

Going In Circles

Implications for Individuals, Industry and the Ecosystem

Mark Jones

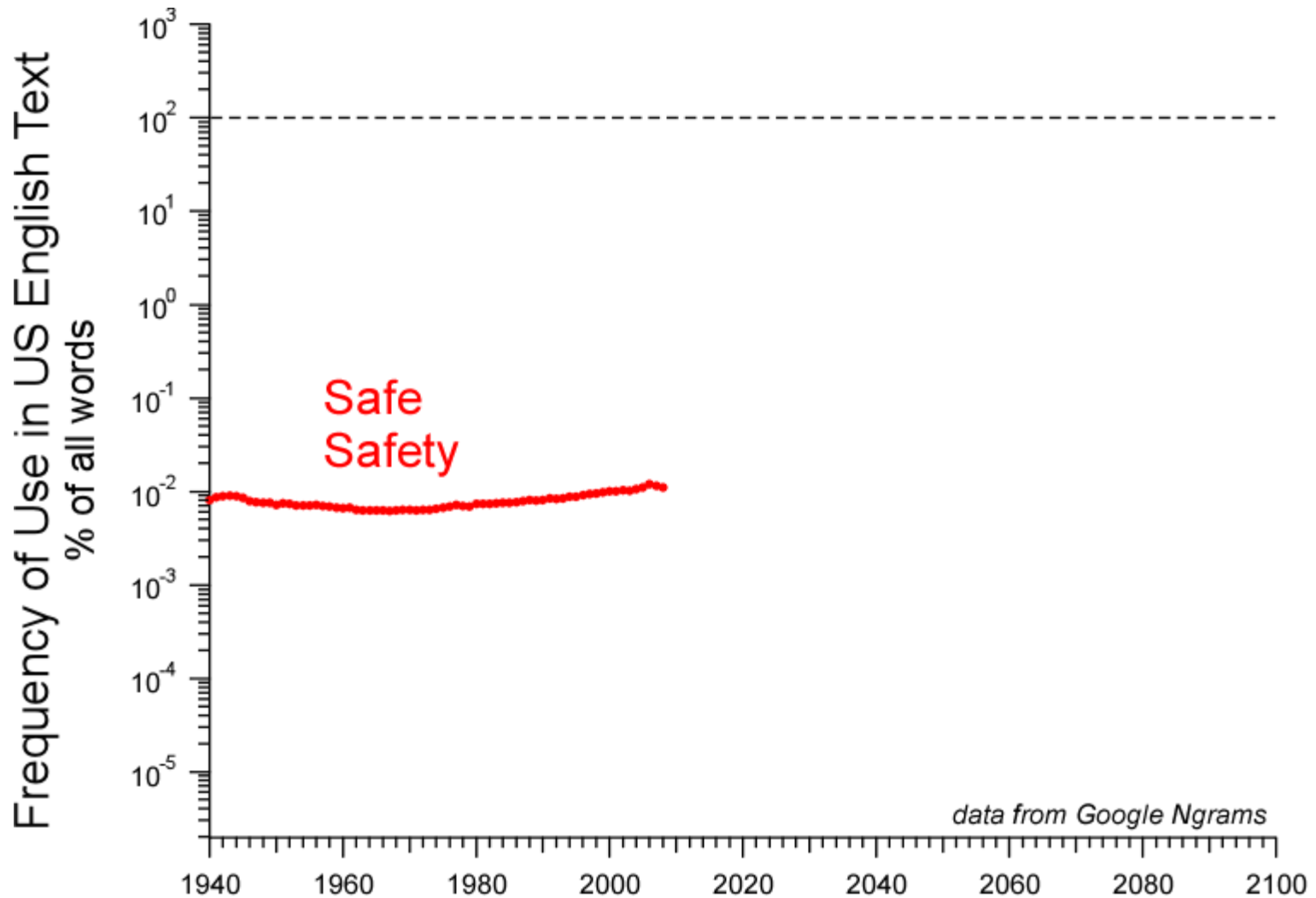
*Executive External Strategy and Communications Fellow
The Dow Chemical Company*



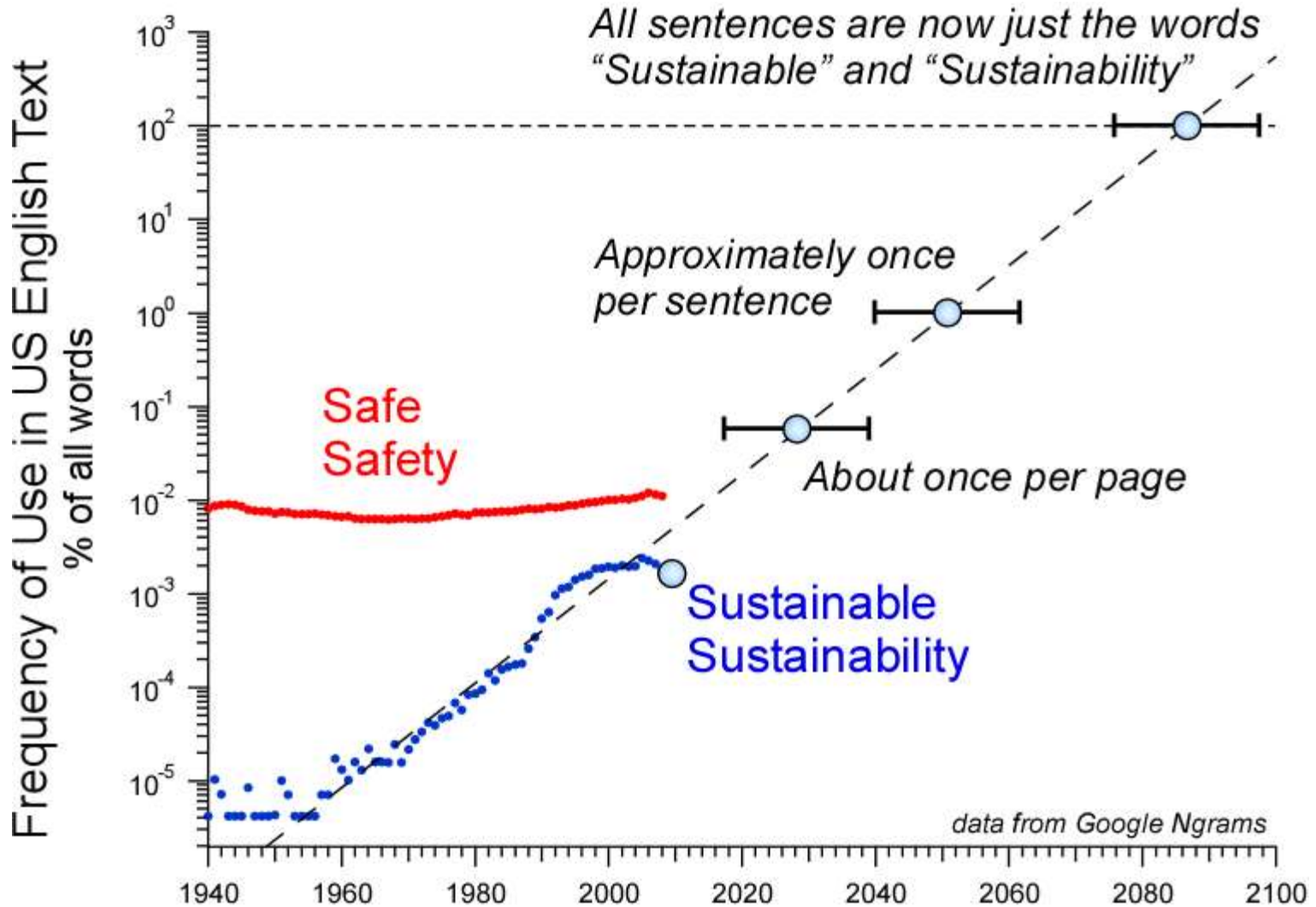
14 February 2017

Caltech

Prevalence Of “safe” and “safety” In English

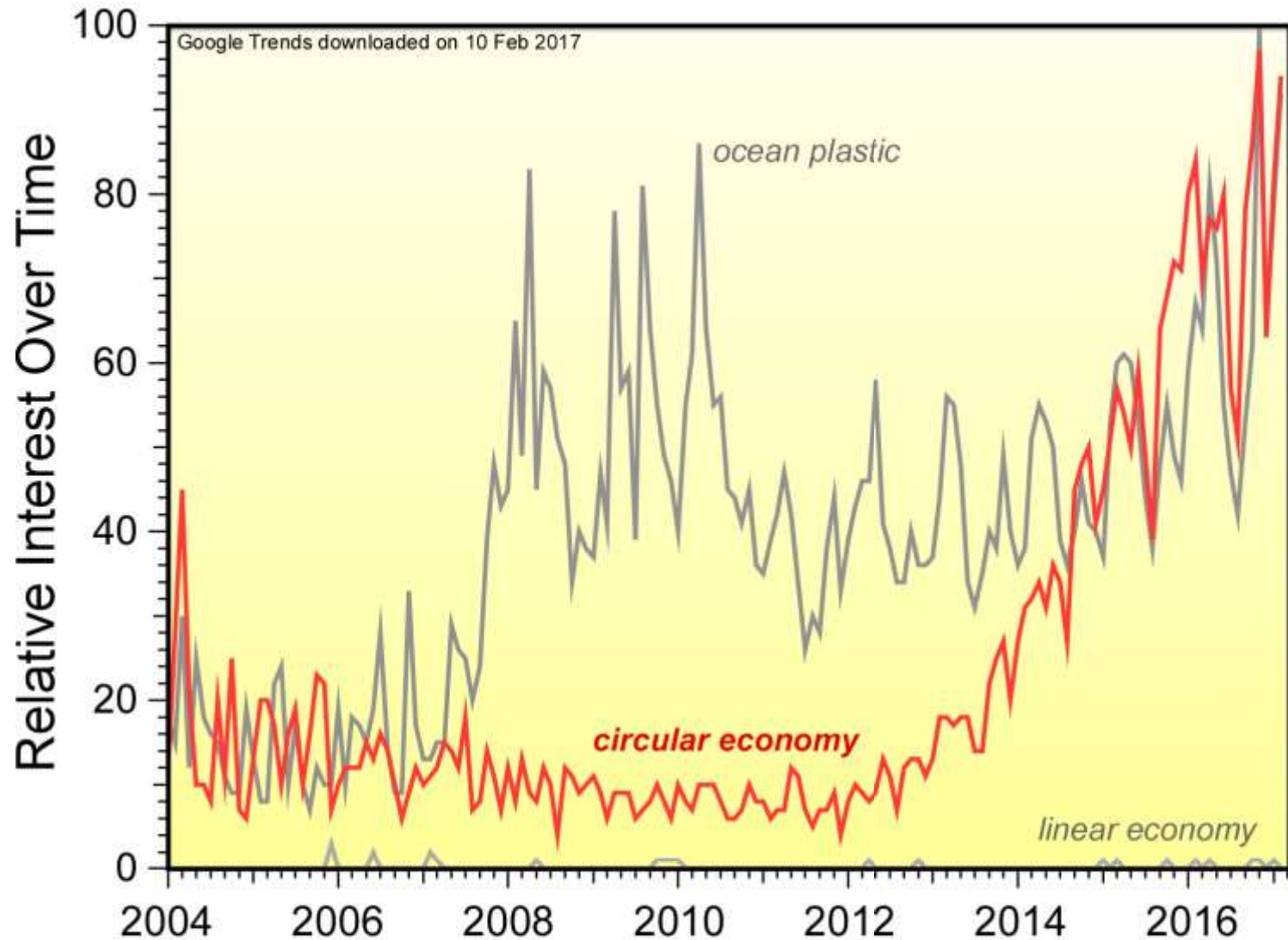


Overuse of Sustainability?



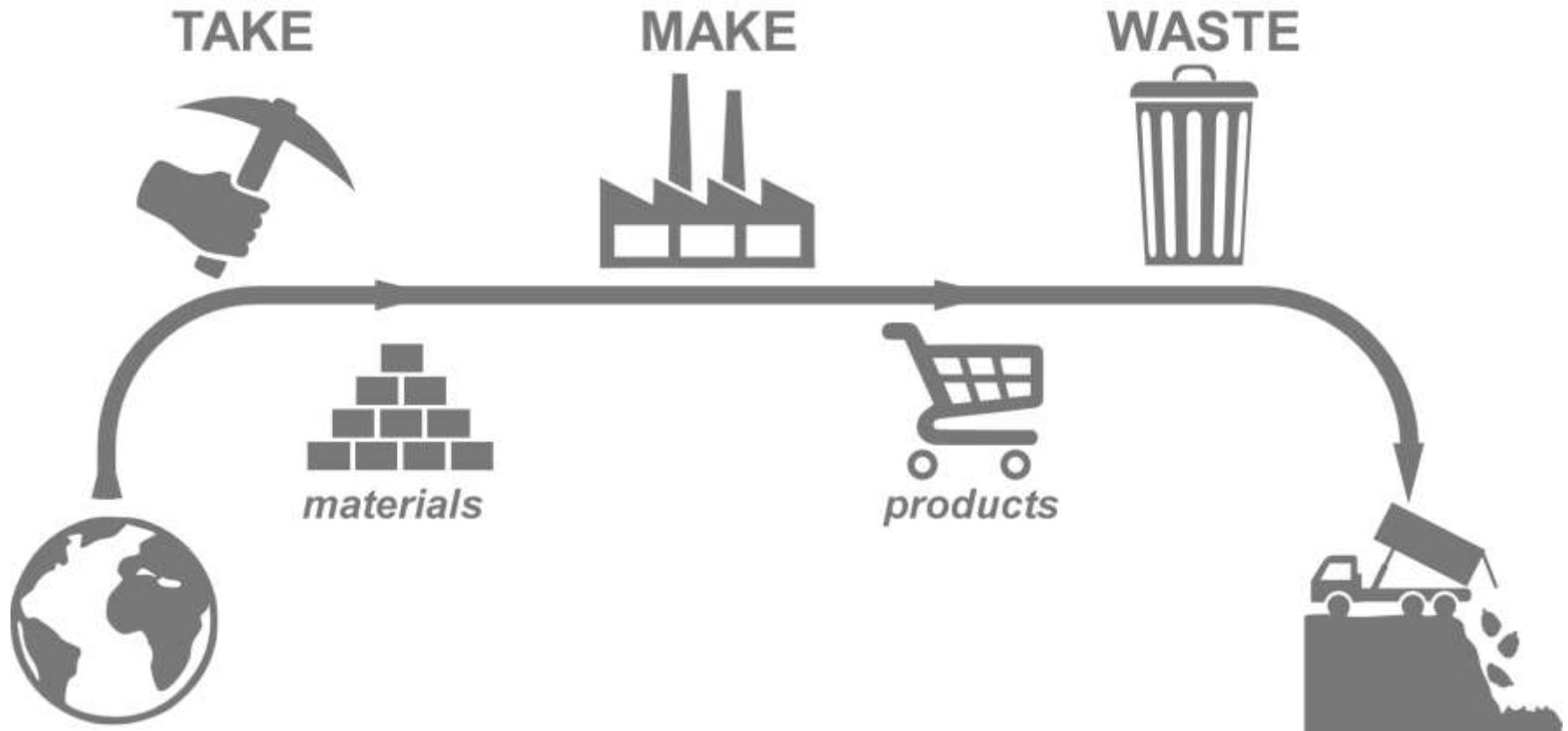
<https://imgs.xkcd.com/comics/sustainability.png>

Use of Circular and Linear Economy



What is the circular
NOT
economy?

