Comparisons of e-Stewards and R2: Insights on business and environmental benefits

By Pamela J. Gordon, with contributors Barbara Kyle and Kim Holmes

Clients, colleagues, and friends who have seen photos or footage of deplorable conditions of certain manual electronics "recycling" communities in disadvantaged regions of the world ask me, "How do I know where the products I no longer need end up, and how they are processed? Am I really doing the right thing by recycling them?" They ask how to tell which electronics recycling services are responsible for human and environmental health, adding, "Wouldn't it be a good idea if there were certifications or standards for recyclers so we could choose the ethical ones?"

These are good questions, and previously I've had to answer them by sharing a checklist of responsible practices to use while evaluating recyclers. Unfortunately, most people don't have the time or access to do a rigorous job of it. As far as standards, I've mentioned that many recyclers are getting ISO 14001 certified, and that while it *does* provide a structure for continuous management and reduction of environmental impacts, ISO 14001 by itself doesn't prescribe performance requirements or audits for electronics-recycling practices.

Now, however, I can point them to two standards for electronics recycling – R2 and e-Stewards – to compare and contrast and find recyclers becoming certified to the standard of their choice, or both. I'm grateful to *Electronic Waste Journal* Editor Ismail Oyekan for enthusiastically accepting this article and providing space to knowledgeable advocates of both R2 (Kim Holmes) and e-Stewards (Barbara Kyle). Fortunately, I can now share this article with clients, colleagues, and friends, so that they can make their own decisions about the standards that are right for themselves and their organizations.

Background on R2

Giving perspectives on R2 throughout this article is Kim Holmes, a consultant to R2 Solutions. Before writing this article, I worked with Kim on Design-for-Environment elements of a client's products; she was helpful particularly in the area of plastics analysis and recommendations. Kim runs 4R Sustainability, Inc.

The R2 Standard was developed during three years by a multi-stakeholder group, with facilitation funded by the USA EPA. Their goal was to create a voluntary, market-based mechanism for ensuring best practices in the electronics recycling industry, which would also provide essential information and assurances to prospective customers. Among the stakeholders were USA State regulators; electronics recyclers and refurbishers, and their trade associations; as well as OEMs/customers of electronics recycling services. (Non-Governmental Organizations (NGOs) – representatives from environmental justice organizations – were active participants for much of the R2 development process, but withdrew toward the end; refer to "Background on e-Stewards" below.) The result was the *"Responsible Recycling Practices for Use in Accredited Certifications Programs"* (the R2 Standard).

The non-profit organization R2 Solutions was formed in September of 2010 to act as the housing entity for the standard. R2 Solutions is responsible for educating the industry about the R2 Standard, providing information to the public about the standard, and supporting the R2 Governing Council, which is responsible for updating the standard. R2's website asks us to "become part of the movement to raise the overall industry standards for operations and material handling."

Background on e-Stewards

I asked Barbara Kyle, National Coordinator for Electronics TakeBack Coalition, to give her perspectives on e-Stewards for this article. Earlier this year, Barbara and I held a brainstorming session on ways to reduce e-waste, ranging from legislation and standards, to Design-for-Environment training, to understanding the material composition of electronics.

