

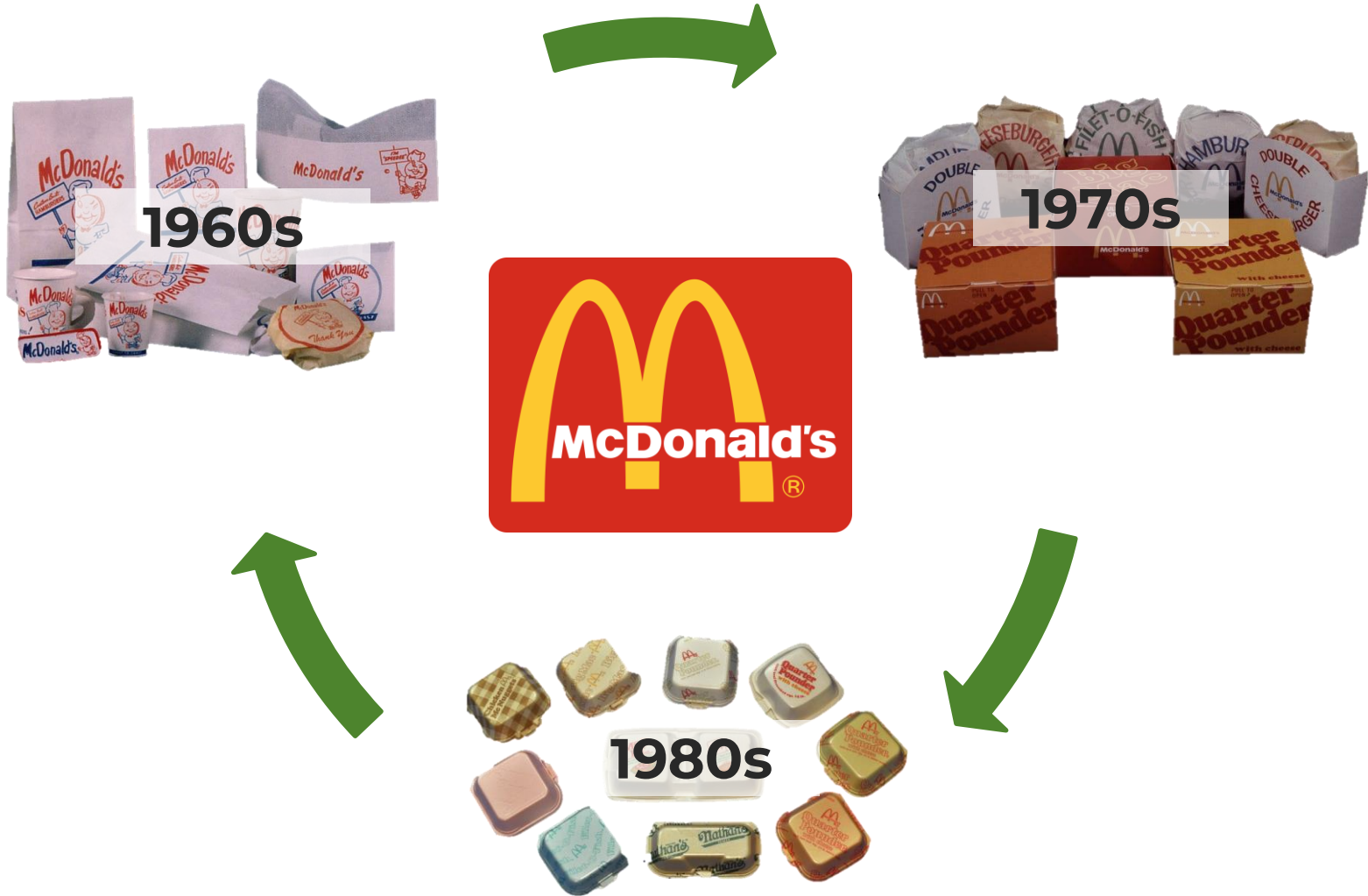
Breaking Through the Sustainable Packaging Dilemma: Carbon Footprint Vs. Waste Management



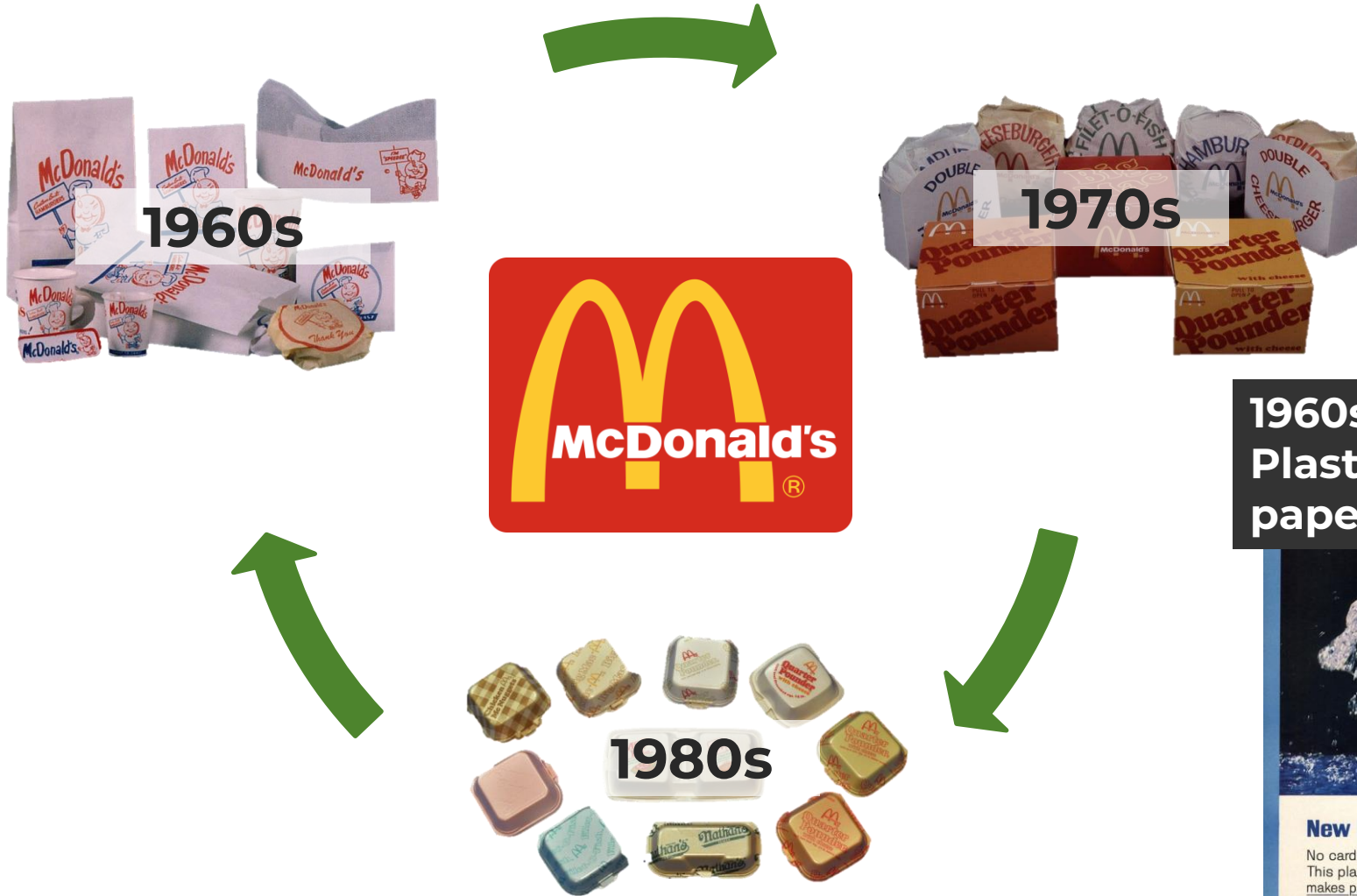
Marcian Lee, Ph.D.

Analyst

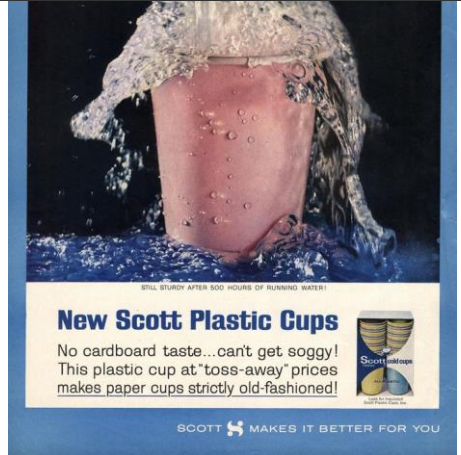
The ever-evolving definition of “sustainable” packaging



