Flexible Food Packaging in the Context of Circular Economy

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Plastics in the Oceans: the Facts are not New…


- Plastic Soup: shocking discovery in 1997 by the American captain Charles Moore when sailing in the middle of the ocean, of an accumulation of marine litter, the so-called ‘Great Pacific Garbage Patch’

- Moore, C.J. et al., Plastic in the North Pacific Central Gyre, 2001, An average of 334,271 plastic particles per km² which suggests a huge increase in ten years’ time.


- Micro plastics in personal care products Position paper, 2012*


- March 2018-June 2019: Plastic Attacks targeting food packaging in grocery, at least 17 countries in Europe + Canada

Source: U.S. Energy Information Administration
https://www.eia.gov/dnav/pet/pet_pri_spt_s1_m.htm
Source of Plastics Inputs into the Oceans

8 million tonnes of plastic are thrown into the ocean annually

“Let’s say you recycle 100 percent in all of North America and Europe, you still would not make a dent on the plastics released into the oceans.

If you want to do something about this, you have to go there, to these countries, and deal with the mismanaged waste.”

Ramani Narayan
Michigan State University
NG, June 2018

http://www.ellenmacarthurfoundation.org/publications
Plastic Waste Entering the Ocean from Rivers

- Estimation of 1.1-2.4 million tons/year of plastic waste currently enters the ocean every year from rivers
- The top 20 polluting rivers, mostly located in Asia, account for 67% of the global total

Lebreton et al., River plastic emissions to the world’s oceans, Nature Communications volume 8, Article number: 15611 (2017)
https://www.nature.com/articles/ncomms15611
Plastic Packaging Waste

- Packaging accounts for more than 50% of all plastic waste \(^2,4,5\)
- 70% less material and potential waste used in flexible plastics compared to rigid plastics \(^3\)

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Plastic Packaging End of Life

- Global flows of plastic packaging materials in 2013:

- 76% Landfilled or leaked
- 14% Incinerated and/or energy recovery
- 10% Recycled
- 40% Landfilled
- 32% Leakage
- 14% Collected but 4% processes losses

Plastic Food Packaging: Are They Useless?

but also:

- Protect food
- Transport
- Identify / Inform
- Extent shelf life
- Reduce preservatives
- Reduce food waste

...with an important outcome:

Getting rid of plastic packaging? The Economics of Change, R. Gray, July 6, 2018, BBC
Plastic Food Packaging: Are They Useless?

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1 week on the kitchen counter
Plastic Food Packaging: Overpackaging?

- Very rare, in my opinion!
- The issue for the oranges is not the packaging, but the use of packaging in this application!
- Debate about individual packages

- Iceland, a major retailer in UK, committed in 2018 to eliminating plastic packaging from its own label products – to be completed by 2023
- In May 2019: Iceland scrapped a plastic-free greengrocer trial that was running in Liverpool after just three months following a 20% plunge in sales
- July 2019: Iceland had to reintroduce plastic packaging across its bananas after its paper band replacement failed
- Here… the issue comes from the packaging (paper band): more food waste!

Plastic Food Packaging: Are They Bad for the Environment?

- Packaging only accounts for an average of 7-10% of the total environmental impact of a product\(^1\)
- Just 1.5 g of plastic keeps the cucumber fresh for 14 days and untouched\(^2\)

**Single-Serve Coffee Case Study**

- Very large packaging-to-product ratio, but only 14% of the total carbon footprint comes from the capsule

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\(^{1}\) From R. Morier, The Circular Economy & the Impacts on Packaging for Food, PAC(Packaging Consortium) at the SIAL Canada, Montreal, May 3\(^{rd}\), 2018

\(^{2}\) [Incpen.org](https://www.incpen.org/too-much-packaging/)
Estimates of Food Loss and Waste

- Roughly 50% of the food waste occurs in households

415 kg/capita/year

Flexible packaging plays a major role to prevent waste!