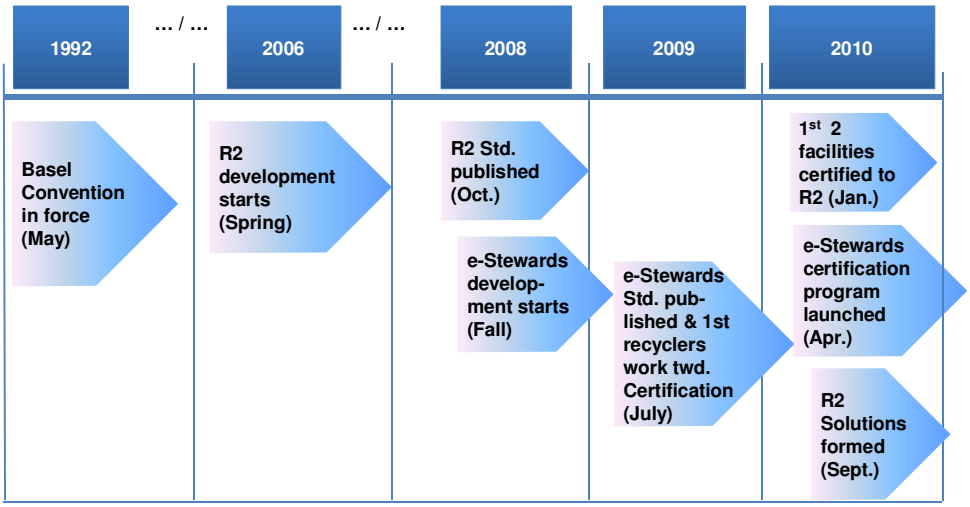
For the first 2.5 years of the R2 multi-stakeholder process (described above), NGOs Basel Action Network (BAN) and the Electronics TakeBack Coalition were active participants. BAN then withdrew, believing that a field test of the draft standard could result in violations of the Basel Convention-- the basis of BAN's work. Even though R2 modified the document (addressing some of these concerns) following the NGOs' departure, several recyclers asked BAN to develop the separate e-Stewards Standard and certification program, beginning in late 2008, after the R2 Standard was completed.

The e-Stewards certification program was launched on April 15, 2010, with the endorsement of large corporations — including Bank of America, Wells Fargo, and Samsung—that publically committed to using e-Stewards certified vendors. The program has also been endorsed by 68 environmental organizations, including the Sierra Club, Greenpeace, the National Resources Defense Council, and the Electronics TakeBack Coalition.

From its inception, the e-Stewards certification program has been owned and housed by BAN, a 501(c)3 non-profit public interest group devoted to preventing illegal and unjust trade in hazardous waste. The e-Stewards Leadership Council provides recommendations in the areas of technical and business issues, policy expertise, and marketing. With the goal of providing a consistent and rigorous program worldwide, BAN's full-time staff and certification consultant oversee quality control on all aspects of the standard, auditing, certification, and accreditation elements of the e-Stewards program.

Figure 1 is a timeline noting key milestones in the development of the two certification programs.

Figure 1: Timeline of key milestones in the formation of e-Stewards and R2



certification

Summary Comparison of the Two Standards

R2 and e-Stewards have many fundamental similarities: Both standards seek to publically differentiate electronics recyclers based on their ethical practices. Both are accredited by ANAB, which "assesses and accredits certification bodies that demonstrate competence to audit and certify organizations conforming to management systems standards." Each of the standards requires accredited third-party verification for certification. Each is endorsed by a growing number of recyclers. People concerned about the way their e-waste is treated can look to each standard to learn the minimum requirements of recyclers certified to the standard. Both programs call for a written hazards identification procedure, and require responding to hazards using engineering controls, administrative controls, and personal protection equipment.

The differences revolve mainly around export restrictions (e-Stewards disallows the export of hazardous electronic waste to developing countries for recycling or disposal, R2 does not), whether certification may be facility by facility or must be company-wide (R2 allows the former; e-Stewards requires all company sites to become certified within 18 months), specification of Environmental Management Systems (EMS) (R2 requires an EMS but does not advocate for a specific system, and e-Stewards prescribes ISO 14001 including detailed health and safety requirements--reflecting also most of the OSHAS 18001 standard).

Several of these distinctions owe to whether or not the standards were based on the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal. This United Nations multi-lateral treaty is the most comprehensive global

environmental agreement on hazardous and other wastes (with 175 countries having ratified to date), aiming to protect human health and the environment against the adverse effects resulting from the generation, management, transboundary movements, and disposal of hazardous and other wastes. As the e-Stewards' primary author's name – Basel Action Network – suggests, the e-Stewards program is based on the tenets of the Basel Convention. R2 was not designed with the Basel Convention in mind--with expectation that national and International laws may change—but instead specifies that certified recyclers abide by international law.

