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Natural Barrier Coatings

Hugo Adams, CCO

‘The Evolution to Paper Packaging’ Webinar:
Two Sides

18th July 2024

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171,000,000,000,000,000


Microplastics found near Everest's peak, highest ever detected in the world
Microplastics: Research finds almost 100 times more microplastics in UK coastline than six years ago
30 March 2023 · Comments
Microplastics found to permeate the ocean's deepest points
One liter of water from the Mariana Trench contains thousands of tiny plastic
to new research.
Despite deals, plans and bans, the Mediterranean is awash in plastic

Average number of microplastic particles found per gram/liter/m^3 of selected consumables



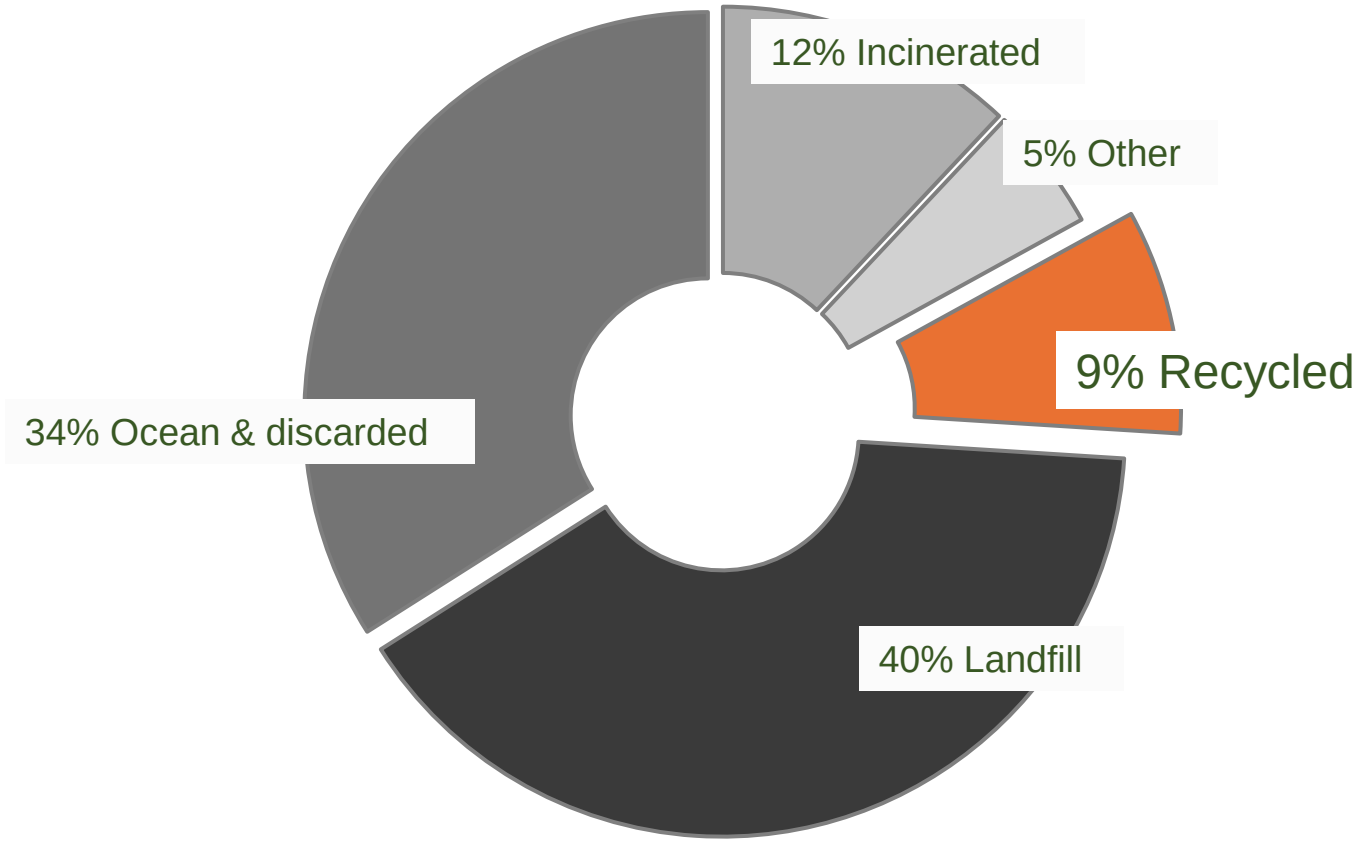
Estimated annual microplastic particles consumed per person*

Between **78,000** and **211,000**


San Miguel
600ml



Recycling is only a small part of the answer



"By 2050 there will be more plastic than fish in the sea"

ELLEN MACARTHUR FOUNDATION




Seafood lovers eat 11,000 pieces of plastic each year with just one portion of mussels containing up to 90 particles, scientists warn
Alarming Study Finds Most Bottled Water Is Full of Microplastics
Microplastics found in 75% of fish in New Zealand, report shows
Plastic fibres found in tap water around the world, study reveals
Exclusive: Tests show billions of people globally are drinking water contaminated by plastic particles, with 83% of samples found to be polluted


