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Foxes Guarding the Hen House?

Industry-led design of product stewardship schemes

Abstract

For the first time since the enactment of the Waste Minimisation Act 2008, New Zealand is applying regulated (or mandatory) product stewardship to several priority products. By making those who manufacture, sell and use products responsible for minimising the waste those products cause, well-designed product stewardship schemes can act as a critical tool in the transition to a circular economy. However, the New Zealand government has put its faith in industry to lead scheme design. Such an approach threatens to vitiate robust, ambitious schemes and foreground industry interests over those of wider society and the natural environment. This article juxtaposes the radical potential of product stewardship against the probable outcome of industry-led schemes, and recommends reforms that the minister for the environment should pursue in order to shift the dial towards more inclusive design of product stewardship schemes.

Keywords product stewardship, zero waste, circular economy, industry capture

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In 2020 New Zealand began developing its first regulated product stewardship schemes in a drive to reverse our status as one of the world's most wasteful countries. Schemes will cover tyres, electronics, agrichemicals, farm plastics, refrigerants and plastic packaging. Whether this foray into regulated product stewardship triggers meaningful waste prevention or simply results in the proliferation of end-of-pipe recycling programmes will depend on robust, ambitious schemes reinforced by regulations. Success hinges on scheme design, especially who gets to set the product stewardship agenda, and government's role in the process. Unfortunately, New Zealand lacks a precedent for effective scheme design. The minimalism of the Waste Minimisation Act 2008 – home to New Zealand's product stewardship provisions – permits an outdated reliance on industry self-regulation, with only light-touch government intervention, and no guarantee of oversight in the public interest. The minister for the environment must ensure that the upcoming review of

the Waste Minimisation Act addresses these issues. Otherwise, New Zealand risks leaving the fox in charge of the hen house, and validating weak schemes that hinder true circularisation of our economy.

What is product stewardship and what is its purpose?

Product stewardship is about making those who manufacture, sell and use a product responsible for reducing that product's environmental impact across its life cycle. Traditionally, product stewardship includes:

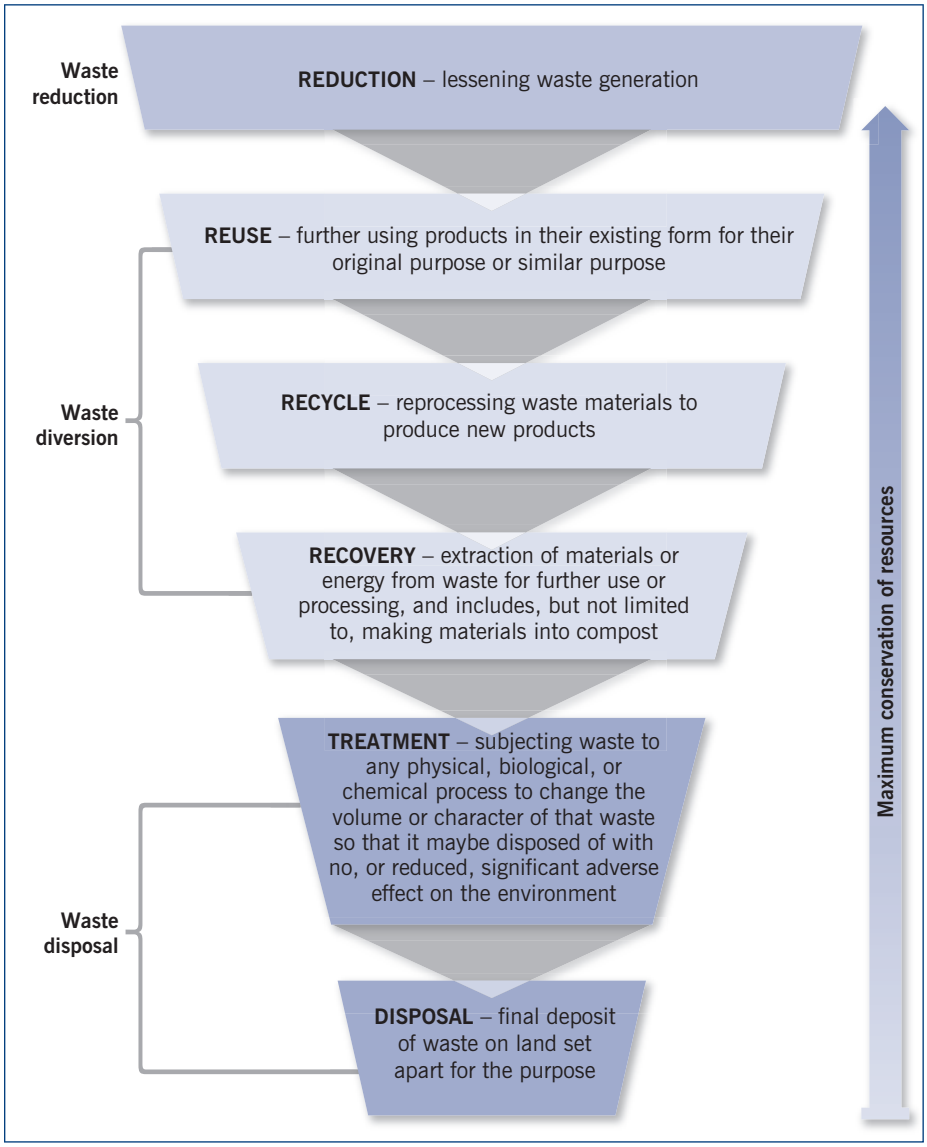
- product take-back services for reuse or recycling;
- market-based measures to lift recovery rates (e.g. advanced disposal fees or deposit/return systems); and
- modulating fees to cover costs of processing hard-to-recycle products.