Table 1 describes e-Stewards and R2 according to a list of tenets and qualities that I developed, plus additional categories suggested by our co-contributors. The content is from the co-contributors (edited by me).

Table 1: Descriptions of R2 and e-Stewards edited from Contributors' summaries

Tenet / Qualities	**R2**	**e-Stewards**
International scope of the standard	Currently 61 facilities in North America have been certified, and a number of certifications are underway in Europe and Asia. Customers, recyclers, and downstream processors around the world are already benefitting from the accelerating implementation of the best practices in R2.	The e-Stewards Standard is a global standard, written so that it can be applied in any country. There are currently 35 certified e-Stewards facilities (in four countries so far), and 65 more that have contracted with e-Stewards certification bodies for certification in the upcoming months.
Restrictions against / allowances for landfilling and incineration of e-waste	Land disposal, incineration, and energy recovery are not acceptable practices, except when required by law or in circumstances beyond the recycler's control (e.g., accident or disaster).	Recycling excludes landfilling or incineration, including waste to energy incineration. e-Stewards prohibits recyclers from putting the e-waste into municipal landfills or incinerators.
Method of certifying to the standard, audits, renewals, number of certification bodies.	All certification of recyclers is through independent third-party auditors employed by ANAB accredited certification bodies. Once certification is attained, the certification body conducts annual facility audits. Certification must be renewed every three years. Three certification bodies are currently accredited to R2.	All certification of recyclers is through independent third-party auditors employed by ANAB-accredited certification bodies (or other approved IAF member accreditation bodies around the world). Once certification is attained, the certification body conducts surveillance audits (usually annually, or more frequently). Certification must be renewed every three years. Three certification bodies are currently accredited to e-Stewards. For quality control, BAN's certification consultant witnesses most audits, monitoring activities of all e-Stewards certification and accreditation bodies.

Full-company and/or site-by-site certification.	Recyclers' individual facilities may be certified; for example, Sims Recycling Solutions announced April 25, 2011, that their Tucson, Arizona (USA) facilities received R2 certification.	Requires all of a company's locations to certify in <18 mos. of the initial site certification. Companies may determine if their certificate is issued site by site, or corporate-wide.
Any in-country requirements for recycling?	Requires downstream due-diligence to ensure all recyclers--regardless of location-operate state-of-the art facilities that employ the many best practices contained in the Standard and operate in accordance with all applicable laws, including the importing and exporting laws of all relevant countries. A description of the approach to ensuring proper management of exported material can be found at the Product Stewardship Institute's blog.	Prohibits export of hazardous e-waste* to developing countries, consistent with the Amendment to the Basel Convention. The e-Stewards Standard has detailed requirements for downstream accountability, except where using other certified e-Stewards downstream. * Untested or non-working equipment, parts, and processed materials if they contain toxic constituents. But tested working equipment and parts are considered 'products' and are free to be traded with any country that does not ban their import.
Use of prison recycling operations	Allowed, so long as the facilities are audited to, and meet all provisions of the Standard.	Not allowed
Two business benefits of the standard	• The R2 Standard provides a simple means for customers to verify that an electronics recycler is forthright and responsible in its management of used and end-of-life equipment. • It also provides a means for responsible electronics recyclers to highlight their values and performance to customers, affirming their use of best practices and the highest standards for legal and ethical management.	• Aiming to be the most demanding standard with the most vigorous verification in the industry, e-Stewards gives customers confidence of having a comprehensive shield from e-waste threats: global pollution, data loss, worker exposure, violation of international laws, and brand damage. • Businesses can reduce their in-house recycling vendor qualification, due diligence, and monitoring costs by using certified e-Stewards recyclers.
Two brief examples of the standard's environmental benefits	• Requires use of a materials management hierarchy with all practical steps being taken to reuse equipment and components, and then recovery of materials for the rest. "Focus Materials", materials that can pose environmental concern, are carefully managed to ensure environmental and worker safety. • Requires thorough downstream due diligence on all vendors handling Focus Materials to ensure proper state-of-the-art handling throughout the recycling chain, including	• Does not permit e-waste (including untested or non-working electronics) to be exported to developing nations, where they can cause great harm to the environment and public health, including the removal of bad parts for refurbishment. • Prohibits shredding (under any circumstances) of mercury-containing devices, inks & toners, batteries, polychlorinated biphenyls, etc. (End processors for these materials are allowed to do this, in fully licensed and permitted mercury processing operations.)

