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Single Use Plastics versus Consumerism in the case of Snack Food Packaging;

Evolving Societal Norms, Culture and Tipping Points

E.P. Byrne[16], N. Dunphy[2], G. Mullally[36], C. Sage[46], S.V. Crowley[5]

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UCC University College Cork, Ireland Coláiste na hOllscoile Corcaigh

International Sustainable Production and Consumption
4-5 October 2018, Manchester, United Kingdom

Edmond Byrne BE MSc PhD MA(TLHE) CEng FIChemE MIEI
Professor of Process & Chemical Engineering,
University College Cork, Ireland

Plastics Tipping Point



Plastic pollution – what was the tipping point?

20/06/2018 Share:



DR PHIL ALDOUS
Director of Water, Thomson Ecology

Despite years of research, news stories concerning plastics and the pollution of the marine and water environment have finally started making headlines, Dr Phil Aldous writes. Why the sudden change?

Returning to the trigger that made us all sit up and listen. Was it the BBC's 'Blue Planet II' – and Sir David Attenborough's words, "the future of all life now depends on us" – that was the trigger for action, and why is that more powerful than 50 years of published research? Maybe because it is citizen power that can be really emotive and, if spoken by a non-politician, is seen as more trustworthy. We do need to reduce our plastic pollution in seas and waterways and clean up our act. All of industry has a role to play in this – whether that is manufacturer or user.

Franchise NEW ZEALAND the franchise advice centre

advice | news & events | news items

TIPPING POINT ON PLASTIC - HOW ARE FRANCHISES COPING?

last updated 10/06/2018

Tipping point

12 Jun 2018 | Updated: 15 Jun 2018 | Robin Mannering

Print | Email | Share | Comment

Shocking images of the damage our plastic use has had on the planet have put the issue firmly on the public and government's radar. *C-Store* looks at what retailers are doing to reduce its use and why the war on plastic is far from straightforward

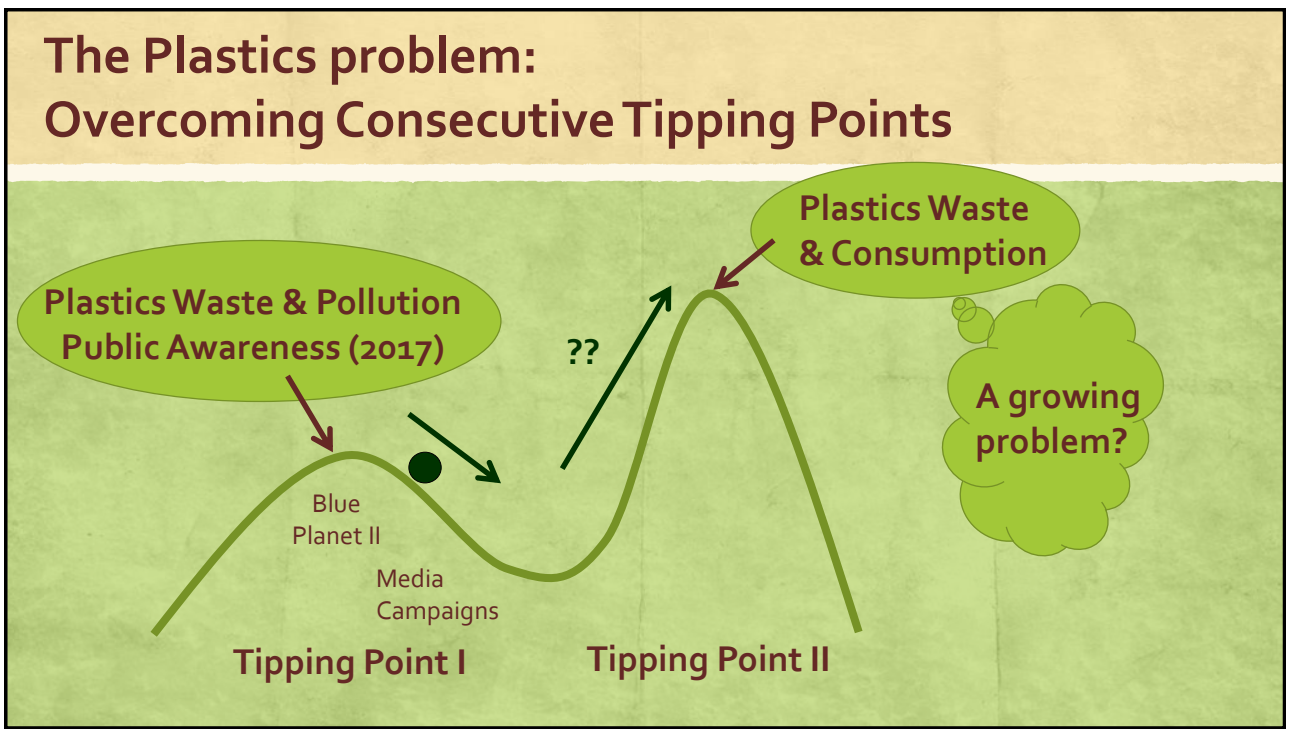
Plastic has suffered a dramatic fall from grace. Its destructive impact on the environment was hardly a secret, but it wasn't until David Attenborough's recent Blue Planet series that public consciousness appeared to undergo a tipping point.


Blue Planet II (BBC, 2017) David Attenborough

Media Driven..




sky ocean rescue
#PassOnPlastic
val: One Year On
Emily Penn joins Sky Ocean Rescue as official ambassador
Sky Ocean Rescue launches in Ireland


The Plastics problem:
Overcoming Consecutive Tipping Points
Plastics Waste & Pollution Public Awareness (2017)
??
Plastics Waste & Consumption
A growing problem?
Blue Planet II
Media Campaigns
Tipping Point I
Tipping Point II

Plastics Consumption & Waste: A Growing Problem?

Plastics Consumption & Waste: A Growing Problem?



