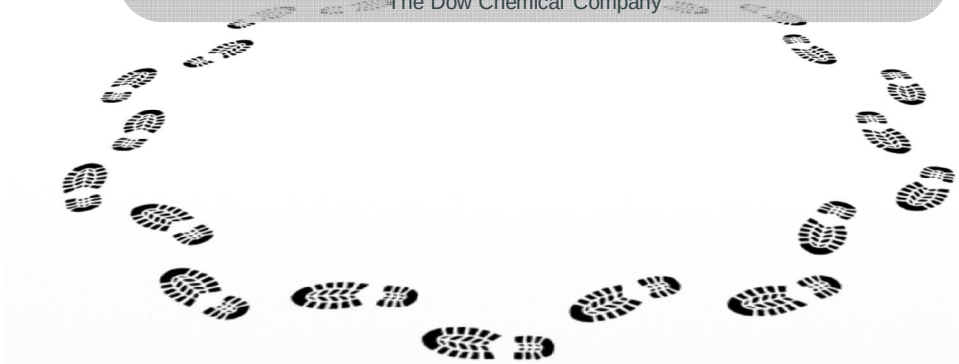
Going In Circles

Implications for Individuals, Industry and the Ecosystem

Mark Jones

Executive External Strategy and Communications Fellow
The Dow Chemical Company



23 January 2019

Word of the Year

THE COLLINS WORD OF THE YEAR 2018 IS...

SINGLE-USE

'Single-use', a term that describes items whose unchecked proliferation are blamed for damaging the environment and affecting the food chain, has been named Collins' Word of the Year 2018.

Single-use refers to products – often plastic – that are 'made to be used once only' before disposal. Images of plastic adrift in the most distant oceans, such as straws, bottles, and bags have led to a global campaign to reduce their use.

The word has seen a four-fold increase since 2013, with news stories and images such as those seen in the BBC's Blue Planet II steeply raising public awareness of the issue.

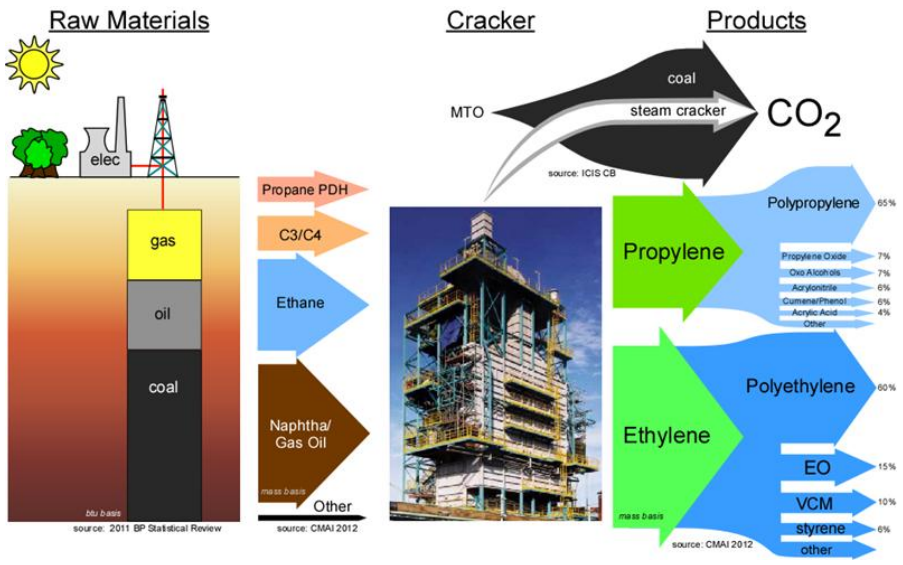
SINGLE-USE

adj (sɪŋgəl'juːs)
made to be used once only

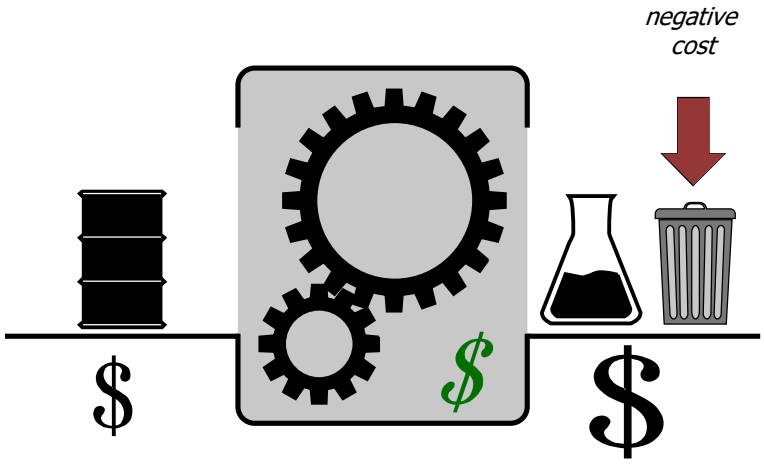
#CollinsWOTY

Collins
Pioneers in dictionary publishing since 1819

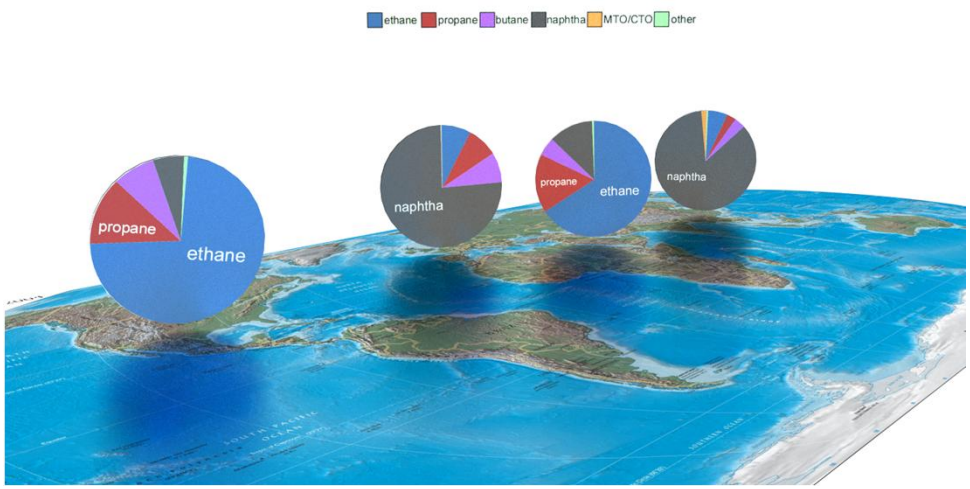
Global Chemical Industry



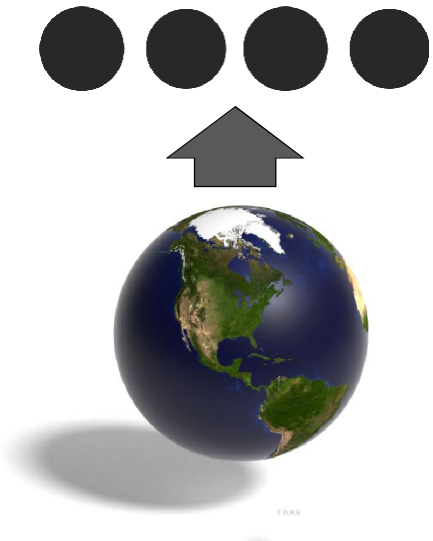
Simplified Chemical Industry



Global Feedstock Slates Differ



Rough Mass Balance for Chemical Industry



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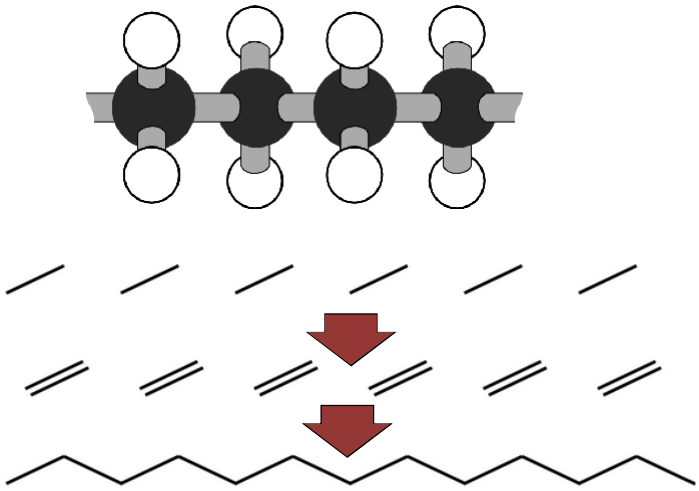

