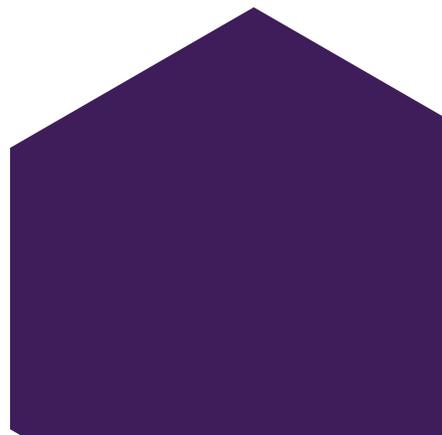
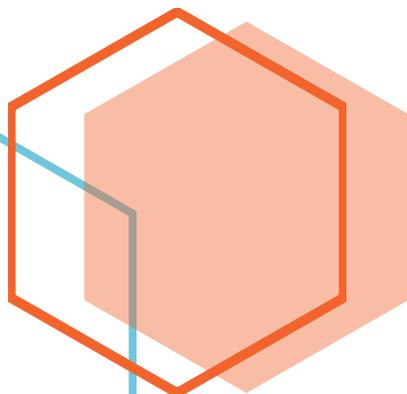




New Zealand  
**FOOD SAFETY SCIENCE  
& RESEARCH CENTRE**

# Stakeholder Perceptions on the Challenges Associated with the use of Recycled Food Packaging

Miranda Miroso and Phil Bremer, University of Otago.





**Funding:** This work was funded jointly by members of the Food Industry and New Zealand Food Safety Science & Research Centre through its provision from MBIE

**Date:** June 2022

New Zealand Food Safety Science & Research Centre  
Hopkirk Institute, Massey University, Tennant Drive, Palmerston North 4442  
Phone: +64 (0) 6 356 9099

**RECOMMENDED CITATION:** Miroso M. and Bremer, P. 2022. Stakeholder perceptions on the challenges associated with the use of recycled food packaging. Report No. 63PAC-1, New Zealand Food Safety Science & Research Centre

© COPYRIGHT: This publication may be reproduced in whole or in part without further permission of the NZFSSRC, provided that the author and NZFSSRC are properly acknowledged.

**DISCLAIMER:** This report or document (“the Report”) is given by the University of Otago solely for the benefit of the New Zealand Food Safety Science & Research Centre as defined in the Contract between University of Otago and Massey University and is strictly subject to the conditions laid out in that Contract. Neither University of Otago nor any of its employees makes any warranty, express or implied, or assumes any legal liability or responsibility for use of the Report or its contents by any other person or organisation.



# Stakeholder Perceptions

## Objectives

This 'Stakeholder Perceptions' work stream was designed to support the wider research programme on recycled packaging by providing early consultation with key food and packaging stakeholders to understand their needs and capabilities in the recycled packaging space. The viewpoints of three groups of stakeholders are considered: (1) brand owners and packaging users to gain an understanding of their potential future Recycled packaging needs; (2) packaging suppliers and manufacturers, including those that use recycled materials in NZ and abroad, to better understand their capabilities and capacities; and (3) regulators and industry body representatives to understand what their organisation is advocating for/working towards in the Recycled packaging space. This report summarises the information collected in these interviews.

## Method

Semi-structured interviews with food packaging stakeholders were conducted by two experienced 'food' and 'consumer' scientist members of the NZ Food Safety Science Research Centre (NZFSSRC). Interviews were mostly conducted online using Zoom in 2021. The University of Otago's Human ethics approval processes assured that all information collected, including commercially sensitive data, remains confidential. Interviews were 60 minutes long on average. Audio files were transcribed and analysed using the qualitative data software NVivo.

## Overview of Interviewees

The stakeholder interviews included a range of NZ and Australian organisations in the food and packaging sectors. A total of 33 people were interviewed. This included: 7 different brand owners (meat n=2 people, dairy n=7 people, horticulture n=5 people, other n=1 person); 6 packaging suppliers/manufacturers n=10 people; and 5 different regulators / industry body representatives n=8 people).

## Example Questions for Packaging Suppliers / Manufacturers

- What is your current capacity to produce recycled packaging? Relative to current and future demands?
- How do you ensure the functionality (barrier properties, strength, and opacity)?
- How confident are you that the packaging conforms with specifications?

## Example Questions for Regulators / Industry Bodies

- What is your organisation advocating for in recycled packaging?
- Do you see conflicts between different stakeholders? If so, how do you think these could best be addressed/resolved?
- [If relevant, e.g., for testing agencies] – What is your organisation's capability to assess contaminants? What is the current demand?



## Background of Wider Research Project

### Programme Goal

To provide the knowledge (scientific publications) and tools (guidelines and resources) to enable the NZ food industry to make informed decisions on the risks posed by using recycled non-permanent materials.