*"A **whale** found washed up on a beach in Spain earlier this year had **29kg of large pieces of plastic** in its digestive system – including rubbish bags, ropes, pieces of net and a drum.*

*In 2015, an international research team led by Erik van Sebille at Imperial College London estimated that between **15 and 51 trillion plastic particles** are floating in the world's oceans. Their combined weight is between **93,000 and 236,000 tonnes**.*

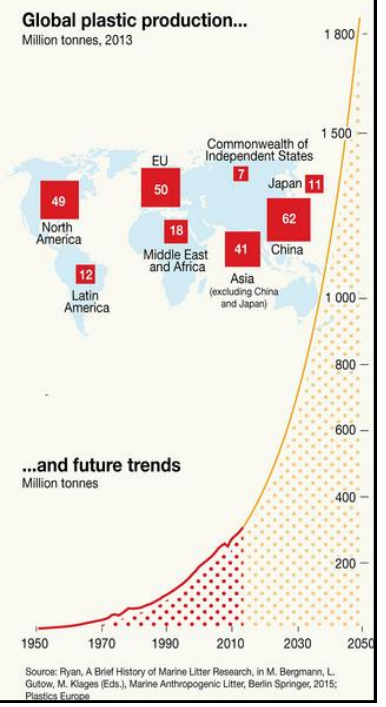
*Each year, between **1.2 and 2.4 million tonnes** of plastic enters the oceans from **rivers**, according to a paper published last year in Nature Communications by Laurent Lebreton of The Ocean Cleanup (TOC) and colleagues. They calculated that two-thirds of this comes from just **20 rivers, mostly in Asia**."*

The Institution of Engineering & Technology (2018)
https://eandt.theiet.org/content/articles/2018/05/plastic-waste-pollution-in-the-ocean-technology-at-the-tipping-point/

Plastics Consumption & Waste: A Growing Problem?

"Based on forward projections, current (2018) waste arisings are estimated at 5.2 million tonnes, and are forecast to increase to around 6.3 million tonnes by 2030 – a 20% increase over this 12 year period."

A plastic future: Plastics consumption and waste management in the UK (WWF, 2018)



Global plastic production and future trends (Ryan,2015)

Plastics Consumption & Waste: A Growing Problem?

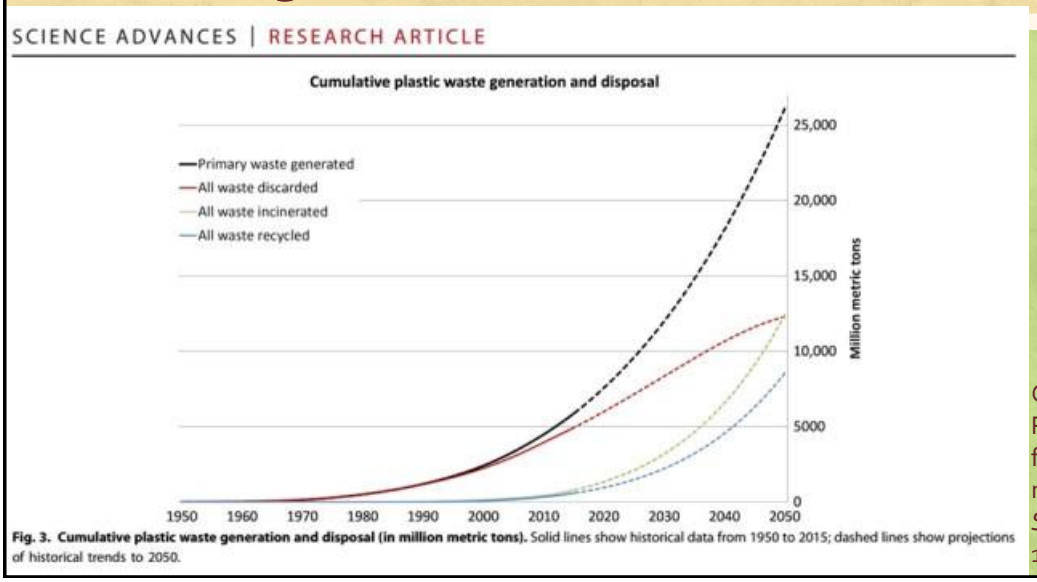


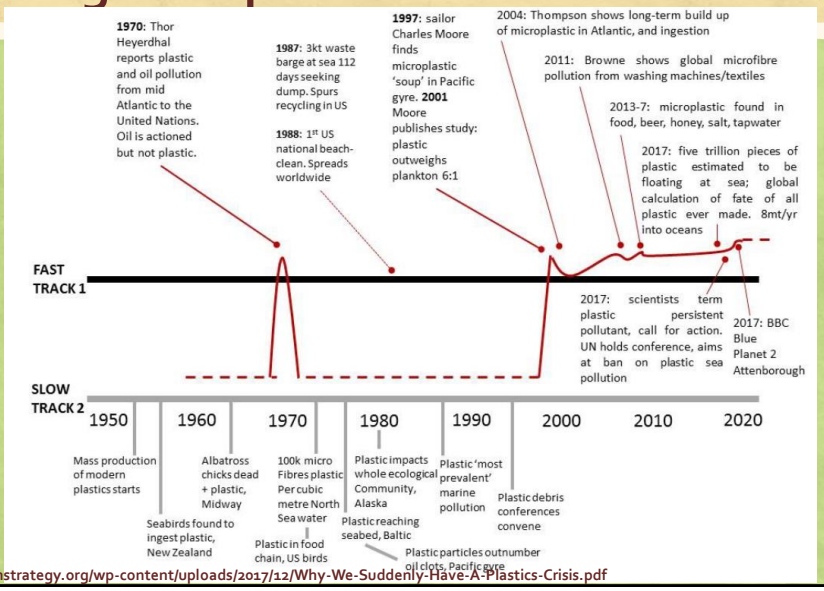
Fig. 3. Cumulative plastic waste generation and disposal (in million metric tons). Solid lines show historical data from 1950 to 2015; dashed lines show projections of historical trends to 2050.

