



Rethinking Plastics in Aotearoa New Zealand resources

Circular Economy

International

- The Ellen MacArthur Foundation (EMF) is a UK-based organisation to accelerate the transformation to a circular economy. They work with business, academia and governments to build a framework for an economy that is restorative and regenerative by design. EMF publish a wide variety of reports including:
 - *New Plastics Economy Global Commitment Spring 2019 Report* – (March 2019) A report an initiative to reduce plastic waste and pollution at source to which the New Zealand Ministry for the Environment is a signatory. <https://www.ellenmacarthurfoundation.org/assets/downloads/GC-Report-Final.pdf>
 - *Artificial intelligence and the circular economy* – (January 2019) Interviews with 40 experts to explore the intersection of these two emerging megatrends. <https://www.ellenmacarthurfoundation.org/assets/downloads/Artificial-intelligence-and-the-circular-economy.pdf>
- Accelerating circular supply chains for plastics: a landscape of transformational technologies that stop plastic waste, keep materials in play and grow markets – Closed Loop Partners (April 2019). A report developing a shared landscape and understanding of next steps for investment strategies and infrastructure for converting plastic materials into a range of safe and high-quality materials. http://www.closedlooppartners.com/wp-content/uploads/2019/04/CLP_Circular_Supply_Chains_for_Plastics.pdf
- *A European Strategy for Plastics in a Circular Economy* – European Commission (2017) Brief report laying out a series of actions the EU could take to reduce plastic waste. <http://ec.europa.eu/environment/circular-economy/pdf/plastics-strategy-brochure.pdf>



Packaging

Local

- *New Zealand's Plastic Packaging System: an initial circular economy diagnosis* – Circular Economy Accelerator, Sustainable Business Network (November 2018) An overview of the use of and end-of-life of plastics used for packaging in New Zealand with recommendations to transform the system into part of the circular economy. https://www.circulareconomy.org.nz/developing-a-circular-economy-for-plastics-in-nz?_hstc=249356888.40cf49f1054c689fbc9c9d5f831fa9f1.1554439439651.1554695524592.1554775836883.3&_hssc=249356888.2.1554775836883&_hsfp=432180540
- *Review of packaging mass balance measurements* – Infometrics for the Packaging Council of New Zealand (April 2015). A review of the method, data sources and present initial estimates of the mass balance of packaging materials in New Zealand. The approach relies on Statistics New Zealand export data for estimates of recovery volumes and to calculate recovery rates as a proportion of population or GDP measures rather than material specific estimates of consumption or usage. A critical aspect of the choice of method is to allow reliable and easily calculated international comparisons of packaging material recovery rates. <http://www.packaging.org.nz/attachments/docs/review-of-packaging-mass-balance-measurements.pdf>

International

- *UK Plastics Pact Roadmap* – Waste Resources Action Programme (November 2018) Brief report from the charity, in conjunction with the Ellen MacArthur Foundation, on how the UK can meet targets to eliminate unnecessary single use packaging, have 100% reusable, recyclable or compostable packaging, 70% of plastic packaging effectively recycled or composted and 30% recycled content in plastic packaging. Lists challenges and potential solutions. <http://www.wrap.org.uk/sites/files/wrap/The-UK-Plastics-Pact-Roadmap-v2.pdf>



Product Design

- *Design for Recycled Content Guide* – Sustainable Packaging Coalition (2019) An online guide providing practical recommendations to inform strategy and decision making by outlining existing challenges to address an array of environmental considerations across the packaging life cycle. <https://recycledcontent.org/>
- *Considerations and Criteria for Sustainable Plastics from a Chemicals Perspective* – OECD (May 2018) The report identifies design principles for developing new sustainable plastics from a chemicals perspective. <https://www.oecd.org/environment/waste/background-paper-sustainable-plastics-from-a-chemicals-perspective-considerations-and-criteria.pdf>
- *Reuse and recycling of plastic packaging for private use* – Danish Forum for Circular Plastic Packaging (2018). A manual for designing plastic packaging intended for use in consumer products. <https://avl.dk/images/CirkulaerPlastemballage/Design-Manual---Reuse-and--recycling-of--plastic-packaging--for-private-use.pdf>
- *Tesco Preferred Materials List* – Tesco (April 2019) A traffic-light approach outlining the materials that this UK-based retailer will stock and those that will be removed from their shelves. <https://sustainability.tescopl.com/media/475835/tesco-preferred-materials-list-april-2019.pdf>



