

# MJPhD

## THE JOURNEY TO "MORE SUSTAINABLE"

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CREATIVE DIRECTOR

EXECUTIVE EXTERNAL STRATEGY AND COMMUNICATIONS FELLOW (RETIRED)  
THE DOW CHEMICAL COMPANY

*18 October 2021*





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Green-e

**Energy**  
CERTIFIED

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saved 6 tons CO2  
at \$917/ton  
offsets are ~\$10/ton





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min wage is \$32,600/MM BTU

gasoline at \$3/gal ~\$24/MM BTU

Dow CEO in 2020 is  
\$6.2 million/MM BTU assuming  
24/7 work at high output





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# SUSTAINABILITY DEFINITION

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Sustainability means meeting our own needs without compromising the ability of future generations to meet their own needs.

*Brundtland Commission*

# DOW SUSTAINABILITY JOURNEY

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**2005 EH&S Goals**  
Journey to EH&S Excellence

**2015 Sustainability Goals**  
Product Solutions to World Challenges

**2025 Sustainability Goals**  
Dow's Thought Leadership and Actions

**Dow's Handprint**  
Products and services that help customers meet their challenges

**Dow's Blueprint**  
Changes in technology, public policy and the value chain that lead human society toward sustainability

**Dow's Footprint and EH&S Culture**  
World-leading operations and supply chain performance

1995

2006

2016

2025

# MAIN FOCUS AREAS-2020 UPDATE

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**Protect the Climate**



**Stop the Waste**

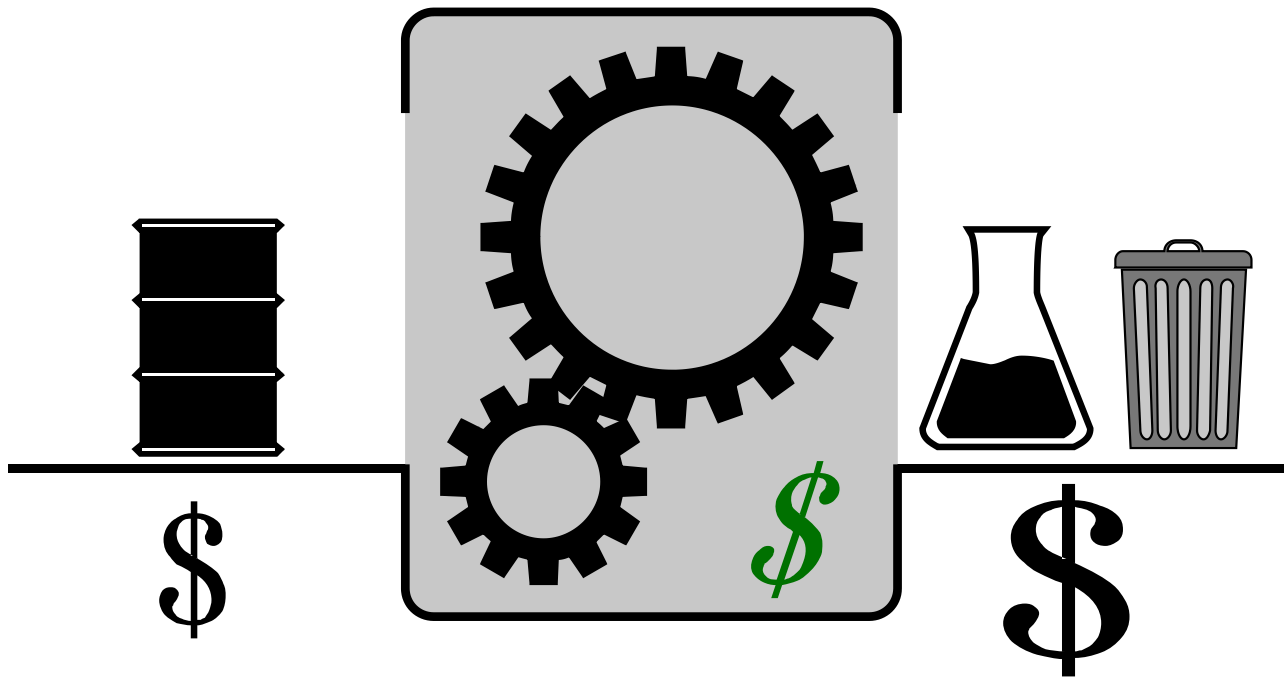


**Close the Loop**



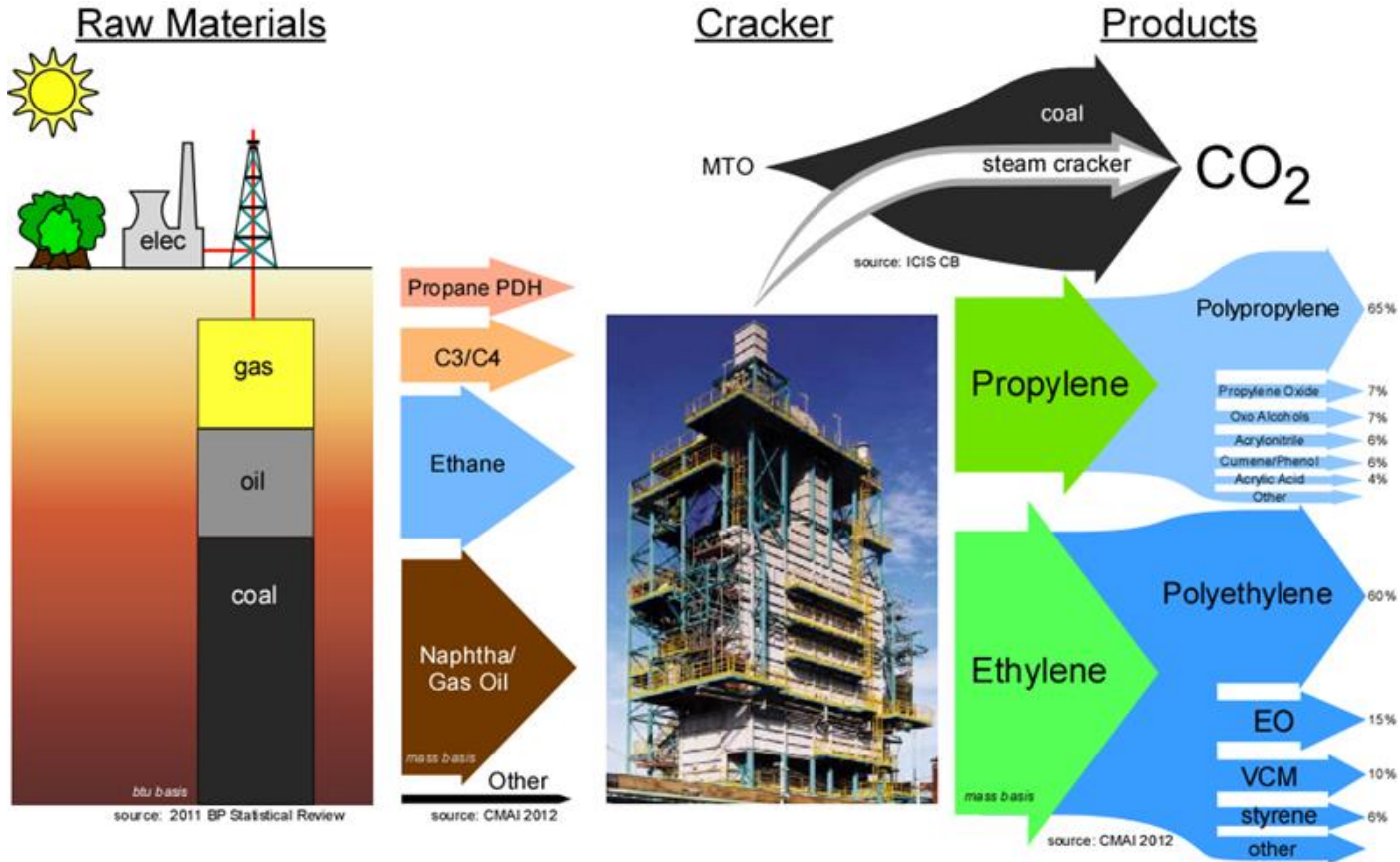
# SIMPLIFIED CHEMICAL INDUSTRY

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# MODERN CHEMICAL INDUSTRY





# ROUGH INDUSTRY MASS BALANCE

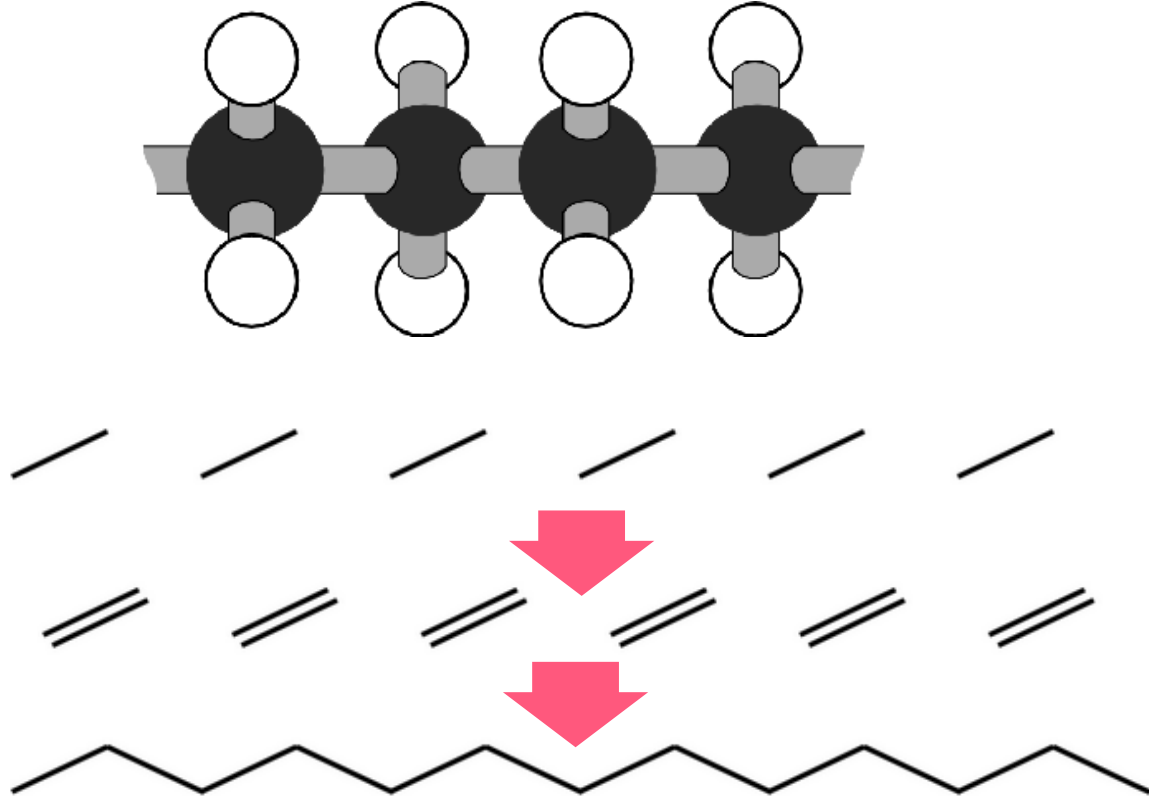
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# CHEMICAL TRANSFORMATION

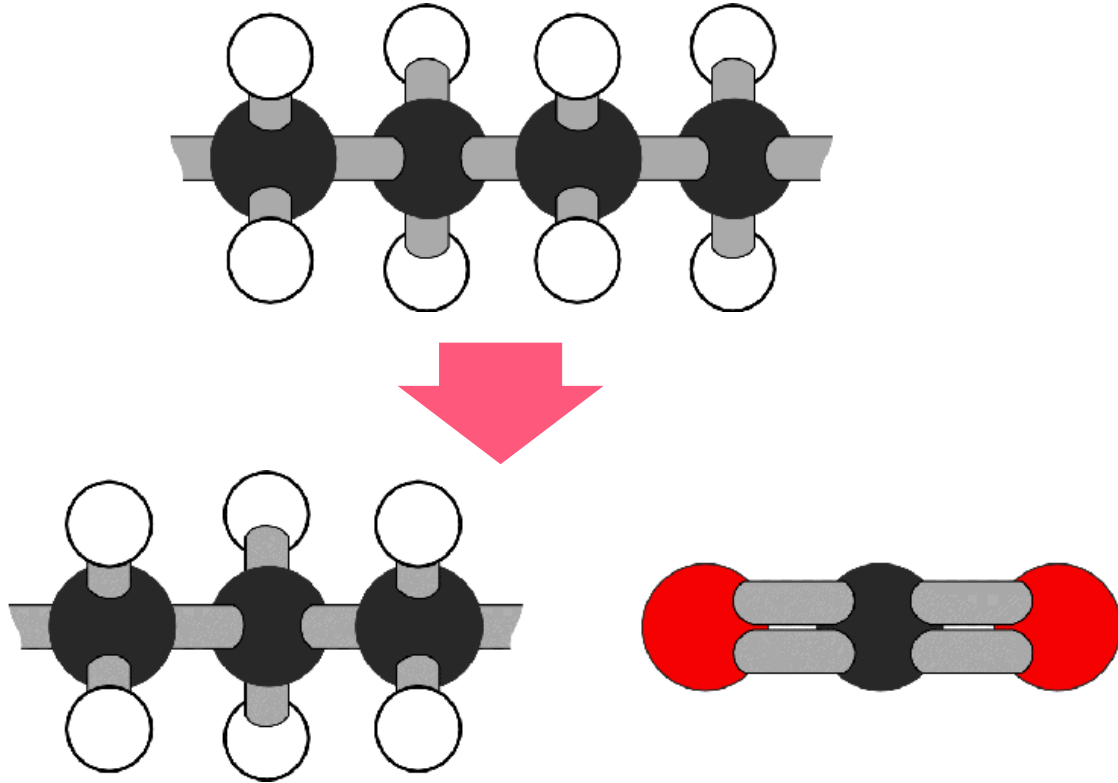
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# ROUGH MASS BALANCE

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# IMPLICATIONS

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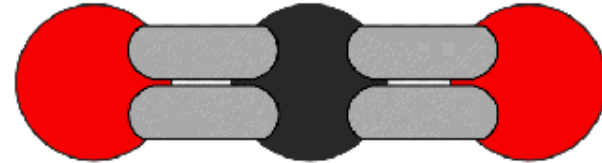
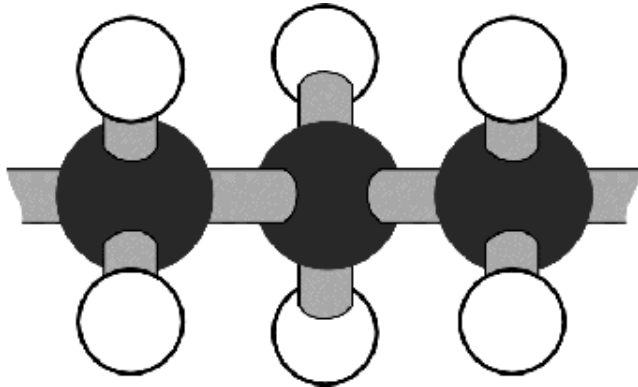
EPA 2.59 lb CO<sub>2</sub>/lb black

~5 carbons out of ground

2 go to CO<sub>2</sub>

3 go to CB

(12 out, 5 burned, 7 product is closer)



# FOOTPRINTS

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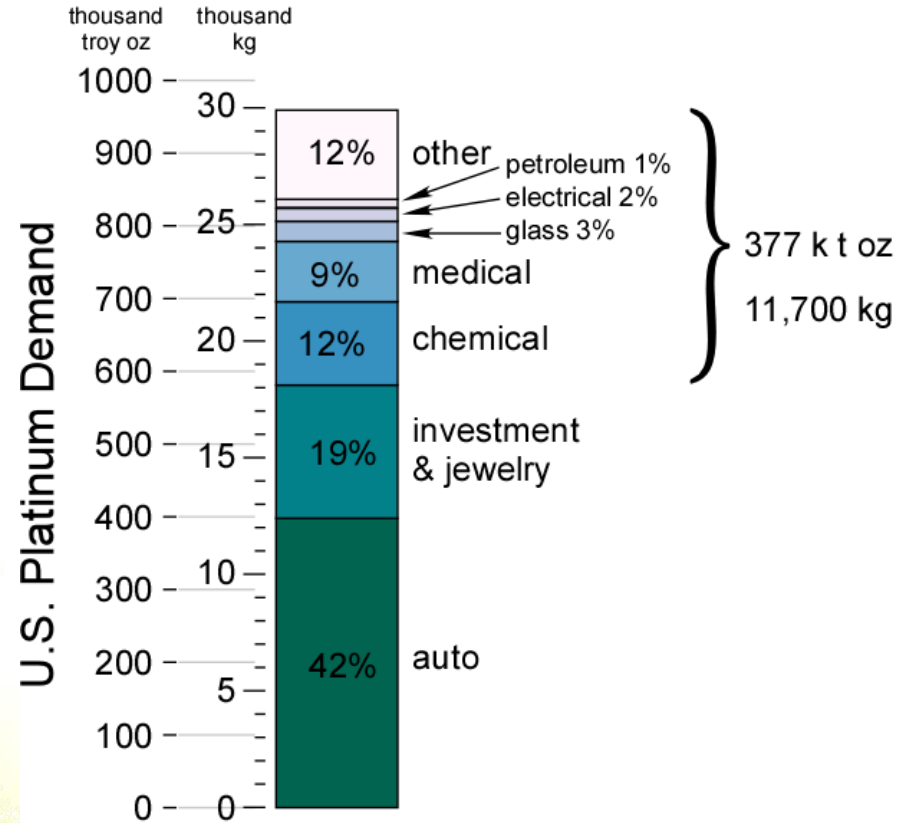
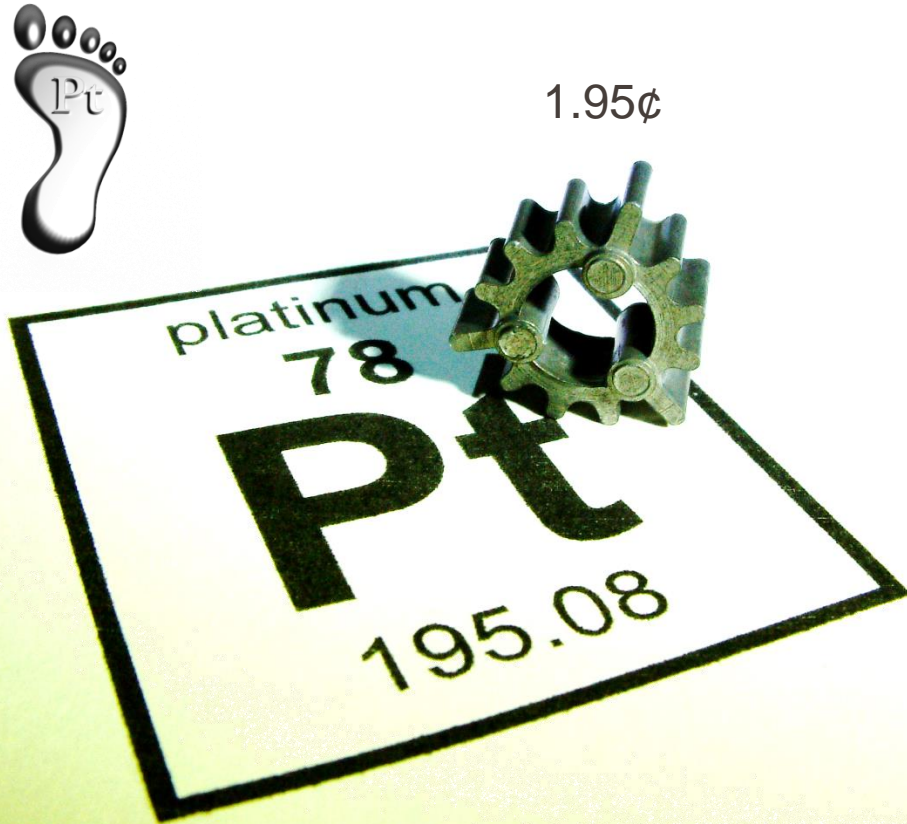
# ELEMENTAL FOOTPRINT