Geyer *et al.*, (2017) Production, use, and fate of all plastics ever made. *Science Advances*, 19 Jul 2017: Vol. 3, no. 7



Plastics Consumption & Waste: A long recognised problem..

Plastics Consumption & Waste: A long recognised problem..



Chris Rose (2017)
http://threeworlds.campaignstrategy.org/wp-content/uploads/2017/12/Why-We-Suddenly-Have-A-Plastics-Crisis.pdf

Plastics Consumption & Waste: A long recognised problem..



The unaltered stomach contents of a dead albatross chick photographed on Midway Atoll National Wildlife Refuge in the Pacific in **September 2009** include plastic marine debris fed the chick by its parents. (Source: Greenpeace)

Plastics Consumption & Waste: A long recognised problem..

EDUCATION FOR CHEMICAL ENGINEERS 4 (2009) 51–67

Contents lists available at ScienceDirect

Education for Chemical Engineers

journal homepage: www.elsevier.com/locate/ece

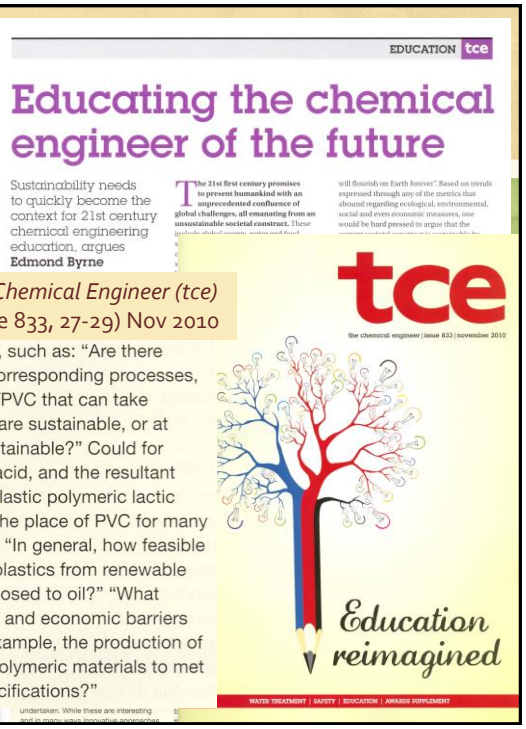
Chemical engineering in an unsustainable world: Obligations and opportunities

Edmond P. Byrne, John J. Fitzpatrick*

Department of Process & Chemical Engineering, University College Cork, Ireland

*"Plastics companies who hire chemical engineers who see their role as merely "**paid hands" to produce plastics more efficiently** may find themselves **without a market** over time, and the chemical engineer they hired **without a job**. Chemical engineers who join plastic manufacturers, and who see their role as one which produces a product which meets a required specification for a given function, may help lead their organisation to continued success through **innovation** and **new product lines**."*

Byrne & Fitzpatrick (2009)



EDUCATION tce

Educating the chemical engineer of the future

Sustainability needs to quickly become the context for 21st century chemical engineering education, argues **Edmond Byrne**

The 21st first century promises to present humankind with an unprecedented confluence of global challenges, all emanating from an unsustainable societal construct. These

will flourish on Earth forever." Based on trends expressed through any of the metrics that abound regarding ecological, environmental, social and even economic measures, one would be hard pressed to argue that the

The Chemical Engineer (tce) (Issue 833, 27-29) Nov 2010

the design team, such as: "Are there materials, and corresponding processes, other than MVC/PVC that can take their place, that are sustainable, or at least, less unsustainable?" Could for example, lactic acid, and the resultant biodegradable plastic polymeric lactic acid (PLA) take the place of PVC for many applications? Or "In general, how feasible is it to produce plastics from renewable materials as opposed to oil?" "What are the technical and economic barriers preventing for example, the production of biodegradable polymeric materials to met the required specifications?"

undertaken. While these are interesting

tce

the chemical engineer | issue 833 | november 2010

Education reimagined

WATER TREATMENT | SAFETY | EDUCATION | AWARDS SUPPLEMENT

Consumer Responses..

Consumer Responses



http://www.bordbiaconsumerlifestyletrends.ie/trends/responsible-living/

Consumer Responses



Germany (KPMG, 2016):
'84 % even prefer unpacked food, where possible'

(UK, Kantar TNS, 2018):
Factors important in shoppers purchasing decisions

'Price'	72%
'Quality'	58%
'Special offers'	42%
'Packaging concerns'	17%
'Fairtrade'	8%
'Carbon footprint'	6%

https://uk.kantar.com/consumer/green/2018/plastic-packaging-concerns-across-generations/

Plastic packaging: concerns across generations



EVE DIXON
UK Managing Director, FMCG & Retail

GREEN 22.05.2018 / 13:00



Kantar TNS data shows that packaging is an important concern for

"63% are concerned about reducing the amount of packaging they buy."
UK, Kantar TNS (2018)

packaging they require, particularly when it comes to plastic bottles and plastic bags, as well as single-use cups and straws.

Consumer Responses



ITV REPORT 26 September 2018 at 11:00am

Royal Mail ask people to stop posting their non-recyclable crisp packets back to Walkers without envelopes

38 DEGREES people. power. change. Search Start a Campaign | News | Donate | More

To: Walkers Crisps

Walkers Crisps: ditch plastic packaging

Campaign created by Geraint Ashcroft



331,437 of 400,000 signatures

Sign the petition

First Name *

Last Name *

Email *

Postcode *

I'd like to be emailed about this, and other 38 Degrees campaigns

Yes, keep me informed via email

No, don't send me emails or keep me

The Engineers Response

The Engineers Response

- There's huge **Media and Consumer hype.**
- ..and **ignorance**: e.g. carbon emissions from ground down recycled glass greater than that of single use plastics.
- Yet, we need to **do something**/seek acceptable consumer solutions.
- It used to be the **product** that was centre of attention, now it's the **packaging!**



Industry Responses..