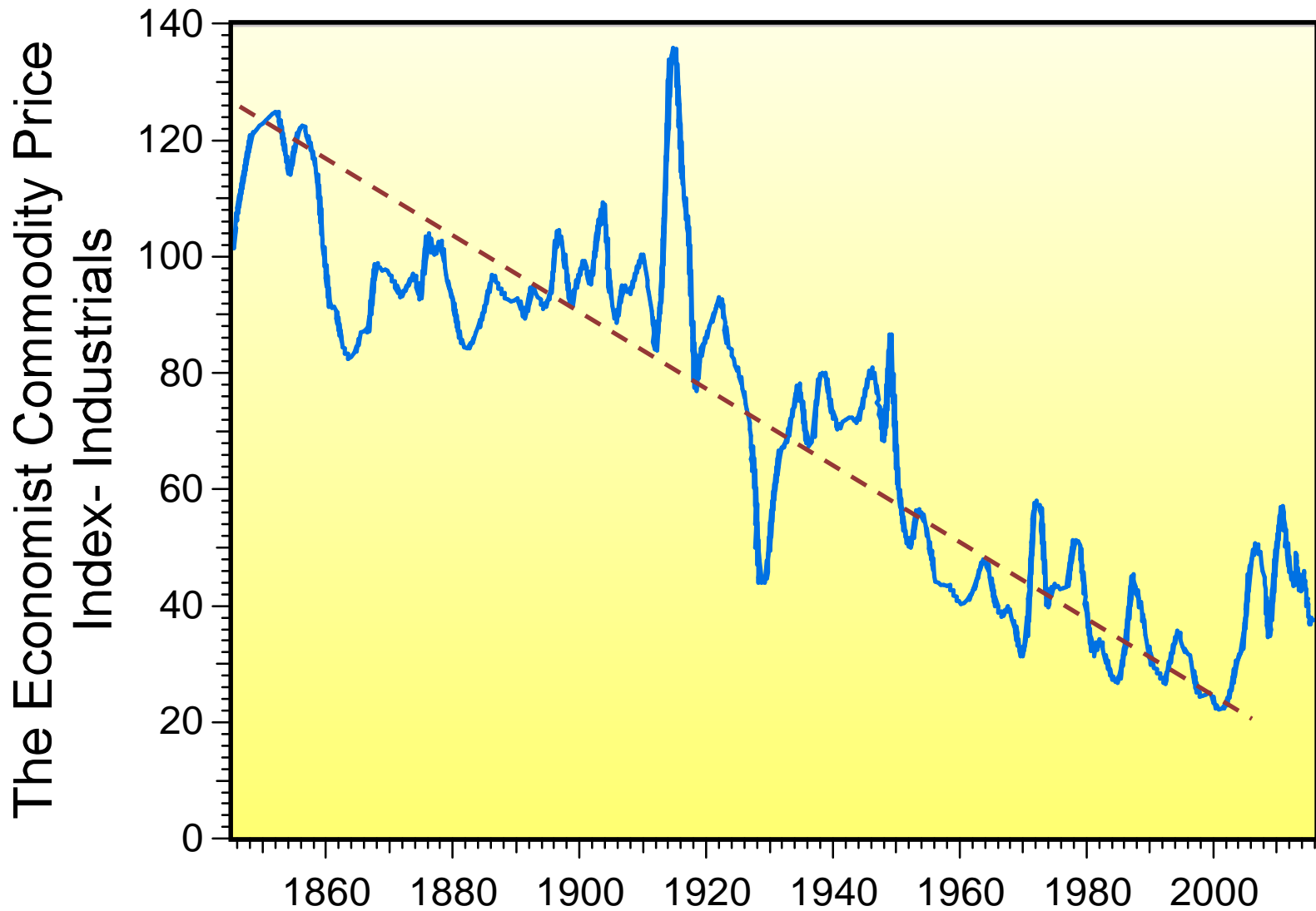
The Linear Economy



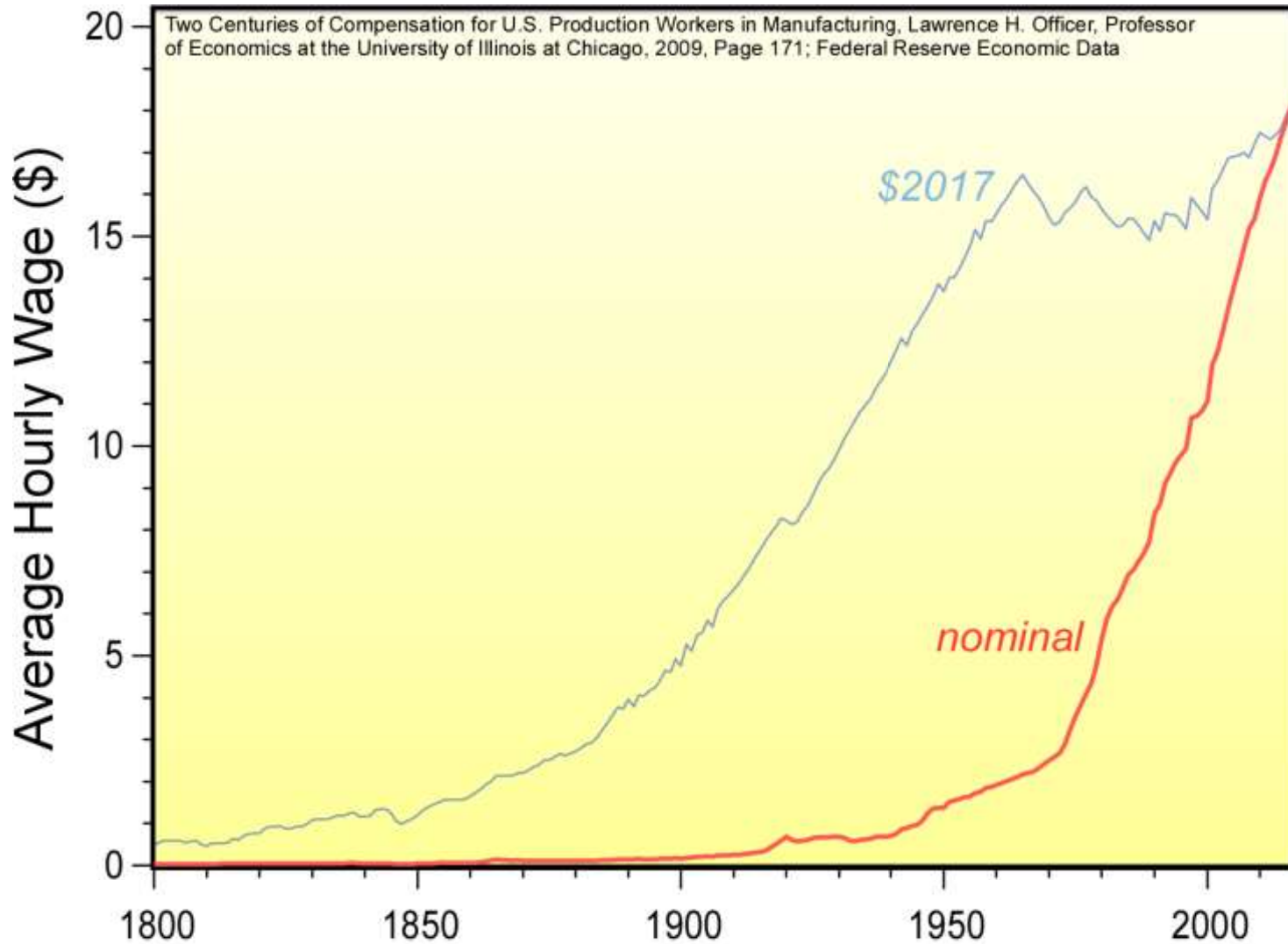
Value



Commodity Prices



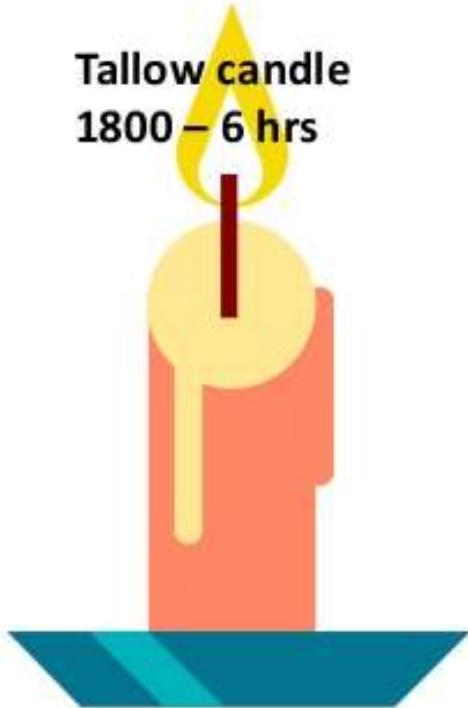
Wages Over Time



Implications

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

Tallow candle
1800 – 6 hrs



Kerosene lamp
1880 – 15 mins



Incandescent bulb
1950 – 8 secs



CF bulb
1997 – ½ sec

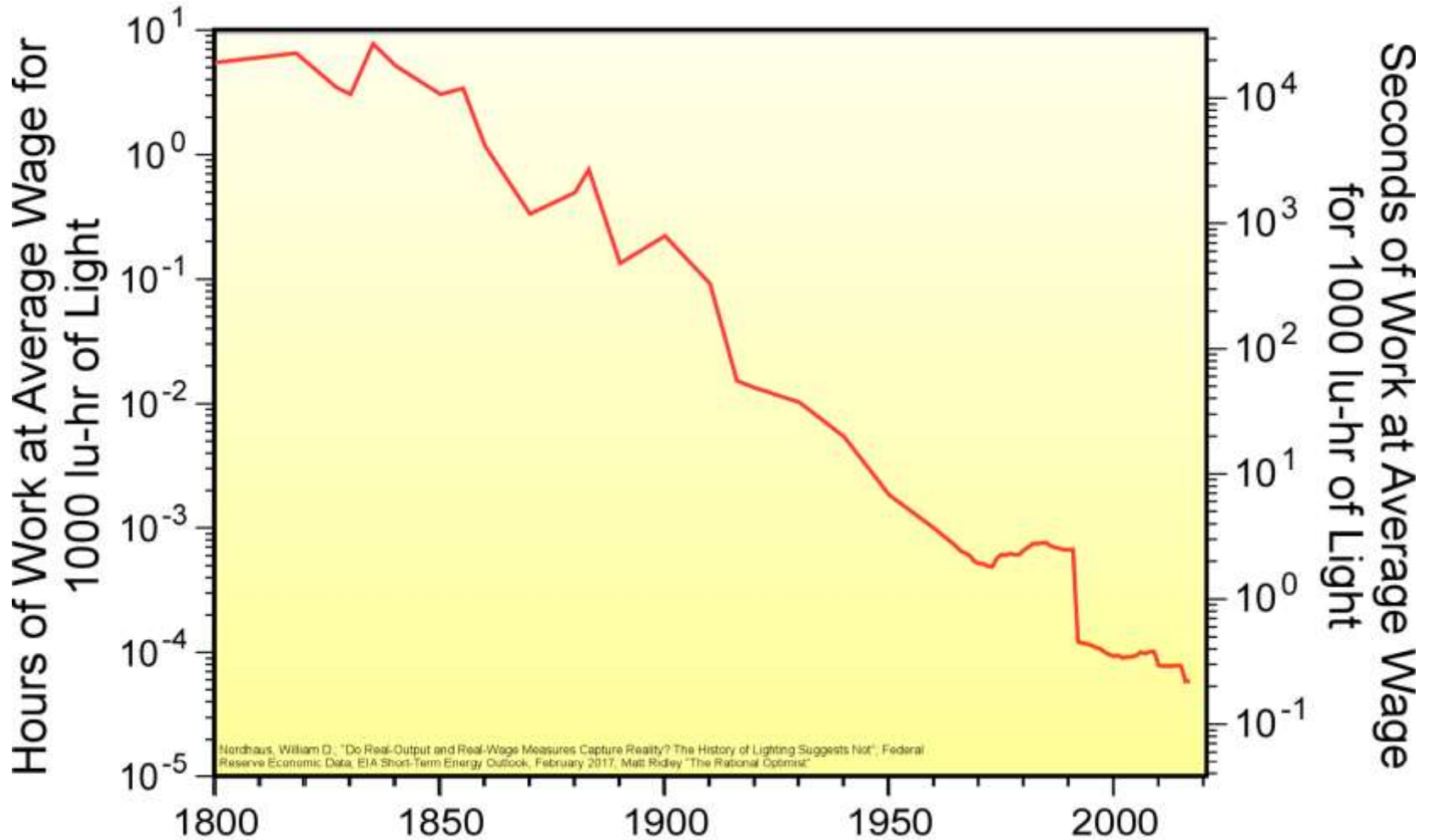


Labour cost of 1,200 lumen
hours at average US wage

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

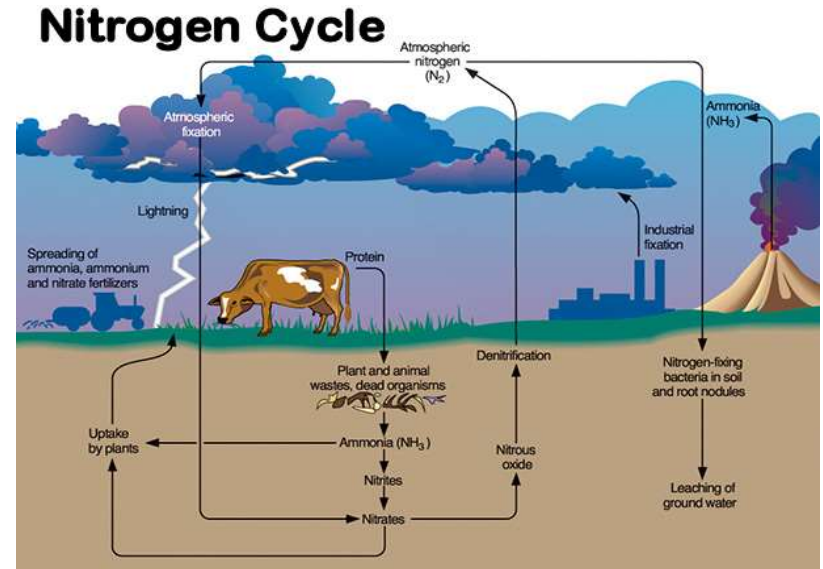
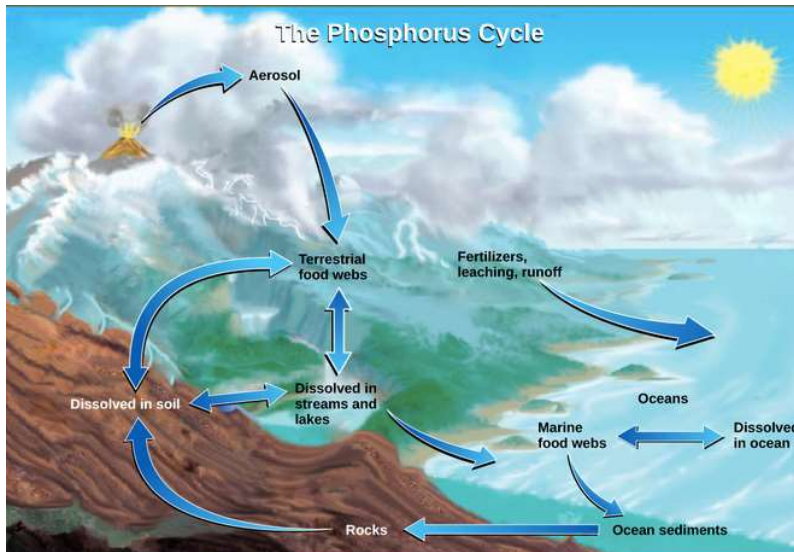
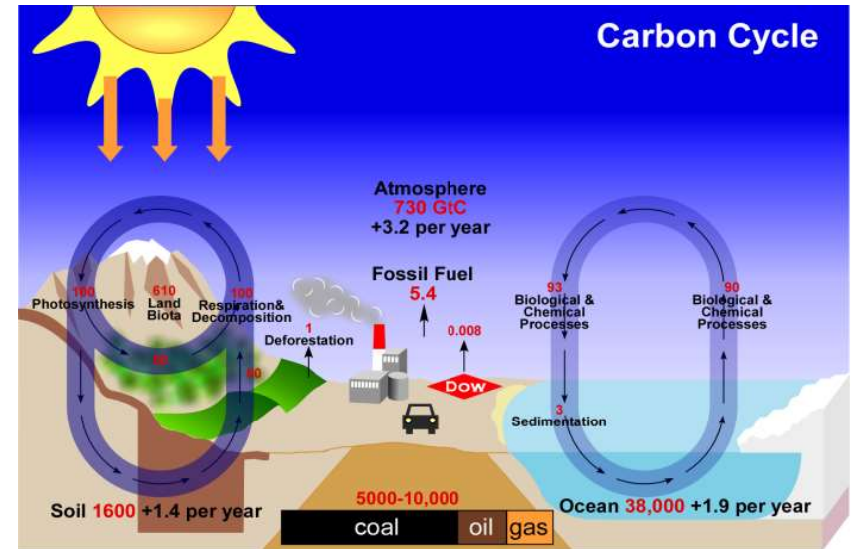
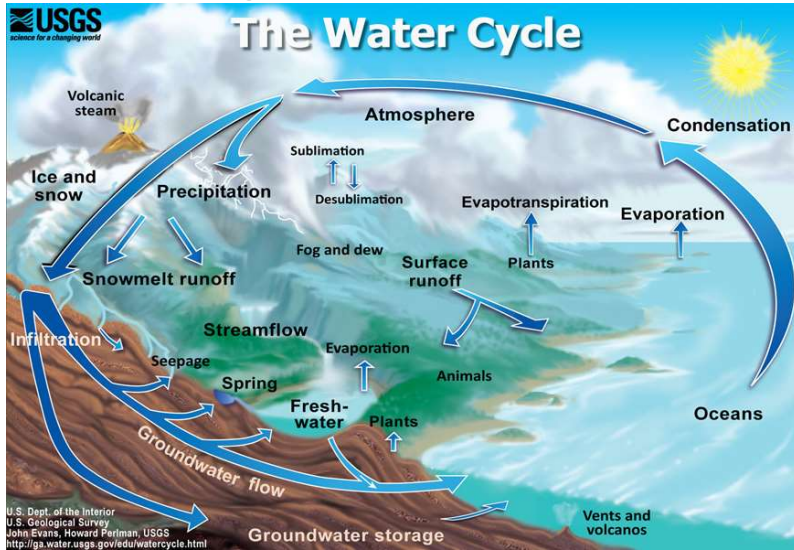
K2 London Keynote: Where Does Innovation Come From? - Lord Matt Ridley <http://kenshoo.com/k2-london-keynote-matt-ridley/>

Work Needed to Supply Light



What is the circular economy?

Natural Cycles





Main Sources Consulted

Towards the Circular Economy: Accelerating the scale-up across global supply chains

Prepared in collaboration with the Ellen MacArthur Foundation and McKinsey & Company
March 2017



WORLD ECONOMIC FORUM
COMMITTED TO IMPROVING THE STATE OF THE WORLD

Industry Agenda

The New Plastics Economy

Rethinking the future of plastics



Plastics and Sustainability:

A Valuation of Environmental Benefits, Costs and Opportunities for Continuous Improvement



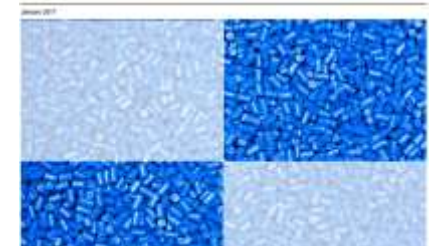
WORLD ECONOMIC FORUM
COMMITTED TO IMPROVING THE STATE OF THE WORLD

System Initiative on Environment and Natural Resource Security

The New Plastics Economy

Catalysing action

In Collaboration with the Ellen MacArthur Foundation



American Chemistry Council
Plastics Division Welcomes Recommendations for Innovation to Support Packaging Sustainability

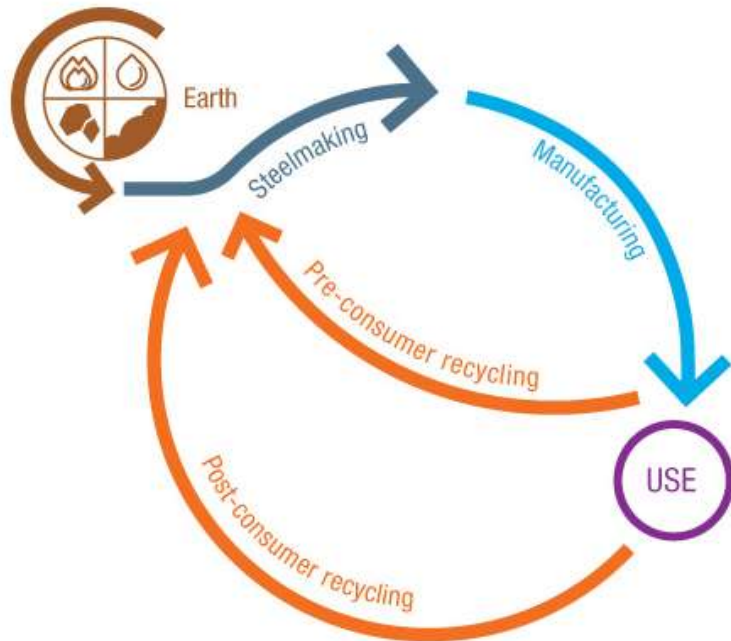
Contact Us
Jennifer Killinger
E203 249-6619

