Southern Sydney Regional Organisation of Councils

SSROC

Product Stewardship Centre of Excellence

Product Stewardship Centre of Excellence

Funded by NSW Environment Protection Authority

Acknowledgement of Country

Southern Sydney Regional Organisation of Councils (SSROC) and the Product Stewardship Centre of Excellence acknowledge the Darug, Dharawal and Gadigal people of the Eora Nation, upon whose ancestral lands the SSROC stands. We would also like to pay respect to the Elders both past and present, acknowledging them as the traditional custodians of knowledge for these lands.

Research Team

John Gertsakis, Rose Read and Vincent Mason – Product Stewardship Centre of Excellence
Annie Walker and David Kuhn, SSROC
Kapil Kulkarni, RPS Group
Dr Taylor Brydges, UTS Institute for Sustainable Futures

Project funding

The project has been funded by the NSW EPA Sustainability Partnerships Program. The program supports collaboration between the parties to help solve complex problems around waste and emissions reductions.

Acknowledgements

We thank Annie Walker, David Kuhn and Vincent Ogu from SSROC for their contributions to the project and this report. We also thank the numerous research participants from business, government, associations and NGOs for their input.

Citation

Brydges, T. , Gertsakis, J., Read, R., Summary of Stakeholder Views. Report prepared for the Southern Sydney Regional Organisation of Councils, June 2025.

Disclaimer

Contents

Related Documents

- Stewardship Solutions: Product Stewardship Pathways for Large Household Appliances. (main report), June 2025
- Desktop Review of Product Stewardship and EPR Laws for Large Appliances. June 2025
- Improving Stewardship for Large Household Appliances – Economic Modelling. June 2025

Executive Summary

The Product Stewardship Centre of Excellence (the Centre), Southern Sydney Regional Organisation of Councils (SSROC) and the NSW Environment Protection Authority collaborated in 2024-2025 on a research project to investigate stewardship pathways for large household appliances. The purpose of the project was to commence a solution-oriented conversation by identifying barriers, opportunities, and potential pathways for increased action on product stewardship for large household appliances, with a focus on large household appliances such as refrigerators, freezers, washing machines, dryers, and dishwashers.

The project included three key stages:

1. A desktop review of international and national stewardship approaches for large appliances.
2. Stakeholder interviews and roundtable discussions to hear and understand diverse perspectives
3. High-level modelling of financial, environmental and social implications of different product stewardship scheme options.

Stewardship approaches are designed to improve the whole-of-life management of products by keeping valuable materials recirculating in the economy in their highest value uses and minimising the environmental impacts of products throughout production, consumption and end-of-life management. This is especially important given Australia's circular economy ambitions and the need to design out waste and pollution and keep products and materials circulating in the economy for much longer. Effective and enduring stewardship involves producers of the products taking ownership of funding and facilitating these outcomes.

This report is a summary of the key findings from the interviews and roundtable discussions.

Interviews and roundtables were conducted with stakeholders across the large appliances industry, including manufacturers, retailers, recyclers, and government representatives, to gain insights on existing product stewardship initiatives, barriers and opportunities related to the collection, repair, degassing, and recycling of appliances, and perspectives on potential future collective stewardship initiatives.

Key Findings

1. Existing product stewardship initiatives:

    - Repair: Brands are increasingly investing and expanding spare parts and repair networks but face challenges including service availability, increased integration of technology into appliances and growing labour shortages.
    - Reuse: Take-back programs and refurbishment initiatives exist but are constrained by several factors, including warranty restrictions and consumer preference for new products
    - Recycling & degassing: Australia has strong refrigerant management regulations, but a limited in-home collection of appliances creates challenges for effective and transparent degassing and material recovery.

2. Barriers to the expansion of product stewardship initiatives:

    - Regulatory uncertainty: Despite supporting the development of a mandatory stewardship scheme, stakeholders emphasised that uncertainty around future regulation and free-riders are key barriers to participation.
    - Financial constraints: Moreover, stakeholders noted that current financial models fail to incorporate recovery costs into pricing, making embedding stewardship costs in operations financially challenging, especially for budget brands.