The ever-evolving definition of “sustainable” packaging



**1960s and 1970s:
Plastics touted as
paper alternative**



The ever-evolving definition of “sustainable” packaging



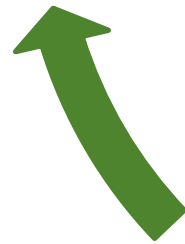
1960s



1970s



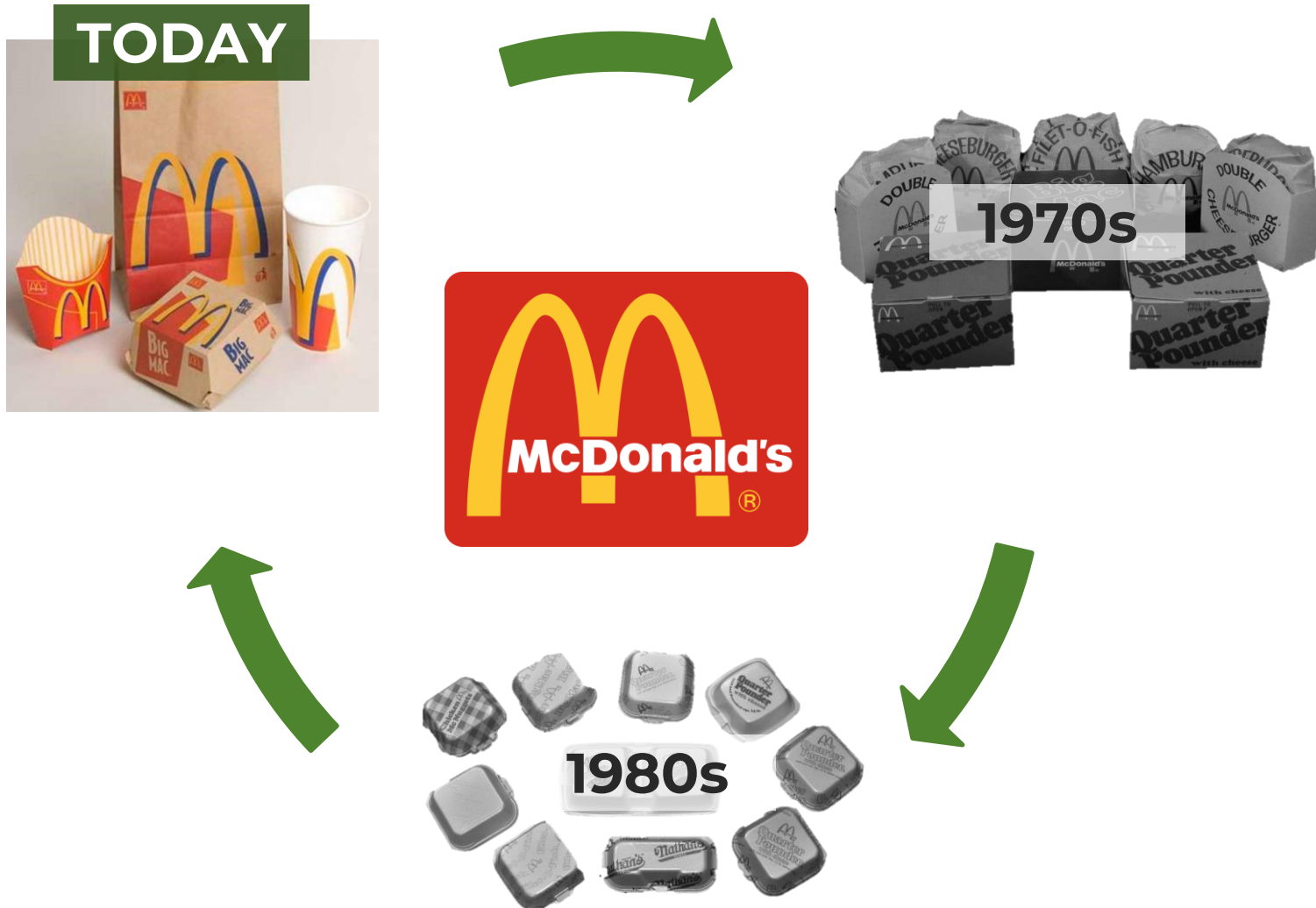
1980s: Ronald
“McToxic”
campaign against
polystyrene



