Fresh produce on the loose: Exploring the relationship between food and packaging waste

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Midlands Packaging Society Webinar

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ENVIRONMENTAL RESEARCH
FOOD SYSTEMS

PAPER

Fresh produce on the loose: examining the coherence between plastic packaging and food waste policy using the case study of fruit and vegetables in the UK

CITY ST GEORGE'S UNIVERSITY OF LONDON

Centre for Food Policy
Policy and practice to redesign food systems

UKRI Natural Environment Research Council

University of Sheffield

Introduction

- Packaging and Plastics
- Study 1 – Trial Progress
- Study 2 – Policy Analysis
  - Compare retailer food waste and packaging policies
  - UK Plastics Pact
  - Courtauld 2030
- Discussion
  - Update (study performed 2020 - 2022)

Packaging

Packaging is Everywhere!

What is Packaging?

‘a coordinated system of preparing goods for transport, distribution, storage, sale and use’

(Soroka et al., 1996)

- Existed for as long as people have traded goods
- $1.4 trillion turnover predicted by 2030 (Singh, 2022).

Packaging Functions?

3 main areas:

- Protect the product
- Facilitate handling through the supply chain
- Communicate

Lindh, Helena et al., 2016. Contributions of Packaging to Sustainable Development: A Terminology of Packaging Functions and Features. Packag. Technol. Sci. 29, 225–246. https://doi.org/10.1002/pts.2197

Functions of Packaging (IOM3)

Protect	Facilitate	Communicate
Protect	Contain	Inform
Preserve	Convenience	Sell

Contain, *protect* and *preserve*, *inform* and *sell* to the consumer, and provide a level of *convenience*, within *economic* and *environmental* constraints

(Soroka et al., 1996).

Packaging:

Economic & Environmental

Convenience

Inform & Sell

Contain

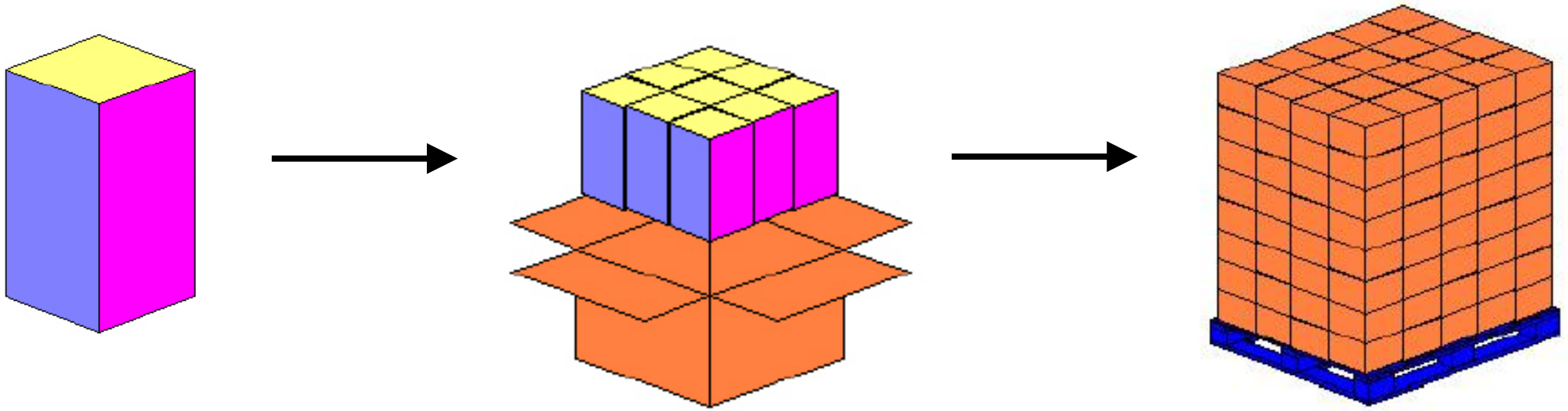
Protect & Preserve

Transit Packaging

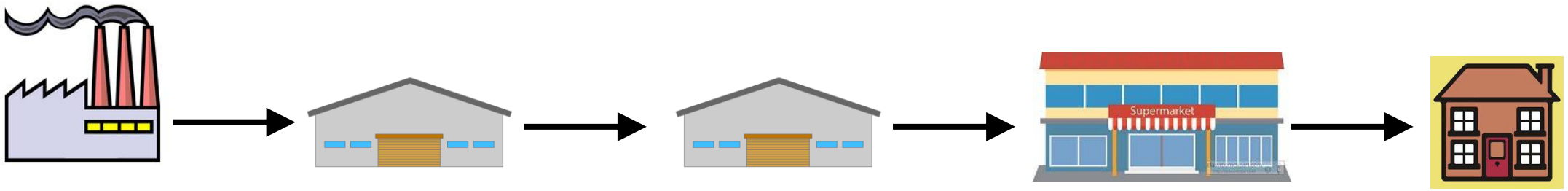
Primary 1°

Secondary 2°

Tertiary 3°



Supply Chain (Ambient Food, UK)



Factory

Warehouse (manufacturer)

Warehouse (retailer)

Store

Consumer

Road journey

Plastics

The plastics problem

Of the 9 billion tonnes of plastic ever produced

only 10% has been recycled

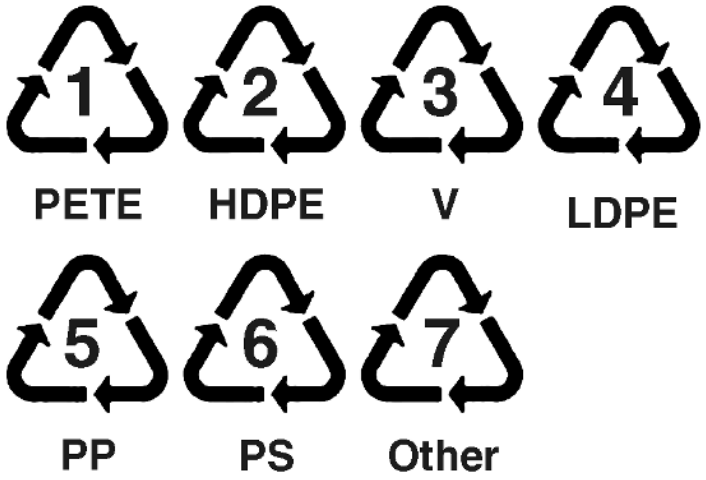
14% has been incinerated

…and the remainder still exists in landfill or the natural environment

1.7 million tonnes A YEAR ends up in the ocean

(Geyer 2020, (OECD, Our world in data)