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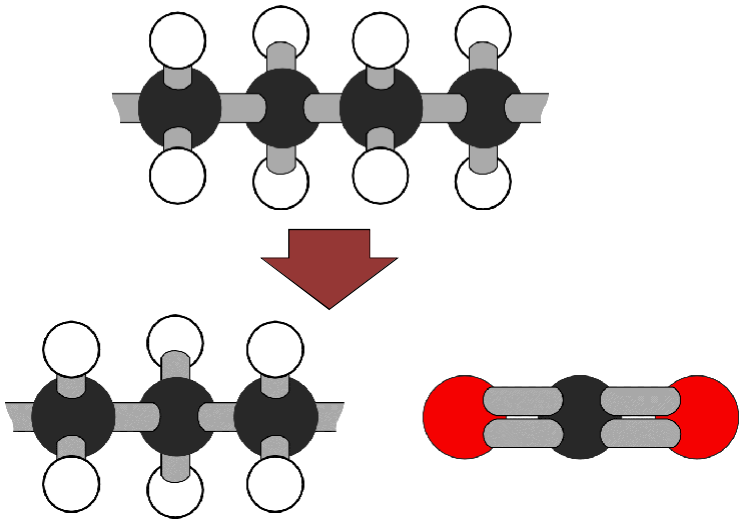
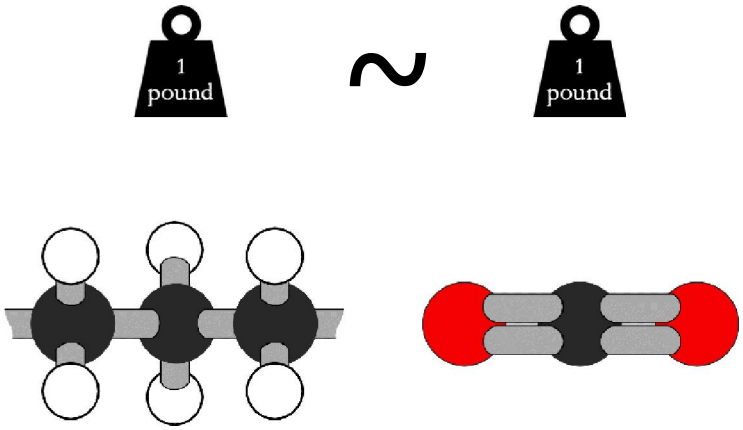
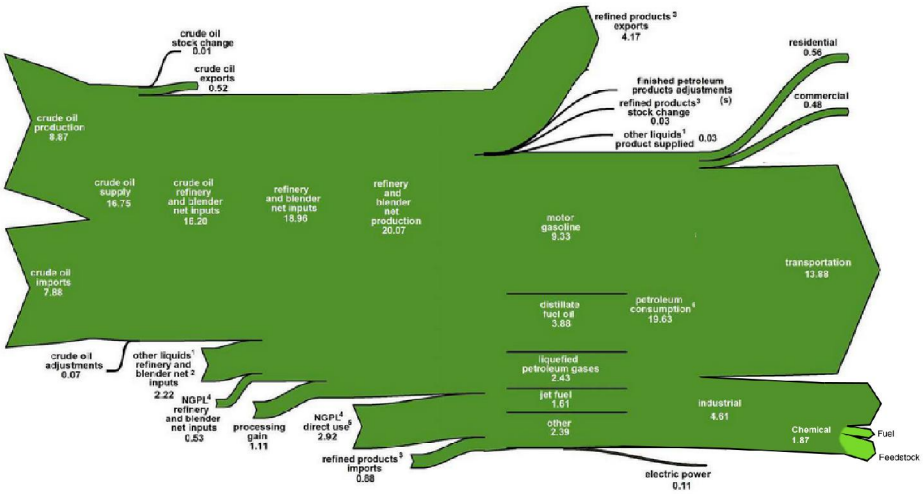


Rough Mass Balance for Chemical Industry



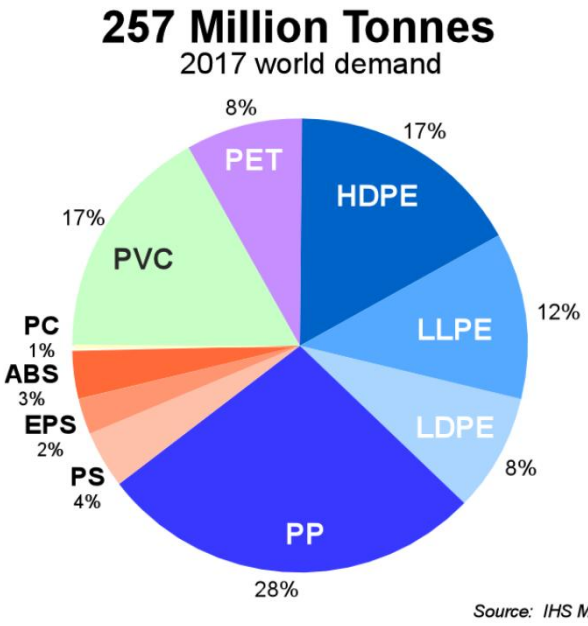
US Petroleum Flow, 2016

in million barrels per day

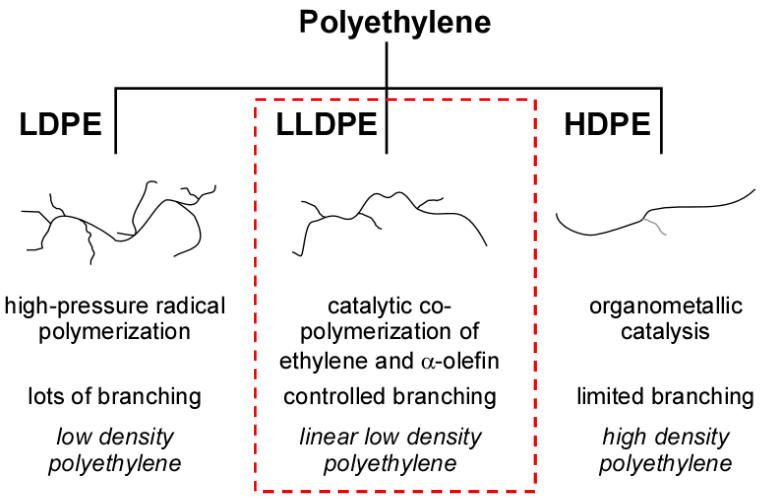


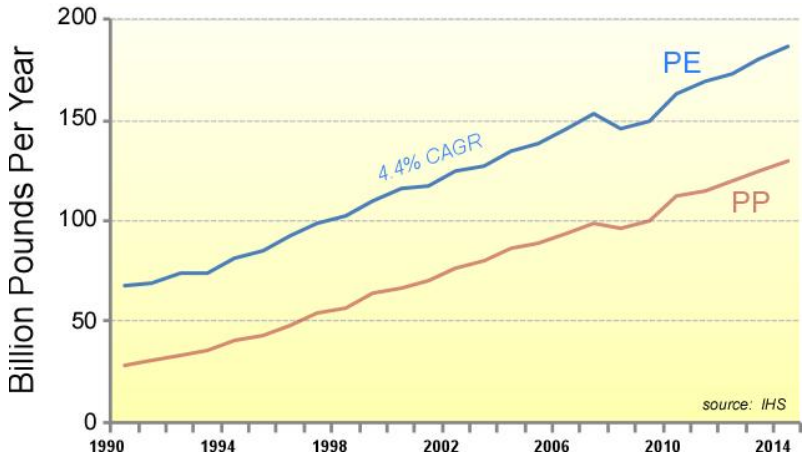
EIA Monthly Energy Review, September 2017 (Release Date: September 28, 2017)
Lippe, Dan; *Oil & Gas Journal*, 4 Sept 2017, pg 82.

Polymers

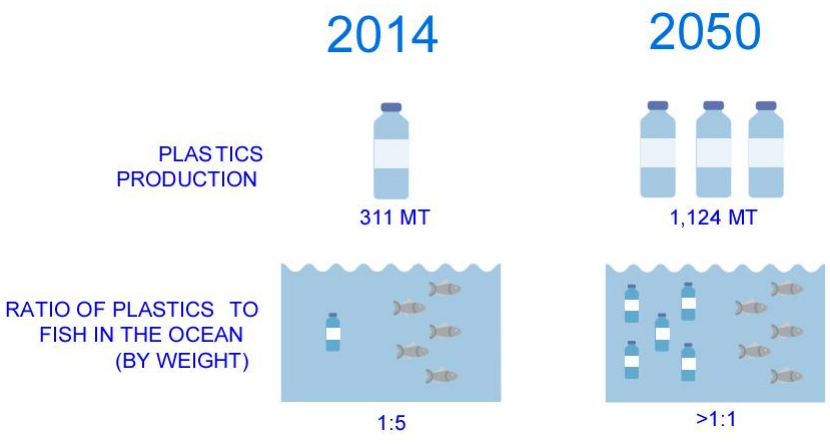


Polyethylene





Production and Impact



Source: World Economic Forum

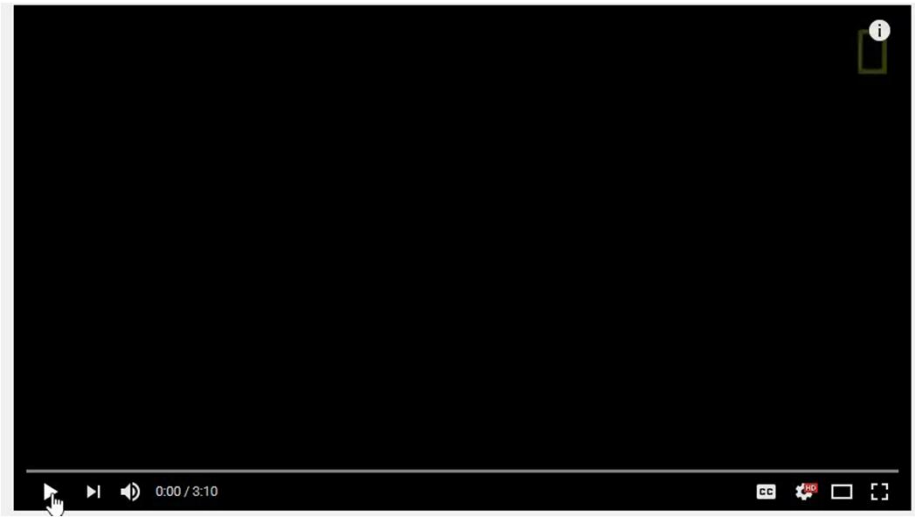
WHAT GOES IN THE OCEAN GOES IN YOU.

