

RETHINKING THE PACKAGING SYSTEM

Innovation manifesto



RISE & Intressentföreningen Packforsk

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The packaging dilemma

Packaging is essential to the modern economy, but the system is broken

The writing is on the wall. With a 10 billion global population by mid-century consuming and demanding more, while we at the same time must reach net zero emissions to stay within planetary boundaries, we must **'go circular or go home'**. But exactly how circular do we need to be, and what does this mean for packaging and packaging materials?

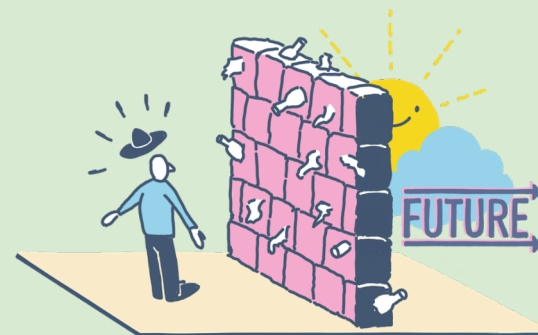
Packaging plays a crucial part in sustainability, by being protective and durable, making transports lighter while using as little material as possible. Plastics as a material type excel in all these properties, which explains why their use has increased more than 20x in the last 50 years. Without the tremendous innovations in packaging materials in that period, the world would be a place of lower efficiency, food security and prosperity.

WHY DO I HAVE TO CHOOSE BETWEEN EATING FOOD AND SAVING THE OCEANS?



Still, the packaging system we have built for ourselves is not working. This is becoming more and more apparent as evidence is piling up over the remarkably low volumes of material - especially plastics - that gets recycled, and the vast and growing volumes of mismanaged waste and the adverse consequences to human health and the environment.

We have indeed as an industry, with all our innovative spirit and ability to solve problems, **created a dilemma.** On the one hand, we have created materials capable of solving almost any packaging challenge. On the other hand, the versatility and diversity of these materials make them near-impossible to keep circulating within the material system. Because of the complexity of packaging materials, especially the rapidly growing multi-material laminates, retaining their value in our current waste management system is incredibly hard.



Suddenly the bump in the road was a gigantic wall.

95%

of the material value of plastics packaging is lost after 1 short use cycle

With business as usual, plastics on the market will **DOUBLE** and plastics in the ocean **QUADRUPLE** by 2040

Objective of this project

Since we cannot realistically do without packaging, **it is essential to rethink the packaging system to establish truly sustainable, circular material flows.** This project set out to understand where we can get with current technology and innovation, what is still missing and what we need to do to close that gap.

The current focus on incremental improvement of recycling is likely to be ‘too little, too late’

In short: We are NOT solving the dilemma with today’s technology landscape and investments

‘Ambitious’ goals require massive investments in infrastructure and innovation. The EU has set the overall material recycling target for plastics packaging to 55% by 2030, which in today’s volume would require an additional 2.4 million tonnes to be recycled, requiring 10-20 new plants and a 10x increase in use of recycled material. A similar goal in Sweden would require the actual material recycling to increase by 5x with current growth in plastics use. To reach the 75% target in beverage carton recycling, an additional 13 plants of 25 ktpa capacity would be needed.

We are already picking the low-hanging fruit: doubling our recycling will not be as easy. There is almost no recycling of packaging film, small formats or other specialised packaging types (like multi-material laminates) in Europe, and the current gap cannot be closed without addressing these fractions.

“[The solution] needs to be part of a wider paradigm shift. It is not longer acceptable to say it is not our responsibility, this is an old-school mindset.” – Global brand owner

Against these challenges, the R&D activity in packaging appears to be low. Packaging materials and recycling technologies are hard to find amongst innovation and R&D. There may be data inconsistencies, but it is clear that much more resources are spent in e.g. the Chemicals and Machinery sectors.

