A guide for selecting compostable products in Aotearoa, New Zealand

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Executive Summary

This document aims to help stakeholders navigate decision-making processes across the different stages of the life cycle of compostable products in Aotearoa, New Zealand.

Purpose

This document is intended to accompany a scientific report to improve understanding of the impacts of compostable products on soil and how these may be mitigated.

The Ministry for the Environment in Aotearoa, New Zealand has implemented bans on certain single-use and hard-to-recycle plastics. While banning certain plastic items is a positive step, there are gaps in understanding the environmental impacts of alternative products. Eliminating single-use items and promoting reusability is strongly preferred, but sometimes, it may not be feasible. In these cases, compostable products may be a suitable alternative.

This guide aims to help stakeholders understand the compostability of products in Aotearoa, New Zealand. Ensuring high-quality compost that benefits soil health is crucial, given the importance of agriculture in the country's economy and our relationship with soil within Te Ao Māori (the Māori worldview).

This guide considers global policies, standards, and certifications for compostable products. It summarises the chemical additives in these products and their environmental impacts with a focus on soil health. It also provides additional information on local testing and composting facilities, and incorporates links to relevant publications.

This is an interactive document. You can click on sections marked with a hand to navigate to different sections of this manual. You will also find expanded info on some topics and links to external documents.

This Framework Aims to:

- Guide decision-making for compostable products.
- Include Aotearoa, New Zealand's specific context.
- Compare how compostable products are addressed globally.
- Summarise chemical additives of compostable products and their environmental impacts.

Contents

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Compostable Products Framework

Before considering using compostable products, align with the Waste Hierarchy rationale and refer to the MFE position statement.

Is the product made of compostable materials?

Fibre

Wood e.g. timber shavings

Pulp e.g. cardboard, paper

Grass e.g. bamboo, sugar cane

Biomass e.g. moulded fibre, mycelium

Polymers

Starch-based e.g. potato starch (TPS)

Cellulose-based e.g. regenerated cellulose

Chemically synthesised e.g. polylactic acid (PLA)

Produced by bacteria e.g. PHA, PHB

Petrochemical origin e.g. PBS, PCL

N

Y

Is the product certified compostable?

Tests should include:

Product characterisation, including total fluorine, heavy metals

Biodegradation testing

Disintegration testing

Ecotoxicity testing of generated compost (plants and/or earthworms)

N

Y

Could it be certified compostable?

N

Y

Is it likely to contain persistent and/or bioaccumulative and/or toxic components?

These may include:

Per - and polyfluoroalkyl substances (PFAS)

Polymers

Bisphenols

Phthalates

Y

N

Consider an alternate product

The compostable product is likely to be at lower risk of creating harmful contamination in compost

Align your compost strategy with Te Ao Māori values

Clearly communicate the compostability of the product

Make sure that there is adequate infrastructure for compost collection and disposal

The MfE's position statement regarding Compostable Products

Before considering Compostable Products as a suitable alternative, it is important to consult the Ministry for the Environment's position statement on compostable products and align with the Waste Hierarchy rationale, as there may be alternative waste management strategies that are preferential to composting.

MfE position statement on compostable products

This document describes the Ministry's position on where compostable products could play a role in a circular economy in Aotearoa, New Zealand. The position outlined in this document provides information to support Government policy initiatives, including consultation on improving household kerbside recycling collections, the phase-out of single-use and hard-to-recycle plastics, and regulated product stewardship schemes for priority products.