Life Cycle Assessment and Material Flow Analysis

- Norway – østfoldforskning research institute – Publish a variety of research on sustainability issues and lifecycle analysis <https://www.ostfoldforskning.no/en/>, including:
 - *Comparison of recycling and incineration of PET bottles* (2017). This study compares the environmental impacts of a consumers' choice to whether: a) use Infinitum's deposit system in order to recycle their PET bottles; or b) dispose of their PET bottles together with their residual waste to incineration. <https://www.ostfoldforskning.no/en/publications/Publication/?id=2031>
 - *LCA of beverage container production, collection and treatment systems* (2016). This study assesses and compares the potential environmental impact of beverage container production with different collection and treatment systems in Norway. <https://www.ostfoldforskning.no/en/publications/Publication/?id=1983>
- *APCO Packaging Material Flow Analysis 2018* – Australian Packaging Covenant Organisation (APCO) (February 2018). A report from the Institute for Sustainable Studies at the University of Technology Sydney characterising waste material flows through the Australian packaging system using material flow analysis methodology. <https://www.packagingcovenant.org.au/documents/item/2171>
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Product Stewardship

- *Product Stewardship: what our members think* – WasteMINZ (May 2018) A survey of WasteMINZ members (101 responses) showed that most were in favour of some sort of mandatory product stewardship scheme for problematic waste streams. <http://www.wasteminz.org.nz/wpcontent/uploads/2018/07/WasteMINZMembers-Product-Stewardship-Research.pdf>

Waste Management

Local

- *The New Zealand Waste Strategy: reducing harm, improving efficiency* – Ministry for the Environment (October 2010). A revision of the New Zealand Waste Strategy, released in 2002, the report outlines progress to date -including introduction of the Waste Minimisation Act 2008 - and enables a more flexible approach to waste management and minimisation through two high level goals: reducing harm and improving efficiency. <http://www.mfe.govt.nz/publications/waste/new-zealand-waste-strategy-reducing-harm-improving-efficiency>



- *Local Government Waste Management Manifesto* – WasteMINZ's Territorial Authority Forum (January 2018). The report sets out 5 priority actions for central Government to enable the local government sector to reduce waste.
<https://www.wasteminz.org.nz/wpcontent/uploads/2018/01/Local-Government-Waste-Manifesto-final-22012018.pdf>
- *Economic Factors of Waste Minimisation in New Zealand* – Covec for Ministry for the Environment (November 2012). This report examines a number of economic issues relating to waste disposal and alternatives in New Zealand. Specifically the report addresses: the rationale for government intervention in waste minimisation and the place of the waste disposal levy within this rationale; issues surrounding disposal pricing in New Zealand and the extent to which it is providing efficient incentives for waste minimisation; and the overall costs and benefits of waste minimisation and the contribution of the waste disposal levy towards increasing net benefits.
<https://www.mfe.govt.nz/sites/default/files/media/Waste/economic-factors-of-waste-minimisation%20-final.pdf>
- *Waste assessments and waste management and minimisation planning: a guide for territorial authorities* – Ministry for the Environment (December 2015) Guide for councils to prepare waste assessments and waste minimisation plans. The Waste Minimisation Act 2008 (WMA) gives councils the responsibility to promote effective and efficient waste management and minimisation within their district. The WMA requires councils to adopt a waste management and minimisation plan, which must be reviewed every six years.
<https://www.mfe.govt.nz/sites/default/files/media/Waste/wmmp-guide.pdf>
 - For example see: Auckland's Waste Assessment 2017 – Auckland Council <https://www.aucklandcouncil.govt.nz/plans-projects-policies-reports-bylaws/our-plans-strategies/topic-based-plans-strategies/environmental-plans-strategies/docswastemanagementplan/waste-assessment-2017.pdf>
 - And: Auckland's Waste Management and Minimisation Plan 2018 <https://www.aucklandcouncil.govt.nz/plans-projects-policies-reports-bylaws/our-plans-strategies/topic-based-plans-strategies/environmental-plans-strategies/docswastemanagementplan/auckland-waste-management-minimisation-plan.pdf>
- National Waste Data Framework, WasteMINZ. This project to develop a waste data framework was to establish the following:
 - Definitions for waste data terms
 - Protocols for gathering waste data that meets the definitions
 - Protocols for managing and reporting waste data
 - Roles and obligations of key parties