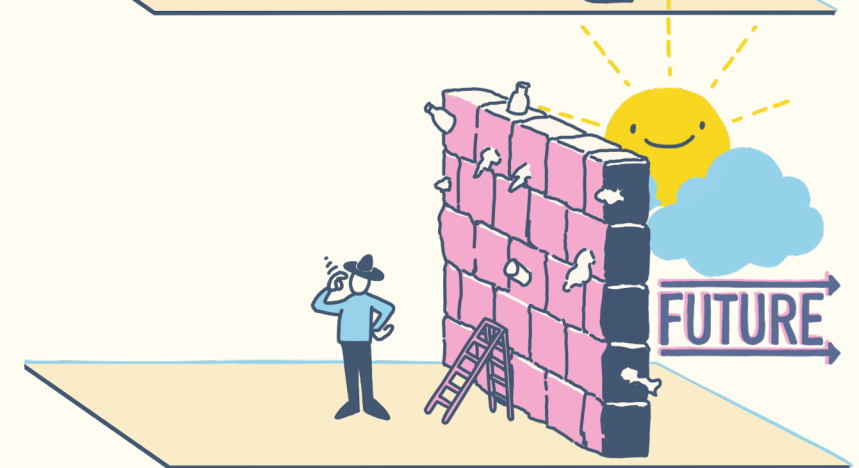
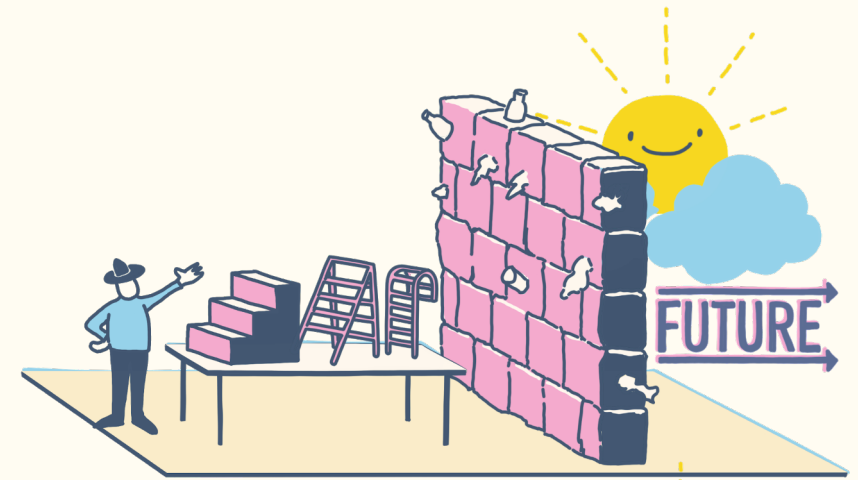
Almost all innovation that does occur focuses on incrementally improving the current system. Most of the innovation in packaging can be described by two categories;

- Recycling technology and processes, such as various chemical recycling methods, hot-washing, delamination, marker technology and robotic sorting
- Material innovation, such as replacing a multi-material film with a mono-material equivalent

Their common denominator is that they assume the packaging system will remain largely unchanged.

But there is ample evidence that doing only that is not going to be enough. While the waste management system would struggle to meet the set targets even with today’s waste volumes, the volumes keep rising. In Sweden, investments in recycling would need to at least triple to reach EU targets, but the amount of non-recycled plastics waste would barely change.

To solve the packaging dilemma, we also have to look upstream and focus more on design solutions that simplify and preserves more value downstream.



Nobody seemed to think about doing something about the wall itself.

55%

material recycling
by 2030 is the EU target for plastics packaging. In Sweden, the actual plastics material **recycling rate is 16%**

\$600 billion per year

in investments needed for a ‘recycling only’ strategy, which only reduces ocean leakage from 29 to 18 million tonnes / year by 2040.

ASAP

innovation needed in alternatives to fossil-based, non-recyclable materials. Yet, **material innovation only** will not solve the packaging dilemma.

Everyone has a stake in determining what the future looks like

Understanding the potential future state of the packaging system requires understanding the dynamics of the multiple factors influencing it

Packaging touches everyone, every day. So it makes sense to look at how all major stakeholders and trends influence how the packaging system evolves. We did this by looking at 6 ‘what-if’ event categories and explored a total of 37 dimensions, looking at how they impact different stakeholders in the value chain as well as the wider social and environmental system.

