



# ECONOMIA CIRCOLARE. LA SFIDA E LE SOLUZIONI

9 NOVEMBRE 2021

## PRESENTAZIONE

L'estrazione e l'uso delle risorse materiali sono stati, fino ad oggi, uno dei principali motori dell'attività economica. Volumi più che triplicati dal 1970 e destinati a raddoppiare entro il 2050, prefigurano uno scenario insostenibile. Estrazione e lavorazione di materiali, carburanti e alimenti contribuiscono a metà delle emissioni globali di gas serra e a oltre il 90% della perdita di biodiversità, mentre scarti di lavorazione e prodotti dismessi (a fine vita) generano miliardi di tonnellate di rifiuti i cui impatti (sull'ambiente e sulla salute) hanno superato da tempo i livelli di guardia. Il disaccoppiamento della crescita economica dall'uso delle risorse è indispensabile: eppure è una delle sfide più critiche e complesse per l'umanità. In questo quadro, l'economia circolare ha un ruolo fondamentale. Questa richiede un abbandono del modello economico lineare corrente ("prendi-produci-usa-getta"), per un modello orientato a mantenere prodotti, componenti e materiali alla massima utilità e valore il più a lungo possibile, minimizzando l'uso di materie prime vergini e, idealmente, azzerando i rifiuti.

## OBIETTIVI

Lo sviluppo di "soluzioni" di economia circolare a vari livelli - imprese, settori, paesi - richiede un profondo ripensamento delle attività economiche, comprendente aspetti tecnologici, politiche pubbliche, modelli di business, processi aziendali, modalità di interazione tra attori del mercato e consumatori. Il corso ha l'obiettivo di fornire conoscenza di base su queste tematiche, unitamente all'introduzione di modelli e strumenti rilevanti (incluse le norme volontarie), per permettere a una pluralità di attori di considerare o avviare progetti o iniziative in questo campo.

## DESTINATARI

Il corso è rivolto a: titolari o dirigenti di impresa (le funzioni R&D, produzione, ambiente/sostenibilità, qualità/sicurezza, marketing possono essere particolarmente interessate); dirigenti/funzionari di associazioni di imprese; manager di organizzazioni pubbliche (a livello centrale o locale) interessati a promuovere e supportare politiche e programmi per l'Innovazione e la Sostenibilità (incluso Green o Circular Procurement).

## DOCENTE

**DANIELE GERUNDINO** - Docente universitario - Membro Centro Studi per la normazione UNI

# ***Economia circolare: la sfida e le soluzioni***

Corso UNITRAIN

9 novembre 2021

Daniele Gerundino

Academic Fellow, University of Geneva

Affiliate, Sant'Anna Pisa University

# A note about myself



**GTI SDG  
Dual Degree Master**  
清华大学 - 日内瓦大学可持续发展公共政策  
双硕士学位项目



# Contents

- **Circular Economy: why?**
  - Sustainable development, the SDGs and Paris Agreement
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  - Sustainable consumption and production patterns
- **The Circular Economy: what**
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- **Learning from exemplary cases**
- **The Circular Economy in Europe and in Italy**
- **Circular Economy and Cities**
- **What does this mean for organizations?**
- **Circular Economy Indicators**
- **Standards for the Circular Economy**

# The Circular Economy: why?

# Sustainable development

The Brundtland report (1987) defines:

*Sustainable development is development that **meets the needs of the present** without compromising **the ability of future generations to meet their own needs***

*It contains within it two key concepts:*

- *the **concept of 'needs'**, in particular the essential needs of the world's poor, to which overriding priority should be given; and*
- *the **idea of limitations** imposed by the state of technology and social organization on the environment's ability to meet present and future needs*



Norwegian Prime Minister Gro Harlem Brundtland of the UN Brundtland Commission delivered the report "Our Common Future"



# From the Brundtland report to the SDGs

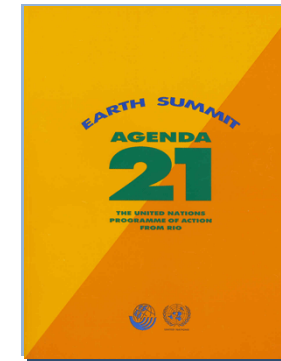
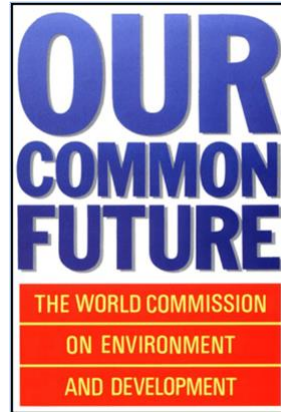
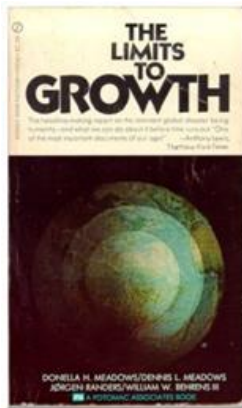
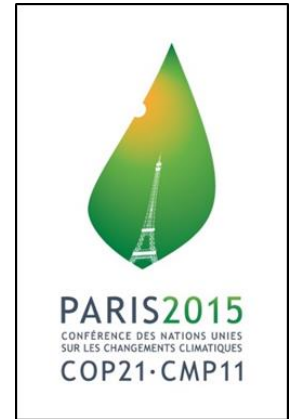
The Millennium Development Goals

