Circular Economy Towards Reducing E-waste: Cases and Best Practices

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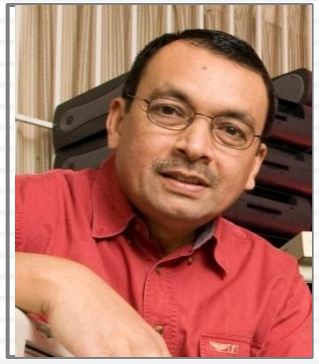

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Global E-waste Generation

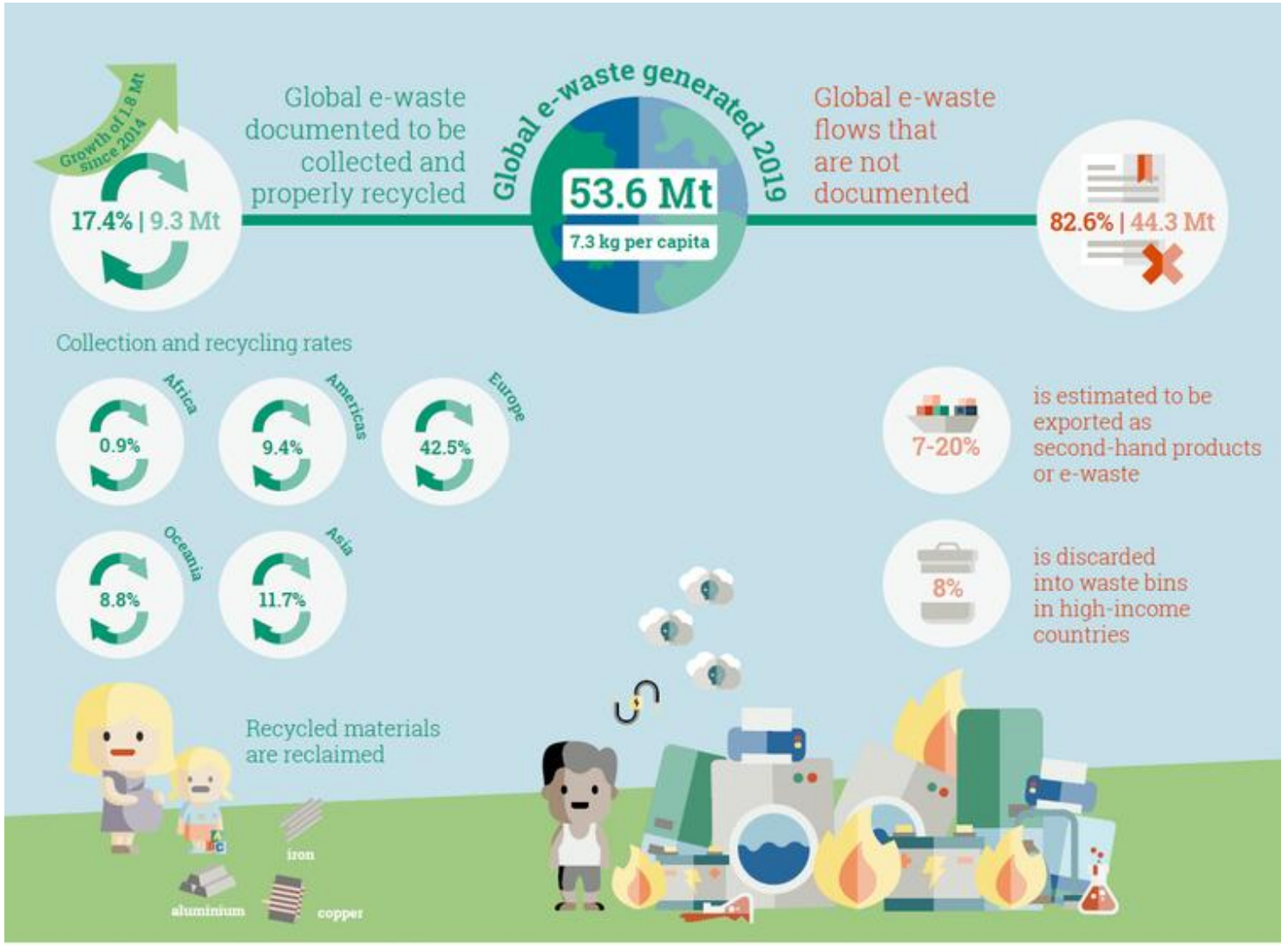
- During 2019 world generated around 53 million tonnes (Mt) of E-waste
- Global e-waste generation to reach 111 Mt by 2050
- Only 17% formally collected and recycled
- Asian region produced the highest amount of e-waste (24.9 Mt or 46.5% of total)
- The top three Asia-Pacific countries with the highest e-waste generation in absolute quantities are China (10.1 Mt), India (3.2 Mt) and Japan (2.5 Mt)