WASHINGTON January 16, 2017—The Ellen MacArthur Foundation and World Economic Forum today released "The New Plastics Economy: Catalysing Action," which aims to address global plastics issues through innovation in packaging design, recycling, and delivery models. The American Chemistry Council (ACC) issued the following Statement, which may be attributed to Steve Russell, vice president, Plastics Division:

"America's Plastics Makers™ welcome collaborative efforts such as the Catalysing Action report aimed at promoting innovation and advancing the sustainability of plastics.

"Catalysing Action recognizes that plastics combine 'unrivaled functional properties with low cost.' And every day plastics contribute to sustainability by reducing material use, energy use, waste, and greenhouse gas emissions in everything from packaging to transportation to homes and buildings. A recent study by Trucost found that switching from plastics to alternatives would quadruple environmental costs, causing them to grow from \$139 billion to \$523 billion annually.

Already Circular - Metals



Steel attributes



Infinite recycling without loss of properties



Permanent material



Easy magnetic separation and recovery

Benefits of steel recycling

Raw materials conservation



One tonne of steel recycled saves on average :
1,400 kg iron ore
740 kg coal
120 kg limestone

70% Energy saving



Recycling a single steel can saves :
1 laundry load, or
1 hour TV, or
4 hours lighting
(60 watt bulb)

Job creation



Jobs required for scrap collection, separation and recycling

Challenges



Being 100% recyclable, copper can be used again and again with no loss of properties.



50%
Of the EU demand for copper is met through recycling



Copper is a naturally occurring mineral resource in the earth's crust.

4,100,000
Tonnes of copper products made by the EU industry



The superior electrical and thermal conductivities of 1 tonne of copper can deliver lifetime savings of:

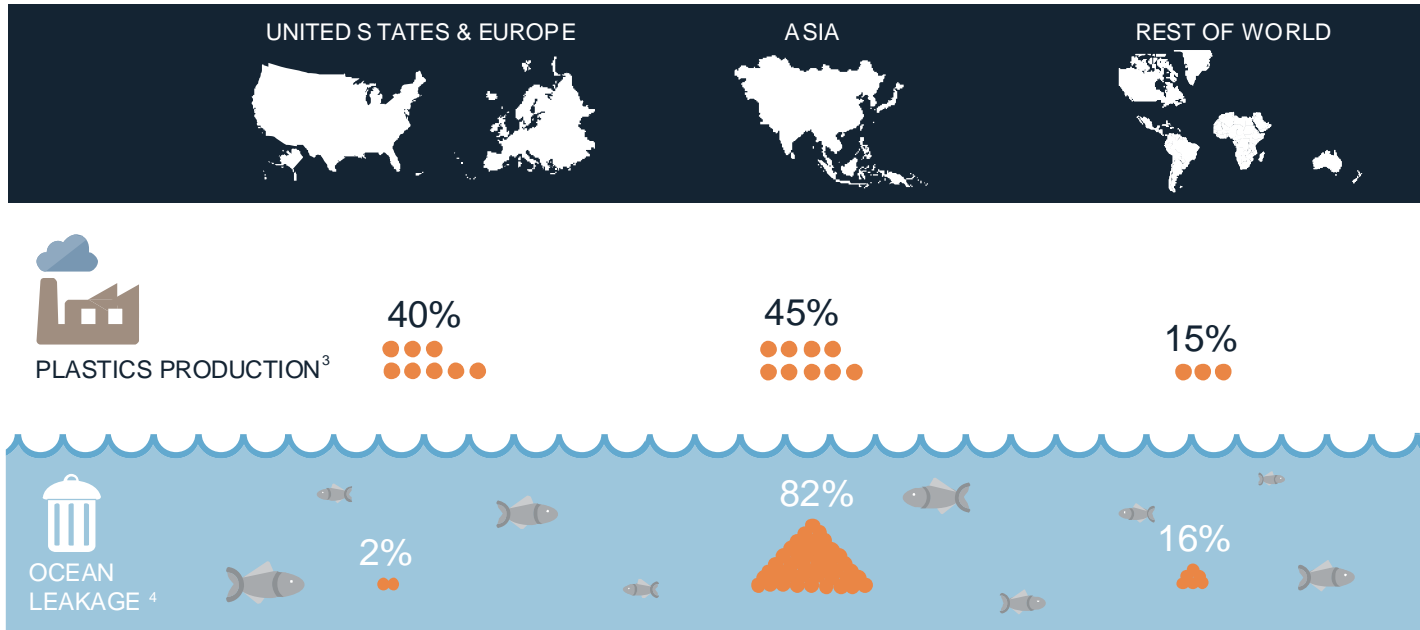


■ Ellen MacArthur

Video introducing circular economy with Ellen MacArthur



Where Does Plastic Waste Come From?



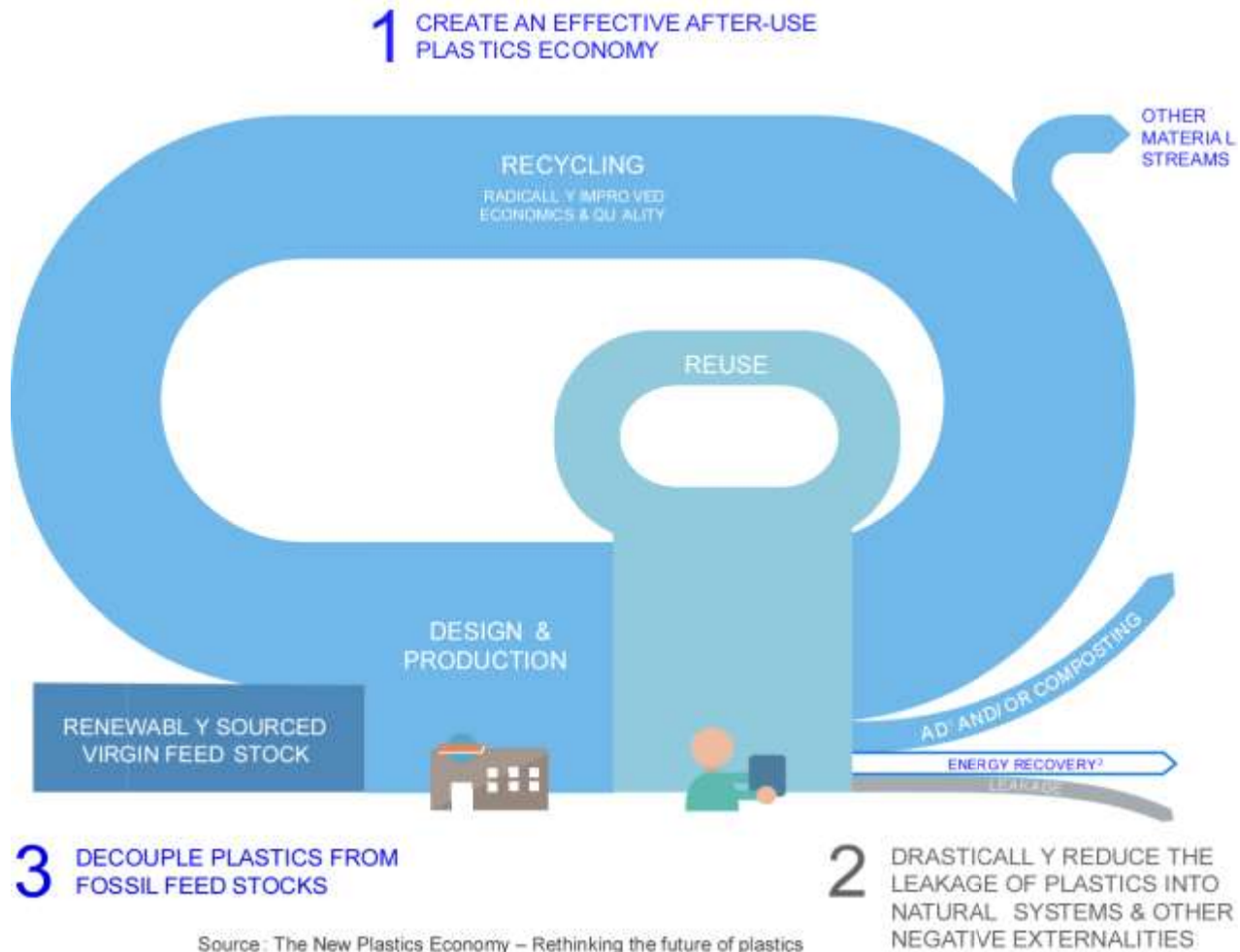
³ Production of plastics material volumes (excluding thermoplastics and polyurethanes)