## Eight Goals for 2015

1 Eradicate extreme poverty and hunger	5 Improve maternal health
2 Achieve universal primary education	6 Combat HIV/AIDS, malaria and other diseases
3 Promote gender equality and empower women	7 Ensure environmental sustainability
4 Reduce child mortality	8 Develop a global partnership for development



## SUSTAINABLE DEVELOPMENT GOALS





# SUSTAINABLE DEVELOPMENT GOALS



# Sustainable Development Goals

- ***Transforming our world: the 2030 Agenda for Sustainable Development*** – approved by the UN General Assembly in September 2015 – comprises 17 "Global Goals" (o SDGs) with 169 target concerning sustainable development
- SDGs are a universal call for action to reducing poverty, protecting the planet and ensuring peace and prosperity
- The international agenda concerning sustainability is complemented by the Paris Agreement, also signed in 2015



Lise Kingo, CEO and Executive Director, UN Global Compact



*“...The SDGs or Global Goals present the greatest opportunity of our time. They are the guiding star for knowing what is needed to solve humanity’s biggest challenges and improve the lives of billions.*

***Facing these challenges opens up business opportunities.** The recent Business and Sustainable Development Commission report, concludes that achieving the Global Goals opens up at least \$12 trillion in market opportunities and generates 380 million new jobs by 2030.*

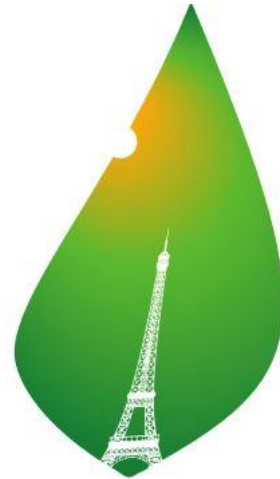
***This is urgent, and it is not going to be easy.** The 2030 deadline is not far away; we **will need to disrupt the status quo now** [...] the challenges we have ahead of us are complex and systemic.*

*Incremental innovation has failed to deliver the necessary advances.*

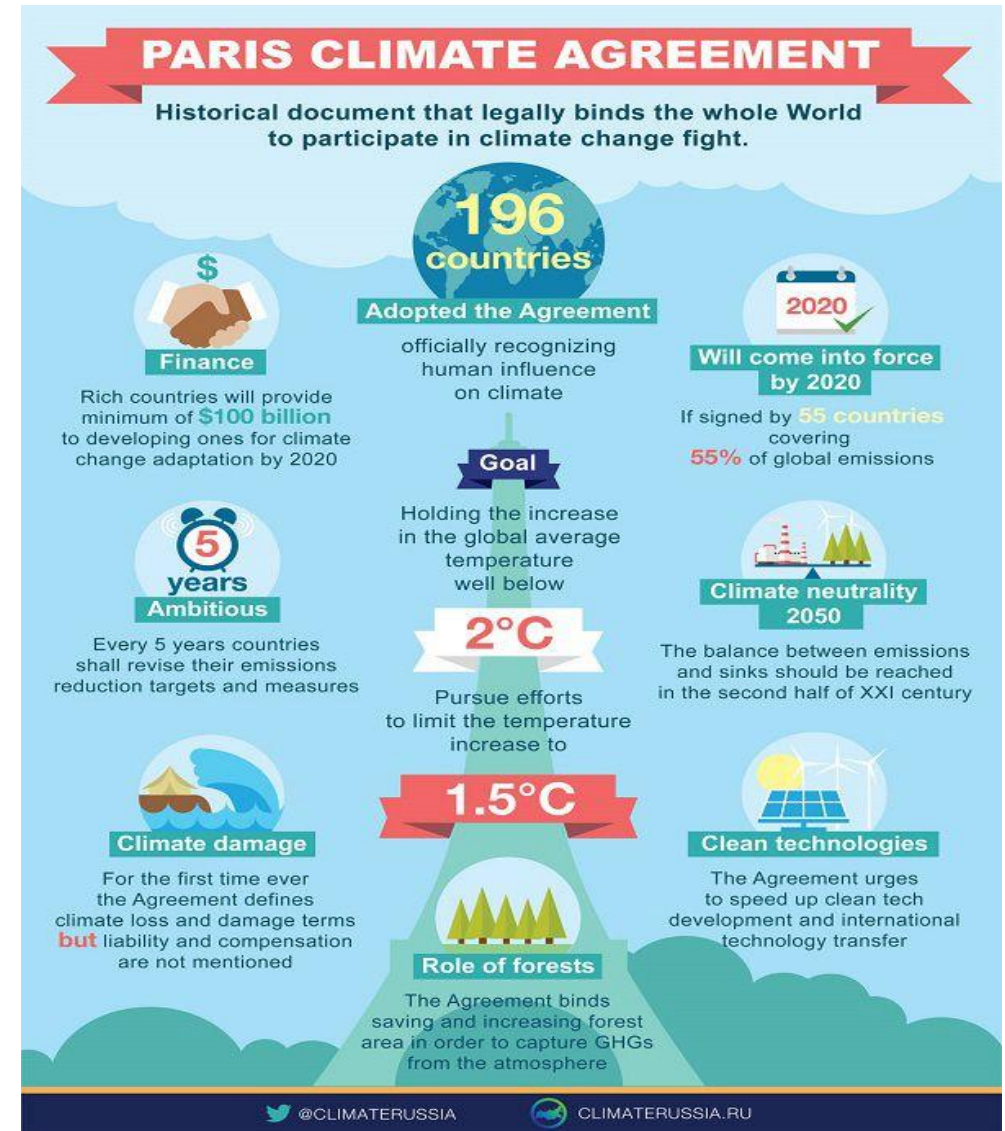
***Breakthrough innovation holds the potential to launch us into a new economic order, which is more social, lean, integrated and circular”***