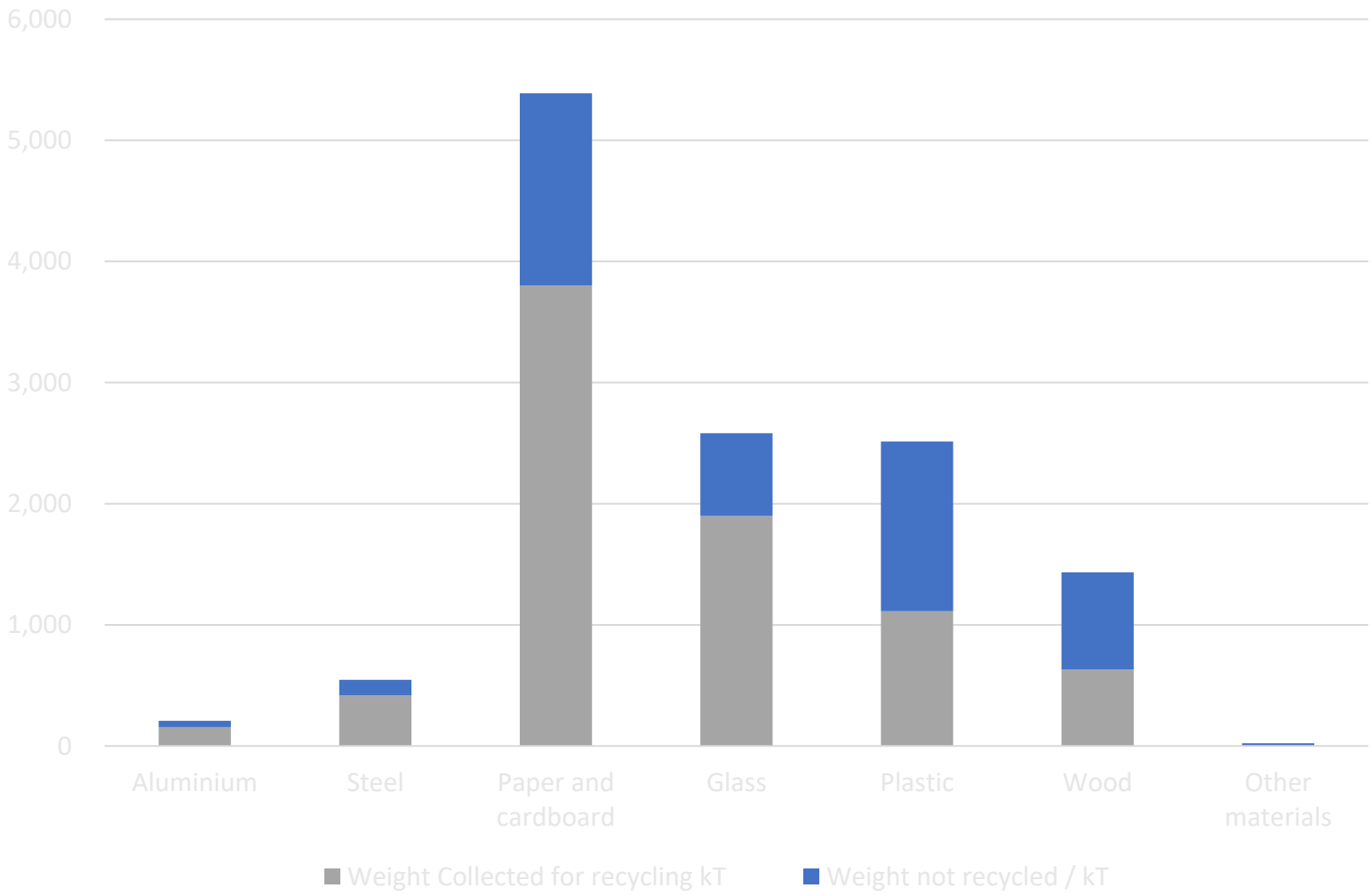
Why is Plastic Such a problem?



Brent crude settled on Wednesday at its lowest level since December 2021 © Bloomberg

Source: Beach Guardian.
Volunteer Laurence Miller,10, found a Walkers crisp packet that is three times as old as he is