The proposed research is broken down into seven objectives within three workstreams:

#### WS1: Understanding stakeholder needs and capabilities

*(Findings are reported on in this report)*

#### WS2: Review of scientific literature

Obj 3. Obtain information on the composition and recommended use of the recycled packaging currently available and review the developing analytical capabilities to detect non-intentionally added substances

Obj 4. Review the scientific, technical, and regulatory literature (and the potential that their inadvertent presence could also cause issues in traded food) to gain an understanding of the types of NIAS that could potentially occur in recycled packaging material of interest and how these compounds may impact on the quality, safety, or marketability of relevant NZ products

Obj 5. Identify knowledge gaps and indicate the nature of research needed

#### WS3: Realising benefits to the NZ food industry

Obj 6. Develop industry sector-specific checklists and guidelines (packaging specifications) for companies to follow when investigating the feasibility of using recycled packaging

Obj 7. Present the results to the food industry via a workshop at the NZIFST conference or a similar event

*(WS2&3 findings are NOT reported on in this report).*

## Example Questions for Packaging Brand Owners



- Do you currently use packaging with recycled material in it? Where do you get this?
- How do you determine what non-intentionally added substances might be present?
- How do you ensure the functionality (barrier properties, strength, and opacity)?
- How confident are you that the packaging conforms with specifications?
- Do you ever do your independent test to ensure safety?
- Do you have any views on the safety of recycled packaging?
- In the future, which packaging food combinations will most likely become important to you in the recycled packaging space?



## Recommendations

Based on the stakeholder insights reported in the following section, ten key recommendations are made.

### *1. Provide guidelines, standards or guidelines for recycled packaging in NZ*

The lack of NZ-specific regulation, standards or guidelines in NZ for recycled packaging was noted as problematic. Clarity here would help progress the adoption and more widespread use of recycled packaging. Note that while not all stakeholder thought that the provision of “more” guidelines, standards or guidelines were required, some brand owners were adamant that “best” practice guidelines were required to ensure that critical safety steps in the production of recycled packaging are being controlled.

### *2. Packaging companies must better communicate on the processes / steps they have in place to assure the safety of recycled packaging. This should involve the adoption of a risk assessment-based approach.*

Packaging manufacturers/suppliers need to convey to the brand owners the steps they take to ensure that the risks associated with their recycled packaging offerings in specific markets are acceptable. A number of brand owners expressed significant concern that despite scientific data clearly highlighting that recycled packaging contains more non-intentionally added substances (NIAS) than virgin packaging, packaging companies are not doing enough to explain the processes they follow and the checks they employ to ensure the safety of the recycled packaging they manufacture / sell. There was a desire for packaging companies to take a risk assessment-based approach and implement processes common in the food industry such as the adoption of HACCP plans, incorporating critical control points.

### *3. Invest in training packaging technologists*

Given the complicated nature of the recycled packaging landscape, it would be beneficial for brand owners to have some in-house capability in this space. However, packaging technologists equipped with the background required to come to grips with the challenges associated with recycled packaging are in short supply in NZ; hence investment here is also needed.

### *4. Find feasible solutions to recycle pre-consumer materials*

There is considerable demand for recycled packaging in NZ, and this demand is expected to increase as companies scramble to meet ambitious sustainability targets. Therefore, the sourcing of quality recycled feedstock is critical. Since pre-consumer materials are considered a 'cleaner' source than post-consumer materials, finding feasible pre-consumer circular solutions for key product/packaging formats makes sense. Brand owners can start by considering the circularity potential of materials within their controlled supply chains.

### *5. Improve waste management systems for recycling post-consumer materials*

Pre-consumer materials, however, will not be enough to match the demand for recycled packaging, and post-consumer materials will inevitably be required. Therefore, NZ's recycling collection systems need to improve to provide quality post-consumer recycled packaging.



There is a need for increased volumes, better sorting, greater diversity of products recycled, and greater consistency across regions.

#### *6. Increase government investment in waste management*

These infrastructural improvements will be costly and will require significant government investment.

#### *7. Collaborate*

The challenge in getting the material to include in recycled packaging at suitable quality and quantity is complicated due to potential conflicts between the different stakeholders and vested interests. Finding mechanisms for varied stakeholders to work together better to progress the development of recycled packaging will be essential.

There is also a lot of uncertainty about many aspects of recycled packaging. The provision/sharing of pre-competitive information that helps brand owners come up to speed with, and stay abreast of, the fast-changing recycled packaging scene (e.g., market regulations, feasible packaging formats) will be valuable for 'NZ INC.'

#### *8. Research market demand for recycled packaging*

Although there is assumed demand for packaging made with recycled content, we do not yet have a good understanding of businesses and consumers' willingness to buy this at a price that pays. Market insight information such as this is needed to inform decision-making.

#### *9. Communicate recycled packaging needs*

Brand owners need to be discussing their potential future recycled packaging needs with suppliers.

#### *10. Advocate for global harmonisation of recycled packaging regulations*

Regulations on the permitted use of recycled packaging in direct contact with foods are not globally harmonised, making understanding what is required challenging and meeting sustainability targets impossible in some instances. NZ needs to advocate for further global harmonisation to assist our exporters to more easily integrate recycled packaging into their product lines.



