



DRAFT

Queensland E-Products Action Plan **2023–2033**

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

Prepared by: Office of Circular Economy, Department of Environment and Science

© State of Queensland, 2023.

The Department of Environment and Science acknowledges Aboriginal peoples and Torres Strait Islander peoples as the Traditional Owners and custodians of the land. We recognise their connection to land, sea and community, and pay our respects to Elders past, present and emerging.

The department is committed to respecting, protecting and promoting human rights, and our obligations under the Human Rights Act 2019.

The Queensland Government supports and encourages the dissemination and exchange of its information. This work is licensed under a Creative Commons Attribution 4.0 International License.



Under this licence you are free, without having to seek our permission, to use this publication in accordance with the licence terms. You must keep intact the copyright notice and attribute the State of Queensland as the source of the publication.

For more information on this licence, visit <https://creativecommons.org/licenses/by/4.0/>

Accessibility

If you need to access this document in a language other than English, please call the Translating and Interpreting Service (TIS National) on 131 450 and ask them to telephone Library Services on +61 7 3170 5470.

This publication can be made available in an alternative format (e.g. large print or audiotape) on request for people with vision impairment; phone +61 7 3170 5470 or email <library@des.qld.gov.au>.

#32559 | March 2023

Contents

Action Plan summary	4
1. Introduction	5
2. Discovery and engagement	7
3. Use, repair, recycling and disposal	8
4. Circularity for e-products	14
5. Action Plan	20
References	27

Action Plan summary

Vision

To make Queensland a zero-waste society, where waste is avoided, reused and recycled to the greatest extent possible.

Goals

- extend the life of e-products
- recover more materials and keep them circulating in the economy
- guide and enable stakeholders to maximise waste reduction and sustainability outcomes for e-products.

Objective

Maximise waste avoidance, reduction, reuse, repair and recycling of e-products.

Strategies

- help consumers repair and reuse more e-products
- encourage more responsible consumption and use
- drive greater e-product durability, repairability, reuse and refurbishing through government and business procurement
- optimise resource recovery through improved collection, handling, processing
- stop recyclable e-products ending up in landfill.

Action themes

- reuse and repair
- consumer awareness and education
- procurement
- infrastructure and transport
- policy and regulatory reforms.

Outcomes

A more circular e-products economy where less e-waste is generated per capita, more e-products are being reused and repaired and 80 per cent of the e-waste generated is collected with 90 per cent of material recovered for reuse in the economy.

Ongoing monitoring and evaluation

The Department of Environment and Science (DES) will coordinate the implementation of the Action Plan with the support of an Action Plan Implementation Reference Group (APIRG) that includes representatives from nominated partners including local and Federal Government, state agencies and departments, manufacturers, retailers, repairers, recyclers and researchers.

DES, on behalf of the Queensland Government and in consultation with the APIRG, will produce an annual progress report on implementation of the Action Plan to be provided to the Minister for Environment and Science.

Once finalised, the Action Plan will be reviewed every three years by the Queensland Government in consultation with APIRG and stakeholders. This will allow for adjustment, if and when required, over the next 10 years to ensure objectives and outcomes are being achieved.

Consultation

Interested parties are invited to provide feedback on the proposed actions and priorities in the draft Action Plan.

Feedback must be provided via email by 5.00 pm on Friday 5 May 2023 to eproductsfeedback@des.qld.gov.au.

1. Introduction

The Queensland E-Products Action Plan 2023–2033 (the Action Plan), an initiative of the Queensland Government and developed in conjunction with the Ewaste Watch Institute, provides a detailed solution-oriented strategy focused on waste avoidance, reduction, reuse, repair and recycling of e-products.

The 10-year strategy strives to make Queensland a zero-waste society, where waste is avoided, reused and recycled to the greatest extent possible.

It is a plan for its time and the years ahead. It aims to build a sustainable future that benefits the health of the Queensland environment for generations to come. It recognises the need for strategic investment by governments at all levels, as well as the private sector, in innovative resource recovery approaches and technologies. It also accepts the importance of finding markets and developing high-value products made from previously used components and materials used in e-products. It identifies objectives, activities, partners, priorities and timeframes for action by relevant stakeholders.

Electrical and electronic products or e-products contribute significantly to our lives—at work and school, in healthcare and for entertainment—and many other sectors, industries and applications. The role and value of technology in everyday life is ever present no matter what the activity, function or service.

However, the benefits of e-products also come with impacts and issues as we become more dependent on their production and consumption.

Waste from e-products, often referred to as e-waste or WEEE, is widely acknowledged as a problematic and challenging waste stream globally, nationally and locally.

Issues and impacts relate to both the sheer volume of e-waste and the presence of hazardous substances and unsafe chemicals in some e-products. These challenges also represent significant opportunities to enhance and maximise circular economy outcomes across the supply chain and product life cycle.

The Global E-Waste Monitor 2020 report notes that 53.6 million metric tonnes of electronic waste was generated worldwide in 2019, and is likely to reach 74 metric tonnes by 2030. Furthermore, only 17.4 per cent of 2019's e-waste was collected and recycled. This represents a significant volume of gold, silver, copper, platinum and other recoverable and recyclable materials that were not recovered for treatment, processing and reuse in the manufacture of new products. The Global E-Waste Monitor states that the materials not collected were 'mostly dumped or burned'.

Australia is a direct contributor to these figures, and as a result we are the fourth highest generator of e-waste per capita in the world. The Australian Government's discussion paper on *Stewardship for Consumer and Other Electrical and Electronic Products* highlights the need for impactful and enduring solutions.

'In 2019, Australia generated 521,000 tonnes of e-waste and this is expected to increase to 674,000 tonnes by 2030. This equates to around 20kg per person in 2019 and 23 kg per person in 2030. While around 50 per cent was collected for recycling, only around 18 per cent of the material value was recovered (\$145 million out of \$820 million).'¹

A breakdown of these numbers shows that e-product flows in Queensland are significant and provides a basis for developing solutions to address the e-waste challenge.

¹ Stewardship for Consumer and Other Electrical and Electronic Products, Department of Agriculture, Water and the Environment, Canberra, December. CC BY 4.0. 2021, p14.



Figure 1: E-product flows in 2019



The need to better manage the production and consumption of e-products has also been acknowledged by the Australian Department of Agriculture, Water and the Environment with its recently released discussion paper *Stewardship for Consumer and Other Electrical and Electronic Products*. This discussion paper considers there is a once-in-a-generation opportunity to take a first principles approach to address barriers to reuse and recycling of electrical products. The paper provides a national vehicle to consult, engage and identify much-needed solutions, especially where they relate to product stewardship for e-products not covered by the National Television and Computer Recycling Scheme (NTCRS) and Mobile Muster.

In Queensland, the Waste Management and Resource Recovery Strategy (the Waste Strategy) sets the framework for addressing multiple waste streams and product types, including e-products.

2. Discovery and engagement

The Department of Environment and Science engaged Ewaste Watch Institute to undertake discovery and engagement to inform development of the Action Plan.

Development of the Action Plan has harnessed the vision, views and ideas from a broad range of sources, stakeholders and studies. It has identified key themes and opportunities as well as barriers and challenges that the Action Plan seeks to address over a 10-year timeframe.

From international research on global e-waste volumes to national and regional stocks and flows, the actions outlined are informed at multiple levels by diverse stakeholders that have an interest in e-products and the need to do more to avoid waste resulting from the production and consumption of e-products.

Specific investigations and analysis included:

Stocks and flows study

Baseline of the current flows of e-products in Queensland. This activity traces new e-products coming into Queensland across their life cycle as they are used, become part of the 'stock', then at the end of their useful lives, where they enter different waste management and resource recovery pathways.