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

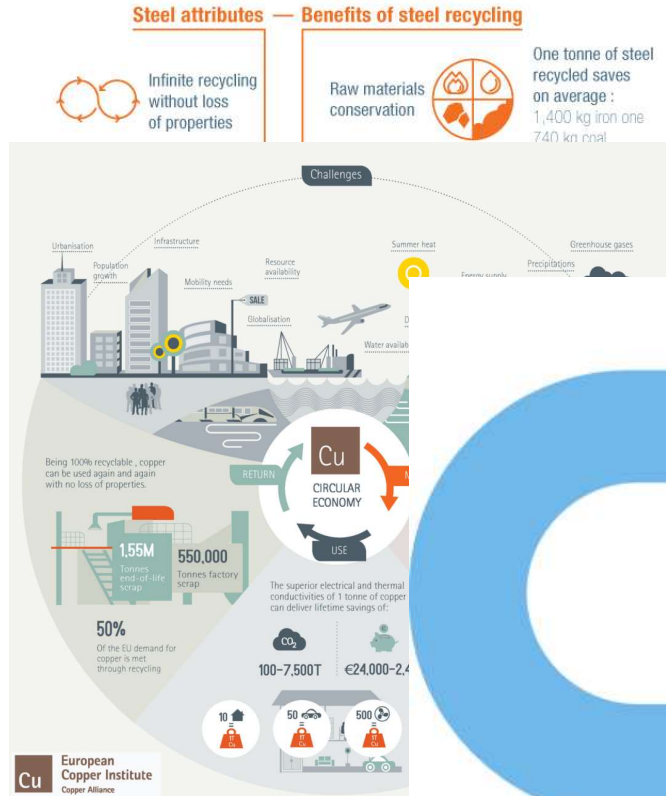
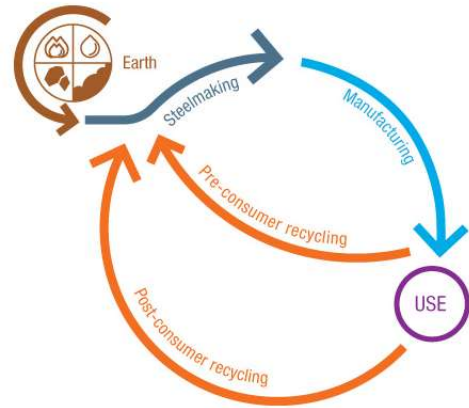
The Circular Economy



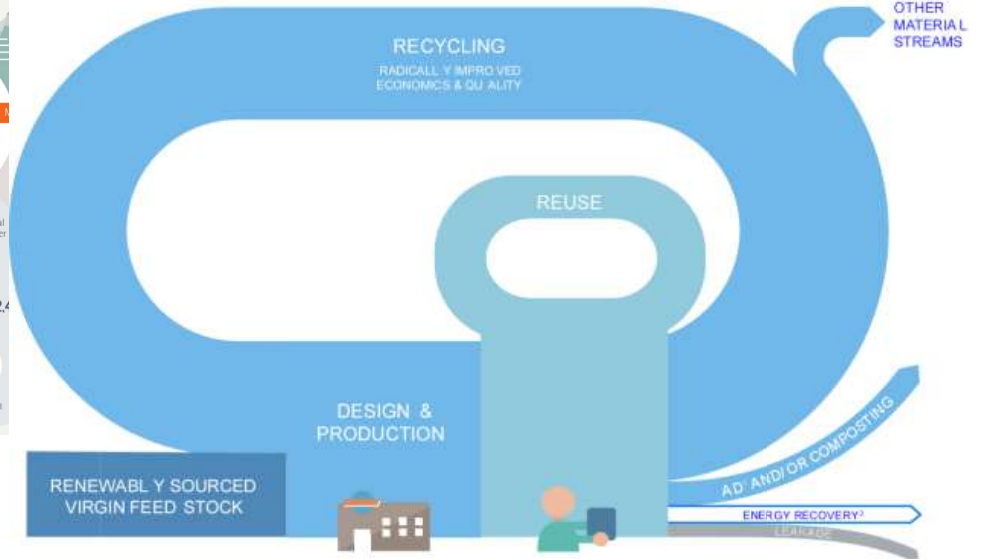
Source: The New Plastics Economy – Rethinking the future of plastics

Source: World Economic Forum

What's Missing?



1 CREATE AN EFFECTIVE AFTER-USE PLASTICS ECONOMY

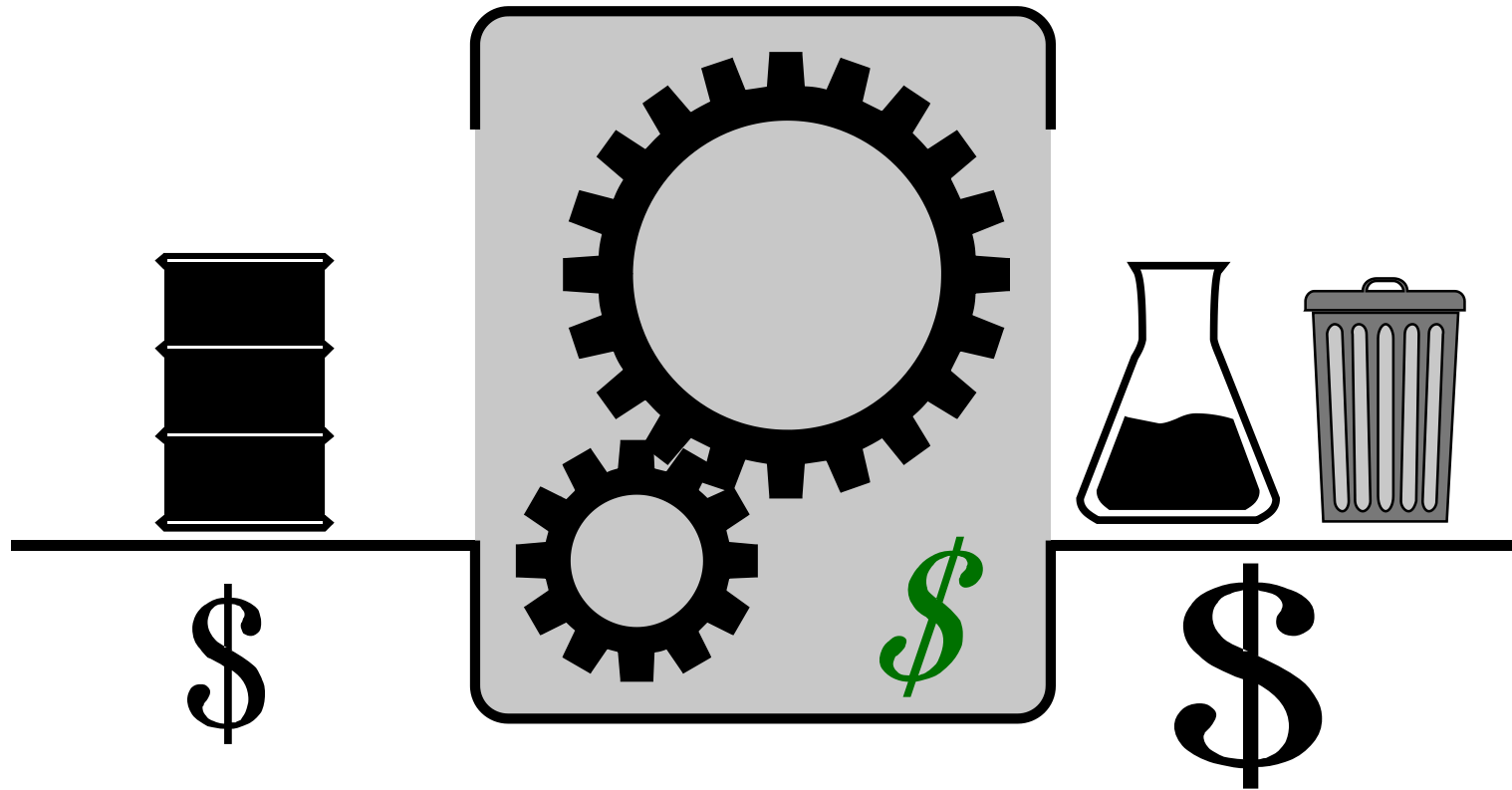


3 DECOUPLE PLASTICS FROM FOSSIL FEED STOCKS

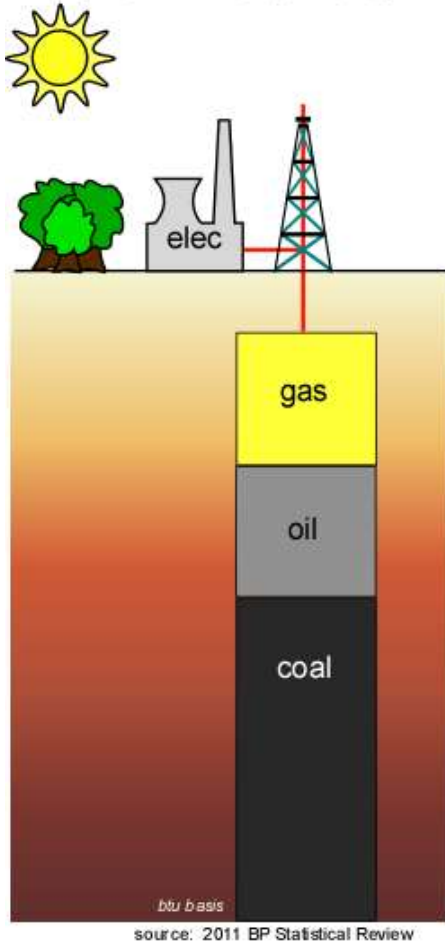
2 DRASTICALLY REDUCE THE LEAKAGE OF PLASTICS INTO NATURAL SYSTEMS & OTHER NEGATIVE EXTERNALITIES

Source: The New Plastics Economy – Rethinking the future of plastics

Simplified Chemical Industry



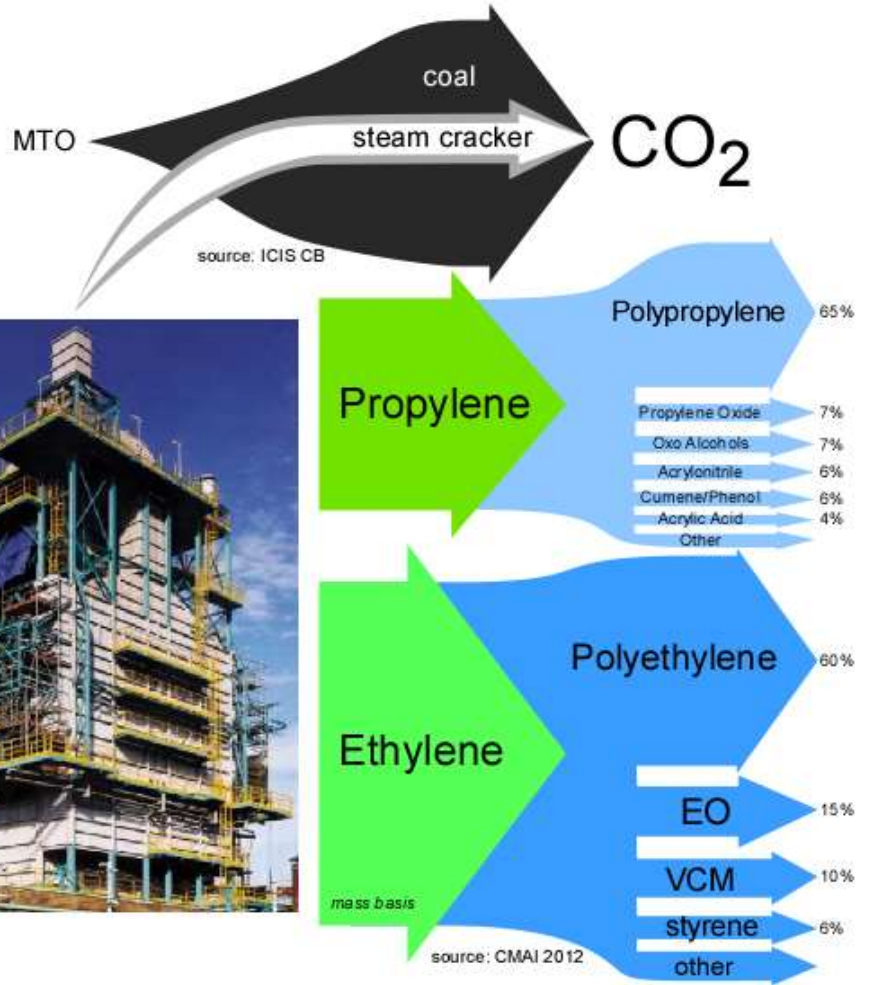
Raw Materials



Cracker



Products

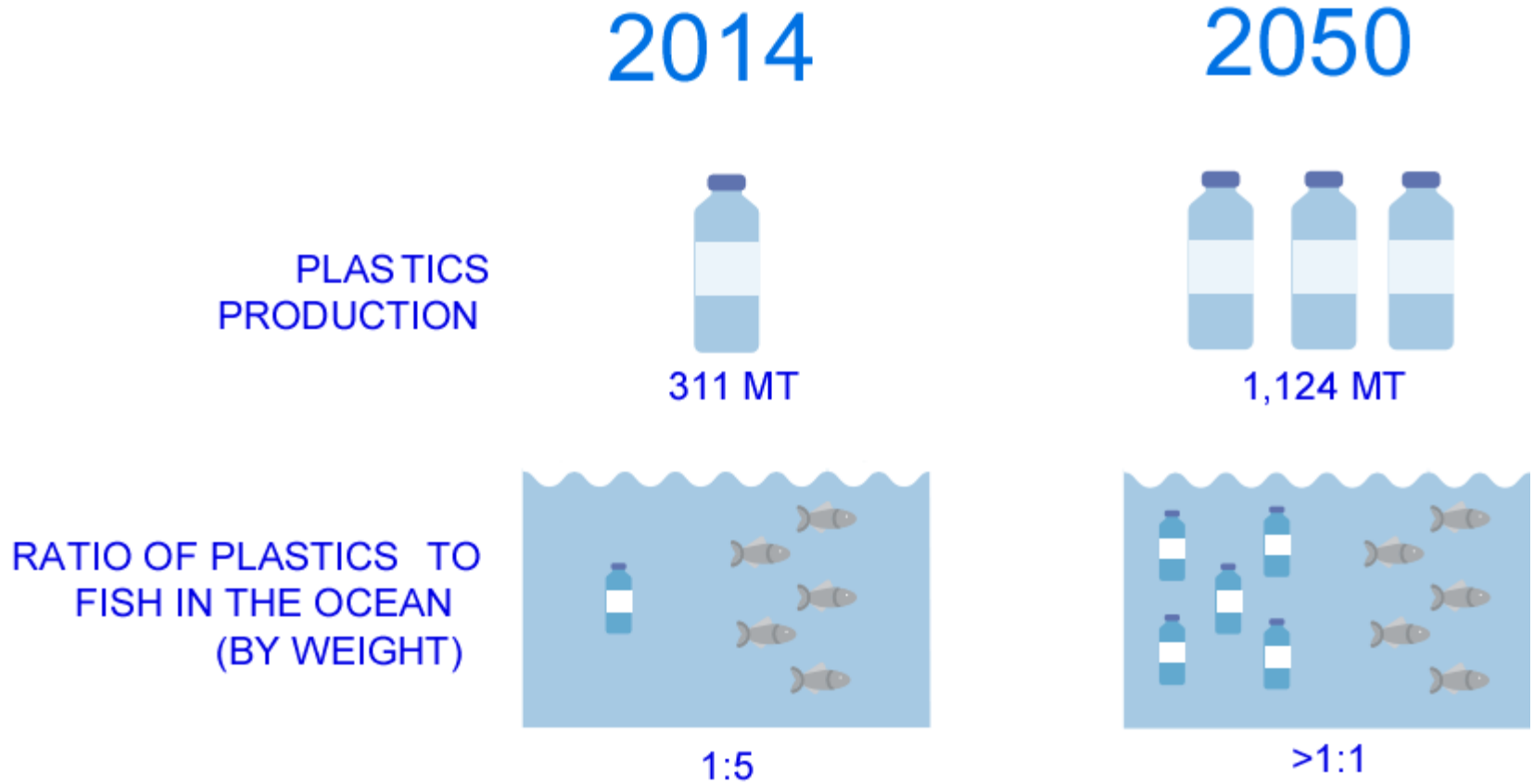




Current Plastic Flow



Production and Impact



Source: World Economic Forum



WHAT GOES IN THE OCEAN GOES IN YOU.