## Results

This section presents results in the following three sections: Perceived challenges for (1) All Stakeholders; (2) Packaging Suppliers / Manufacturers; and (3) Brand Owners. Quotes from the interviews provide illustrative evidence of key points made. To preserve interviewee/organisational anonymity, these are only attributed back to the type of stakeholder: Packaging Suppliers / Manufacturers (PS/M); Brand Owners (BO-meat/dairy/hort/other); Regulators / Industry Body Representatives (Reg/IBR).

### Perceived Challenges for All Stakeholders

#### *The pace of change*

Expectations and the ability to meet them are changing so fast that what wasn't feasible months ago is possible today. This makes it difficult for brand owners to keep on top of what is required and achievable in this space.

*... by the time you've finished it [this report], the recycling industry will have changed, and that's true of any research project. But right now, it's changing really fast. (PS/M)*

Ambitious international demands and resulting targets for recycled packaging have left NZ stakeholders scrambling to catch up.

*And the complexity is we all have these brand aspirations and retailers in the UK telling us 'you have to be X, Y and Z and those things'. (PS/M)*

There was a sense that these ambitions/targets were 'too early' for NZ brand owners, mainly owing to current limitations around the supply of recycled packaging.

*So, the UK is the leader in making these demands or commitments. Don't get me wrong, but they're too soon for our industry... To meet their requirements is really difficult. (BO-meat)*

And the expectations and rules of the game keep changing.

*We had a bit of scrambling because this was a 2025 vision initially, and then they got a new CEO or something, and it became 2021. So, fortunately, we've been doing a bit of research and development and had a good partnership with a [packaging] company. So, we were probably better positioned than most within the meat industry to respond to it. [The packaging suppliers] are scrambling to get new materials out there. (BO-meat)*



Definitions of recycled packaging aren't yet set in stone.

*I'm talking about greenwashing. It's a difficult space from an industry perspective. What is real? What is really sustainable and falls within a circular economy versus what doesn't? Because there's also a lot of discussion at the moment with the APCO in Australia about recycled industrial content going back into products. That isn't considered recycled content because it's part of the overall operational efficiency of the plant, so it cannot be counted as recycled content. (PS/M)*

There hasn't been sufficient time for the recycled packaging infrastructure and production capability to be built/ sufficiently developed.

*And so, in some ways, this is a very new industry... it took decades for glass to transition, for fibre to transition, for PT to transition, for soft drink bottles to transition; you might remember they used to have black independent plastic bottoms for so many years, now they're one piece, so the way they're made is different so that they become recyclable. To hope that food contact plastics will become recyclable in a matter of months is so challenging compared to every other ask that's been put to the packaging industry. (PS/M)*

The ability to recycle different materials is evolving at different rates, and material that was thought uneconomic to recycle mechanically is becoming more feasible. This makes it challenging for stakeholders to stay abreast of which packaging formats are now viable to include recycled packaging

*There'll be advancements in materials to be more recycled, to fit with recycling systems, and in recycling technologies to enable recovery of more material types. That will not be one evolution. There will be mechanical and grades of advanced types of recycling coming. (PS/M)*

### *A mismatch between expectations and reality*

There appears to be a mismatch between expectations from the government, NGOs, retailers, and the public and what is currently feasible.

*But there's a real mismatch between expectations from a sustainability point of view and what sounds nice to do, regulations around what you're allowed to do, and what is actually feasible to do. (BO-dairy)*

*Honestly, I've never been so stressed over trying to develop a solution for our products to meet our customers' expectations and their commitments. Our suppliers are bending over backward like we're all just trying very, very hard. And but I suppose from a public place in the news, they were absolutely getting slammed, and it's just really tough going. It's really tough. (BO-meat)*



*So, I mean, I have family, and they're like, why aren't you guys recycling right now? And it's like, the risk is too high... You know the processes aren't well-established. There are all these reasons why you know you just can't be flicking the switch and going and doing it so. But obviously, we have to do this. (BO-dairy)*

### *Recycled packaging is just one aspect of a sustainability strategy*

Stakeholders not only have to come up to speed with the fast-changing recycled packaging scene, but they also need to consider other elements such as reducing total packaging and sustainable sourcing of materials.

*There's still, I think, a lot of noise out there. You know, a lot of people are directly down the line of the circular economy. However, there's still stuff on the periphery around compostable and biodegradable, and that sometimes gains a bit of traction with your sales and marketing team. (BO-dairy)*

*So, we're also looking at the sustainable side rather than the actual recycled content. Looking at sustainably sourced polyethylene from food through either sugar beet, sugar cane, or synthesize polyethylene through those sources. So, those are other avenues that we're looking for a sustainability perspective for some customers because from a marketing perspective, it always comes back down to marketing; what's best for their brand is if they can claim 50 percent of the product is sourced from a renewable resource, it's better than fossil fuel. (PS/M)*

### *Understanding how sustainable the recycled packaging options are is complicated*

There is confusion about if recycled packaging is the most sustainable packaging option.