Product stewardship aims to internalise a product's social and environmental costs, which is assumed to incentivise producers to redesign products to be more environmentally friendly (Michaelis, 1995; Andrews, 1998, p.188). This assumption has solidified product stewardship as integral to the circular economy aspiration to 'design out waste' (Jensen and Remmen, 2017; Crawford, 2021).

However, to date, excessive focus on managing 'end-of-life' products has shoehorned product stewardship schemes towards recycling, rather than upstream activities. Zero waste and circular economy experts continually remind policymakers that product stewardship should consider products' full life cycles, and adopt interventions that disincentivise over-production and over-consumption and incentivise product redesign, reuse, maintenance and sharing, not only recycling (Hannon, 2020, p.4; Sanz et al., 2015; Lane and Watson, 2012, pp.1256, 1260; National Recycling Coalition, 2020). Examples include:

- landfill bans;
- binding reduction targets and import levies for certain products, materials and chemical additives;
- reuse quotas; and
- design specifications and/or eco-modulating fees to increase product durability, reusability and repairability and decrease product toxicity.

Figure 1: The waste hierarchy, based on the approach in the Waste Minimisation Act



Source: Ministry for the Environment (2009), p.19

These types of interventions focus on changing how we design and use products to decelerate global demand for raw materials and the pace of manufacture, a concept described as dematerialising consumption (Cogoy, 2004; Petrides et al., 2018). Success in this endeavour will mean society generates less waste, but this is not necessarily the end goal. Rather, waste reduction signifies our progress towards mitigating climate change, respecting planetary boundaries, and replacing the current 'take–make–throw' linear economy with a regenerative circular economy.

In the current era of ecological breakdown, environmental policies like product stewardship must serve these critical bigger-picture goals. Fortunately, product stewardship is capable of doing so because it takes an expansive view, identifying roles and responsibilities for actors across the product life cycle (as opposed to 'extended producer responsibility', which places responsibility on producers solely).[1] Accordingly, product stewardship carries the 'radical potential' to highlight the multiple opportunities for waste prevention across supply chains and a product's life. This vista considers post-consumption/end-of-life products, but also how stuff circulates at the household or community meso-scale, and the macro-scale processes that drive raw material extraction and manufacturing decisions (Lane and Watson, 2012; Hannon, 2020, p.4). Some commentators argue that this diffused outlook creates confusion, allowing producers to deflect regulatory accountability, continue externalising scheme costs, and implement ineffectual recycling initiatives (Nichol and Thompson, 2007; Lewis, 2009, p.21; Lane and Watson,

2012, p.1258). However, good scheme design can mitigate these problems, and ensure that product stewardship schemes are ambitious and incorporate robust regulatory measures that help to reduce emissions, material consumption, pollution and waste.