1980s



The ever-evolving definition of “sustainable” packaging



Agenda



1 | **The sustainable packaging dilemma**

2 | **Breaking through the dilemma**

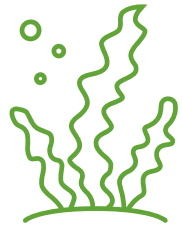
3 | **Next steps**



**Sustainable
packaging
requires
balancing
environmental
impacts**



Climate Change



Eutrophication



Land-Use Change



Acidification



Resource Depletion



Water Depletion

There are many different impacts to consider in a full life cycle analysis



Ozone Depletion



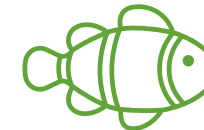
Ionizing Radiation



Photochem Ozone Formation



Microplastics

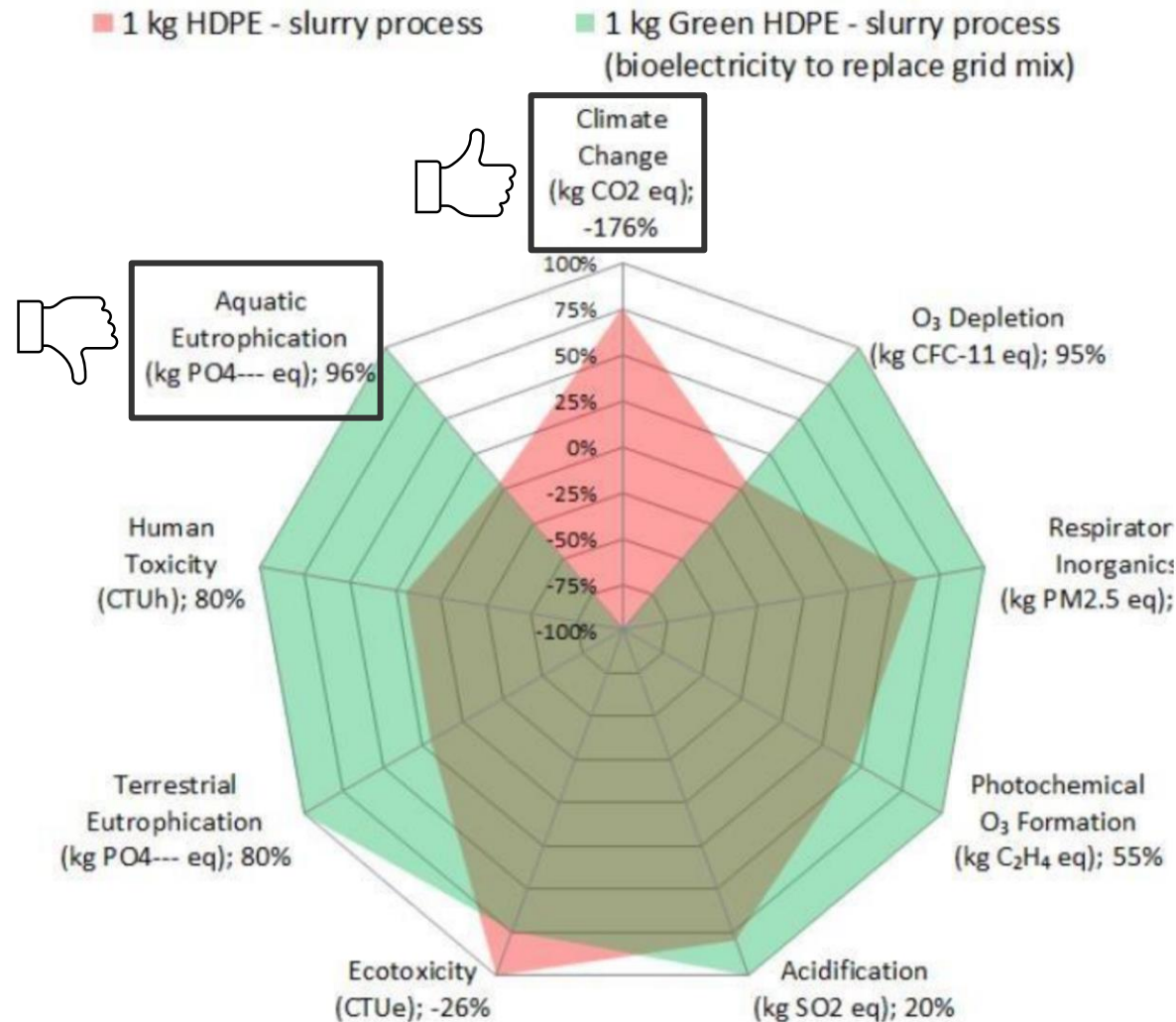


Ecotoxicity

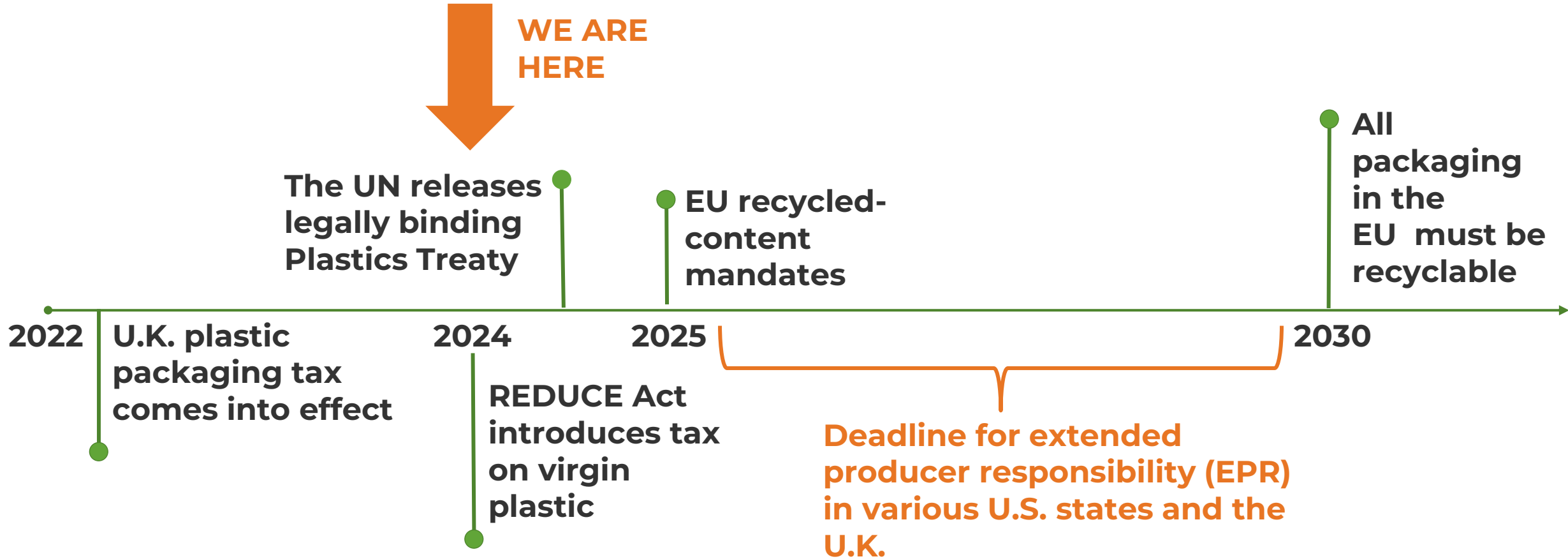


Biodiversity Loss

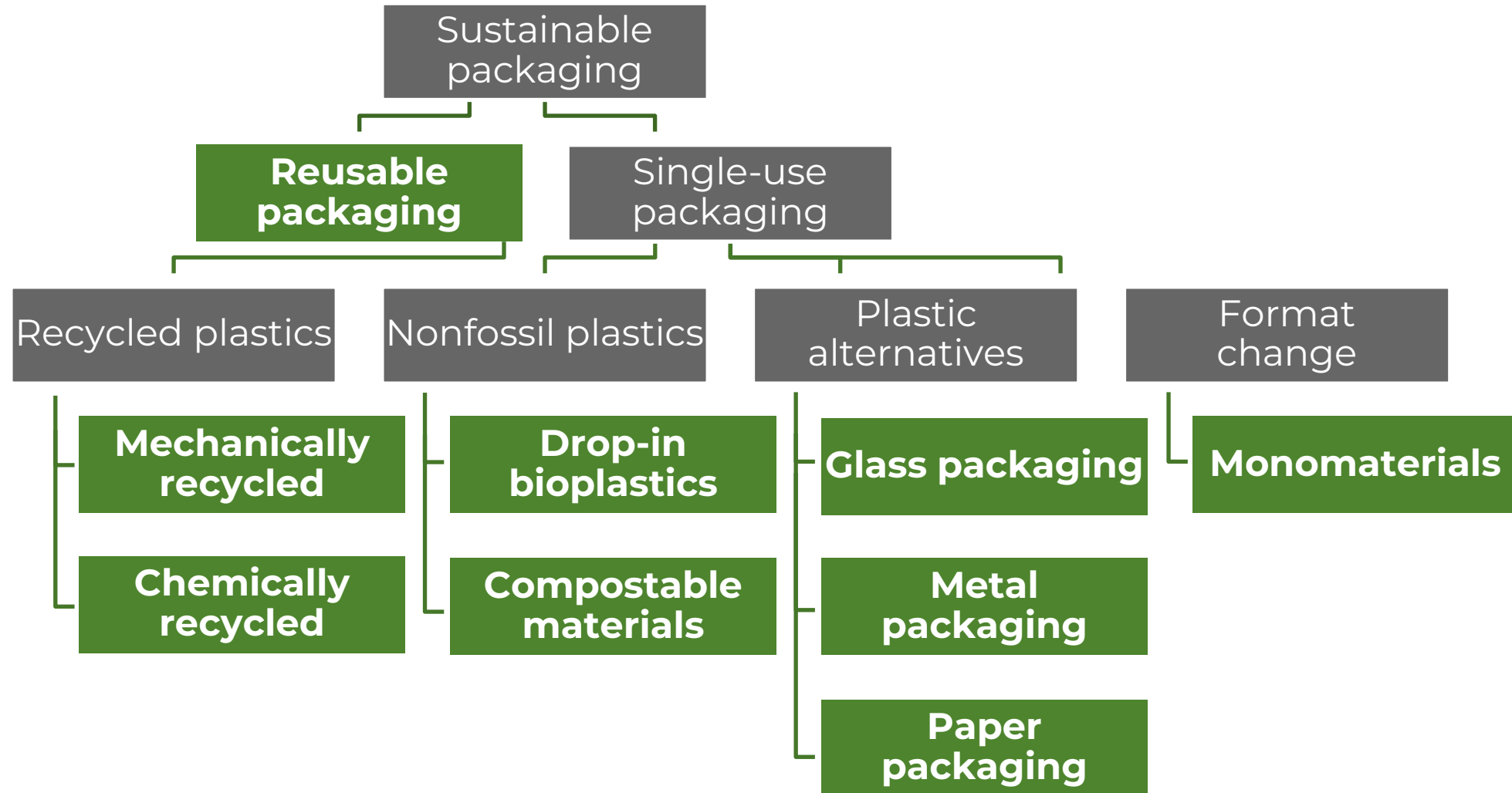
Braskem's third-party LCA for its "I'm green" biobased polyethylene



Deadlines are fast approaching to meet sustainability targets



The 9 alternative packaging materials considered to achieve goals



Balancing different environmental impacts is a common dilemma in industry

“

We care about the end of life of our packaging, but we need to think about our carbon footprint as well.

**Packaging R&D
Director – agrifood
conglomerate**

“

If we wanted to meet our recycling targets, we would choose metal packaging — but if we wanted to meet our carbon-reduction targets, we would choose plastics instead.