*While in theory recycled content for fibre sounds good, the metrics in terms of the carbon footprint impact generally show us that including recycled content increases the carbon footprint of the packs. So, we're not in a hurry if I'm blatantly honest because as much as recycled content is good because it encourages a circular economy and it will give you a material circularity index score which is much better, it doesn't, certainly based on the assumptions within the tool that we are currently using which is the Gabby Packaging calculator, it increases the carbon footprint. Hence, we won't be rushing out there, not just for regulatory complications but also for carbon footprint considerations. (BO-hort)*

There is also a lack of clarity around the sustainability of the different ways of producing recycled packaging.

*Or if you consider what chemical recycling is doing, which is taking things back to the bare bones and making it again etc.,... So, you should logically think that would be the best thing to do. So, it's the holy grail. So, let's actually bring the commercial in and say, so, are we as a world actually going to have everybody going into chemical recycling? Because*



*of the infrastructure, which is actually involved in the additional costs, the answer would be 'no, we're not going to do that'. And then you bring in the sustainability side of it... The emissions are going to be more... You always need to consider every single aspect and then make a call about that. (PS/M)*

*Different market/s and business customers differ in their desire for recycled packaging*

While some retailers/markets are setting ambitious targets for recycled packaging, it's not an important aspect for others. This makes developing a standardised packaging format challenging.

*Thinking about B2B products, I guess some of our customers are driving for and against using recycled materials. Some are really wanting to see it and pushing us to use it, and others are obviously nervous. (BO-dairy)*

*It's what our customers expect or allow in relation to recycling packaging. I mean, our main customer isn't keen on the idea of recycling packaging at the moment. And I would say that's pretty common with quite a lot of customers from China in particular, but also some other countries which aren't that switched on to recycling. So that's probably a main driver.*

*Their concerns behind it are possibly to do with contamination and food safety. But certainly, most companies will be driven by what their customers want or will allow. (BO-hort)*

*Ensuring packaging complies with the regulations of the market/s it will be used in*

Regulations on the permitted use of recycled packaging in direct contact with foods are not globally harmonised, making understanding what is required difficult.

*[with regards to the non-harmonisation of regulations] it is really looking at being solution-focused per country which means there are at least 30 odd countries for which we really need to provide a fit-for-purpose recycled packaging solution. (BO-hort)*

In the absence of universal acceptance/standards of recycled packaging, brand owners exporting to countries that don't allow recycled packaging are reluctant to adapt their packaging formats for other markets.

*Our transport packs go into so many different countries, so we have to look at the current regulatory landscape that has the most stringent rules as we cannot segregate these transport packs out in our supply chain for every market. But what we can do is when the fruit goes in bulk into a market, it can be repacked within that regulation freedom that country gives us to repack.... So, in short, getting stuff out of the NZ market into the global market - we've run into those pains before! (BO-hort)*



Even where recycled packaging is allowed, the way in which it is recycled can impact upon acceptance.

*Because even post-consumer, the distinction between the chemical vs mechanical is absolutely critical. We can get chemical in [to some markets] because it's technically not defined as recycled per se. (BO-hort)*

The regulatory acceptance of recycled packaging is in flux, which makes it challenging to plan.

*What we would benefit from ultimately... is a view on what's next and when it's coming. More specifically, our biggest pain point is China and possibly Japan and the ability to include a recycled content in our consumer packs. And what we need to know is when, and there will be a when, we will be able to include recycled content and under what conditions? When will chemically recycled plastic be allowed into food contact materials, and by when? That view is absolutely critical. (BO-hort)*

The lack of NZ-specific recycled packaging regulations was noted as being problematic for some stakeholders.

*What's lacking in NZ is the regulatory components, I will say around the use of recycled in food content products. Like, we're basically copying what the FDA does in Europe; that's what we based all these tests on. That's one component that needs to be addressed in our legislation, I would say because that topic always comes up. (PS/M)*

*But when it comes to the food contact, I guess our main area of concern is that there's no standard to meet in our jurisdiction, both in Australia and NZ. Both are tied by the Food Code but It doesn't make specific reference to recycled polymers. And as far as we can see, although there's been a little bit of work done around packaging, recycled polymers haven't been taken into specific consideration by any sort of study. So, we say there's a big gap there, and we think that the industry has got a bit of catch up to do in some due diligence around those areas to actually do the science behind the safety. (BO-dairy)*

*And I'll tell you another thing, too, and that is that the day someone's packaging poisons a child will be the day recycled content suddenly falls by the wayside; so, food safety and efficacy still prevails. And I think we're silly as a nation in not holding to some rigorous, scientifically robust standards. (Reg/IBR)*



All packaging suppliers /manufacturers stated that it was their responsibility to work with the brand owners to ensure that the recycled packaging had the required functionality and met regulatory requirements.