Existing Packaging Solutions - Materials



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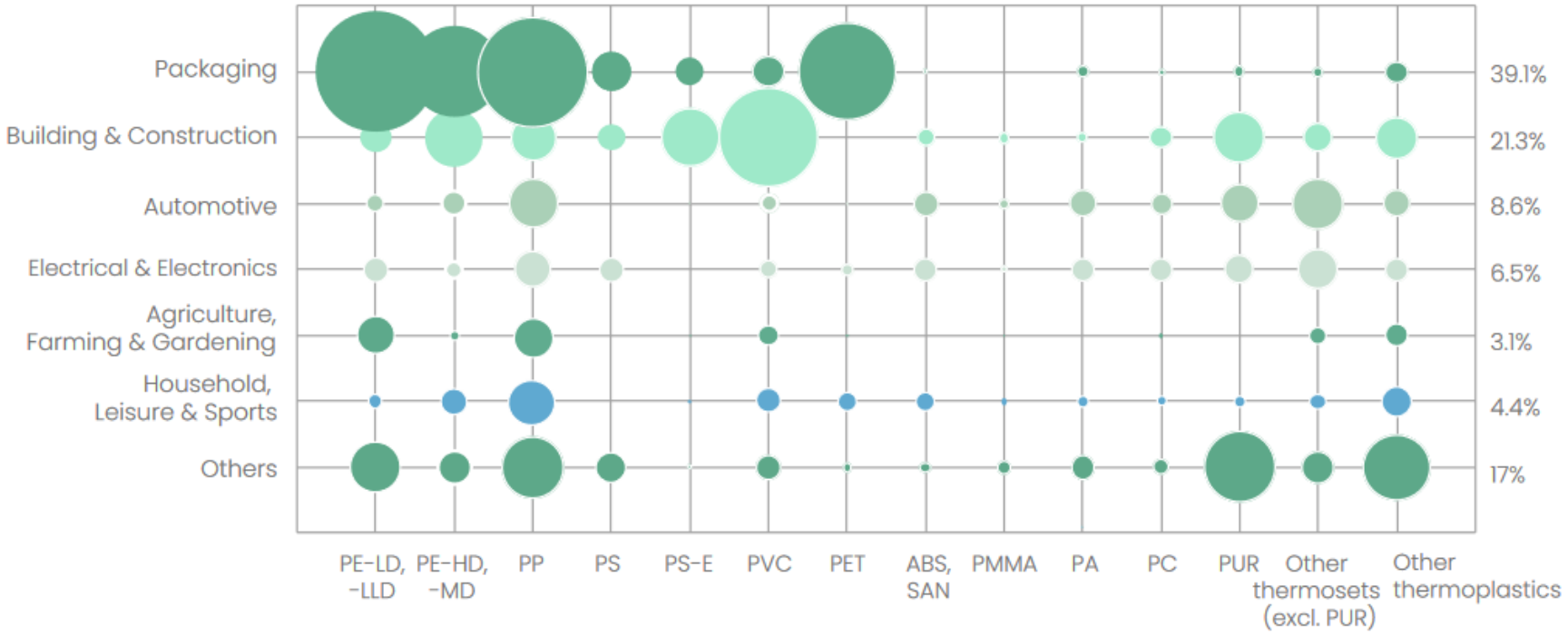
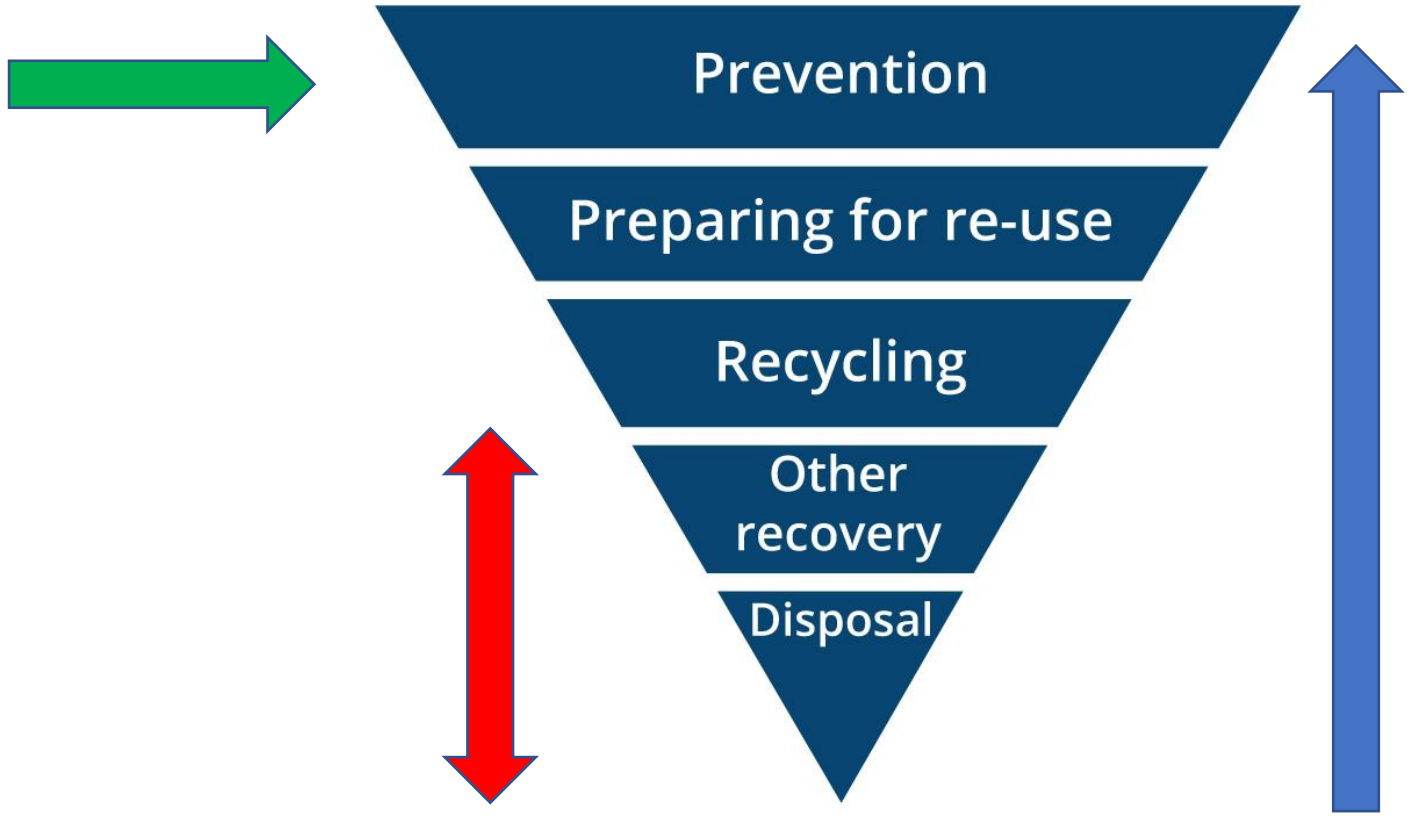
European plastics converters' demand by application and type



Source: Conversio Market & Strategy GmbH based on the input of the Plastics Europe Market Research Group (PEMRG)
The above data are rounded estimations.
Demand data are built on estimations of quantities bought by European converters, including imports.
Demand for recycled plastics and bio-based/bio-attributed plastics is not included. Polymers that are not used in the conversion of plastic parts and products (i.e., for textiles, adhesives, sealants, coatings, etc.) are not included.
Numbers behind this graph are available upon request.
Plastics - the Facts figures on PA only cover PA6 and PA66.