Product stewardship in New Zealand: lofty vision, shaky foundations

Product stewardship is enshrined in the Waste Minimisation Act 2008. Section 8 defines product stewardship as a system to:

> encourage (and, in certain circumstances, require) the people and organisations involved in the life of a product to share responsibility for – (a) ensuring there is effective reduction, reuse, recycling, or recovery of the product; and (b) managing any environmental harm arising from the product when it becomes waste.

Subsection 8(a) guides product stewardship schemes to follow the waste hierarchy, which prioritises preventing and reducing waste, and fostering systems of reuse, before recycling, composting, energy recovery or disposal.[2] The provision's wording encompasses a product's end-of-life, but also upstream, activity, including product redesign geared towards achieving reduction outcomes (e.g. selling liquid products as solid concentrates to eliminate plastic packaging) or improving a product's reusability (e.g. designing durable, repairable electronics). Accordingly, subsection 8(a) envisages ambitious forms of product stewardship that engage interventions across product life cycles.

Section 8 also foreshadows both voluntary and mandatory product stewardship. Under the voluntary approach, anyone (usually an industry group) can design a scheme, then apply for its accreditation, provided certain basic criteria in section 14 of the Act are met. Until recently, successive New Zealand governments preferred the voluntary approach to product stewardship, despite mounting evidence that it was not delivering comprehensive waste reduction, nor cost redistribution outcomes (Blumhardt, 2018).

The pathway for mandatory schemes involves the relevant minister declaring a product a 'priority product', which triggers the requirement that a product stewardship scheme be developed and accredited. Under section 12 the minister can also issue guidelines regarding the expected 'contents and effects' of priority product schemes, with which schemes should be 'consistent' to receive accreditation. Following accreditation, the minister can make scheme participation compulsory under section 22(1)(a), a discretionary power only available for priority product schemes. Any additional regulatory measures to trigger activities up the waste hierarchy, such as fees, deposit/return systems, binding targets or design specifications, are not guaranteed, and likely depend on whether scheme designers recommend them. This makes the scheme design process critical. However, the Act is silent regarding who should design schemes and how.

In July 2020 the then associate minister for the environment, Eugenie Sage, triggered the mandatory product stewardship process for the first time, declaring the following 'priority products':

- tyres;
- electrical and electronic products;
- agrichemicals and their containers;
- refrigerants and other synthetic greenhouse gases;
- farm plastics; and
- plastic packaging.

The minister also exercised her discretion to issue section 12 guidelines.[3] Schemes are now in development for all listed products, with applications for accreditation due over the coming years.

The move towards mandatory product stewardship represents a turning point in New Zealand waste policy, prompting optimistic assessments about its potential to transform the economy and address various environmental ills (Crawford, 2021). For example, the Climate Change Commission has recommended that the government expand product stewardship to more products to help reduce greenhouse gas emissions (Climate Change Commission, 2021, p.125). This optimism reflects the growing influence of zero waste, circular economy strategies, which perceive product stewardship's potential to tackle climate change and resource depletion through upstream reductions in waste, toxicity and material consumption (Haigh et al., 2021; National Recycling Coalition, 2020). However, while the Waste Minimisation Act's expansive definition of product stewardship is fit for purpose, its silence regarding the scheme design process is not. As will be discussed, this silence risks undermining truly ambitious schemes by surrendering product stewardship to vested interest capture.

> Industry-led co-design allocates power to those with a vested interest in the status quo linear economy, while effectively marginalising other interest groups and experts.

Scheme design: who's in charge and why does it matter?

Realising the radical potential of product stewardship to stimulate circular business models hinges on the presence and influence of bold, disruptive ideas during scheme design. Under the Waste Minimisation Act, scheme design loosely follows a 'framework' approach whereby government sets general expectations for scheme outcomes and leaves industry to design schemes within these parameters (Hickle, 2014; Lane and Watson, 2012, p.1257). The minister's section 12

guidelines set the overarching 'contents and expected effects' of schemes. However, when it comes to scheme design, the passive voice in key provisions – 'a product stewardship scheme for the product must be developed' (s10(a)) and 'accreditation of the scheme must be obtained' (s10(b)) – elucidates neither a process nor who should take charge.

