

Bird & Bird ATMD

E-waste



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E-waste stands for electrical and electronic equipment (EEE) that has been discarded. It encompasses household or office items that have circuitry inside, or have electrical components drawing on a power supply. E-waste is an escalating problem in our world as electronic goods have become increasingly affordable due to globalisation and technological progress. This translates into a staggering pace of increase in the generation of e-waste. Compounded by the arguably unethical methods of planned obsolescence, this waste issue will likely intensify in the coming years.

Report and statistics

A report by ENDS Europe agency reported that built-in obsolescence has raised the proportions of all units sold to replace defective appliances from 3.5% in 2004 to 8.3% in 2012.¹ Furthermore, the proportion of large household appliances that need to be replaced within the first five years increased from 7% in 2004 to 13% in 2013. As manufacturing strongholds such as China, India, and Brazil flourish, portable device manufacturing will become inexpensive, whilst the cost of repairing such devices remains relatively high. This shifts consumer demand towards purchasing of brand new products whilst slightly defective (but still usable) products are discarded. Manufacturers also use software incompatibility with new and old products to encourage consumers to purchase updated and newer products to maintain parity of experience. Marketing and branding make light work of moving products through their shelf life quickly. Retailers and after sales also cease support for slightly older devices, further impeding maintenance and repair and nudging consumers towards buying new products.

E-waste accumulation causes a host of issues. Almost all e-waste contain hazardous chemicals. Cadmium is found in semiconductors and batteries, old refrigerators may contain chlorofluorocarbons which deplete our ozone layer, and, mercury may exist within liquid-crystal display screens. Problems arise when e-waste chemicals in a landfill are leached into water supplies or into the soil. If e-waste is incinerated, pollution occurs. The practice of shipping away e-waste into a developing country is merely a short term and, perhaps, unethical solution, because labourers in developing nations may be exposed to the poisons of e-waste as they seek to extract valuable components from them. E-waste is also a waste of valuable resources. Studies indicate an estimated \$65 billion worth of valuable materials in e-waste every year.

Singapore has a dismal record of e-waste recycling. According to the National Environment Agency (NEA), Singapore produces around 60,000 tonnes (60 million kg) of e-waste every year, of which half comes from households.² According to a survey, only 6% of household e-waste is recycled. The NEA has been working with communities and relevant companies to encourage voluntary e-waste recycling. However, the NEA recognises the

¹ <https://www.theatlantic.com/technology/archive/2016/09/the-global-cost-of-electronic-waste/502019/>

² <https://www.straitstimes.com/singapore/environment/regulations-will-be-introduced-to-ensure-e-waste-gets-recycled-masagos>

limitations of a voluntary approach and sees the need for greater regulation for the long term. Another factor causing such a dismal result is the lack of education for the public. For example, StarHub has around 400 e-waste collection points located around Singapore, but the public does not know these services exist or may not find them convenient to access. A survey commissioned by the NEA in 2018 showed that only 4 in 10 Singaporeans know how to recycle e-waste.³

The one silver lining at least is the rise in the number of initiatives to tackle e-waste. Singtel's ReCYCLE programme, which aids in the collection of e-waste, has achieved some success. The National Voluntary Partnership for E-Waste Recycling, formed in 2015 for e-waste, lamp, and battery recycling, has joined up interested partners and stakeholders and improved public awareness and has set the stage for the formulation of a regulated management framework for e-waste in Singapore.

Current regulation

EEEs including mobile phones, portable computers, refrigerators, air conditioners, panel TVs, and washing machines are controlled at the importation stage such that concentration limits for 6 hazardous substances are monitored, and if the concentration exceeds a stipulated amount, the product will be barred from entry into Singapore.⁴ The 6 restricted hazardous substances are lead, mercury, hexavalent chromium, polybrominated biphenyls, polybrominated diphenyl ethers, and cadmium. For cadmium the maximum amount is 100ppm, while the rest have a maximum cap of 1,000ppm. However, existing stocks imported prior to 1 June 2017 will be allowed for sale until these stocks are depleted.