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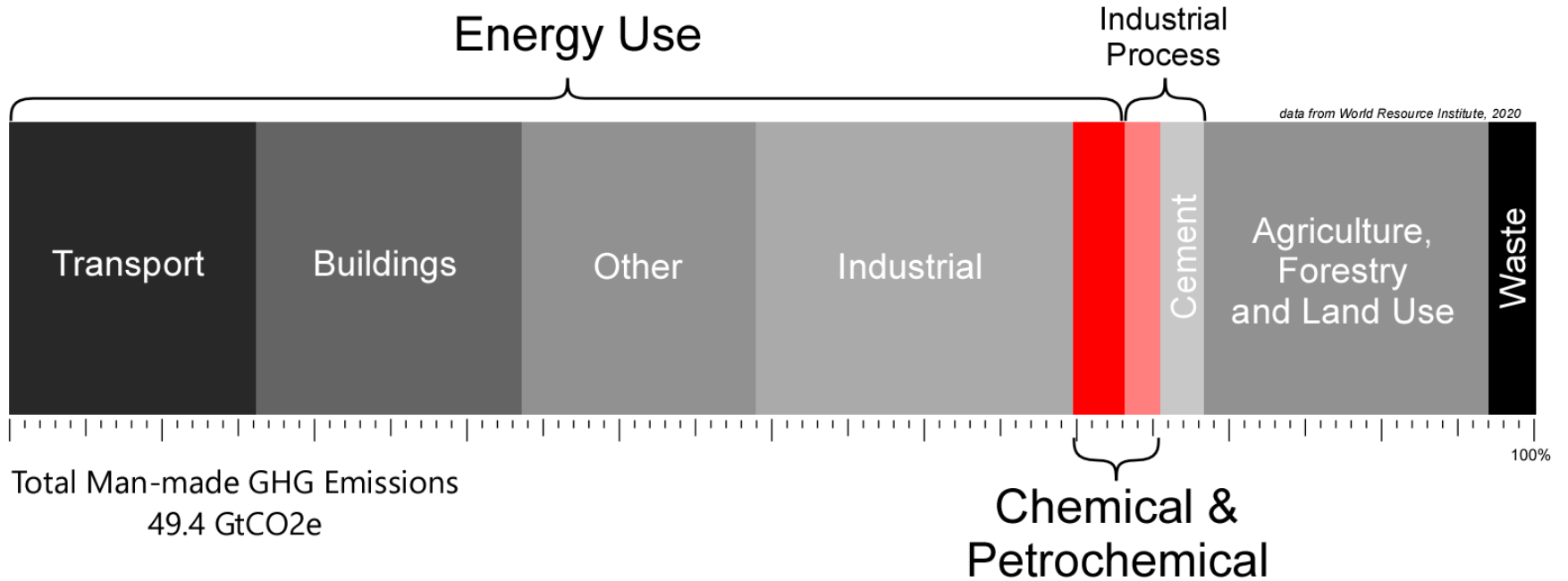