# Paris Agreement

The historical agreement reached in 2015 is the other key element of the international agenda to 2030



PARIS2015  
JN CLIMATE CHANGE CONFERENCE  
COP21·CMP11



31 OCT - 12 NOV 2021

GLASGOW

COP26

IN PARTNERSHIP WITH ITALY



# SDGs and Paris Agreement

- Historical challenges
- Enormous opportunities

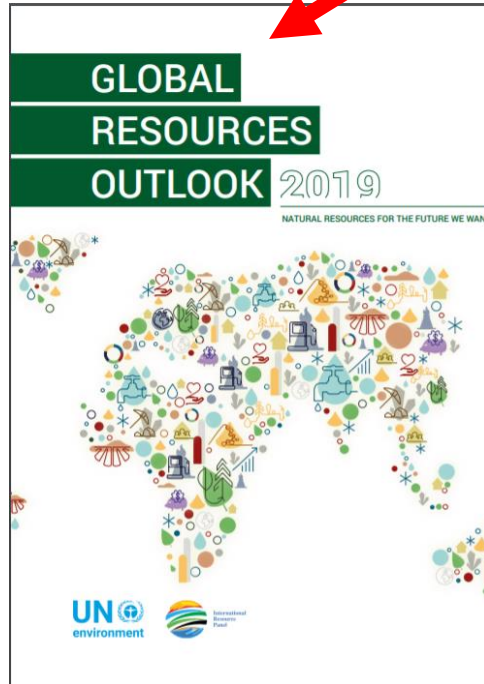
*Today we will focus the attention on the issues related with the use of resources / material efficiency (core issues for the Circular Economy)*

