

# Biodegradable plastics in the circular bioeconomy: myth or reality?

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# Outline

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## **Context & Definitions**

The link between plastic pollution, food waste and the promise of biodegradable plastics

2

## **Research Aims & Approach**

Are biodegradable plastics suitable in the current UK organic waste (think food waste) treatment sector?

3

## **Outcomes & Future work**

Results from stakeholder study and moving forward

But first... What do biodegradable plastics mean to you?

Mentimeter!

[www.menti.com](http://www.menti.com)

**6637 4029**

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# In context: The good, the bad and the ugly



The Advertising Archives

Plastics are fantastic  
(they really are!)



Dan Clark/USFWS via AP

Plastic pollution:  
take-make-dispose  
model



www.weil.de

Recycling trap and  
food contamination

**Biodegradable plastics to enable closing the loop + food waste recycling**



# Biodegradable plastics: a leaky terminology

- Bioplastics
- Industrially compostable plastics
- Home compostable plastics
- Bio-based plastics
- Drop-in plastics
- Oxo-degradable plastics

Decomposed by microbes into water, CO<sub>2</sub> and biomass **under certain conditions**

**It's all about the context!**



# Study Aims


## Policy Agenda

Call for biodegradable plastics under the Bioeconomy Strategy

Separate food waste collections from 2023, to be treated in anaerobic digestion (AD)

## Research Questions

- I. What are the **attitudes** towards the treatment of biodegradable plastics in AD among stakeholders?
- II. How **suitable** is the current **AD infrastructure** and what are the **barriers**?
- III. How can we better design the **system** to ensure a **closed material loop**?



On-the-ground perceptions, practices & performance?