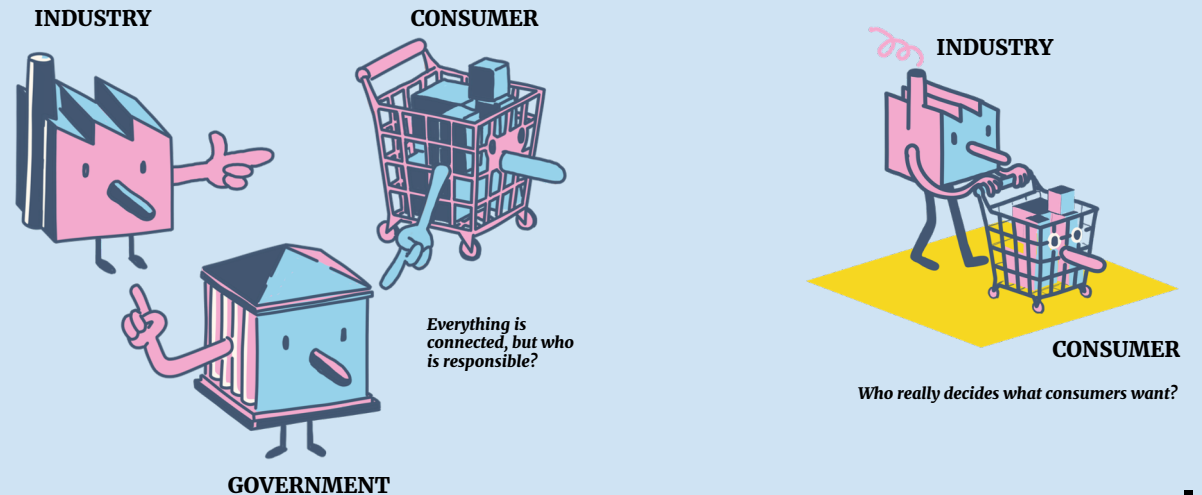
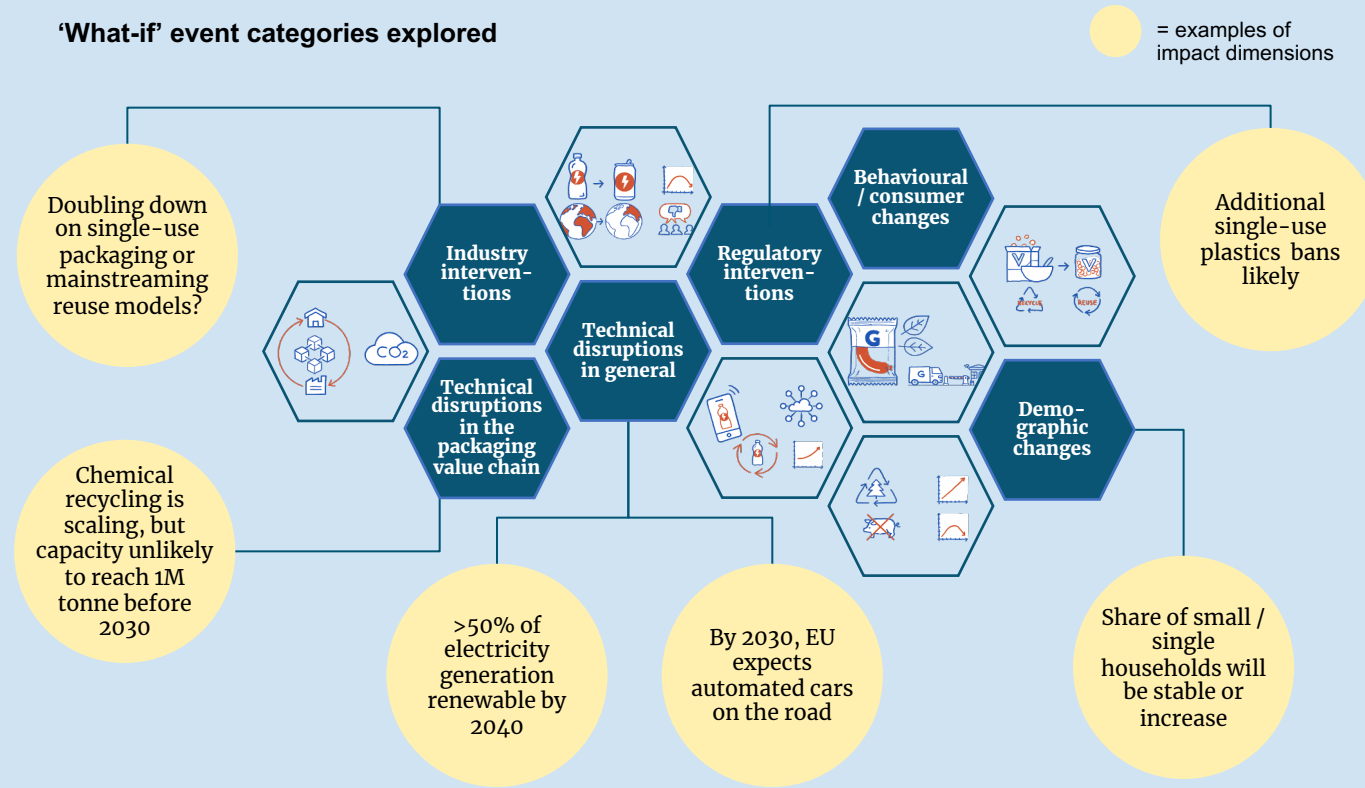
Use plausible development of systemic parameters. With the year 2030 in mind, we evaluated how likely each event is to occur. To do this, reasonable assumptions about the future must be made, something all too often neglected when making forecasts.