Source: Global E-waste Monitor 2020 (UNU)

Opportunities Associated with E-waste

- One tonne of phone handsets contains 3.5kg of Ag, 340 g Au, 140g of Pd and 130 kg of Cu
- Electronics make up 80% of the world demand for indium (magnetic properties in hard disks), 50% of antimony (flame retardants), 30% of silver (contact, solders), 12% of gold (circuits)
- The UN estimates that the value of selected raw materials in e-waste amounts to USD 57 billion during 2019. Iron (24 billion USD), copper (11 billion USD), gold (9 billion USD), Aluminium (6 billion USD) are considered to be the highest value materials contained in e-waste (Forti et al. 2020).

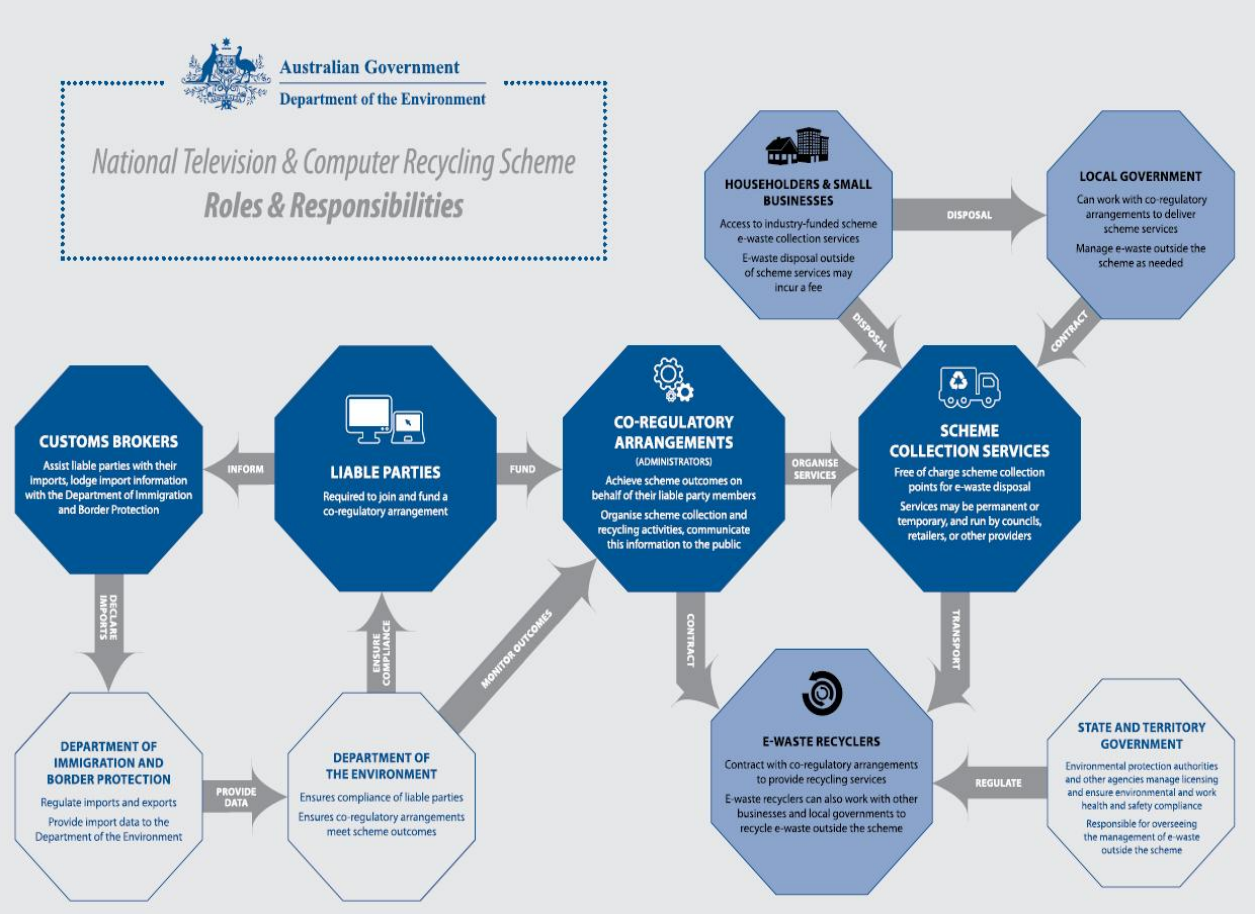
Global E-waste Monitor 2020 (UNU)