	legality of exports and imports anywhere in the world.	
Program costs	The only cost associated with R2 certification is the cost of the Certifying Body audits. Typically, this cost ranges from US$6,000 to $15,000 or more, depending on the activities being performed and size of the facility. Of course, this fee does not include the costs of getting into conformity with the standard, such as establishing the Environment Management System (EMS) of their choice.	Costs include setting up an EMS in conformity with the e-Stewards Standard, auditing fees to the certification body (based on cost restrictions found in global ISO standards for certification bodies), and a sliding-scale marketing and licensing fee (based on e-recycling revenues) to BAN for on-going oversight of the certification and accreditation bodies, standard revisions, Q&A, marketing, legal, and resources for e-Stewards recyclers.
Licensing	There are no licensing restrictions on the R2 Standard, which can be freely downloaded from the R2 Solutions website. There is no licensing fee that R2 certified recyclers must pay to use the R2 name.	Anyone can refer to the "e-Stewards" programs under the Fair Use guidelines. Only licensees conforming to the program's requirements can claim they are e-Stewards Recyclers or e-Stewards Enterprises.
How Environment, Health, and Safety (EH&S) is addressed in the standard	R2 supports and complements a variety of global management system standards, including ISO 14001, OHSAS 18001, RIOS, etc. Recyclers must have a robust management system, but are allowed to choose the EH&S management system most appropriate for their facility and location(s) throughout the world.	Specific minimum H&S requirements addressing worker-exposure concerns including: full occupational H&S inspection and evaluation in all operations (every $\leq$3 years), testing air quality if using shredding, breaking CRTs, removing mercury lamps, etc., assessing ergonomics, identifying hazardous substances. To be incorporated into ISO 14001, with most elements of OHSAS 18001.
Relationship with national laws	Respects the right of every nation to establish a legitimate electronics recycling industry by allowing trade with state-of-the-art partners where legal in the developing world.	Because it is illegal for the non-OECD Basel countries to trade with non-party countries (including the USA), e-Stewards requires recyclers to respect an outright ban on hazardous waste going to developing countries for any reason.
Reporting of proprietary business data to a housing organization	Does not require disclosure of proprietary business information to any person other than the independent certifying body auditor and governmental entities (such as state and/or municipality where the recycler is located).	Requires annual, confidential reporting of toxins from air tests, volumes, etc., to foster future revisions of the e-Stewards Standard, based on actual exposures in the industry and to quantify impacts of the program.

Additional points made by Kim Holmes about R2 include the following:

- The R2 standard was developed through an open and collaborative stakeholder process. The R2 Governing Council, an independent governing body made up of representatives from all stakeholder groups is responsible for future updates of the standard. All of the work of the Governing Council is open to public review and comment.
- The R2 Standard avoids conflicts and legal risks by requiring that recyclers conduct business in a legal manner rather than interpreting regulation within the standard. Recyclers are not led to assume they are legally compliant based on following the standard. Because domestic and international law are not defined in the standard, the standard does not become invalid as regulatory changes are made.