Everything is connected, from raw materials to consumer behaviour. Working through all event categories and impact dimensions really highlights how these different parts of the system influence each other. To understand the impact of a technology, we must consider the evolving preferences of consumers and vice versa.

This analysis found that current technical and consumer developments are set to benefit the value chain. Future technological developments benefit the value chain in general, while trends in demography and consumer behaviour support current business models and do not add much pressure unless a major disruption in consumer sentiment occurs. However, the same development points to mixed outcomes for society and the environment: if left unchecked, the overall impact is negative even with more recycling.

The big watershed moments will come from industry and political decision-making. The biggest uncertainties in what direction the packaging system will take lie not so much about what technologies come online, but what strategies industry stakeholders and policymakers employ. Since they have a lasting impact on how the system develops, exploring what would happen if different key decisions are made is crucial.

‘What-if’ event categories explored

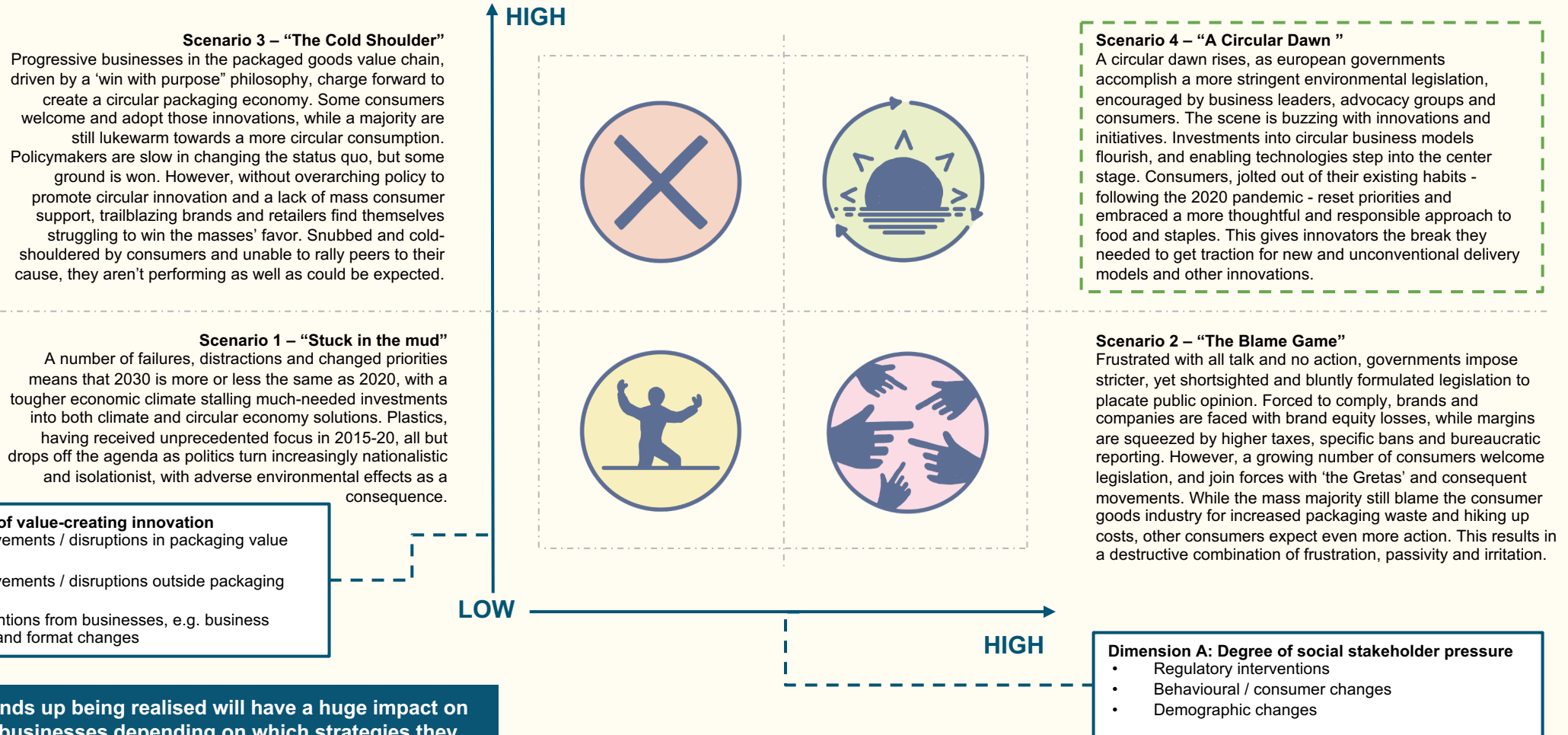


”There is no quick fix – all value chain stakeholders need to contribute” – Recycler