# A few key references

UNEP – Global Environment Outlook 6 – 2019

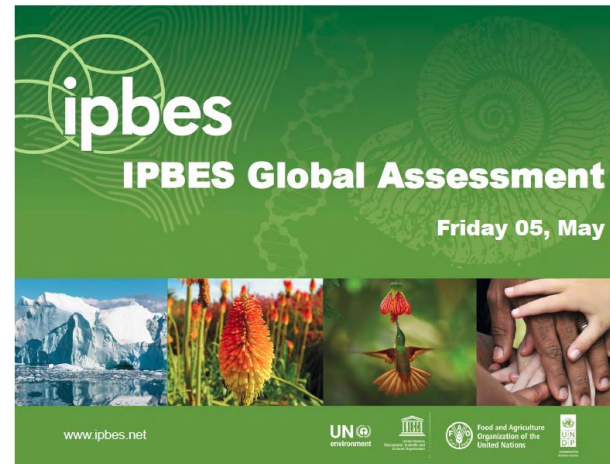


International Resource Panel Global Resource Outlook 2019

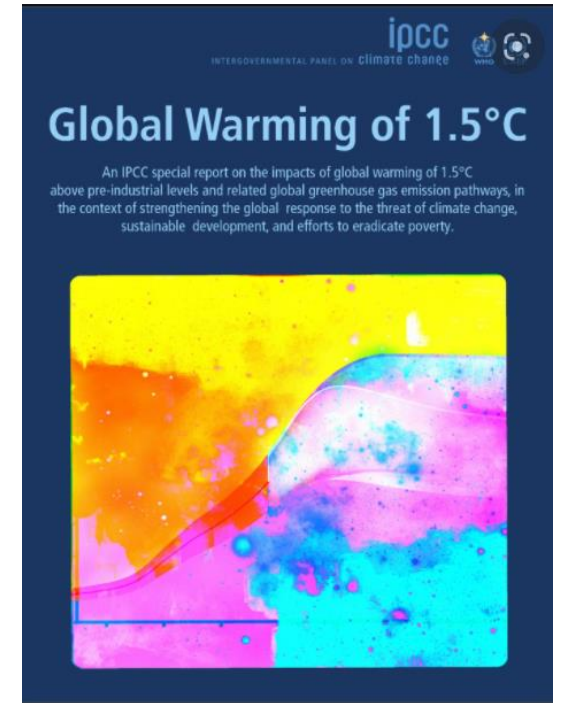


**Today we focus our attention on material resources**

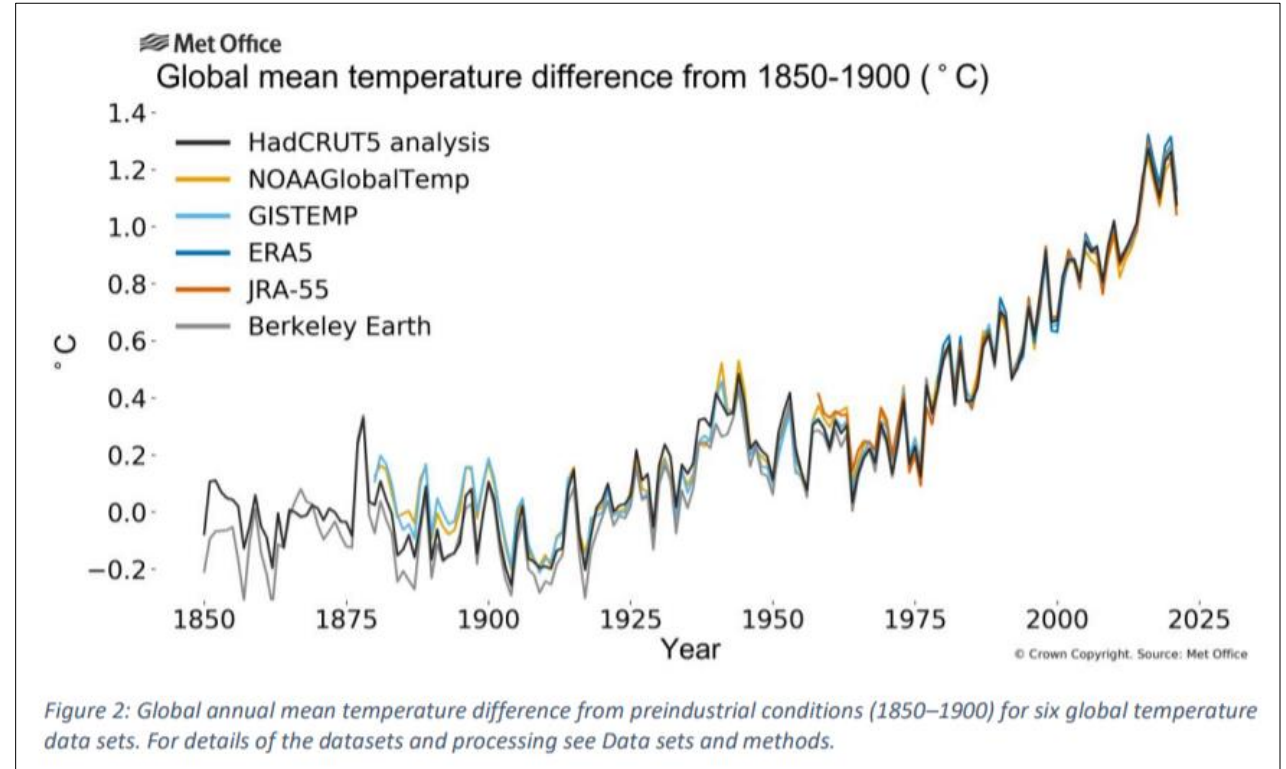
Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) – Global Assessment 2019



IPCC Special report on the impacts of global warming of 1.5 °C (2018 etc.)