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# PLATINUM FOOTPRINT

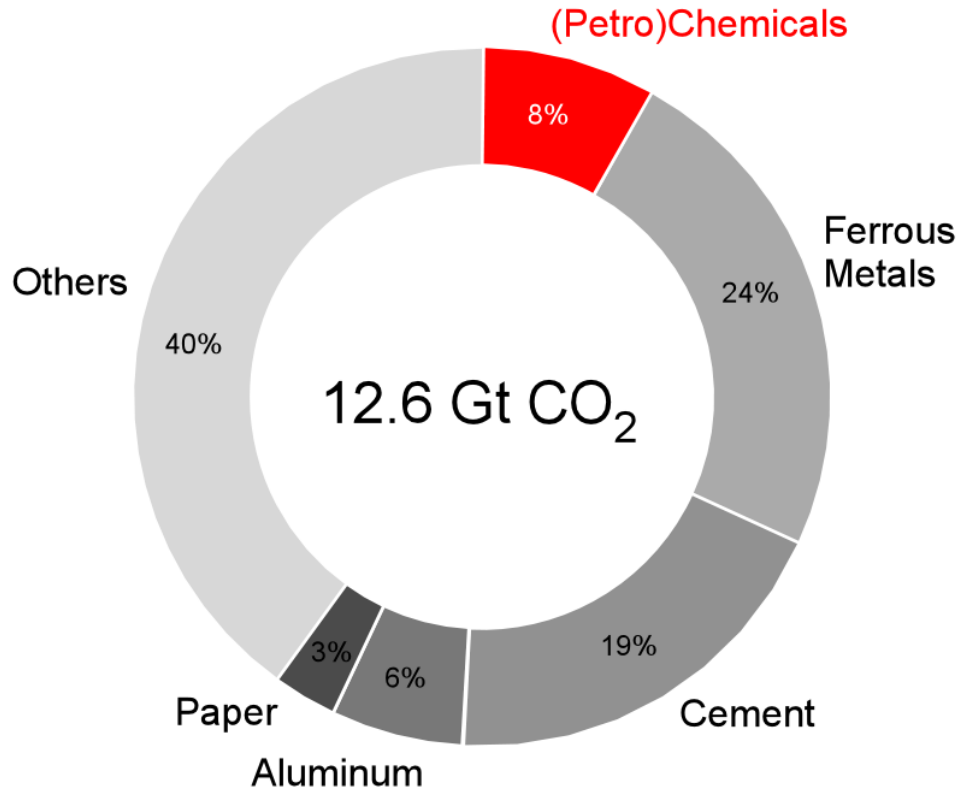


# CARBON FOOTPRINT OF INDUSTRY





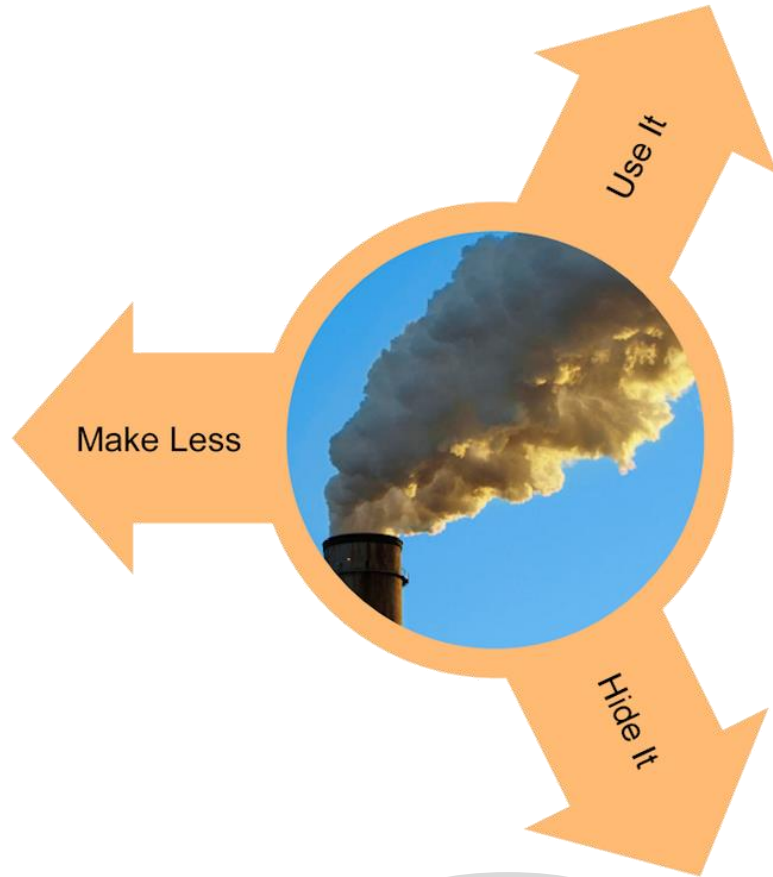
# GLOBAL CO2 EMISSIONS FROM INDUSTRY



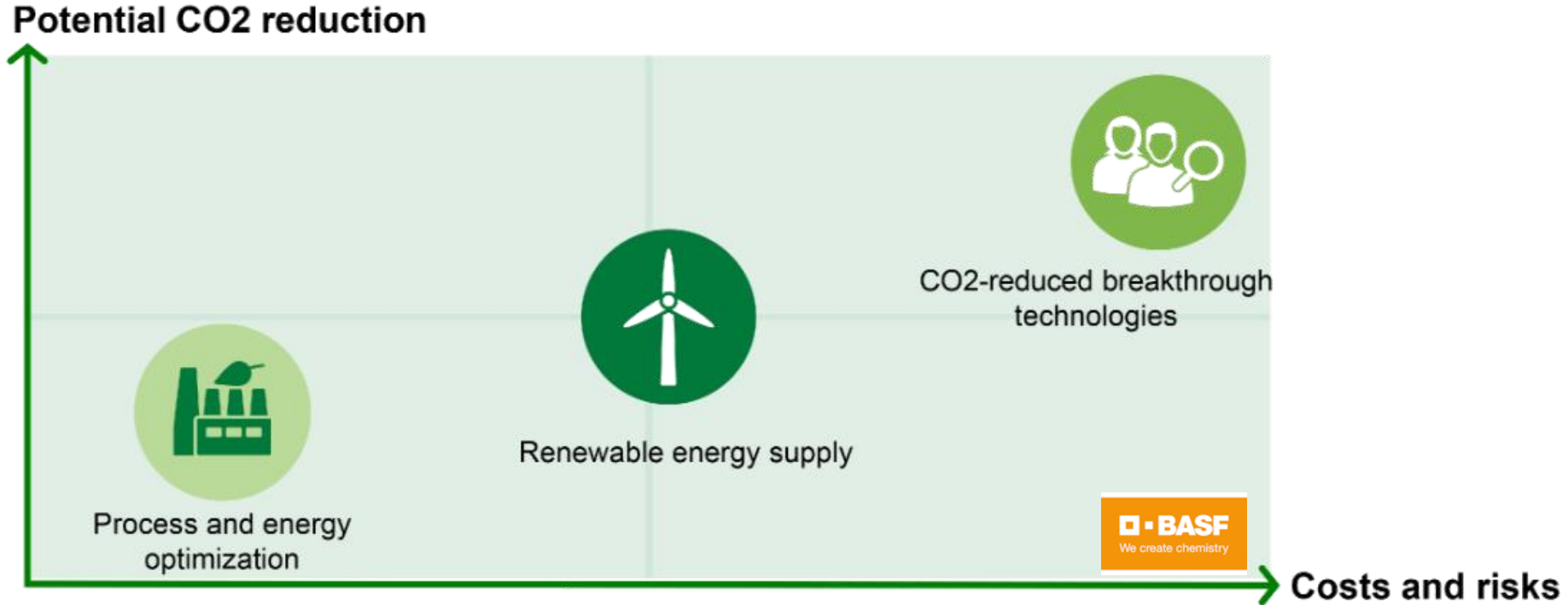
Martin Brudemuller, BASF at the World Economic Forum, 21 Jan 2020

# OPTIONS FOR CO<sub>2</sub>

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# POTENTIAL SOLUTIONS FOR DIRECT EMISSIONS



Martin Brudemüller, BASF at the World Economic Forum, 21 Jan 2020

# CHANGING PERCEPTIONS/NEW ACTIONS

## SINGLE-USE ITEMS



PLASTIC BAGS



STIR STICKS



SIX-PACK RINGS



PLASTIC UTENSILS



SOME FOOD WARE



PLASTIC STRAWS

## REUSABLE ALTERNATIVES



#ZeroPlasticWaste

Canada

Environment and Climate Change Canada

## Bill



## CA SB343

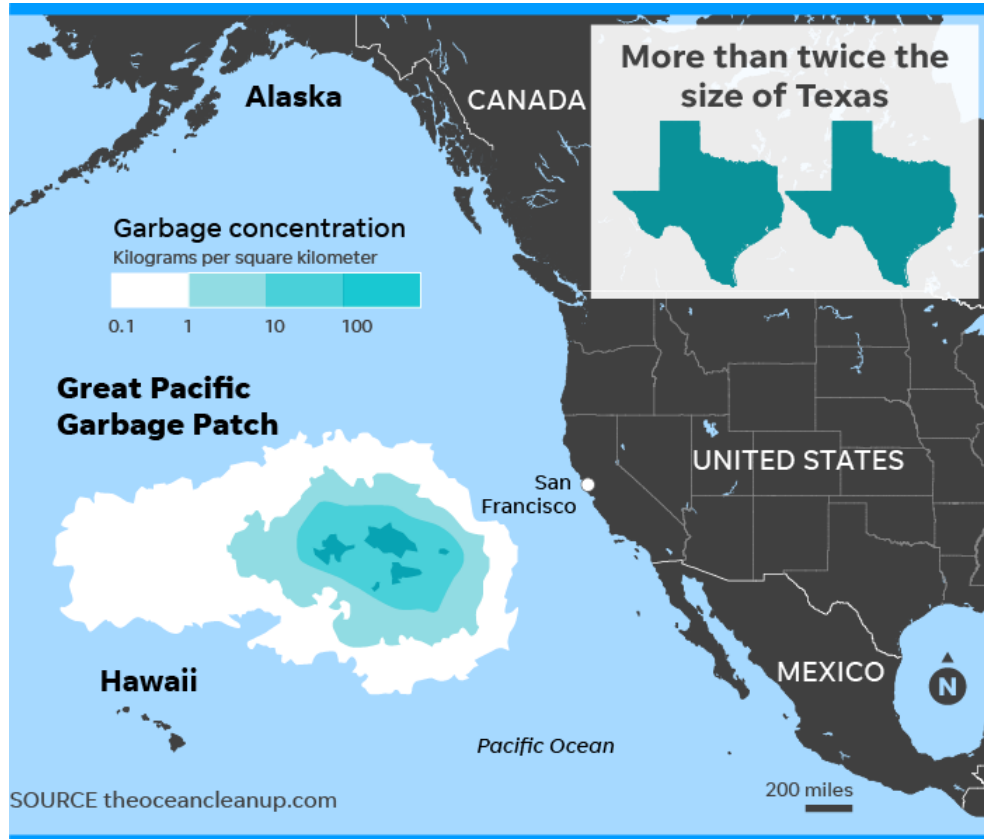
Environmental advertising: recycling symbol: recyclability: products and packaging.