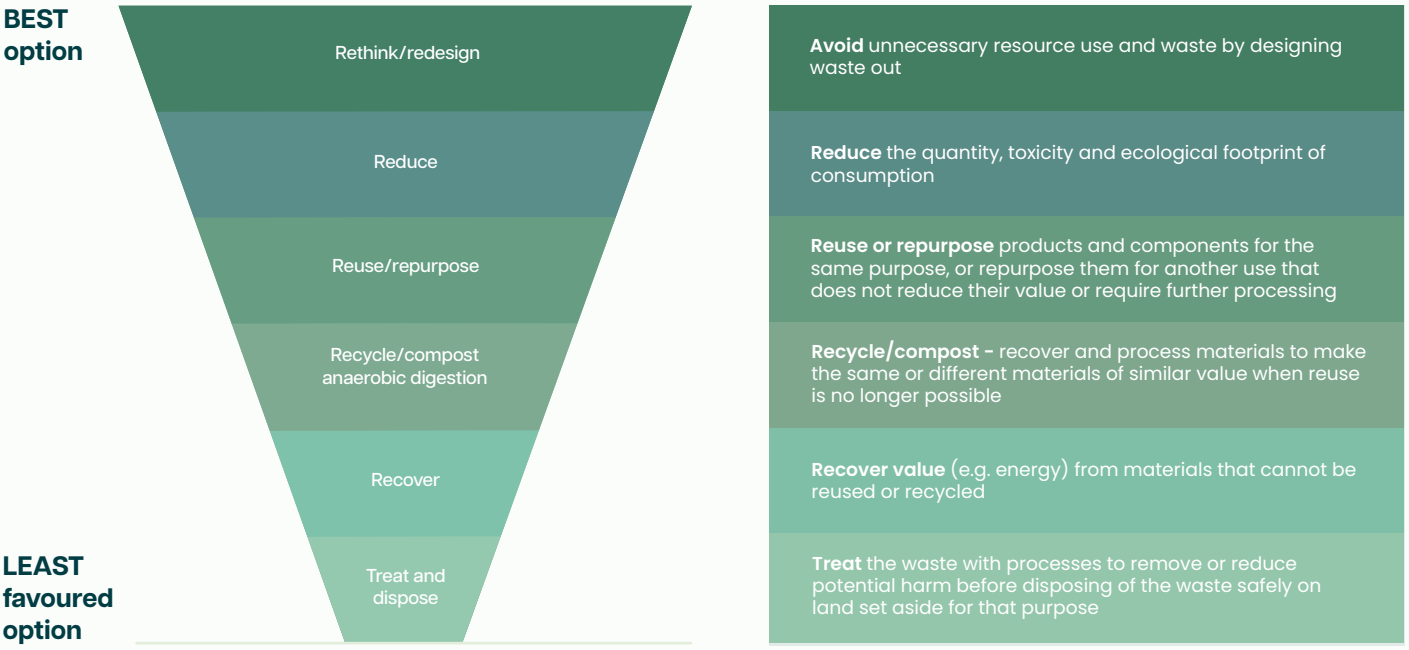
The Waste Hierarchy

The waste hierarchy establishes the order of preference for different waste management options. Due to the challenges with compostable products, they often end up in the 'dispose' step of the hierarchy (i.e. in landfill or the environment). At best, they fit into the 'recycle' step of the hierarchy when composted correctly. In either scenario, these products are single-use, meaning they are used once before being thrown away or composted. Because single-use products are energy-intensive, contributing to greenhouse gas emissions and resource depletion, it should be considered only if the other alternatives are unsuitable.

Compostable products might be a suitable alternative when:

1. Elimination, reduction, reuse or recycling are not a suitable alternative for your business.
2. The compostable product will help divert food waste away from landfills and will provide nutrients to soil (e.g. a dirty food container).
3. The compostable product will help reduce plastic contamination in compost (e.g. vine clips used for agriculture).
4. The compostable product is certified with an overseas standard and has undergone additional NZ testing.
5. The compostable product does not contain intentionally added PFAS
6. There is existing infrastructure to process the compostable product (whether home compost, industrial compost or a closed-loop composting system).