Additional points made by Barbara Kyle about e-Stewards include the following:

- The e-Stewards Standard was developed by BAN in conjunction with multiple stakeholder groups committed to writing the highest standard. The multi-stakeholder Leadership Council provides technical, marketing, and other guidance to BAN, including a Technical Committee helping to revise the standard. The e-Stewards Standard states that if there is a conflict between the standard and the law, that law will always prevail.
- e-Stewards requires use of a materials management hierarchy with all practical steps being taken to reuse equipment and components, and then recovery of materials for the rest. Throughout final disposition, hazardous e-waste is managed to ensure environmental and worker safety. Extensive downstream due diligence must be conducted on all vendors handling hazadous e-waste to ensure proper handling throughout the recycling chain. (Brokers are not allowed to become certified recyclers.)

To help us understand some of the reasons the R2 and e-Stewards standards are valued in the marketplace, I asked each of my co-contributors to highlight one or more of their standard's stakeholders -either recyclers certified to the standard and/or companies publically committed to selecting recyclers based on the particular standard. Here is what the contributors wanted to share.

Stakeholders talk about e-Stewards

WeRecycle! was among the first group of recyclers certified to e-Stewards. The company's services include asset management, data destruction, complete recycling, logistics services, and compliance assistance services.

Mick Schum, WeRecycle's president said of the company's e-Stewards certification,

> *"e-Stewards Recyclers and their customers are taking a significant step forward in achieving the most responsible level of management for obsolete electronic equipment. Now, we can provide a competitive domestic alternative to the irresponsible exportation and dumping that runs rampant throughout the industry. Finally, consumers can really know they are doing the right thing when they recycle their old electronics and as Certified e-Stewards Recyclers, we can prove it."*

WeRecycle's website states, "WeRecycle! is committed to advancing globally accepted best practices for managing e-waste, in accordance with standards set forth by the Basel Action

Network (BAN). As an ISO 14001:2004 & NAID certified business and an e-Stewards Founder, WeRecycle! affirms a promise to providing environmentally responsible recycling."

Figure 2: Photo of WeRecycle! operations

Wells Fargo & Co., the USA financial services company, chooses to use e-Stewards Certified recyclers because the program aligns with their commitment to doing business responsibly. "Through the e-Stewards program, we make our intentions clear," says Stephanie Rico, Vice President of Environmental Affairs at Wells Fargo. "We want to make sure that none of our hazardous e-waste ends up in places where it does not belong – especially in the hands of children."

Another financial giant, Capital One, one of the most widely recognized brands in America, relies upon the security that using e-Stewards recyclers offers. "Being an e-Stewards Enterprise is important to us since it provides 100% assurance that our e-Waste is being handled in a responsible manner and ensures our disposal of older equipment is not impacting the environment," says Brad Mierenfeld, of Capital One's Environmental Sustainability Office.

One of the newest e-Stewards Enterprises, NVIDIA, the world leader in visual computing technology (NVIDIA invented the graphics processing unit, or GPU, in 1999), cites the high quality of the e-Stewards program as one reason they pursue recyclers with this certification. "Wherever possible, NVIDIA chooses to use e-Stewards certified recyclers. This ensures that our e-waste is managed safely and that it does not contribute to the global toxic waste crisis. All

of NVIDIA's U.S. recyclers undergo auditing and performance requirements that are outlined in the e-Stewards program guides and are consistent with NVIDIA's auditing requirements for well organized and safe facilities."

Stakeholders Talk about R2

Currently, there are 61 R2-certified facilities in North America, with dozens more worldwide in the process of attaining certification. The R2 Standard has quickly become the most widely adopted third-party certification in the marketplace, with strong support for the standard from electronics recyclers, manufacturers and customers.

Intechra, a leading electronics recycling and IT Asset Disposition (ITAD) service provider has been a long-time supporter of the R2 Standard as well as an early adopter. Intechra is a subsidiary of Arrow Electronics (NYSE: ARW), a global provider of products, services and solutions to industrial and commercial users of electronic components and enterprise computing solutions. It has four R2-certified facilities in the USA. Though Intechra has always offered environmentally responsible electronics recycling and asset management services to its clients, management saw the R2 certification as a way to further demonstrate leadership in this area, as the R2 Standard creates a solid framework for instilling industry best practices into operations.