State of play of repair in Queensland

Desktop research, survey and interviews to investigate, document and analyse the current reuse and repair pathways in Queensland, as well as repair and reuse case studies.

Productivity Commission Inquiry on Right to Repair

Analysis of submissions from Queensland stakeholders as they relate to e-products. This included a summary of the views and attitudes of organisations and individuals operating or living in Queensland about the repair and reuse of e-products, including associated barriers and opportunities.

Review of legislation and policies related to repair and second-hand goods

Review of the current State and Federal legislation that regulates the repair and reuse of e-waste in Queensland.

Service providers and other interested stakeholder in Queensland

Map of relevant service providers, social enterprises, NGOs and other active stakeholders involved with the reuse, repair, remarketing and recycling of e-products.

Consultation and engagement activities included:

1. Key person/organisation interviews

In-depth engagement discussions with stakeholders on various issues and themes related to e-waste and e-products with a focus on future actions and solutions.

2. Open online survey of stakeholders

Survey of waste management activities across relevant stakeholders and organisations within the Queensland waste management and reduction sector. This included a focus on capturing current avoidance and reduction behaviors, understanding barriers and enablers, and identifying initiatives and incentives which can help reduce e-waste in Queensland.

3. Working group sessions on specific themes

Five working groups explored interconnected themes including logistics and resource recovery infrastructure, procurement, reuse and repair, land fill bans and consumers and community.

4. Online suggestion box

Online suggestion box invited individuals and organisations to share their ideas, solutions and views.

In addition to the above investigations and activities, an E-Products Reference Group (ERG) was established to further expand the breadth of input during the development of the Action Plan.

The ERG's input in terms of time and knowledge was gratefully appreciated. Their contribution served as a sounding board to solicit a more targeted contribution of information, knowledge and experiences that are relevant to avoiding and reducing waste from e-products in Queensland. It is envisaged that the ERG may provide ongoing input and monitoring to support the implementation of the Action Plan.

3. Use, repair, recycling and disposal

E-products includes all types of electrical and electronic products with a power supply cord and/or battery including photovoltaic systems.

More specifically, the Global E-waste Monitor 2020 defines e-products as ‘a wide range of products with circuitry or electrical components with a power or battery supply. Almost any household or business use products like basic kitchen appliances, toys, tools to music, and ICT items, such as mobile phones, laptops, etc.’²

The item becomes e-waste ‘once it has been discarded by its owner as waste without the intent of reuse (Step Initiative 2014).’³

To understand the current and future volumes of new e-products being placed on to the market and the e-waste generated in Queensland, Lifecycles undertook a stocks and flows study of electrical and electronic products in Queensland.⁴ E-products have been grouped into seven nationally recognised categories (see Table 1).

The modelling estimates that while annual, the weight of new e-products entering Queensland will trend downwards from 239,000 tonnes in 2019 to 204,000 tonnes in 2030, the annual weight of e-waste generated will grow significantly from 100,000 tonnes to 138,000 tonnes per annum. E-waste per capita is also forecast to grow from 19.5kg in 2019 to an estimated 23.7kg per capita in 2030 (see Table 2).

Table 1: E-product categories

PRODUCT CATEGORY	EXAMPLES
Solar PV and battery storage	Photovoltaic panels and associated battery storage, from small household systems to large solar farms
TV and computing equipment	Televisions and computers, including printers, computer parts and peripherals (as covered by the scope of the National Television and Computer Recycling Scheme—NCRS)
Mobile phones	Mobile phones, batteries, chargers, accessories, mobile modems and smart watches (as covered by the Mobile Muster product stewardship scheme)
Lighting equipment	Light-emitting diodes (LEDs), fluorescent tubes, lamps
Large household appliances	Washing machines and dryers
Temperature exchange equipment	Fridges, freezers, heating and cooling
Other small equipment	Vacuum cleaners, kettles, household power tools, musical instruments
Other large equipment	Professional equipment, leisure equipment

Table 2: Flows of electronics today and tomorrow in Queensland

	2019	2030	TREND
E-products entering the market (tonnes)	239,000	204,000	↘15%
E-products in use (tonnes)	1,772,000	2,648,000	↗49%
E-waste (tonnes)	100,000	138,000	↗38%
E-waste per capita (kilogram)	19.5	23.7	↗21%

2 Forti V., Baldé C.P., Kuehr R., Bel G. The Global E-waste Monitor 2020: Quantities, flows and the circular economy potential. United Nations University (UNU)/United Nations Institute for Training and Research (UNITAR)—co-hosted SCYCLE Programme, International Telecommunication Union (ITU) and International Solid Waste Association (ISWA), Bonn/Geneva/Rotterdam. p18.

2 Forti V., Baldé C.P., Kuehr R., Bel G. The Global E-waste Monitor 2020: Quantities, flows and the circular economy potential. United Nations University (UNU)/United Nations Institute for Training and Research (UNITAR)—co-hosted SCYCLE Programme, International Telecommunication Union (ITU) and International Solid Waste Association (ISWA), Bonn/Geneva/Rotterdam. p18.

4. Lifecycles (2022) Stocks and flows study of electrical and electronic products in Queensland.

By weight, 50 per cent of the e-products currently entering Queensland per annum are solar PV and battery storage equipment. Together these items weight 114,000 tonnes (mostly represented by PV systems) with temperature exchange equipment (i.e. heating and cooling, fridges, freezers) the second-largest stream of new e-products at 44,000 tonnes.

Of the estimated 100,000 tonnes of e-waste generated in 2019, over 70 per cent was made up of three e-product categories: other small equipment like vacuum cleaners, kettles, household power tools (26,000 tonnes), temperature exchange equipment (24,000 tonnes), and TV and computing equipment (22,000 tonnes).

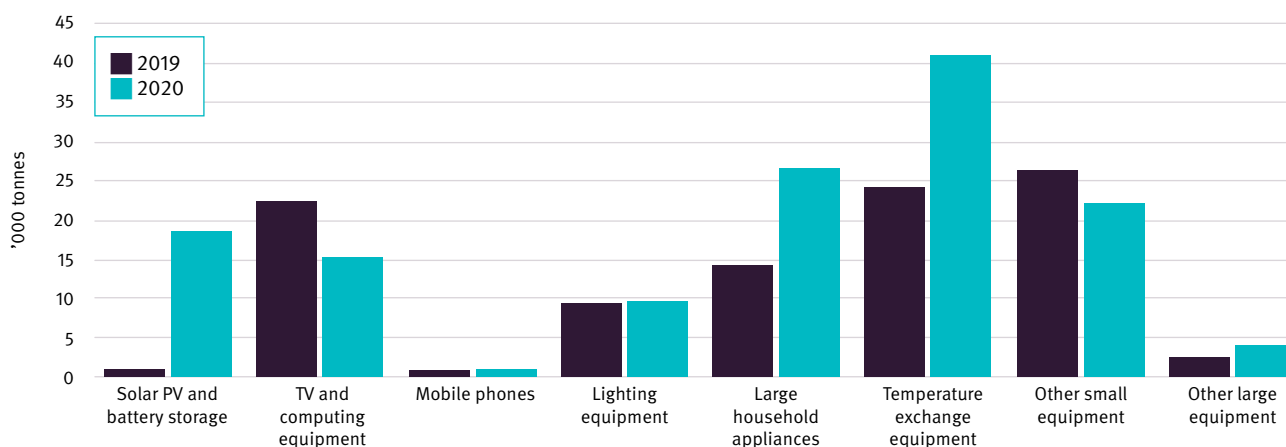
As expected, most (over 70,000 tonnes, or 70 per cent) of e-waste generated in Queensland came from South East Queensland with Wide Bay, Cairns, Townsville and Fitzroy generating a further 21,190 tonnes. Remote Queensland generated just over 2,200 tonnes (see Table 3).