- Information system requirements if we were to move towards consolidated national waste data reporting <https://www.wasteminz.org.nz/projects/national-waste-data-framework-project/>
- Reports produced include:
- *National Waste Data Framework: Review of International Waste Data Practice* – WasteMINZ (February 2015) <http://www.wasteminz.org.nz/wp-content/uploads/Waste-Data-Framework-International-Practices-FINAL-2-Mar-2015.pdf>
- *New Zealand Waste Data Framework Protocols* – WasteMINZ (August 2015) <http://www.wasteminz.org.nz/wp-content/uploads/National-Waste-Data-Framework-Combined-Protocols-FINAL.pdf>
- *New Zealand Waste Data Framework Implementation Report* – WasteMINZ (August 2015) <http://www.wasteminz.org.nz/wp-content/uploads/Waste-Data-Framework-Implementation-Report-FINAL.pdf>
- *National Waste Data Framework – Standard reporting indicators for territorial authorities* – WasteMINZ (August 2015) <http://www.wasteminz.org.nz/wp-content/uploads/2018/04/National-Waste-Data-Framework-Standard-Reporting-Indicators-Final.pdf>

International

- *What a waste 2.0 – A global snapshot of solid waste management to 2050* – World Bank Group (2018) The report aggregates extensive solid waste data at the national and urban levels. It estimates and projects waste generation to 2030 and 2050. Beyond the core data metrics from waste generation to disposal, the report provides information on waste management costs, revenues, and tariffs; special wastes; regulations; public communication; administrative and operational models; and the informal sector. <https://openknowledge.worldbank.org/handle/10986/30317>

Landfills

- *New Zealand Non-Municipal Landfill Database* –Tonkin & Taylor for the Ministry for the Environment (January 2014) a survey of the non-municipal landfill sites operating in New Zealand by region. <https://www.mfe.govt.nz/sites/default/files/media/Waste/nz-%20nonmunicipal-landfill-database-report-final.pdf>
- *National Waste Disposal Survey* – MWH for the Ministry for the Environment (March 2017). The report updates the data on non-levied landfill sites developed by Tonkin & Taylor in 2014. <http://www.mfe.govt.nz/sites/default/files/media/Waste/National%20Waste%20Disposal%20Survey%20Final%20Report.pdf>



Resource Recovery and Recycling

Local

- *Rebooting recycling – what can Aotearoa do?* – WasteMINZ (May 2018) The report outlines a series of proposed actions to increase recycling in New Zealand after China stopped accepting international material for recycling.
<http://www.wasteminz.org.nz/wpcontent/uploads/2018/05/Rebooting-Recycling.-What-can-Aotearoa-do-FINAL.pdf>