CEC. Characterization and Management of Food Loss and Waste in North America. Montreal, Canada: Commission for Environmental Cooperation. 48 pp., 2017
CE: A New Relationship With Our Goods and Materials

Linear economy: “Flows like a river”

Circular economy: “Like a lake”

Identification of a Concrete Set of Priority Actions

1. Inseparable layers (13%): innovate
2. Uncommon materials (EPS, PS): replace
3. Small format (lids, caps, sachets): redesign
4. Takeaway food pack.: scale up compostable plastics

Share of market by weight

30%  20%

FUNDAMENTAL REDESIGN & INNOVATION

50%

RECYCLING WITH RADICALLY IMPROVED ECONOMICS & QUALITY

Bottles, carrier bags, e-commerce packaging, pallet wraps, larger rigid packaging…

1. Design changes to improve recyclability (materials, formats)
2. Harmonise / Adopt best practise for collection and sorting
3. Improve recycling processes
4. Improve collection & sorting infrastructures
5. Implement policy measures & regulations


PolyExpert: Blown Film Manufacturer

Ships everywhere in North America

QUEBEC, CAN
- 100 000 sq ft facility
- 14 blown film lines

https://www.polyexpert.com/en

Satellite Warehouses
Our Product Sustainability

- SPE/FlexPackCon 2019
  “Flexible Plastic Packaging Sustainability: Will the Industry be Ready for 2025?”

- Recycled & Compostable resins
- Transition to Flexible (sealant webs)
- Sustainability Barrier Structures
- Transition to PE for recyclability

- Downgauging (HDSS, MWPB)

- • Use less resins for the same functional requirements
  • Need to use more performant PE resins
  • 100% Recyclable
  • Come with a unique set of processing challenges, for PolyExpert and/or the converters

- • Try to match the properties of the incumbent films
  • 100% Recyclable
  • Try to extent the limits for the breathable or barrier properties
  • Need adaptation for the conversion processes

- • 100% Post industrial recycling of our retains
  • Use of PCR: 25 to 95% in specific products

- Raw Materials
- Design
- Production
- Residual Waste
- Collection
- Consumption, use, reuse

SPE/FlexPackCon 2019
“Flexible Plastic Packaging Sustainability: Will the Industry be Ready for 2025?”

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Compostable Plastics: Revival of our Customers’ Requests

...But the previous difficulties for food packaging have not been settled!

- **Compostable make sense if:**
  - The design is applied to the product or packaging as a whole
  - The facilities to compost the films are existing (specific applications)
  - The product would not be recycled anyway e.g. due to contamination
  - The application should be appropriate
- Be careful to not contaminate the PE recycling stream

- Mulch films is a perfect application for specific compostable resins
- PolyExpert already produces several millions lb/year of mulch films
The Use of Compostable Resins

• Some considerations:

- Blown films are usually low in clarity (milky)
  - Except PLA films

- Limited gauge
  - Ex: 3.4 - 5 mil for film made from the resin = 1.7 – 2.5 mil for a sealed packaging, considering the thickest part of the product

- Convertingers could have to modify their process

Required BPI certification to label the product (testing and annual fees)
https://www.bpiworld.org/
- The inks need to be tested for ecotoxicity
“Cradle to Cradle” for Flexible Food Packaging

• From assumed less energy consumption / carbon footprint process:

1. Reuse: very limited for freshness

2. Recycling by melt processes: separation, cleaning, compatibilization if needed (ex: Dow Retain™), re-extrusion
   • Compatibilization will lead to a new class of mix plastics containing barrier resins (EVOH, PA) in minor phases, with new properties: contamination for PE recycling stream?

3. Composting for niche applications

4. Recycling by Selective dissolution & Recycling by depolymerization
A Package of Recycling Solutions

According to a report prepared by McKinsey&Company:

- By 2050, nearly 60% of plastics production could be based on plastics reuse and recycling.
- Nearly 30% from Recovered monomer & Recovered feedstock.

