

Circular Economy strategies action to promote efficient and sustainable E-waste: Perspectives from Asia Pacific Region

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What is E-waste?

- Temperature exchange equipment (refrigerators, freezers, air conditioners, heat pumps).
- Screens, monitors (televisions, monitors, laptops, notebooks, and tablets).
- Lamps (fluorescent lamps, compact fluorescent lamps, high-intensity discharge lamps, and LED lamps).
- Large equipment (washing machines, clothes dryers, dishwashing machines, electric stoves, large printing machines, copying equipment, **PV solar panels**).
- Small equipment (vacuum cleaners, microwaves, toasters, electric kettles, electric shavers, scales, calculators, radio sets, video cameras, electrical and electronic toys, small electrical and electronic tools, small medical devices, small monitoring and control instruments).
- Small IT and telecommunication equipment (mobile phones, GPS, pocket calculators, routers, personal computers, printers, telephones).

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)

Top 10 Asia Pacific countries with highest generation of E-waste

(Source: Forti et al. (2020))

Country	E-waste (2019) (tonnes)	% of total Asia Pacific generation (2019)	E-waste (2016) (tonnes)	% of total Asia Pacific generation (2016)	% increase 2016 - 2019
The PR China	10,129,000	43	7,211,000	41	40
India	3,230,000	14	1,975,000	11	64
Japan	2,569,000	11	2,139,000	12	20
The Russian Federation	1,631,000	7	1,392,000	8	17
Indonesia	1,618,000	7	1,274,000	7	27
The Republic Korea	818,000	3	665,000	4	23
Thailand	621,000	3	507,000	3	22
Australia	554,000	2	574,000	3	-3
Pakistan	433,000	2	301,000	2	44
The Philippines	425,000	2	290,000	2	47
TOTAL	22,028,000	94	16,328,000	93	

Problems Associated with E-waste

- Dangerous chemicals and metals from E-waste may leach into the environment
- Lead (Pb) - most significant concern
- Lead present in the solders used to make electrical connections on printed wire boards and Cathode Ray Tubes (CRTs)
- Mercury found in laptop computers and discharge lamps.
- Cadmium (found in chip resistors, CRTs)
- Brominated Flame Retardants (BFRs)



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).

E-Waste in Australia

- Australia has specific e-waste laws and policies, making it unique in the South Pacific.
- **The Australian Waste Policy of 2018** aims to transition the country into a circular economy with defined principles and strategies.
- **The Australian Government Product Stewardship Act of 2011** allows for various approaches, including mandatory, co-regulatory, and voluntary product stewardship.
- **The National Television and Computer Recycling Scheme (NTCRS)** provides free e-waste collection and recycling for individuals and small businesses.
- **Mobile Muster** is an accredited program for recycling mobile phones, administered by the Australian Mobile Telecommunications Association.

E-Waste in Australia...

NATIONAL WASTE POLICY

LESS WASTE, MORE RESOURCES

2018



Australian Government
Department of Climate Change, Energy,
the Environment and Water

Wired for change:

Regulation for small electrical products
and solar photovoltaic system waste



dceew
gov.au



Australian Government
Department of Agriculture,
Water and the Environment

Stewardship for Consumer and Other Electrical and Electronic Products

Discussion Paper

December 2021



DRAFT
Queensland E-Products Action Plan
2023–2033

A 10-year plan to maximise waste avoidance, reduction, reuse, repair and recycling of e-products

Managing e-waste in Victoria

Policy Impact Assessment



AS 5377:2022



Management of electrical and electronic
equipment for re-use or recycling

E-Waste in New Zealand

- New Zealand introduced the **Waste Minimisation Act in 2008** to encourage waste reduction and minimize disposal.
- In 2020, electronic and electrical products (EEW) were designated as a priority for regulated product stewardship under the Act.
- New Zealand manages e-waste through a **voluntary product stewardship scheme**, with only three accredited schemes: **RE: Mobile, Fuji Xerox NZ, and Sharp**.
- Recycling e-waste in New Zealand mainly involves manual remanufacturing processes that break down waste into individual components for further processing.
- The Waste Minimisation Fund in New Zealand has a substantial budget of over USD 75 million, supporting projects for a low emissions and low waste circular economy.
- New Zealand's waste strategy for 2023 recognizes the need for a mandatory product stewardship scheme for EEE, including large batteries.