*They're pretty quick to come back to the manufacturer and try and unload all responsibility onto that. So, we make sure we're pretty robust to the levels of internal auditing and external auditing that we have to go through. (PS/M)*

*We have a supplier approval process for new packaging items. So, we request all of the normal compliance documents. Ultimately, it's the documents from the supplier that confirms the compliance with the markets we're interested in. (BO-dairy)*

However, packaging suppliers /manufacturers also stated that ultimately it was the brand owner's responsibility to make informed decisions regarding the risks for particular products and particular products.

*No, the buck stops with the brand owner... and it always does; that's who everyone goes after. However, they rely on us to ensure that they're all good to go, they are expecting and entirely relying on us that the packaging that we supply meets the standards and performance they need. (PS/M)*

The ability of brand owners to make informed decisions however, varied, depending on companies in-house packaging expertise.

*So, we reviewed that technical information on the packaging, but we haven't got real detailed packaging expertise here. We did have a packaging technologist role, but that is disestablished now. So, it's very much relying on the packaging supplier to confirm that. (BO-dairy)*

There was a perception that there is a lack of packaging technologists in NZ equipped with the background required to overcome the challenges associated with recycled packaging.

*I've been living and breathing this for years and I still don't have a solution... So, I hope there's a lot of packaging technologists out there at the moment! (BO-meat)*

## **Perceived Challenges for Packaging Suppliers / Manufacturers**

### *Ensuring supply and suitability of recycled packaging*

The sourcing of quality recycled feedstock was noted as becoming a strategic issue overseas with brand owners in the EU, for example, investing in recycling processes to make sure that they have their own supply. Packaging manufacturers generally believed that there was sufficient capability in NZ to meet the current need for recycled packaging. However, there was some



concern that if demand increased substantively, it could exceed their ability to supply in the short-term.

*We do, and we don't have the capacity to do 100% PCA food-grade content... so we don't push it hard. We do it on a limited basis because behind all this is a supply and demand problem of everyone switching to 100% requirement... And I tell them, just be careful what you wish for because the amount of recycled material coming through would run out. The recycling rates need to improve because there's no way in the current climate in NZ you could supply everyone 100%. There's just not the available level of recycled material to draw from. (PS/M)*

Overall though, suppliers /manufacturers seemed confident that their ability to make or source recycled packaging would be able to match demand.

*The business has been built to be scalable because that's all reflective on what NZ society does and how they get on board because it has many components involved. There is the MRFs, the general public themselves, and their habits. Then there's the MRFs, regional councils... There's a lot of growing up to do in the NZ recycling environment. (PS/M)*

It was acknowledged that as demand increased, the diversity of sources from which post-consumer materials sources would need to increase. Recycling collection systems need to improve to provide quality post-consumer recycled packaging: increased volumes; better sorting; greater diversity of products recycled; greater consistency across regions.

*It's very difficult to get post-consumer at a level that you don't have contamination. So, the risk is just too high for us at this stage. (PS/M)*

*NZ's recycling rates... have a long way to go to improve captured recycled material that can be reprocessed. (PS/M)*

The impact of a future Container Deposit Scheme, in terms of improving the available materials to recycle, was noted.

*In Australia, they operate container deposit schemes. So, they are actually collecting those bottles back in a more controlled environment. Yet again, we don't actually know how controlled it is but that potentially is a way to get a cleaner source because you're not mixing it up with all the other things. If it was food beverage containers only, you've got a way of sorting which is perhaps safer. (PS/M)*

Other options for improving the quality and quantity of the feedstock, such as optical sorters, were noted.

*There are a lot of other things that would change it, so the improvement of the optical sorters throughout the MRFs is having a significant impact on our ability to reprocess it. So as soon as people put optical sorters in the MRFs, you can actually say bring the punnets on.*



*Bring all of the things which potentially could have been a contaminant, which could have included PVC or plant tech or polystyrene, etc., because they've actually got better sorters in place. Now all of those products are actually getting put in, so you've got a more reliable source of PET. (PS/M)*

The challenge in getting the material to include in recycled packaging at suitable quality and quantity is complicated due to potential conflicts between the different stakeholders and vested interests.

*Yes, there are inherently massive conflicts. Hence, despite repeated and very costly court processes and hearing processes, they decided to go for co-mingling anyway because it was cheap. The transport and logistics companies have massive investments in holes in the ground; it costs millions to develop the landfill. Are they really, truly motivated to recycle and minimise the volumes going in, or does their vested interest kick in? I mean, I'm not saying anyone goes out there deliberately to exploit or pursue their vested interest but that they are rife throughout the industry. (PS/M)*

Simplicity in packaging design and composition (e.g., having all packaging made from a homogenous material) would also aid with the recyclability of materials.