# Climate Change - GMT



The global mean temperature for 2021 (based on data from January to September) was **1.08 ± 0.13°C above** the 1850-1900 average. 2021 is cooler than recent years due to the influence of a moderate La Niña at the start of the year (a driver of short-term variability).

The last decade, 2011-2020, is the **warmest on record**.

# Effects of climate change



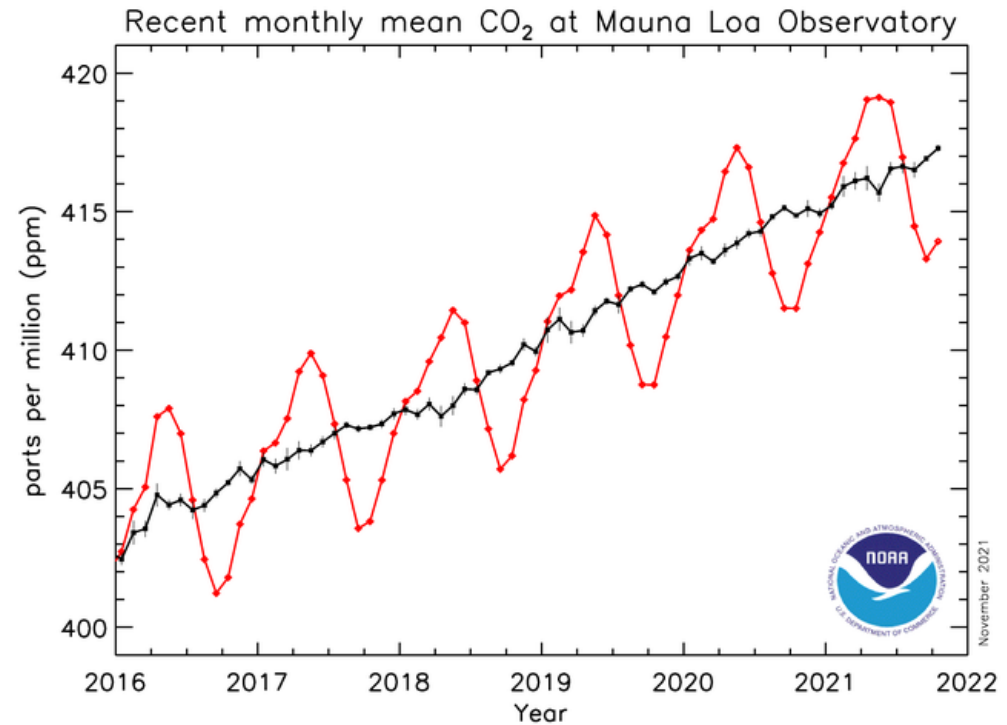
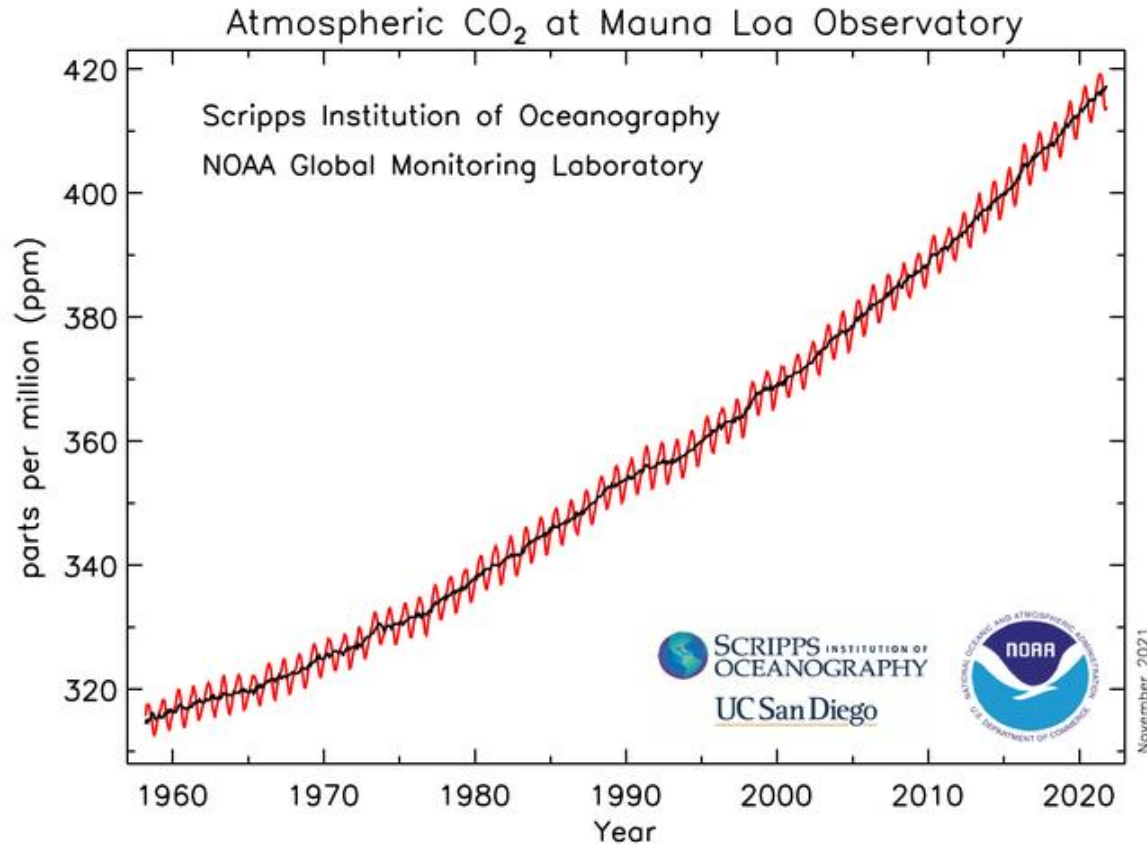
Images: NASA