Industry Responses



It takes around 80 years for crisp packets to decompose. Credit: 38 Degrees

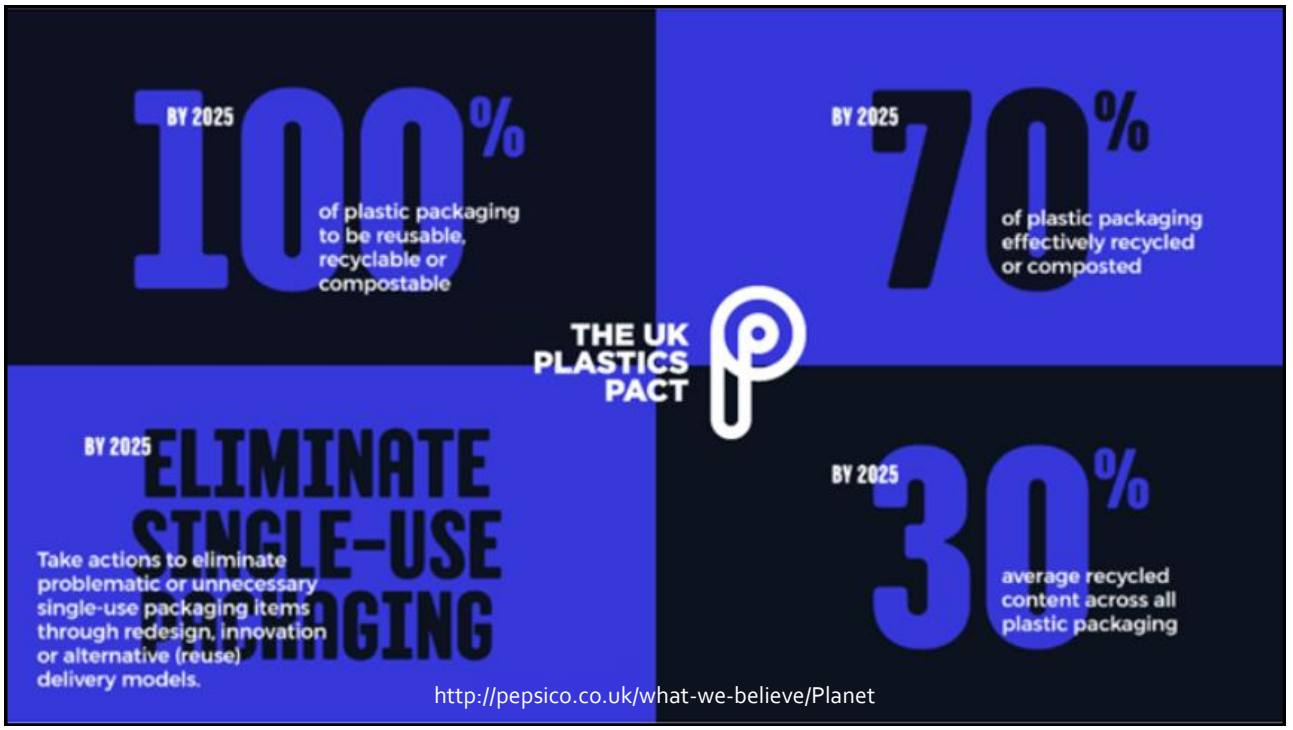
38 Degrees
@38_degrees
Follow

From @walkers_crisps "We have received some returned packets and recognise the efforts being made to bring the issue of packaging waste to our attention.
"The returned packets will be used in our research..." #packetinwalkers



Walkers reveals what they will do with returned crisps packets
People are sending the packets back to the company in the post
leicestermercury.co.uk

8:15 am - 25 Sep 2018



http://pepsico.co.uk/what-we-believe/Planet

Industry Responses

Nestlé: 'It has taken us a little more time than we would have liked to address the issue of plastic packaging'

By Jenny Eagle
17-Apr-2018 - Last updated on 17-Apr-2018 at 12:28 GMT

Nestlé Philippines responds to Greenpeace waste criticisms following Manila's 'plastic waves'

By Pearly Neo
04-Sep-2018 - Last updated on 04-Sep-2018 at 07:22 GMT



Nestle Philippines has responded to criticisms of plastic packaging waste by environmental campaigners following 'plastic waves' that hit Manila this month.

RELATED TAGS: Plastic, Waste, Philippines, Nestle

Nestlé Philippines has responded to criticisms over packaging waste made by environmental campaigners after 'plastic waves' hit Manila, with the firm issuing reassurances that steps are in place to 'reduce its environmental footprint'.

Tropical Storm Yagi (local name: Karding) hit Manila earlier this month, and its aftermath saw enormous waves of



Industry Responses

*The partners "aim to develop and launch at commercial scale a **PET plastic bottle** made from **bio-based material** i.e. 100% sustainable and renewable resources ..[e.g.] used cardboard and sawdust, so it does not divert resources or land from food production"*

Nestlé Good Food, Good Life

Change Locati

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Latest News
Media Contacts
Meet Our Experts
Latest Stories
Press Information and Resources

Home > Media > Latest News > Danone and Nestlé Waters Launch NaturALL Bottle Alliance with California Startup to Develop 100% Bio-Based Bottles

Danone and Nestlé Waters Launch NaturALL Bottle Alliance with California Startup to Develop 100% Bio-Based Bottles

R&D Partnership to Accelerate Food and Beverage Industry Breakthrough - First New Bottles to Reach Store Shelves in 2020

PepsiCo Joins Danone And Nestlé's NaturALL Bottle Alliance

Published on Sep 10 2018 1:30 PM in Packaging And Design tagged: Trending Posts / PepsiCo / Danone / Nestle waters / NaturALL / Origin Materials

https://www.nestleusa.com/media/pressreleases/nestle-waters-launch-alliance-naturall-bio-based-bottles

Industry Responses

NEW MATERIALS

Plastic: changing it up

If we are going to benefit from new materials, clear labelling will be essential. Bio-PET, for instance, is a plastic made from renewable feedstocks like the leftover pulp from harvesting sugarcane. Coca Cola's bio-PET Plant bottle is made like this, but bio-PET behaves like oil-based PET (used for plastic bottles) and is recyclable, but not compostable.