Source: Plastics Europe

EU Waste Hierarchy



Remove

Reduce

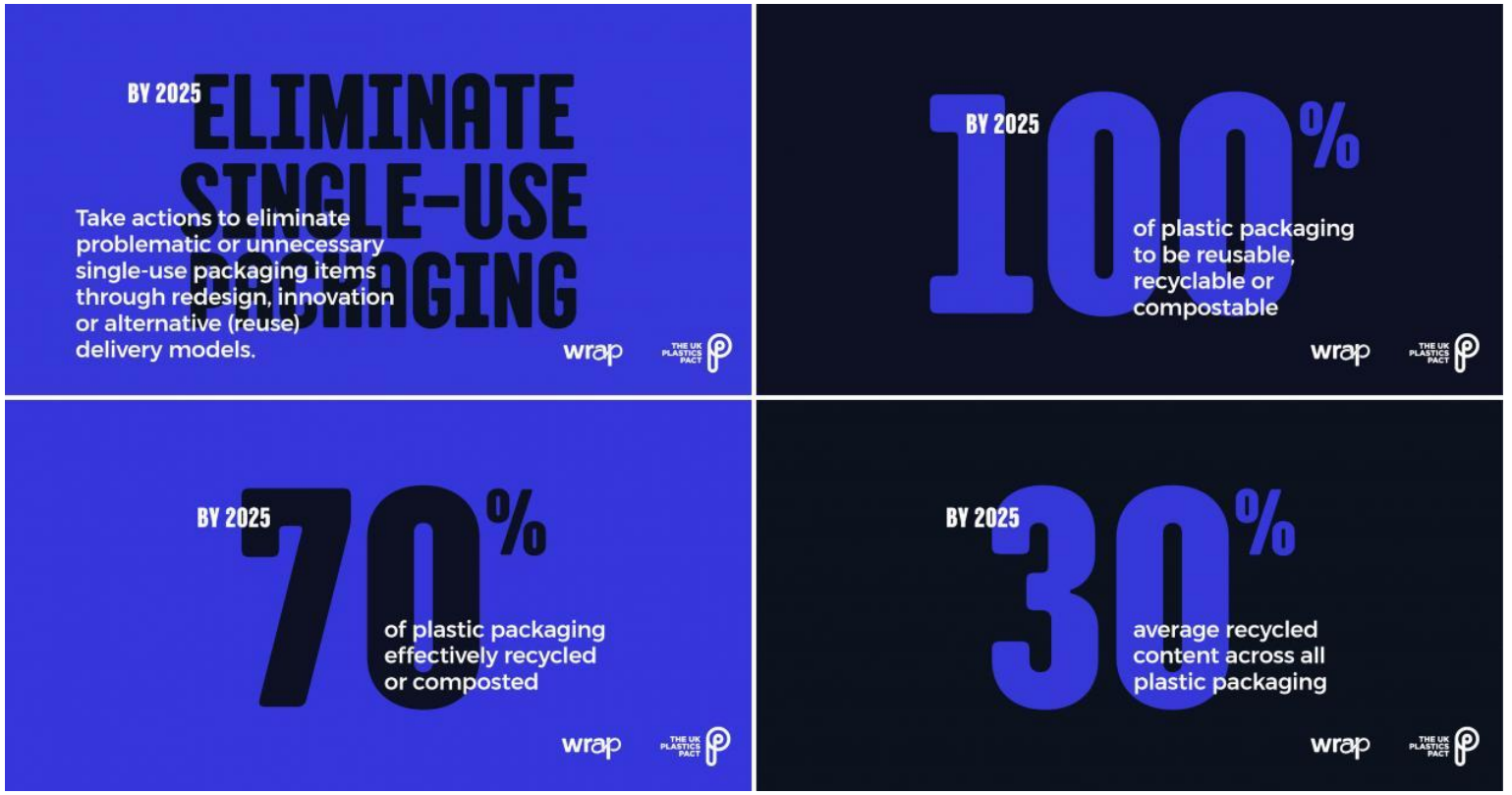
Reuse /Refill

Recycle

(Renewable)

International policy

National level – UK Plastics Pact



WRAP

University of Sheffield

Food Waste

Food Waste

- 1/3 all food is lost or wasted
- 2022 1.05 billion tonnes wasted globally
- UK 9.5 million tonnes pa
  - 73% households
  - 12% hospitality
  - 11% manufacture
  - 4 % retail

(Gustavsson et al., 2011), UNEP 2024, WRAP 2023)