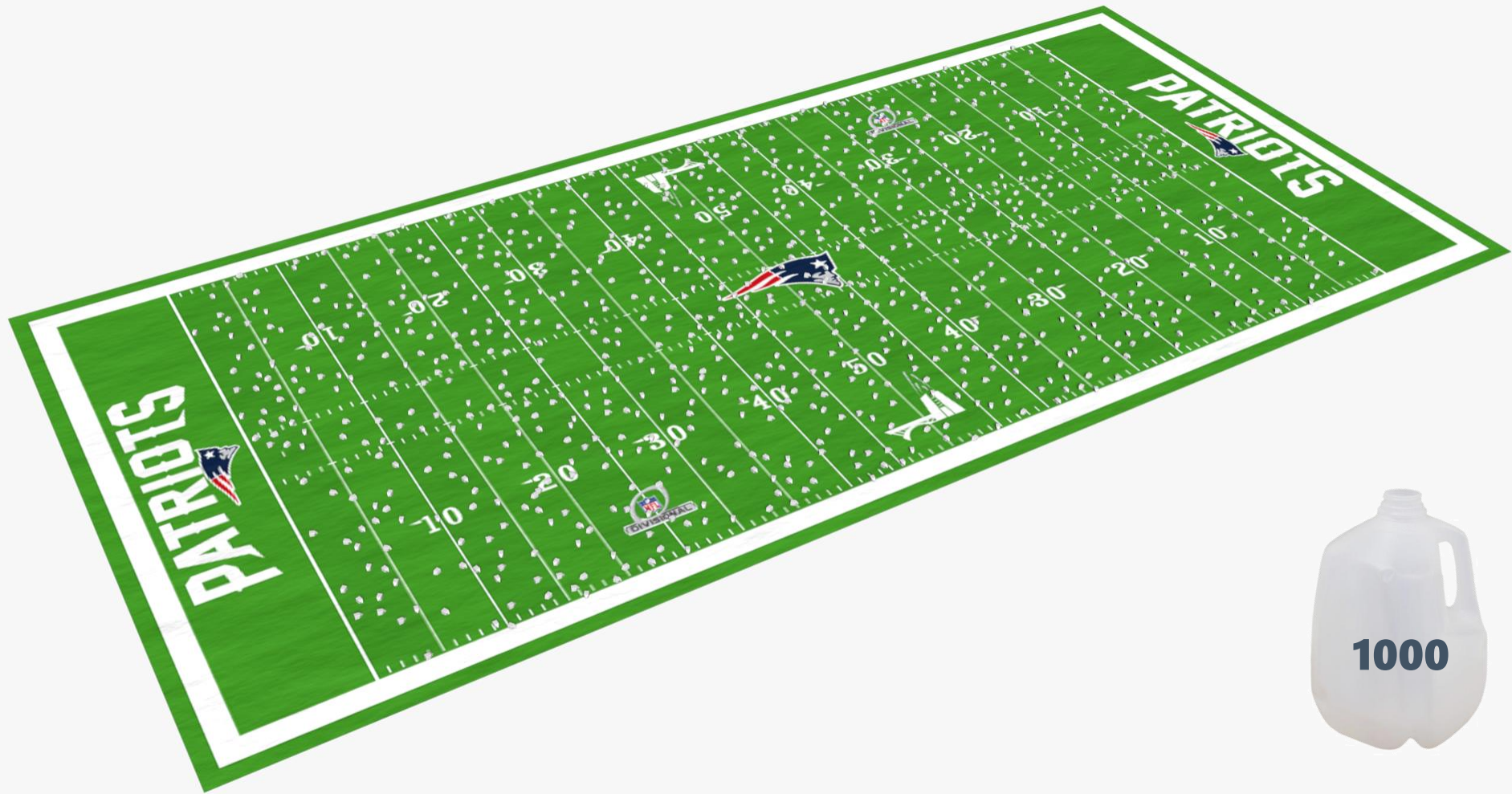
# OCEAN PLASTIC

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# THE PACIFIC GYRE





**1000**













<https://www.youtube.com/watch?v=DcpEcngTrOQ>



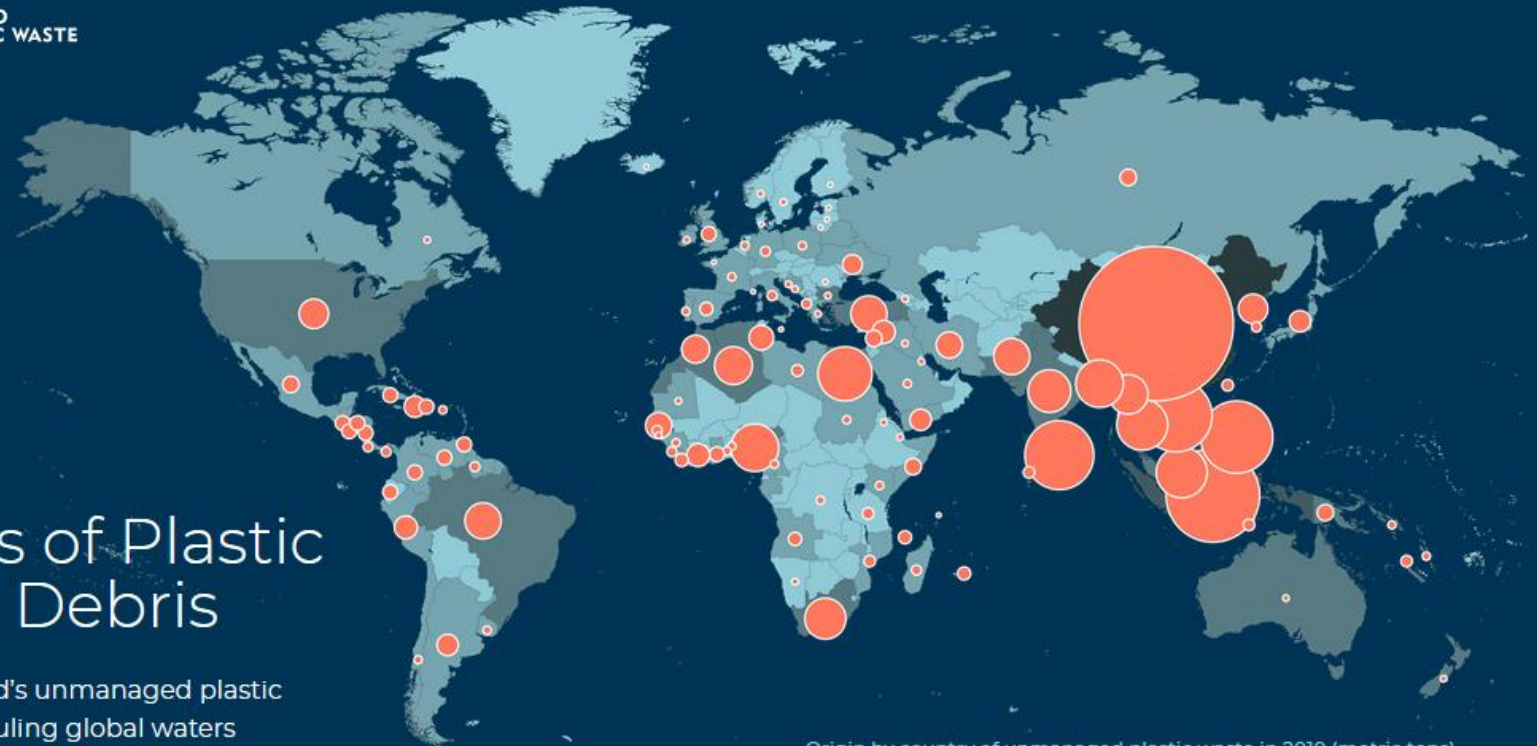
In The Pacific Gyre At Point of Highest Plastic Concentration

# SOURCE OF OCEAN PLASTIC



## Sources of Plastic Marine Debris

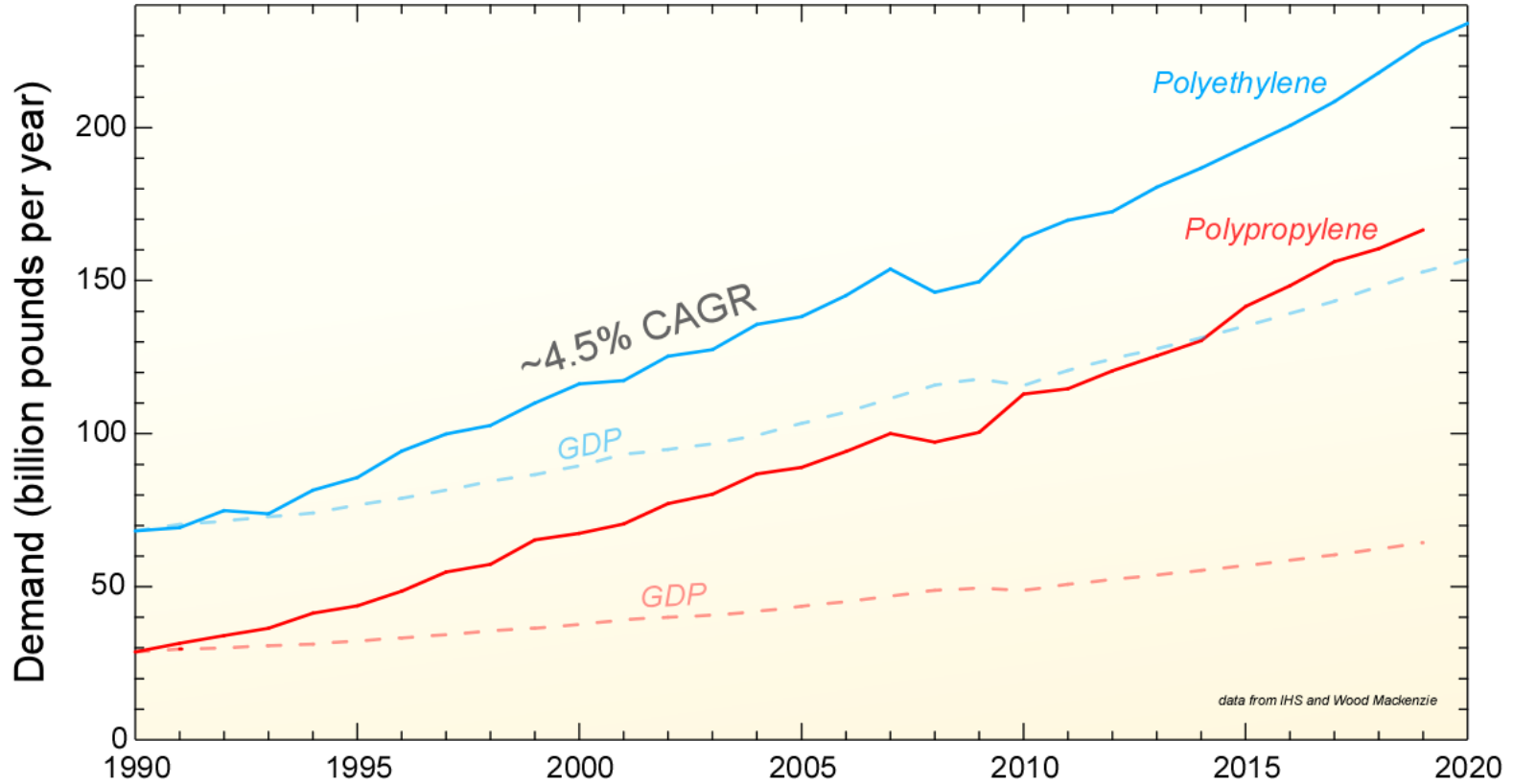
Much of the world's unmanaged plastic waste ends up fouling global waters



Origin by country of unmanaged plastic waste in 2010 (metric tons)

Sources: Science; University of Georgia; University of California; Sea Education Association