EEEs such as fluorescent lamps and compact fluorescent lamps are also barred from being imported if the amount of mercury exceeds 9mg for straight and circular lamps, and 4mg for compact fluorescent lamps.⁵ However, existing stocks imported prior to 1 July 2012 will be allowed for sale until these stocks are depleted.

Effective 31st March 2018, batteries with mercury contents exceeding 0.0005% in each cell are not

allowed into Singapore.⁶ These importation controls reduce e-waste slightly, while reducing the prevalence of hazardous substances in our country.

Upcoming regulation

Singapore still lacks comprehensive regulation on e-waste. Given the prudent stance of agencies, regulations will likely take the form of progressive baby steps rather than giant strides.



In 2021, Singapore is expected to implement a mandatory e-waste management system to manage the growing e-waste.⁷ Such a system operates through an Extended Producer Responsibility (EPR) approach which has been adopted in countries such as South Korea or Sweden. Typically, such a system requires manufacturers and importers of electronic and electrical equipment to take back a proportion of the products they put on the market. To oversee such a system, Producer Responsibility Organisations (PROs) which are licensed by the National Environment Agency (NEA) will have to organise the collection, transport and treatment of e-waste. Courts, Harvey Norman and Gain City are examples of EEE producing companies which may form PROs. If successful, the e-waste system will help the environment and generate business opportunities in the recycling industry. According to a Straits Times report,⁸ the potential value of e-waste in terms of business opportunities is S\$234 million. The regulation will also set collection targets, in consultation with the industry, before implementing penalties. Strict enforcement will enhance public awareness of the dangers of neglecting the growing e-waste issue, and will steer Singapore towards a greener and more ethical economy.

³ <http://www.eco-business.com/news/how-smart-is-singapore-at-recycling-e-waste/>

⁴ <https://www.nea.gov.sg/our-services/waste-management/3r-programmes-and-resources/e-waste-management>

⁵ <https://www.nea.gov.sg/our-services/waste-management/3r-programmes-and-resources/e-waste-management>

⁶ <https://www.nea.gov.sg/docs/default-source/resource/circulars/nea-pcd-hs-circular-for-enhanced-control-of-mercury-added-batteries-under-the-epma.pdf>

⁷ <https://www.channelnewsasia.com/news/singapore/e-waste-management-system-2021-10017012>

⁸ <https://www.straitstimes.com/opinion/what-spore-can-learn-from-swedens-e-waste-recycling-push>

Best practices

South Korea

In 2013, South Korea recycled 27% of its e-waste.⁹ South Korea has several systems which aid in recycling e-waste.



Its Extended Producer Responsibility (EPR) System obliges manufacturers and distributors to meet recycling targets. If the target is not achieved, recycling costs are imposed on the manufacturer and distributor. South Korea also has an e-waste tracking system, called the Allbaro System. This system computerises comprehensive waste stream processes into electronic information. Since 2011, the system was applied to all industry wastes generated from industries. The Eco-Assurance System (ECOAS) is another system which aims to minimise environmental loads through systematic management of the entire life cycle of products. The ECOAS has two components, the preventive regulation and the follow-up management regulation. For the preventive regulation section, it restricts the use of toxic materials to an extent, encourages material and structure improvement, sets targets for an annual recycling rate and sets out other provisions for the disclosure of information related to recycling. The ECOAS's post recycling policy follows up with ensuring recycling goals are achieved with proper documentation and proof.¹⁰ Similarly, Singapore may learn from South Korea's imposition of strict targets and fines for failed adherence. Fines, if used timely, would make e-waste producers more inclined to meet set targets for fear of a loss of profits or a loss of reputation.