4 possible scenarios for 2030

Projecting possible trends and developments onto 2030, the packaging system can evolve in different directions. Of the 4 possible outcomes, only one has a chance to enable a transition to a circular packaging economy and meet the UN Sustainable Development Goals.

“Government intervention need to make recycled content mandatory.”
– Recycler



Which scenario ends up being realised will have a huge impact on packaged goods businesses depending on which strategies they have chosen for the next 10 years.

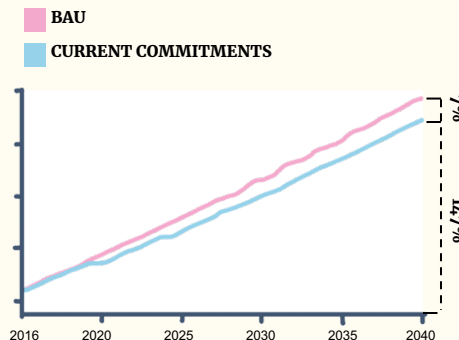
Yet, with current developments we seem to be heading towards ‘The Blame Game’

If the packaging industry wants to avoid serious regulatory risk and cuts in profitability, it must **rethink business** and **accelerate innovation** to steer towards Scenario 4 - “A Circular Dawn”.

Despite a widespread recognition that there is no ‘silver bullet’ solution, most industry efforts focus on recycling and recyclability. There are many promising solutions *eliminating* the need for packaging or shifting towards *reuse models*, several of which are piloted by the largest FMCG* brands in collaboration with startups. Yet, the vast majority of known commitments focus on making the current packaging portfolio more recyclable, sticking to the current (mostly single-use model).