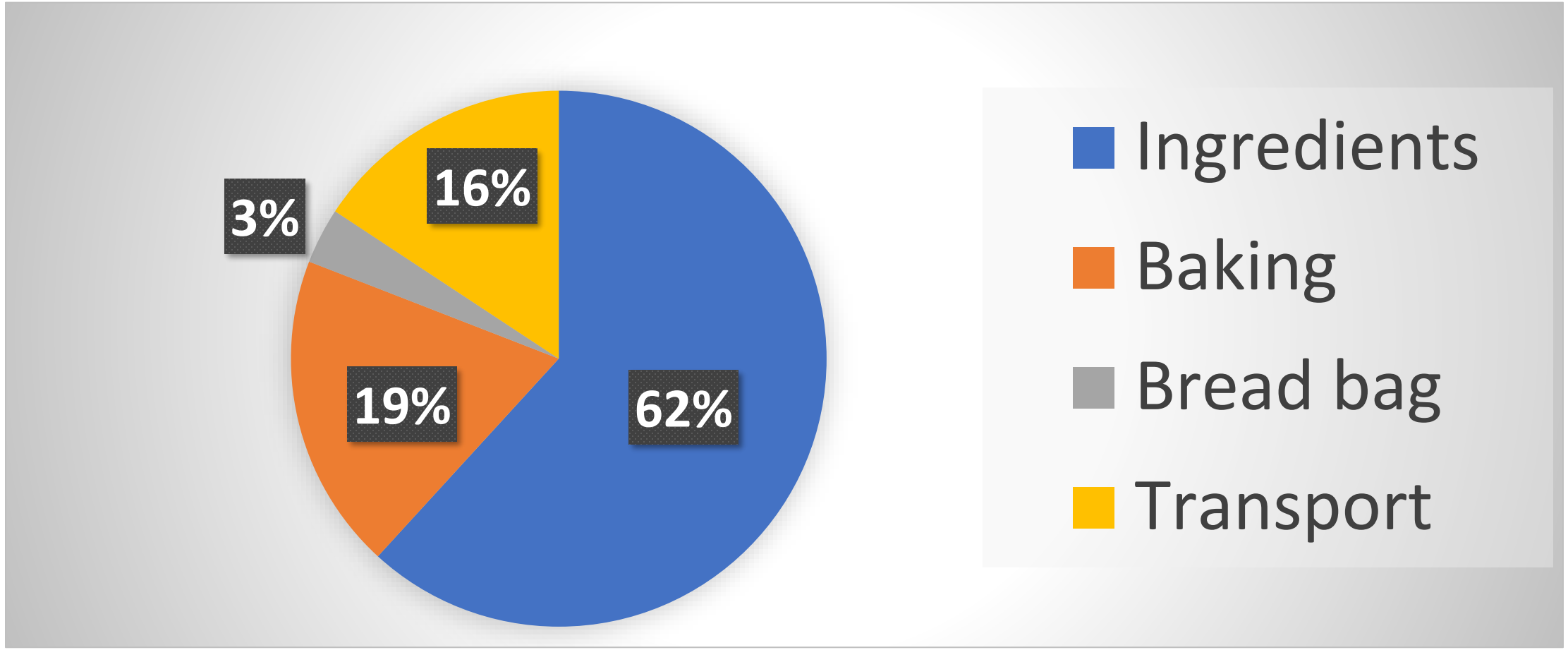
International policy

UK food and drink pact (Courtauld 2030)

- **Reduce food waste by 50% per capita (in line with SDG 12.3)**
- Halve GHG emissions arising from the food and drink system
- Ensure that half of all fresh food is sourced from areas with sustainable water management.

Plastics and Food Waste

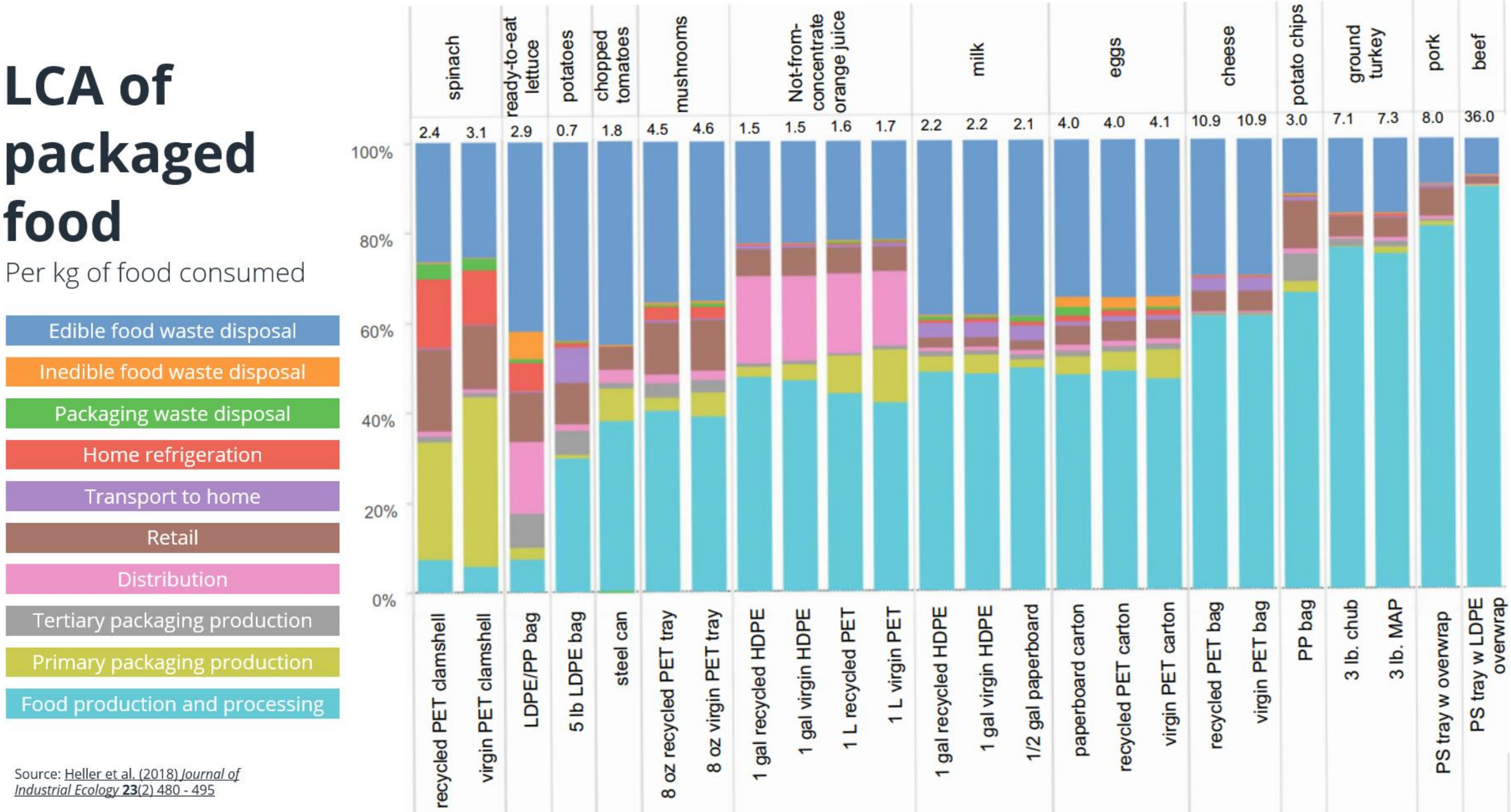
Context – Carbon Footprint – Loaf of Bread