# Research Methods



Semi-structured  
stakeholder interviews



Computer-assisted  
qualitative data analysis



Rapid evidence  
assessment



Microbial analysis



Qualitative systems  
modelling



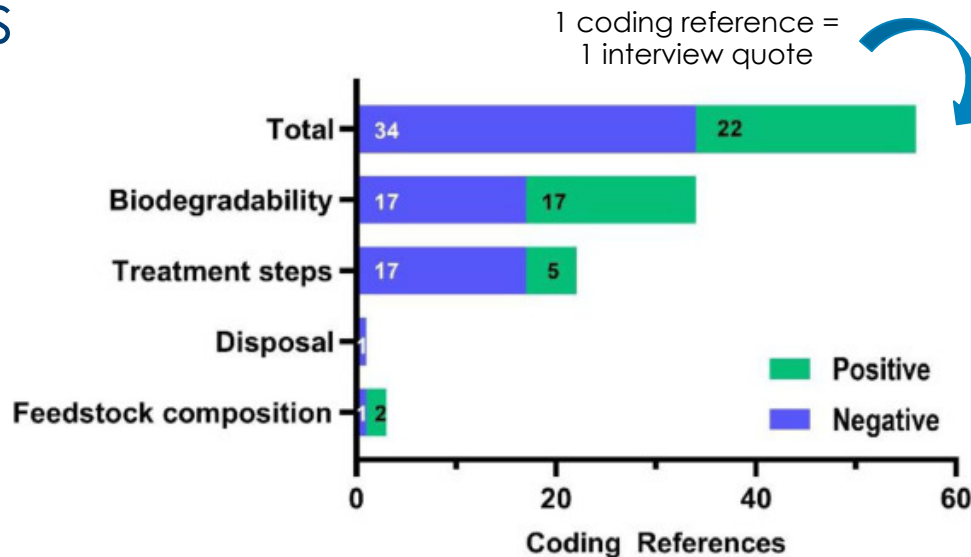
Behaviour chain

# Real-life insights: stakeholders attitudes

Concerns over biodegradability –  
systematically removed from stream

Scepticism over scientific evidence

Develop research design that is  
industry-relevant





# But what about the consumers and the wider system?

Stakeholders identified consumers as **key actors**

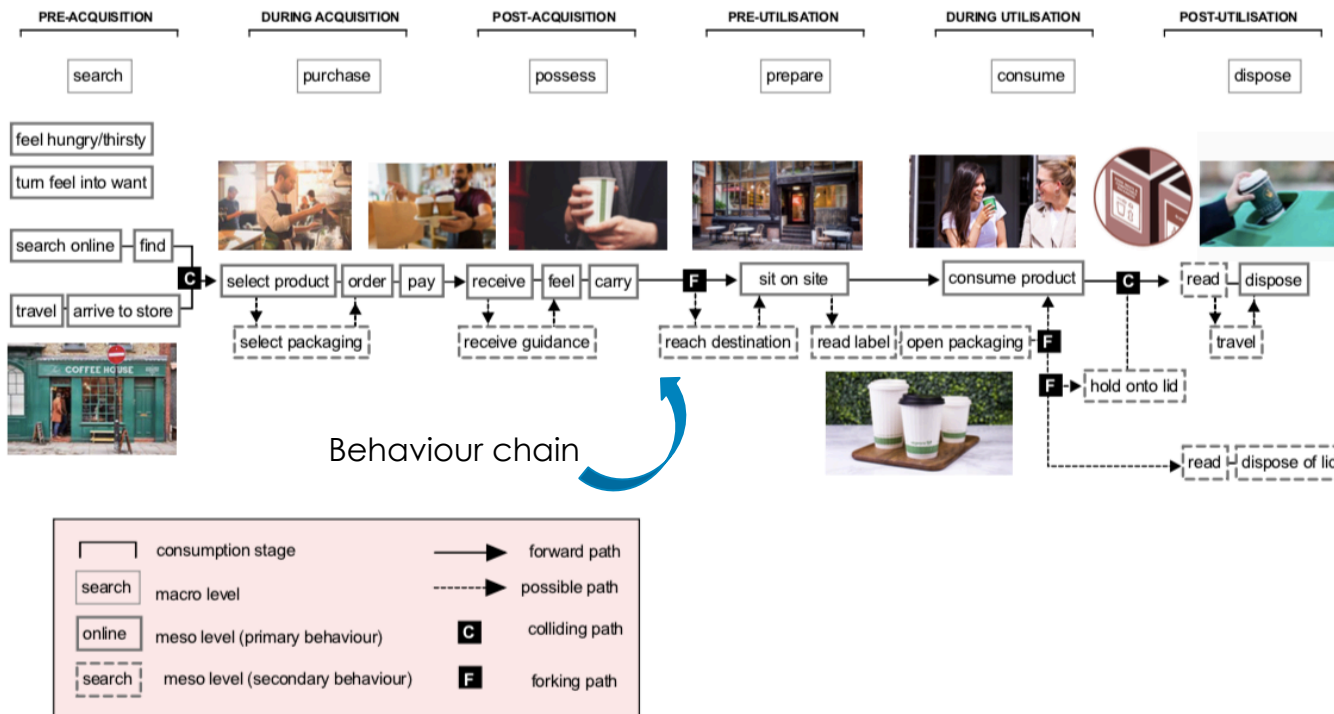


Embedding the research question in a **socio-technical systems theory**

Consumers as vehicles for **material flow and circularity**

# Systems approach

Mapping the **system elements** that enable or undermine the realisation of appropriate **disposal**



## In conclusion:

Myth: They won't solve the plastics crisis (sorry!)

Reality: In the **right context**, they can support circular waste management practices

## Thank you

Out today (whoop!) S. Kakadellis & G. Rosetto (2021). Achieving a circular bioeconomy for plastics. *Science*, 373 (6550): 49-50 doi: 10.1126/science.abj3476

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# Appendix: Aligning research with current AD practices

Develop research design that is industry-  
relevant

AD system still poorly characterised,  
particularly biological aspect