**Sustainability
Manager – major
packaged seafood
producer**



Agenda



1 | The sustainable packaging dilemma

2 | Breaking through the dilemma

3 | Next steps

Today's priorities: Carbon footprint and waste management

Carbon Footprint Cost



Carbon taxes = \$\$

Waste Management Cost



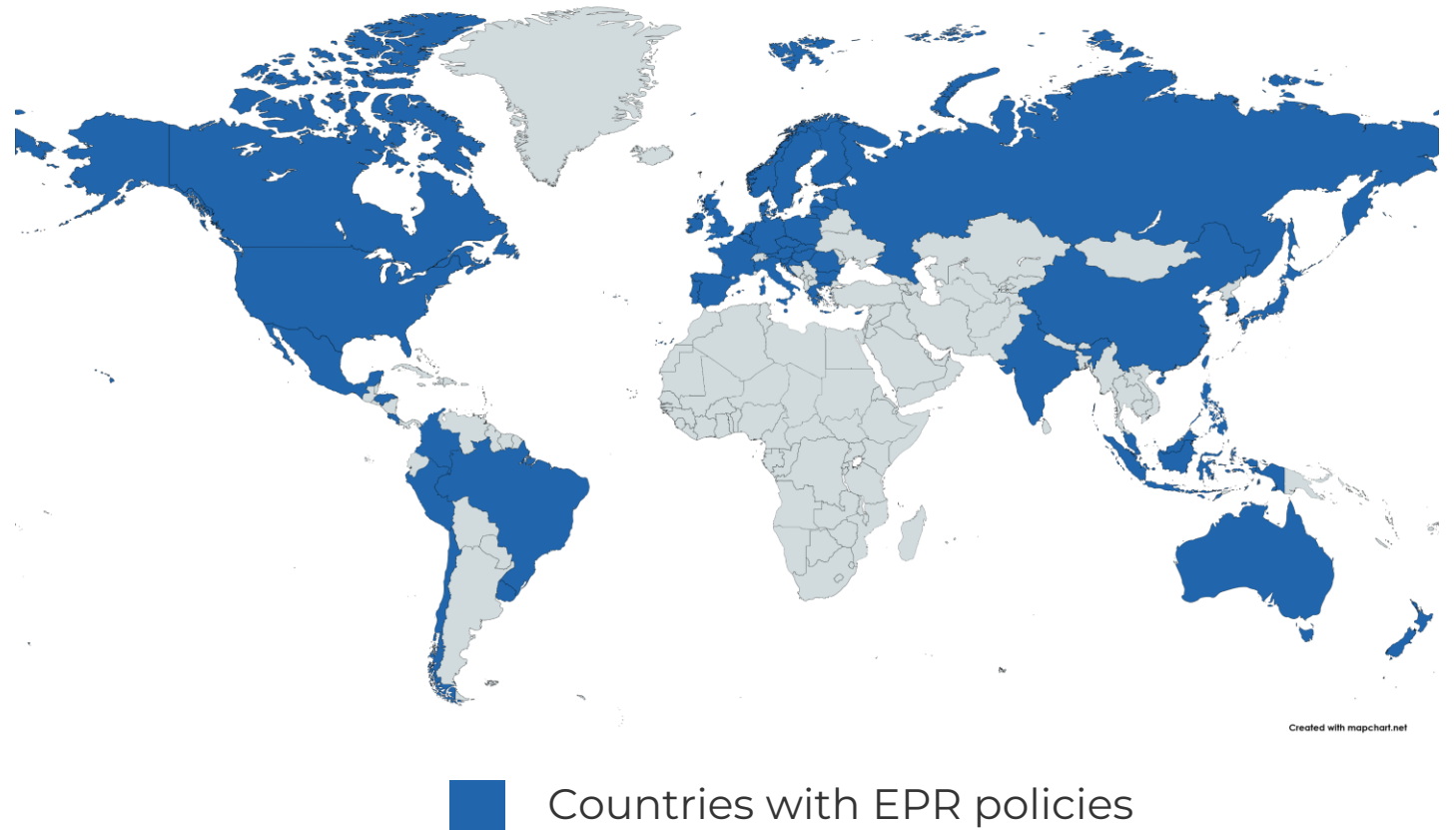
EPR fees = \$\$

EPR is being adopted across the globe

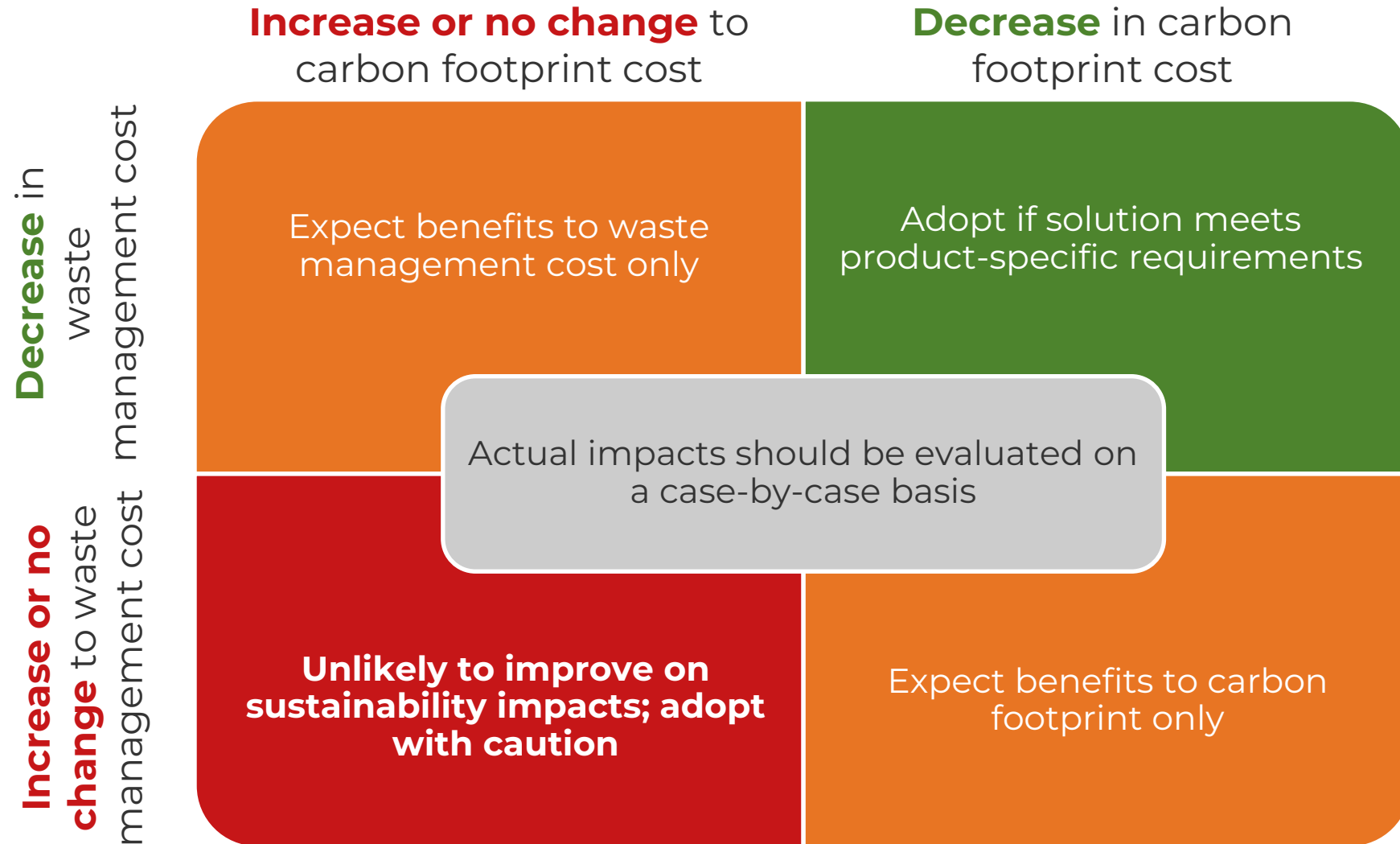
EPR schemes require producers to pay a fee for the amount of packaging waste they put on the market

Fees charged based on weight and/or number of articles

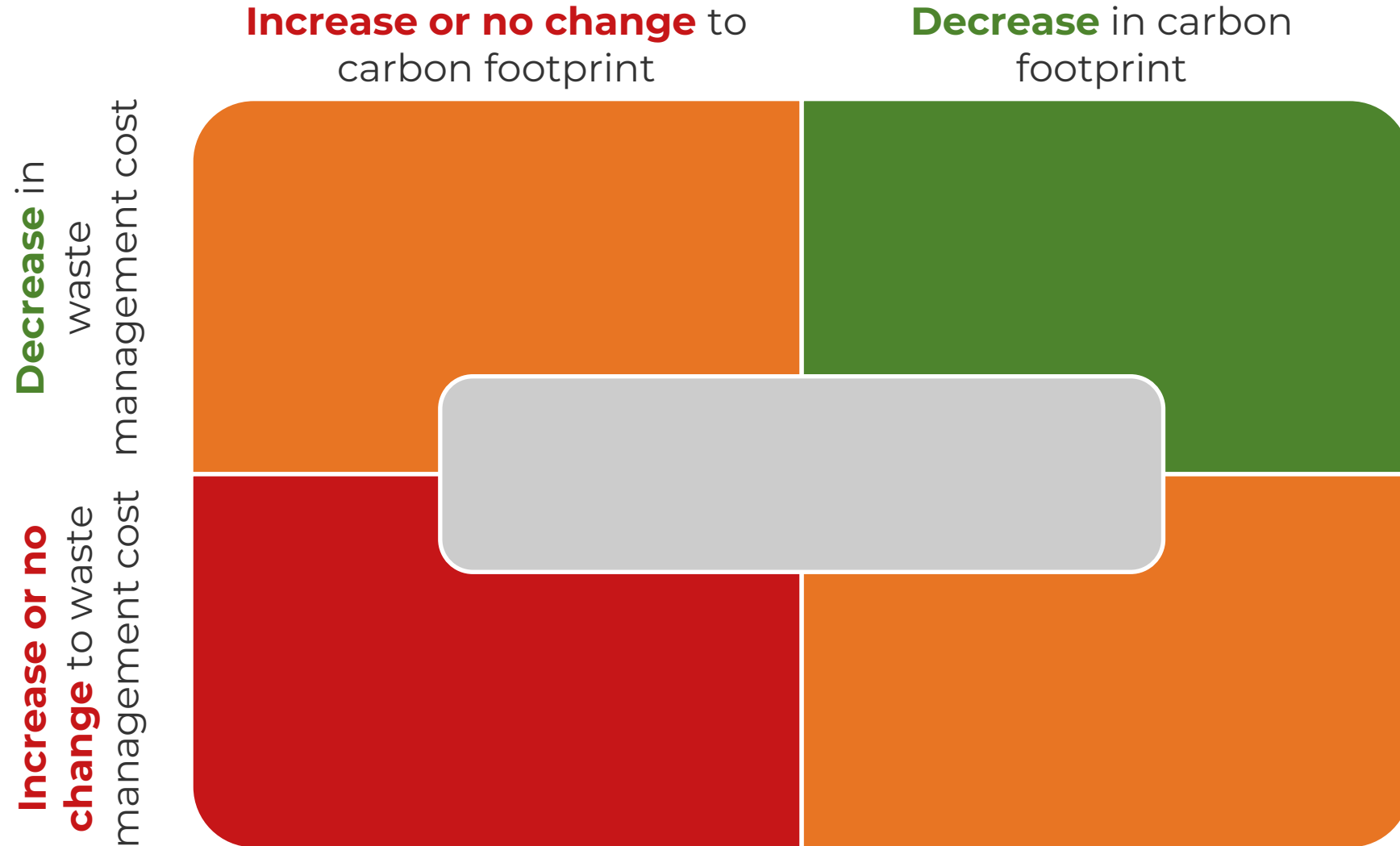
Eco-modulated EPR schemes give bonus or discounts for more sustainable packaging — usually referring to more easily recycled ones



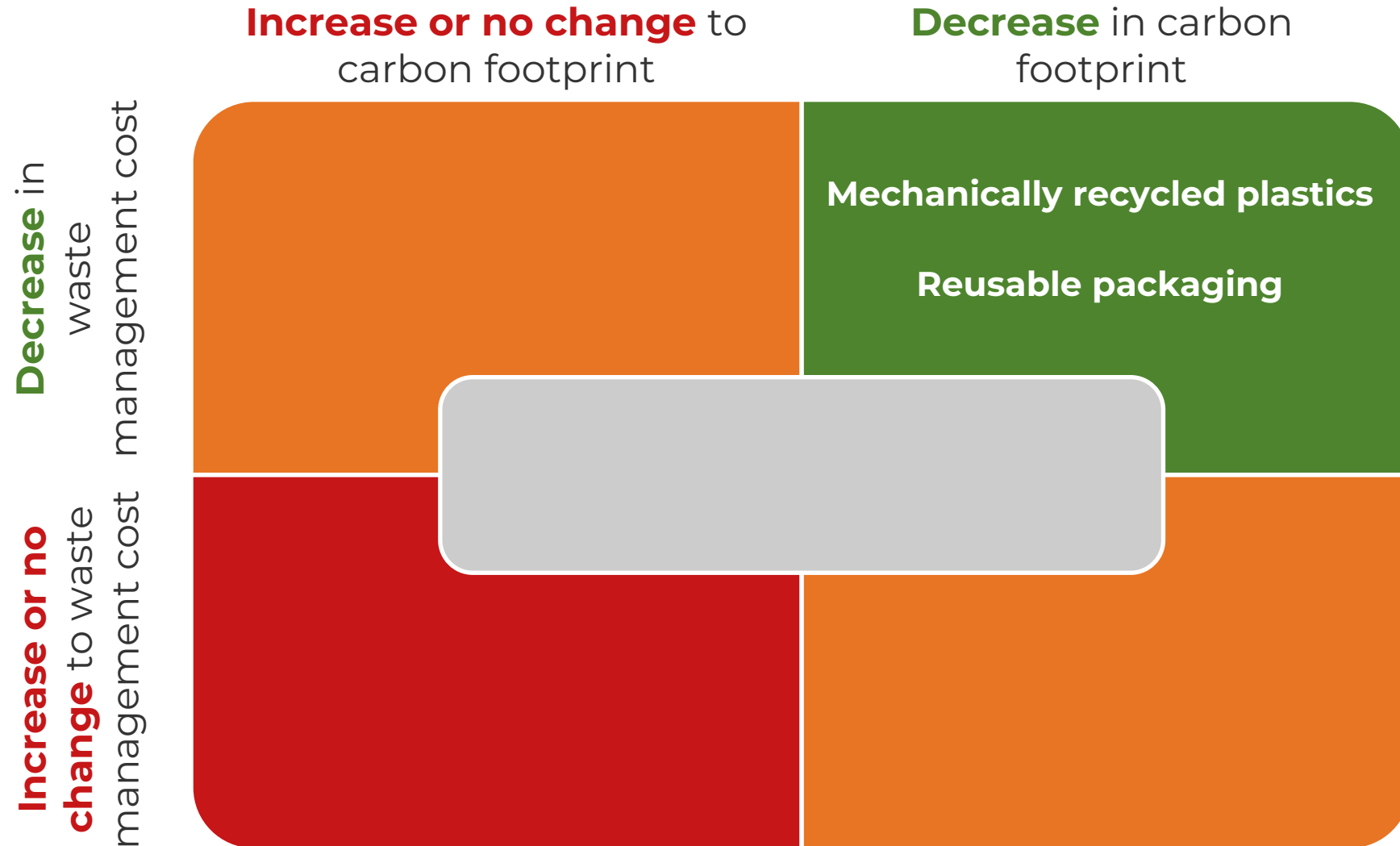
A 2-factor analysis helps identify where to focus efforts



The sustainable packaging materials map — a general perspective



The sustainable packaging materials map — a general perspective



Mechanically recycled plastics: High priority but limited availability`

Carbon Footprint Cost

✓ Most life cycle analyses agree that mechanically recycled plastics have significantly (up to 80%) lower carbon footprints than virgin plastics.