Source: Heller et al. (2018) *Journal of Industrial Ecology* **23**(2) 480 - 495

LCA of packaged food

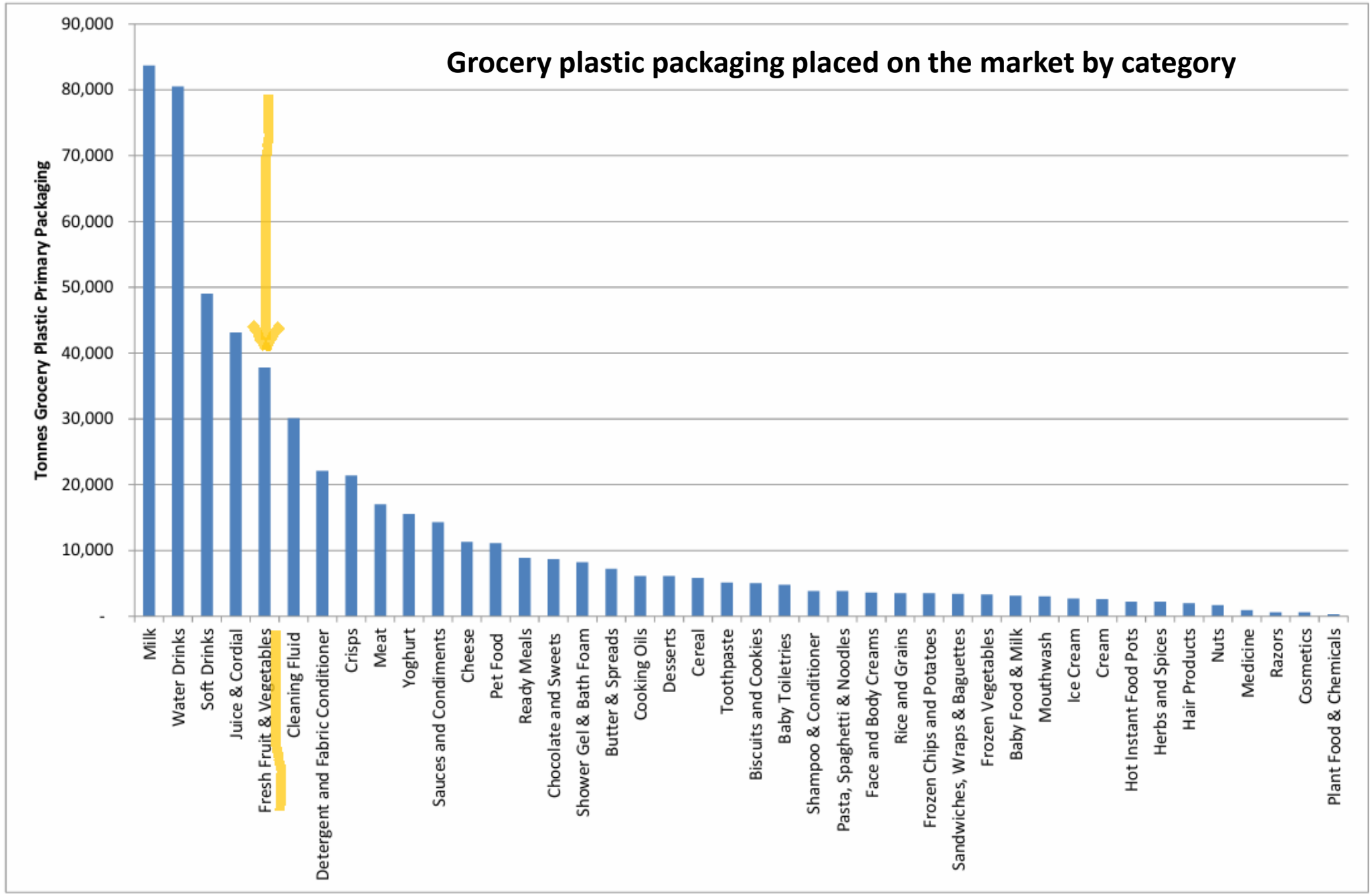
Per kg of food consumed



Source: Heller et al. (2018) *Journal of Industrial Ecology* **23**(2) 480 - 495

Figure 3 Distribution of GHG emissions across cradle-to-grave life cycle stages for the food/package combinations in table 1. Values above bars represent total GHG emissions in kg CO_2-eq. (kg consumed)-1. Note that "edible food waste contribution" includes emissions associated with edible retail- and consumer-level food waste accumulated throughout the life cycle: production, packaging, distribution, retail, refrigeration, and disposal. GHG = greenhouse gas; kg CO_2eq. = kilograms of carbon dioxide equivalent

Why Fresh Produce?



SOURCE: Thomson, H., Illingworth, K., McCoach, H., Jefferson, M., Morgan, S., 2018. PlasticFlow 2025: Plastic Packaging Flow Data Report, Wrap.

Campaigns

the WI
INSPIRING WOMEN

LIVE BBC NEWS CHANNEL

Last Updated: Tuesday, 20 June 2006, 08:51 GMT 09:51 UK

E-mail this to a friend Printable version

Cut excess packaging, WI urging

A campaign against "unnecessary" packaging used by supermarkets has been launched by the Women's Institute.

The WI wants packaging to be compostable or recyclable

It wants stores to charge for plastic bags and phase out practices such as shrink wrapping fruit and vegetables and placing them on trays.

Supermarkets say they have made efforts to cut packaging in recent years.

In a day of action WI members in England and Wales will return "excess" wrappers to stores and urge them to do more to address environmental concerns.

According to the WI, supermarket groceries still account for 70% of the UK's packaging market.

Campaigns and coverage

sky ocean rescue

THE BIG PLASTIC COUNT
9-15 MARCH

SURFERS AGAINST SEWAGE

Sheffield ACTION ON PLASTIC

GREENPEACE

Overall Research Question

"Is going packaging-free the answer to the UK's plastic waste problem for fresh fruit and vegetables?"

Study 1

Research Questions

“What proportion of fresh produce is sold loose?”

“What progress has been made by retailers since 2006 ?”

Method

- Literature review
  - Academic

    ‘Plastic shelf life fresh produce’; ‘packaging shelf life fresh produce’; ‘loose produce; ‘loose produce and shelf life’

  - Grey (websites, trade press etc)

    ‘loose produce’ ‘historic loose produce sales UK’; ‘produce and shelf-life’;

  - Trials that covered a significant amount of produce on sale in a retailer
  - Amount of fresh produce sold loose

Scopus

PackagingNews

The Grocer

Results

Percentage sold loose:

British Growers Association- 15.5%

Greenpeace/EIA- 17 – 19 %

(Greenpeace figures self-reported)

Results

Retailer	Market share % ‡	% sold loose†	Trials of loose F+V	Results reported?
Tesco	27.3	17.0	2019	No
Asda	14.9	-	2007	Y - increased waste
			2017 - pre-packaged only	Y - abandoned
			2020	N
Sainsbury's	15.3	22.0	No trials announced	
Morrisons	10.4	24.4	2018	Y - detailed report
Aldi	7.9	19.0	2019	N
Co-op	6.2	15.0	2018 - cucumbers only	Y
Lidl	5.7	17.0	N	N
Waitrose	5.0	20.0	2021	Y - detailed report
Iceland	2.1	3.0	2019	Y - loss of sales
Ocado	1.4	0.01	N	N
M&S*	1.9	5.0§	2019	Y