*As the consumer sees it, they don't have to think; for them, it's just packaging, and it all goes in the bin... But our optical sorters, by definition, can't look inside a box and say, hey, 'it's got some fillers'. So, if they're all moulded fibre, and the box is fibre, it'll get sent one way and largely all turned back into paper. So, simplicity is what I'm lobbying for... But, while I preach simplicity and ease of recyclability, we are not blind to the fact that it actually has to first and foremost serve its function. (PS/M)*

Pre-consumer was considered a 'cleaner' source than post-consumer material

*I mean the only thing that we can see ultimately is that you have to have a completely clean source. So you've got to make sure it is food grade and preferably it's closed. It's milk bottles back into milk bottles with effective decontamination, but that's really the only discussion elsewhere globally around that being at least a safer route. But you still got to effectively remove anything that could still get in there. But at least you're not introducing a whole lot of risk at the start of your process. And you can't get rid of all things. There's only a limit to how much you can get rid of. And if it wasn't there in the first place, then you don't have to have to get rid of it as long as you don't create it along the way. But there is some work that could be done in the area. And certainly, that's what we hear from various conferences and things, that food packaging back into food packaging is a less risky option. (PS/M)*



It was thought that the uniqueness of the NZ market could lead to an advantage in this pre-consumer space.

*And the thing is, we've got the perfect scenario in NZ because we have an Island Nation, basically. If I take HDPE milk bottles, we as a business basically make milk bottles in NZ and have that circularity. So the closed-loop back into HDPE is really easy to achieve because you've got that feedstock control almost automatically built into the system. Whereas if you get the HDPE from a source outside of NZ, you need to validate that the feedstock comes from milk bottles. So, in a way, we are perfectly positioned to get that HDPE if we get circularity going in NZ. That's certainly something that we are very keen to do as a business.*

*(PS/M)*

The importance, however, of also taking a Trans-Tasman regional approach to recycled packaging was highlighted.

*Interestingly, NZ has a very particular challenge in that parts of the full circle for plastics particularly do not exist in the country. So, it's a regional play for Australia and NZ; I think we absolutely have to think about a regional play here. (Reg/IBR)*

Regarding concerns around the importance of assuring the source of the recycled material, opinion here differed depending on the final use of the packaging material in terms of the product being stored / shelf-life/customer expectations, etc.

*I guess the company that we work with is a massive producer, huge, and their entire plant is 100 percent post-consumer. So, there's no cross-contamination issues - it's just is what they do. And they're certified. So, we certainly don't run deeper than providing that certification to anyone who needs that evidence. (PS/M)*

### *The technological feasibility of replacing conventional with recycled packaging*

In NZ, the manufacture of recycled plastic packaging relies upon the use of locally or internationally mechanically recycled plastics or imported plastic (which comes from either mechanically or chemically recycled plastic streams).

A range of views was expressed on whether mechanical or chemical recycling was the best approach for food contact materials. Limitations around chemical recycling included capital investment, production costs, and limited production (relative to virgin PET plants). Companies concerned about the safety and functionality of mechanical recycling were companies that had the offshore capability in chemical recycling plants (Mainly PET, but also HDPE).

*I'm hoping that there's going to be some kind of breakthrough [in chemical recycling] to make this work; I really do. I think that's the only way. Mechanical recycling, based on the variety of available products and contaminants, I think it can't go any further than probably what it is. And chemical recycling is the only way forward, I believe. (PS/M)*



Other manufacturers were confident of the ability of mechanical recycling to decontaminate PET. Additional safeguards were using post-industrial recycled material or distinctive post-consumer material (e.g., Coca-Cola bottles 50% recycled rPET, Meadow Fresh one, and two-litre fresh milk bottles with 30 percent food-grade rHDPE).

*If you look at what Coke is doing, Coke is making a similar mono bottle... They've been doing this for how long? Yeah, you could ask yourself the question, 'is Coke going to take a risk?' (PS/M)*

There appears to be some misinformation around the best and safest way to produce recycled packaging.

*Well, I would hazard a guess from what I've found from a personal perspective. You have conflicting commercial reasoning from a number of other companies, those who don't manufacture their feedstock themselves and relying completely on third-party material that doesn't suit their commercial argument to support the recycling system, in essence, because they are more of a distributor than a manufacturer. It's always saying that some speak with a forked tongue. (PS/M)*

### *The economic feasibility of producing recycled packaging*

The cost of building the infrastructure required to manufacture packaging with recycled content is considered prohibitive without the significant government investment occurring in Australia, for example.

*I don't think that we will have the infrastructure here, unless it is a government-funded item. (PS/M)*

*They [Australia] have a lot of different types of funding and they use some different models as well. So, you've got Central vs. Local Government. And your State in your Local Government has a bit of different funding and they look at things from a different perspective. So, in NZ, like the Waste Minimisation Funding, it is very specific and it considers only specific criteria and only limited amounts. In the last round of waste minimisation funding, which I subscribed to, it was massively oversubscribed. Our government is putting more and more funding in place but the Australian government are doing it differently; like they'll say, in terms of the things that they're looking at with the criteria, it might be about the recycled content but it also might be about jobs in the area. So, there are actually a lot of other things to consider. (PS/M)*

The scale of production given NZ's small size was seen as an economic barrier.

*You can see even the entire plastics consumption of NZ is only a small proportion of a single petrochemical plant. We've got issues of scale not to lose track of here. (PS/M)*



However, there was recognition that as the scale of recycled packaging required increases in the future, the economic viability will become more realistic.