Waste Management Cost

✓ Eco-modulated EPR schemes grant bonuses or discounts for recycled content in packaging.



Clients should prioritize adopting mechanically recycled plastics. Most governments expect it to play a vital role in sustainable plastics consumption, so adopting such materials will help clients stay on the right side of the law for the foreseeable future.



Reusable packaging: Carbon footprint benefit largely depends on multiple use

Carbon Footprint Cost

- ☑ Breakeven from as few as two reuse cycles

Waste Management Cost

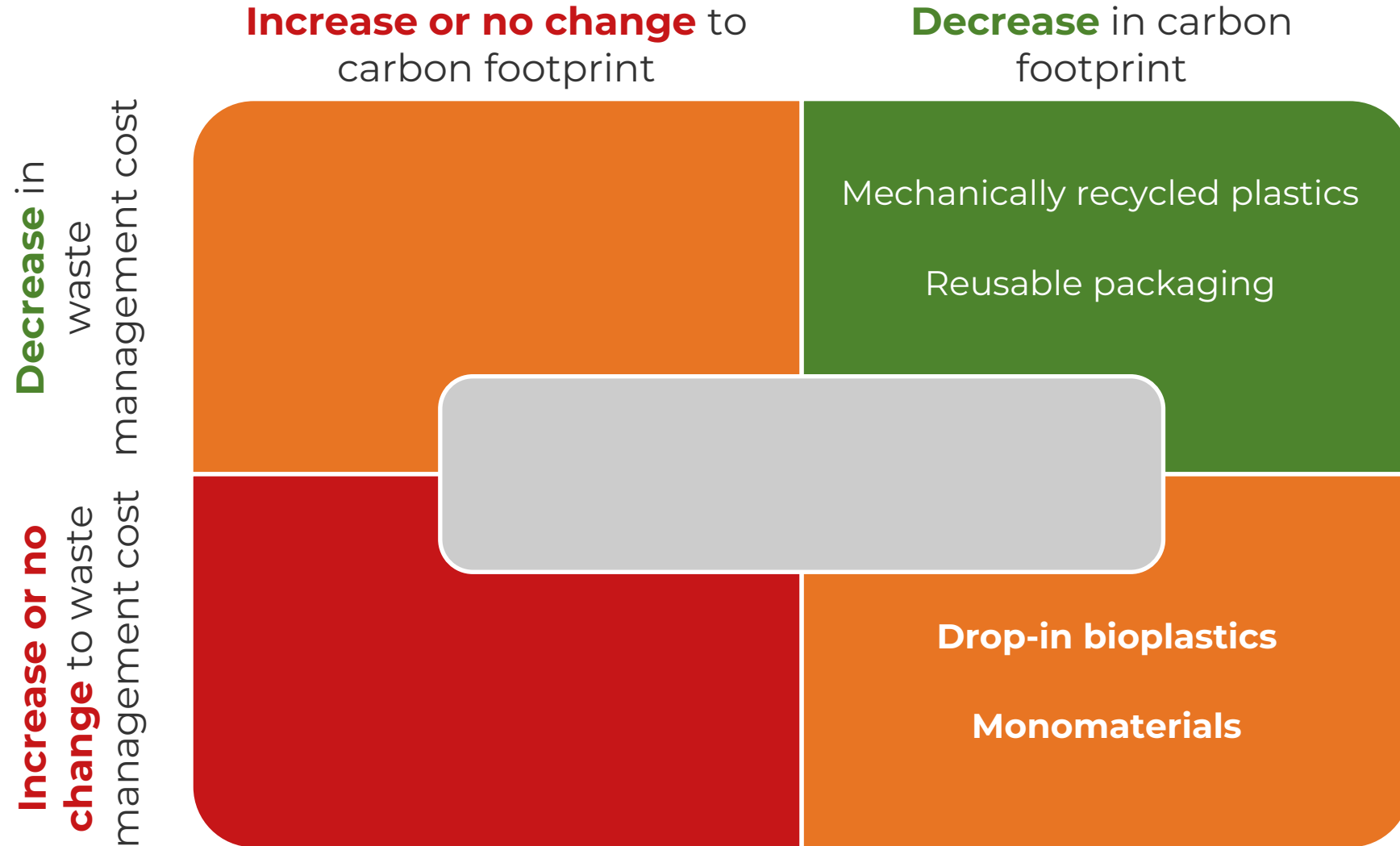
- ☑ Reusable packing reduces overall EPR obligations by virtue of less packaging used or may be exempted from it.



Clients can expect reusable packaging to be viewed favorably by both governments and consumers. However, its success hinges on trusting that consumers “do the right thing” and reuse the packaging.



The sustainable packaging materials map — a general perspective



Monomaterials: Practical vs. technical recyclability is an important factor to consider

Carbon Footprint Cost

✓ The removal of materials like metals, lightweighting and potential recyclability can reduce carbon footprint.

Waste Management Cost

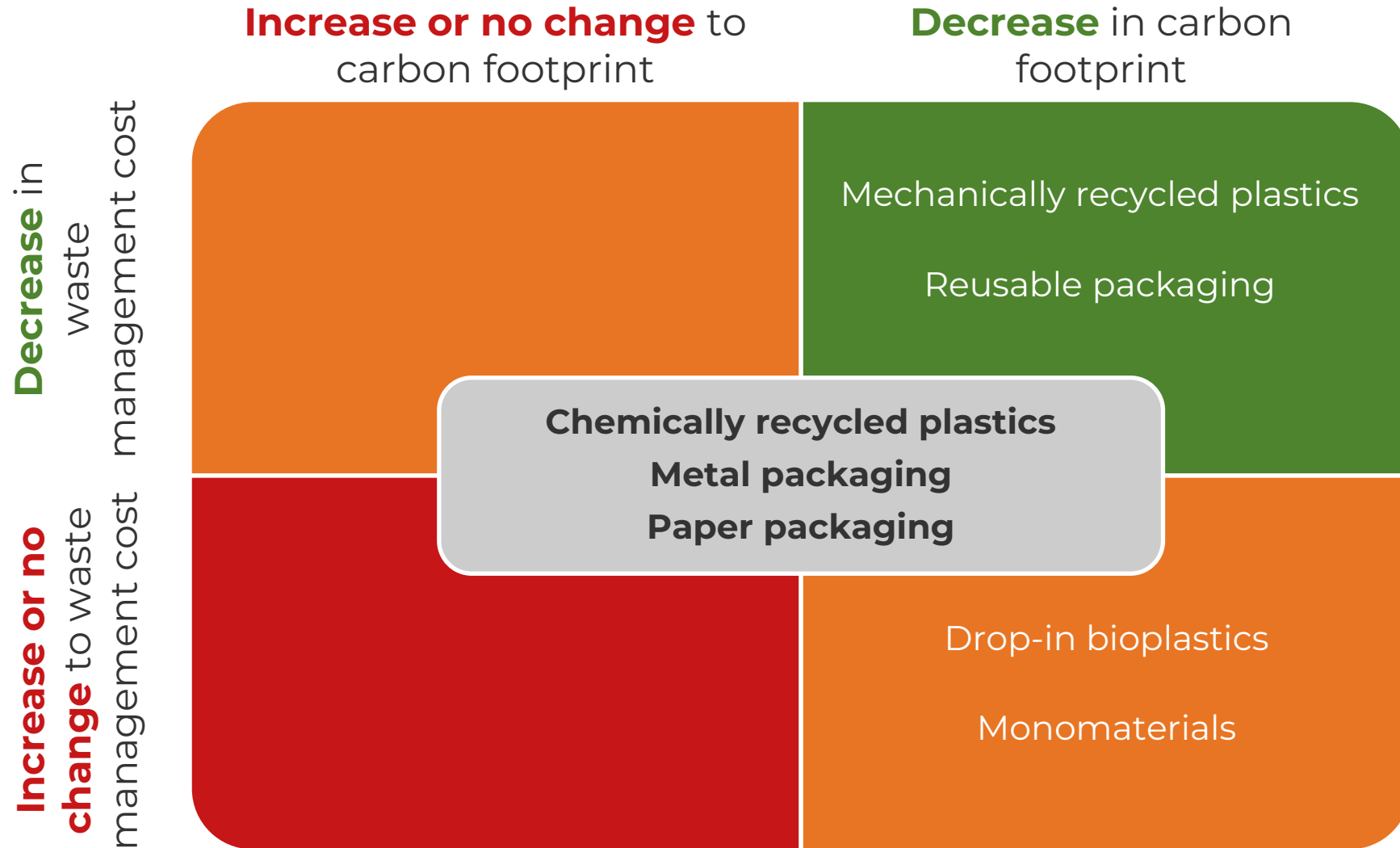
✗ Unless the packaging format changes, simply switching to monomaterials will have limited impact on waste cost in the near term.