# Atmospheric CO<sub>2</sub> concentration

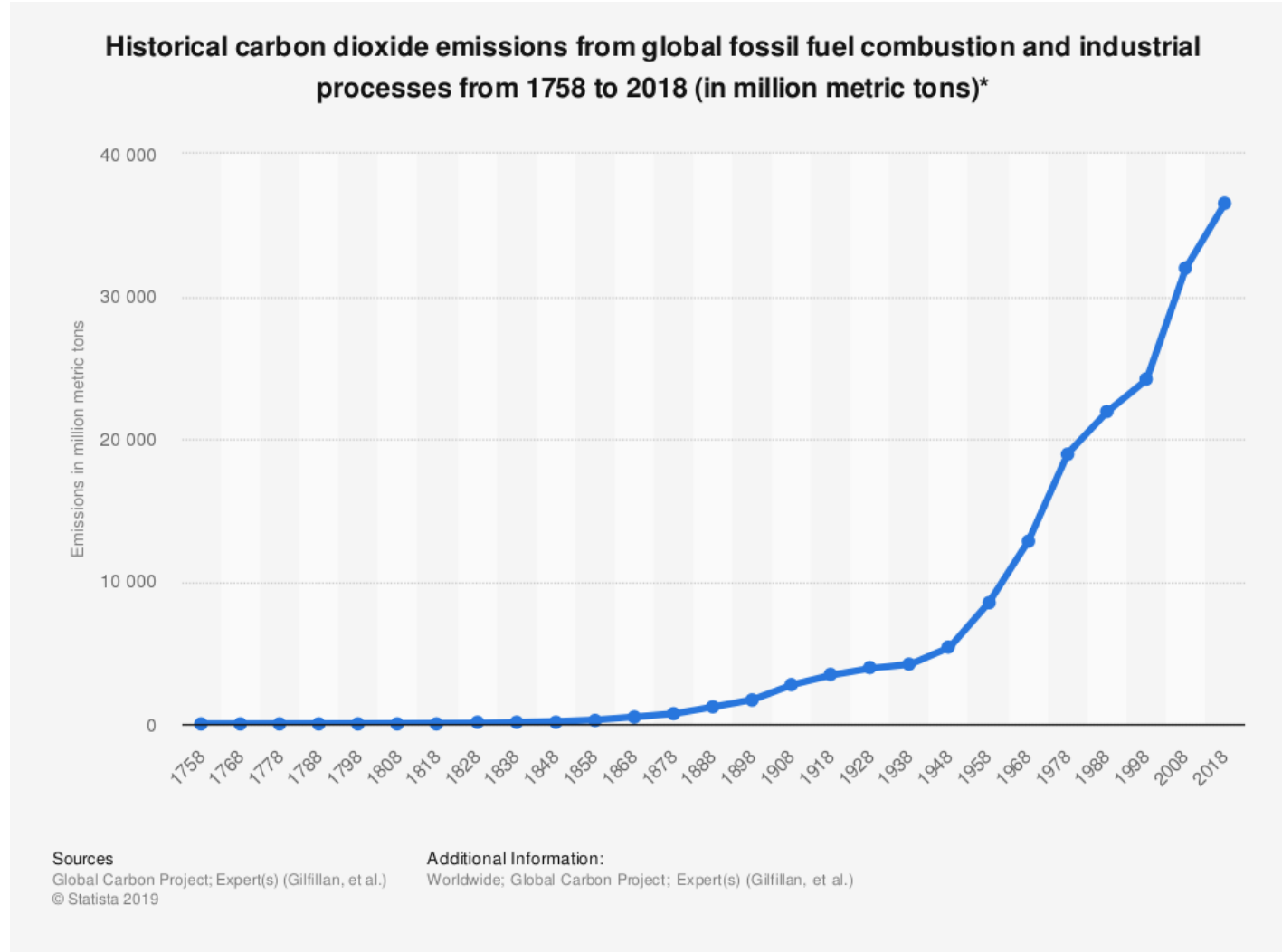
**October 2021: 413.93 ppm**

**October 2020: 411.51 ppm**

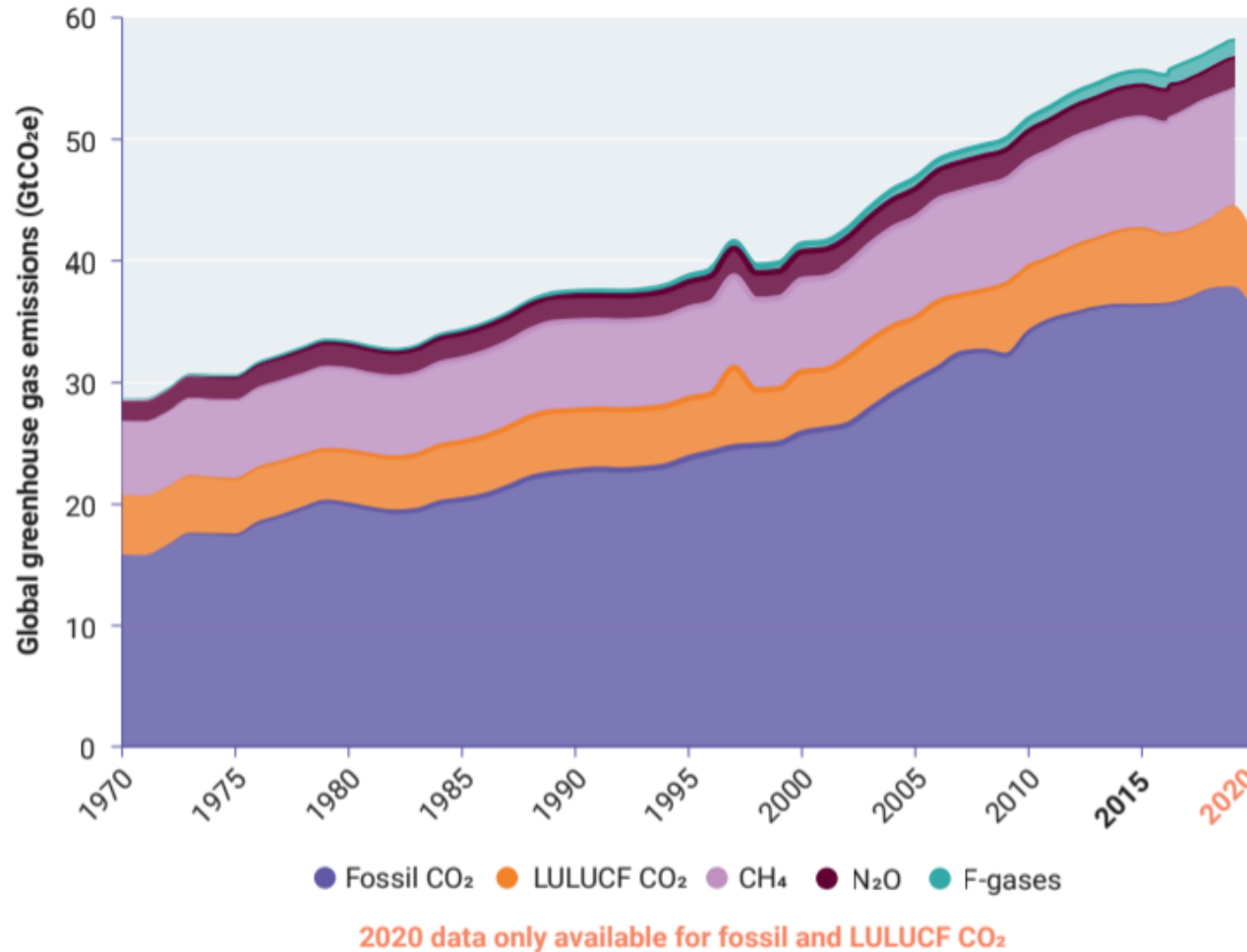
*Last updated: November 5, 2021*