It is forecast that by 2030 the mix of e-waste generated per annum will change significantly (see Figure 2). Solar PV and battery storage waste will grow the fastest to over 17,000 tonnes, temperature exchange equipment to 40,000 tonnes and large household appliances (dryers washing machines) to over 25,000 tonnes. Other small equipment will remain a large percentage of e-waste generated in 2030 at over 20,000 tonnes per annum.

Table 3: Mass of e-waste generated by product category and region 2019

Product category	Total Queensland (tonnes)	Region (tonnes)							
		Cairns	Townsville	Mackay	Fitzroy	Wide Bay	Darling Downs/ Maranoa	South East Qld	Remote Qld
Solar PV and battery storage	951	42	44	31	55	73	71	603	32
TV and computing equipment	22,185	1,126	1,084	836	1,078	1,383	626	15,572	480
Mobile phones	736	37	35	27	35	45	20	522	15
Lighting equipment	9,361	476	459	353	457	585	267	6,559	205
Large household appliances	14,188	722	696	534	693	886	405	9,940	312
Temperature exchange equipment	24,085	1,228	1,185	908	1,181	1,507	695	16,844	537
Other small equipment	26,372	1,334	1,283	985	1,274	1,635	738	18,561	562
Other large equipment	2,478	126	122	94	121	155	71	1,734	55
TOTAL	100,356	5,091	4,908	3,768	4,894	6,269	2,893	70,335	2,198

Figure 2: Key e-waste categories and their evolution



E-waste by weight is made up of the following materials:

- ferrous metals (iron and steel) 49,000 tonnes, (49 per cent)
- plastics, about 23,000 tonnes (23 per cent)
- other, 12,000 tonnes (a significant 12 per cent of the total)
- non-ferrous metals (copper, aluminium, zinc and tin), 11,000 tonnes
- glass, including lead glass, estimated to represent 5,600 tonnes
- speciality metals such as rare earth elements, cobalt, lithium and mercury, 52, tonnes
- precious metals include gold, silver, palladium and platinum, 1.8 tonnes.

Ferrous metals are generally the most valuable part of the product, driving the economic viability of shredding activities. The engineered plastics found in e-products, such as ABS (acrylonitrile-butadiene-styrene) are higher value plastics than in packaging.

However, the large variability of polymer types used in e-products and potential presence of difficult-to-detect chemicals of concern (i.e. brominated fire retardants) make plastics a challenge to recycle, hindering the commercial viability of e-waste recycling.

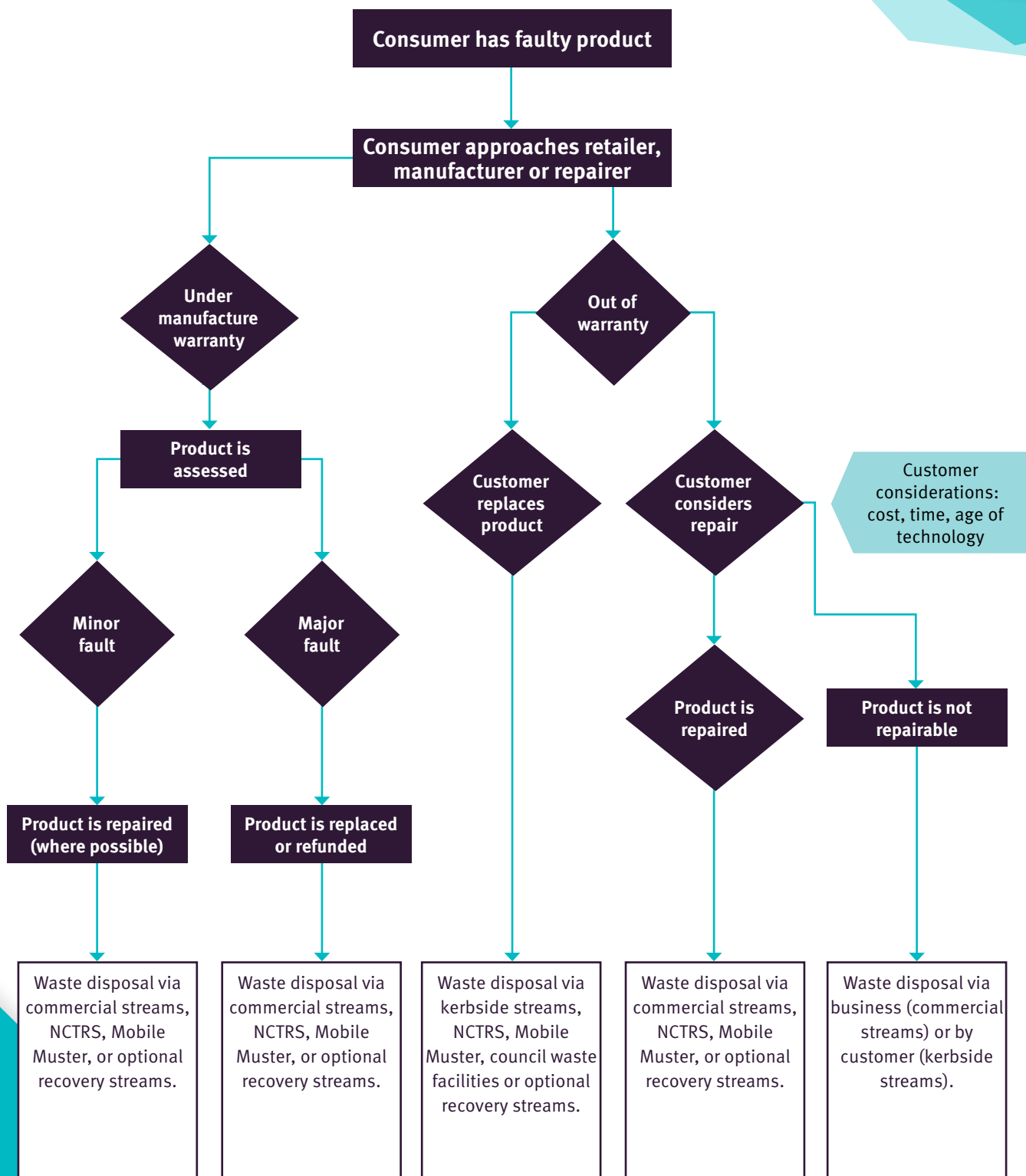
Glass can be a challenging stream as its value is low as a secondary material (used as a fine in construction applications) and some product categories may contain chemicals of concern, such as lead that requires specialist processing.

While precious and specialty metals are the smallest material category found in e-products, they are highly valuable and several metallurgical processes exist to extract them from e-waste.

Repair pathway

There are two essential pathways for repair, under warranty or out of warranty as illustrated in Figure 3. Repairs are typically undertaken in e-products still within the manufacturer's warranty.

Figure 3: E-product basic repair pathways



Who does repairs?

All repairs to electrical equipment in Queensland must be conducted or supervised by a person holding an applicable electrical work license.⁵ All electrical work is regulated under the Queensland *Electrical Safety Act 2002*, Electrical Safety Regulation 2013, Electrical Licensing Eligibility Guide (March 2021) and the Electrical Safety Code of Practice 2021.