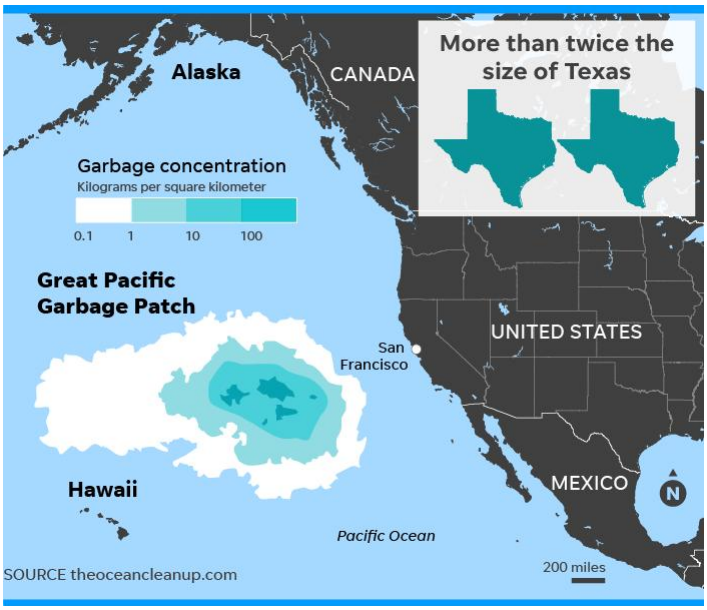
SURFRIDER FOUNDATION

RISE ABOVE PLASTICS

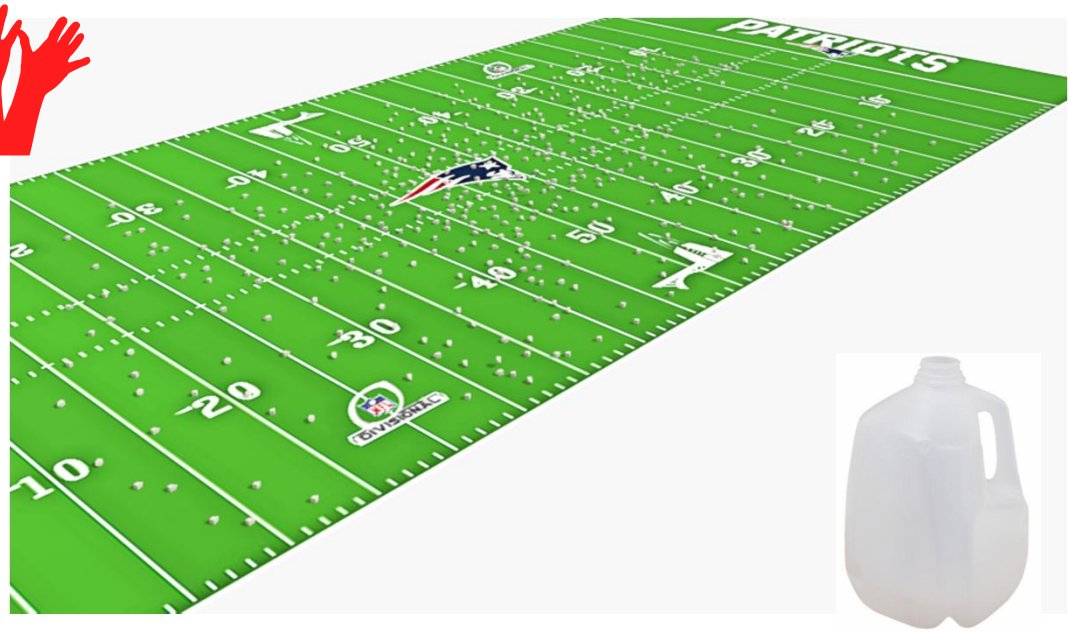
RECENT STUDIES ESTIMATE THAT FISH OFF THE WEST COAST INGEST OVER 12,000 TONS OF PLASTIC A YEAR. FIND OUT HOW YOU CAN HELP TURN THE TIDE ON PLASTIC POLLUTION AT WWW.SURFRIDER.ORG/RAP

Ellen MacArthur




Alaska
CANADA
More than twice the size of Texas
Garbage concentration
Kilograms per square kilometer
0.1
1
10
100
Great Pacific Garbage Patch
San Francisco
UNITED STATES
Hawaii
MEXICO
N
Pacific Ocean
SOURCE theoceancleanup.com
200 miles

PATRIOTS


PATRIOTS

PATRIOTS

PATRIOTS

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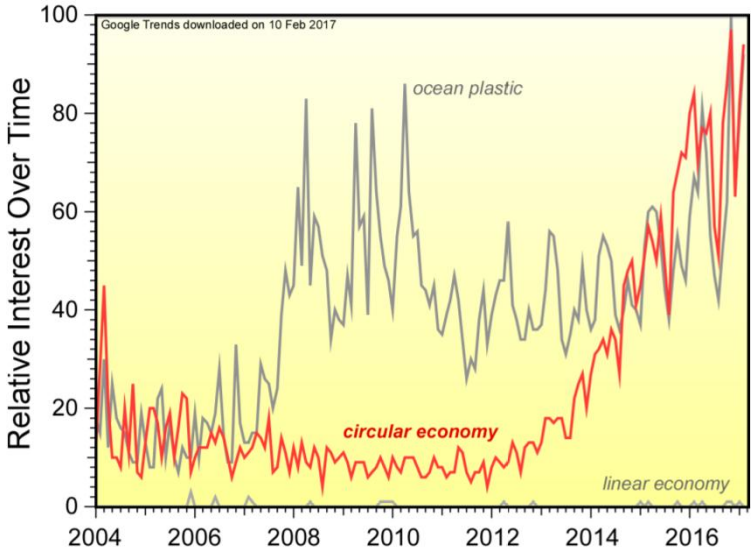
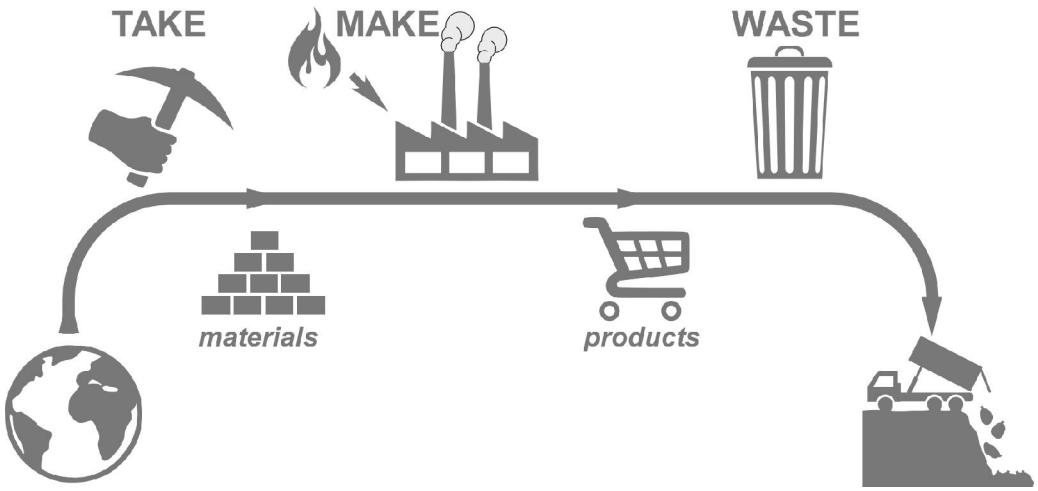
Use of Circular and Linear Economy



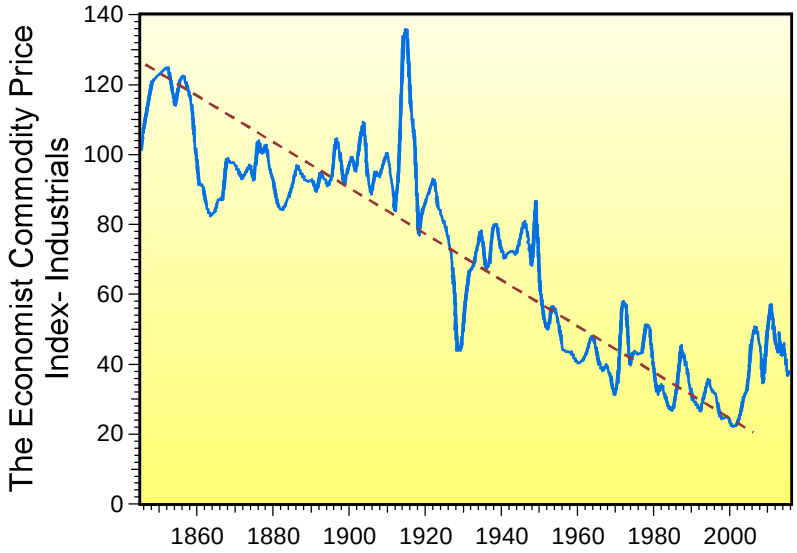
What is the circular economy? NOT

The Linear Economy

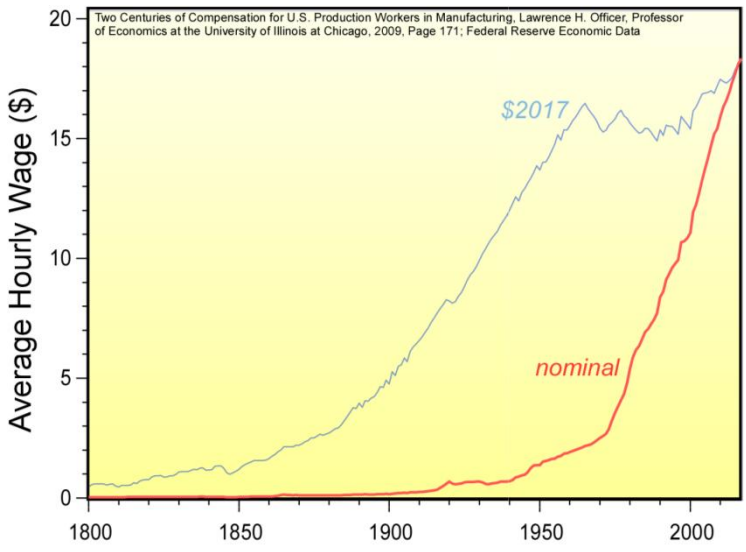


Value

Commodity Prices

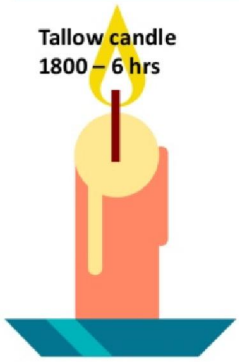


Wages Over Time



Implications

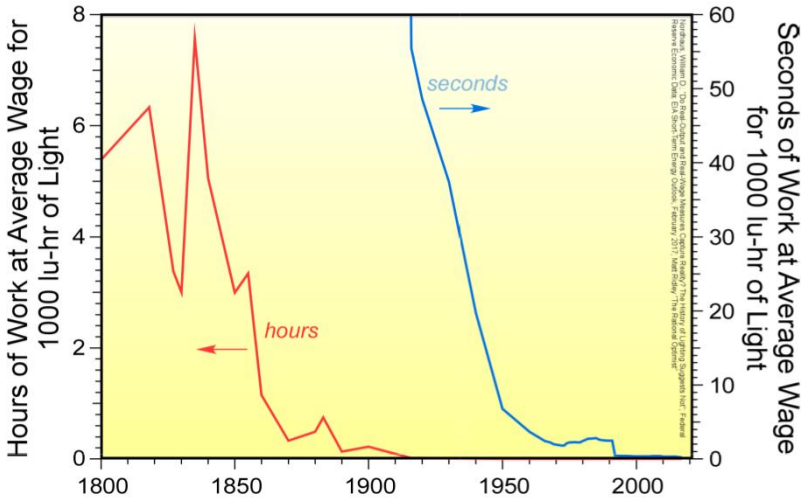
How long does it take to earn an hour of reading light?