- Logistics & infrastructure: Collecting and transporting large appliances requires investment in and expansion of dedicated infrastructure, particularly. Servicing regional areas also increases complexity and cost.
- Labour shortages: Alongside high labour costs, a shrinking skilled workforce risks limiting the growth of repair and reuse initiatives, particularly in regional areas.
- Consumer engagement: There is an opportunity to increase awareness and support for product stewardship initiatives (both at the level of individual business and a collective scheme) amongst the general public.

3. Enablers for effective product stewardship:

    - Policy support: Stakeholders were largely in favour of a mandatory stewardship approach. They also supported exploring product design standards for durability and repairability to keep products in use longer and reduce waste.
    - Industry-led collaboration: Existing industry collaboration (working groups and sharing of data/knowledge) can be leveraged to increase participation in stewardship initiatives.
    - Consumer awareness & incentives: Public education campaigns and financial incentives, such as buy-back programs, can promote responsible disposal and repair behaviour.

4. Governance considerations:

    - Strong stakeholder support was also found for a co-regulatory approach to product stewardship, ensuring that industry is actively engaged in scheme design and delivery while still advocating for a mandatory approach to address free-rider concerns.
    - Eco-modulated fees based on product recyclability could encourage responsible design (such as using recyclable parts and recycled materials), so product life can be extended and keep material out of the landfills. Plastic flock going to landfills were identified as a persistent and growing concern.
    - Transparent financial contribution guidelines are needed to determine cost-sharing responsibilities amongst stakeholders across the product lifecycle.

Next steps are discussed in more detail in the main project report – Circular Solutions for Whitegoods: Stewardship Pathways for Large Household Appliances.

Given the enthusiasm of appliance manufacturers and retailers to reduce waste and improve stewardship outcomes, it is recommended that manufacturer and retailer-led organisations such as the Coalition for Sustainable Solutions, Refrigerant Reclaim Australia, the Consumer Electronics Suppliers' Association, and other industry peak bodies, work with SSROC, recyclers and the repair industry to proactively participate and inform the above investigations and activities.

1. Introduction

The Product Stewardship Centre of Excellence (the Centre), Southern Sydney Regional Organisation of Councils (SSROC) and the NSW Environment Protection Authority collaborated in 2024-2025 on a research project to investigate stewardship pathways for large household appliances. The purpose of the project was to commence a solution-oriented conversation by identifying barriers, opportunities, and potential pathways for increased action on product stewardship for large household appliances, with a focus on large household appliances such as refrigerators, freezers, washing machines, dryers, and dishwashers.

The project included three key stages:

1. A desktop review of international and national stewardship approaches for large appliances.
2. Stakeholder interviews and roundtable discussions to hear and understand diverse perspectives
3. High-level modelling of financial, environmental and social implications of different product stewardship scheme options.

Stewardship approaches are designed to improve the whole-of-life management of products by keeping valuable materials recirculating in the economy in their highest value uses and minimising the environmental impacts of products throughout production, consumption and end-of-life management. This is especially important given Australia's circular economy ambitions and the need to design out waste and pollution and keep products and materials circulating in the economy for much longer. Effective and enduring stewardship also involves producers of the products taking ownership of funding and facilitating these outcomes.

Project objectives

The purpose of this project is to identify barriers, opportunities, and potential pathways for increased action on stewardship for large household appliances, including appliances such as refrigerators, freezers, washing machines, dryers, and dishwashers.

Specifically, the project's objectives were to understand the perspectives, pressures, and opportunities from manufacturers, brands, suppliers and retailers to participate in stewardship initiatives, and to completing complete high-level economic modelling of the potential stewardship pathways.

What is the problem

It is now widely accepted by business, government and the community that we need to significantly minimise waste and ensure it does not become an environmental problem either now or for future generations. This is especially important given Australia's transition to a circular economy and the need to design out waste and pollution and keep products and materials circulating in the economy for much longer. This was clearly identified by the Circular Economy Ministerial Advisory Group in its final report to the Commonwealth Environment Minister in December 2024. The report included specific recommendations to transform supply chains through targeted regulation and "a framework for product stewardship that provides an enhanced focus on mandatory participation, reporting, measurement and governance principles."[1]

[1] Circular Economy Ministerial Advisory Group: Final report, Department of Climate Change, Energy, the Environment and Water, December 2024, p35.