There may yet be hope for biodegradable PET following the discovery of an enzyme dubbed 'PETase', produced by a bacterium called Ideonella sakaiensis 201-F6 that was found in the soil of a Japanese PET bottle recycling plant. Researchers at the US Department of Energy's National Renewable Energy Laboratory (NREL) and University of Portsmouth announced recently they had developed a faster working variant of the enzyme this year that can break down PET bottles more quickly.

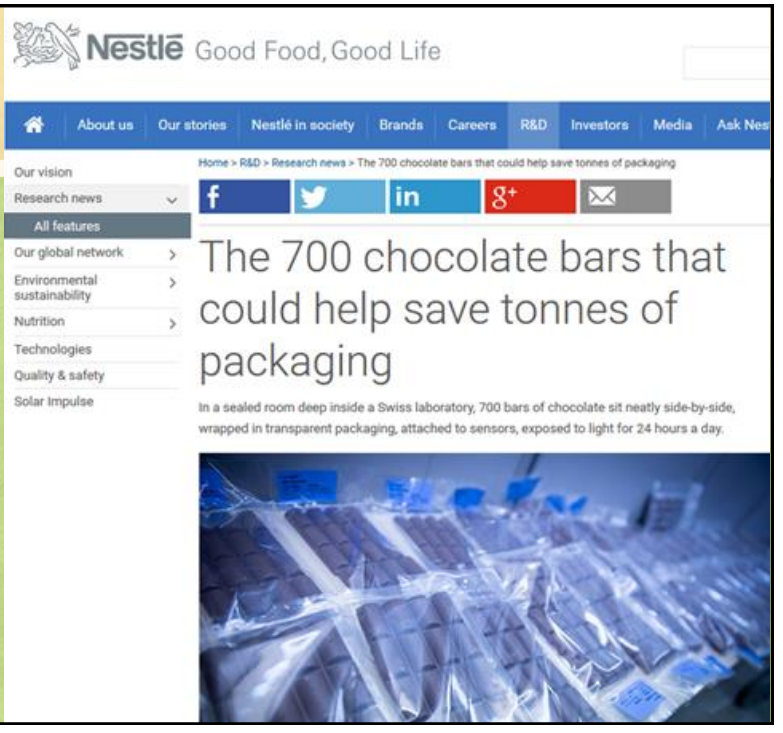
The Institution of Engineering & Technology (2018)
https://eandt.theiet.org/content/articles/2018/05/plastic-waste-pollution-in-the-ocean-technology-at-the-tipping-point/

Industry Responses

"The chances are it's being ***'over packed'*** *in an unnecessarily high level of protection.*

Shortening its shelf life*, and adjusting its associated packaging requirements, can be a simple but highly effective way of improving its environmental performance."*

https://www.nestle.com/randd/news/allfeatures/swiss-chocolate-bars-save-environment-packaging



Industry Responses

*"A Tetra Pak package has a thin layer of polymer, or plastic, to prevent moisture getting in or out and to keep contents fresh. ..Our **long-term ambition** is for all our chilled and ambient packages to be made from **renewable alternatives to oil-based plastics**.*

*..Despite considerable progress, **bio-based polymers** are still **only in a small fraction of our cartons** and a **niche product** for the plastics industry.*

*..We are working with a number of our stakeholder partners to explore these issues, while also continuing to assess alternatives like other **plant -based materials, organic waste** and **algae**."*



https://assets.tetrapak.com/static/documents/sustainability/2017-sustainability-report.pdf

Industry Responses

*"Performing as regular plastic is not so simple. ..TIPA's solution is a blend of **bio-based polymers** and derived from **plant-based** sources, which is not an easy technological feat."*



https://www.geektime.com/2015/06/21/how-tipas-100-biodegradable-packaging-plans-to-solve-the-food-waste-problem

Industry Responses



https://www.nytimes.com/2017/05/30/dining/packaging-materials-food-waste.html

"Molded packing material by Ecovative made from a mushroom-type fungus."

Packaging Food With Food to Reduce Waste



The design company Ecovative makes a variety of packaging materials using mycelium fungus.

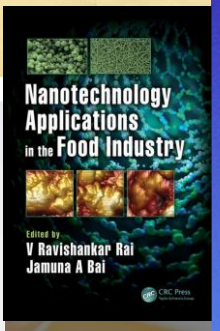
Nathaniel Brooks for The New York Times

Industry Responses

Packaging the Future: Edible Wrappers, Containers and Bags (Yum?)



PACKAGING THE FUTURE
edible wrappers, containers and bags



You Will Soon be Able to Eat Your Food Packaging

August 23, 2016 0 Comments 897 Views 3 Min Read

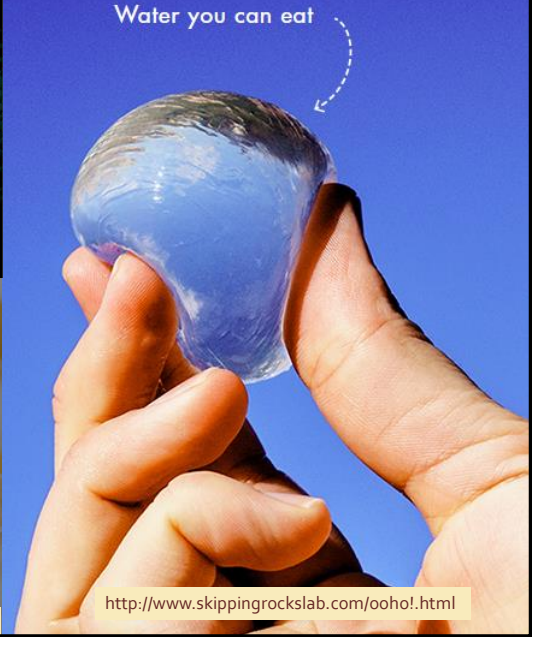
https://inhabitat.com/packaging-the-future-edible-wrappers-containers-and-bags-yum/

http://sciencenewsjournal.com/will-soon-able-eat-food-packaging/

Skipping Rocks Lab

Ooho!