Sustainability impacts for monomaterial packaging depend heavily on local circumstances. Some packaging formats (e.g., flexible pouches and tubes) are rarely recycled in the first place, and switching to monomaterial variants will do little to address this.



The sustainable packaging materials map — a general perspective



Metal packaging: Many factors, including recycled content, local recycling rates, and application, will impact sustainability

Carbon Footprint Cost

? Carbon footprint may be competitive with plastic in some cases, but it depends on a variety of factors.

Waste Management Cost

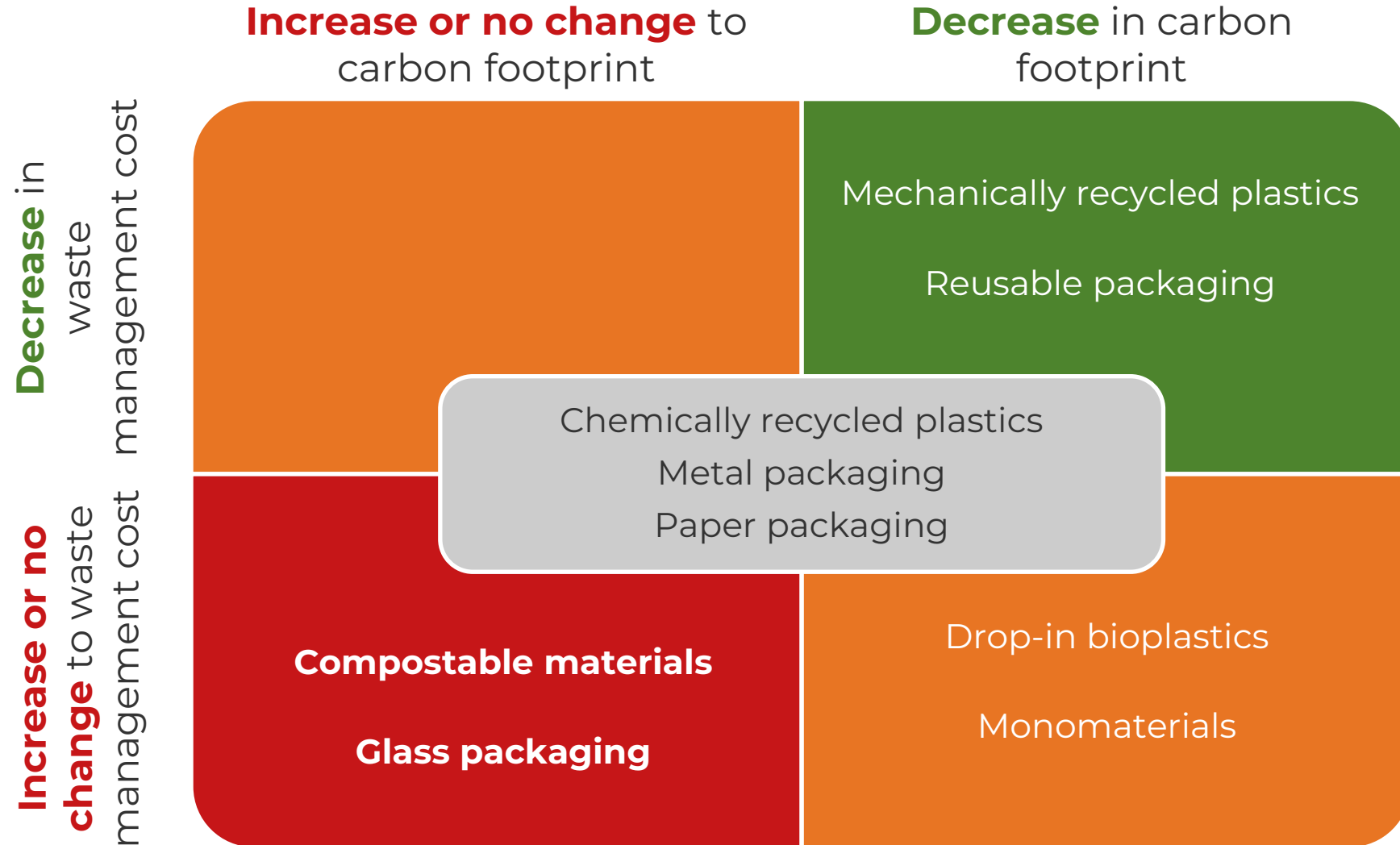
? It typically attracts a lower EPR fee by weight, but metal packaging can be heavier. Net differences in EPR fees will depend on packaging design.



Clients should not be hasty in disregarding metal packaging as an alternative to plastics. There are many factors to consider, so study applications case by case to determine if metal packaging can offer benefits in a given use-case.



The sustainable packaging materials map — a general perspective



Compostable plastics: Poor sustainability value, but regional policies may mandate their use

Carbon Footprint Cost

❌ Compostable plastics can have greater or no change to carbon footprint based on cradle-to-grave analysis, even after accounting for optimistic composting scenarios.

Waste Management Cost

❌ Compostables may be charged greater EPR fees as they are seen as contaminants in recycling streams.



Clients should be cautious when using some of these materials as their carbon footprints become less favorable when seen from a cradle-to-grave perspective. However, some regional policies may mandate their use.



Agenda



1 | The sustainable packaging dilemma

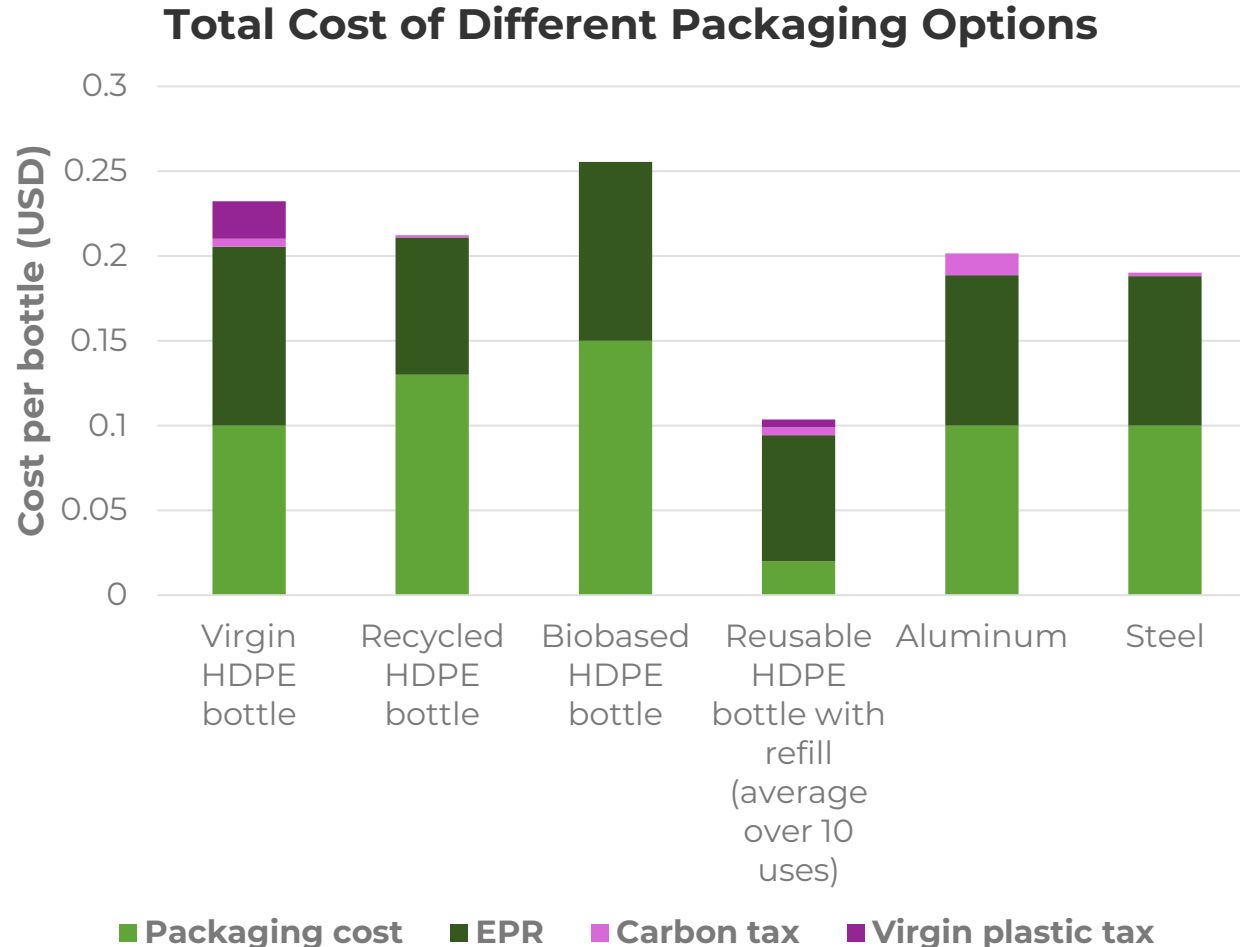
2 | Breaking through the dilemma

3 | **Next steps**



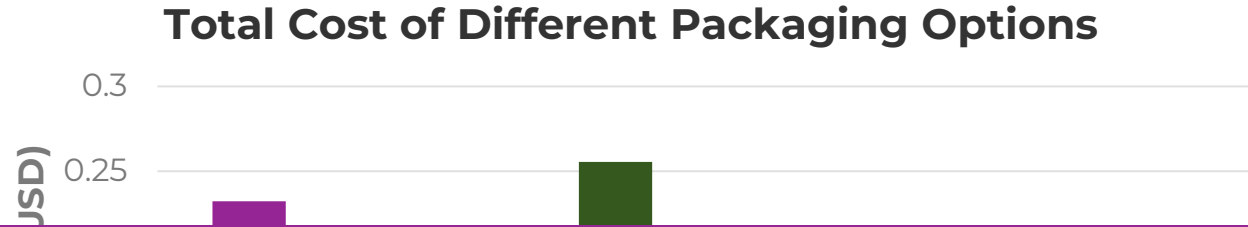
**Pay
attention
to true
financial
costs**