†EIA / Greenpeace figures self-reported by retailers, Asda did not report. ‡June 2019 (Statista and Kantar Worldpanel, 2022). §M&S figure. *part of 'other multiples'

Timeline

Loose produce trials

WAITROSE & PARTNERS

Iceland

TESCO

Morrisons

M&S

ASDA

ASDA

co op

ALDI

ASDA

More activity expected

1994 — 2005 — 2006 — 2007 — 2017 — 2018 — 2019 — 2020 — 2023 — 2030 — 2042

theWI INSPIRING WOMEN

THE UK PLASTICS PACT

Packaging Essential Requirements introduced

Courtauld 1 launched

Reform to legislation announced

WRAP launch roadmap for Loose Produce

Courtauld 2030 due

25-year plan due

Legislation, Campaigning & Voluntary Agreements

ASDA

2007 - unsuccessful - in-store spoilage rates doubled to approximately 6% caused by

"acceleration of the ripening process, produce becoming damaged and not subsequently purchased and the practical difficulties of keeping track of stock rotation"

and that many customers

"preferred to buy packaged produce" for reasons of convenience and hygiene

2017 - comprehensive 10-month trial in three stores

Initial waste levels were **2.7 times higher** than normal, but this was **brought back to average levels** through improvements to store processes and management.

Morrison's had dedicated loose produce areas in 63 stores in 2019 and in 2020, 332 of their 497 stores included loose produce (Perkins, 2021).

in a customer survey as part of the trial **75% of customers** preferred to buy fresh produce loose

WAITROSE
& PARTNERS

Loose produce formed part of the wide-ranging Unpacked trial in Waitrose in the Botley Road, Oxford store starting in 2019 (John Lewis Partnership, 2021). in-store food wastage increased at the start of the trial (due partly to *“ordering too much pre-packed soft fruit”*) but they do not detail the value that this levelled off to. They considered the trial a success in the reduction of the amount of plastic waste generated and overall greenhouse gas reduction. Customer feedback included that there was a loss of quality of some of the naked products.

Iceland

Abandoned a 2019 trial quoting a loss in sales of 30% stating *“What people want is pre-packaged convenience. Lots of people pop in and spend small amounts of money. We need to keep prices low and the trial cost us more in the end.”*

Other retailers that stated an intention to run trials but did not report detailed results included M&S, Tesco and Aldi. M&S generally positive and due to employing ‘green grocers’ in the trial store.

Investigating a move in the opposite direction, Asda provoked internet outrage by experimenting with selling only pre-packed produce in 2017 (Paterson, 2017). Perhaps learning from this, they started to investigate loose produce again in a store dedicated to trialling sustainable initiatives (Asda, 2020).

Discussion

- Asda vs Morrisons & Waitrose – now a will to overcome increased waste
- Activity 2018 -2022
- Iceland Asda try again
- No reporting on –
  - Costs (staff time, greengrocers)
  - Secondary packaging for protection or preservation
- Consumer acceptance – loss of convenience Loss of communication channel, perceived hygiene reduction. Difference between Asda/ Iceland and Morrisons could be demographics or intention-behaviour gap.
- Cultural and social factors → plastics reduction
- 3/11 acknowledge customer acceptance as an issue → further investigation

Study 2

Research Question

"How well aligned are supermarket policies on food waste and packaging waste with the UKPP and the Courtauld 2030 voluntary agreements?"

Part 1 - Method

Grey literature search – online search engine

‘[name of retailer]’ and ‘packaging policy’
‘[name of retailer] and food waste policy’

98 webpages and documents of interest

Key information → spreadsheets cf UKPP and C2030 targets

Searched for within those documents the terms, ‘hygiene’ ‘safe*’, ‘protect*’, ‘convenien*’ and ‘food waste’.

Results

Retailer	Tesco	Sainsbury's	Asda	Morrisons	Aldi	M&S	Co-op	Lidl	Iceland	Waitrose	Ocado
UKPP member?	Y	Y	Y	Y	Y	Y	Y	Y	N	Y	Y
Policy aligned with T1? (elimination of 'unnecessary' items)	Y + all materials	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Policy aligned with T2?											
RECYCLABLE?	Y	Y	Y	Y	Y	Y	Y	Y	n/a	Y	Limited info
REUSABLE?	Y	Y	Y	Y	Y	Y	Y	Y	n/a	Y	Limited info
COMPOSTABLE?	N	N	N	N	?	N	Carriers	N	Y - lobbying for waste stream	Produce giveaway bags only	Limited info
Policy aligned with T3? (70% effectively recycled or composted)	Y	Y	Y	Y	Y	Y	Y	?	n/a	?	Limited info
Policy aligned with T4? (30% recycled)	'contains recycled content where possible"	Say they are working towards (8)	Y	Y	Ambiguous.	Target to exceed	Achieved and target to exceed	Ambiguous	n/a	Not much on recycled content - (ready meal trays)	Limited info
Retailer strategy name / description?	4 Rs (**Remove Reduce Reuse Recycle**)	Reduce by 50% by 2025 - **Removed Reduce Replace Recycle**	3 Rs of waste management (**Reduce Reuse Recycle**)	Plastic and Packaging Policy	7 Plastic and Packaging Pledges	Plastics Plan- 5 Plastic Principles - **Refuse, Redesign, Reduce, Reuse and Recycle**	Action on Plastics. Across supply /disposal chain.	Circular motion' strategy - **Reduce, Recycle, Reuse, Engage, Collaborate** (21)	**#TooCoolForPlastic** Complete removal by 2023	Taking Action on Plastics	Limited info
Reduction targets?											
Plastic	-	50%	3 bn pieces	50%	-	30% (2027)	15% (2022)	40%	100% (2023)	50%	-
All packaging	50% by 2023	-	-	-	50%	-	-	25%	-	One third	-
Paper and Board	100% sustainable by 2025	-	-	-	Y	-	-	Y	-	-	-
Acknowledgement re:											
Food waste prevention	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	-
Protection, (protection, safety, hygiene)	Y	Y	Y	Y	Y	Y	Y	Y		Y	
Consumer acceptance/ convenience	-	-	Y	Y	-	-	-	-	-	-	Y
Courtauld 2030 Signatory? (WRAP, 2022d)	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y
Reference document in supplementary information	1,3,4,6,10,11,12,46,47, 51, 94,102	7-9, 12a, 13, 48, 49, 76	14, 15, 60, 61, 86, 89	16-19, 83, 95, 101	20, 20a, 65, 72, 74	27-34, 50, 69, 77, 82, 85, 87, 88	35-39a, 70, 73, 75, 79, 80, 91, 92	21-23, 53-55, 62, 97-99	24-26, 56-59	40-45, 78, 90, 93, 103	52, 63-64, 71, 96, 104