Water you can eat



http://www.skippingrockslab.com/ooho!.html

Industry Responses

No packaging options **but..** students need to **purchase microchipped bottles** in order to dispense.

Students To Trial Smart Coca-Cola Dispensers To Reduce Drinks Packaging

Posted on 9 October 2017 by Darrel Moore

Coca-Cola European Partners (CCEP) has launched a new initiative in partnersh ip with the University of Reading that will see students trial Coca-Cola Freestyle machines.



The programme combines a new generation of smart Coca-Cola fountain dispensers – known as Coca-Cola Freestyle machines – with refillable containers that are micro-chipped to interact with the dispenser technology, allowing students and staff to buy all their soft drinks in reusable bottles

Industry Responses

Recycling

Pret a Manger doubles discount for bringing reusable coffee cups

Chain will now knock 50p off prices in bid to help change customers' habits, with the UK discarding an estimated 2.5bn coffee cups every year

Sara Luxmoore and agency

Tue 2 Jan 2018 18.46 GMT

3,484

This article is over 8 months old



Industry Responses



University College Cork is Now Home to Ireland's First Plastic Free Café



Monday 24 September 2018

Life Food & Drink

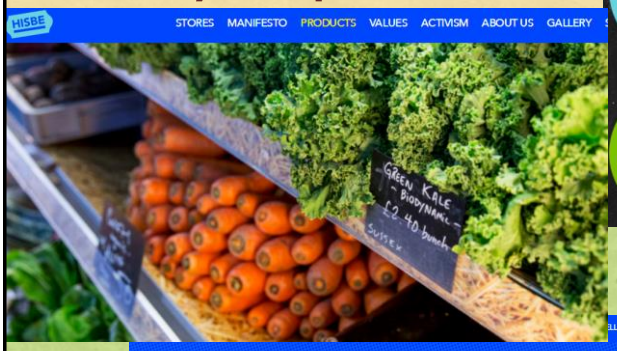
Ireland's first plastic free café opens today



https://www.independent.ie/life/food-drink/irelands-first-plastic-free-caf-opens-today-37305145.html

1

Industry Responses







LET'S IGNITE A REVOLUTION

Buck convention, break the mould, reinvent, challenge, transform, make good **FOOD** normal, affordable, accessible, source **LOCAL, SEASONAL, ETHICAL**, sustainable, don't **WASTE** it, eat it, support independents, real producers, pay fairly, price fairly, be transparent, less hype, more truth, value our **PEOPLE** and respect customers, farmers, suppliers, **ANIMALS** and the **PLANET**, champion quality, health, provenance and service, create a real food community and put happiness before profits. Together we will transform the food industry. So eat your greens, smile at strangers and know this to be true: being a fully conscious shopper will make you popular, desirable and ***very attractive***.

HOW IT SHOULD BE

at our kitchen table next to the soap box.

The Pepsi Challenge!

The Pepsi Challenge



https://money.cnn.com/video/news/2018/07/13/starbucks-sunchips-go-green-orig.cnnmoney/index.html

The Pepsi Challenge

MIT Sloan Management Review

Pepsi's biodegradable backlash: The snack bag that was too noisy

Leslie Brokaw
Tuesday, March 18, 2014 - 4:15am



https://www.greenbiz.com/blog/2014/03/18/pepsis-biodegradable-backlash-snack-bag-was-too-noisy



https://money.cnn.com/video/news/2018/07/13/starbucks-sunchips-go-green-orig.cnnmoney/index.html

The Pepsi Challenge



https://money.cnn.com/video/news/2018/07/13/starbucks-sunchips-go-green-orig.cnnmoney/index.html

PepsiCo to launch 100% compostable, plant-based packaging

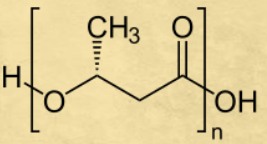
June 6, 2018 Food Business Africa



INDIA – The food and beverage company Pepsico has announced it will be launching 100% compostable, plant-based packaging for its Lay's and Kurkure snacks products in the fourth quarter this year to address rising concerns around plastic pollution.

https://www.foodbusinessafrica.com/2018/06/06/pepsico-to-launch-100-compostable-plant-based-packaging/

The Pepsi Challenge

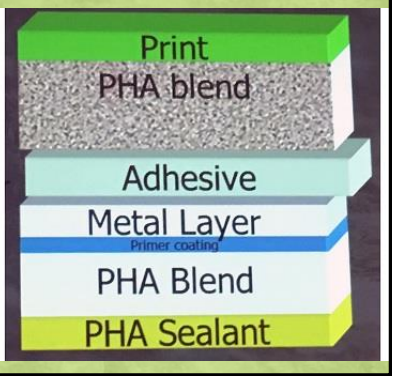


Compostable snacks packaging snags bioplastic award for Danimer Scientific, PepsiCo

by: Rick Lingle in Packaging, Sustainability, Materials on September 18, 2018

https://www.plasticstoday.com/packaging/compostable-snacks-packaging-snags-bioplastic-award-danimer-scientific-pepsico/83659095059493

The industrial compostable snack bag is comparable in feel, noise and performance to PepsiCo's current bags and certified to be industrially compostable by TUV Austria. The new Danimer resins that are blends of biopolymers and mineral filler give the bag its white exterior and can be processed in blown film lines for improved economics. The new bio-based structures are currently being piloted in a limited test in the U.S. and Chile, with plans for a test in India later this year.