⁹ https://ac.els-cdn.com/S1878029616000566/1-s2.0-S1878029616000566-main.pdf?_tid=cbfdeb5c-aecd-45a4-993c-bf2117b181bb&acdnt=1531898346_757c779f50bc6de87875be59725a416c

¹⁰ https://www.keco.or.kr/en/core/operation_eco/contentsid/1978/ind ex.do. Also see: https://ac.els-cdn.com/S1878029616000566/1-s2.0-S1878029616000566-main.pdf?_tid=cbfdeb5c-aecd-45a4-993c-bf2117b181bb&acdnt=1531898346_757c779f50bc6de87875be59725a416c

Japan

In 2016, Japan collected 546.4 kilotonnes of e-waste out of the 2.1 megatonnes generated¹¹ (that means 26.1% of e-waste generated was collected for recycling).¹²



To achieve this, Japan relies on a strong legal framework, an advanced take-back system, and having a developed processing infrastructure.¹³

Under Japanese law, the Law for Recycling of Specified Kinds of Home Appliances which came into effect in 2001 covers several types of e-waste.¹⁴ These include, air conditioners, CRT TVs, LCD/plasma TVs, refrigerators, freezers, washing, and drying machines. Furthermore, the Law for Promotion of Effective utilization of Resources which came into effect in 2001 established a recycling-based economic system through several measures. First, it stipulates for the the collection and reuse of products by businesses. Second, it introduces measures to save materials used in products to minimize waste and improve product lifetime. Third, it sets out the need to reuse certain components of the products collected.

Relevant stakeholders are responsible for playing a part in an advanced take-back system. Manufacturers must take back appliances manufactured or imported by themselves from retailers, recycle them, and publish the costs for recycling the appliances. Retailers must take back home appliances, sold by themselves, from consumers. Retailers must also take back used appliances from consumers who buy new ones to replace old ones and send the replaced appliances to licensed recycling plants. Costs related to the collection and transportation must be displayed openly to all relevant parties. Next, consumers have the responsibility to properly dispose of their appliances, bearing the costs for the collection and recycling of used appliances. Lastly, the municipalities are responsible for delivering the appliances which they have collected to manufacturers or designated bodies, as well as to recycle them in some instances. The approach taken in Japan is largely similar to those taken in Sweden

¹¹ ITU Global E-waste monitor 2017 pg 68.

¹² ITU Global E-waste monitor 2017 pg 68.

¹³ ITU Global E-waste monitor 2017 pg 68

¹⁴ E-waste Management and Recycling Mechanism in Japan, slides by Satoshi Sugimoto. Also see: <http://workspace.unpan.org/sites/internet/documents/S2CN10%20Characteristics%20of%20E-waste%20Recycling%20Systems%20in%20Japan%20and%20China.pdf>

and South Korea. This has enabled Japan to achieve relative success in terms of e-waste recycling. Singapore too, may draw inspiration from Japan's EPR approach towards e-waste recycling.

An all-out approach

Upcoming laws

The upcoming implementation of laws in Singapore is likely to improve e-waste recycling rates and create business opportunities in the recycling sector. However, much more can be done to raise recycling rates.

As Singapore lacks a formal e-waste collection system, a national collection system may be set up to provide for a more uniform system to receive bulky and less bulky e-waste products. Such systems should take into consideration the need for recycling points to be accessible to the general public and be placed sufficiently close to major housing estate regions. Along with this, comprehensive legislation which covers more aspects of e-waste production and recycling can be implemented. Drawing inspiration from UK,¹⁵ producers and suppliers of EEE may be mandated to provide a way for people to return waste marked for recycling or refurbishment. Collection points could be designated in-store or external alternatives. Furthermore, WEEE regulations should apply broadly to all producers and suppliers of EEE regardless of how they sell the products, whether direct or by internet, mail order or telephone. Companies established outside Singapore who supply to the Singapore market should also be captured under this scope as they contribute to the creation of WEEE. Should there be failure to adhere to these regulations, fines should ensue. Additionally, information on e-waste recycling efforts achieved by cooperating companies should be provided to customers by publishing these details on online stores, or posters and leaflets for physical stores. This would build consumer conscientiousness, and helps cooperating companies build brand loyalty amongst its customers.

All contributors of WEEE should be mandated to register as producers of EEE. However, larger contributors of WEEE should be separated from smaller contributors because they have a greater responsibility toward the environment and society. In the UK, a small producer is defined as a company which places below 5 tonnes of EEE on the UK market, whilst a big producer is defined as a company which places more than 5 tonnes of EEE on the UK market. Generally, big producers must join a scheme where they pay a registered third party recycler to handle recycling efforts. On the other hand, small producers generally have no responsibilities for financing the collection and treatment of household WEEE, but may still have some responsibilities toward non-household WEEE. The stark difference in treatment is sensible as small producers, who likely have less revenue, should not be financially barred from carrying on their business, rather a balanced approach should be taken to maximize the economy and encourage waste management.