It appears Queensland's approach to electrical repair of e-products is out of step when compared to its interstate counterparts. Mend It Australia contacted the relevant electrical regulators of each State and Territory to establish that 'it is not illegal for a person, who is unlicensed, to repair low-voltage household appliances with a cord and plug in Victoria, Tasmania, Australian Capital Territory, West Australia, New South Wales and South Australia'. However, Mend It Australia confirmed that in Queensland it is 'illegal to repair low-voltage electrical appliances with a cord and plug', unless the individual is licensed accordingly.

There are also two Australian standards that impact repair and reuse. The Australian Standard AS/NZS 3760 for in-service safety inspection and testing of electrical equipment (i.e. test and tagging) outlines a testing method and frequency for electrical appliances.

The recently updated Australian Standard (AS 5377:2022) for the management of electrical and electronic equipment for reuse or recycling sets out principles and minimum requirements for the safe and environmentally sound collection and storage, transport, preparation for reuse (including repair) and treatment of electrical and electronic equipment (including components, consumables and parts thereof) designed for a supply voltage not exceeding 1000 V a.c. and 1500 V d.c. It addresses issues around data security, traceability for substances of concern, risk management and quality management.

Where are repairs done?

Depending on the product, the repair may either take place on site, at the manufacturer, or at third-party authorised repairer's workshop, independent repair shops or kiosks. Major appliances (i.e. clothes washers, dishwashers, refrigerators, microwave ovens, air conditioners) and business ICT equipment will, if possible, be repaired on site by a technician, or alternatively they are transported to an approved workshop.

It is uncommon to repair small kitchen benchtop appliances such as toasters, blenders and kettles as customers typically replace these items when they become faulty. However, common small appliances that are repaired include vacuum cleaners and power tools.

One repairer in Mackay, who is authorised for repair by a wide range of manufacturers, estimates they repair 50–100 vacuum cleaners and 400–450 power tools per month.

Mobile phone repair shops and kiosks are prevalent in most shopping centers. Data provided by the Queensland Investment Corporation (QIC) shows a total of 32 electronics repair businesses in properties within their portfolio in Queensland. This equates to an average of four repair businesses per centre, making mobile phone repair fairly accessible (Envirocom Report).

From Consumer Electrical Suppliers Association (CESA) members survey results, the majority of repairs are carried out by third-party authorised repairers and only a small proportion of repairs are carried out in-house. This indicates the majority of repairers are self-employed and are therefore required to undertake their own training and organise their own insurance.

What happens to repair waste?

The majority of waste associated with repair will move through commercial waste streams. Depending on the location and collections service provider, this would include general waste at a minimum, and could also include commingled recycling and cardboard. Additional optional waste streams are available to commercial customers, such as e-waste collection and scrap metal.

Consumers who choose to upgrade or replace broken e-products have their kerbside collections options (typically general waste and commingled recycling, depending on location), as well as drop-off points at council waste facilities, participating retailers, and mail-back options (Mobile Muster).

Scrap metal collection for larger items (those within the major appliance category) can also be arranged.

Customer rights to repair and warranties

Under Australian Consumer Law (ACL), if a product fails to meet a consumer guarantee (i.e. it's faulty or fails), the customer has the right to ask for a repair, replacement or refund. The remedy a customer is entitled to will depend on whether the issue is minor or major.

If it is a minor problem, the business can choose to give the customer a free repair instead of a replacement or refund. If the business offers a free repair, the customer must accept this. If it is a major problem, the customer has the right to ask for a replacement or refund.

5. Including connecting electricity supply wiring to electrical equipment or disconnecting electricity supply wiring from electrical equipment; or manufacturing, constructing, installing, removing, adding, testing, replacing, repairing, altering or maintaining electrical equipment or an electrical installation

Businesses accepting goods for repair must provide customers with repair notices when the goods being repaired are capable of retaining user-generated data (i.e. mobile phones, computers, portable music players and other similar electronic goods).

Most major retailers offer their own version of an extended warranty which focuses on providing customers with a replacement (usually if the product is less than a certain value, somewhere between \$250–\$1000) or a repair warranty for goods over that amount.

The retailer who sold the product cannot refuse to help a customer by sending them to the manufacturer or importer. A customer can, however, approach the manufacturer or importer directly to recover costs from them but cannot demand a repair, replacement or refund from the manufacturer.

The manufacturer of a product is responsible for ensuring that spare parts and repair facilities (a place that can fix the consumer's goods) are available for a reasonable time after purchase unless told otherwise.

Section 16 of the Fair Trading Act 1989 (Qld), enacts the provisions of the ACL in Queensland.

Second-hand e-products in working order can be dropped at charity shops who have the capability to tag and test (licensed electrician required), re-sold privately online or offline, or sold to companies which refurbish and re-sell.

E-waste collection

There are approximately 85 dedicated e-waste drop-off points in Queensland, half of which are located in South East Queensland.⁶ These include council transfer stations

and recycle centres, e-waste recycling facilities and retailers such as Officeworks and Harvey Norman. A further 306 council transfer stations are noted in the database that could potentially provide drop-off points. There are also 3,000 Mobile Muster collection points in mobile phone retail outlets. See Table 4 for a regional break-down of collection points.

While the more urban population centres of South East Queensland have fewer collection points per capita, the proximity of the collection points can effectively cover more households.

Kerbside audits by Envirocom have found that within domestic kerbside general waste streams, e-waste (i.e. materials covered either by the NTCRS or Mobile Muster scheme) typically represented less than 0.5 per cent of the entire waste stream. However, e-waste is typically observed in most samples of general waste (most frequently found items include charging cables and headphone). The proportion of e-waste present in general waste from councils in South East Queensland compared to regional councils does not significantly differ.

E-waste within domestic kerbside co-mingled recycling streams typically represents a smaller proportion than in general waste, around less than 0.2 per cent of the stream. Commercial general waste and recycling show similar results but are significantly more varied in their composition.

For self-haul general waste, however, the proportion of e-waste can be up to three per cent of the stream, despite there being e-waste drop-off areas available for free.

6. According to the national infrastructure database [Data | Infrastructure Australia](#)

Table 4. E-waste collection points by region

Region	E-waste drop-off points	Metal scrappers	Other transfer stations	Total potential drop-off points
Cairns	6	2	35	43
Darling Downs/Maranoa	8	4	64	76
Fitzroy	9	4	40	53
Mackay	7	5	30	42
Remote Queensland	5	1	11	17
South East Queensland	43	27	80	150
Townsville	2	3	9	14
Wide Bay	5	3	37	45
Total	85	49	306	440

4. Circularity for e-products

E-waste recycling

The three main pathways for recycling e-waste in Australia are landfill, metal scrapping and disassembly/component recycling.

Metal scrapping is considered a low-value recycling option as products are simply shredded to sort and recover the metals. All other materials (i.e. shredder residue made up of plastics, fabrics, glass and hard-to-separate materials) are disposed to landfill.

Disassembly is the first step to higher-value recycling of components and materials. The disassembly step typically occurs in Australia by recyclers servicing the NTCRS and Mobile Muster. The separated components and materials are then either recycled onshore (i.e. ferrous metals and glass) or overseas (non-ferrous, precious, specialty metals and plastics).

About 50,000 tonnes, or half of all e-waste generated in Queensland, is estimated to be collected, with 71 per cent going through low-efficiency recycling processes, such as shredding for metal recovery. Most of the high-efficiency recycling (disassembly) is used for TV and computing equipment and mobile phones thanks to the recovery rate requirements of the NTCRS. Figure 4 shows the fate of e-waste in Queensland in 2019.