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**FlexPack Recovery Challenge**

Launched on October 23, 2018
April 19, 2019: the winner is:

- [Sustainable Packaging Coalition](https://sustainablepackaging.org/challenge/)

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![Global polymer demand 2016–50 and how it could be covered, millions of metric tons](image)

<table>
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<th>Year</th>
<th>Virgin Feedstock</th>
<th>Recovered Feedstock (Plastic Equivalent)</th>
<th>Recovered Monomer</th>
<th>Mechanical Recycling</th>
<th>CAGR 2016–50, %</th>
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1. Scenario based on a multi-stakeholder push to boost recycling, regulatory measures to encourage recycling, consistent progress on technologies, and $75-per-barrel oil price.
2. Compound annual growth rate. Mechanical recycling limited by downcycling and applicable materials, monomerization limited by applicability to condensation polymers only, pyrolysis limited by likely rise in input costs.
3. After demand reduction, assuming annual global GDP growth of 3.1%.
New Plastic Packaging Recycling Solutions

- 13 companies: Canada (3), Italy (2), France (2), Germany (2), Japan (1), Netherlands (1), UK (1), USA (1)

Action Plan for Right Now

- Plastics tend to be the scapegoat for many environmental issues due to the visible waste, dissociated from the real plastic effect on the climate global issues.

- The flexible plastic industry has to be flawless on the design and manufacturing of food packaging, because Global warming is a very concerning issue.

- Design with the end of life in mind: we have to know more on the use of our products.

- On July 29, humanity has used nature’s resource budget for the entire year, according to Global Footprint Network.

- Its date has moved up two months over the past 20 years to the 29th of July this year, the earliest date ever.

Action Plan for Right Now

- Scientific knowledge is variable in our industry: we have to be more open-minded concerning to the environmental consequences.
- We should not execute immediately the requests of our clients, but challenge them more, as part of our service to them.
- Sustainable Development & Circular Economy are keys.
- Food supply should be made more locally, and could limit the extra-packaging / secondary packaging to protect the food & freshness for long transportation (and transportation is costly for the environment).
- The packaging value chain should be optimized to be also more local:
  - It is perfect for small production units.
- Increase collaborative development with packers and retailers.
Action Plan for Right Now

- Flexible plastic industry should be involved in the consumer’ education directly at the food retail stores: we are more and more knowledgeable: the data already exist!
- Explain simply:
  1. Why the plastic packaging is there at each food sections
  2. What would be the serious consequences on the food without packaging
  3. What would be the environmental cost by switching plastic for another packaging type & materials, based on facts
  4. Ask the consumers to find overpackaging, feedback on this topic during a 2nd campaign
Action Plan for Right Now

- **Active participation of the consumers for the collection**

- Currently, the collection & segregation at the source through Store Drop-Off is the best solution (in my opinion)

- Consumer’s education to be implemented to clearly explain how the recycling will be done

- Collection costs to be evaluated by the retailers & incorporated in the retail prices

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“A standardized labeling system that clearly communicates recycling instructions to the public”

Created to provide consistent and transparent on-package recycling information to consumers in North America

[https://www.how2recycle.info/](https://www.how2recycle.info/)
**Action Plan for Right Now**

- Aug 28, 2019: Ebara UBE Process (EUP), applied since 2003, to provide gases for the synthesis of chemicals
  

- May 8, 2019: collaboration with Vienna-based OMV AG for the use of the company’s waste-based ReOil in the production of virgin polymers
  

- Aug 29, 2019: partnership with Fuenix Ecogy Group to supply oil feedstock for Dow to produce new polymers. Fuenix recycles plastic waste into oil. According Fuenix, the process yields a 65 percent reduction in CO2 emissions compared to alternative recycling methods
  

- Dec 4, 2018: partnership with Plastic Energy Ltd. to use the company’s patented TACOIL as a feedstock for polymers
  

- Dec 13, 2018: BASF SE partners with Recenso GmbH, to use their feedstock oil to produce virgin polymers
  

- New players are developing recycling technologies which should demonstrate their environmental benefits

- Resin manufacturers should massively invest in these companies in order to generate renewable feedstock, and be more &more decoupled from the petroleum feedstock


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Recenso’s process converts mixed plastic fractions into processing oil (catalytic tribochemical conversion)

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Thank you!

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