E-Waste in Pacific Islands

- Pacific Islands Countries and Territories (PICTs) face numerous challenges in managing e-waste, including limited land availability, inefficient collection services, resource shortages, inadequate planning, lack of regulations, geographical isolation, and limited knowledge about e-waste management.
- **The Cleaner Pacific 2025 strategy** aims to implement Advance Recovery Fees and Deposits (ARFD), akin to product stewardship, for electrical and electronic products.
- The Pacific-EU Waste Management Programme (PacWaste Plus) is a five-year initiative initiated by the European Union in July 2018, with the goal of addressing waste management issues in the Pacific region.

What is Extended Producer Responsibility (EPR)

EPR schemes make producers physically or financially responsible for the environmental impacts of their products throughout their life cycle.

EPR Categories include:

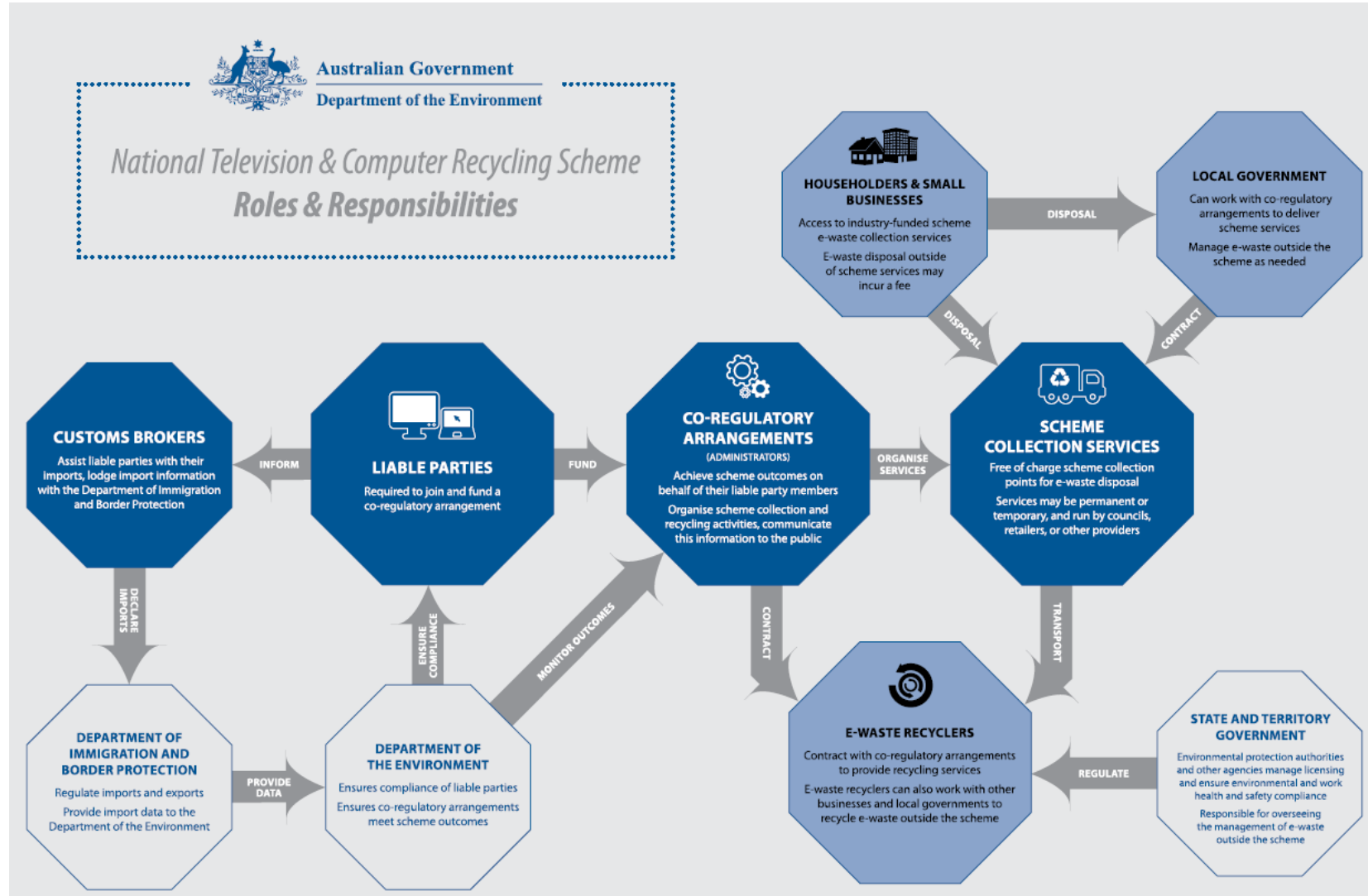
- Product take-back schemes that require the producer or retailer to collect the product at the post-consumer stage.
- Economic and market-based instruments that include measures such as deposit-refund schemes, Advanced Disposal Fees (ADF)
- Regulations and performance standards
- Information-based instruments