2. Methodology

The study took a mixed-methods approach, consisting of a desktop review of international policies, stakeholder engagement through interviews and roundtable discussions, and high-level modelling to assess the viability of different stewardship options. This summary highlights findings from stakeholder engagement.

First, semi-structured interviews were conducted to gather insights on current stewardship activities, barriers, and opportunities related to the collection, repair, degassing, and recycling of appliances. Interviews also explored stakeholder perspectives on potential future stewardship initiatives and how these can align with circular economy principles and broader environmental, social, and governance objectives.

Stakeholders across the appliance industry were consulted, including manufacturers spanning budget to high-end market segments to major retailers, distributors, industry organisations, and recyclers. Participants were selected based on their involvement across the product lifecycle, whether that be manufacturing, importing, retail, recycling, or end-of-life management. Priority was given to stakeholders with direct experience in product stewardship, repair, recycling, or disposal initiatives.

Before participating, interviewees received an information sheet outlining project details and a consent form. Verbal consent was also sought at the beginning of each interview. With permission, interviews were recorded via Zoom and transcribed. Handwritten notes were also taken to be used for verification and further discussion amongst the research team.

Alongside one-on-one interviews, roundtables enabled stakeholders to participate in facilitated collaborative discussions. These discussions allowed participants to review preliminary findings from the stakeholder engagement, international review and economic modelling, provide feedback to the research team on stewardship pathways, and discuss viable policy options, regulatory frameworks, and financial implications.

The objective of the roundtables was to capture diverse perspectives and, where possible, foster consensus on potential strategies to increase the uptake of product stewardship initiatives for appliances. Roundtable participants included manufacturers, retailers, recyclers, and local and state government representatives. All interviews and roundtable discussions were transcribed and analysed by theme, and a summary of these findings is below.

3. Existing product stewardship initiatives

This following section provides an overview of existing product stewardship initiatives underway in the sector, including repair, reuse, and recycling.

i. Repair

Product repair was one of the most common product stewardship initiatives identified during interviews. Some stakeholders highlighted the importance of extending product life through repair services as core to their stewardship approach. These stakeholders described extensive spare parts catalogues and maintaining authorised repair networks to undertake repair service requests.

Some stakeholders described stocking spare parts for years after a product is discontinued to maintain repairability as an option. There were also discussions of the role of warranties in enabling repair (and reuse) as viable options for consumers besides simply replacing an appliance.

There was an ongoing tension between affordability, durability, and repairability, with stakeholders highlighting the challenge of balancing cost-effectiveness with sustainability objectives. Several challenges with offering repair services were also noted, including:

- Difficulty in sourcing parts, particularly for older models.
- In addition to the cost of spare parts, the high labour costs to undertake a repair leads some consumers to consider purchasing a new appliance rather than a repair.
- Lower cost appliances may not be designed with repair in mind, making replacement the only option.
- Repair networks remain fragmented, and the sector is facing growing labour shortages. There was a related concern that without industry-wide coordination and advocacy for growing apprentice programs to build service networks, accessibility to affordable repair options remains inconsistent.

It should be noted that stakeholders had a range of perspectives on the growing use of technology in smart appliances. It was noted that the growing integration of technology into appliances (such as smart fridges) making repairs more complex and expensive. While this is a challenge, diagnostics, apps, and AI are also used in appliances, allowing consumers to detect and resolve minor faults independently. These tools can reduce service needs and support more sustainable product lifecycles when paired with user-friendly product design.

ii. Reuse

Some stakeholders noted introducing take-back programs that facilitate reuse and refurbishment of appliances. These initiatives can enable the resale or donation of second-hand appliances, extending their lifespan.