# CO2 emissions – historical

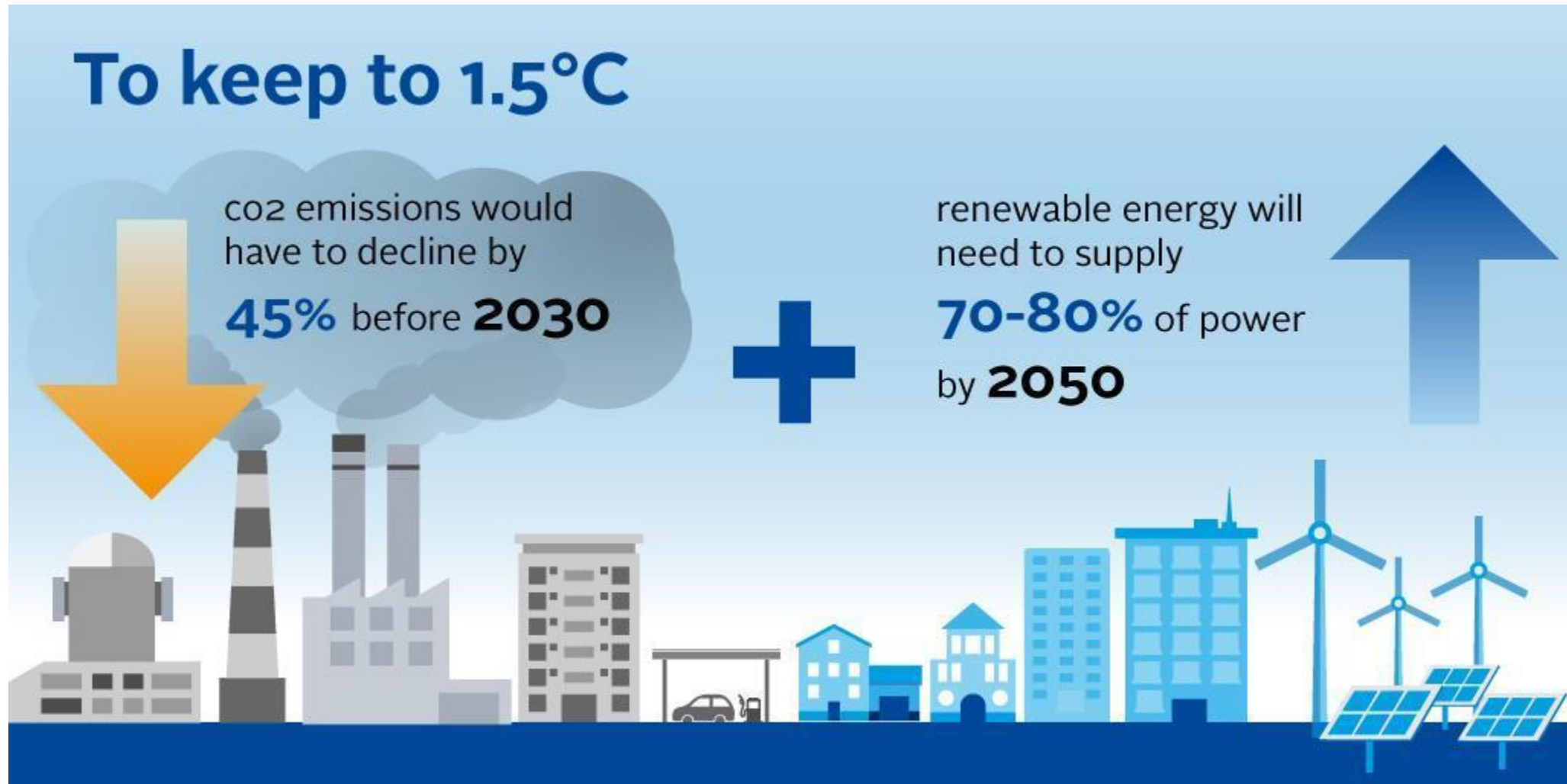


# Global GHG Emissions

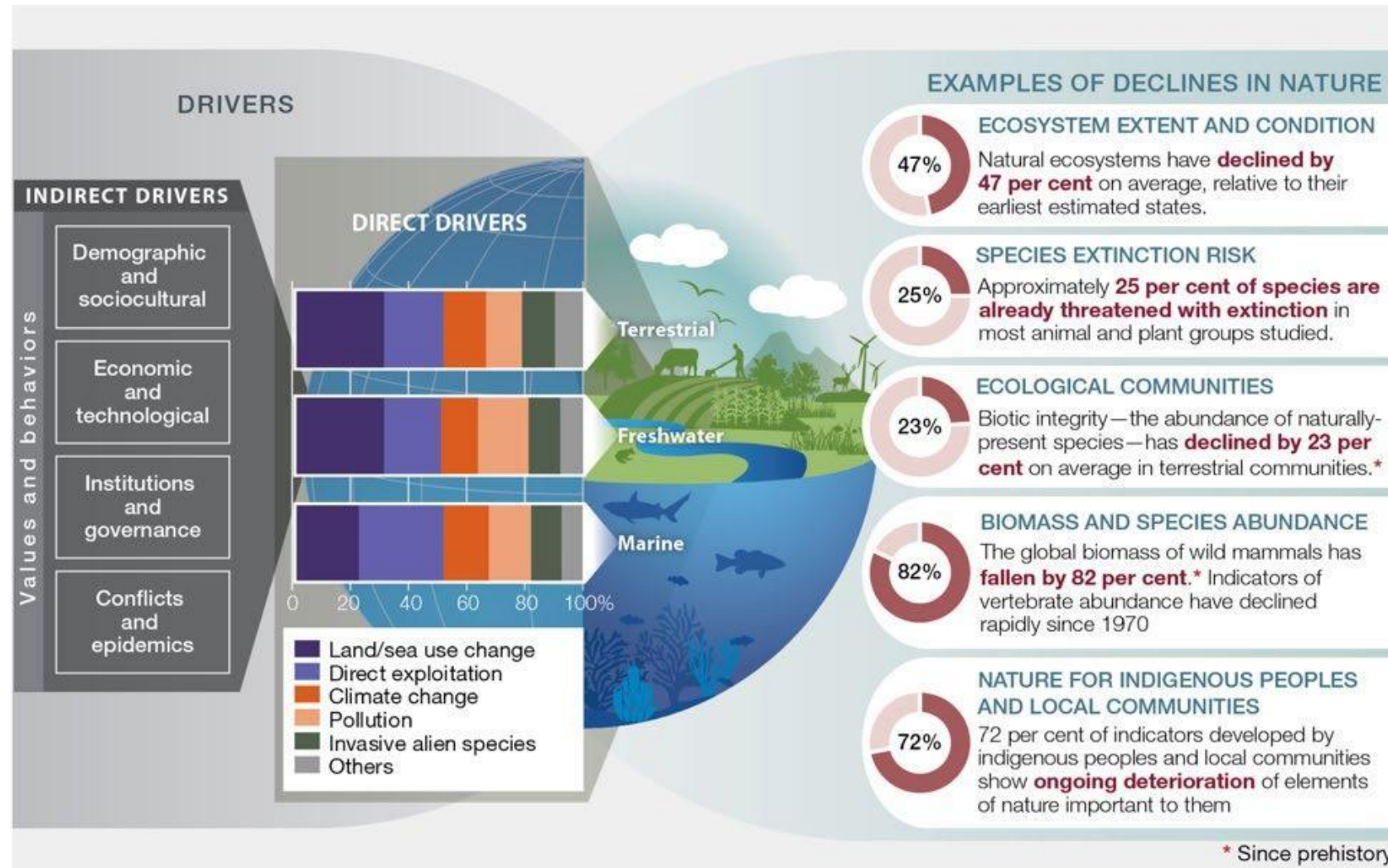


Following an unprecedented drop of 5.4 per cent in 2020, **global carbon dioxide emissions