# GROWING > GDP



# PLASTIC PROVIDES BENEFITS

*Shelf-life  
Comparison*

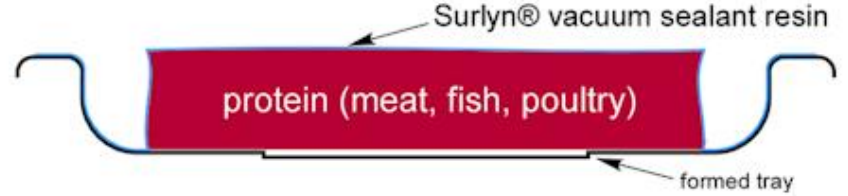
VSP with Surlyn®

21-35  
days

MAP

12-15  
days

stretch-  
wrap  
3-5  
days





# PLASTIC PROVIDES BENEFITS

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# ALTERNATIVES COST MORE

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\$98 Billion



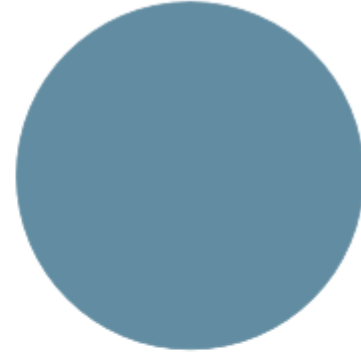
More Sustainable Plastic

\$139 Billion



Business as Usual Plastic

\$533 Billion



Alternatives to Plastic

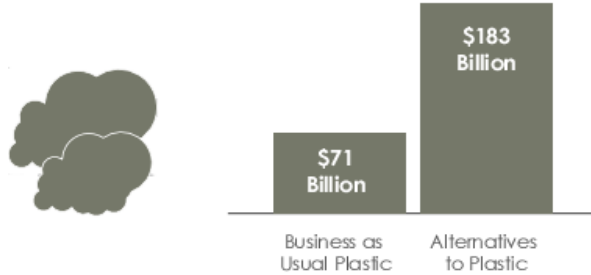
The cost of using alternative materials is approximately four times that of using plastic (in a business as usual scenario). We're producing more and more consumer goods, so choosing the material that creates the least impact is important.

Source: Trucost

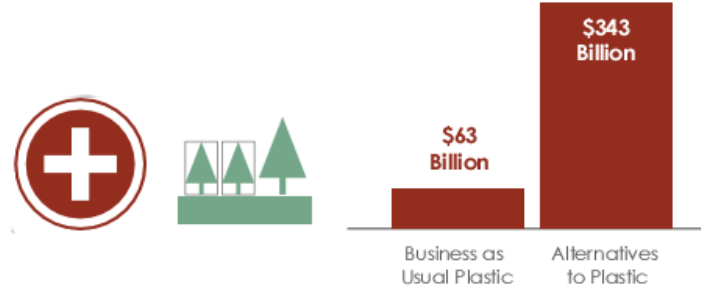
Source: American Chemistry Council TRUCOST report

# ALTERNATIVES HAVE HIGHER ENVIRONMENTAL COSTS

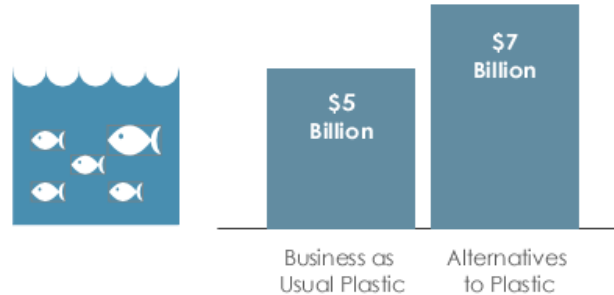
## Climate change



## Damage to the health of humans and ecosystems



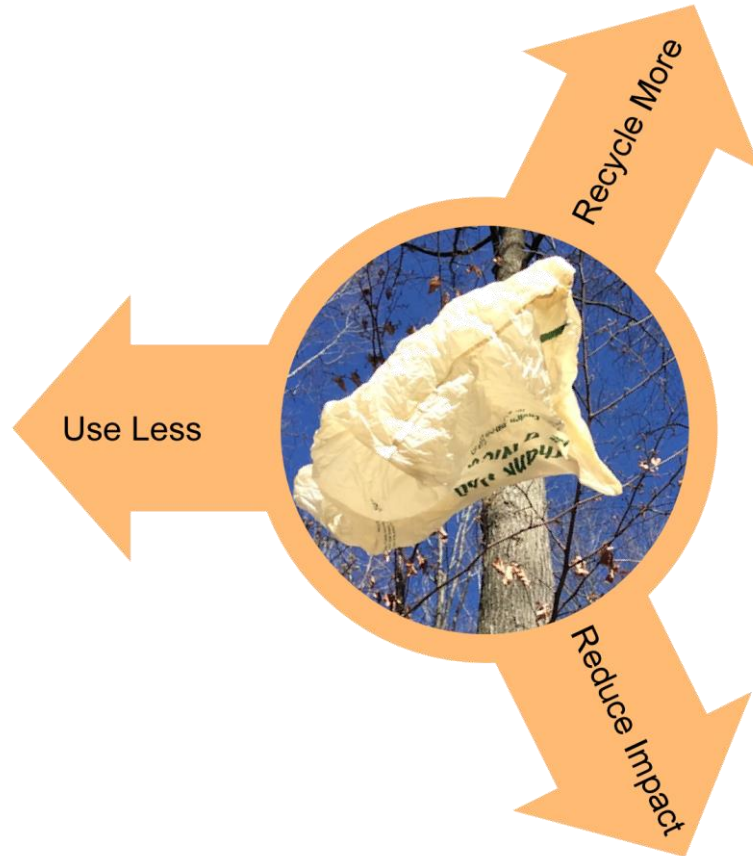
## Damage to the oceans



All dollar values are in USD  
Source: Trucost

# POSSIBLE SOLUTIONS

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# USE LESS WITH MORE 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<sup>®</sup>  
2015



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



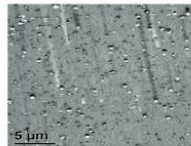
# ENABLE RECYCLING



Transmission Electron Microscopy

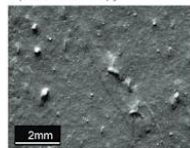


No Compatibilizer  
Large EVOH domains

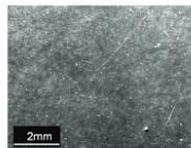


XUS 69 108.01<sup>(1)</sup>  
Modifier Polymer  
Small, uniform EVOH domains

Optical Microscopy



No Compatibilizer  
Large EVOH domains



XUS 69 108.01<sup>(1)</sup>  
Modifier Polymer  
Small, uniform EVOH domains

**Retain**  
polymer modifier by **Dow**



ABUSE



BARRIER



OPTICS

<sup>(1)</sup>Dow estimate per overall barrier figures from *Barrier Materials 2012-2015 Market Report*, Allied Development, 2013.  
\*Trademark of The Dow Chemical Company