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

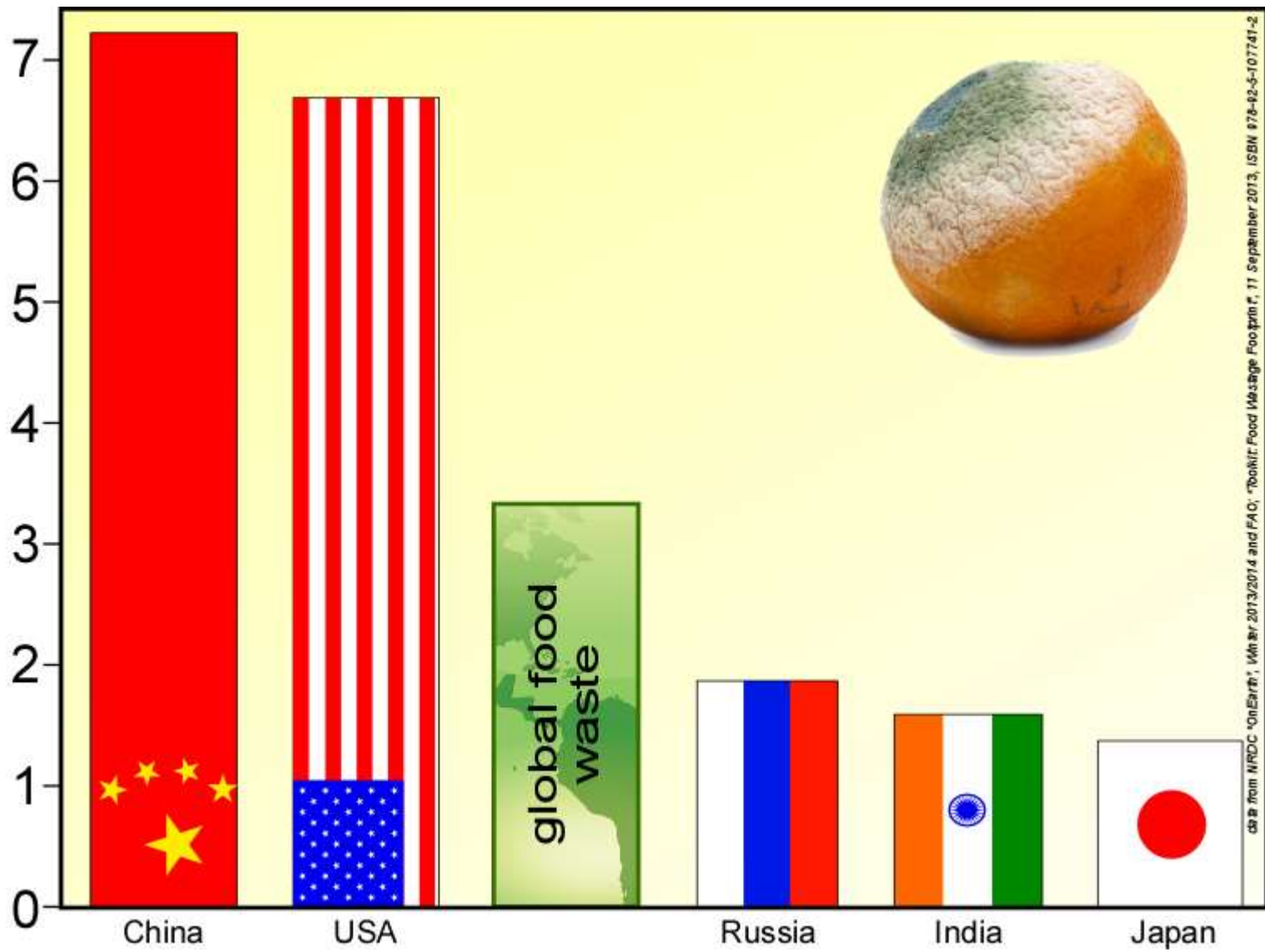




30-40% food
grown is wasted.
Much of it to
spoilage.

GHG Emissions

(billions of metric tons CO_{2e})

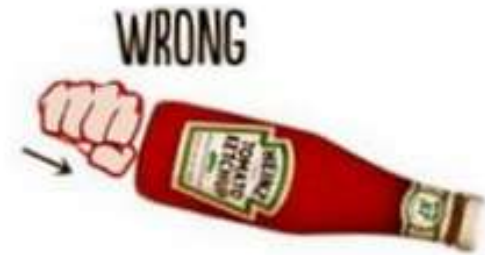


data from WRI's 'The State of the World 2014' and FAO's 'The State of the World's Fisheries and Aquaculture 2012' (September 2013). ISBN 978-92-5-107741-2

World Without Packaging

Video showing a world without plastic packaging.

Frustration with Packaging





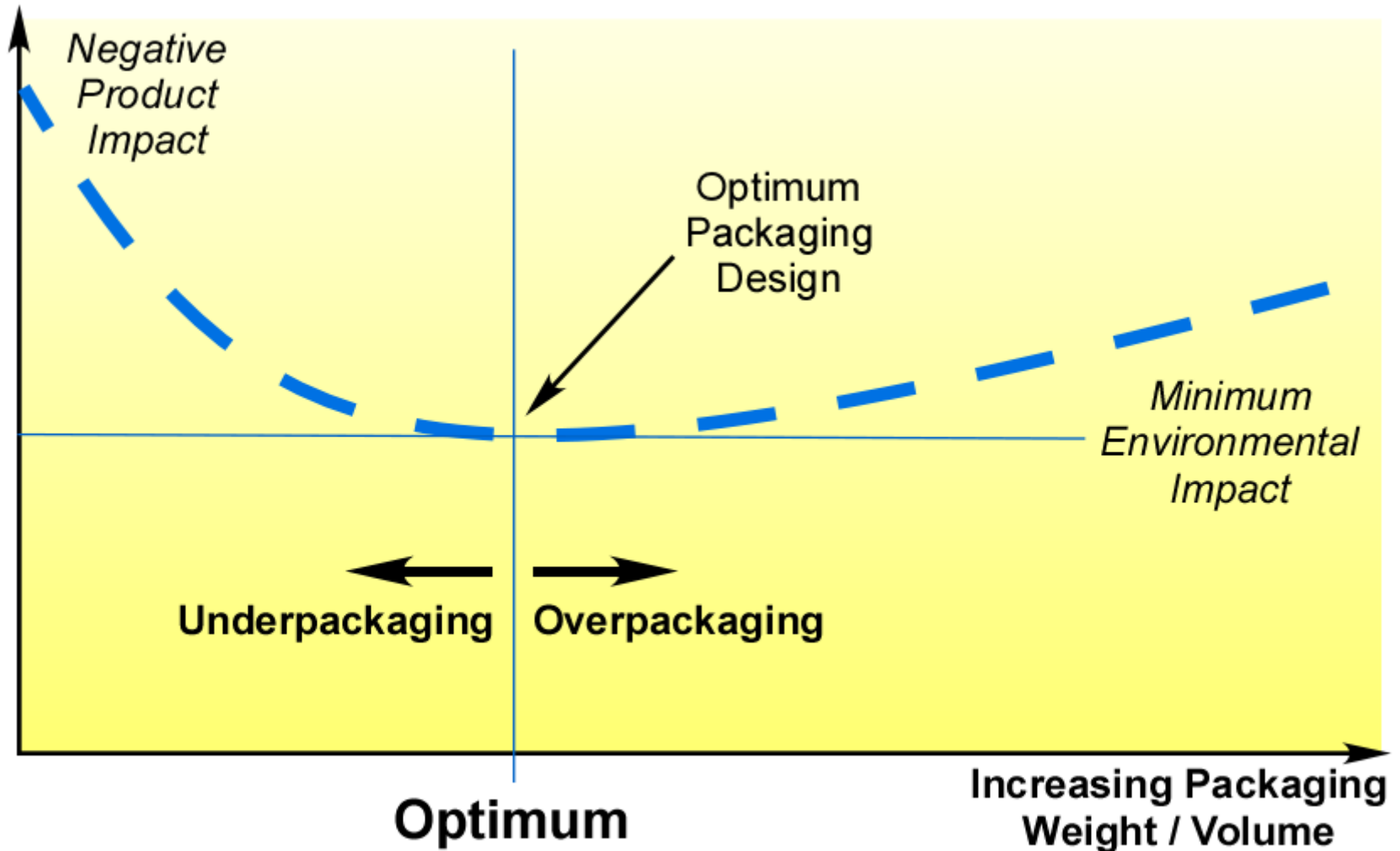
✓ Same Heinz
✓ Great Low Price

HEINZ
ESTD 1869
**TOMATO
KETCHUP**
57 VARIETIES
GROWN NOT MADE

NET WT 10 OZ (283g)



Optimizing Packaging

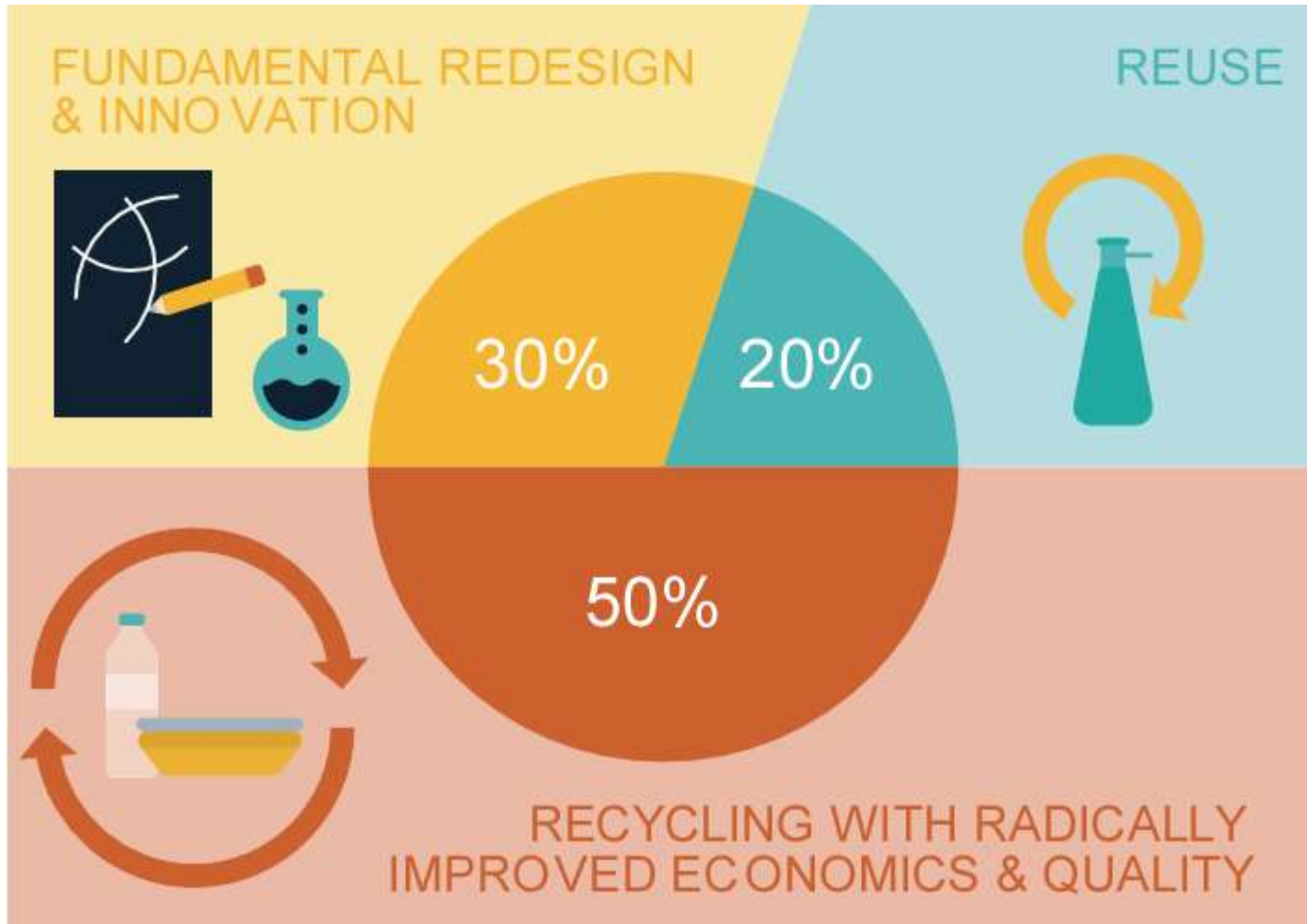


adapted from *Optimal Packaging* (The Consumer Goods Forum, Global Packaging Project, 2011)

The New Plastics Economy

video introducing the New Plastics Economy

Remedy



Source: New Plastics Economy initiative analysis (see Appendix for details)

Source: World Economic Forum

Plastic Paradox



Recycling





platinum

78

PT

195.08



Price?



1.6¢

Price?



4.2¢



1.6¢

Price?

