



Electronics Recycling Certification Standards

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In October 2017, the County of San Mateo adopted the Responsible Recycling of Electronic Waste Ordinance (Ordinance No. 4785). The Ordinance requires that all electronics recyclers located in unincorporated areas of San Mateo County (SMC) must be certified by a third-party approved by the County. Electronics collectors in the unincorporated areas of SMC are also required under the County Ordinance to deliver their electronics to recyclers that are certified by a third-party. The third-party certifications that are being accepted by the County's Office of Sustainability are e-Stewards and R2. Both programs provide guidelines and standards that maximize reuse and recycling, minimize exposure to human health or the environment, ensure safe management of materials by downstream handlers, and require destruction of all data on used electronics. Accepting both certification programs as part of the County's electronics recycling efforts provides collectors and recyclers the flexibility in choosing the best approach for responsible electronics recycling that meets their objectives and needs. It is also important to note that given the volatility and uncertainty in the current recycling market, the County favors providing options for recyclers to be able to integrate responsible recycling practices into their operations while meeting their bottom-line.

Both R2 and e-Stewards certification programs hold recyclers accountable for their recycling practices. Certified electronics recyclers have demonstrated through audits and other means that they continually meet specific high environmental standards and safely manage used electronics. Below is information on the two programs in addition to feedback collected from neighboring local governments, recyclers, and collectors that utilize these programs.

e-Stewards

e-Stewards is a program created by a non-profit organization called the Basel Action Network (BAN). All e-Stewards recyclers are committed to using best practices for the disposal of electronics in an environmentally sound manner. This means no disposal in landfills or incinerators; environmentally safe working conditions; no prison labor; and no export to developing nations. To become e-Stewards certified, recyclers must attain an International Standards Organization (ISO) 14001 certification, maintain an annual licensing agreement with BAN, which includes payment of a licensing fee based upon a sliding scale calculated on the volume of material recycled on an annual basis, and undergo an annual verification audit conducted by an independent third-party auditing agency. There are four independent auditing agencies nationwide qualified by BAN to conduct e-Stewards certification audits. They take measures to ensure the control and processing of electronics recycling according to U.S. EPA standards.

R2

Responsible Recycling ("R2") Standard is a program developed by the non-profit organization, R2 Solutions. With the dissolution of R2 Solutions, Sustainable Electronics Recycling International (SERI) became the new certifying body responsible for administering the R2 certification. The R2 Standard was developed through an EPA-convened multi-stakeholder process. The requirements in the R2 Standard is designed to protect people, the environment, data, and to preserve resources. This is achieved through rigorous annual independent third-party audits of R2 certified facilities and through transparency and accountability throughout the entire reuse/recycling chain of used electronic products. To become R2 certified, recyclers must apply for a license and have their facility audited and approved by a SERI approved

certifying body. Recyclers must attend a R2 training webinar from SERI and carefully review their operational procedures, materials management, and other functions to ensure they are in line with the criteria laid out in the R2 Standard. On an annual basis, recyclers are required to renew their R2 license as well as schedule and conduct a surveillance audit with SERI's approved certifying body. There are seven independent auditing agencies nationwide qualified by SERI to conduct R2 certification audits. R2 also requires recyclers to assure that toxic material streams are managed safely and responsibly by downstream vendors—all the way to final disposition. It prohibits recyclers and their downstream vendors from exporting these toxic materials to countries that have enacted laws making their import illegal. All R2 certified electronics recyclers must maintain necessary permits, licenses, and insurance as required by state and federal regulations.