Researchers and NGOs are pointing out that this is not enough and that more upstream innovation is needed. Organisations like the [Ellen MacArthur Foundation](#) and [As You Sow](#) have called for ambitious commitments beyond recyclability. A new report by the Pew Charitable Trusts shows that current, public corporate commitments would only reduce plastic leakage into the ocean by 5% vs. a ‘business as usual’ scenario.

Meanwhile, policymakers are starting to step up their action against single-use plastics. Several national governments, e.g. France, are setting targets well beyond the EU-wide ambition level. It is less clear what will be done to meet these targets; so far the regional and national responses has focused on bans and/or taxes to demonstrate action with potentially disruptive effects on industry. More regulatory actions are on their way, with both the EU Green Deal and an upgraded Extended Producer Responsibility system in the works.



Plastic leakage into the ocean

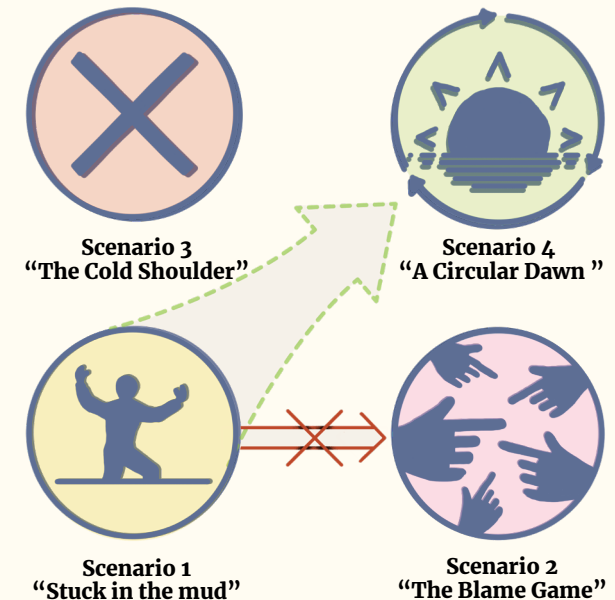
Given the mounting evidence that we are currently shooting far off the mark, the legislative momentum is likely to pick up and become more aggressive.

If industry does not show equal intent to increase ambition levels, it may miss a seat at the table which would push us into “The Blame Game” (Scenario 2). This is a world where stricter regulations are imposed on a reluctant industry, with consequences such as:

- Sweeping bans and taxes create resentment and fail to differentiate between good and bad initiatives, while additionally creating a more fragmented regulatory landscape that is hard to navigate within.
- Loss of hard-won brand equity and goodwill as the FMCG* sector is increasingly seen as part of the problem rather than the solution.
- An innovation agenda driven by politicians instead of industry and innovators.

*FMCG = Fast Moving Consumer Goods

“By 2030, we should all feel guilty if the packaging we are using cannot or isn’t recycled.” – Packaging producer



To avoid this unappealing scenario, “The Blame Game”, industry must adopt a transition agenda of its own to help steer towards “A Circular Dawn” (Scenario 4).

Getting beyond incrementalism and to 'A Circular Dawn': a massive haul but a huge opportunity

The data clearly shows that successfully transitioning to a sustainable system for packaging requires innovation and business transformation beyond what the industry has ever done before. It is not comfortable, the opportunities outsize the costs and are available to those willing to leave their comfort zone and challenge status quo.

It requires an almost
50% reduction
in virgin plastic input needed
to address plastic leakage...

The plastics and waste management
industries need to **quadruple** its
R&D agenda to get on par with
comparable sectors...

The majority of packaged goods
businesses are **not operating in
line with what is needed**
to achieve this...