Of the estimated 50,000 tonnes of e-waste going to landfill, small equipment like vacuum cleaners, power tools, musical instruments etc. makes up half. Lighting equipment is the next highest contributor of e-waste to landfill, then TV and computer equipment not recovered via the NTCRS.

The objectives of a circular economy are to design out waste and pollution, prolong the life of products and materials, and be restorative and regenerative.

At a global level, the Circular Electronics Partnership (CEP) has clearly acknowledged the need for system-wide transformation by uniting ‘leaders in technology, consumer goods and waste management, to reimagine the value of e-products, using a lifecycle approach, reducing waste from the design stage through to product use and recycling’.⁷

The CEP has produced an important roadmap that goes beyond recycling and outlines key interventions and players required to achieve a circular electronics industry.

The CEP roadmap recognises the need for a circular approach to producing and consuming e-products, and highlights the importance of the Queensland Government’s approach through this Action Plan.

E-products typically have a linear lifespan. They are made, bought, used and disposed of, often going to landfill. There is now an international movement towards creating a circular economy that promotes sustainable solutions and eliminates waste through good design. Key to this is shifting from a linear economy to a circular economy, where the objectives are to design out waste and pollution, prolong the life of products and materials, and to restore, regenerate and decarbonise.

System-wide redesign and life cycle thinking are key to ensuring that e-products are not only designed with circularity in mind, but that their function and application directly and indirectly contribute to a sustainable and zero waste future for Queensland.

Circular thinking and action also require attention to decarbonising the life cycle, from embodied energy and emissions in e-products, but also how energy efficiency and productivity can be maximised during the use phase of e-products.

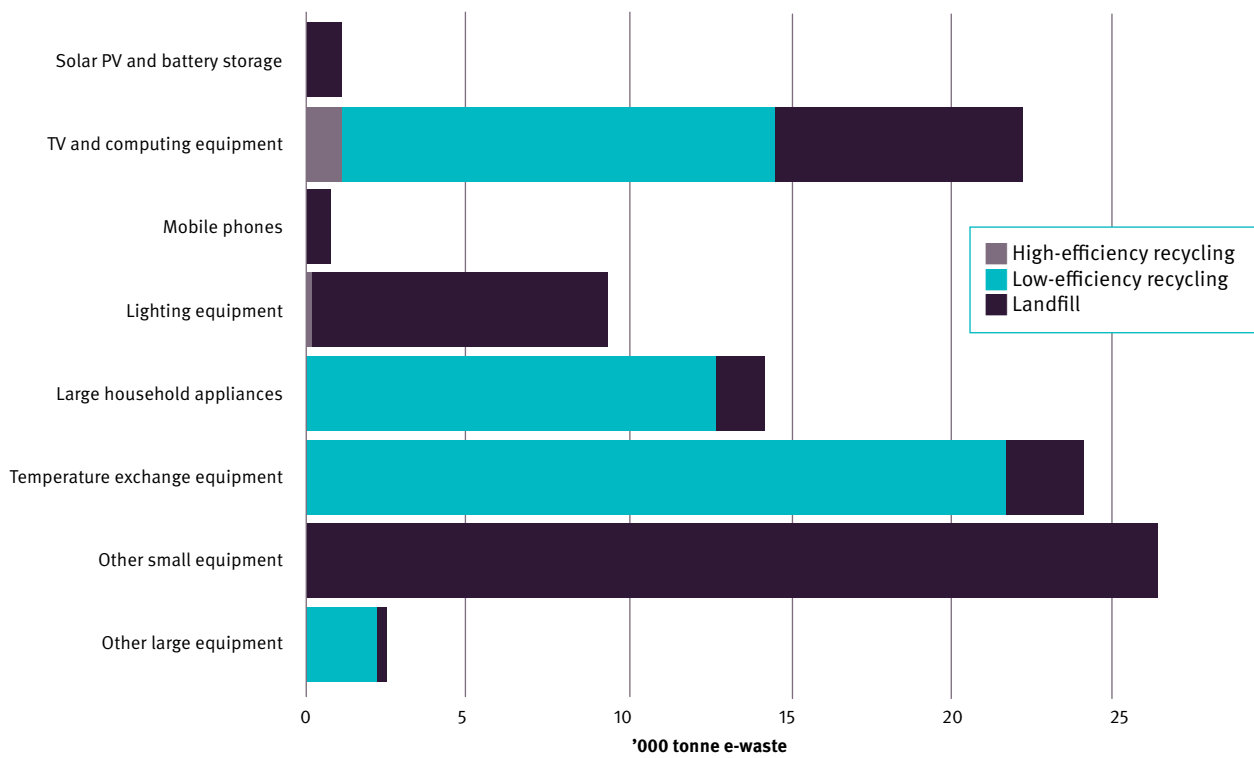
Core to achieving a circular economy is the shift from business as usual and ‘less harm’ environmental measures to outcomes that are restorative and regenerative. In other words, products, materials and services that positively build social, economic and ecological capital.

The challenges in Queensland are not insignificant, especially with regard to waste management and the need to achieve much higher levels of waste avoidance, reuse, repair and recycling.

The Queensland Government through its Waste Strategy is committed to moving the state to a zero-waste society, where waste is avoided, reused and recycled to the greatest possible extent.

7. Circular Electronics Partnership website: <https://cep2030.org/> The CEP is a consortium comprising the World Economic Forum, World Business Council for Sustainable Development, the Global Electronics Council, Responsible Business Alliance and the Global Enabling Sustainability Initiative.

Figure 4: Fate of e-waste in Queensland, 2019



Production—designing out waste and pollution from e-products

One way of looking at the current e-waste problem in Queensland is to view it as a design flaw. E-products need to be designed smarter to avoid waste, use less materials and, not contain chemicals of concern. Design also needs to consider how to extend the life of a product, enable easy repair, parts harvesting, reuse and repurposing, be easily dismantled for material recovery and made from materials that can be recovered and reused.

There are many e-products currently placed on the market in Queensland that are not designed for circularity. This is illustrated by the preference to replace rather than repair products and shorter life spans of once durable e-products like televisions and toasters. Also, less than half of the used e-products being recycled and that 60 per cent of this recycling is low efficiency with only the metals being recovered.

Design is central to achieving the objectives of a circular economy which are to eliminate waste and pollution, circulate products and materials, and regenerate nature. A circular economy involves a transition from the linear ‘take, make and dispose’ model to one in which the material loops get closed and products are regenerated.

Designing e-products for circularity will lead to:

- reduced environmental and human health impacts by designing-out waste and pollution
- longer-life products that are designed for durability, repair, reuse, repurposing, remanufacturing and recycling
- increased use of environmentally preferable materials through closing materials loops
- creation of high-value upcycled products, materials and related design services that close supply chain loops
- higher levels of waste avoidance, reduction, reuse, repair and recycling.

Manufacturers and brands are central to leading this change. Many companies are already designing e-products with these objectives in mind, and some are exploring how alternative models of production and consumption can be achieved to meet consumer expectations on functionality, sustainability, value and convenience.

Through their procurement, government at all levels can actively support and grow demand for more circular e-products.

Similarly, the Australian Government through its industrial chemicals environmental management standard (IChEMS) can fast track the removal of hazardous substances in e-products.

Both the Australian Government, through the Recycling and *Waste Reduction Act 2020*, and the Queensland Government, under its *Waste Reduction and Recycling Act 2011*, can regulate manufacturers to design more circular e-products.

Consumption: Prolonging the life of e-products

Consumers can choose from an enormous range of products, from cars to coffee machines, that incorporate sophisticated technology with embedded software. This sometimes involves manufacturers' intellectual property.