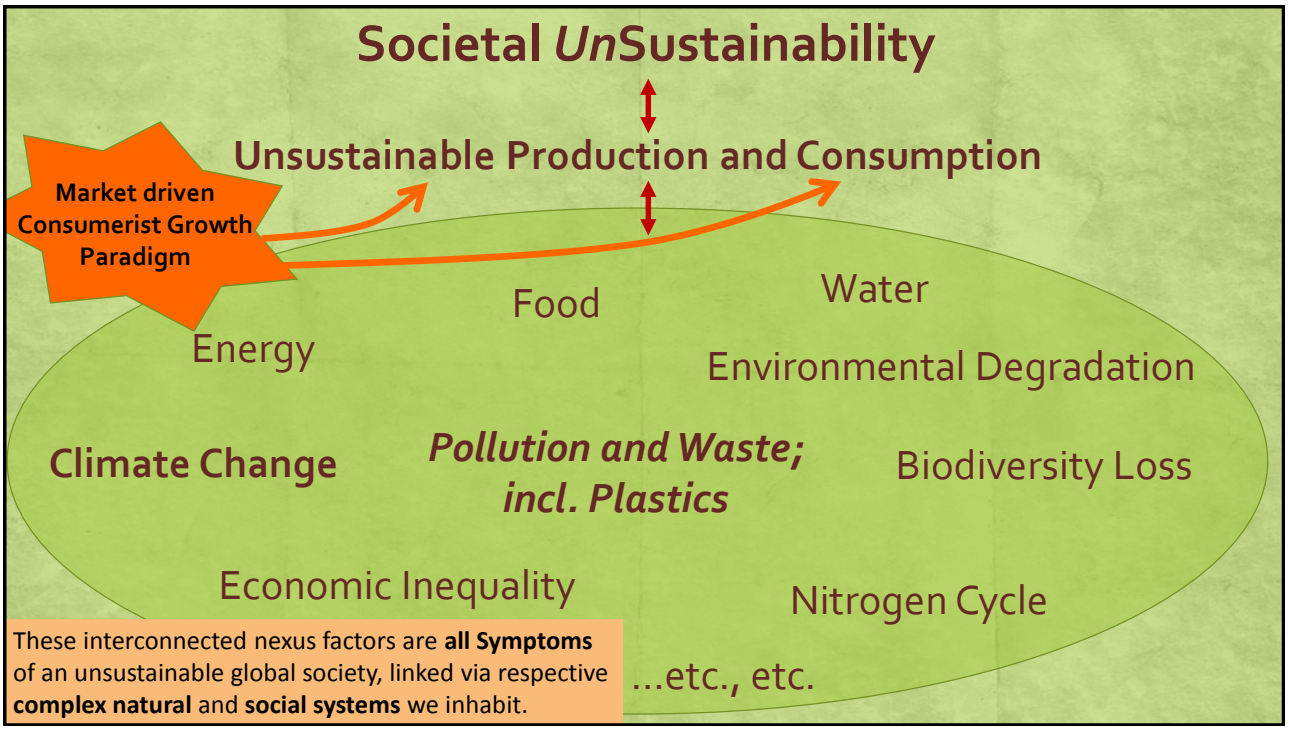


Polyhydroxyalkanoates (PHAs): polyesters produced by microorganisms, including via bacterial fermentation of sugars/lipids. They are used to produce biodegradable plastics.

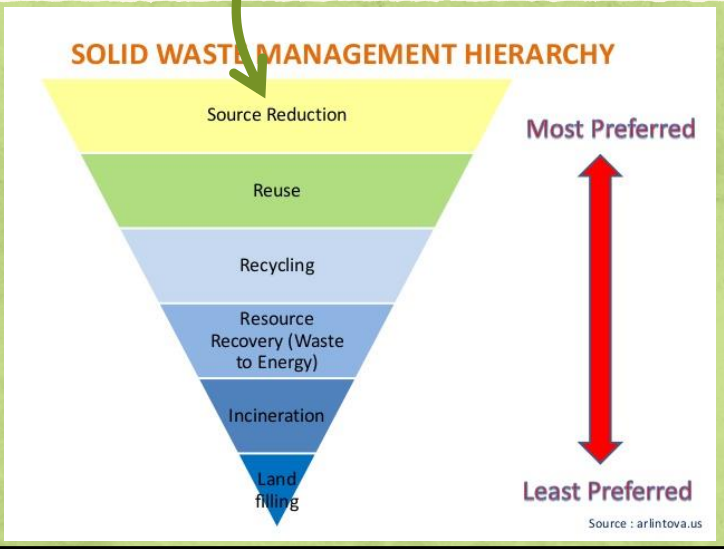
Problematizing Responses..

Are proposed 'solutions' (including recyclable, bioplastic, biodegradable or no packaging options) more sustainable?

..Or in the context of the dominant societal paradigm of consumerist growth will they ultimately just contribute to creating more waste, carbon emissions & environmental degradation?



Waste Triangle: Reduce! (Consumption)



The problem with Recycling..

'in the long run, recycling reduces waste generation only if it reduces primary material production; otherwise, it merely delays it'.

Geyer et al. (2015) Common Misconceptions about Recycling, *Journal of Industrial Ecology,* 20, (5) pp. 1010-1017.

"No amount of recycling can get us out of this global mess," said Abigail Aguilar, Campaigner at Greenpeace Philippines.
"Corporations may have conned us by providing so-called convenience but it's not convenient when Your city, oceans, roads, and rivers are clogged by plastic garbage."

https://www.onegreenplanet.org/news/manilla-streets-literally-flooded-trash/



The problem with Biodegradable Plastics..

European Parliament says biodegradable plastics will not solve plastic pollution

13 09 2018

animals. The Parliament today has acknowledged that biodegradable plastics are not a silver bullet to our plastic pollution crisis, but merely a distraction from real solutions. Policies that dramatically cut our plastic footprint need to be urgently implemented."

The Parliament voted to strengthen the European Commission's plans to slash plastic pollution, under the European Strategy for Plastics in a Circular Economy launched in January 2018.