International

- *10 point plan for results-based recycling* – Australian Council of Recycling (October 2018) What it says on the tin.
https://www.acor.org.au/uploads/2/1/5/4/21549240/acor_10_point_plan_for_results-based_recycling_.pdf
- *Australian Packaging Covenant* – Australian Packaging Covenant Organisation (APCO) (January 2018). The covenant is an agreement between industry participants and state, territory and commonwealth governments to optimise resource recovery of packaging through the supply chain and prevent the impacts of fugitive packaging to the environment.
<https://www.environment.gov.au/system/files/resources/936c31e6-749b-4298-a457-24808a76cc15/files/australian-packaging-covenant-2017.pdf>
- *2016-17 Australian Plastics Recycling Survey National report – Envisage Works* (May 2018). Information collected through a detailed survey of Australian reprocessors, Australian resin manufacturers and importers, and extensive interrogation of Australian Customs data, sourced from the Department of Foreign Affairs and Trade provides a comprehensive picture of the consumption, flow, recovery and recycling of plastics in Australia, the state of reprocessing markets and assists in informing the status of product stewardship commitments in relation to plastic products. <https://www.environment.gov.au/system/files/resources/c8dd95af-c028-4b6e-9b23-153aecbf8c3c/files/australian-plastics-recycling-survey-report-2016-17.pdf>
- *New Plastics Economy: A Research, Innovation and Business Opportunity for Denmark* – McKinsey & Company (January 2019). A study presenting the case for Denmark to improve its recycling of plastics by developing a portfolio of technologies.
https://www.mckinsey.com/~/_media/McKinsey/Featured%20Insights/Europe/The%20new%20plastics%20economy/The-new-plastics-economy-A-Danish-research-innovation-and-business-opportunity-Technical-report.ashx



Container Deposit Scheme (CDS)

Local

- *The inCENTive to recycle: the case for a Container Deposit System for New Zealand* – Envision (September 2015) The report describes the benefits of and lays out a plan for the introduction of a container deposit system in New Zealand. <https://www.nzpsc.nz/wpcontent/uploads/2017/12/CDS-Report-Summary-28-September-2015.pdf>
- *Evaluating the costs and benefits of introducing a container deposit scheme for New Zealand – summary of analysis* – Covec for the Public Place Recycling Scheme (March 2016). The report estimates that the introduction of a container deposit scheme would increase beverage container recycling to 82%, but would impose significant costs. https://www.recycling.kiwi.nz/files/3014/6101/9990/CDS_report_2016.pdf
- *Cost-benefit analysis of a container deposit scheme* – Preston Davies for Auckland Council (August 2017) The report estimates that recycling rates of beverage containers would increase to 82% and the benefits would outweigh the cost by at least a factor of two, taking in to account reduced landfill and litter collection costs. <http://www.wasteminz.org.nz/wpcontent/uploads/2017/12/Container-Deposit-CBA-Report-Final.pdf>
- and summary report (WasteMINZ) <http://www.wasteminz.org.nz/wpcontent/uploads/2017/12/Container-Deposit-Scheme-Summary-Report-Final.pdf>
- *Costs and benefits of a Container Deposit Scheme for New Zealand* – Warren Snow (July 2016) A review of the Covec report on CDS from March 2016. <https://www.nzpsc.nz/wp-content/uploads/2017/12/Review-of-PF-CDS-Report-July-2016.pdf>
- *Recovery rate of beverage containers in New Zealand* – Waste Not Consulting (2018). An estimate of the quantity of beverage containers that were collected and recycled through kerbside recycling collections in New Zealand and an estimate the proportion of beverage containers that were recovered and diverted from landfill disposal. <https://www.dropbox.com/preview/OPMCSA/Plastics/Reference%20materials/1.%20Categorising%20plastics%20in%20NZ/Industry/Packaging%20Forum%20beverage%20container%20recovery%20rate%202018.doc?role=work>