Nordhaus 1997: http://www.nber.org/chapters/c6064.pdf

K2 London Keynote: Where Does Innovation Come From? - Lord Matt Ridleyhttp://kenshoo.com/k2-london-keynote-matt-ridley/

Work Needed to Supply Light



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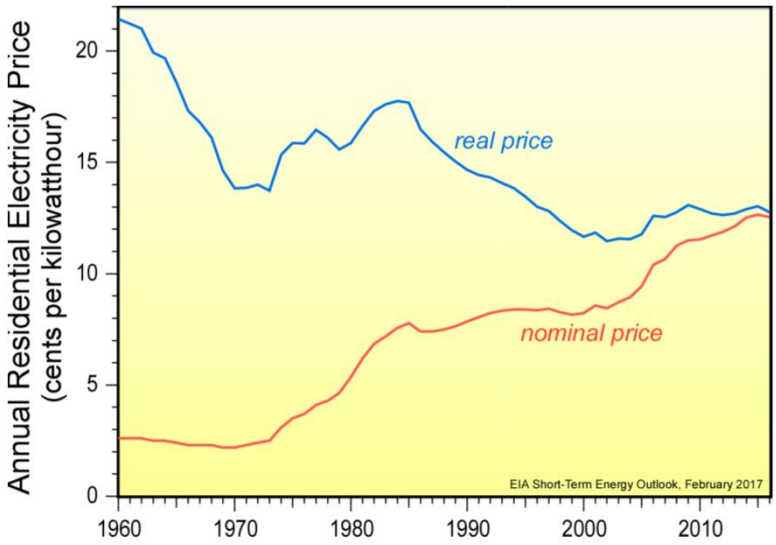
Combining Impacts



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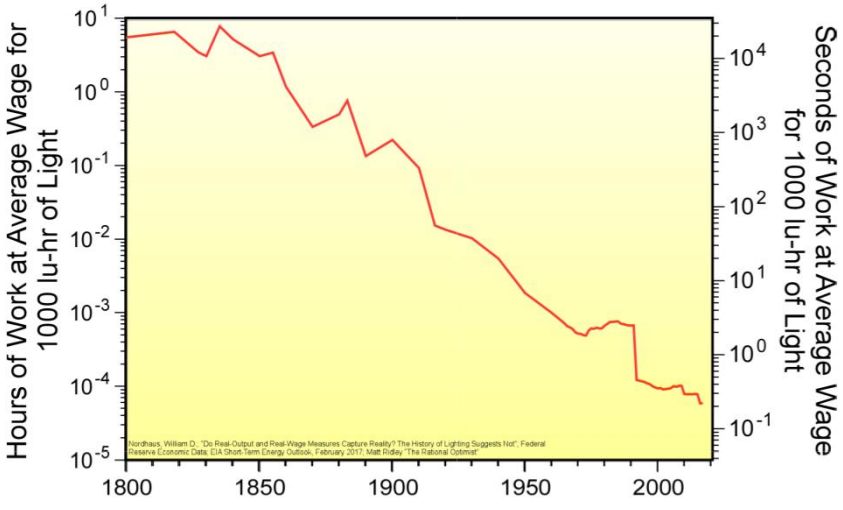
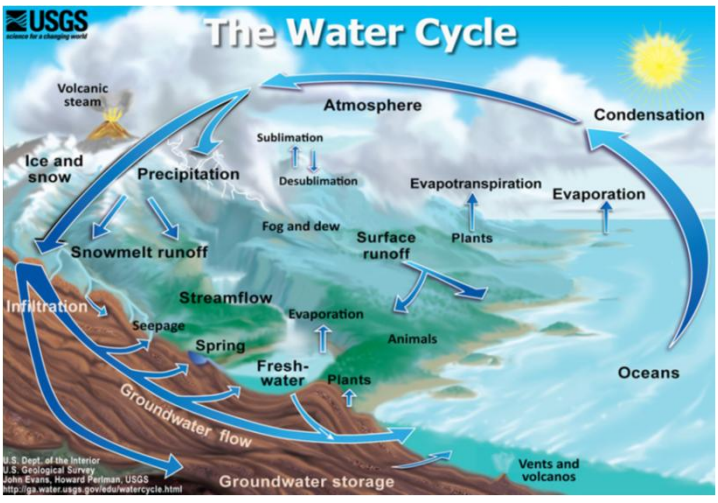
Work Needed to Supply Light



What is the circular economy?

Natural Cycles



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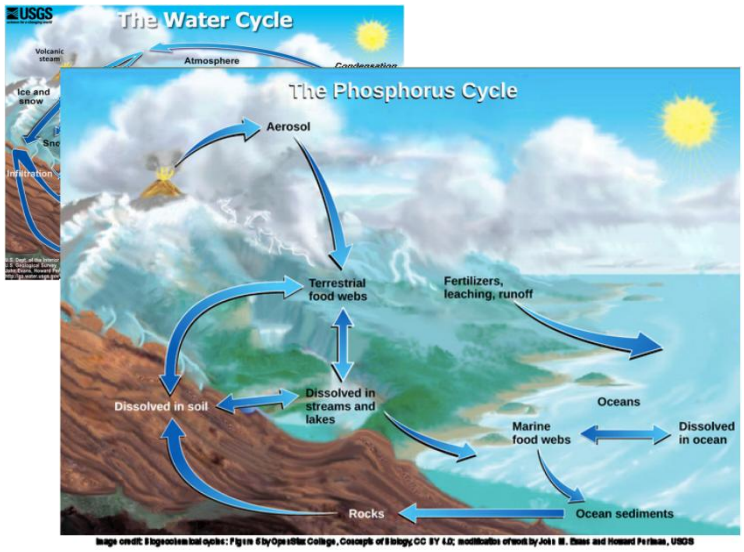

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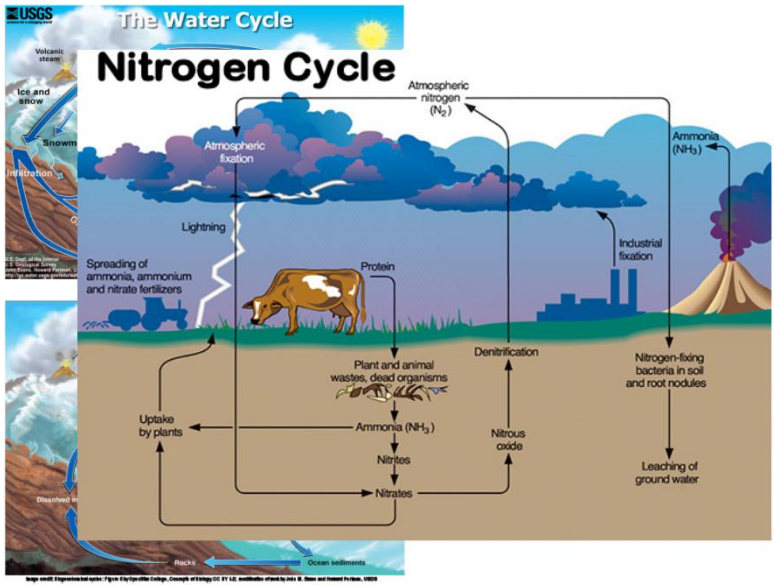
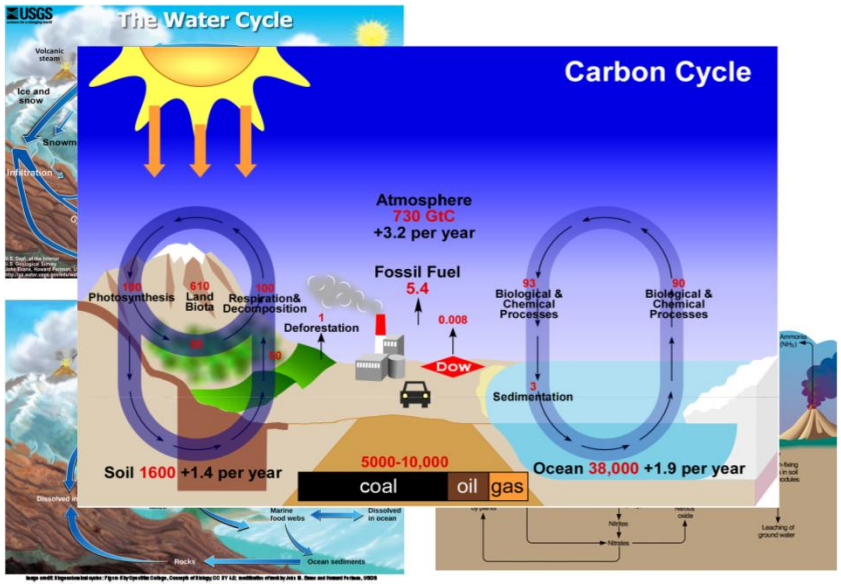
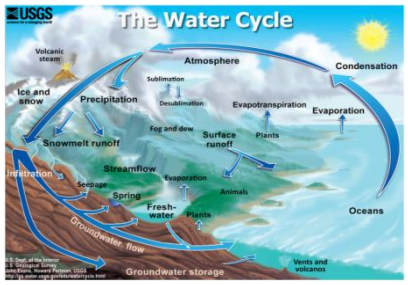
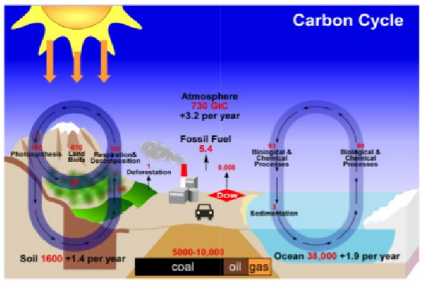


