</i></p>	<ul style="list-style-type: none"> <li>▶ <b>Partial</b></li> <li>▶ WT: Section 5.8.2 requires that hazardous substances or preparations for disposal shall be destroyed or immobilized prior to disposal in authorized landfills.</li> <li>▶ The operator is required to provide evidence to the auditor that appropriate technologies have been used to minimise the environmental impact if any fractions sent to landfill. Landfill may only be considered if applicable law and specific facilities with the correct permits for the materials being sent for recovery and/or disposal exist.</li> <li>▶ Verification at a single facility relates to each single WEEE stream treated:               <ul style="list-style-type: none"> <li>▶ Large household appliances.</li> <li>▶ Small / mixed WEEE appliances.</li> <li>▶ Display units (TVs, monitors, flat screens inc. laptop screens).</li> <li>▶ Temperature exchange equipment (fridges, freezers, air-con units, dehumidifiers, water coolers and tumble dryers containing F-gas). &amp;</li> <li>▶ Gas discharge lamps.</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>▶ <b>Partial</b></li> <li>▶ <b>Section 4.4.6.6</b> prohibits Hazardous e-Wastes and Problematic Components and Materials destined for materials recovery or disposal from entering solid waste landfills or incinerators for Final Disposal, throughout the Recycling Chain, with the exception of cleaned CRT glass and ink/toner cartridges, if allowed by law, under certain circumstances.</li> </ul>	<ul style="list-style-type: none"> <li>▶ <b>No</b></li> <li>▶ While <b>Section 5(d)</b> prohibits Energy Recovery, Incineration, and Land Disposal of FMs, organizations may be exempt from this requirement if circumstances beyond the control of the R2 recycler disrupt its normal management of an FM so long as it is allowed under applicable law.</li> </ul>	<ul style="list-style-type: none"> <li>▶ <b>Yes</b></li> <li>▶ <b>RQP: Section 4.5</b> identifies landfills as an unacceptable destination for substances of concern.</li> </ul>
<p><b>Section 4.6.2.1(h) Tracking Throughput</b> <i>Requires tracking of all “materials of concern” to final disposition, and to ensure that the downstream take-back service providers that process “materials of concern” are meeting the requirements of in section 4.6.2.1</i></p>	<ul style="list-style-type: none"> <li>▶ <b>Yes</b></li> <li>▶ <b>WT: Section 5.9.2</b> requires a mass balance that documents all material flows.</li> </ul>	<ul style="list-style-type: none"> <li>▶ <b>Yes</b></li> <li>▶ <b>Section 4.5.1.1</b> requires a tracking system for controlling, weighing, and documenting total incoming Electronic Equipment, and total outgoing materials, wastes, and equipment and components going for recycling, reuse, and disposal at each e-Stewards location, including materials in off-site storage or locations.</li> <li>▶ This includes tracking process, a mass balance accounting, and documentation of downstream vendors in a downstream flow chart.</li> </ul>	<ul style="list-style-type: none"> <li>▶ <b>Yes</b></li> <li>▶ <b>Section 7</b> Tracking Throughput requires maintenance of business records sufficient to demonstrate the material flow of equipment, components, and materials that pass through its facility.</li> <li>▶ <b>Section 7 (a)</b> requires maintenance for at least three years commercial contracts, bills of lading, or other commercially-accepted documentation for all transfers of equipment, components, and materials into and out of its facility, as well as for any brokering transactions.</li> </ul>	<ul style="list-style-type: none"> <li>▶ <b>Yes</b></li> <li>▶ <b>RQP:</b> <ul style="list-style-type: none"> <li>▶ <b>Section 4.4</b> requires a current inventory with associated storage limit, for any substances of concern and other hazardous materials or wastes.</li> <li>▶ <b>Section 6.1</b> Maintain a process to track and report the quantity and chain of custody of program materials received.</li> </ul> </li> <li>▶ <b>ERRS:</b> <ul style="list-style-type: none"> <li>▶ <b>Section 7</b> requires tracking and reporting systems to ensure that program materials are suitably identified and accurately reported.</li> </ul> </li> </ul>

Common acronyms: EH&S: Environment, Health, & Safety, OHS: Occupational Health and Safety, H&S: Health and Safety

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Shaded rows indicate topics go beyond the IEEE standards 1680.2 and 1680.3 sections 4.6.2.1 requirements - GEC requested these be included in order to provide a broad review that will better inform the revision process for 1680.1.