Key Similarities between e-Stewards and R2

1. Both programs result in independent third-party verifiable implementations of safety, environmental compliance, and advance best management practices.
2. They take measures to ensure the control and processing of electronics according to EPA standards.
3. The programs apply around the globe in efforts to reform electronics recycling worldwide. They both comply with ISO 14001 standards, an international environmental management system. In the case of R2, recyclers have an option to use ISO 14001 standards or the Recycling Industry Operating Standard (RIOS).
4. The programs offer a way to assess the environmental health, worker health, and security practices of entities managing used electronics.
5. They both require refurbishing of the equipment that can resell at a fair and reasonable price before dismantling, unless the customer directs otherwise. R2 electronics recyclers need to evaluate the equipment and components for reusable viability and direct equipment capable of repair to qualified refurbishers, unless the customer directs otherwise. In the case of e-Stewards, the recyclers need to test monetarily viable reusable equipment, direct it to a repair department and ensure that they are fully functional for the second-hand market consumer.
6. Both programs require data sanitization for hard drives and data storage devices.
7. In the case of downstream accountability, the two programs require recyclers to research and audit their downstream vendors to ensure they are meeting the requirements of both the certification program and the local government. Both programs also require recyclers to establish and maintain an up-to-date downstream vendors flow chart. The chart includes current company/entity name, contact information, address of physical location of facility and office (including country), and type of operation. Recyclers are also required to identify if their downstream vendors are e-Stewards or R2 certified. R2 recyclers are required to ensure that the services and activities their downstream vendors are performing match the scope statement on their R2 certificate. For example, a R2 certified refurbisher with a certificate that lists the scope of activities as "sorting, repair, and dismantling of computers and cell phones" is not certified as a processor of cathode ray tubes (CRT) monitors or batteries.

Key Differences between e-Stewards and R2

1. e-Stewards employs a set of specific standards for worker safety and health guidelines on recyclers with certification. R2 allows companies to create custom standards to fit their workplace that fall within the overarching compliance standards.
2. e-Stewards allows exports of tested, working equipment for the second-hand market (reuse), whereas, R2 allows exports of working and non-working equipment.

3. e-Stewards prohibits exporting hazardous materials to developing countries. In the case of R2, recyclers may export hazardous equipment, but must comply with legal requirements of the receiving country for exporting equipment containing *Focus Materials*. R2 defines the following types of equipment as Focus Materials: items containing polychlorinated biphenyls (PCBs), items containing mercury, CRTs and CRT glass, batteries, and whole and shredded circuit boards. Documentation must be obtained for any exports to developing countries stating that the country legally accepts the Focus Materials being exported, permits the export of both functional and nonfunctional equipment as long as it does not violate the laws of the receiving country, and the facilities handling the material abroad meet basic environmental and health standards.
4. e-Stewards bans the disposal of hazardous electronics in solid waste landfill and incinerators, including waste-to-energy incinerators. In the case of R2, recyclers shall not use energy recovery, incineration, or landfilling unless local law requires use of such technologies (e.g., if the local law requires incinerating equipment containing PCBs, the recycler shall follow the local ordinance).
5. e-Stewards bans the use prison and child labor for electronics recycling. No such provision is explicitly stated in the R2 standards.
6. For data destruction, e-Stewards requires the use of National Institute of Standards and Technology Special Publication (NIST SP) 800-88 guidelines. (NIST SP 800-88 is the standard used by the U.S. Department of Defense to ensure complete data sanitization of the data device.) R2 requires the use of NIST SP 800-88 guidelines or another generally accepted standard.
7. There is a difference in cost for an electronics recycler to obtain certification from the two programs. R2 offers a flat annual price (e.g., \$1,500/facility/year). If an organization has two sites, the annual certification fee is \$3,000. E-Stewards has sliding scale fees based on the company's annual revenue. Each ancillary site is \$250 up to a maximum of five sites, and each processing site is \$250. For example, if the annual gross revenue of a recycling firm is less than \$1 million, the certification fee for one site is \$1,500/year. For two sites, the fee is \$2,000/year. If the revenue of the company is \$1-1.9 million, the certification fee for one site is \$ 2,300/year and for two sites the certification fee is \$2,800/year. If the revenue of the company is \$8 -10.9 million, the certification fee for one site is \$ 9,300/year and for two sites the certification fee is \$9,800/year. Overall, recyclers pay a higher price for e-Steward certification because the certification fee increases as their revenues increase, unlike R2, which remains at a flat fee regardless of the recycler's revenue.