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## PROVIDE ALTERNATIVES

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DISAPPEAR

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# MAIN FOCUS AREAS

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**Protect the Climate**



**Stop the Waste**

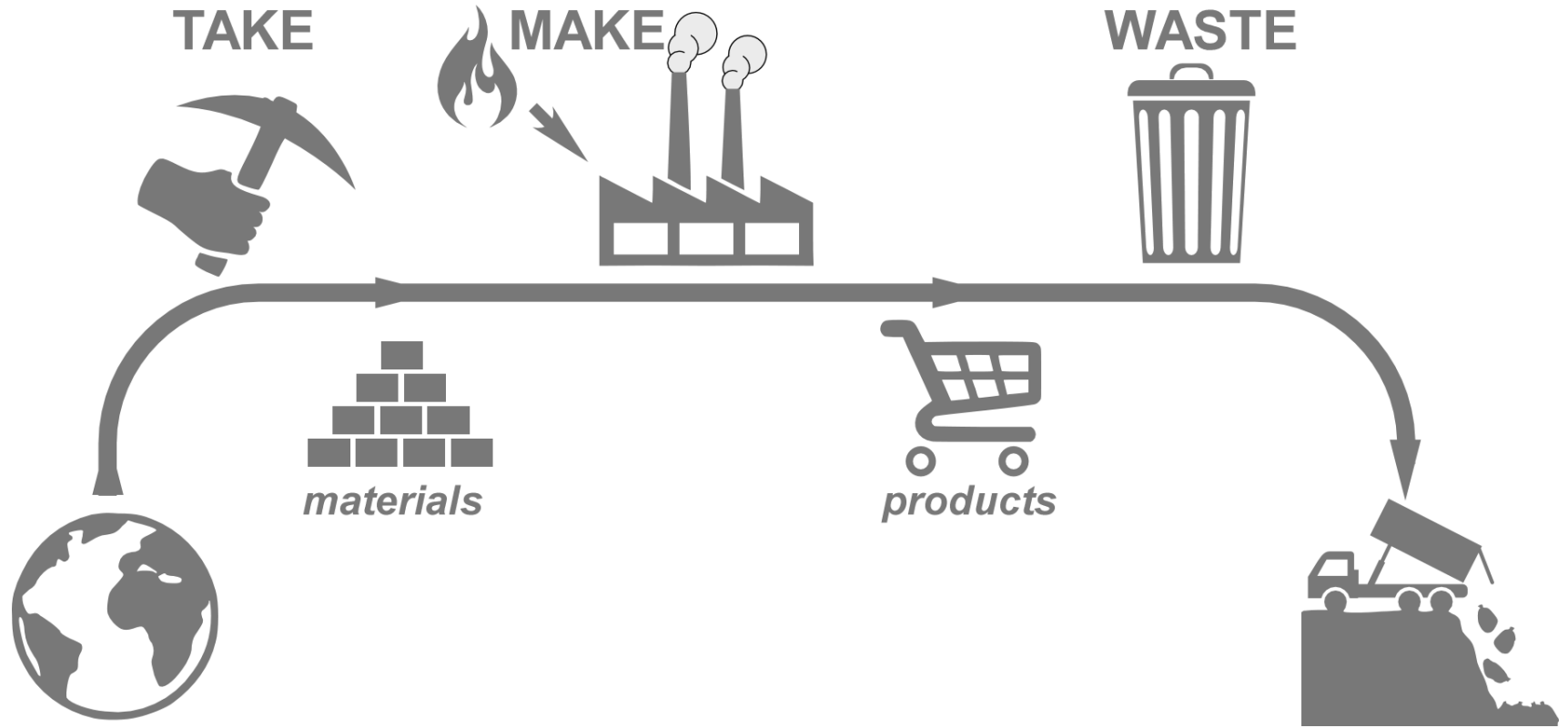


**Close the Loop**

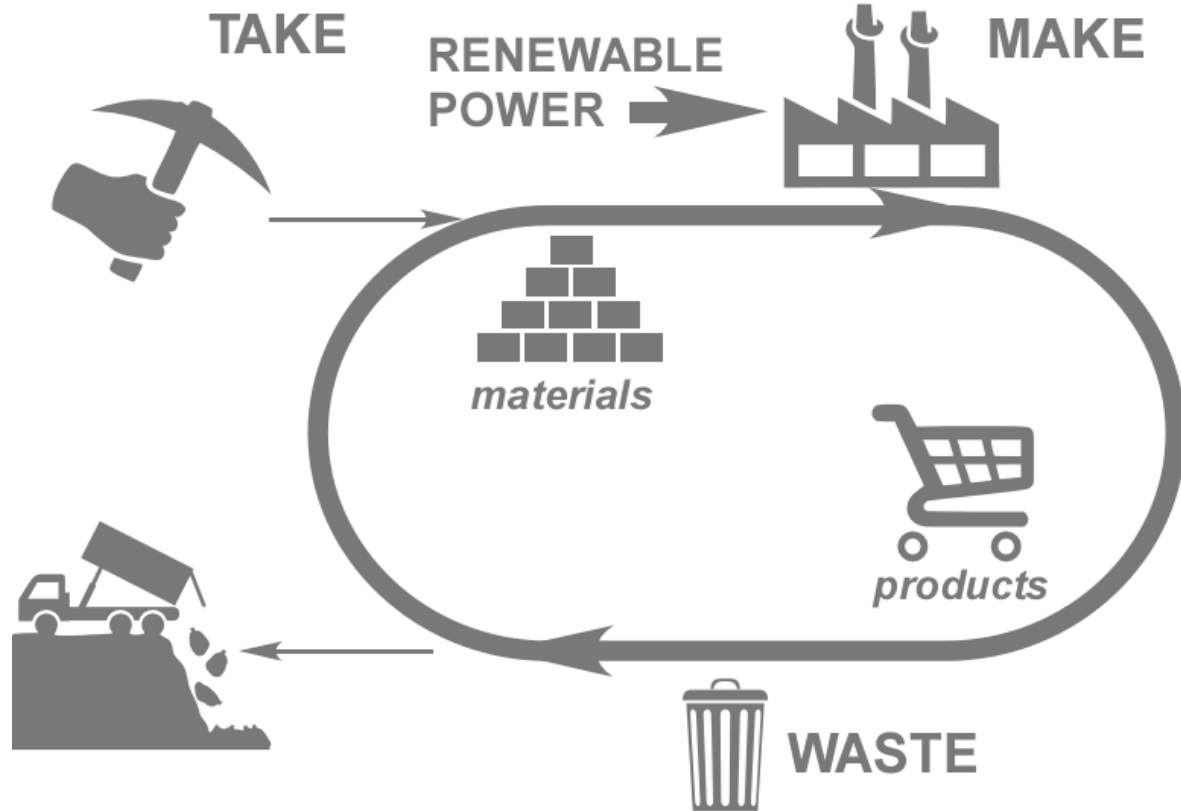


# LINEAR ECONOMY

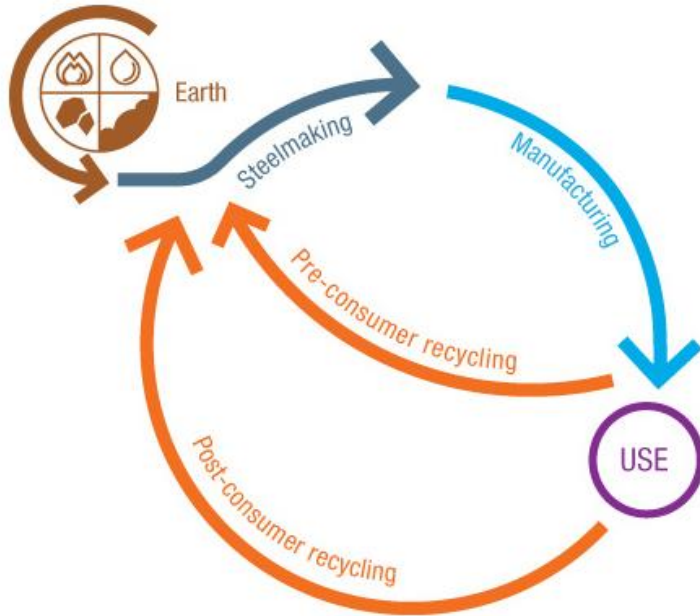
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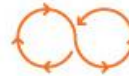
# CIRCULAR ECONOMY



# SUCCESSFUL CIRCLES



## Steel attributes — Benefits of steel recycling



Infinite recycling without loss of properties



Permanent material



Easy magnetic separation and recovery

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)