An advanced e-system to track e-waste should also be implemented. Recycling centres can work with WEEE producers in ascertaining the weight and category of the e-waste. Recycling centres can then note down how much items are recycled or refurbished. Evidence of WEEE being reused or treated can be issued by authorised treatment facilities and be kept by the relevant parties. All this information can be uploaded to a central governmental website for public viewing. In Singapore, this may potentially be useful as having more accurate statistics about e-waste would allow legislators to understand whether policies are making sufficient change to the system. With better tracking, citizens, through education, are kept up to date on e-waste recycling efforts, and can play a larger role in e-waste management by demanding more positive action from themselves and other citizens. Accurate data may also be used to educate youngsters in schools, to enable informed learning, which in turn, helps groom a generation of conscientious citizens.

Then, conscionable policies around exporting of Singapore's e-waste should be developed. The global waste trade have led developing nations to become toxic dumping grounds for hazardous waste. In our view, creating or stimulating a domestic demand for recycled materials may possibly be a solution to reduce the surplus of e-waste requiring export. Governments should work with industry leaders to identify long-term sources of waste products as input feedstocks. For example,

¹⁵ [https://www.gov.uk/government/collections/producer-responsibility-regulations#waste-electrical-and-electronic-equipment-\(weee\)](https://www.gov.uk/government/collections/producer-responsibility-regulations#waste-electrical-and-electronic-equipment-(weee))

a proportion of recycled EEE can be used as input feedstocks for EEE manufacturing companies. In other words, a competitive circular flow of material from recycled products can be put back into multiple manufacturing sectors such as construction, vehicles, electronics, and packaging. Certain EEEs may be earmarked to be used in building government projects, such as HDBs or governmental buildings. Furthermore, governmental action can include public sector procurement measures, which favour the use of recycled materials, thereby encouraging the profitability of recycling EEEs.

Upcycling

Upcycling, is the process of transforming e-waste into new materials or products, is becoming an A-list pursuit in big companies such as Adidas, Starbucks, and Proctor and Gamble. Apart from being used as decorative art, EEE parts can potentially be remade into premium products. Schools, industries, and the government can explore greater avenues for collaboration through think-tanks and case competitions to tease out affordable ways of upcycling. Governmental bodies and interested industries may then invest in upcycling startup companies to give them a boost. However, upcycling may not be a long-term solution due to supply and demand mismatches.

Educating the masses

Perhaps most importantly, the willingness to care for the Earth must come from within, with too little done as of date, changing the mindset of our citizens would probably be the largest challenge. Greater education is required to spread the word about the how, why, and when to recycle. Possibilities include having more recycling

campaigns, as well as having mandatory courses on protecting the environment in secondary school till tertiary education, to develop a recycling culture in Singapore. Another point to educate people on is to eradicate the habit of quickly replacing old but usable products with new products.

Conclusion

Singapore is very well-placed to implement and enforce greater and clearer shared responsibility of e-waste management amongst relevant stakeholders. Technical and policy-level intervention, a sound regulatory framework, and heightened public awareness on e-waste may transform this challenge into an opportunity for Singapore to live up to its image of being a 'clean city'.

There may a some way to go before Singapore attains world class e-waste recycling standards; however, the upcoming regulations is certainly a positive step in the right direction and will hopefully reinforce the message that e-waste is hazardous and is a collective problem requiring conscionable recycling, an effective collection system and a sustainable end-of-life (EOL) management for e-waste products . A robust system for the recycling of e-waste will also enhance the potential for the recycling of other materials.

A sensible e-waste regime will also provide business opportunities for waste disposal firms who are able to help or advise companies, governments and consumers in their recycling efforts for electronic waste, including provision of ancillary services on data destruction, electronic recycling and data security.

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