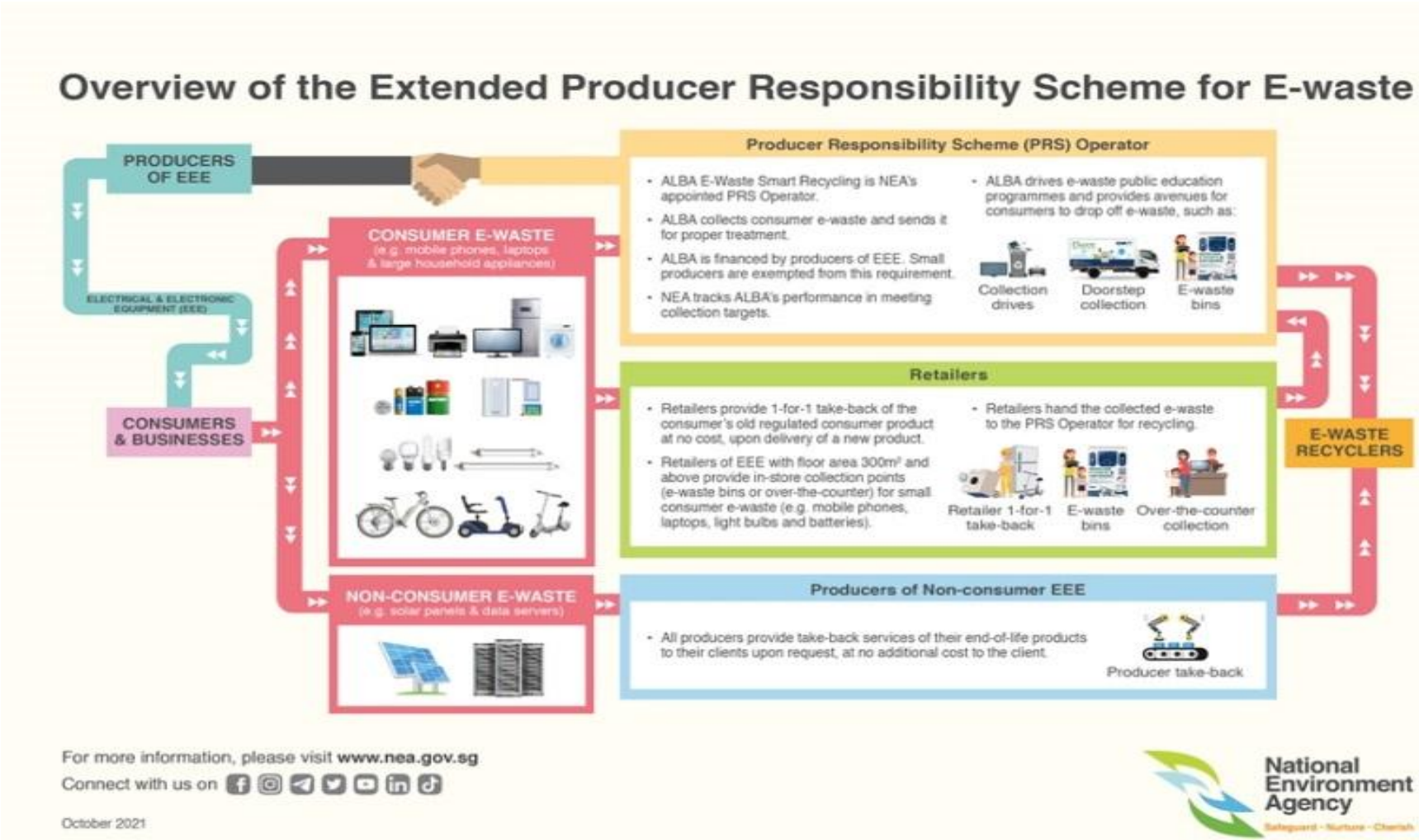
Circularity and E-waste

- Reduce and reuse
- Properly recycle with no harmful impacts on the environment
- Design and manufacture electronic and electrical products with less toxic material inputs (design for the environment)
- Effective product take-back schemes towards circularity (Extended Producer Responsibility or EPR)