0.61¢



0.01¢



4.2¢



0.22¢



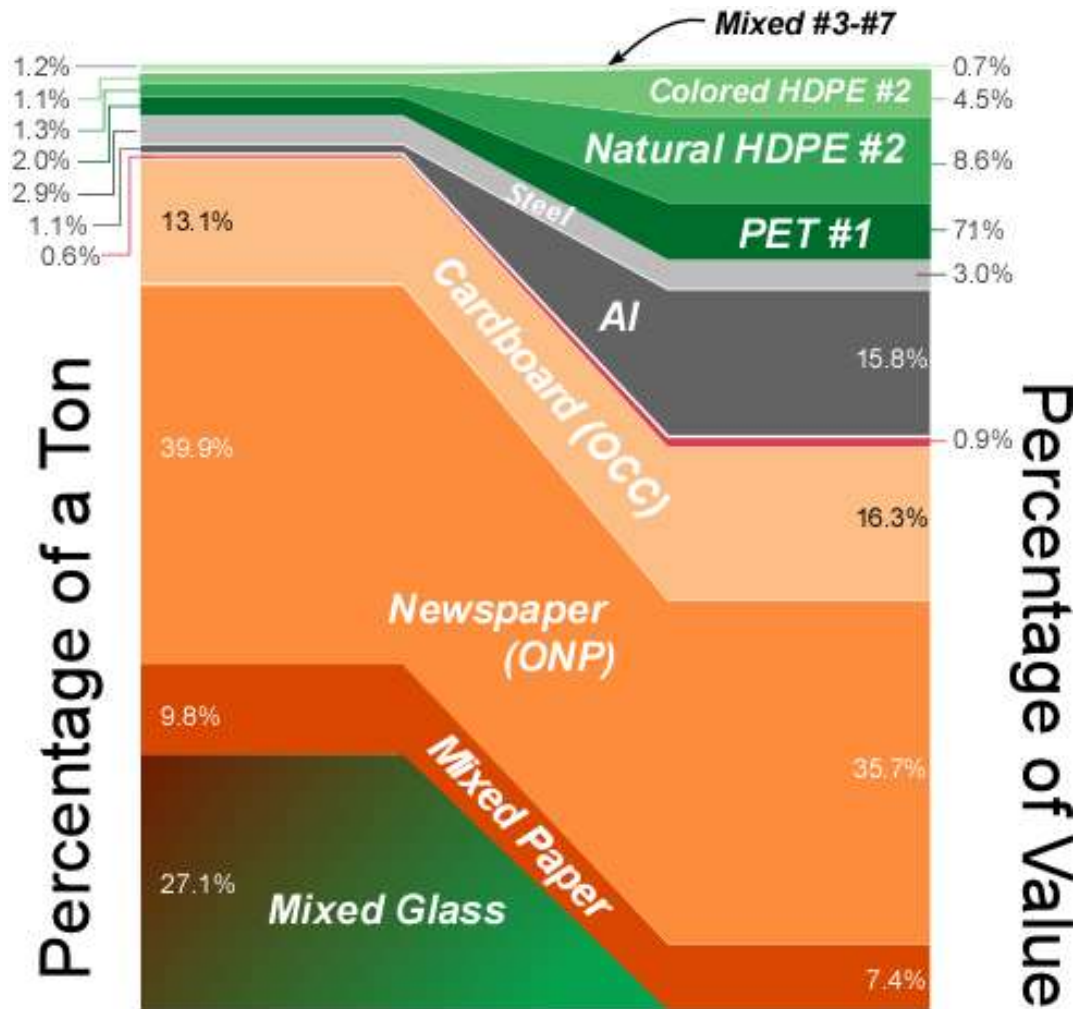
0.20¢



1.6¢



Value of Recycled Materials



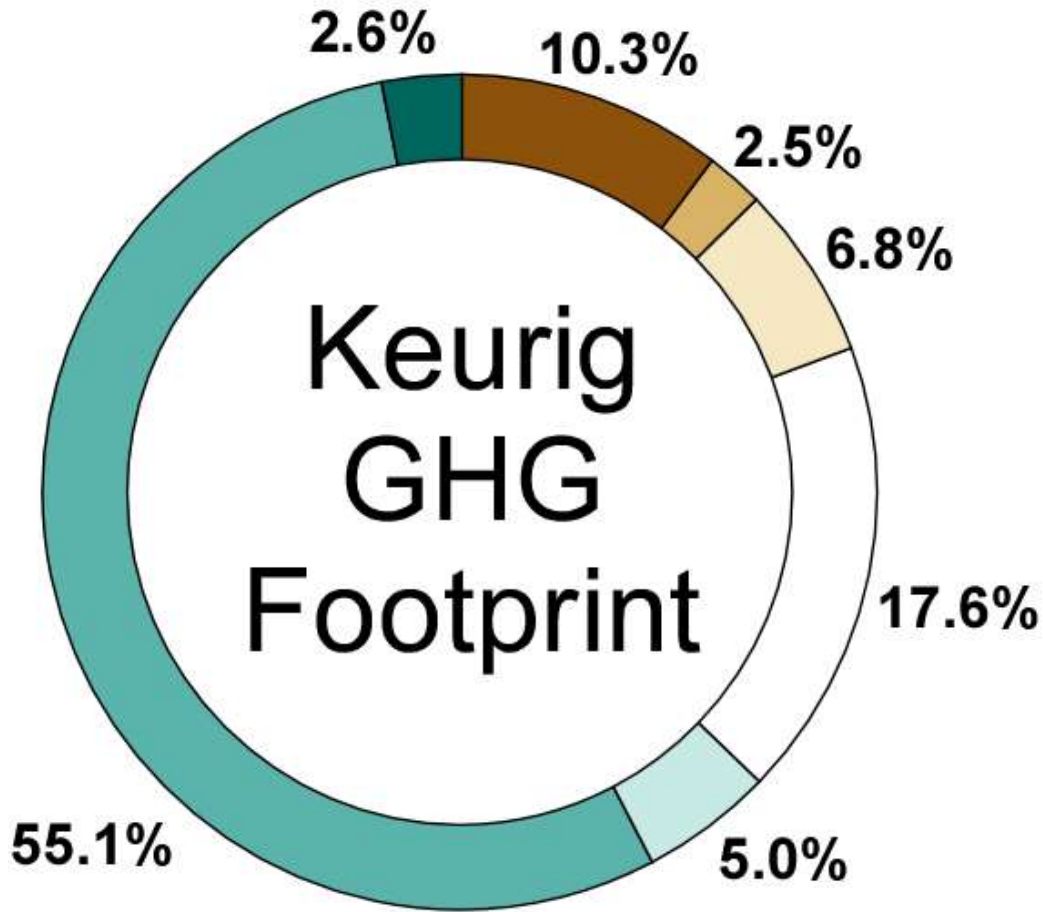
source: RRS from recycling.com and published in November 2015 Resource Recycling



K-Cup

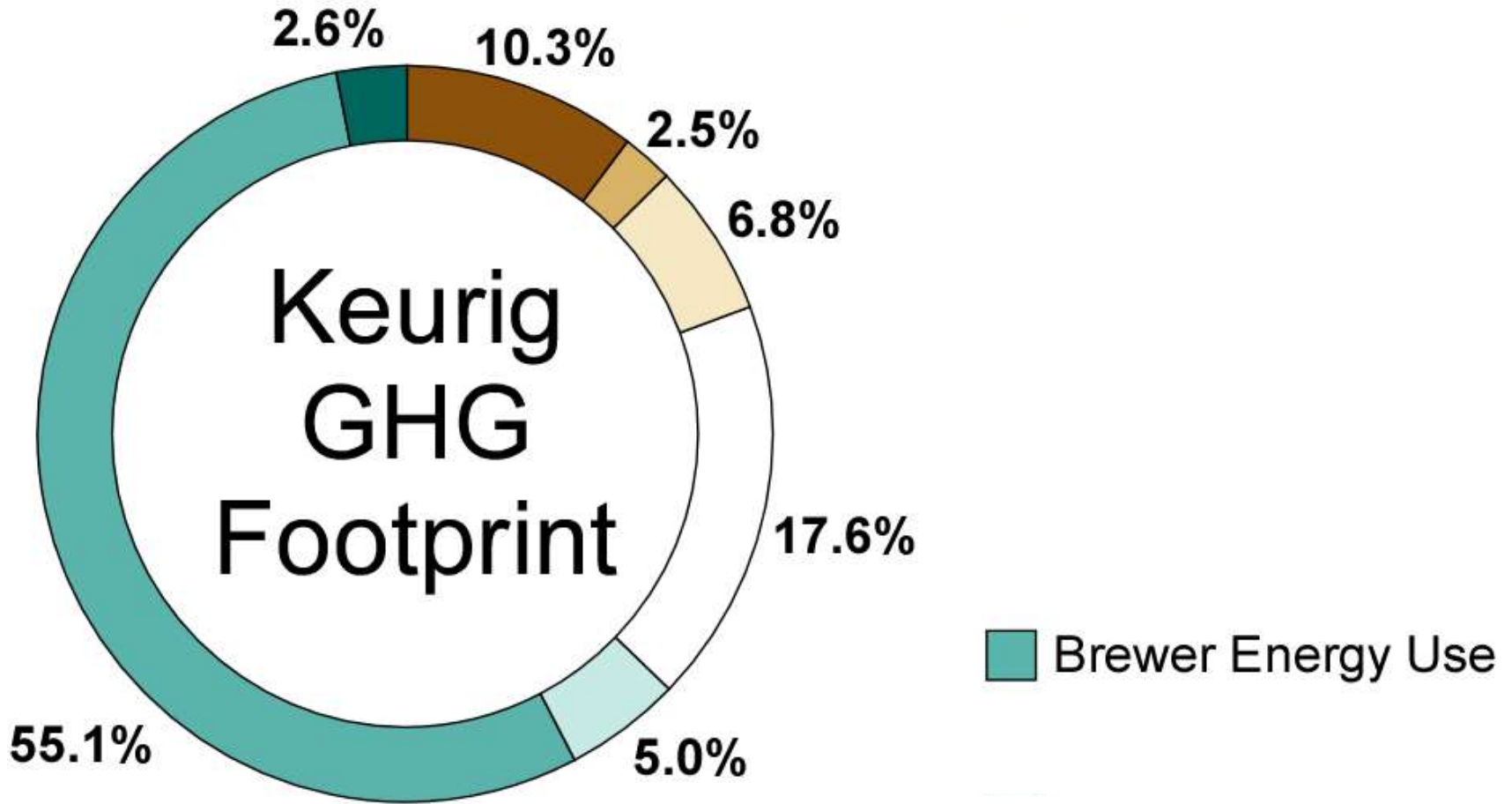


Keurig Corporate Footprint



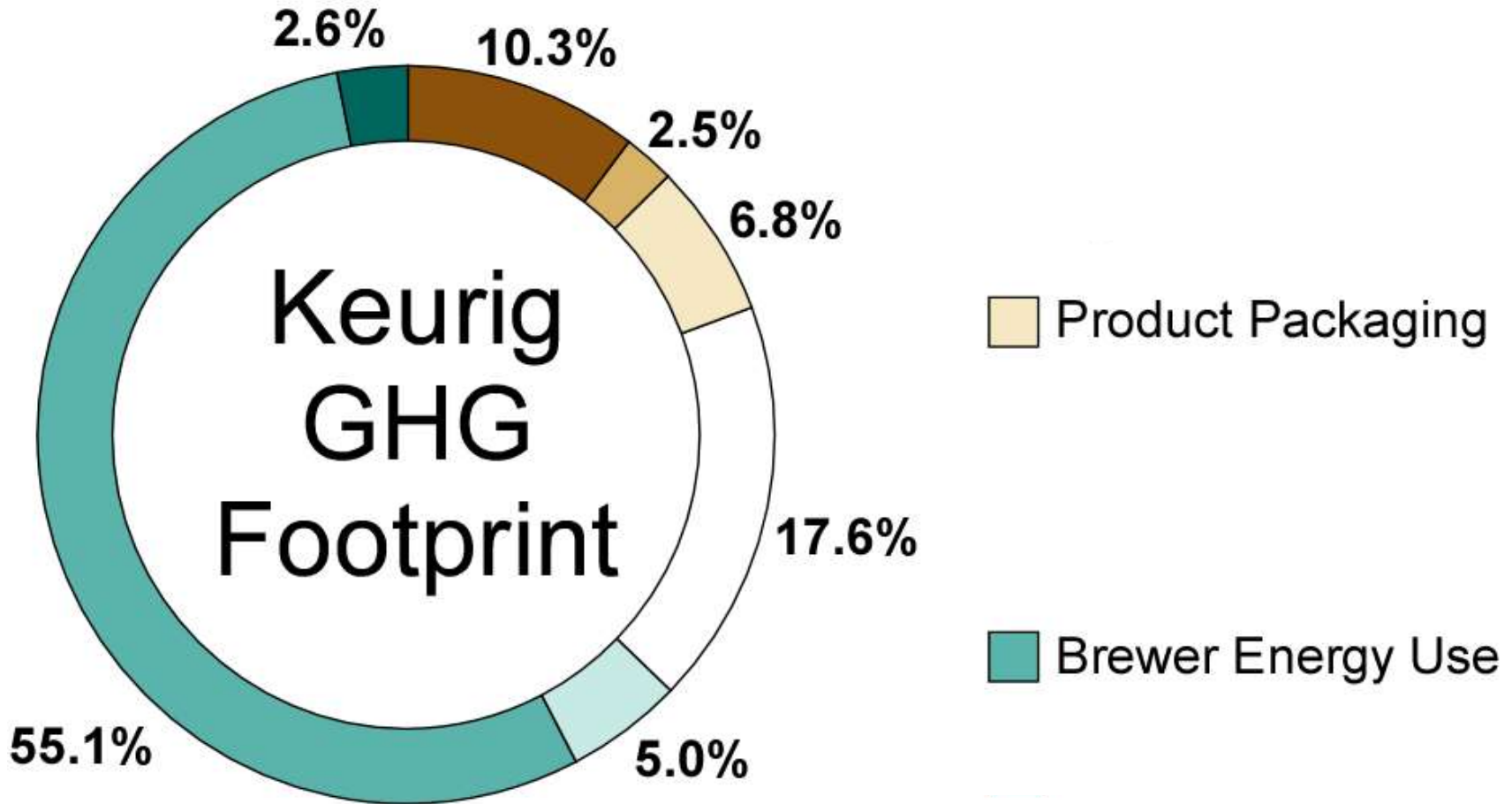
Keurig Green Mountain; "Beyond the Cup: Sustainability Report Fiscal 2014.

Keurig Corporate Footprint



Keurig Green Mountain; "Beyond the Cup: Sustainability Report Fiscal 2014.