ISSUE OR APPLICABLE 1680.2 SECTION NUMBER	WEELABEX: 2011 (WT=TREATMENT STANDARD, WL=LOGISTICS STANDARD, & WC = COLLECTORS STANDARD)	E-STEWARDS® STANDARD FOR RESPONSIBLE RECYCLING & REUSE OF ELECTRONIC EQUIPMENT: 2009	RESPONSIBLE RECYCLING (“R2”) PRACTICES FOR USE IN ACCREDITED CERTIFICATION PROGRAMS FOR ELECTRONICS RECYCLERS: 2008	RECYCLER QUALIFICATION PROGRAM FOR EOLE RECYCLING (2010) (RQP) & ELECTRONICS REUSE & REFURBISHING STANDARD (2012) (ERRS)
<p><i>Summary information is provided to highlight relevant criteria, and is not comprehensive. IT IS IMPORTANT THAT IT BE READ IN CONJUNCTION WITH THE ACTUAL LANGUAGE IN EACH STANDARD. Section numbers cited are specific to the standard in each column.</i></p>				
<p><b>COMPARISON OF STANDARDS AGAINST 1680.2 &amp; .3 END-OF-LIFE PROCESSING REQUIREMENTS</b></p>				
<p><b>Mass Balance</b> <i>Mass balance is not a requirement however it is a useful tool for demonstrating conformity to section 4.6.2.1(h)</i></p>	<p>▶ <b>Yes</b> ▶ <b>WT: 5.9.2</b> Documented mass balance of all material flows (summaries of incoming and outgoing deliveries of WEEE or WEEE fractions) in an annual overview under consideration of stored amounts.</p>	<p>▶ <b>Yes</b> ▶ <b>Section 4.5.1 (a)</b> requires a complete mass balance accounting of all incoming and outgoing Electronic Equipment and resulting materials (including for Reuse), on a six-month basis at a minimum, preferably on a monthly basis.</p>	<p>▶ <b>No</b> ▶ There is no requirement to conduct a mass balance accounting or reconciliation.</p>	<p>▶ <b>No</b> ▶ <b>RQP &amp; ERRS:</b> Tracking is required, but there is no requirement to conduct a mass balance or reconciliation.</p>
<p><b>Section 4.6.2.1(i) Tracking Materials Of Concern to Final Disposition</b> <i>Tracking of “materials of concern” to final disposition, and to ensure that the downstream take-back service providers that process “materials of concern” are meeting the requirements of 4.6.2.1 c) – i).</i></p>	<p>▶ <b>Yes</b> ▶ <b>WT: Section 4.5.1</b> Documentation of the origin of the WEEE treated and the downstream treatment chain of WEEE and fractions thereof as long as they have not reached the end-of-waste status. ▶ <b>WT: Section 4.5.2</b> Responsibility of downstream monitoring remains in cases where handing over of WEEE to dealers or brokers, or when shipped across borders.</p>	<p>▶ <b>Yes</b> ▶ <b>Section 4.4.6.3</b> requires the organization to be accountable for management of Hazardous e-Waste (HEWs), through to Final Disposition. ▶ This includes a documented system of direct controls and accountability for all Hazardous e-Waste throughout the Recycling Chain, including detailed requirements for: ▶ Initial due diligence prior to shipping materials. ▶ On-site audits of next tier recyclers, written work agreements. ▶ Contacting all Downstream Recyclers for all HEWs throughout Recycling Chain and verify the receipt and processing of a minimum of 3 months’ random sampling of shipments. ▶ Assuring on-going conformance (documentation, on-site and administrative audits and tracking of shipments). ▶ Verifying Intermediaries are directing shipments only to approved destinations, ▶ Providing transparency to customers (upon request).</p>	<p>▶ <b>Yes</b> ▶ <b>Section 5(e)</b> requires downstream vendors to be selected on the basis that they will also conform with Section 7, tracking their own throughput. <b>Section 7</b> requires an R2 recycler to track throughput for all materials into and out of its facility and brokering transactions. ▶ <b>The definition of “Recycling Chain”</b> refers to all the downstream vendors that handle end-of-life equipment, components, or materials that pass through an R2 electronics recycler’s facility or control. It includes, but does not extend beyond materials recovery facilities such as smelters. For equipment and components that are sold or donated for reuse, it does not extend beyond the entity that conforms with Provision 6 (c) or (d).</p>	<p>▶ <b>Yes</b> ▶ <b>RQP: Section 12.1</b> requires documentation of the downstream flow and handling of materials from the Recycler’s facility to each Point of Final Disposition, including details on how the goods are processed at each point, and the percentage of processed materials sent to each Downstream Recycler. ▶ <b>ERRS: Section 7</b> requires tracking of the number of units or weight of material sent to a program approved processor for recycling.</p>

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## ACRONYMS & END NOTES

- <sup>i</sup> Standards Australia - <http://www.standards.org.au>
- <sup>ii</sup> [WEEE Forum](http://www.weee-forum.org) - [www.weee-forum.org](http://www.weee-forum.org)
- <sup>iii</sup> [Basel Action Network](http://www.ban.org) - [www.ban.org](http://www.ban.org)
- <sup>iv</sup> [R2 Solutions](http://www.r2solutions.org) - [www.r2solutions.org](http://www.r2solutions.org)
- <sup>v</sup> Electronics Product Stewardship Canada: <http://www.epsc.ca>
- <sup>vi</sup> Electronic Products Recycling Association: <http://www.eprassociation.ca>
- <sup>vii</sup> [http://www.weee-forum.org/system/files/various/weeelabex\\_conformity\\_verification\\_governance\\_v7.0\\_final\\_2012\\_09\\_20.pdf](http://www.weee-forum.org/system/files/various/weeelabex_conformity_verification_governance_v7.0_final_2012_09_20.pdf)
- <sup>viii</sup> WEEE = Waste Electrical and Electronic Equipment
- <sup>ix</sup> Sean De Vries, Director, Recycler Qualification Office Electronic Products Recycling Association
- <sup>x</sup> TCLP = Toxicity Characteristic Leaching Procedure
- <sup>xi</sup> FM = Focus Materials
- <sup>xii</sup> CFC = Chlorofluorocarbon
- <sup>xiii</sup> HCFC = Hydrochlorofluorocarbons
- <sup>xiv</sup> HFC = Hydrofluorocarbon
- <sup>xv</sup> OECD = Organization for Economic Cooperation and Development