Yet, although product reuse is an area of growing interest, it remains limited due to several key challenges:

- Warranties often stipulate that only new parts may be used in repairs to maintain the warranty coverage, limiting the use of reused parts as part of repairs.
- Reuse requires brands to have access to parts and skilled technicians to ‘harvest’ parts for reuse. (Collection is a related challenge, as only items collected in-home can be used for these purposes, with curbside collection focused on recycling.)
- Stakeholders noted limited consumer awareness of second-hand and/or refurbished white goods, with many still preferring firsthand consumption. Firsthand purchases, including budget items, were also often seen by consumers as the most economical option, particularly in the current cost-

of-living crisis, where purchasing a higher-quality, more expensive (even second-hand) option is increasingly out of reach for consumers.

Scaling these programs was noted to be a challenge without clear industry guidelines on testing, certification, and resale of appliances. Policy interventions to support warranties for products with second-hand parts or sold on second-hand markets were also seen as necessary to increase uptake. Some stakeholders highlighted the need for a national framework that defines best practices for appliance refurbishment and resale.

iii. Degassing and recycling

Large household appliances, including fridges and air conditioners, pose several important issues related to degassing. It should be noted that Australia is recognised as a global leader in refrigerant management, with existing regulatory frameworks that require harmful substances are properly handled and disposed of. To ensure degassing takes place, stakeholders consistently emphasised the benefits of in-home collection, which provides the necessary quality control and transparency of appliances during transport, recycling and degassing.

However, several challenges were identified, including:

- In-home collection services are limited, typically found in premium industry segments, and are often only initiated when a customer makes a new purchase product.
- Most large appliances are collected for recycling during curbside pick-up. Once on the street, however, they are vulnerable to metal scavenging and weather exposure, both of which contribute to declining material recovery. Interviews consistently noted that one of the most valuable scrap components is the compressor, which is often removed by metal scavengers. The removal of the compressor releases harmful gases and decreases the value of a refrigerator or freezer for recyclers.
- Appliances received by recyclers without compressors reduce the need for degassing infrastructure. This negatively impacts recyclers who have invested in degassing systems and related training and are then underutilised.
- Stakeholders also expressed significant concern about plastic flock and plastic recovery. Sorting and separating plastics in appliances at end-of-life is labour-intensive, with the resulting material having low recovery value. There are also limited recycling pathways for plastic flock, most of which end up in landfills. This led many stakeholders to call for better product design to reduce the amount of plastic utilised and prioritise recyclable materials.
- Packaging was also identified as a priority area for future stewardship action. Packaging waste, notably expanded polystyrene, remains a notable issue. Some stakeholders described engagement with other industry stakeholders to improve data collection on use and to explore more sustainable alternatives.

Stakeholders also had varying views regarding the size of the degassing problem. Some suggested that the amount of hazardous chemicals used in appliances is decreasing it is therefore less of an issue. (This was a common argument for deprioritising white goods degassing, particularly as other priority products, such as lithium-ion batteries, are a growing issue). Others maintained that even small amounts of degassing chemicals can have a large environmental impact and, as such, should be high on the agenda. There were also discussions of how to increase education and awareness on the importance of degassing and increasing enforcement to ensure compliance with degassing regulations.

4. Barriers to the uptake of product stewardship

Stakeholders identified regulatory uncertainty as a key barrier to product stewardship, with several stakeholders noting that the current environment is discouraging longer-term investment in stewardship initiatives.

Looking to the future, stakeholders emphasised the importance of aligning any new stewardship regulation in Australia with international standards—particularly from the EU. Leveraging and learning from existing frameworks, such as those around durability and repairability, which are also more advanced, could reduce duplication and ease compliance for businesses operating across multiple jurisdictions.

However, when introducing new legislation, stakeholders also noted that the sudden introduction of stewardship regulation could create unplanned costs and challenges with implementation. Instead, taking a longer-term view with extensive industry consultation was seen as necessary to give the industry the time to prepare for changing regulations.

This was seen as important to give the industry time to address potential issues related to conflicting regulations. For instance, stakeholders highlighted how right-to-repair regulation might contradict consumer law provisions that could unintentionally favour product replacement over repair. These regulatory dynamics risk hindering the uptake of product stewardship initiatives.