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

EPR in Australia



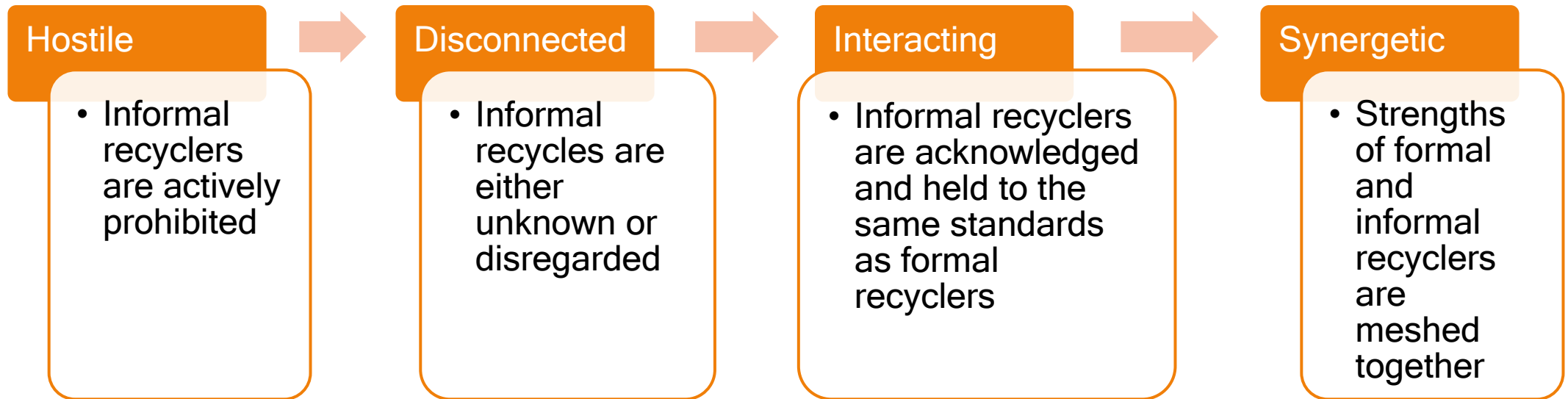
Circularity and E-waste

- Reduce and reuse
- Properly recycle with no harmful impacts on environment
- Design and manufacture electronic and electrical products with less toxic material inputs (design for environment)
- Effective product take back schemes towards circularity (Extended Producer Responsibility or EPR) EPR schemes make producers physically or financially responsible for the environmental impacts of their products throughout their life cycle.



Partnering with Informal E-waste Recycling Industry: A model for Developing Countries

Source: Davis, J. and Garb, Y. (2015) A model for partnering with informal e-waste industry, Resource, Conservation and Recycling 105 (2015) 73-83



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

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