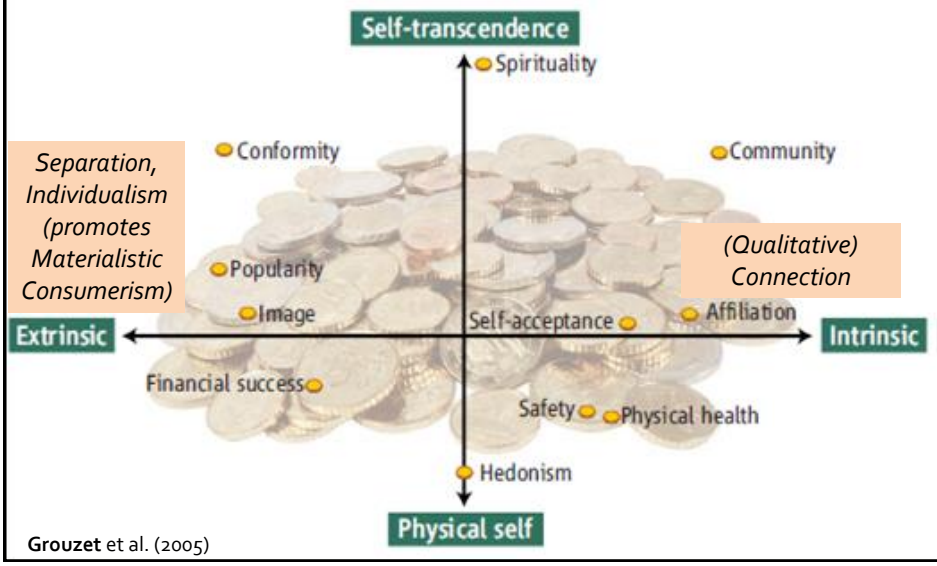
FOR IMMEDIATE RELEASE: Strasbourg, 13/9/2018

https://rethinkplasticalliance.eu/news/european-parliament-says-biodegradable-plastics-will-not-solve-plastic-pollution/

Promoting Responsible Consumption?



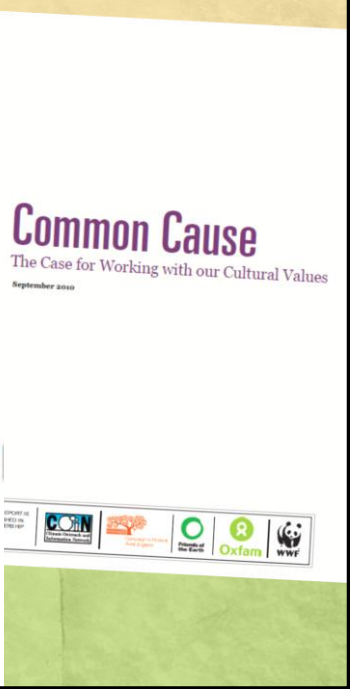
Intrinsic and **Extrinsic values** act in **opposition**; **strengthening** one **weakens** the other.



Separation, Individualism (promotes Materialistic Consumerism)

(Qualitative) Connection

Grouzet et al. (2005)



Demonstrating Conflicting Values?

A careful evaluation of the narratives used in our everyday lives as consumers reveal that the package of narratives used are ***collectively contradictory.***

In the context of ethical and environmental narratives, ..we purchase ***water-intensive Fairtrade organic fruit and vegetables*** *that are* ***imported huge distances*** *by air transport from countries prone to* ***drought****."*

P. Haynes (2015) ,Consuming Sustainability Narratives, in *Advances in Consumer Research*, 43, 364-367.

How to move to Sustainable Consumption?

http://www.srfood.org/en/how-to-move-to-sustainable-consumption

"Much of what we consume remains fueled by status competition and the ***quest for social recognition*** *and acceptance: this suggests that in order to make progress in* ***curbing excessive consumption*** *and its impacts on* ***sustainability****, we may need to* ***reconceive consumption*** *not merely as a matter of* ***individual choice*** *but as one of* ***social norms*** *that is tied in with broader efforts to achieve* ***social justice.***

-If ***social norms*** *are such a big driver of consumption,* ***how can these norms be made to evolve****?*

-How can ***technological*** *change be* ***reoriented*** *around* ***sustainability****, instead of the never-ending quest for economic efficiency, increased labor productivity, and profit maximization for technology owners?*

-How can ***markets be reshaped*** *in order to favor the shift to more* ***sustainable consumption*** *patterns, sometimes referred to as* ***voluntary simplicity"?***



Olivier de Schutter, UN Special Rapporteur 2008-2014

Douglas Holt (2012): Another way towards Sustainable Consumption?

- *Extremely difficult/will take too long to dislodge the **Dominant Consumerist Market Paradigm***
- *But, its **not necessary**; Use **marketing tools** to change **behaviour** (and elicit sustainable consumption tipping point), as with introduction of **plastic bottled water** from the 1980s, which was not down to drinks companies, but due to:*
  - *Fears over **tap water safety** following high profile incidents*
  - *1988 NY Times article suggesting experts recommend people drink **8 glasses water/day** to remain **hydrated***
  - *1990/2000s narratives around **obesity** and **sugary drinks***

D. Holt (2012) Annals of the American Academy of Political and Social Science, Vol. 644, pp. 236-255

Popularising & Embedding Sustainable Consumption?



Refill .ie

CONSUMER

Supermarkets join free water campaign

By Tom Bawden
ENVIRONMENT CORRESPONDENT

Morrisons, John Lewis and Heathrow Airport are offering free drinking water after joining a nationwide campaign to reduce plastic waste.

Anyone with a reusable cup can fill it in over the counter at the supermarket chains' cafés, while dozens of fountains will be dotted around the west London airport.

They join Greggs, Costa, Starbucks and other outlets which have set up more than 12,000 water refilling stations across the country since the campaign kicked off in January.

The Drinking Water Refill initiative is being co-ordinated by industry association Water UK.

It has commissioned research showing that 85 per cent of the British population is worried about plastic waste.