UN
environment
programme
Turning off the Tap
How the world can end plastic pollution and create a circular economy







OXYGEN TRANSMI
RATE



Kelpi: Turning the tide on plastic pollution

- Mission: To take the plastic out of packaging
  - We don’t need plastic packaging that lasts 1,000 years to contain food that lasts for weeks or months
- Using no fossil fuel components
  - We use only renewable feedstocks – polysaccharides from seaweed and vegetable oils
- More likely to be recycled …
  - At average 80% recycled, paper and card recycling 9 x better than plastic
- But if littered, then no microplastics
  - Kelpi material will break down in the natural environment – compost, in soil, at sea

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Kelpi has created an entirely new packaging material

- **End of life** was a paramount consideration – why do we need a material that lasts up to 1,000 years to package food with a fridge life of 1-2 weeks?
- We innovated to achieve a **world-leading water barrier** in our unique **coating for paper**, card and fibre
- Achieving barrier properties previously **only achievable by fossil fuel plastics**
- In packaging for **food and drink**; **personal and home care**



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Why seaweed?

One of the most regenerative feedstocks on earth. Capble of growing around 60 times faster than land-based crops and sequestering up to 20 times more carbon per acre than forests.



Provides oxygen, food and habitat to life underwater



Low-resource crop that doesn't require land, fresh water or fertilizer



Grows prolifically



Supports job creation and economic growth

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Functionalisation is Kelpi's secret weapon...

We use only renewable feedstocks – seaweed, vegetable oils

— Functionalisation (patented) builds in the sort of bonds seen in nature

— Which is key to creating a material that's fully bio-degradable

and apply this as a thin-film coating to paper & card

— to deliver packaged product shelf life > 12 months

— and ensure packaging can be recycled with paper/card



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Selected via competition and tenders...

L'ORÉAL

Beyond Plastic

140 bidders worldwide

Winner – Kelpi

Paid contract

DS Smith

Innovation Challenge

Winner - Kelpi

DIAGEO

Institute for Manufacturing

Open Innovation Forum

Award-winner – Kelpi

Paid contract



Compostable Barrier Solutions tender

Winner – Kelpi

WAITROSE & PARTNERS

UK supermarket Waitrose

Replacing plastic fresh fruit punnets

Paid contract



Partnership with world leader in dry-moulded fibre

In collaboration with PA consulting

Defining a new generation of sustainable packaging...

that uses no plastic, but matches plastics' performance

L'ORÉAL

Current L'Oréal paper tubes require 6 layers including plastic & metal



Kelpi-coated paper tubes could replace HDPE for skin cream

DIAGEO

Fibre bottles will replace glass, but right now they need PE plastic liners



Kelpi-coating could enable the fibre whisky bottle of the future

WAITROSE & PARTNERS
BLUE SKIES

Consumers are demanding supermarkets avoid plastic trays



Replacing PET trays with Kelpi-coated card/fibre for fresh fruit

DS Smith

Packaging giants are facing growing demands for biodegradable coatings



Providing Kelpi-coated card and fibre as a sustainable packaging option

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It’s the water barrier that opens a huge market opportunity for Kelpi & our clients

Other brands:

Low water barrier sufficient to

Package takeaway meals
Water barrier needed only for hours / days

Produce drinking straws for single use



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High water barrier needed to

Package high water-content food & drink
providing barriers to water; acidic food; oxygen; grease

Keep moisture content stable in skin creams
Achieve >12 months shelf life



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Preparing for market launch

Scaling up production

- Internal: Large lab-scale 10kg+ per week
- Q3 2024: Pilot scale 100kg+ per week
- By end 2024: Large scale pilots tonne+ scale

Go-to-market in 2025

- FCM regulatory approval: mid 2025

Designed to work with current production machinery

- Extrusion and dispersion applications
- Proving scale with global packaging partners

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A team of deep tech expertise ...

... and entrepreneurial experience



Dr Georgios Gkotsis
Chief Technology Officer



Dr Stefanie Federle
Chief Scientific Officer

Team of 18

12 + 6

Science + Business



Neil Morris
CEO & Founder



Hugo Adams
Chief Commercial Officer



5 PhDs



3 MBAs





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Report: Plastic pollution levels on course to double by 2040 without urgent action
Plastic trash flowing into the seas will nearly triple by 2040 without drastic action
An ambitious plan, two years in the making, might have the solution.
Without urgent action, the estimated 11 million metric tons of plastic currently entering the ocean annually will triple in the next twenty years.

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Turning the tide on plastic packaging

1	2	3
With soaring demand for sustainable packaging from global clients	Kelpi has developed a unique solution to industry requirements	Capturing the market opportunity
Driven by **innovation**	Protected by **patents**	Proven by **winning tenders**

Q&A



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