**Adapting to new
legislation is
painful...**



... which can be delivered by
new business models
and substitution to **renewable
materials**

... and this could unlock savings
worth **\$200 billion / year**
while reducing emissions by **25%**
and creating **700,000** new jobs

... which means a **giant
opportunity awaits**
the successful first movers

... but working with governments,
businesses can also make sure
painstaking **change is rewarded
by positive incentives**

The community of Swedish packaging research and industry are uniquely positioned to contribute to a positive transition

In short: there is a lot to do, and time is limited.
Stakeholders need to come together on especially three agenda points to reach “A Circular Dawn”:

Create mechanisms
for value retention in the system through material ecosystems & circular business models

Design materials, products and systems for circularity so that the installed capacity can actually reprocess them in a cost-effective way

Invest in infrastructure and innovation to circulate the materials we do need while eliminating or replacing the materials we don't need



Focus of existing initiatives

A flurry of business networks, NGOs, research initiatives and investors have started to address this agenda, but they are typically clustered around either:

1. setting common (voluntary) goals;
2. financing collection & recycling (mostly in emerging markets); or
3. piloting new technology solutions in recycling (e.g. pyrolysis or delamination)

Position and opportunity of RISE-IFP

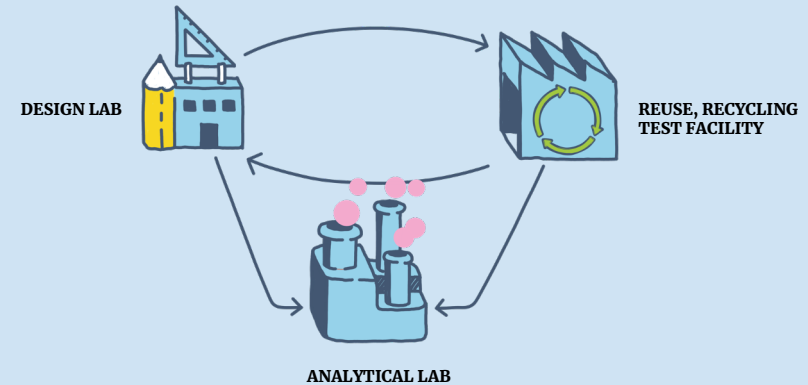
RISE and Intressentföreningen Packforsk has an opportunity to contribute to this growing body of action by addressing a significant gap in this web by: Creating tools and platforms to lower the transition cost from linear to circular. **With its track record of innovative solutions in the packaging space, the community of Swedish research and industrial stakeholders is uniquely positioned to take on this challenge at an international level.**

Our Innovation manifesto:

We want to lower the transition barriers to unleash the power of ideas, creativity and innovation towards circular packaging systems

By now, we know that today's packaging system will not deliver on 2030 targets. We need to not only fix what's broken, but move beyond incrementalism and accelerate innovation towards circular packaging systems to unprecedented levels. RISE – IFP will contribute by lowering the barriers to change and accelerate innovation by providing leading expertise, tools and enabling collaboration. We invite you to join us.

To begin, we have identified two ambitious initiatives that would catalyse innovation by enabling more rapid research & development, experiments with prototyping and upscaling of circular packaging solutions.



A

Packaging design guidelines with value analysis on impact, cost and feasibility. There is room – and need – in the market for a more comprehensive design tool that helps stakeholders to lower their cost of experimenting with, and implementing new packaging solutions. Specifically, it needs to help evaluate the cost-efficiency of investments and development of new business models.

We envision a guideline with value analysis that can:

- Provide a set of 'design principles' to adhere to in order to stay within the boundaries of circularity.
- Calculate total footprint and cost, including sourcing *but also* effects of the after-use pathway, including end-of-life externalities.
- Compare single-use with reuse as alternatives.

B

Test facility and centre of excellence for future packaging design and recycling. What would set such a facility apart, and increase its international relevance, is modularity: the ability to represent any existing or future end-of-pipe system (different chemical recycling technologies, new sorting methods), and test any existing or future material or design composition (e.g. how does a new fibre-based film sort in a given set of conditions?, how can a plastic packaging be improved to reduce false sorting and increase yields?), as well as creating circular business models for packaging and packaging materials.

ABOUT THIS REPORT

This report was produced by RISE and Intressentföreningen Packforsk (IFP) in collaboration with Grow AB. It is supplemented by a technical survey of the innovation landscape in packaging and packaging recycling, and a literature review and trend analysis projecting potential developments and outcomes to 2030.

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