*But again, this is an industry that's like 5 and 10 years old, and it's got a lot of evolution and incremental improvement to come. So I believe that future advanced recycling solutions will be more efficient and more economical than today for sure. (PS/M)*

*We're part owners of a chemical recycling company. So, we have some stock invested in it as a route forward, and this is one of the challenges you have right now because if you're looking at what's available today and the cost of it today, it doesn't make any sense as to why you are doing it... I think we could get there by volume by 2025, but the true economic penetration scale is probably even beyond that. (PS/M)*

Of course, the ability to make recycled packaging and its economic feasibility depends on the materials.

*But in terms of flexible plastics, that is entirely the meat, the milk powder. As primary exports, they are very much reliant on advanced recycling setting up. I believe our company's position on that is mechanical will probably not ever be economical as a path for components and flexible packaging. (PS/M)*

Although there is assumed demand for packaging made with recycled content, we do not yet have a good understanding of businesses and consumers' willingness to buy this at a price that pays.

*Today we are certainly seeing people interested in testing the market and supporting differentiated brands. I think no one has really tested the supply chain and consumers' appetite for a doubling in the cost of raw materials in the mainstream. (PS/M)*

*I was advocating again that we have a massive need for research into what terms resonate with consumers. (PS/M)*

### *Predicting future demand*

Everybody expected future demand to increase substantially as company's scramble to meet their ambitious sustainable packaging targets. Although predicting future demand was deemed by some as difficult, one of the large packaging manufacturers did report that they have a pretty good understanding of this.

*We have a complete map of where our recycled content is; we have that broken down. I can look it up almost into the single product line, and we have year-on-year targets on the road map and plans behind that to deliver us to where we need to get to in 2025. So, I do actually know exactly how many tons of advanced recycled material we are likely to need. And clearly, we aspire to deliver the global target effectively and transparently. But like you said, we will be tending to put recycled content into places where it's most easy to do.*

*(PS/M)*



## Perceived Challenges for Brand Owners (Packaging Users)

### *Risks associated with the use of recycled packaging*

Safety risks associated with the presence of non-intentionally added substances (NIAS). The presence of NIAS was thought to have a wide range of consequences.

*The scientific data clearly highlights that recycled packaging contains more NIAS than virgin packaging, yet packaging companies are not doing enough to explain how they know their products are safe, what checks do they use? How often do they carry them out? (BO-dairy)*

*You get a bit nervous when you're talking about primary packaging because if there is any chemical cancer migration, then it's gonna go straight in. So nervous about primary packaging, but secondary packaging should be manageable, definitely. (BO-dairy)*

Safety risks associated with a lack of understanding of the steps that packing companies are taking to ensure the safety of the products they manufacture / sell

*Packaging companies should take a risk assessment based approach and implement processes that are common to us in the food industry to ensure safety. They should have HACCP [Hazard Analysis and Critical Control Point plans] in place and use critical control points to ensure safety. (BO-dairy)*

Non-conformance risk: There was concern that a product could be rejected in-market owing to a NIAS being detected in its packaging or the NIAS affecting product quality (e.g., taints) or safety (e.g., migration).

*And you can now test for the wide range of little, tiny, insignificant stuff hanging off the record here. But our owners are very good at doing that. They pick up on new tests, test things, and find something which in their mind shouldn't be there, even though they're such small amounts that they could be naturally occurring or whatever else. (BO-dairy)*

Functionality risk: There was a concern that the addition of recycled content could impact the functionality of the packaging.

*Yep, I think there is an option there for us to use a recycled component with our cardboard cartons so long as this has the same technical performance. We actually have downgauged a lot of our cardboard shippers, and probably getting at that point now we're struggling with them to maintain the functionality. (BO-dairy)*

Reputational risk: There was also a concern that if there was an incident associated with the use of recycled packaging, the brand owners' reputation could be damaged.

*The big hitter for us as a brand would be a food safety scare. (BO-hort)*



*It means that we're sort of forced to take a very conservative approach to risk. If we were to have some sort of a food safety mishap, the consequences for that tend to become very, very large, very quickly, and more so because of our history. (BO-dairy)*

*So, the real benefit to consumers is a bit of a feel-good factor. Hey, I'm buying something, and it's got recycled material. However, it's really only going to take one case of, I guess, a common household product to have some really bad press, you know, some nasty chemical off-flavours. And I think consumers may reassess that. At the moment, it's not even on their radar. But if they become aware that, hey, by buying this, I'm risking some nasty chemicals ending up in the food that I'm putting to my children, that view could change very quickly... so, that's, I guess, a bit of a worry for us. (BO-dairy)*

Investment risk: Some brand owners were wary of if they invested time and money to convert to recycled packaging options, this could be wasted if public opinion on recycled packaging changed.

*We could invest a huge amount of money in and get fully up to speed on recycling plastic packaging materials. And you have a big fiasco in Europe where there is some sort of a big contamination scare and the global media coverage of that. And we will then be very vulnerable to the investment not paying off if consumers switch off. (BO-dairy)*

Regulatory risk: Some also saw a risk in developing product packaging formats in a changing regulatory landscape.