New Zealand policymakers have long assumed that industry would fill this gap. Soon after the Waste Minimisation Act's enactment, the Ministry for the Environment released *A Guide to Product Stewardship*, stating that 'it is expected that any business involved in the product life cycle will take the lead in designing and implementing schemes' (Ministry for the Environment, 2009, p.2). The document explained that industry 'know the most about the product' and 'are best placed to efficiently incorporate initiatives to manage end-of-life impacts into the design, production and distribution of the product' (p.2). A decade later the ministry called this approach 'co-design', adopting it for New Zealand's first regulated product stewardship schemes with similar justifications: 'government intervention can be slow', whereas business is 'far more agile in leading innovation in areas of expertise' (Ministry for the Environment, 2019, p.17). Furthermore, '[u]nlike the Government, business can bring to the design process a deep understanding of supply chains, cost-effective logistics, product design, and stakeholder and customer expectations' (ibid.).

Industry-led co-design allocates power to those with a vested interest in the status quo linear economy, while effectively marginalising other interest groups and experts. The ministry does state that co-design would 'benefit from including wider stakeholders', including collectors, recyclers, territorial authorities, and advocates for consumers and environmental and community health, and that Māori must be part of co-design as partners with the Crown (ibid., p.18). However, the Waste Minimisation Act creates no framework to ensure wider stakeholder participation (Mia, 2011, p.103). Although the ministry commits to 'promote and monitor' scheme design processes (Ministry for the Environment, 2019, p.18), an active facilitation and oversight role is warranted, given that 'groups have unequal access to government policy-making processes' (Lewis, 2009, p.82) and 'the environment cannot sign a contract and has no way to represent its interests' (Rashbrooke, 2018, p.130). Furthermore, inclusive processes are needed to ensure fairness and scheme durability:

> If everyone is in the room when regulations are being drawn up – including the firms affected, but also their sharpest civil-society critics – and the issues are fully canvassed, the openness of the process raises the chance of producing rules that are well-informed, necessary and likely to be obeyed. (ibid., p.77)

Undoubtedly, industry stakeholders are essential. However, product stewardship accords responsibility to many actors who share a stake in scheme outcomes and a right to influence them. Sometimes these interests will conflict with industry, given that many social and environmental costs of production are currently externalised. A neutral arbiter with policymaking competency is needed to oversee inclusive scheme design, balance competing interests and power discrepancies between stakeholders, and act decisively for the public good. In a democracy, these are roles government can fulfil that 'no other body can' (ibid., p.3).

The government's decision to derogate these roles likely stems from resourcing constraints that prohibit the ministry from leading scheme design when the Waste Minimisation Act does not require this. This predicament reveals the legacy of neo-liberalism, which views government as clunky, bureaucratic, or even oppressive when upholding social and environmental goals vis-à-vis the efficiency of industry self-regulation (ibid.) – views that have led New Zealand to excel at 'privatizing its environmental regulatory system' (Haufler, 2001, p.41). However, industry self-regulation 'is not … a viable substitute for effective governance regimes for environmental protection' (Andrews, 1998, p.193). One example of the consequences of this approach are the industry projects that have lumped the New Zealand government with tracts of contaminated land and toxic waste to manage at public expense: for example, the hazardous waste stockpiled at the Tīwai Point aluminium smelter, and in Northland by Sustainable Solvents Group (Pennington, 2021; Hancock, 2021).

> Research indicates that 'companies tend to apply strategies that do not challenge the concept of business as usual, which in the long run does not change companies' relationship with nature' …

Producers may indeed know best how to redesign their products to reduce waste most efficiently. However, this does not mean they can be relied upon to propose necessary solutions that go against their vested interests. Ultimately, product stewardship exists to redress problems industry has been unable (or unwilling) to solve independently. While producers may wish to control the rules that bind them, government should not aspire to deliver this. And yet, those selected to lead New Zealand's first priority product schemes are largely industry-led groupings and/or non-profit membership organisations comprised of industry representatives. Warning signs are already emerging that this approach could vitiate robust, ambitious product stewardship schemes.

Warning signs: the pitfalls of industry-led scheme design

Small horizons – 'If recycling is the answer, we're asking the wrong question'

Allowing the regulated community to design the rules facilitates neutralisation of robust, ambitious regulatory proposals. Research indicates that 'companies tend to apply strategies that do not challenge the concept of business as usual, which in the long run does not change companies' relationship with nature' (Jensen and Remmen, 2017, pp.377–8). Industry-led product stewardship schemes rarely rise above recycling, as recycling fits more comfortably within current linear business models than activities up the waste hierarchy (Lane and Watson, 2012, p.1256). Can we really expect the plastic packaging industry to impose binding reduction targets on their own product? Or the electronics industry, which profits from product upgrades and obsolescence, to recommend regulations that require longer-lasting, repairable products or increased sharing or service-based business models?