Composting



- *Assessing the availability of composting facilities for events in NZ – Beyond the Bin* (October 2015). The report identified 98 composting facilities around New Zealand with 12 able to accept and process event waste including food packaging and the food it contains. https://www.recycling.kiwi.nz/files/2314/4546/6921/Assessing_the_availability_of_composting_facilities_for_events_in_New_Zealand.pdf
- A review of the availability of New Zealand composting facilities to process compostable coffee cups & food packaging – *Beyond the Bin* (June 2017).
- The report surveyed 27 relevant composting facilities from the database created in 2015 to look at barriers to processing event waste. Barriers include contamination, lack of education of waste producers as to what can be composted, and items mislabelled as compostable which are not. https://cdn.shopify.com/s/files/1/1375/2417/files/Industry_Composting_Report_-_Version_2.pdf?759982256165438741
- *Tackling coffee cups: Innovation identification and investment*. A presentation from *Beyond the Bin* and the Packaging Forum on how compostable coffee cups can be managed based on the 2017 report. https://www.recycling.kiwi.nz/files/2615/1131/2994/Tackling_coffee_cups_presentation.pdf
- *Guides to terminology for compostable; biodegradable, and oxo-degradable products* – WasteMINZ (April 2019). A collection of consumer resources covering the terminology around degradable plastic alternatives, standards confirming the products are compostable, and the best end of life options for each type. <https://www.wasteminz.org.nz/pubs/guides-to-compostable-packaging-terminology/> The resources include the summary guide *It's Complicated: A guide to biodegradable & Compostable plastic products and packaging* <https://www.wasteminz.org.nz/wp-content/uploads/2019/03/Its-complicated-guide-Final-2019.pdf>

Waste to Energy

- *Municipal Waste Management Strategy Review and Waste-to-Energy Potentials in New Zealand* - Perrot et al. Sustainability (August 2018) An academic paper discussing municipal waste management and Waste-to-Energy potentials in New Zealand. WtE options were explored Zealand. <https://www.mdpi.com/2071-1050/10/9/3114/pdf>

Waste Disposal Levy



- *Review of the Effectiveness of the Waste Disposal Levy 2017* – Ministry for the Environment (July 2017). This interim review reports on the effectiveness of the waste disposal levy and associated systems for the period of 1 July 2013 to 30 June 2016. This review also reports on progress against the recommendations from the 2014 review and provides new recommendations for the future.
<http://www.mfe.govt.nz/sites/default/files/media/Waste/Review-of-the-effectiveness-of-the-waste-disposal-levy-2017.pdf>
- *A wasted opportunity – using the waste disposal levy to create economic and environmental advantage for Aotearoa New Zealand* – Eunomia (June 2017). This study looked at what effect possible changes to the waste disposal levy could have. It concluded that there are likely to be sizable benefits for the economy, employment, and waste reduction if key changes are made.
<https://eunomia.co.nz/wpcontent/uploads/2017/06/WDL-Final-Report-30-05-17.pdf>
- and summary report: <https://eunomia.co.nz/wpcontent/uploads/2017/07/A-Wasted-Opportunity-NZ-Waste-Disposal-Levy-Summary-Report.pdf>



Policy

Local

- *Waste Minimisation Act 2008* – Parliamentary Counsel Office (January 2018). The purpose of this Act is to encourage waste minimisation and a decrease in waste disposal in order to — (a) protect the environment from harm; and (b) provide environmental, social, economic, and cultural benefits. <http://www.legislation.govt.nz/act/public/2008/0089/latest/DLM999802.html?src=qs>
- *Trashing waste: unlocking the wasted potential on NZ's Waste Minimisation Act* - Blumhardt, H. Policy Quarterly (November 2018). This academic article outlines a range of policy solutions available to the government under the Waste Minimisation Act 2008, analyses why these policy tools have been underutilised to date, and proffers a roadmap for overcoming the identified obstacles. https://www.victoria.ac.nz/_data/assets/pdf_file/0006/1713615/Blumhardt.pdf

International

- *UN guidelines for framework legislation for integrated waste management* – United Nations Environment Programme (February 2016). The purpose of these Guidelines is to support countries with clear advice for their efforts to introduce or enhance their waste management legislation. The principles they are based on consider ways that waste can be diverted from release into the environment while providing for economic development that enhances social development to reinforce good environmental management within a supportive governance framework. <https://wedocs.unep.org/bitstream/handle/20.500.11822/22098/UNEP%20Guidelines%20for%20Framework%20Legislation%20for%20Integrated%20Waste%20Management.pdf?sequence=1&isAllowed=y>
- *Improving Plastics Management: Trends, policy responses, and the role of international co-operation and trade* – OECD. (September 2018) The report provides an overview of current plastics production and use, the environmental impacts that this is generating and identifies the reasons for currently low plastics recycling rates, as well as what can be done about it. https://www.oecd-ilibrary.org/environment/improving-plastics-management_c5f7c448-en
- *Solving plastic pollution through accountability* - WWF (2019) Overview of current global plastic waste with projections to 2030. The report proposes a series of actions for government, business and the public to tackle the problem taking a systems approach. https://c402277.ssl.cf1.rackcdn.com/publications/1212/files/original/SOLVING_PLASTIC_POLLUTION_THROUGH_ACCOUNTABILITY_ENF_SINGLE.pdf?1551798060