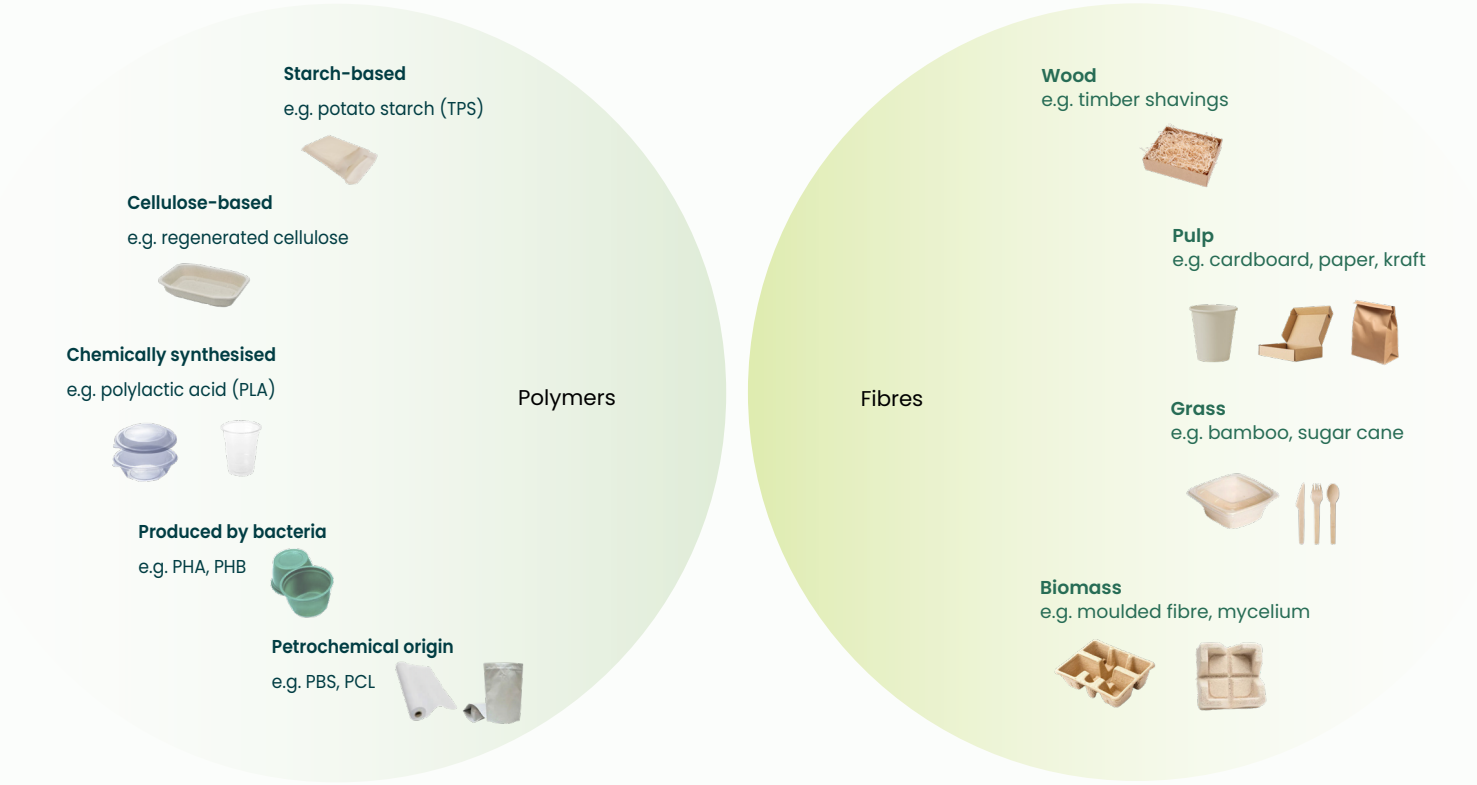
The Waste Hierarchy



Source: Ministry for the Environment (2022) *Compostable Products: Ministry for the Environment position statement*

Types of Compostable Products

Compostable products are made of materials certified to decompose completely to their basic components of water, carbon dioxide, and biomass. The timeframe and conditions required determine whether this is at an industrial or home/community scale. All compostable products are biodegradable.