Some technology companies guard this intellectual property closely. However, under a circular design approach to product stewardship, consumers would be more enabled to repair products.

Community interest is demonstrably growing around this 'right to repair'. That is, a consumer's ability to repair faulty goods, or access repair services, at a competitive and affordable price.

This movement is not just about getting manufacturers to facilitate straightforward repairability and increased durability. It's also about enabling and encouraging consumers to take control of the products they buy, own and use.

Around the world, the 'right to repair' is proving a powerful advocacy movement. In Australia, 'right to repair' advocates would like to see copyright laws changed to allow repairers to legally circumvent digital locks to access report information.

In its *Right to Repair Report* to the Australian Government, the Productivity Commission found there are significant barriers to repair for some products and it is considering reforms that can improve consumers' right to repair without the uncertainty and costs associated with more forceful policy interventions.⁸

In Queensland, stakeholders identified that the main barriers to repairing e-products are:

- the lack of skilled labor, especially in the regions
- access to appropriate repair facilities
- cost to the business/organisation/consumer especially when the product falls out of warranty for ICT equipment where software and technology are being updated regularly
- regulations and legislation (see Table 5).

Other barriers to repair include the availability of parts, diagnostic software and repair manuals along with data security (Envirocom Report). Repair cafes, in particular, expressed frustration with the inability to access spare parts and repair manuals, which reflects the tensions between manufacturers' preference for authorised repairers rather than consumers repairing products themselves (Griffith Report).

Table 5: Responses from survey to CESA members; 'On a scale of 1–5 where 1 is 'not at all a barrier' and 5 is 'an extreme barrier', how much of a barrier to repairing all types of e-products are the following

Barrier	Average response (1–5)
Skills availability	4
Appropriate repair facility availability	3
Cost to business/organisation	3
Cost to consumer	3
Regulations/legislation (state and federal)	3
Parts availability	2
Diagnostic software availability	2
Repair manuals availability	2

Another concern expressed by Queenslanders as part of the Productivity Commission Right to Repair Inquiry was around planned obsolescence, how the economy has been developed around planned obsolescence, and a consumer culture that has been trained into replacing rather than repairing or renewing (Griffith Report).

To help guide consumer choices, Australia has a host of ecolabel certification and labelling organisations such as Green Tick, Fairtrade, EPEAT and TCO Certified. These advise consumers and users on which products and services meet environmental standards or are the most environmentally preferable within their category. In Australia, the Energy Star Ratings Program is a readily identifiable label on most whitegoods and household electrical appliances.

Research by leading consumer advocacy group CHOICE suggests there is growing consumer demand for increased repair information and other sustainable product solutions.

In a CHOICE 'consumer pulse' survey, 85 per cent of Australians said they want products that are durable and 73 per cent said they consider repairability when deciding what to buy. But 39 per cent reported finding it difficult to make decisions about environmental factors for products and services.

CHOICE says labels like the Energy Ratings Program work because they are consistent, mandatory and clear. The consumer advocate is now campaigning for the same clarity about product durability and repairability.

8. Productivity Commission 2021, Right to Repair, Inquiry Report no. 97. Canberra

CHOICE says providing repairability information at the point of sale can lift the quality of all products.

Much can be done by the Queensland Government in partnership with other stakeholders to develop and operationalise circular economy policies and programs that enable and support greater attention to repair, reuse and durability for e-products.

Community-led circularity for e-products should not be underestimated. Queenslanders are already finding ways to make worthwhile contributions to e-waste issues through grassroots organisations like repair cafes and tool libraries. A growing number of these repairing and sharing social enterprises and community-based, impact-oriented organisations are developing sustainable solutions of their own across the state.

The waste management and resource recovery industry (including local governments) is central to the state's waste reduction and recycling efforts but it also has the potential to keep e-products in use by how they handle, sort and triage e-waste collections.

For instance, in Kingston a social enterprise is helping Brisbane's long-term unemployed people get back on their feet at an e-waste recycling project. Substation 33 specialises in electronic waste collection and processing, and diverting e-waste from landfill. It also has a team of technical specialists who are developing and commercialising innovative products and services including flooded road smart warning signs, electric e-bikes, 3D printers and a vertical garden monitoring system.

Brands can also lead the change on how we can 'buy better' and develop new patterns of consumption. Innovation in retail is part of this equation, be it online or through traditional 'bricks and mortar' stores.

Young Queenslanders have grown up with music and video streaming services and so the idea of having to physically own albums, CDs or DVDs must seem absurd. Why own when you can stream? And there is far less waste.

Businesses, too, are changing their ways as they revise business models to accommodate this era of digital transformation and understand that maximising the use of precious resources is not only good for the planet, but can also be good for the bottom line.

One of the emerging themes of the circular economy is a move from ownership of products which need replacing to the introduction of a managed service, and this holds significant potential for e-products and the function or service they provide. Offering products-as-a-service through rental, leasing, pay-per-use and pay-per-service is happening around the world.

When material components of a product are seen by manufacturers as investments, rather than simply a cost, new business models that promote multiple uses of the product over multiple cycles can make perfect business sense.

The Director of Sustainability at technology company Philips, Anton Brummelhuis, says the idea of ownership is still engrained in some businesses.

'These concepts require a change in thinking as well as in actions and in roles and responsibilities,' he says.

Post-consumption: Prolonging the life of materials

The post-consumption stage of e-products presents a major challenge in terms of diverting e-products from landfill while also creating solutions to ensure improved levels of recovery and recycling. Currently it is legal to dispose of most types of e-waste to Queensland landfills and this clearly needs to change.

Improved resource recovery of end-of-life e-products will require a focus on:

- recycling more e-waste generally but also recycling categories in addition to televisions, computers and mobile phones
- recycling processes that can better deliver cleaner streams of material at the highest value
- proactively supporting and developing more resilient markets for the recovered materials
- investing in recycling and logistics infrastructure that can effectively service all of Queensland
- ensuring appropriate alignment and complementarity with existing e-products stewardship schemes, related legislation and regulations, as well as the Australian Government's e-stewardship taskforce work program
- effective and impactful community and consumer education that drives behavior change.

There are three main reasons why e-waste in Queensland is currently collected and recycled:

- the value of the materials, in particular ferrous, precious, and rare earth metals
- product stewardship schemes like the National Television and Computer Recycling Scheme (NTCRS), Mobile Muster, FluoroCycle and Cartridges 4 Planet Ark which fund the cost of collection and recycling
- local and international regulatory frameworks such as the Queensland Government's landfill levy, the Australian Government's Hazardous Waste Act and Ban on Export of Waste Plastics and the international Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their disposal.

While this means that some white goods, televisions, ICT equipment, printer cartridges, mobile phones and some mercury containing lamps are being collected and processed, many types of e-products are still going straight to landfill or being stored and hoarded. This includes smaller appliances, electrical and electronic tools, toys, sound systems, solar panels, lighting equipment, medical and other monitoring electronic equipment.

For householders, there are several options to dispose of e-waste. They include local government hard waste kerbside collection, drop-off collection points at council transfer stations or resource recovery centers, a retail or charity outlet or a temporary collection event and post back options for smaller items like mobile phones. Collection services for televisions, computers, printers, mobile phones and their batteries and accessories are usually free. For other types of e-products, a fee may be charged.

Businesses, government agencies and other organisations usually pay for a pick-up or take-back service. A rebate may be paid in some cases depending on the type of e-products being collected and if they can be resold for reuse. For some organisations, collection services may be included as part of the procurement of the e-products through a leasing arrangement. This is especially so for printers, ICT and mobile telecommunications equipment.