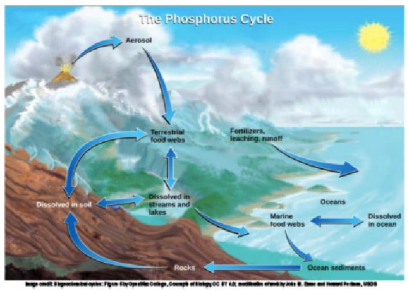
Natural Cycles

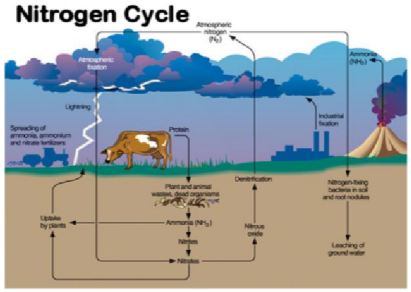


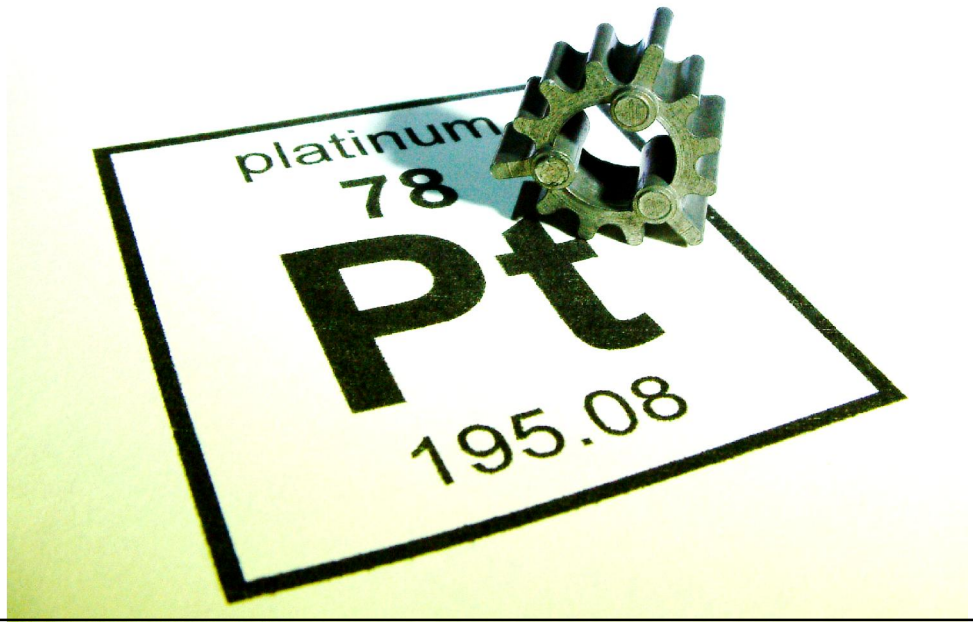
Natural Cycles







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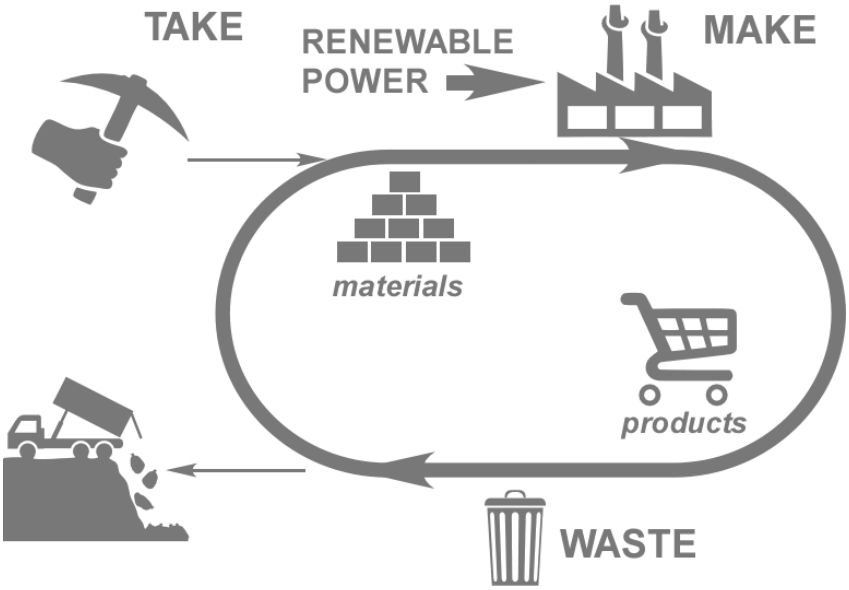
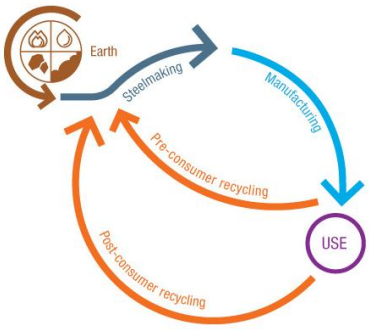
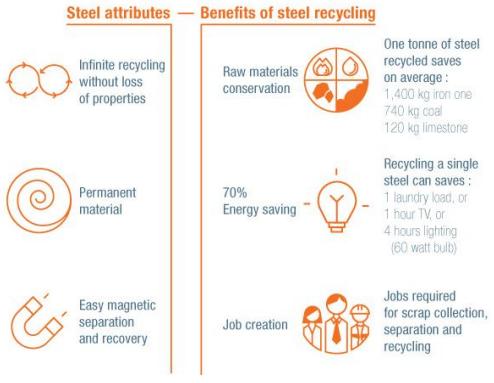
The Circular Economy

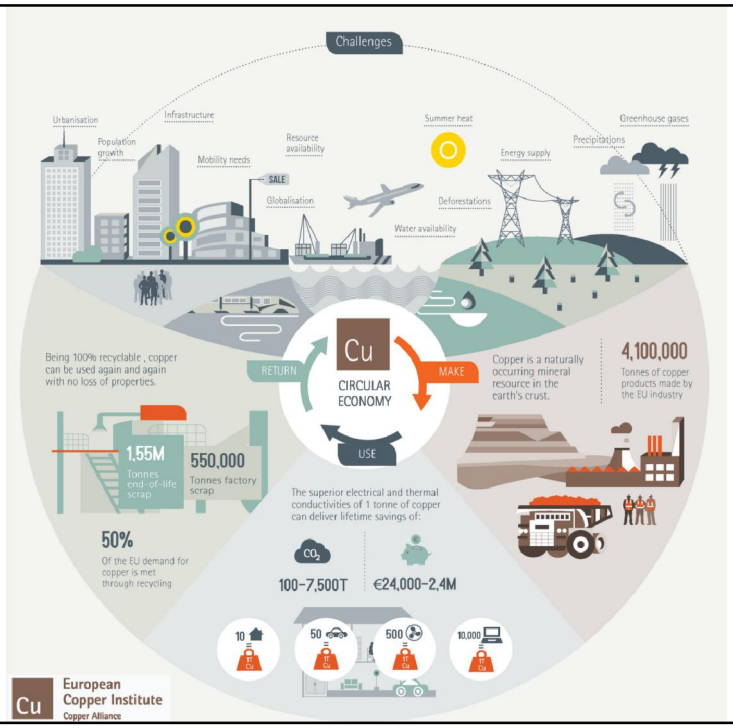


Already Circular - Metals

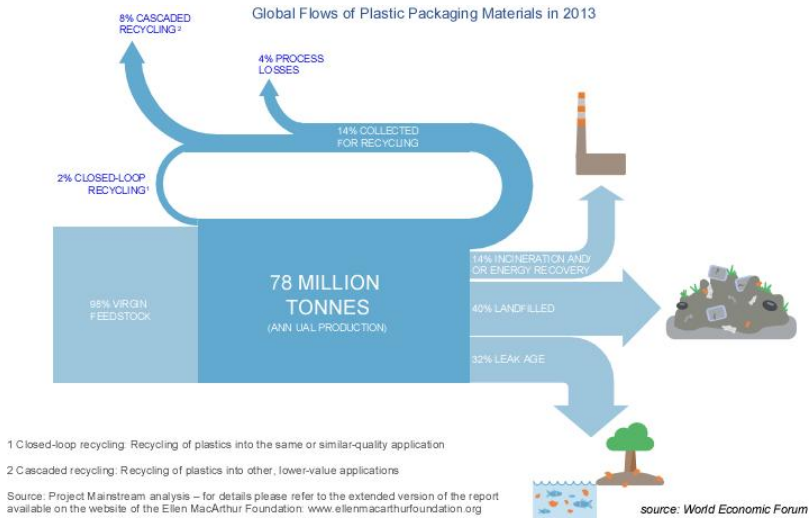




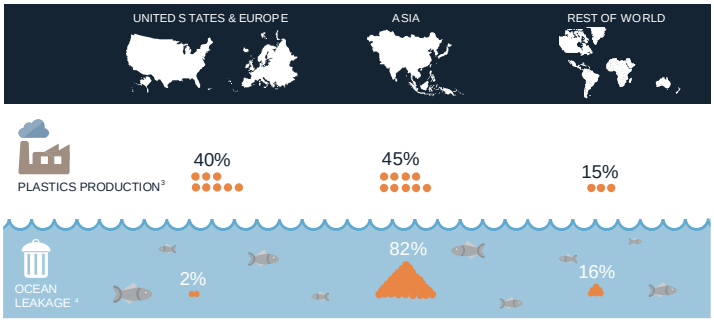
http://circulareconomy-worldsteel.org/



Current Plastic Flow



Where Does Plastic Waste Come From?