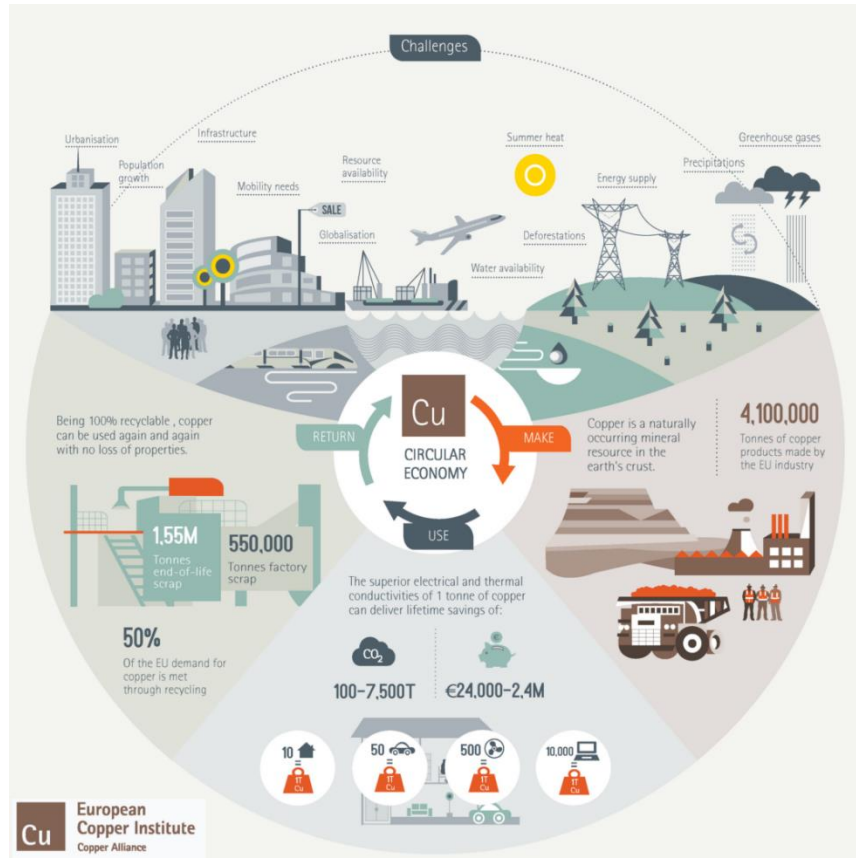
Job creation



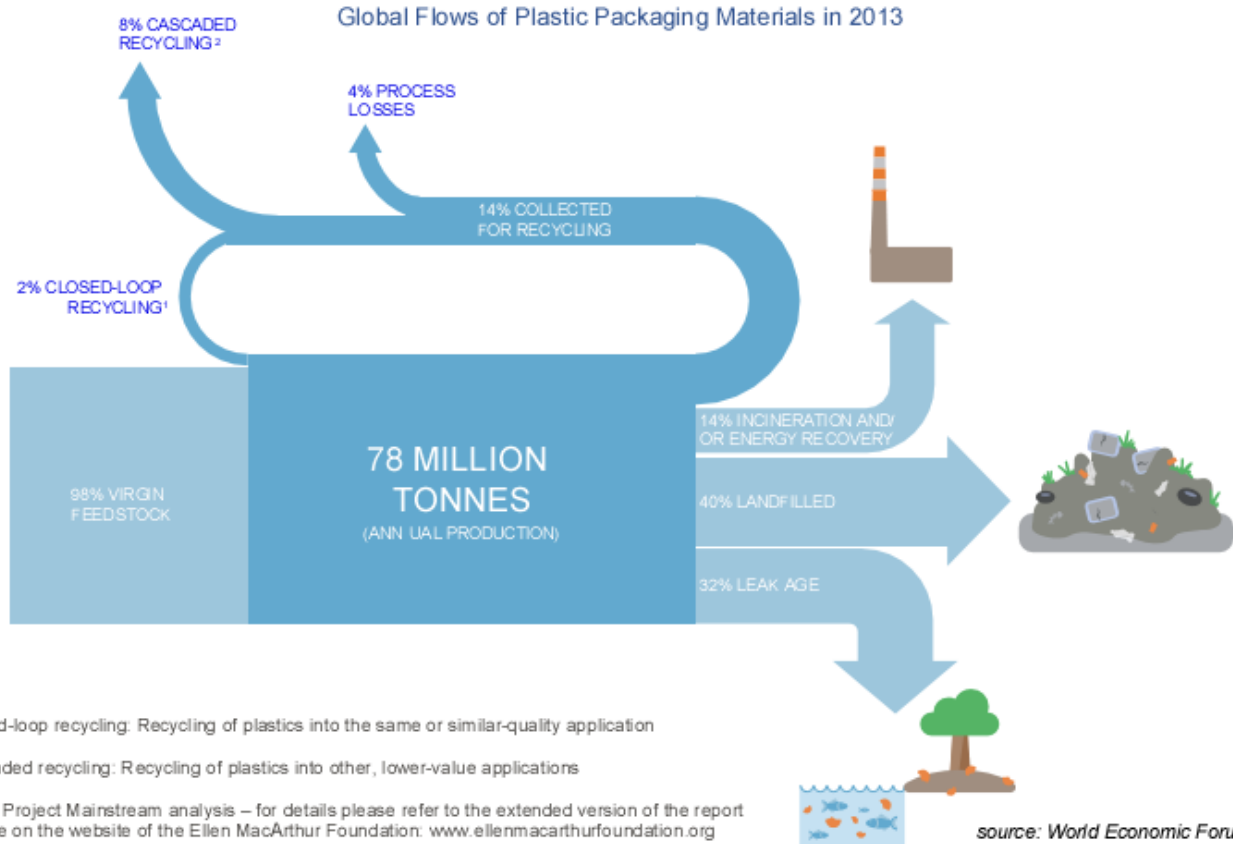
Jobs required for scrap collection, separation and recycling

<http://circulareconomy-worldsteel.org/>

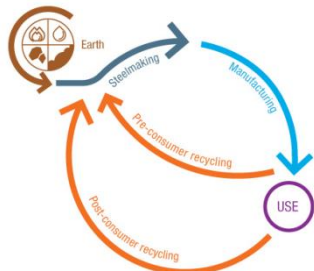
# SUCCESSFUL CIRCLES



# PROBLEMATIC CIRCLES



# WHAT IS MISSING



## Steel attributes — Benefits of steel recycling



Infinite recycling without loss of properties



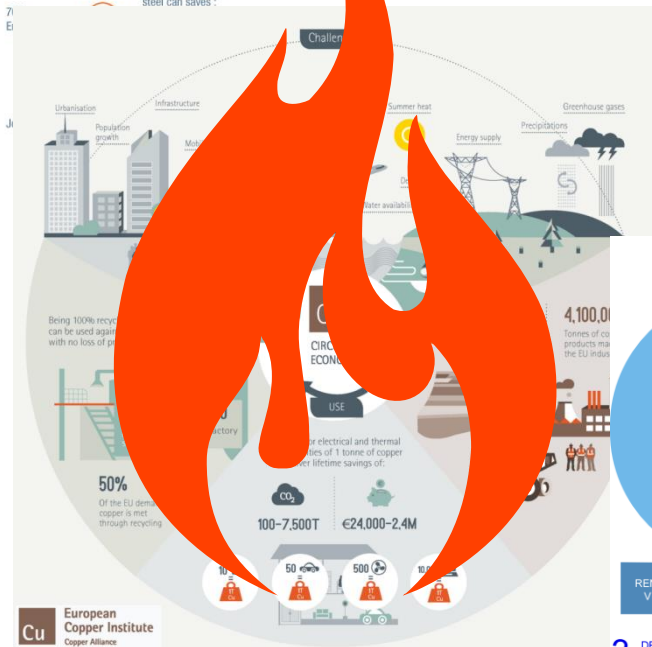
Permanent material



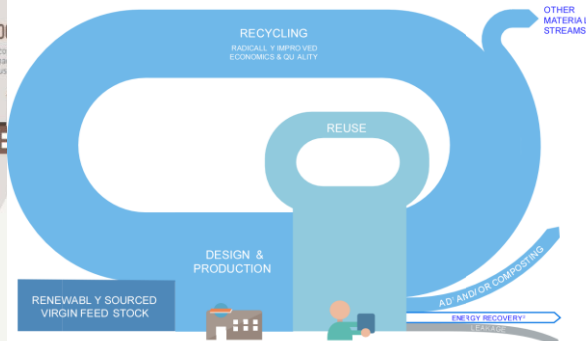
Easy magnetic separation and recovery

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

Recycling a single steel can saves :



### 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



# ORTHOGONAL AXES

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# RECYCLING PRICES

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0.61¢



0.01¢



~2¢

9.16¢



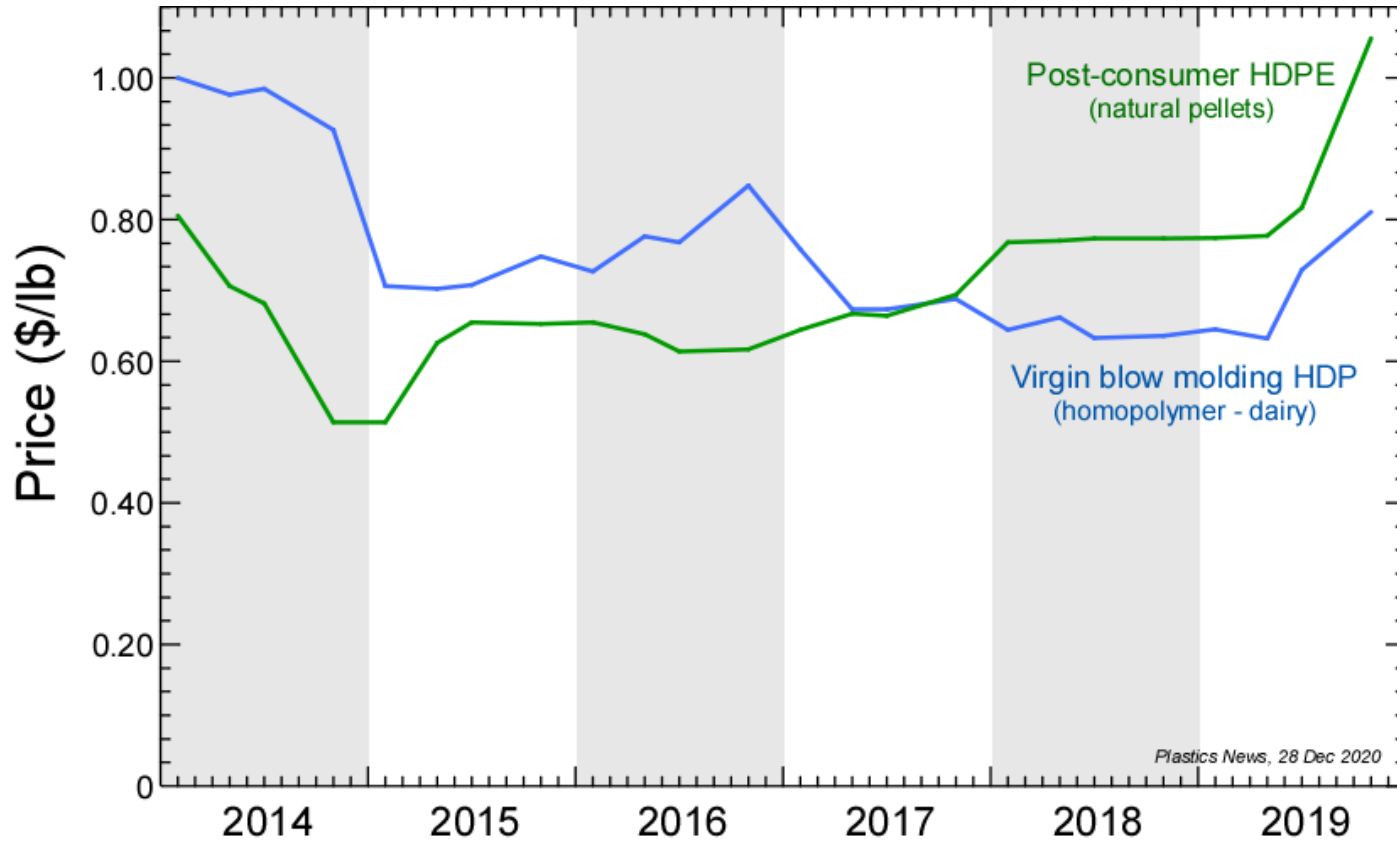
0.22¢



0.20¢



# GOOD NEWS





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