While community access to collection services in metropolitan areas in Queensland is reasonable, access in outer regional and remote areas is intermittent at best. The Action Plan sees improved service and activity in these areas as a major priority for reform, improvement and expansion.

The opportunities to optimise resource recovery, bolster existing services and demonstrate the Queensland Government's commitment to a zero-waste society is reflected throughout this Action Plan. A significant investment will be made to make waste avoidance, reduction, reuse, repair and recycling of e-products a reality through a variety of measures.

The Action Plan outlines the steps required to address these challenges in a way that can add value, create new market opportunities, meet consumer expectations and keep e-products out of landfill. It talks to the touchpoints of the e-products life cycle and where change can be achieved.

5. Action Plan

The Action Plan is a 10-year strategy that focuses on waste avoidance, reduction, reuse, repair and recycling of e-products.

While recycling has a critically important role to play, it alone does not provide a sustainable and waste-free solution. Additional measures and interventions are required that delay and prevent e-waste from entering the resource recovery chain.

This plan seeks to tackle head-on what we can do to avoid, reduce and reuse e-products, as well as improve our current and future recovery and recycling activities to ensure they are fit-for-purpose and reflect emerging consumer and industry needs.

It is underpinned by the principles of circularity and the waste hierarchy which aim to keep e-products and the materials circulating in the economy in a productive and sustainable manner.

The plan represents a shift in mindset towards waste avoidance, reuse and repair, acknowledging the important role of product design and procurement. It identifies objectives, activities, partners, priorities and timeframes for action by relevant stakeholders.

It also identifies the need for strategic investment by government at all levels as well as the private sector, in innovative approaches and technologies to extend the life of e-products and recover resources. This includes finding new markets and developing high-value products made from previously used components and materials used in e-products.

The goals of the Action Plan are to:

- extend the life of e-products (production and consumption product life cycle stages)
- recover more materials and keep them circulating in the economy (post-consumption)
- guide and enable stakeholders to maximise waste reduction and sustainability outcomes for e-products.



01 Design and production

Designing out waste, pollution and emissions; reducing material intensity, specifying renewable and restorative materials eliminating unsafe chemicals and hazardous substances.

02 Consumption

Prolonging the life of e-products and components; maximising durability, repairability and remanufacturing; circular business models to enable sharing, micro-lending and leasing; increasing consumer awareness and education, and action through behaviour change.

03 Post consumption

Prolonging the life of materials in e-products' increase resource recovery performance; safe treatment and disposal of residuals, increasing consumer awareness and education, and action through behaviour change.

In response to stakeholder feedback and investigations into the state of recycling and repair in Queensland, the actions to address the current challenges and issues facing Queensland have been grouped into five themes and objectives.



01 Reuse and repair

Supporting consumers and users to safely extend the life of e-products through repair and reuse of more e-products.

02 Consumer empowerment

Informing, educating and activating consumers to adopt responsible consumption, use and disposal of e-products

03 Procurement

Equipping business and government purchasing and leasing to drive circular design, greater durability, repairability, reuse and refurbishment of e-products.

04 Infrastructure and transport

Optimising resource recovery access and performance through improved collection, handling and processing with a focus on rural, regional and remote areas.

05 Policy and regulatory reform

Adjusting existing policies and regulations, and initiating new reforms to stop reusable, repairable and recyclable e-products going to landfill, being hoarded and littered.

The first three themes and objectives focus on extending the life of e-products. The last two themes and objectives are focused on recovering more materials and keeping them in the economy.

- **Reuse and repair:** helping consumers repair and reuse more e-products.
- **Consumer empowerment:** more responsible consumption and use.
- **Procurement:** business and government procurement drive greater durability, repairability, reuse and refurbish.
- **Infrastructure and transport:** optimise resource recovery—including collection, handling, processing.
- **Policy and regulatory reforms:** stop recyclable e-products ending up in landfill—which e-products and when.

Reduce and repair

Extending the life of e-products: A helping consumers repair and reuse more e-products

Actions	Partners	Priority
(Circular economy objectives) 1. Designing out waste and pollution 2. Prolonging the life of products and materials 3. Restorative, regenerative and decarbonisation		Near (1–2 years) Medium (3–5 years) Long term (5–10 years)
1. Identify and address gaps in community access to reuse, repair and e-products sharing in regional, rural and remote areas, including the need for government funding and investment. (1,2)	All levels of government, waste management and resource recovery sector and logistics service providers.	Near
2. Mobile repair service to travel to regional Queensland with focus on rural and remote areas. (1,2)	Local governments, CESA, Australian Information Industry Association (AIIA); Australian Mobile Telecommunications Association (AMTA) Queensland Government, Australian Repair Network, LGAQ	Near
3. Training—Up-skilling and re-skilling. Training specifically on repair of appliances, ICT and consumers electronics. (1,2)	CESA, AIIA, AMTA, Queensland Government, repair cafes, tool libraries, LGAQ	Near
4. Training—continuing education for existing electrical and electronic trades to build capabilities in repair-specific knowledge and skill. (1,2)	CESA, AIIA, AMTA, Queensland Government, repair cafes, tool libraries	Medium
5. Government cash rebates/contributions/subsidies to support the repair of e-products. (1,2)	All levels of government	Medium
6. Co-investment and grants to support the development of a manual/guide for ‘Setting Up a Repair Café’ in partnership with LGAQ. (1,2)	All levels of government, repair cafes, tool libraries, LGAQ	Near
7. Government grants to seed fund the creation/implementation of a repair café in every Queensland region with support from LGAQ. (1,2)	Queensland Government, repair cafes, tool libraries, LGAQ	Near
8. Establish a Reuse and Repair Research Centre in collaboration with universities and relevant industry bodies. (1,2)	Queensland Government, Griffith University, repair cafes, tool libraries, Australian Repair Network, CESA, AIIA, AMTA	Medium
9. Queensland Government should closely monitor and support the implementation of relevant recommendations from the Productivity Commission Inquiry on the Right to Repair, e.g. repairability star rating. (1,2)	Queensland Government	Near
10. Comprehensive singular source of consumer and business-friendly waste avoidance and waste reduction information on where, how and why to reuse, repair and recycle e-products as well as information on sharing, leasing and ‘buying better’.	Queensland Government, Australian Repair Network, Planet Ark. CESA, AIIA, AMTA, NTCRS co-regulatory arrangements MobileMuster, B-Cycle, C4PA, NRA and ARA, repair cafes, tool libraries, LGAQ, local governments, Recycle mate	Near

Consumer empowerment

More responsible consumption and use

Actions	Partners	Priority
(Circular Economy Objectives) 1. Designing out waste and pollution 2. Prolonging the life of products and materials 3. Restorative, regenerative and decarbonisation		Near (1–2 years) Medium (3–5 years) Long term (5 –10 years)
11. Education to inform, engage and activate consumers to choose well and make it last. Partner with existing product stewardship schemes and programs e.g. NTCRS co-regs, Mobile Muster, B-Cycle, C4PA. (1,2,3)	Queensland Government, Australian Repair Network, Planet Ark. CESA, AIIA, AMTA, NTCRS co-regulatory arrangements Mobile Muster, B-Cycle, C4PA, NRA and ARA, repair cafes, tool libraries, LGAQ, local governments, Recyclemate	Medium
12. Equip e-products retailers with educational materials to buy better, choose well and make it last. (1,2,3)	Queensland Government, Australian Repair Network, Planet Ark. CESA, AIIA, AMTA, NTCRS co-regulatory arrangements MobileMuster, B-Cycle, C4PA, NRA and ARA, repair cafes, tool libraries, LGAQ, local governments, Recyclemate	Medium
13. Partner with key channels and stakeholders to support education for consumers to buy better, choose well and make it last, e.g. LGAs, LGAQ, NTCRS co-regs, MobileMuster, B-Cycle, C4PA, National Retail Association, Australian Retailers Association, ACOR, WMRR. (1,2,3)	Queensland Government, Australian Repair Network, Planet Ark. CESA, AIIA, AMTA, NTCRS co-regulatory arrangements MobileMuster, B-Cycle, C4PA, NRA and ARA, repair cafes, tool libraries, LGAQ, local governments, Recyclemate	Medium
14. Develop incentives/rewards for consumers to buy better, choose well and make it last. For example, vouchers, rebates, product subsidies, etc. on relevant e-products for set time periods. (1,2,3)	Queensland Government	Medium