Fibre-based

Fibre-based compostable products use diverse sources like reused elements such as newspaper and cardboard, and natural fibers like wood pulp, bamboo, bagasse, mycelium, and wheat straw. They are used in construction, chemicals, and food/beverage sectors. About half of Aotearoa New Zealand's compostable products are fiber-based, decomposing easily and adding carbon to compost if not mixed with non-compostable additives.

Compostable polymers

These fall into 5 categories:

Starch-based polymers

Starch-based polymers primarily use starch from potatoes, corn, rice, or grains. They are heat resistant and potentially biodegradable in various environments, including industrial and home composting. However, they can be costly and sensitive to water damage due to starch's solubility in water.

Cellulose-based polymers

Cellulose-based polymers can be made from natural, regenerated, or modified cellulose fibers. While they can biodegrade in different environments, chemically altered cellulose may not always meet compostability certifications.

Chemically-synthesized

Chemically-synthesized polymers, like polylactic acid (PLA), are commonly used. PLA can degrade under industrial composting or anaerobic digestion conditions but blends with non-renewable materials may not.

Polymers produced by bacteria

Polymers produced by bacteria, such as PHA, offer desirable properties and can be biodegradable in various conditions, including composting and anaerobic digestion, but production can be costly.

Petrochemical polymers

Petrochemical polymers are petroleum-based, like PBS, PCL, and PBAT. They mainly degrade in industrial composting, and their biodegradability in other environments is uncertain.

Existing Certifications

Overseas compostability standards are separated into industrial, home compostable, and other environments. These standards require products to be measured for biodegradation, disintegration, ecotoxicity, chemical characteristics, and product dimensions.

Compostability

The compostability of a product can be certified through certification bodies located worldwide. Currently, Aotearoa, New Zealand lacks specific policies and regulations and relies on overseas standards. In this context, Australian and European standards are preferred, as they are more conservative and protective of soil health.

Biodegradation

Testing must be completed within a maximum of 6 months for industrial composting and 12 months for home composting and must show at least 90% biodegradation. The total proportion of organic constituents in composite or packaging materials that do not need to exhibit biodegradability shall not exceed 5%.

Disintegration

Upon visual inspection of the compost material, no remaining product shall be visually distinguishable from 0.5 m distance. At least 90% of the original dry material shall pass through a 2-mm sieve. The original thickness of the tested material needs to be reported alongside the test results.

Ecotoxicity

Ecotoxicity testing ensures that the generated compost is fit for purpose and that there are no negative effects on terrestrial organisms from compost application to soils. Testing commonly includes plant germination and biomass testing. Some standards also include earthworm toxicity and soil microbial nitrification inhibition testing.

Chemicals

Standards typically set limits for total carbon, heavy metals and total fluorine in compostable products. Any intentional additions of fluorine including PFAS chemicals will need to be declared and will result in a failure to achieve compostability certification.

Industrial Composting

DESCRIPTION	AUSTRALIAN SEEDLING INDUSTRIAL COMPOSTING	SEEDLING INDUSTRIAL COMPOSTING	OK COMPOST INDUSTRIAL COMPOSTING	DIN INDUSTRIAL	BIODEGRADABLE PRODUCTS INSTITUTE / US COMPOSTING COUNCIL
REGION	Australia	Europe	Europe	Europe	USA
LOGO					
VERIFICATION	Australasian Bioplastics Association / DIN CERTCO	DIN CERTCO	TÜV Austria	DIN CERTCO	DIN CERTCO
OVER ARCHING STANDARD	AS 4736	EN 13432	EN 13432	EN 13432	ASTM D 6400 OR 6868

Home Composting

DESCRIPTION	AUSTRALIAN SEEDLING HOME COMPOSTING	OK COMPOST HOME COMPOSTING	DIN HOME COMPOSTING
REGION	Australia	Europe	Europe
LOGO			
VERIFICATION	Australasian Bioplastics Association / DIN CERTCO	TÜV Austria	DIN CERTCO
OVER ARCHING STANDARD	AS 5810	Variation of EN 13432	AS 5810 / NF T 51-800

Additives

ADDITIVE FUNCTION

Bioplastics	add mechanical functions
Plasticisers	improve flexibility and durability
Stabilisers	enhance resistance to moisture and heat
Colourants	make visually appealing
Barrier coatings	prevent moisture, oil or oxygen from permeating

While compostable products are generally considered more eco-friendly than their traditional counterparts, chemical additives that can be present in some compostable products have not been fully evaluated yet. Additives are sometimes added during the manufacturing process of compostable products to improve material function. Many additives have not yet been fully evaluated for their environmental impact.