A pro-recycling approach permeates New Zealand's proposed product stewardship schemes. For example, AgRecovery – the existing voluntary product stewardship scheme for agrichemicals – has been selected to lead co-design of the agrichemical and farm plastics mandatory schemes. AgRecovery has pioneered efforts to reduce on-farm burying and burning of waste plastics, which is laudable. However, the scheme has relied on open-loop recycling of collected plastics.[4] When the priority products were declared, AgRecovery's early communications called product stewardship a 'recycling scheme', only occasionally referenced reuse and redesign, and made no mention of reduction (AgRecovery, 2020). A more inclusive scheme redesign process to introduce fresh, external perspectives might help broaden horizons.

Similarly, in designing the proposed product stewardship scheme for tyres, the industry-led Tyrewise group comprehensively weighed various options for managing rubber from end-of-life tyres (ELTs) against the waste hierarchy, yet excluded 'reduce' outcomes:

> Whilst reducing the waste generated has the highest weighting within the Waste Hierarchy it is unable to be applied … This report identifies the alternative uses for ELTs and to do that it must be assumed that the waste has already been created. (3R Group Ltd, 2012, p.25)

While pragmatic, framing analysis around 'alternative uses for ELTs' does not uphold the spirit of section 8(a) of the Waste Minimisation Act. Of course, end-of-life tyres will always exist. Nevertheless, product stewardship presents an opportunity to reduce their total numbers, an opportunity that is missed when removed from the equation.

Tyrewise also gives reuse pathways like retreading short shrift, and averts any ability to influence tyre design to address durability, toxicity or microplastic pollution (3R Group Ltd, 2020, p.22). The scheme proposes that end-of-life tyre processors receive modulated payments to encourage preferred uses according to the waste hierarchy (ibid., p.132). However, the end-of-life focus restricts scheme incentives to energy recovery (tyre-derived fuel and pyrolysis) and various open-loop recycling options. Some of the proposed uses have potential ecological and human health hazards that Tyrewise underexplores, reinforcing the need for independent, suitably qualified oversight of industry-led scheme proposals to assess environmental and social outcomes (Llompart et al., 2013).

> … as regulators consider product stewardship, industries begin 'co-opting public regulation' to lock in 'comfortable rather than demanding standards'

Regulatory capture

At times, the legitimacy the product stewardship process grants to industry-designed schemes can be exploited to decelerate advances towards effective and ambitious regulation. Overseas commentators have noted that as regulators consider product stewardship, industries begin 'co-opting public regulation' to lock in 'comfortable rather than demanding standards' (Andrews, 1998, p.186). This can include 'getting out in front of state legislatures' by designing industry schemes for adoption, or mandatory EPR (extended producer responsibility) laws being 'absorbed by a pre-existing, voluntary industry consortium' (Sarno and Hopkins, 2015, pp.13, 12). Industries may create or platform such consortia – typically non-profit associations with a veneer of separation and beneficence – that then act as blocking coalitions either within or outside the product stewardship system. Sometimes, the very agencies established to manage product stewardship schemes (producer responsibility organisations or PROs) become lobbyists against progressive legislation (Tangpuori et al., 2020, p.150).

The global packaging industry has repeatedly demonstrated this behaviour, creating multifarious industry-led non-profit groupings and consistently pre-empting legislation by promoting voluntary pacts that create the semblance of activity while delaying real progress (ibid., pp.13–17). In Europe, established packaging PROs have opposed regulatory efforts to lift packaging recovery rates and introduce design specifications and binding plastic reduction targets (ibid., p.150; Wermter and Vanhoutte, 2021). New Zealand's Glass Packaging Forum, an accredited voluntary product stewardship scheme, actively opposes a beverage

deposit/return scheme applying to glass, much like the glass industry overseas (Tangpuori et al., 2020, p.109).