"We really felt R2 created the best approach to addressing the concerns of our clients when it comes to managing retirement of their IT equipment," explains Michael Profit, Intechra president. "Our clients want us to offer the highest levels of data security, ensure proper environmental recycling of materials, protect worker safety and be able to redeploy and reuse equipment when possible. We felt the R2 Standard best addresses all of these areas of concern, while respecting the importance for global enterprises to responsibly, ethically and legally conduct business wherever they operate."

Recyclers and ITAD service providers are also beginning to see more educated customers seeking services, with third-party certification becoming a prerequisite for vendor selection because the R2 Standard addresses the primary areas of customer concerns. "We've had more clients inquire about the status of our R2 certification than any other audit-based program out there," adds Profit.

Figure 3: Photo of Operations at Intechra

Photo of Intechra facility is courtesy of Liz Margerum, *Reno Gazette-Journal*.

Some of these large customers were active participants in the development of the R2 Standard, helping craft a standard that also meets their needs. Though not in the original multi-stakeholder group, Sony is an example of an electronics-recycling customer appreciative of R2. "As a result of that collaborative process, R2 brings together manufacturers and responsible management of unwanted or surplus electronic products and components," notes Doug Smith, Director of Corporate Environment, Safety and Health for Sony. "From a customer's perspective, R2 is a great baseline to promote competition amongst recyclers. The certification assures safe and secure processing, thus enabling more focus on innovative

solutions which will yield higher recovery rates, all while protecting the environment and human health."

After more than a year in practice, the R2 Standard continues to receive positive feedback from recyclers and their customers. Overall confidence in electronic recycling is improved and recyclers report numerous ways in which R2 has enhanced operations, including better record keeping, enhanced worker safety and the selection of more transparent downstream vendors. R2 Solutions and the supporters of the R2 Standard are confident the original goals of the Standard, to provide a market-based mechanism for ensuring best practices and providing essential assurances to prospective customers, are successfully being met.

What Everyone Can Agree On

- Standards are necessary. Years ago, several reporters interviewed a TFI client about their impressive e-recycling program. When the reporters started asking for the names of the electronic recyclers our client used, our client immediately had us independently evaluate their recycler's ethical practices. If only an industry standard such as e-Stewards or R2 were available at the time! Yes, standards are necessary to differentiate recycling companies' adherence to practices that are important to those concerned about safe and responsible treatment of e-waste.
- Education is a key benefit – for all stakeholders. Studying the principles of e-waste standards raises awareness for users, agencies, recyclers, and the media about what is fair, safe, and acceptable. This education is necessary for individuals to make informed choices that are best for themselves and their organizations.
- Design for Environment (DfE) can reduce E-waste. While documenting e-waste-reduction successes for my book *Lean and Green: Profit for Your Workplace and the Environment* (2001, Berrett-Koehler Publishers), I found that by deploying DfE principles design engineers and their management can deliver the same or greater product functionality by using less hardware, and design products for reuse and high economic value at end-of-life. (Article contributor Barbara Kyle's organization sponsored a short film about leveraging design for reducing e-waste.) TFI has been training electronics and mechanical engineers in DfE since 2005 (starting at Microsoft's headquarters in Redmond, Washington, USA). (Note that on May 25th, at the International Electronics Recycling Conference and Expo (IERCE), I will give a mini-version of TFI's day-long Design for Environment Workshop. I recommend that anyone vested in reducing e-waste attend. Register yourself and team; it's for OEMs, CMs, ODMs, component companies, and recyclers).

Next Steps

What will the future bring? Two parallel standards each respected and espoused by their stakeholders, or eventually a harmonized standard with the best of both? I predict the former. Yet I hope that by featuring the numerous merits of each standard, this article and others like it will promote communication and cooperation toward (1) reducing e-waste in the first place through reuse and other Design-for-Environment features, and (2) vastly improving recycling practices for the health and sustainability of the environment, workers, and all of us.

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