POSSIBLE ADDITIVES

Per - and polyfluoroalkyl substances (PFAS)

Polymers

Heavy metals

Bisphenols

Phthalates

Additionally, supplementary materials may be employed to convert polymers and papers into packaging materials that thus include adhesives, coatings, and printing inks. This is a common pathway for additives to end up in compostable products.

PFAS

PFAS are synthetic chemicals that enable heat stability, degradation resistance, and water/grease repulsion in products. These are often called 'forever chemicals' due to their incredible stability in the environment. PFAS do not degrade during composting processes and negatively affect soil quality.

Heavy Metals

Heavy metals in compostable products can arise from various sources, such as raw materials (e.g. feedstock in compost), additives (e.g. colourants in labels), and production processes (e.g. contamination during manufacturing).

Phthalates

Phthalates refer to a group of chemical compounds commonly used as plasticisers to improve the flexibility and malleability of plastic products. They are also used in printing inks and lacquers.

Polymers

Polymers, in the form of plastics, are ubiquitous contaminants. Despite the promotion and use of biodegradable plastics, marketed as compostable, the degradation of these products is known to produce micro-/nanoplastics that affect the biophysical environment of the soil.

Bisphenols

Bisphenols, including BPA, are a class of chemical compounds commonly used in the lining of food/drink products with well-known human toxicity implications.

Testing facilities in NZ

Compostable products should meet at least one international standard, which ensures testing for disintegration, biodegradation, and product characterisation regarding heavy metals and total fluorine, as well as compost quality through ecotoxicity testing.

Certification

Scion Research's Biodegradation Testing Facility is the only DIN-CERTCO-accredited testing facility in Australasia that meets the required international standards/certifications for the complete testing of compostable products.

DIN-CERTCO is a German certification organization specialising in assessing and certifying various products and services to conform to established standards and regulations. Compostability testing for accreditation encompasses the following stages: biodegradation, disintegration, identification, chemical characterisation, and ecotoxicity testing of the generated compost. As part of the chemical characterisation requirements, Scion tests the products' total fluorine and heavy metal content (e.g. zinc, copper, nickel, cadmium, lead, mercury, chromium, molybdenum, selenium, and arsenic).

These tests do not routinely include testing for phthalates or specific PFAS. If this is required, it takes 12–24 months to undertake all four stages of compostability testing.

Scion can test the biodegradability of additives such as glues and inks separately if required by the accreditation body DIN-CERTCO. Identifying specific chemicals other than those listed in the standards is not part of the routine compostability testing for accreditation purposes. They typically provide testing requirements for biodegradable and non-biodegradable additives.

Other testing

Alternatively, products can obtain 'compostability reports' from commercial laboratories, such as the Hill Laboratory, which provide a nutritional and elemental breakdown of the product.

However, these tests are usually inadequate for certification/compliance related to international standards on compostability. A comparatively short turnaround time, within a week instead of months, and substantially smaller costs (~$1K) make such tests attractive for interested businesses.

Common chemical additives used in compostable products, such as PFAS and phthalates, can be tested in commercial laboratories in Aotearoa, New Zealand, that specialise in advanced analysis. There are three laboratories that can undertake target analysis of more than 30 PFAS compounds: Eurofins, Analytica, and AsureQuality. The target analysis of PFAS costs ~$250/sample, while the non-target analysis, which provides comprehensive information on unknown PFAS additives, can cost up to $5K per sample. Eurofins has well-established methods for testing phthalates.