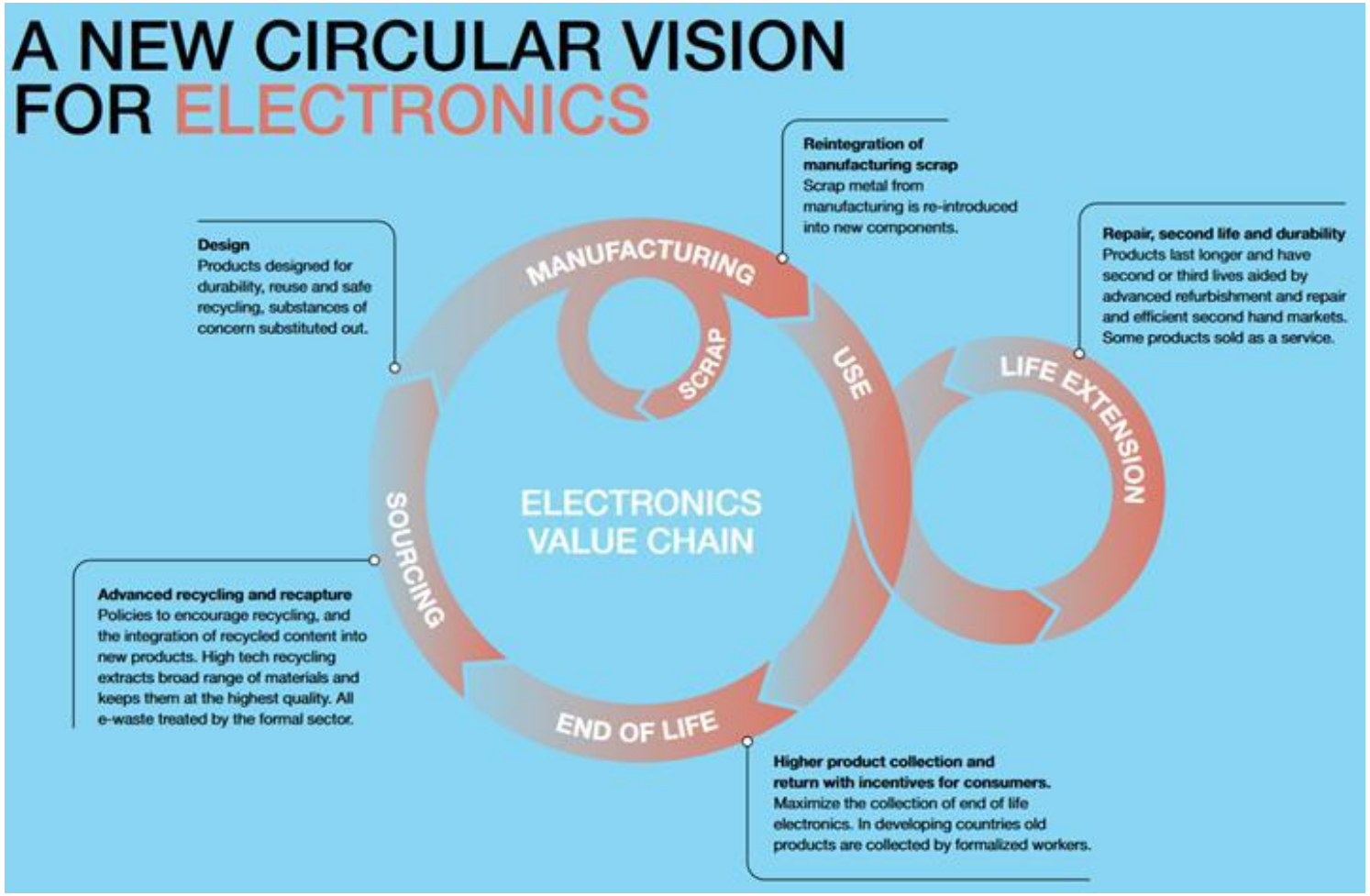
Australian Example



Singapore Example



India's Circular Economy Approach to E-waste



State of EPR Implementation

Full implementation of EPR Regulations	Partial or Draft EPR Regulations	No EPR Regulations
Australia, the People's Republic of China, India, Japan, Singapore, the Republic of Korea, Taiwan Province of China	Bangladesh, Cambodia, Indonesia, New Zealand, the Russian Federation, Thailand, Viet Nam Malaysia	Bhutan, Laos, Mauritius, Maldives, Mongolia, Myanmar, Nepal, Pakistan, Philippines, Sri Lanka

End of Life Vehicles (ELVs)

- Vehicles that have reached the end of useful life (naturally or unnaturally) and can no longer be used are ELVs
- ELVs are one of the fastest-growing waste streams, which is estimated to grow by approximately 80 million vehicles per annum
- ELVs generally comprise 20 to 30 thousand various parts made of precious materials such as platinum, aluminum, lead, zinc, copper, iron, glass, rubber, textile, wires, plastic, and many others
- ELVs also contain many harmful components such as transmission oils, fuels, refrigerants, brominated flame retardants, and acid batteries

ELV Recycling in Japan

Law on Recycling of End-of-Life Vehicles (ELV Recycling Law)

- Japan's ELV Recycling Law specifies that users should bear the disposal cost of fluorocarbons, airbags, and automobile shredder residue (ASR) items from ELVs. As a result, owners of disposed of automobiles shall pay recycling fees when they purchase new cars.

- Manufacturers are required to take back and recycle the above items

- The fund is managed by Japan Auto Recycling Promotion Center (JARC) and Japan Auto Recycling Partnership (JARP).

ELV Recycling in Korea

The Act for Resource Recycling of Electrical and Electronic Equipment and Vehicles (known as **Korean RoHS**) entered into force on **1 Jan 2008**.

- The regulation restricts certain hazardous substances in **electrical and electronic products** and **vehicles**