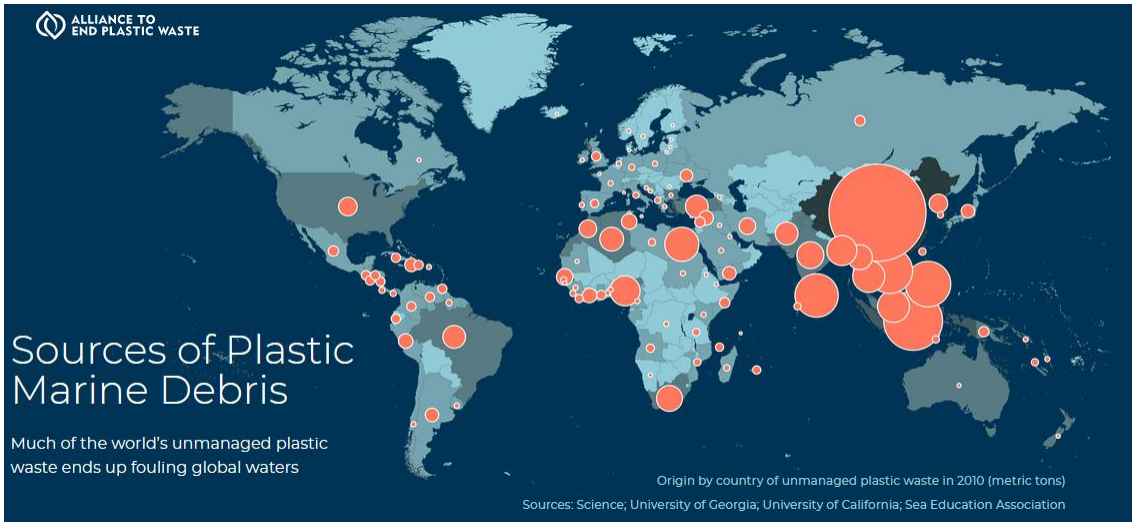
3 Production of plastics material volumes (excluding thermoplastics and polyurethanes)

4 Source of plastics leaked into the oceans (proportion of the total global leakage measured in million tonnes of plastic marine debris leaked per year)

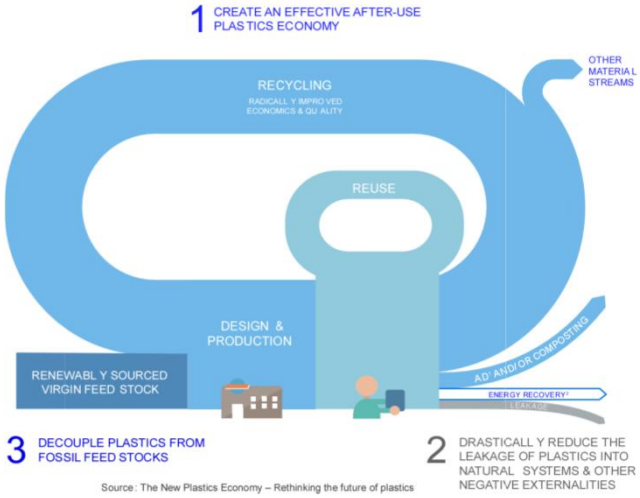
Source: PlasticsEurope, Plastics – the Facts 2015 (2015); Statista; ICIS Supply and Demand; J. R. Jambeck et al., Plastic waste inputs from land into the ocean (Science, 13 February 2015)

Source: World Economic Forum

Where Does Plastic Waste Come From?

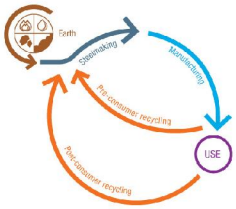


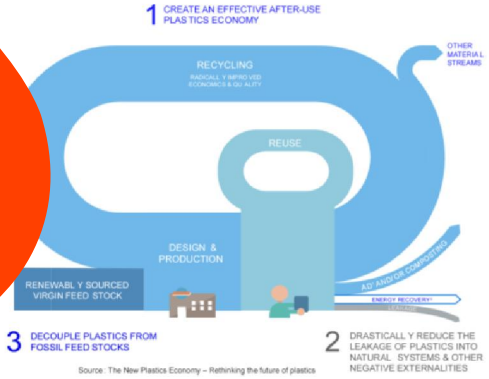
The Circular Economy



Source: World Economic Forum

What's Missing?





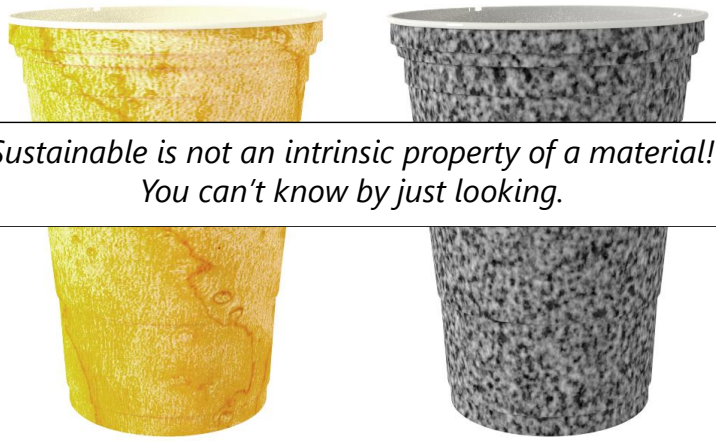
Which is more sustainable?

A meat-eater in a Prius

A vegan in a Hummer

Sustainable?

Is this Cup Sustainable?

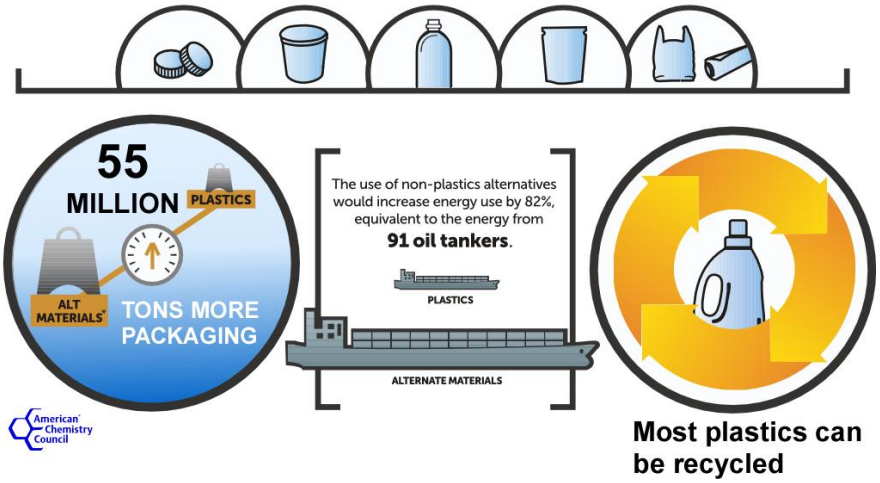


Sustainable is not an intrinsic property of a material!
You can't know by just looking.

How about this one?

Life Cycle Assessment

Plastic Benefits



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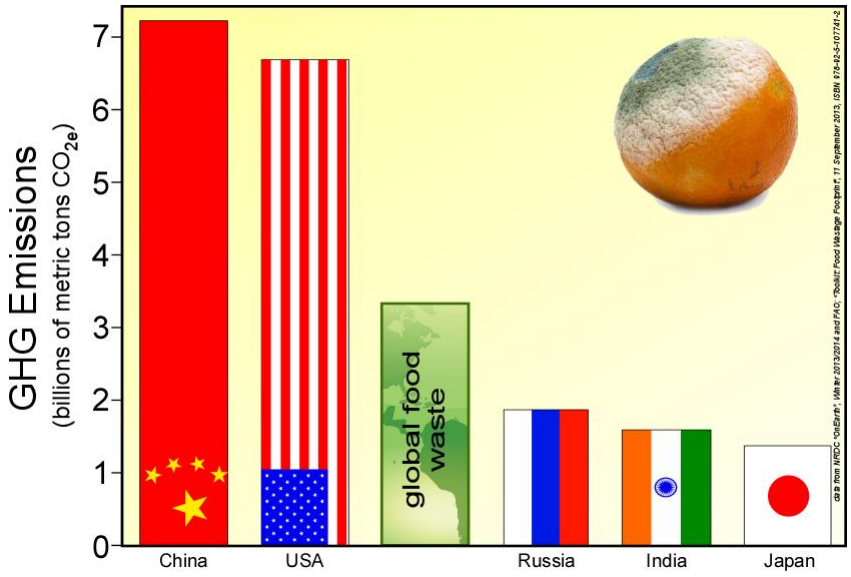
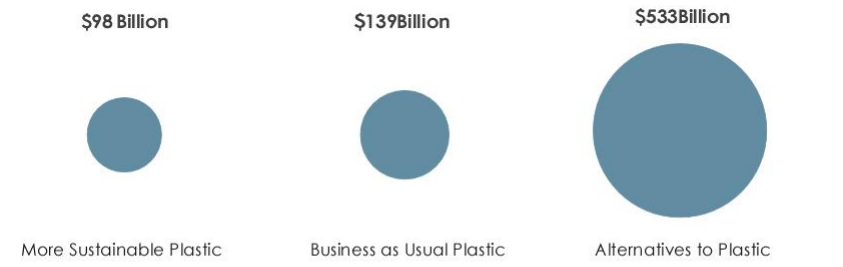


World Without Packaging

Summary

The Costs to Society and the Economy

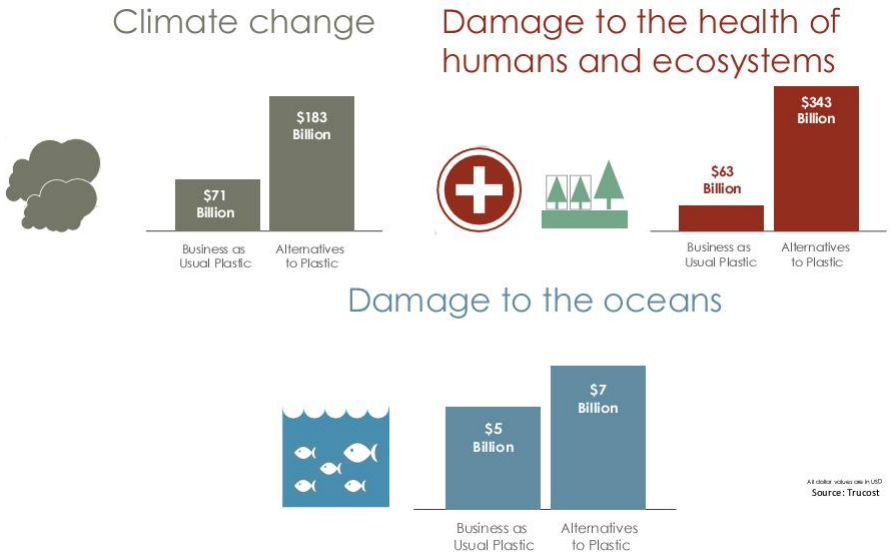


The cost of using alternative materials is approximately four times that of using plastic (in a business as usual scenario). We're producing more and more consumer goods, so choosing the material that creates the least impact is important.