Feedback from Local Governments and Recyclers/Collectors

1. City of Santa Cruz: One of the first cities in the United States to adopt a responsible electronics recycling ordinance is the City of Santa Cruz. The City adopted the ordinance in mid-2012, and it went into effect in January 2013. The City supports both e-Stewards and R2 certification programs because they understand the educational value that both programs bring to the community in terms of raising awareness around the importance of recycling electronics responsibly. The City also took into consideration the importance of providing recyclers options and flexibility in terms of how they choose to pursue responsible electronics recycling since recyclers may have different needs based on their operations.
2. County of Santa Cruz: According to County of Santa Cruz, when developing their responsible electronics recycling ordinance, which was adopted in 2012, they decided to support only e-Stewards certified recyclers because they viewed e-Stewards' standards as being more stringent than R2 at that time. However, with the improvements that R2 has made to their certification program over time, the County of Santa Cruz staff now believes that R2 can now also be utilized by recyclers for proper recycling of electronics.
3. E-Recycling of California (ERC): Based on discussions with ERC, an electronics collector and recycler, one of the biggest challenges of being an only e-Stewards certified facility is that they are limited to work with very few downstream vendors due to lack of vendors that meets e-Stewards' stringent

standards. For ERC to add a downstream vendor to their list, they must audit the vendor and ensure they are meeting all standards. However, most of the recyclers are not able to meet e-Stewards standards without making considerable improvements to their facility and operations. Statistics show that R2 has a wider network of recyclers than e-Stewards. As of April 2017, 94 electronics recycling facilities are e-Steward certified in the United States. Twelve of those recyclers are based in California and five of them located in the San Francisco Bay Area. To contrast this, the R2 certification is an extensive network with 761 certified recycling facilities around 30 countries, 594 currently located in the United States. In California, there are 62 R2 recyclers, with 13 located in the San Francisco Bay Area. This allows R2 certified recyclers to conduct business with a much wider network of vendors.

4. **Goodwill Industries:** One of the highest priorities for Goodwill Industries of San Francisco Bay Area, an electronics collector, is the data security of their customers. According to the Senior Director of Resources, Goodwill Industries sends their collected electronics only to e-Stewards certified recyclers as Goodwill Industries believes that e-Stewards has a more stringent data destruction standard than R2. E-Stewards uses the NIST SP 800-88, the standard utilized by the Department of Defense to securely destroy information from data devices, while R2 requires the use of NIST SP 800-88 guidelines or another generally accepted standard.

Resources

- EPA's page on Certified Electronics Recyclers
<https://www.epa.gov/smm-electronics/certified-electronics-recyclers>
- Full Report on the Implementation Study of the R2 and e-Stewards® Electronics Recycling Certification Programs (PDF)
https://www.epa.gov/sites/production/files/2016-02/documents/u_s_epa_implementation_study_final_report_february_2016.pdf
- Recycling Standards- e-Steward and R2
<http://www.oceantech.com/2016/05/r2-vs-e-stewards/>
- EPA Certified Electronics Recyclers
<https://www.epa.gov/smm-electronics/certified-electronics-recyclers>
- A Program to Certify Electronic Waste Recycling Rivals an Industry-U.S. Plan; Zeller Jr. Tom; 2010
<https://www.nytimes.com/2010/04/15/business/energy-environment/15ewaste.html?src=busln>
- e-Stewards sliding fee scale
http://e-stewards.org/wp-content/uploads/2014/07/Annual-License-Fee-Schedule-For-Website-Revised-June-1_2016.pdf
- Chart of differences provided by e-Stewards
<http://e-stewards.org/learn-more/for-enterprises/overview/the-e-stewards-difference/>
- R2: 2013 The Responsible Recycling Standard for Electronics Recyclers
<https://sustainableelectronics.org/sites/default/files/R2-2013%20Standard%20%5BENGLISH%5D.pdf>
- e-Stewards Certification Standards
http://e-stewards.org/wp-content/uploads/2014/09/eStewards_Standard_Review_Version.pdf
- e-Stewards certified recyclers database
<http://e-stewards.org/data/list-recyclers/>
- R2 Certified recyclers database
<https://sustainableelectronics.org/recyclers?style=list>

- Mary Simmons, Waste Reduction Program Manager, City of Santa Cruz, personal conversation, March 29, 2018.
- Virginia Posada, Environmental Health & Safety Representative, E-Recycling of California, personal conversation, April 5, 2018.
- Tim Goncharoff, Resource Planner, County of Santa Cruz, personal conversation, April 9, 2018.
- Chiman Lee, Senior Director of Resources, Goodwill Industries of San Francisco Bay Area, personal conversation, April 16, 2018.