- *Single-use plastics: A roadmap for sustainability* – United Nations Environment (2018). The report looks at what governments, businesses and individuals have achieved at national and sub-national levels to curb the consumption of single use plastics.
https://wedocs.unep.org/bitstream/handle/20.500.11822/25496/singleUsePlastic_sustainability.pdf?sequence=1&isAllowed=y



Environment

Local

- *National Litter Survey Litter Field Count 2017/18*– Waste Not Consulting (June 2018). The Survey involved the counting and classifying of loose litter, in situ, at 300 transects in eight urban areas in New Zealand. The urban areas include 52% of the population of New Zealand. https://www.recycling.kiwi.nz/files/5315/3023/4734/2nd_National_Litter_Survey_June_2018_publication.pdf

International

- Mapping of global plastics value chain and plastics losses to the environment, with a particular focus on the marine environment. - UN Environment (2018). This report provides a comprehensive overview of the global production and consumption of different polymers. Based on available literature on the losses of plastics throughout the plastic value chain, it estimates the annual mass of microplastics and macroplastics that are being lost to the environment. https://wedocs.unep.org/bitstream/handle/20.500.11822/26745/mapping_plastics.pdf?sequence=1&isAllowed=y
- *Plastic waste inputs from land into the ocean* – Jambeck et al. Science (February 2015). An academic paper linking worldwide data on solid waste, population density, and economic status, to estimate the mass of land-based plastic waste entering the ocean. <https://science.sciencemag.org/content/347/6223/768.full>
- *Global Material Resources Outlook to 2060: Economic drivers and environmental consequences* - OECD (October 2018) This report presents global projections of materials use and their environmental consequences, providing a quantitative outlook to 2060 at the global, sectoral and regional levels for 61 different materials (biomass resources, fossil fuels, metals and non-metallic minerals). <https://www.oecd.org/environment/waste/highlights-global-material-resources-outlook-to-2060.pdf>
- *PlasticsEurope Operation Clean Sweep Report 2018* - PlasticsEurope (2019). Report on progress of an accord amongst European plastics manufacturers to prevent loss of plastic raw material pellets into the environment.
- http://www.opcleansweep.eu/wpcontent/uploads/2019/03/OCS_A4_Report_2018_ONLINE.pdf

Health



- *Plastic and Health: The hidden costs of a plastic planet* – CIEL (February 2019) This report provides a detailed overview of the health impacts associated with plastic at every stage of its supply chain and lifecycle, and it reveals the numerous exposure routes through which human health is impacted at each stage.
- <https://rethinkplasticalliance.eu/wp-content/uploads/2019/02/Plastic-and-Health-The-Hidden-Costs-of-a-Plastic-Planet-February-2019.pdf>

Microplastics

- *A Scientific Perspective on Microplastics in Nature and Society* – SAPEA Consortium (January 2019). A comprehensive review of the current evidence on health, environmental and societal impacts of nano- and microplastic pollution. <https://www.sapea.info/wpcontent/uploads/report.pdf>

Volumes of plastic produced

- *Production, use, and fate of all plastics ever made* – Geyer et al. Science Advances (July 2017) Research article identifying and synthesizing dispersed data on production, use, and end-of-life management of polymer resins, synthetic fibers, and additives, to present the first global analysis of all mass-produced plastics ever. Source of the widely used figure of 8.3 billion tonnes of plastic produced since their discovery. <https://advances.sciencemag.org/content/3/7/e1700782/tab-pdf>