Source: Trucost

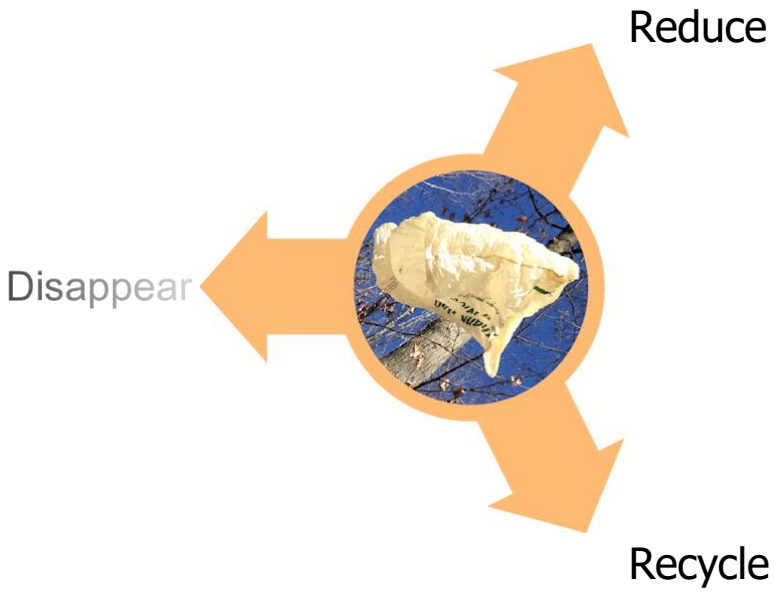
Source: American Chemistry Council TRUCOST report

TRUCOST Analysis

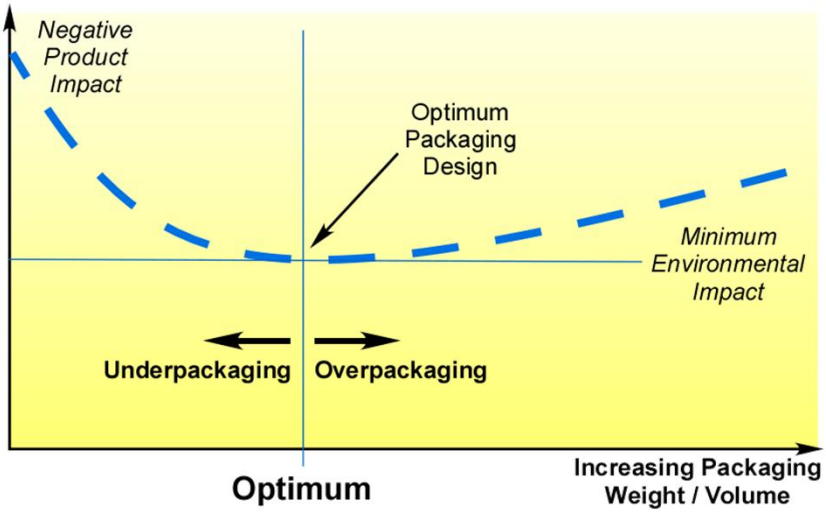


Source: American Chemistry Council TRUCOST report

Options



Optimizing Packaging



adapted from Optimal Packaging (The Consumer Goods Forum, Global Packaging Project, 2011)

Resource Efficient Packaging

EDIBLES		NON-EDIBLES
Edible Oils	Rice & Grains	Paint & Coatings
Ketchup & Other Condiments	Breakfast Cereal	Detergents & Cleaning Products
Sauces	Dry Baking Products (flour, sugar, etc.)	Motor Oil & Fuel Additives
Soups	Ground Coffee	Seeds
Honey & Syrups	Snack foods	Cat Litter
Water & Juices		De-icer Pellets
Dry Pet Food or Treats		Fine Aggregates (filter sand, etc.)

EDISON AWARDS 2015

R&D 100 2015 R&D 100 Winner

Re-Closable Cap
- Precision pouring
- Maximum filling content utilization

Flexible Design
- Four Print Surfaces
- Superior drop resistance
- Reduce excess head space
- Improved dispensing
- Collapses easily

Top and Bottom Handles
- Easy handling

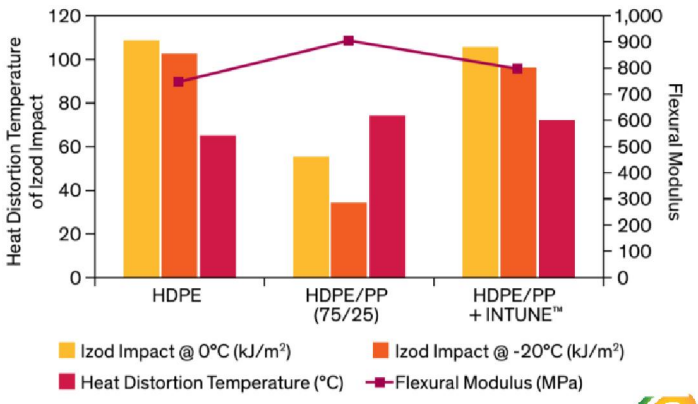
Cubic Shape
- Shelf Stable & Maximizes Shipping Efficiency

Space Saving
- Ships and Stores Flat when Unfilled

Recycling

Enabling Recycling

Enabling Recycling



INTUNE™
OLEFIN BLOCK COPOLYMERS

Price?

1.6¢

Price?

4.2¢

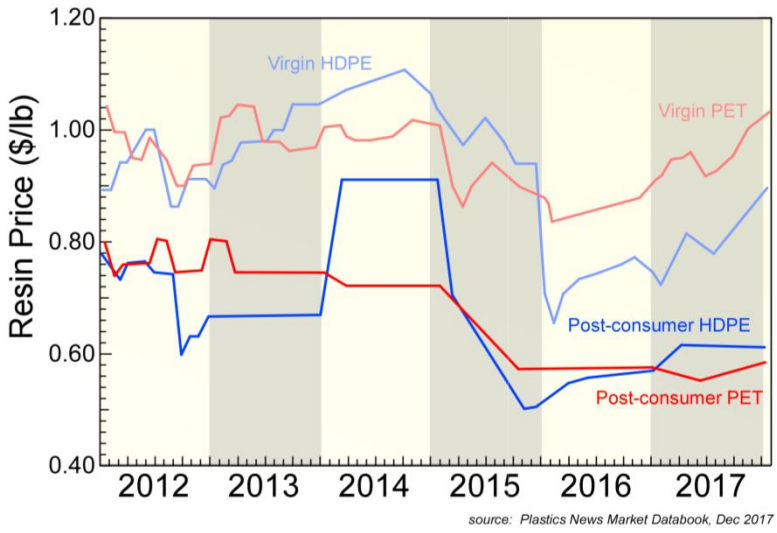
1.6¢

Price?

0.61¢ 0.01¢ 4.2¢ 0.22¢ 0.20¢

1.6¢

Recycle Pricing

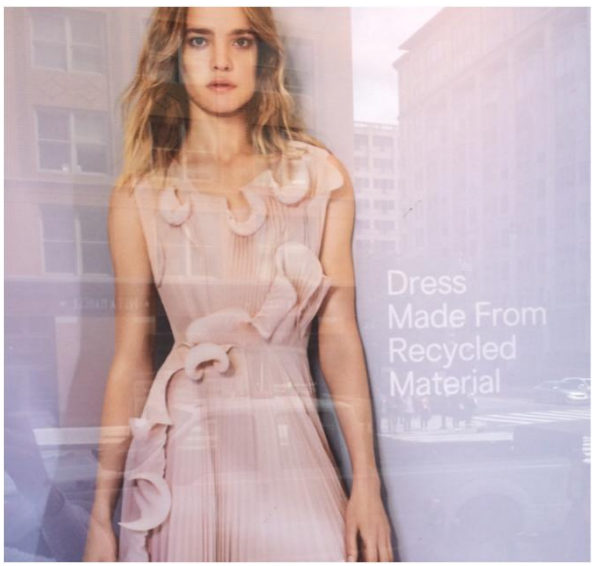


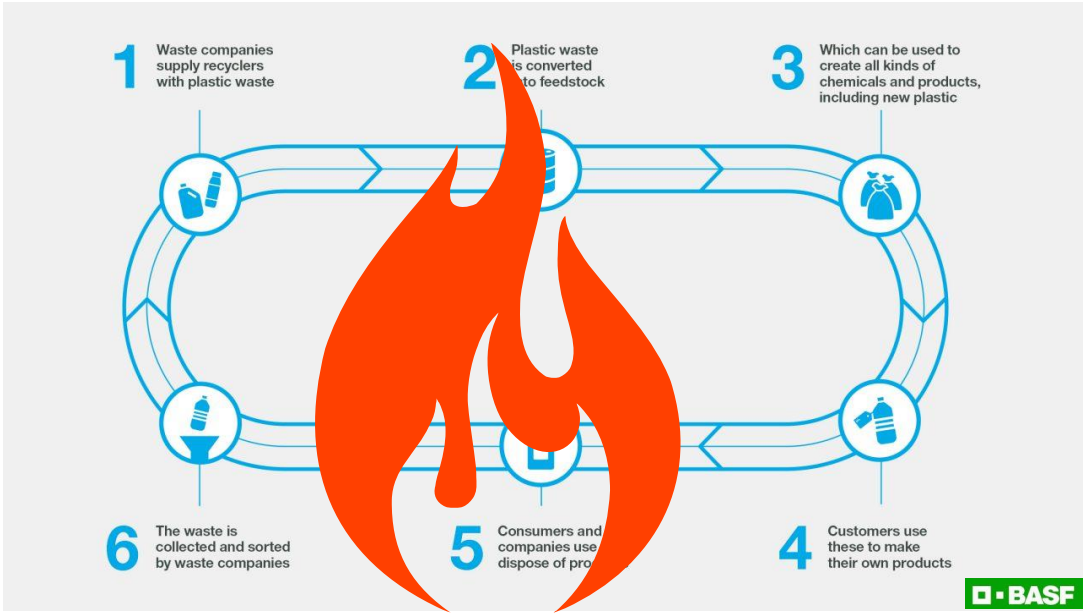
source: Plastics News Market Databook, Dec 2017