*I mean, imagine a scenario where we would go out and invest lots of money in a recycling set up in an environment where there are currently no regulations. And then we have government regulations that come down the track in a year or two's time. And we find, oops, what we've set up actually isn't compliant. So, we kind of have to go and rebuild and write off a whole lot of investment. So, there are multiple risks that, as a manufacturer, we have. (BO-dairy)*

### **Lack of compatibility with existing packaging equipment**

Recycled packaging materials have to be able to run on the same lines as the conventional packaging products, so they need to have similar physical properties.

*The other thing it has to do is obviously run on the lines that we have today. So, implant technology. The heat tunnels, the rubber loaders, the chambers, the vacuum packers, you've got all of that; each site has a slightly different process. We have a bag today that is functionally very good from end to end. I suppose you can't turn off a line to run a specific bag for a specific customer because that's just not how those rooms work... Each bag has to run down that same process. So, you couldn't have a bag that sits outside of that line process. At least it needs to fit in with the variables of the line. (BO-meat)*



### *Recycled packaging technology is not ready for all packaging needs*

Not all currently used packaging would be able to be replaced with recycled packaging. For example, specialised packaging such as the multi-layered bags which are used in vacuum packaging of chilled product.

*We don't have a silver Bullet. Globally, the technology really isn't there yet. I'm saying, if I want that lamb leg and that bag to have a 91-day shelf life like I do today with a PVC bag, I'm going to say we're getting close to having recyclable content. I mean long-term goal is having a 30% recyclable material within the bag. But the technology is not there yet...There's not a technology yet to put on red meat. (BO-meat)*

### *Obtaining the volume of packaging required as needed*

Some brand owners were concerned about some of the complex supply chains associated with some internationally sourced recycled packaging.

*I have tested another outside-the-box supplier, and their material was equivalent to some of the other stuff I've been trialling, but their supply chain is really poor... The material is made in one country and converted in another country, and then it still needs to be printed... So, for us, that is very hard to manage. But if you have somebody in NZ that can convert and print at the same time as required, obviously, it will be a much safer supply chain. (BO-meat)*

Several brand owners preferred to work with NZ-based packaging manufacturers due to shorter supply chains and the ability to get packaging delivered when and where they need it.

*Yeah, our biggest challenge is storage as well. So, on a lot of our sites, we actually have no storage. It might be a skylight garage, so we want a next-day delivery or a two-day window of delivery. So that is another big challenge for us. So, we expect our suppliers to hold our materials for us and distribute them as and when required, rather than filling up warehouses full of packaging materials...Yeah, [if we're getting them by the shipload from overseas] the thing is, and I've seen that before, you can order a container, that container arrived, you start using the material, then 50% of it has a quality issue. But the next container is three months away. There are a lot of challenges around that type of supply chain for a fast manufacturer like us in the meat industry. Depending on the season, we could end up with a very big peak of production because of a drought, and the farmers have got to clear their farms. We can't meet those peaks if we've got a poor supply chain for packaging materials. (BO-meat)*



### *Trying to implement recycled targets across entire product ranges, packaging formats, and markets*

Some brand owners are making progress on meeting targets by including recycled packaging in non-food applications. However, this can only go so far towards meeting sustainability targets.

*So I'd say pellets, corrugated sections of boxes [are ok], but as soon as recycled content comes into direct contact with the fruit, it becomes really complicated, so that's something we would want to avoid at this stage. (BO-hort)*

In a similar vein, companies are also using recycled packaging for products destined for certain countries accepting its use. However, this is challenging when some of the largest destinations are still unwilling to accept recycled packaging.

*The target is based on 30% [recycled content by weight] based on a region, so it doesn't have to be in every single country, but certainly, with countries like China and even Japan in the picture, they take up so much volume that if you haven't got it right in those countries, you're not going to get it for the regional measure. (BO-hort)*

### *Lack of clarity about the processes used to ensure the safety and quality recycled packaging products*

Given that recycled packaging is a rapidly changing space, many brand owners seemed to be uncertain about their product suppliers /manufacturers' processes to ensure the safety and quality of their recycled packaging products.

*We have a good look at that now, but there is still a lot of missing data, and then also what regulations their products comply to. We didn't have any visibility of that before, and we are just starting to gather that info now and then as part of that analysis we will determine where our high-risk areas are that we need to look at closely and maybe do a bit of testing or tap some suppliers on the shoulders or something. (BO-dairy)*

## Further Information

About the contents of this report, please contact the authors:

Prof Phil Bremer and Associate Professor Miranda Miroso  
Department of Food Science, University of Otago

Email: [phil.bremer@otago.ac.nz](mailto:phil.bremer@otago.ac.nz) and [miranda.miroso@otago.ac.nz](mailto:miranda.miroso@otago.ac.nz)

Phone: Phil - 034795469 or Miranda - 034797953