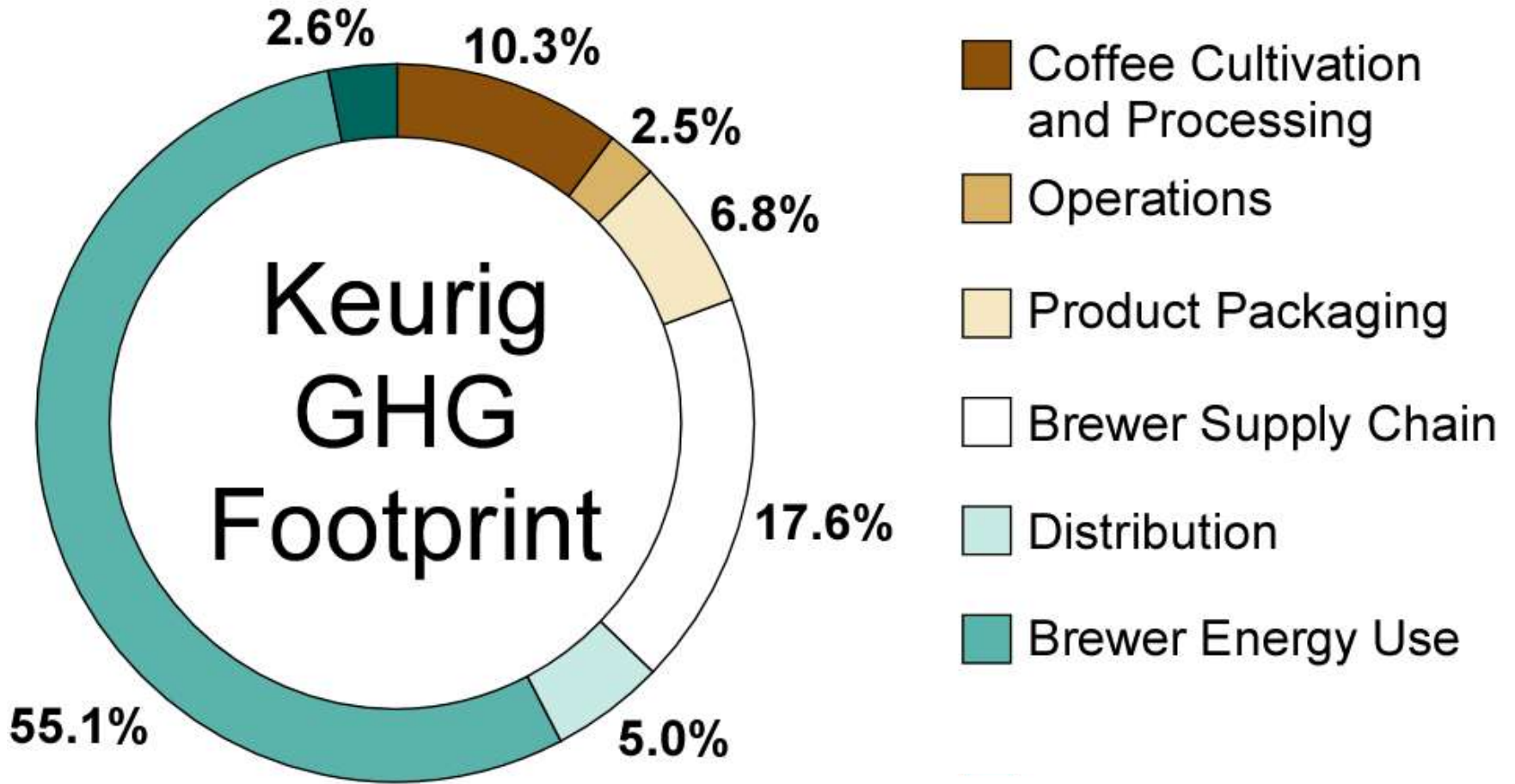
Keurig Corporate Footprint



Keurig Green Mountain; "Beyond the Cup: Sustainability Report Fiscal 2014.

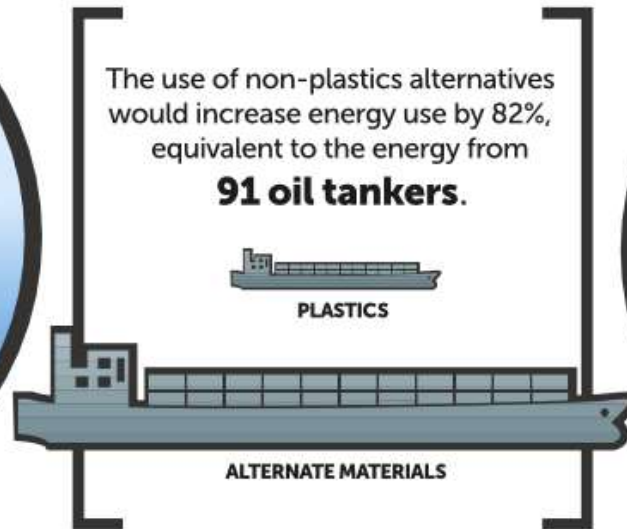


Keurig Corporate Footprint



Keurig Green Mountain; "Beyond the Cup: Sustainability Report Fiscal 2014.

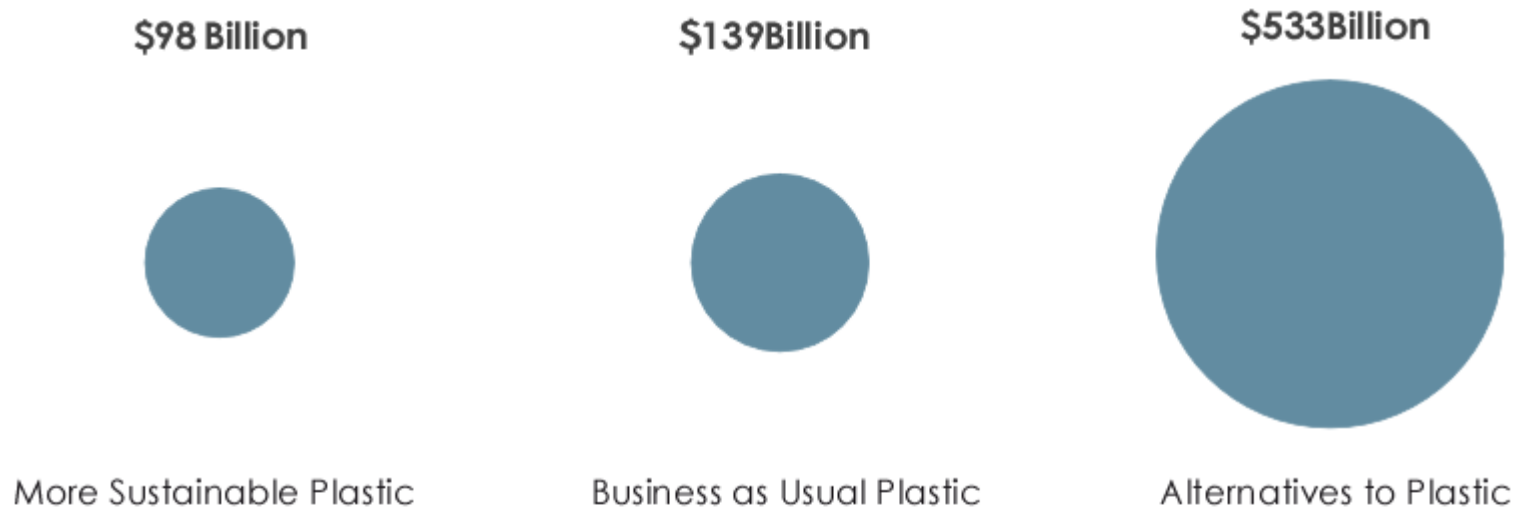
Plastic Benefits



Most plastics can be recycled



The Costs to Society and the Economy

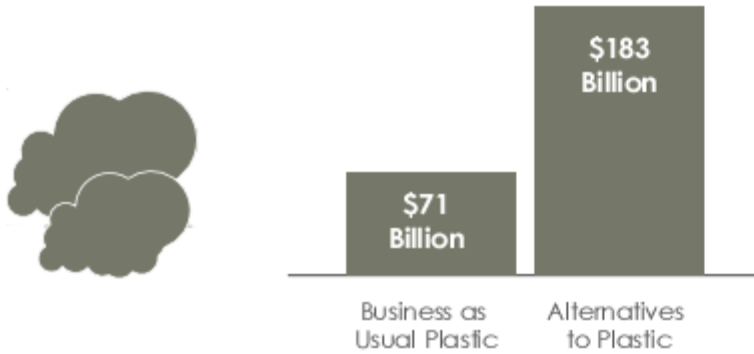


The cost of using alternative materials is approximately four times that of using plastic (in a business as usual scenario). We're producing more and more consumer goods, so choosing the material that creates the least impact is important.

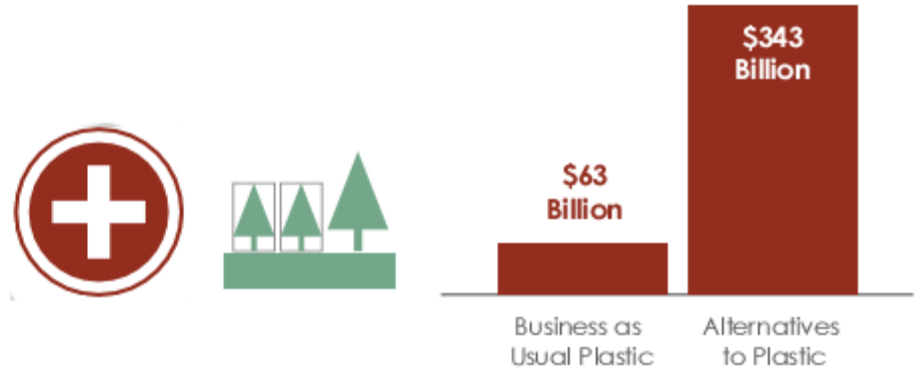
Source: Trucost

TRUCOST Analysis

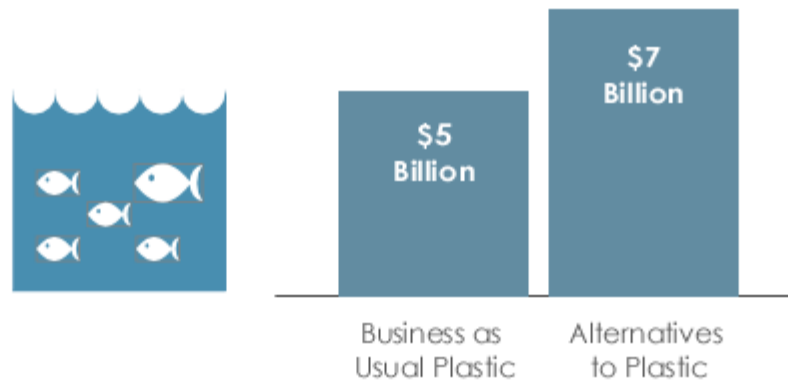
Climate change



Damage to the health of humans and ecosystems



Damage to the oceans



All dollar values are in USD
Source: Trucost



Valuing Nature



<http://www.treebenefits.com/calculator/>

Which is more sustainable?

plastic



paper

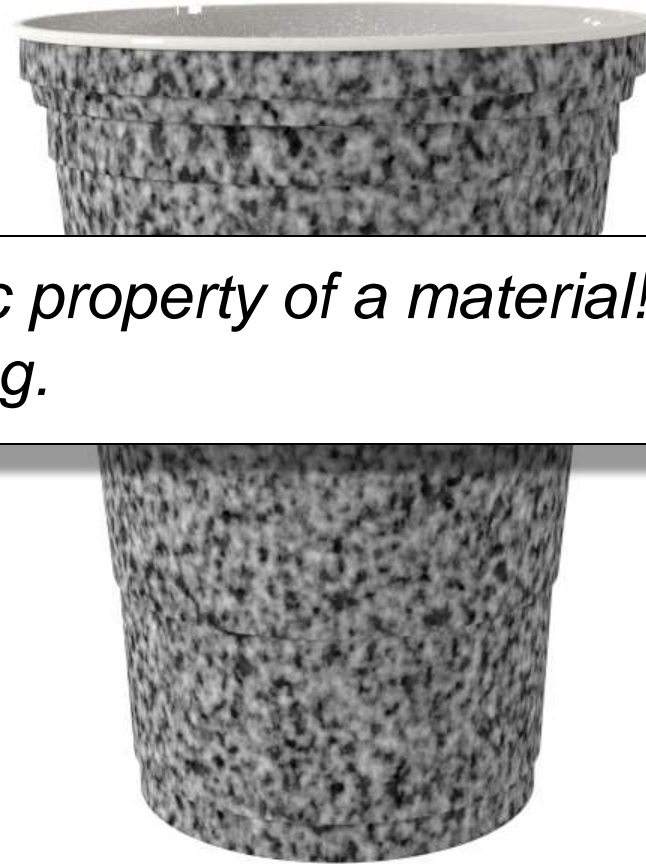
Sustainable?



Is this Cup Sustainable?

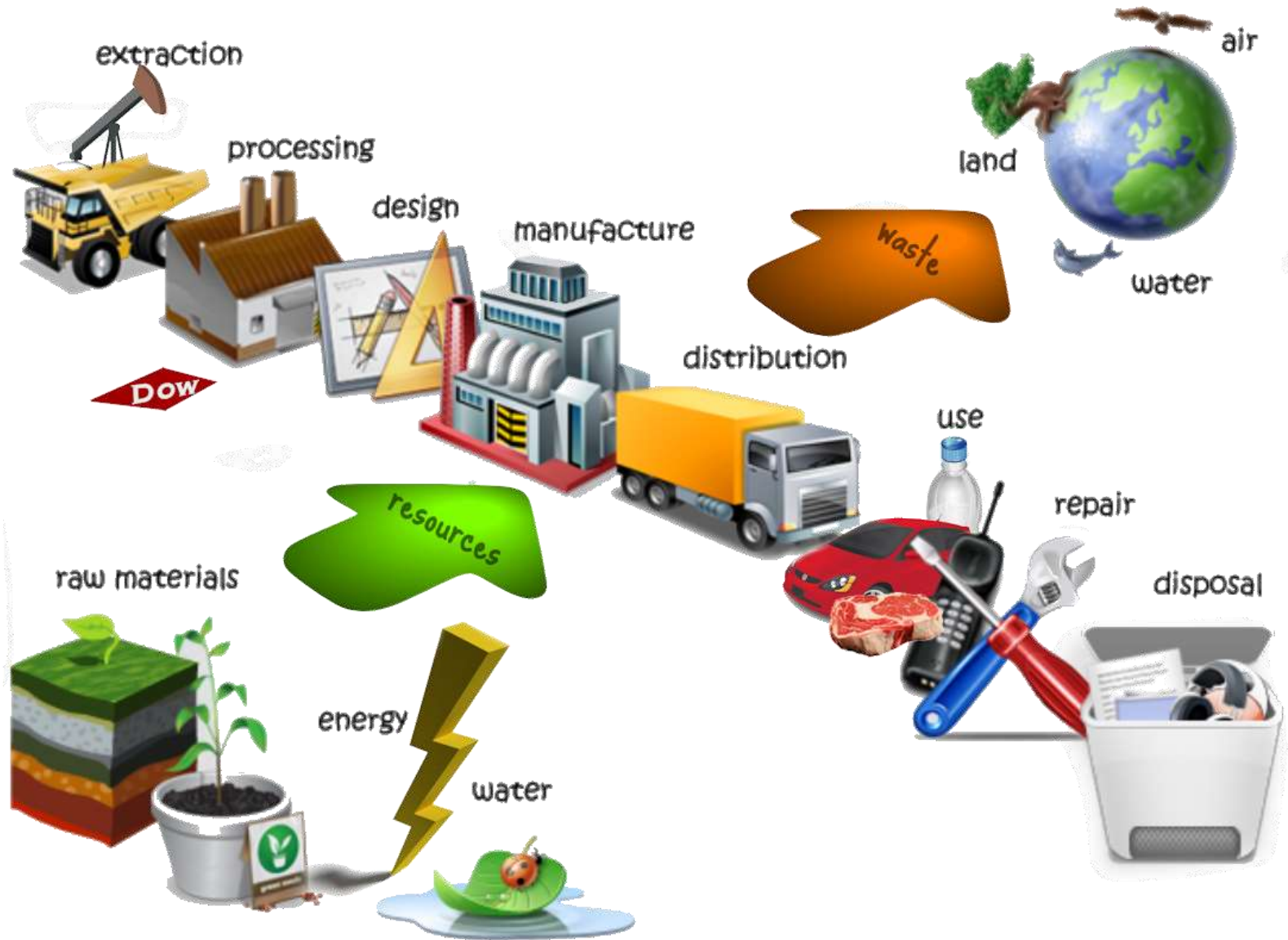


*Sustainable is not an intrinsic property of a material!
You can't know by just looking.*



How about this one?