4.1 Financial barriers

When advocating for a mandatory approach to product stewardship, stakeholders consistently raised concerns about the cost of free-riders. Issues of fairness and brands avoiding operational and financial contributions at the expense of others were consistent concerns voiced by stakeholders. In the current inflationary and cost-of-living crisis, anything that creates an uneven playing field was noted as a key concern. These concerns were also typically directed at budget importers and distributors who were more likely to lack the infrastructure required to participate meaningfully (and financially) in a stewardship scheme.

Building on concerns regarding free-riders, financial costs were identified as barriers to participation in a product stewardship scheme. If manufacturers do not build recovery costs into product pricing, it is incredibly difficult to sustain long-term engagement. Budget and mid-range brands, in particular, may struggle to absorb these costs and ultimately undermine stewardship initiatives.

4.2 Logistical and infrastructure barriers

Expanding product stewardship for large household appliances requires addressing several logistical and infrastructure challenges related to collection, transportation, and servicing networks. For example, the reverse logistics required to offer in-home fridge takeback requires dedicated infrastructure to transport large, heavy objects, which are expensive to develop and maintain. These challenges are exacerbated in remote and regional areas.

4.3 Growing workforce challenges

The high labour cost of repairs was a significant barrier to expanding these services. In many cases, repairing an appliance is more expensive than replacing it, leading consumers and manufacturers to prioritise replacement over repair. Combined with an aging labour force and limited government support for apprenticeship to attract new workers into the industry, these challenges are likely to persist. Without a new generation of skilled technicians, the ability to scale repair-based product stewardship initiatives will remain constrained.

4.4 Consumer awareness and financial incentives

Stakeholders noted low consumer awareness of existing industry product initiatives, such as repair or take-back programs, as a barrier to increased uptake. This suggests a significant opportunity to increase engagement by introducing new education and awareness campaigns. This is particularly important in an industry where the low cost of new appliances can discourage repair.

Education was also connected to financial incentives which may alter consumer behvavuour. Currently, the relatively low costs of new appliances can be a barrier to existing product stewardship initiatives such as product repair. Without education and financial incentives to choose repair over replacement, there was a concern that consumers are unlikely to shift their purchasing and disposal habits.

4.5 Other implementation considerations

With respect to other implementation considerations that emerged during stakeholder engagement, conflicting views existed about whether stewardship for appliances should be integrated into an existing scheme. While some stakeholders emphasised the potential benefits of building on existing infrastructure, others expressed disappointment over past initiatives like Wired for Change, which generated industry interest but were seen as failing to deliver tangible outcomes.

Others questioned whether existing schemes, and particularly the NTCRS, could be expanded to include appliances. One potential pathway forward was to use product size to determine whether a product fits into an existing scheme or requires a new one. For example, large appliances such as fridges benefit from requiring in-home collection and may require a separate dedicated scheme. At the same time, smaller household appliances, such as a B-cycle, may be integrated into an existing scheme.

Some stakeholders also suggested that starting with smaller household items can help normalise participation with product stewardship, which can be leveraged in other product classes. Lessons learned from piloting stewardship initiatives by focusing on a single product category or particular region could inform a broader industry rollout. It was also suggested that the unique characteristics of white goods—such as size, material recovery value, and issues around degassing, require a dedicated scheme.

5. Enablers to the uptake of product stewardship

Despite existing challenges, several enablers were identified during interviews that can support the uptake of product stewardship.

5.1 Policy support

Most stakeholders advocated for mandatory stewardship to increase industry participation and reduce the presence of free-riders. Ensuring that all businesses adhere to stewardship obligations would create a level playing field, encouraging greater accountability across the sector. At the individual business level, policy support could include new durability, repairability, and/or recyclability standards. These standards could help manufacturers design longer-lasting, repairable products and enable consumers to make more informed purchasing decisions.

5.2 Leveraging existing industry-led stewardship initiatives

Through initiatives such as COFOSS, the appliances sector has a proven track record of collaboration, including through working groups and sharing data and information across the industry. This foundation can serve as the foundation for future stewardship initiatives, as well as supporting the benchmarking of waste streams and improve the evaluation of initiatives.