In New Zealand, industry groupings are moving (or have already moved) to absorb or pre-empt mandatory product stewardship. For example, since plastic packaging's 'priority product' declaration, several packaging organisations have begun positioning to influence scheme design, including the Australian Packaging Covenant Organisation (APCO), currently promulgating its ANZPAC initiative across Oceania. APCO already leads the industry component of Australia's co-regulatory packaging product stewardship scheme. Despite this scheme's failure to meet its targets, APCO continues to push for voluntary industry–government collaboration, claiming that further regulatory intervention would be 'heavy-handed' (Readfearn, 2021). Allowing APCO to lead co-design of New Zealand's scheme would likely produce similar outcomes.

Meanwhile, the Australia and New Zealand Recycling Platform (ANZRP) has been selected to lead co-design of the scheme for electrical and electronic products through its flagship programme, TechCollect. ANZRP is a self-proclaimed 'industry-for-industry' organisation whose membership includes over 50 global electronics brands. It is transparent that its members are 'our focus and our motivation' and that members' 'needs are second to none' (ANZRP, 2019, p.18). In 2019, before the priority product declaration, ANZRP described 'actively lobbying the New Zealand Government for a regulated product stewardship scheme' at its members' request, and funding a pilot e-waste collection programme. The organisation noted that '[o]ur efforts have not gone unnoticed as we now find ourselves in the ideal position to deliver such a scheme when the Government launches its program' (ibid., p. 9).

ANZRP/TechCollect already run Australia's largest co-regulatory scheme for e-waste, which faces allegations of excessive competitiveness and ineffectual cost redistribution. When managing product stewardship schemes, industry groups are motivated to reduce the scheme fees producers pay. This can drive improved scheme efficiency, but also continued cost externalisation. For example, within Australia's e-waste scheme, producer fees have dropped so far that some local governments say they are 'financially underpinning the logistics of the Scheme' (Western Australia Local Government Association, 2018, p.14). Furthermore, the cost-driven approach has so depressed the price for e-waste recycling that some recyclers struggle to meet social and environmental standards while maintaining contracts. These recyclers have urged the Australian government to provide more oversight and 'to stop considering that the producer organisations are the best ones to run these schemes' (Stephens, 2020).

Industry dominance in product stewardship scheme design casts a shadow over the allocation of public funds to these processes. The Ministry for the Environment administers the Waste Minimisation Fund, through which it has allocated grants for industry-led co-design, but also to industry-led associations *before* the priority product declarations (presumably to ensure existing capacity to design and run schemes). Since 2018, over $1 million has been allocated to these ends (Ministry for the Environment, n.d.b). Additionally, in 2019, Plastics NZ was awarded $1 million to investigate the circular economy for plastics (Plastics NZ, 2020). One can reasonably assume that this study will inform the future plastic packaging scheme, for which co-design is still pending. This funding was awarded despite Plastics NZ existing to advocate for 'plastics growth and the development of the plastics industry', including working 'to encourage and at times prevent change that we think will adversely affect our member companies' (Plastics NZ, n.d.). The Waste Minimisation Fund is public money and should uphold inclusive design processes, and transparent feasibility investigations that lay the groundwork for robust schemes. Current use of funds risks industry groups being paid to control product stewardship policymaking and bolster future lobbying.

Going forward

As interest in product stewardship grows, New Zealand's approach needs updating to ensure that schemes achieve meaningful waste reduction rather than simply rubber-stamping a plethora of glorified recycling schemes. The minister must prioritise this in the government's waste work programme. The review of the Waste Minimisation Act (occurring throughout 2021) is a good opportunity; several reforms should be considered.

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Establish an independent product stewardship agency and comprehensive compliance regime

The updated Waste Minimisation Act should establish an independent central government agency to oversee product stewardship, with a legislated compliance regime to ensure that scheme outcomes and targets are set, delivered and consistently improved upon. Given growing interest in product stewardship and the circular economy, this agency must be properly resourced to work proactively across ministries and manage a growing work programme. The Act should establish the agency's mandate and key responsibilities, including:

- advancing products for priority product status;
- leading and overseeing inclusive scheme design processes;
- setting ambitious, measurable reduction targets with regular, transparent reporting requirements, and monitoring and reviewing accredited schemes for compliance;
- advocating for the waste hierarchy and public interest in all schemes; and
- recommending new regulatory powers to achieve more ambitious waste reduction outcomes.