Life Cycle Assessment



adapted from sustainable-graphic-design.blogspot.com



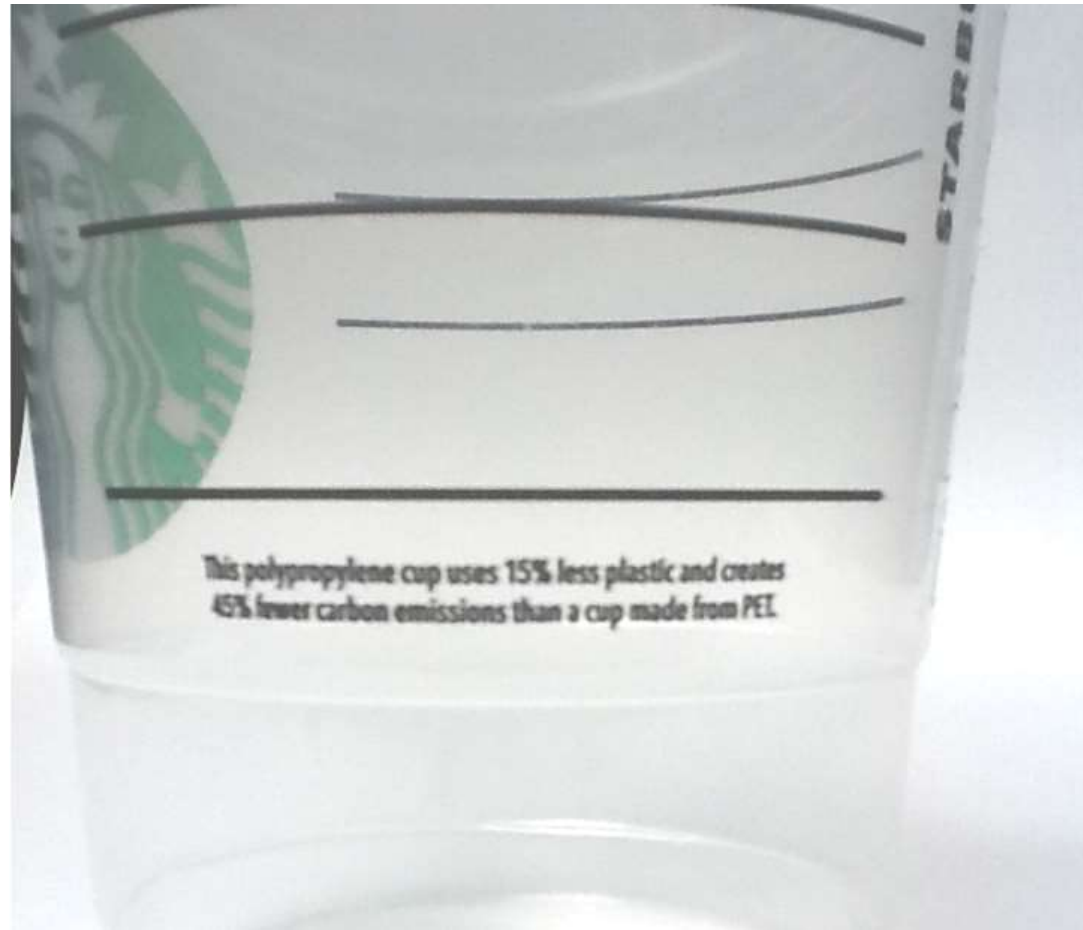
Which is more sustainable?

A meat-eater in a Prius



A vegan in a Hummer

Signs of Hope



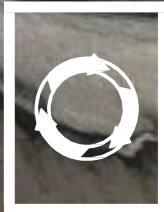
2025 Sustainability Goals



Leading the
Blueprint



Delivering
Breakthrough
Innovations



Advancing a
Circular
Economy



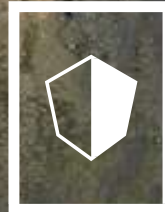
Valuing
Nature



Increasing
Confidence in
Chemical
Technology



Engaging
Employees for
Impact



World-Leading
Operations
Performance

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.



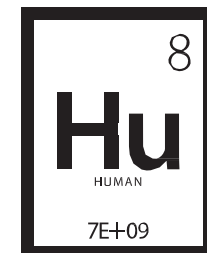
Engaging Employees for Impact

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.



Waste Reduction Hierarchy



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

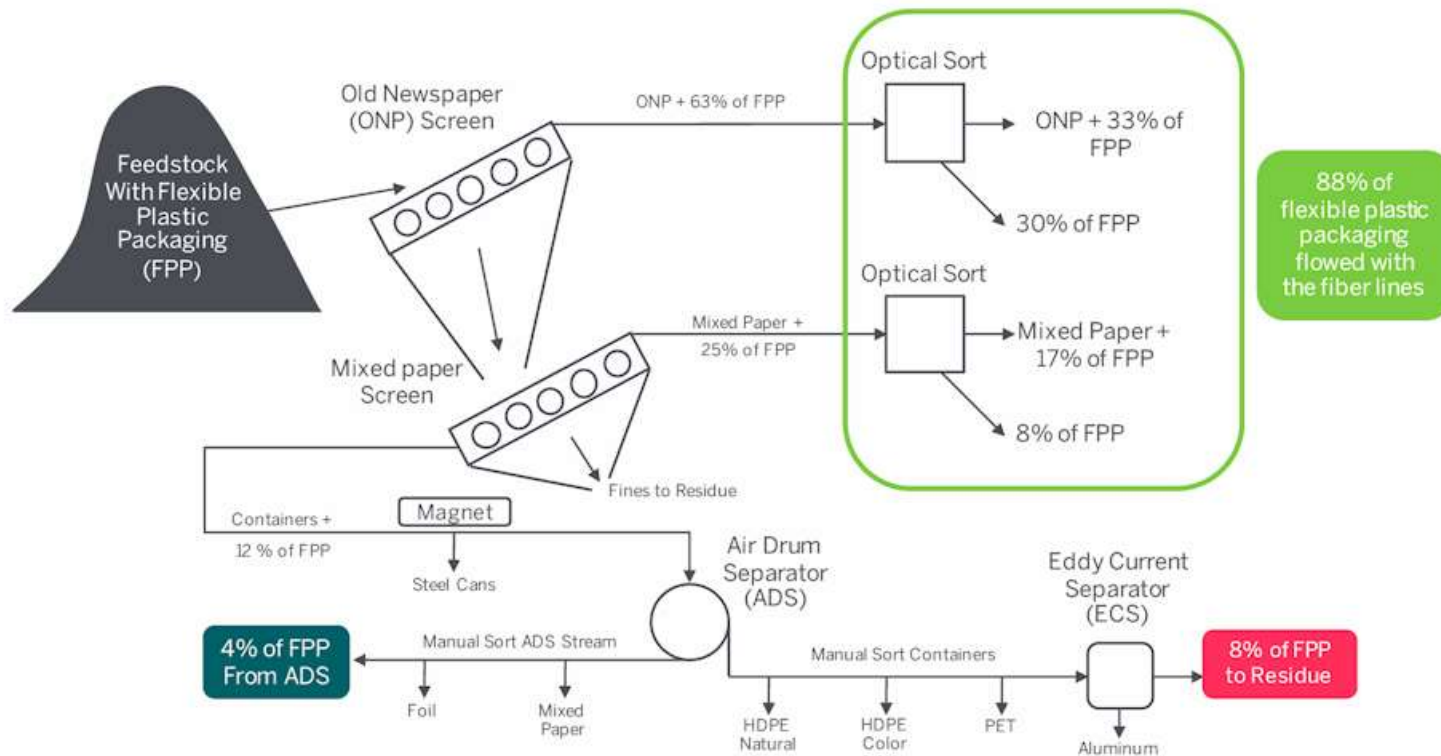
Space Saving

- Ships and Stores Flat when Unfilled



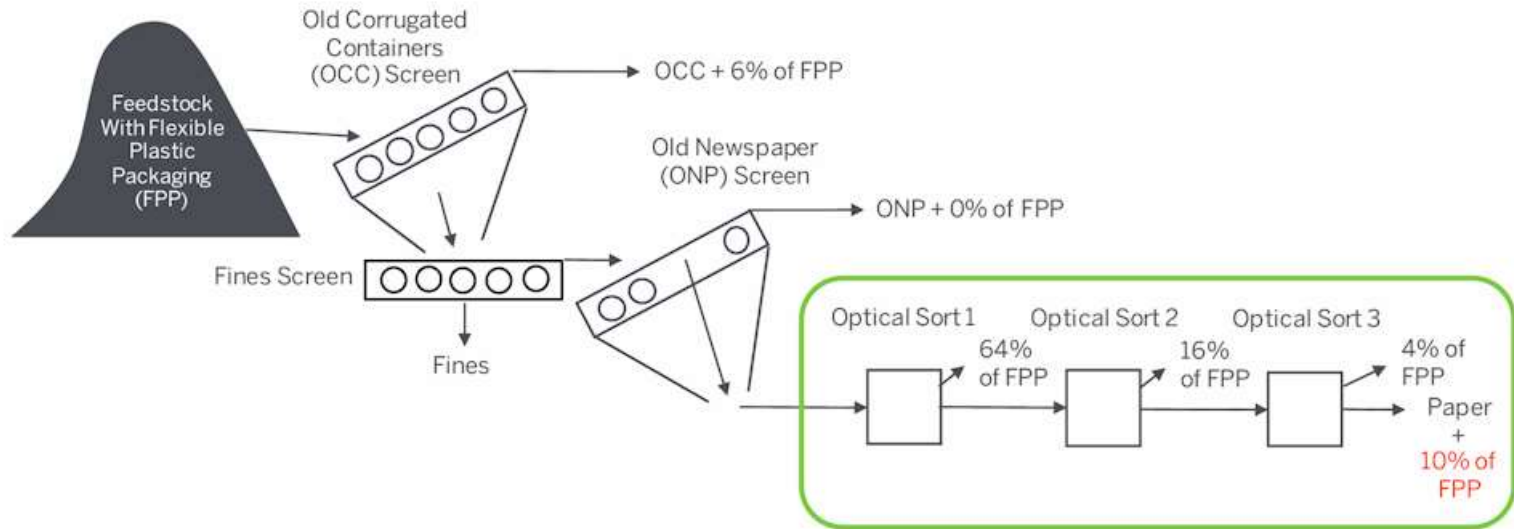
Getting Better At Recycling

BASELINE MATERIAL FLOW



Getting Better At Recycling

MRF TEST 2 MATERIAL FLOW



Explore New End of Life Options



Energy Bag

Energy Bag video

Explore New End of Life Options



THE PLASTICS THAT DON'T GO IN YOUR BIN GO IN YOUR BAG

- juice pouches
- snack bags
- microwavable pouches
- cake mix liners
- cereal box liners
- laundry pouches
- potato chip bags
- frozen vegetable & fruit bags
- plastic meat & cheese packaging
- squeezable pouches
- foam "to-go" boxes
- foam cups
- salad bags
- plastic cups, plates, bowls & serving ware
- dog & cat food bags
- candy wrappers
- pudding cups
- straws & stirrers
- all other non-recycled bags.





head & shoulders

Shampooing antipelliculaire • après-shampooing

2en1
classic clean



FABRIQUÉ À PARTIR DE
PLASTIQUE COLLECTÉ
SUR LA PLAGE



Outline of a Circular Economy

PRINCIPLE 1

1

Preserve and enhance natural capital by controlling finite stocks and balancing renewable resource flows

PRINCIPLE 2

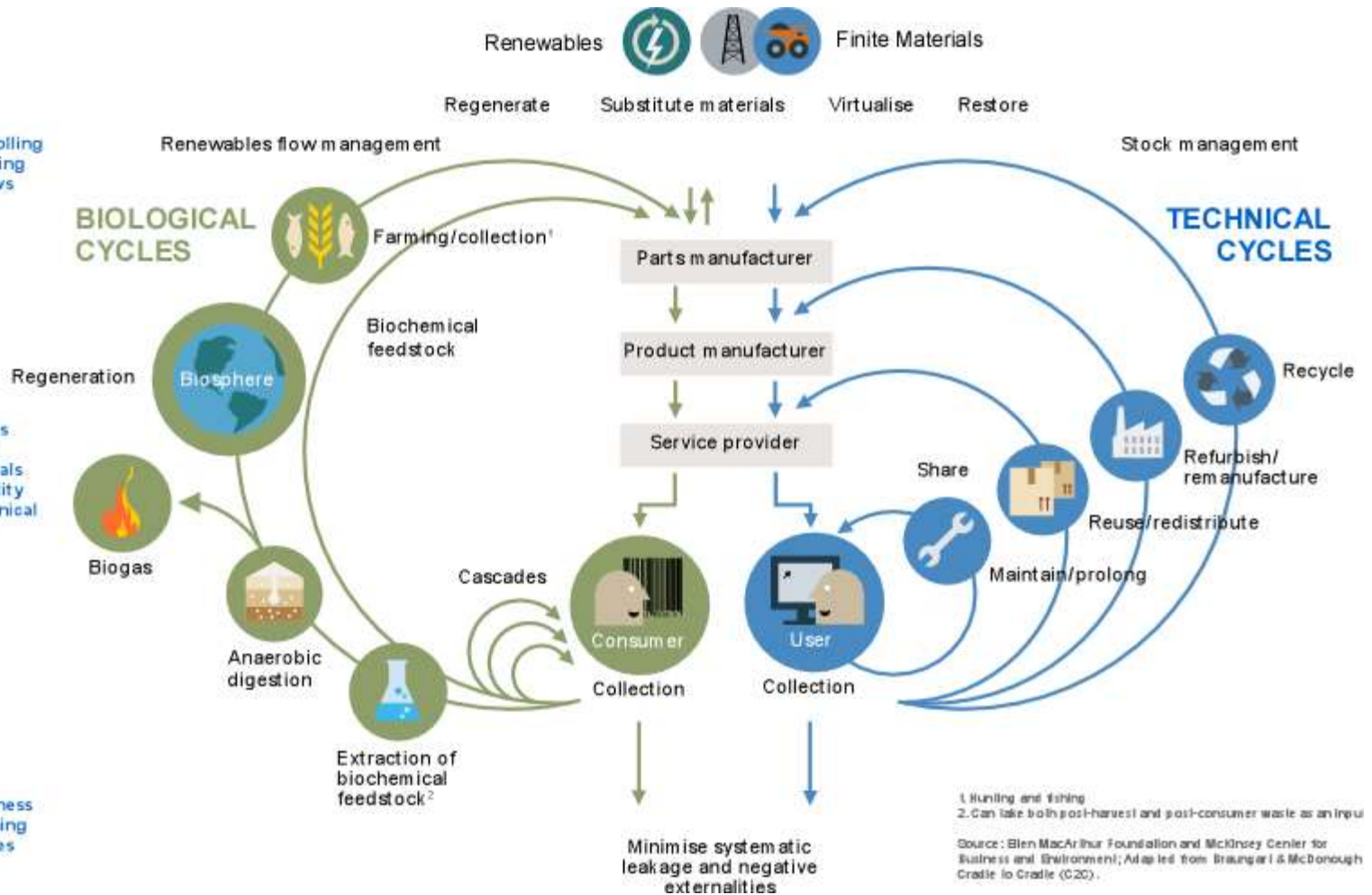
2

Optimise resource yields by circulating products, components and materials in use at the highest utility at all times in both technical and biological cycles

PRINCIPLE 3

3

Foster system effectiveness by revealing and designing out negative externalities



Source: World Economic Forum

The End

Questions?