Useful links:

Scion

Hill Laboratories

Eurofins

Analytica

AsureQuality

Collection and Processing in NZ

Home and Marae composting are common in NZ. However, compostable products often require higher temperatures (55° or higher) to break down, which most home composting systems can't achieve.

Additionally, compostable products aren't accepted in council kerbside food waste collections or privately provided green waste collection bins. Commercially compostable packaging and service ware in New Zealand can only be processed in commercial composting facilities. Currently, eight industrial and two community facilities in New Zealand accept compostable products.

The table below shows the suitability of different composting methods for the most common types of compostable products.

WasteMINZ has compiled a map with existing facilities, the compostable products they accept, and the waste companies that can be used to deliver them to the facility. A few manufacturers of compostable products are also offering take-back services.

Facilities that accept compostable products in NZ

WasteMINZ map

MATERIAL CATEGORIES	MAIN COMPONENTS	COMMON NAMES	HOME COMPOSTABLE • temperature 20°C–30°C • 90% biodegradation • 12 months max. time	INDUSTRIALLY COMPOSTABLE • temperature 58°C • 90% biodegradation • 6 months max. time	ANAEROBIC DIGESTION • thermophilic 52°C • mesophilic 37°C • 50% biodegradation within 2 months • usually followed by aerobic digestion	VERMI COMPOSTING • temperature 25°C • 90% biodegradation • 2 years max. time
FIBRE-BASED	Wood, pulp, grass and other biomass	Timber, bamboo, bagasse, mycelium	✓	✓	✓	✓
CELLULOSE-BASED (Lignin < 5%)	Regenerated cellulose and modified cellulose	Plant-based (paper, kraft, cardboard)	✓	✓	✓	✓
STARCH-BASED	Starch derived from sources such as potatoes, corn, rice or grains like wheat	Thermoplastic starch (TPS)	✓	✓	✓	✓
CHEMICALLY SYNTHESISED	Polymer based on building blocks made from renewable sources	Polylactic acid (PLA)	✗	✓	✓ (thermophilic)	✗
PRODUCED BY BACTERIA	Polymer with desirable thermoplastic and water resistant properties	Polyhydroxy alkanoate (PHA), polyhydroxy butyrate (PHB), polyhydroxy butyrate valerate (PHBV) and poly-3-hydroxy-butyrate-co-3-hydroxyhexanoate(PHBH)	✓	✓	✓	✓
PETROCHEMICAL ORIGIN	Polymer based on building blocks synthesised from petroleum sources	Polybutylene succinate (PBS), polycaprolactone (PCL), and polybutylene adipate terephthalate (PBAT)	✗	✓	✗	✗

Note: these generalised claims about biodegradation can only serve as approximation and need to be confirmed by standardised testing. In situ behaviour can vary, depending on the site conditions, size of the polymer, grade of the polymer, and other factors. The shape, material thickness and composting conditions can have a big impact on the biodegradability outcome.

Tikanga Māori and Cultural Considerations

Over centuries, Māori have cultivated extensive resource management practices to ensure soil sustainability, improvement, and preservation.

Considering the deep cultural significance of soil in Te Ao Māori, strict measures should be applied to soil policy in Aotearoa, New Zealand. The personhood of the soil as an ancestor needs to be recognised as intimately linked to human physical and spiritual health. This reinforces the need for comprehensive protection and management practices that prioritise the well-being of both soil and people. Whakapapa (genealogy) provides a foundation for understanding the relationships between humans, land, and soil ecosystems.

You can draw inspiration from The Hua Parakore Framework as a best practice case study for soil health and sovereignty

A summary of published literature reveals that:

- Existing international certification systems for compostable products do not consider Māori worldviews.
- Mātauranga Māori provides rich guidance on soil health indicators and other factors influencing composting practices.
- We need further Aotearoa New Zealand-based, Māori-led, and Māori-centred research on compostable products under a pūtaiao (scientific) lens.
- Stricter certifications should apply to the composting policy in Aotearoa, New Zealand.
- Soil should be treated as an ancestor directly linked to physical and spiritual health.
- The centralisation of composting facilities poses a challenge to social justice and the ability to access information about the material origins of compost. Composting decisions should include whakapapa-informed and place-based tikanga.