Moreover, many in the industry are already implementing circular economy initiatives, such as repair, take-back, and, to a lesser extent, second-hand markets, which can be scaled to strengthen stewardship efforts. Expanding collaboration across the supply chain will be key to building a more effective model.

5.3 Circular design

Stakeholders noted that increasing the uptake of circular design principles can help to address several key sustainability challenges facing the sector, including designing for durability and repairability to extend product life and reduce waste and using modular components to enable part reuse. There was also an emphasis on designing products that prioritise the use of recyclable and biodegradable materials to improve end-of-life recovery and reduce the amount of plastic flock sent to landfill.

5.4 Increasing consumer awareness

Consumer participation emerged as a crucial enabler of product stewardship uptake. Public awareness campaigns can play a key role in educating consumers about repair and reuse options, encouraging them to extend the life of products rather than replace them. Stakeholders emphasised the importance of equipping consumers with tools to understand different options' long-term costs and environmental benefits. As one example, it was suggested that better data, such as LCA comparisons of the environmental benefits of repair versus replacement, could be utilised when communicating with consumers.

As a first step, increasing public awareness about existing stewardship initiatives could help raise consumer awareness and change consumer mindsets. For example, many stakeholders are already engaging with product stewardship, such as designing products with recyclability or repair in mind, yet these initiatives often go under the radar. Sharing these stories can boost consumer awareness, make participation easier, and drive uptake.

5. Looking ahead

Stakeholders expressed strong support for a mandatory, co-regulatory approach to product stewardship. Engaging the industry in scheme design was key to ensuring that any scheme is financially viable and practically feasible while addressing concerns about free-ride riders.

Noting the challenges of the current economic climate, stakeholders also reiterated the importance of any stewardship (or sustainability initiative more broadly) having a strong business case to be adopted. Here, some stakeholders expressed concern that the commercial incentive for voluntary product stewardship may be insufficient, again making the case for a mandatory approach to ensure fair participation across the industry.

There was broad consensus amongst stakeholders that effective stewardship requires mandatory participation and a shared yet differentiated responsibility model. For example, while there was a strong view that stakeholders should contribute financially, it was also noted that operational roles may differ based on capacity or scale. (For example, smaller importers may be unable to manage logistics but could still contribute financially). Stakeholders noted that voluntary schemes attract responsible businesses, whereas budget brands typically engage only when required. This further reinforced support for regulatory mechanisms to ensure sector-wide participation.

In summary, stakeholders acknowledged that product stewardship is a growing priority for the sector. However, achieving an equitable and cost-effective approach will require continued industry coordination, collaboration, and regulatory backing.

COFOSS was identified as a key platform to facilitate industry engagement around the future of product stewardship for appliances. Consultation is ongoing to refine COFOSS priorities, with current focus areas including packaging, repair legislation, consumer incentives, and improved data collection. Noting that COFOSS operates without dedicated staff, partnerships and strategic collaborations are being explored to support future activities.

Organisations that contributed to the project

We would like to acknowledge and thank the following organisations for participating in interviews, roundtables and providing data to assist with the economic modelling. Their constructive and solution-oriented approach provided an important first phase of engagement towards improving the state of product stewardship for large household appliances.

- BSH Home Appliances
- City of Sydney
- City of Canterbury Bankstown Council
- Coalition for Sustainable Solutions
- Consumer Electronics Suppliers Association
- Ecocycle / EcoBatt
- Electrolux ANZ
- Fisher & Paykel
- Inner West Council
- JB Hi-Fi Group (including The Good Guys)
- KKTS
- Local Government NSW
- Miele
- NARTA
- Next Energy Lighting
- Northern Beaches Council
- NSW EPA
- Panasonic
- Refrigerant Reclaim Australia
- Retravision
- Samsung
- Sell and Parker
- Sircel
- Southern Sydney Regional Organisation of Councils
- Whirl Recycling (formerly Arnies Recon)
- Winning Group