The financial costs associated with using certain types of packaging can help overcome analysis paralysis



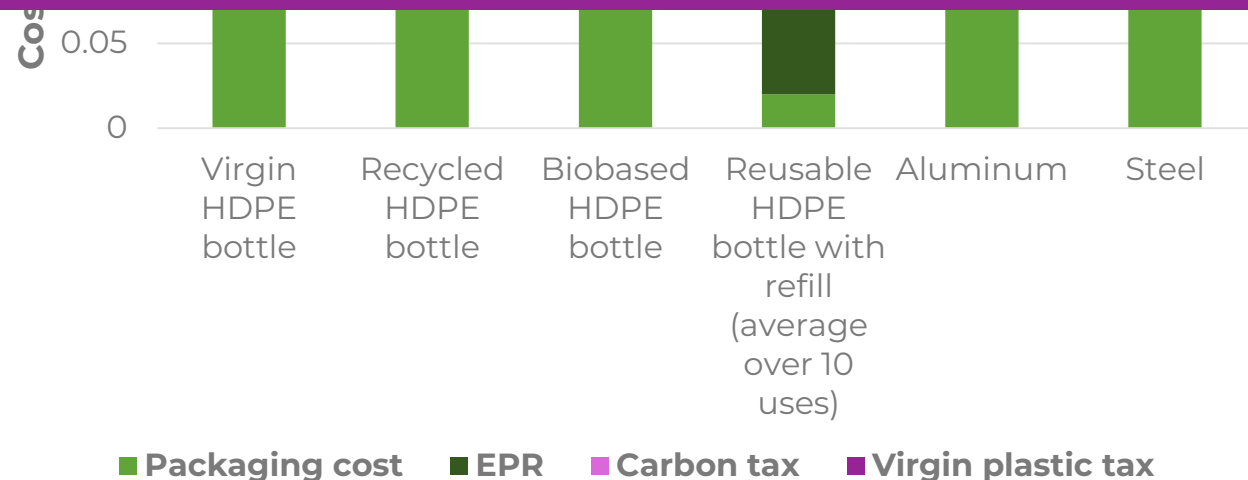
1. The carbon footprint of virgin plastic packaging is so small that the tax incurred will be tiny relative to other costs.
2. EPR fees appear to be the greatest “sustainability cost” associated with the use of packaging.

The financial costs associated with using certain types of packaging can help overcome analysis paralysis



1. The carbon footprint of virgin plastic packaging is so small that the tax incurred will be tiny relative to other costs.

Will carbon emissions still be a priority for choosing sustainable alternatives since cost implications are still so low?





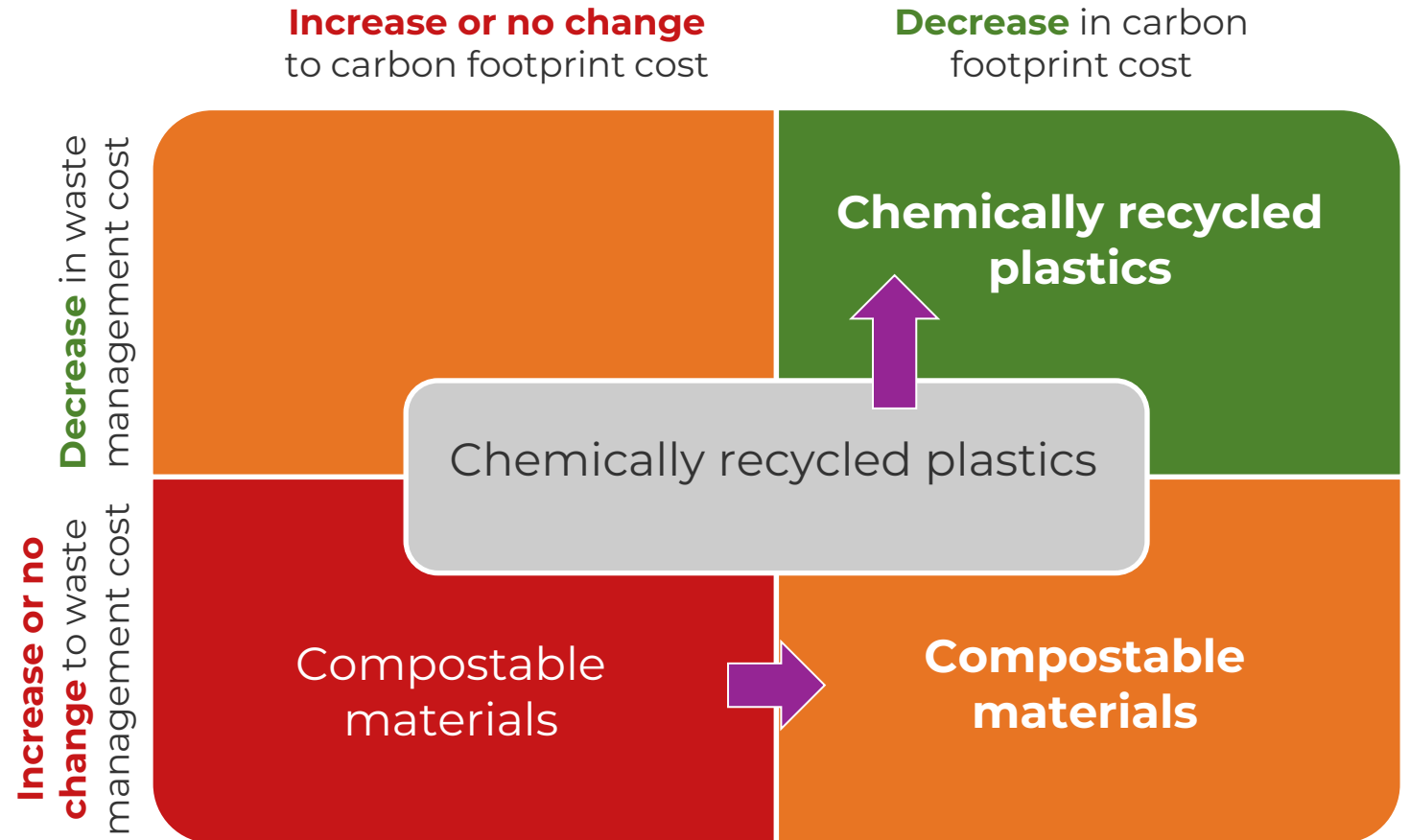
Pay
attention
to true
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costs

**Recognize
solutions'
positions
are
dynamic**



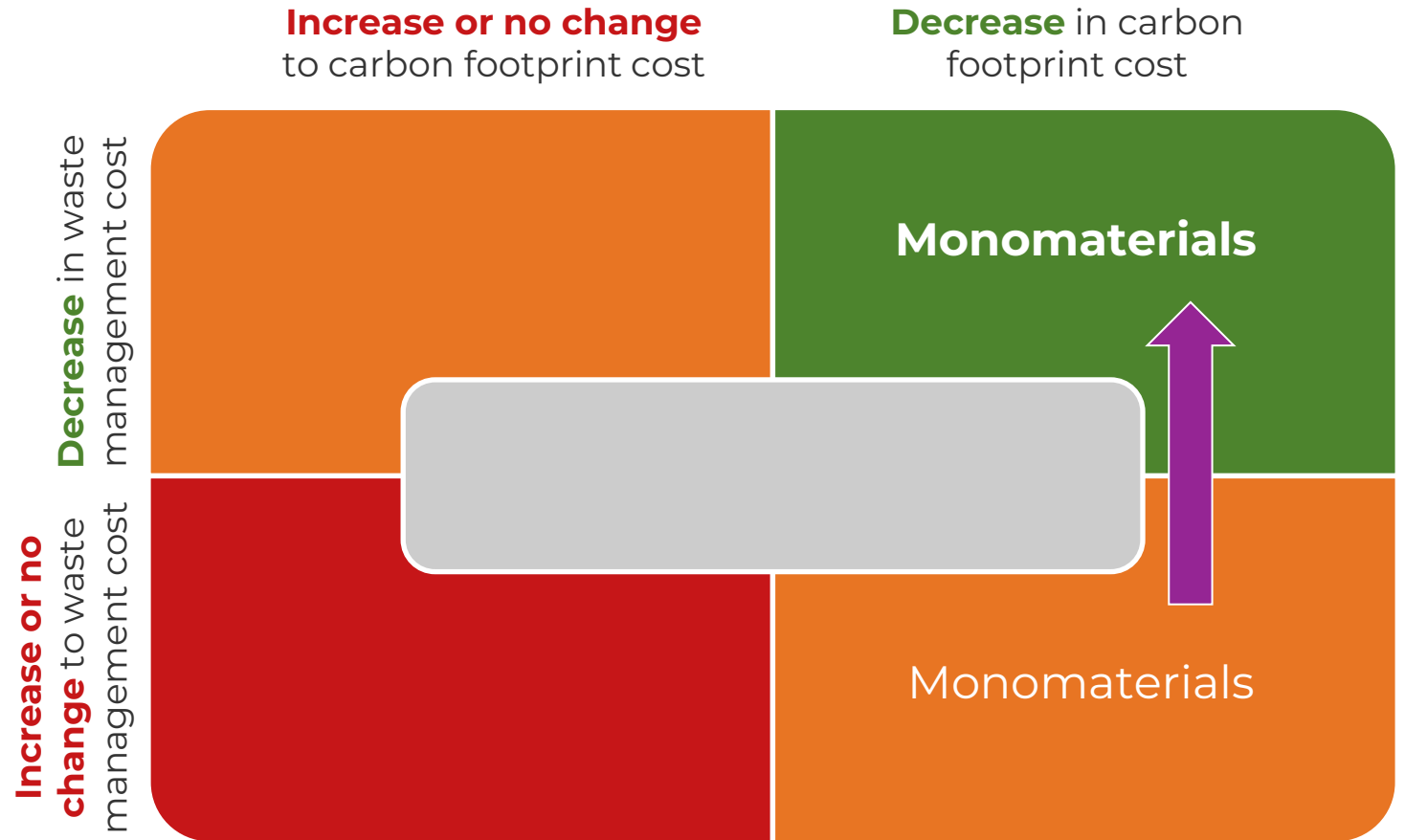
The positions of the solutions are dynamic