Mauri

Life force, vital essence

Only compost natural elements such as organic waste, animal manure, seaweed, food scraps, straw, grass clippings, and plant remains that will add Mauri to the soil.

Tapu

Sacred, prohibited

In compost destined for kai (food) growing, avoid animal remains (such as blood, meat, or bone), human waste (e.g., soiled nappies), and human remains.

Whakapapa

Origin, genealogy

Understand the origins of anything you add to the compost. This also affects the moving of soil from one place to another.

Tikanga

Method, practice

Follow the māramataka (nature and moon calendar) to prepare the soil compost for high-energy periods that are good for planting.

Recommended readings

Harmsworth. (2022). Soil security: An indigenous Māori perspective

Hutchings, J., Smith, J., & Harmsworth, G. (2018). Elevating the mana of soil through the Hua Parakore Framework. MAI Journal: A New Zealand Journal of Indigenous Scholarship. https://doi.org/10.20507/MAIJournal.2018.7.1.8

Hutchings, J., Smith, J., & Roskruge, N. (2020). Te Mahi Oneone Hua Parakore: A Māori Soil Sovereignty and Wellbeing Handbook. Christchurch: Free Range Press.

Communication and Labelling

Reliable, certified information is crucial for confident purchasing decisions.

Because some consumers value the environment in their purchasing decisions, this has led to using environmental claims as a competitive advantage by traders. Transparent communication claims should be observed for both the product's advertising and the printed claims on the packaging.

- Commerce Commission report on environmental claims for traders
- WasteMINZ guidelines

Summary of the guidelines related to communication of product compostability:

Certification Logo and Number

Display the certification logo and unique certification number indicating the product's compostable status.

Certification Database Link

Provide a direct link to the certification body's database to verify a product's compostability.

EoL and Biodegradation

The expected End-of-Life (EoL) conditions and time frame for the biodegradation of the product should be clearly stated.

Materials and Supplier

Specify the names of materials used in the product and include a link to the supplier of the certified materials.

Product Design/Packaging

The certification logo and appropriate end-of-life disposal methods (i.e. home or industrially compostable) should be prominently displayed.

Non-Recyclable Status

It is recommended to state if the product is non-recyclable on the packaging to avoid confusion and contamination of recycling streams.

Examples of product labeling and packaging labeling

Source: WasteMINZ (2019) *Best Practice guidelines for the advertising of compostable products and packaging.*

Glossary

Bio-based plastics	Plastic made from renewable resources as opposed to petroleum. They are not necessarily biodegradable or compostable (European Commission, 2022).
Biodegradable	Materials that naturally break down via microbial action with no specified timeframe or specific environmental conditions (unless specified alongside this term). Many, but not all, biodegradable products are compostable.
Bioplastic	This overarching term encompasses bio-based and/or biodegradable plastics. Not all bioplastics are compostable (Australian Bioplastics Association, 2019).
Compostable	Materials certified to decompose completely to their basic components of water, carbon dioxide, and biomass within a specific timeframe and conditions. The timeframe and conditions required determine whether this is on an industrial or home/community scale. All compostable products are biodegradable (Good Start Packaging, 2023).
Oxo-degradable	Plastics that are enriched with additives that accelerate their fragmentation. This can be triggered using heat energy or UV radiation. These products are not compostable (Deconinck & De Wilde, 2013).
Oxo-biodegradable	Similar to oxo-degradable, however, once in small enough fragments, microbes can access them for partial or complete microbial degradation (Hickford, 2022).
Polymer blends and composites	Blends refer to mixing two or more polymers to create a single phase. Composites refer to mixing a polymer with a non-polymer component such as fibers, ceramics, or other additives (Kulshreshtha & Vasile, 2002).

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