Tighten requirements for expected contents, effects, scheme design and accreditation

The status of the minister's section 12 guidelines regarding the expected content and effects of priority product schemes is too precarious. The guidelines are issued in the *New Zealand Gazette* and could be revoked as ministers change. They are not binding; they do not consider scheme design; and issuing them at all is discretionary. The new Waste Minimisation Act should build scheme expectations into its provisions, including adherence to the waste hierarchy and a focus on full product life cycles rather than 'end-of-life' products and 'end-of-life' costs.

The Act must also establish the basic elements of a robust priority product scheme design process, including articulating a leadership role for government. The design process for the proposed beverage container return scheme in 2020 provides a useful blueprint regarding government oversight (Ministry for the Environment, n.d.a). The Act should also adopt a more stringent accreditation process for priority products that better enables the government to evaluate proposed schemes, rather than being obliged to accredit the first proposed scheme that meets the guidelines.

Extend and utilise section 23 of the Waste Minimisation Act

Discussion about regulated product stewardship has focused on the priority product process. However, all of part 2 of the Waste Minimisation Act relates to product stewardship , including the oft-overlooked section 23. This section enables various regulations for both non-priority and priority products, including:

- landfill bans;
- bans of products containing specified materials;
- mandatory product take-back services for reuse, recycling, recovery, treatment or safe disposal;
- fees to cover product management costs (e.g. advanced recycling fees or clean-up costs);
- deposit/return systems; and
- compulsory labelling requirements.

Arguably, section 23 is the Act's most promising product stewardship provision because it enables regulation without the entire priority product process. Furthermore, its use is initiated by central government and must be preceded by public consultation, which equalises stakeholder input, with government stewarding the process and final decision. However, successive governments have underutilised this provision. Only subsection 23(1)(b) – the provision permitting product bans – has been used (twice), to ban single-use plastic bags and plastic microbeads in janitorial products.

Governments should use section 23 more. Furthermore, the Waste Minimisation Act review should expand the regulatory powers in this provision to enable binding reduction targets for particular products, chemical additives and materials; reuse quotas; product design specifications, including mandatory recycled content; eco-modulating fees; and tools to incentivise the service/sharing economy. The provision should also be amended to permit bans on single-use applications of specified products, regardless of material composition.

Allocate waste levy revenue according to the waste hierarchy

As product stewardship scheme proposals emerge, it is increasingly clear that New Zealand lacks not only recycling capacity, but also infrastructure, systems and expertise to deliver outcomes higher up the waste hierarchy – from reusable packaging systems and repair and refurbishing apprenticeships, to research into product redesign to reduce waste and toxicity. Waste levy revenue should be allocated towards building such capacity to enable scheme designers to recommend ambitious product pathways.

Conclusion

New Zealand is one of the world's most wasteful countries per capita (OECD, n.d.; Hoornweg and Bhada-Tata, 2012, p.82). In the global economy's current 'take–make–throw' setting, an outsized waste footprint signifies entrenched overconsumption of Earth's material resources, and the associated greenhouse gas emissions, pollution, resource depletion and biodiversity loss. High-income countries like New Zealand must reduce waste by reducing material consumption (Haigh et al., 2021). This cannot be achieved by sporadically inventing new recycling programmes, but through transforming how we design and use products. Product stewardship is critical to this transformation, but requires far more activity at the 'reduce' and 'reuse' levels of the waste hierarchy, at every stage of a product's life cycle. This ambitiousness resides in the Waste Minimisation Act's definition of product stewardship, but not in industry-led interpretations. Revamping how we understand, utilise and design product stewardship, and government's role in this process, will better equip us with the tools necessary to move towards a zero waste, circular society and reverse the dramatic degradation of this one planet we call home.

1 However, product stewardship still recognises that producers hold greatest influence in reducing products' adverse impacts, and should carry most responsibility within product stewardship schemes (Hickle, 2014, p.266; Lewis, 2009, p.22; Mia, 2011, pp.82, 124).
2 The waste hierarchy is ordered the way it is because activities near the top are most effective at reducing waste and emissions, so this is where we should invest most time and resources.
3 The guidelines cover expectations such as circular resource use, fully internalised end-of-life costs borne by producers, public accountability, and open and transparent appointment of representative directors or governance boards.
4 Open-loop (as opposed to closed-loop) recycling occurs when a product is not recycled back into the same type of product with the same function. Consequently, there is material 'leakage' in the original product's life cycle, meaning raw materials are required to continue manufacturing the product.

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