Discussion

- 10/11 Members UKPP
- 11/11 Members of C2030
- All broadly in line UKPP
- Each own version of Rs of sustainability (waters down collective effect)
- Most go beyond UKPP for plastics reduction – 50% common
- T2 – (Reusable), **Recyclable** or (compostable)
  - Compostable: Morrisons - lack of infrastructure, Co-op and Waitrose bags, Tesco Red List. Iceland lobbying

Discussion

- Packaging functions
  - 9/11 packaging **protects** the product
  - 10/11 acknowledge **prevents food waste** (or keeping food fresh)
  - 3/11 **convenience** provided to consumer

- Food Waste
  - Simpler and vary less between retailers
  - All signed up to C2030
  - Farm to fork, focus on operational waste (9/11), 4/11 discus supplier and/or customer food waste. 2 just in general
  - Reiterate above – 10/11 acknowledge prevents food waste

Part 2 – Policy Coherence Analysis Method

Interaction label	Description	Meaning
+3	Indivisible	Progress on one target automatically delivers progress on another
+2	Reinforcing	Progress on one target makes it easier to make progress on another
+1	Enabling	Progress on one target creates conditions that enable progress on another
+/- 0	Consistent	There is no significant link between the two target's progress
-1	Constraining	Progress on one target constrains the options for how to deliver on another
-2	Counteracting	Progress on one target makes more difficult to make progress on another
-3	Cancelling	Progress on one target automatically leads to a negative target on another

Table 5.4 *coding framework for coherence analyses in tables 5.4 and 5.5 ref* (Nilsson et al., 2018, 2012) *showing the meaning of each interaction label.*

Policy Coherence Analysis

Retailer	Policy	Reduction Target in policy / % (see Table 5.2)	UKPP				C2030 (food waste only)
			T1	T2	T3	T4	
Tesco	Plastic	50% (All Packaging)	3	3	2	2	0
	Food Waste	n/a	-1	-1	-1	0	3
Sainsbury's	Plastic	50% (Plastic)	3	3	2	2	0
	Food Waste	50%	-1	-1	-1	0	3
ASDA	Plastic	3 billion pieces	3	3	2	3	0
	Food Waste	n/a	-1	-1	-1	0	3
Morrisons	Plastic	50% (Plastic)	3	3	3	3	0
	Food Waste	50%	-1	-1	-1	0	3
Aldi	Plastic	50% (All Packaging)	3	3	2	2	0
	Food Waste	50%	-1	-1	-1	0	3
M&S	Plastic	30% (Plastic)	3	3	2	3	0
	Food Waste	50%	-1	-1	-1	0	3
Co-op	Plastic	15% (Plastic)	3	3	2	3	0
	Food Waste	50%	-1	-1	-1	0	3
Lidl	Plastic	40% (All Packaging 25%)	3	3	2	2	0
	Food Waste	50% (in-store)	-1	-1	-1	0	3
Iceland	Plastic	100% (Plastic)	3	3	2	0	0
	Food Waste	50%	-1	-1	-1	0	3
Waitrose	Plastic	50% (Plastic)	3	3	2	1	0
	Food Waste	50% (operational)	-1	-1	-1	0	3
Ocado	Plastic	n/a	1	1	1	1	0
	Food Waste	100% (operational)	-1	-1	-1	0	3

Discussion

- The UK Plastics Pact (UKPP) and the food waste targets of Courtauld 2030 (C2030) are fundamentally incoherent at a high level
- Harmonisation between these conflicting goals is achieved through **explicit and implied caveats** within plastics policy
- Food waste policy currently **dominates** plastics policy.
- The complexity of the plastics policies compared to food waste can be attributed to the **longer history of voluntary agreements** in the food waste sector, and "knee-jerk" reactions post Blue Planet

Discussion

- Policies similar at the top level but differ at a granular level – e.g 4Rs, 3Rs, different names, when they could have maybe achieved more with a single message
- Competitive edge – ‘being the first to’
- Reduction targets over ambitious (50% from Greenpeace lobbying?)
- Lack of data transparency (trials not reported in detail)– could hinder progress
- Closer collaboration, with a unified awareness campaign (cf Love Food Hate Waste) could speed up progress.

Final thoughts

Overall discussion

Loose produce sales 15-18% - very top line figure

Renewed will to make it work post 2017 – However little activity post period of this study (or at least made public)

Consumer acceptance unclear (Iceland v Morrisons) and not discussed much in policies

Care needs to be taken if case of a ban – diets not affected – understanding of behaviour

EU legislation – ban on packaging for certain produce 2030

France and Spain already have bans, experiencing difficulties – result of lack of harmonisation with other EU states

Future opportunities

Develop / Improve supply chain systems to enable people to buy the exact amount they need without creating food waste in the supply chain

Greater transparency could accelerate progress

WRAP – issued a roadmap to selling more **uncut** produce loose

Progress report expected

Next iteration of the pact – strengthen targets on compostable plastics (or remove!)

Overall Research Question

"Is going packaging-free the answer to the UK's plastic waste problem for fresh fruit and vegetables?"

Overall Research Question

"Is going packaging-free the answer to the UK's plastic waste problem for fresh fruit and vegetables?"

Partially!

Thank you

Sarah Greenwood Packaging

Links

Email: sarah@scgreenwood.co.uk

LinkedIn: https://www.linkedin.com/in/sarahgreenwoodpkg/

Paper: https://iopscience.iop.org/article/10.1088/2976-601X/ad7ff3

PhD Thesis (Chapter 5 is an extended version of the paper):

https://etheses.whiterose.ac.uk/id/eprint/38238/

Plastics Consultancy Network: https://pcn.org/

Sarah Greenwood Packaging: https://scgreenwood.co.uk/