Procurement

Extending the life of e-products—drive greater durability, repairability, reuse and refurbishment through business and government procurement

Actions	Partners	Priority
(Circular economy objectives) 1. Designing out waste and pollution 2. Prolonging the life of products and materials 3. Restorative, regenerative and decarbonisation		Near (1–2 years) Medium (3–5 years) Long term (5–10 years)
15. Incorporate specific product stewardship and circular economy requirements for all government procurement across all departments, agencies and authorities. This should include elements such as attention to repairability, durability and recyclability, referencing specific services, features and support programs. (1,2) 16. Attention to sustainable materials including recycled and recyclable content, renewable materials, elimination of unsafe chemicals and hazardous substances, and materials with low embodied energy and carbon emissions. (1,3) 17. Product warranties that directly contribute to extending product life and avoiding premature product disposal or upgrades service arrangements and attention to take-back services and programs that cover reuse, repair, upgrading and/or recycling and diversion from landfill. (1,2)	Queensland Government, LGAQ, local governments, Federal Government, C-SPARC	Near term
18. Fund and provide expert technical advice to a relevant industry/business body such as the Chamber of Commerce and Industry Queensland to develop an E-products Sustainability procurement program that includes a ‘How to manual for SMEs’, as well as outreach and training for businesses on how to procure low and no-waste e-products. (1,2,3) 19. Conduct a review to establish which government departments, agencies and authorities are high volume consumers of e-products and ensure these are supported as a priority for sustainable e-product procurement reforms. (1,2,3) 20. Information and guidance about TCO Certified and EPEAT programs to support government and private sector procurement. (1,2,3) 21. Develop and implement a market development program for e-products with a focus on recovered materials from e-waste and especially plastics. (2,3) 22. Identify and address gaps in community access to e-waste collection points in regional, rural and remote areas, including the need for government funding and investment. (2)	Queensland Government. Queensland CCI	Near term
	Queensland Government	Near term
	Queensland Government	Near term
	Queensland Government	Medium term
	Queensland Government, Federal Government Recycling Modernisation Fund, local governments. Waste management and logistics service providers.	Near term

Infrastructure and transport

Optimise resource recovery—collection, handling, processing

Actions	Partners	Priority
(Circular economy objectives) 1. Designing out waste and pollution 2. Prolonging the life of products and materials 3. Restorative, regenerative and decarbonisation		Near (1–2 years) Medium (3–4 years) Long term (5–10 years)
23. Regionally-based transport and logistics coordinators in local government to optimise the collection, transport and recycling of e-waste in regional, rural and remote areas. (2)	Queensland Government, local governments, waste management and resource recovery sector, logistics service providers, NTCRS Co-Reg	Near
24. Establish e-products triage systems at aggregation sites to assess e-products with a view to optimising reuse, repair, and recycling outcomes, including options for preliminary processing and pre-treatment facilities in regional, rural and remote areas. (2)	All levels of government, waste management and resource recovery sector and logistics service providers.	Medium
25. Increase recycling capacity. (2)	All levels of government waste management and resource recovery sector and logistics service providers.	Medium
26. Co-fund and invest in technologies to process e-waste plastics recycling in Queensland. (2)	All levels of government, waste management and resource recovery sector and logistics service providers.	Long

Policy and regulatory reforms

Stop recyclable e-products ending up in landfill—which e-products and when

Actions	Lead/partners	Priority
(Circular economy objectives) 1. Designing out waste and pollution 2. Prolonging the life of products and materials 3. Restorative, regenerative and decarbonisation		Near (1–2 years) Medium (3–5 years) Long term (5–10 years)
25. State planning approvals for utility PV to require fully funded end-of-life solutions including setting durability, reuse, material recovery and landfill diversion targets. (2)	Queensland Government	Near term
26. Review and revise relevant Queensland laws to remove barriers to increased level of repair while ensuring product safety is maintained. (2)	Queensland Government	Near term
27. Queensland Government closely monitor and support implementation of relevant recommendations from the Productivity Commission Inquiry on the Right to Repair, e.g. repairability star rating. (2)	Queensland Government	Near term
28. Mandatory national product stewardship scheme for PVs. (1,2)	Queensland Government to advocate Federal Government	Near term
29. Expand the NTCRS to include large household appliances, temperature exchange equipment, other small equipment. (2)	Queensland Government to advocate Federal Government	Near term
30. National regulation of Mobile Muster and expand scope to include modems and routers, digital set-top boxes, landline phones, wearables and smart home devices. (2)	Queensland Government to advocate Federal Government	Near term
31. Mandatory national product stewardship scheme for lighting equipment. (2)	Queensland Government to advocate Federal Government	Near term
32. Ban the disposal of electrical and electronic equipment including PVs from landfill where industry-funded product stewardship schemes are in place and available. (2)	Queensland Government	Long term
33. Establish cross agency/department working group to ensure adoption of relevant actions across all relevant areas of the Queensland Government. (1,2,3)	Queensland Government	Near term

References

Stewardship for Consumer and Other Electrical and Electronic Products, Department of Agriculture, Water and the Environment, Canberra, December. CC BY 4.0. 2021, p14.

Forti V., Baldé C.P., Kuehr R., Bel G. The Global E-waste Monitor 2020: Quantities, flows and the circular economy potential. United Nations University (UNU)/United Nations Institute for Training and Research (UNITAR) – co-hosted SCYCLE

Programme, International Telecommunication Union (ITU) & International Solid Waste Association (ISWA), Bonn/Geneva/Rotterdam. p18.

Lifecycles (2022) Stocks and flows study of electrical and electronic products in Queensland Australian waste and resource recovery infrastructure database

<https://www.dcceew.gov.au/environment/protection/publications/waste-resource-recovery-infrastructure-db> Circular Electronics Partnership website: <https://cep2030.org/>

Productivity Commission 2021, Right to Repair, Inquiry Report no. 97, Canberra Envirocom (unpubl) State of Play of Repair in Queensland

Griffith University (unpubl) Analysis of QLD submissions to Productivity Commission Inquiry on Right to Repair Griffith University (unpubl) Review of repair / second hand goods related legislation

Envirocom (unpubl) Summary of interview results report Griffith University (unpubl) Summary of online survey results

Queensland e-products reference group members:

Australian Information Industry Association

Australian Mobile Telecommunications Association

Brisbane Tool Library

Chamber of Commerce and Industry Queensland

Charitable Recycling Australia

Clean Energy Council

Consumer Electronics Suppliers Association

Ewaste Watch Institute

Griffith University

Lighting Council of Australia

Lite Haus International Substation33

Local Authority Waste Management Action Committee (LAWMAC)

Local Government Association of Queensland

Waste Recycling Industry Association Queensland National Retail Association

Queensland Department of Environment and Science