Waste Reduction Hierarchy

7
1

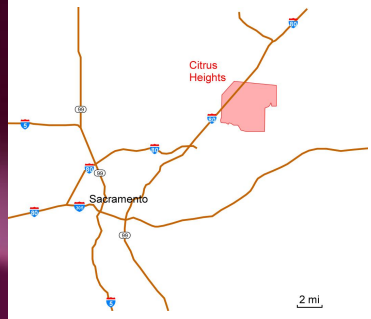
Recycling





https://www.basf.com/global/en/who-we-are/sustainability/management-and-instruments/circular-economy/chemcycling.html

Explore New End of Life Options



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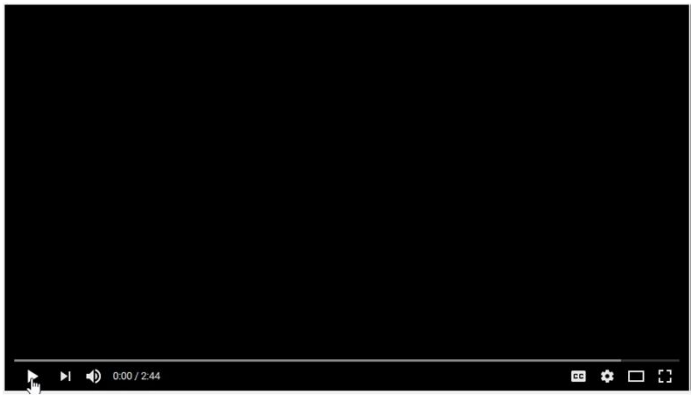
Energy Bag



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Explore New End of Life Options

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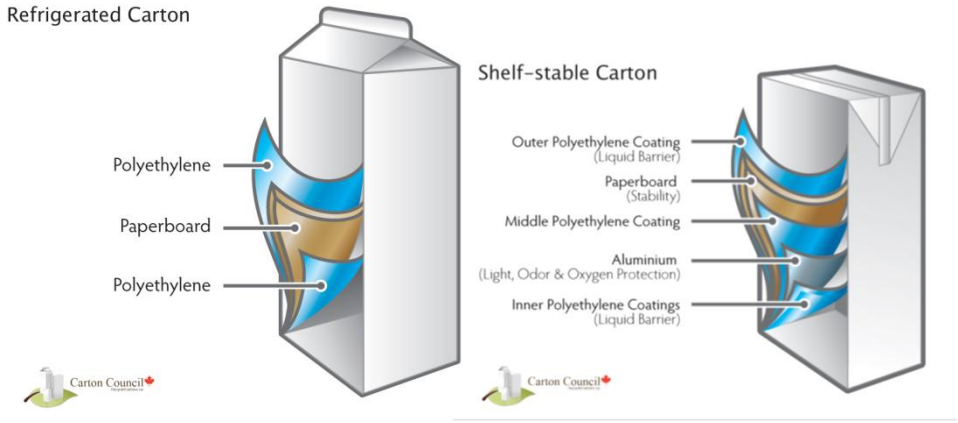
7

Disappear

Polyethylene Coats Paper



Disappear – Option 1

PN

February 22, 2018 UPDATED 9 HOURS AGO

BP predicts plastics bans will impact oil demand

Plastics News Europe

Materials | Public Policy | Sustainability | Materials Suppliers | More +

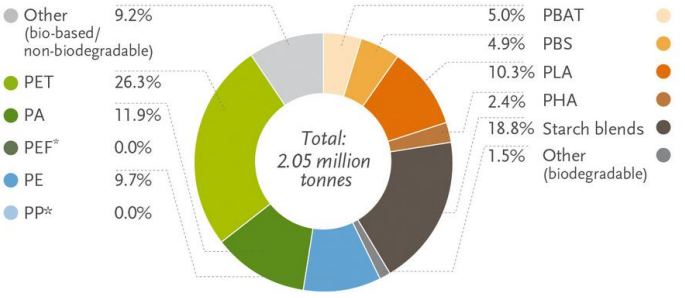
BP plc has predicted that global demand for oil could be impacted by as much as 2 million barrels per day by 2040 due by governments' efforts to regulate products, including bans of single-use plastics.

In its latest energy outlook unveiled Feb. 20, BP predicted that oil demand would continue to grow at about 0.5 percent annually through 2040.

According to the British press, commenting on the new outlook, BP's chief economist Spencer Dale said the company believed that regulation against some types of petrochemicals, particularly single-use plastics, would increase in the coming years.

Disappear – Option 2

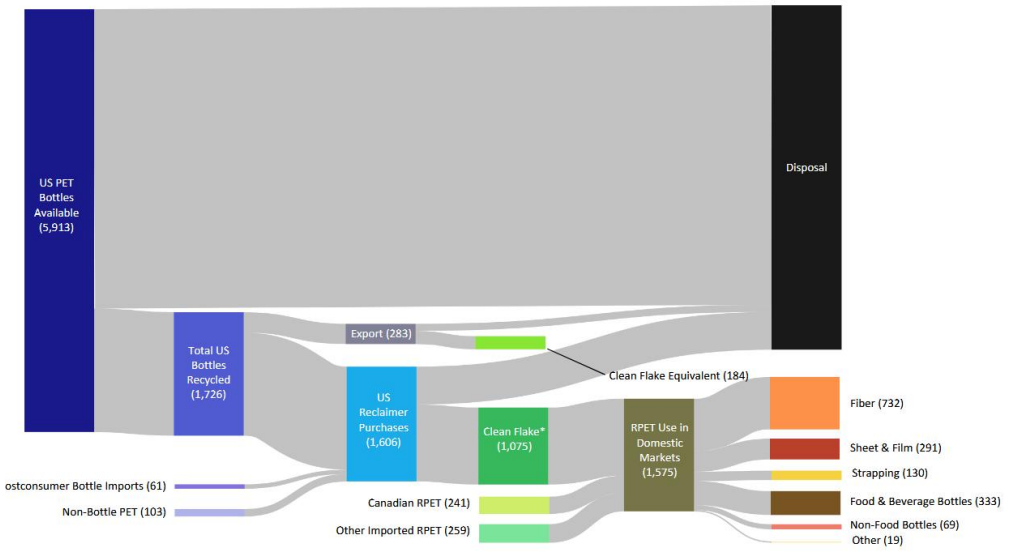
Global production capacities of bioplastics 2017 (by material type)



*Bio-based PP and PEF are currently in development and predicted to be available in commercial scale in 2020.

Source: European Bioplastics, nova-Institute (2017).
More information: **www.bio-based.eu/markets** and **www.european-bioplastics.org/market**

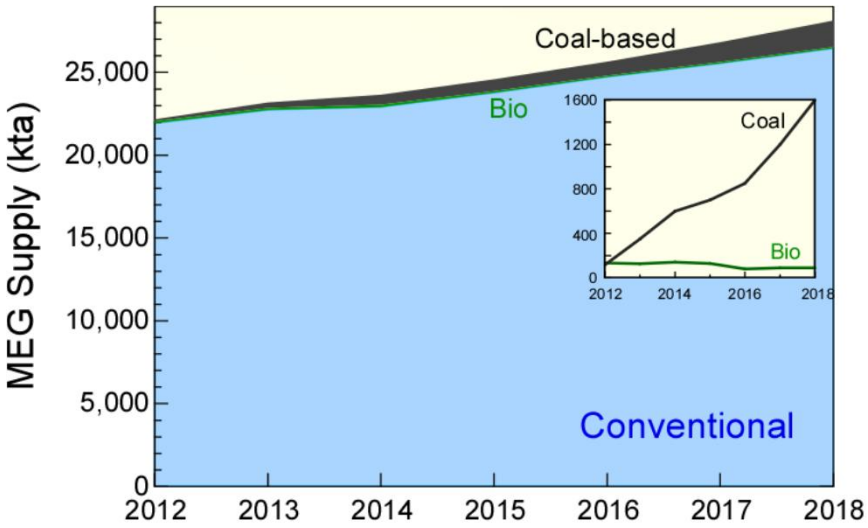
FIGURE 1: PET Material Flows in the US (*MMlbs*)



* This total represents all clean flake sold into end markets by US reclaimers. See Figure 7 for detail on total flake produced by US reclaimers from bottles.

Postconsumer PET Container Recycling Activity in 2017, November 15,2018, NAPCOR and The Association of Plastic Recyclers downloaded from plasticrecycling.org

Reality – MEG production for PET



2025 Sustainability Goals

Leading the Blueprint
Dow leads in developing a societal blueprint that integrates public policy solutions, science and technology, and value chain innovation to facilitate the transition to a sustainable planet and society.

Delivering Breakthrough Innovations
Dow delivers breakthrough sustainable chemistry innovations that advance the well-being of humanity.

Advancing a Circular Economy
Dow advances a circular economy by delivering solutions to close the resource loops in key markets.

Valuing Nature
Dow applies a business decision process that values nature, which will deliver business value and natural capital value through projects that are good for business and good for ecosystems.

Increasing Confidence in Chemical Technology
Dow increases confidence in the safe use of chemical technology through transparency, dialogue, unprecedented collaboration, research and our own actions.

Engaging Employees for Impact
Dow people worldwide directly apply their passion and expertise to advance the well-being of people and the planet.

World-Leading Operations Performance
Dow maintains world-leading operations performance in natural resource efficiency, environment, health and safety.

Main Sources Consulted

Questions