1. The energy transition



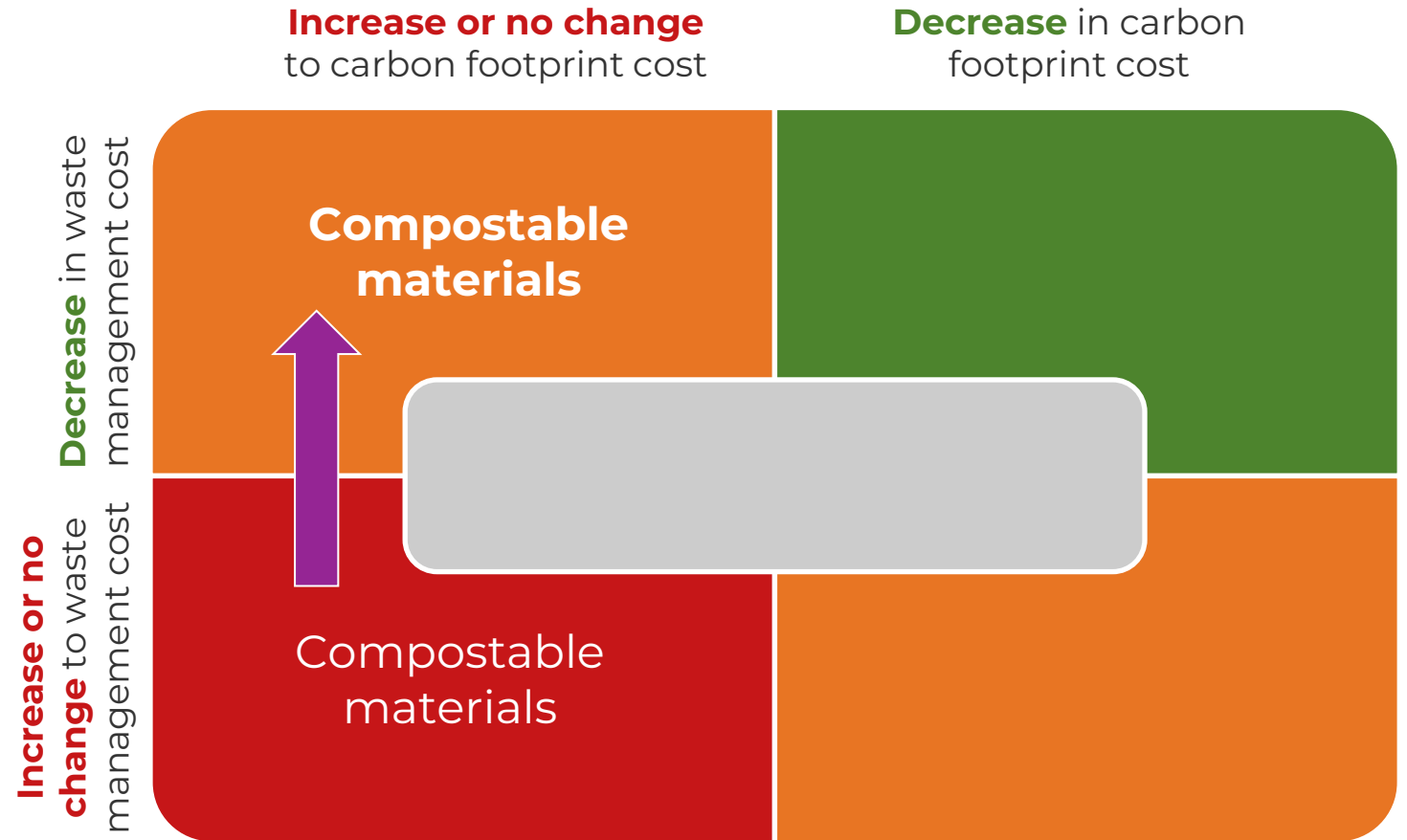
The positions of the solutions are dynamic

1. The energy transition
2. Improvements to waste management infrastructure



The positions of the solutions are dynamic

1. The energy transition
2. Improvements to waste management infrastructure
- 3. Policy changes**



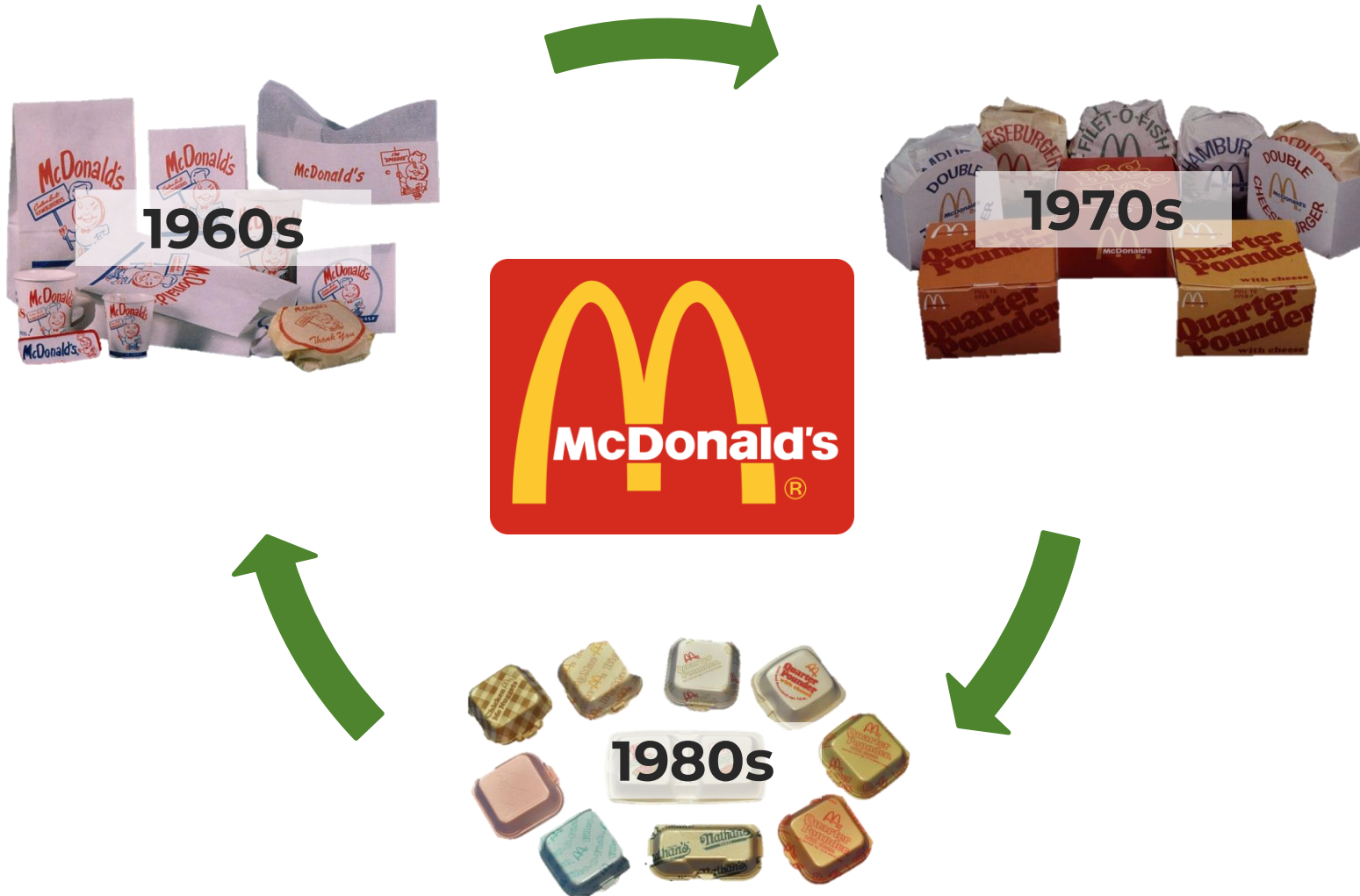


Pay
attention
to true
financial
costs

Recognize
solutions'
positions
are
dynamic

**Consider
what
priorities
are
emerging**

The ever-evolving definition of “sustainable” packaging



The ever-evolving definition of “sustainable” packaging



Recycling can release huge quantities of microplastics, study finds

Scientists find high levels of microplastics in wastewater from unnamed UK plant - and in air surrounding facility



Deadliest plastics: bags and packaging biggest marine life killers, study finds

Wide-ranging review finds whales, dolphins, turtles and seabirds at mortal risk from marine debris

Key Takeaways

1 We are unlikely to see a perfect alternative packaging material scale by 2030; we need to work with what we have.

While investing in future technology is important, the urgency of the plastics problem calls for action today.

2 Prioritize the most important sustainability impacts to overcome the sustainable packaging dilemma.

Determine which sustainability impacts are the most important to your organization and to key stakeholders.

3 What is sustainable today may not be so tomorrow; we must be alert to emerging trends.

The definition of what is “sustainable” will shift as our understanding of environmental issues grows and consumer perception changes.

Thank you

A link of the webinar recording will be emailed within 24–48 hours.

UPCOMING WEBINARS

MAY 2

[UN Update: Moving Toward a Global Treaty on Plastics](#)

MAY 9

[Unlocking Vehicle-to-Grid Commercialization Through Free EV Charging](#)



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The
Deciding
Factor