- Several stakeholders are involved in the recycling and treatment of ELV
- Current recycling rates (89%) are below the national mandatory target of 95%
- Scope and roles of physical and financial responsibilities nor clear

Way Forward

- Well defined national e-waste management strategy based upon circular economy and 3R concepts.
- Such strategy should not only address the environmental and health impacts of e-waste (end-of-pipe) but also look at the reduction of e-waste through green design (up-the-pipe).
- It should also create enabling conditions for relevant stakeholders to develop business and economic opportunities to recover the materials from e-waste.
- The strategy should take into account the financial, institutional, political and social aspects of e-waste management, in particular, incorporating the activities of informal e-waste recycling sector

Way Forward – Connecting with SDG Targets

Elimination of hazardous substances during production of EEE, and during dismantling and processing of E-waste	3.9
Formalisation of the informal E-waste recycling sector to create decent working conditions and environmentally sound management of E-waste	8.3
Recognition of the informal E-waste sector and integrating into a formal waste management system thereby protecting their labour rights	8.8
Establishment of proper institutional infrastructures for collection, storage, transportation, recovery, treatment and disposal of E-waste in cities to reduce the adverse per capita environmental impacts due to unsound management of E-waste	11.6
Eliminate open dumping and open burning of E-waste and use of poor chemical processes to separate valuable materials in E-waste	12.4
Design EEE with circularity in mind to prevent E-waste generation at the end-of-life and implement EPR systems to achieve recycling of E-waste	12.5

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