are bouncing back to pre-COVID levels**, and concentrations of GHGs in the atmosphere continue to rise.

# GMT below 1.5 °C

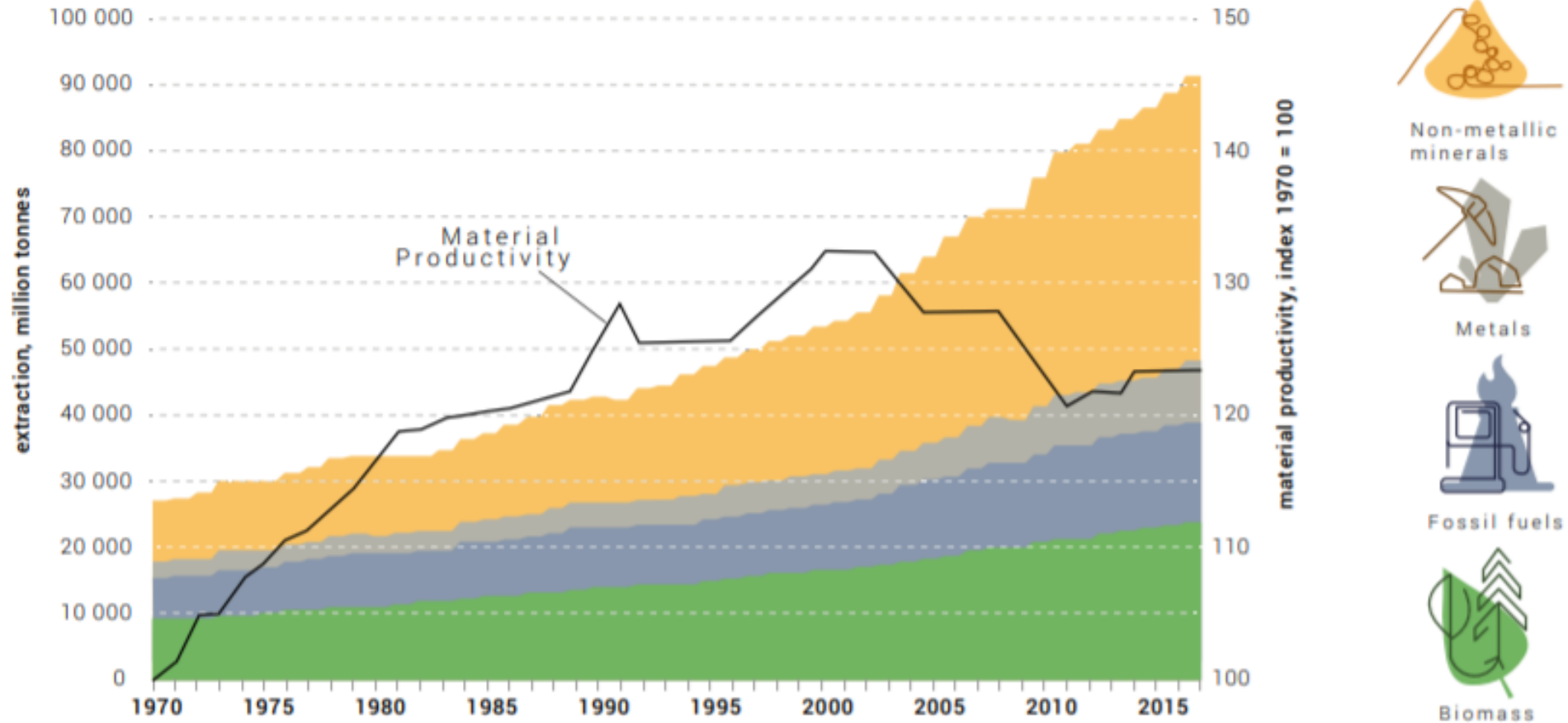


# Loss of Biodiversity



# Extraction and use of Materials

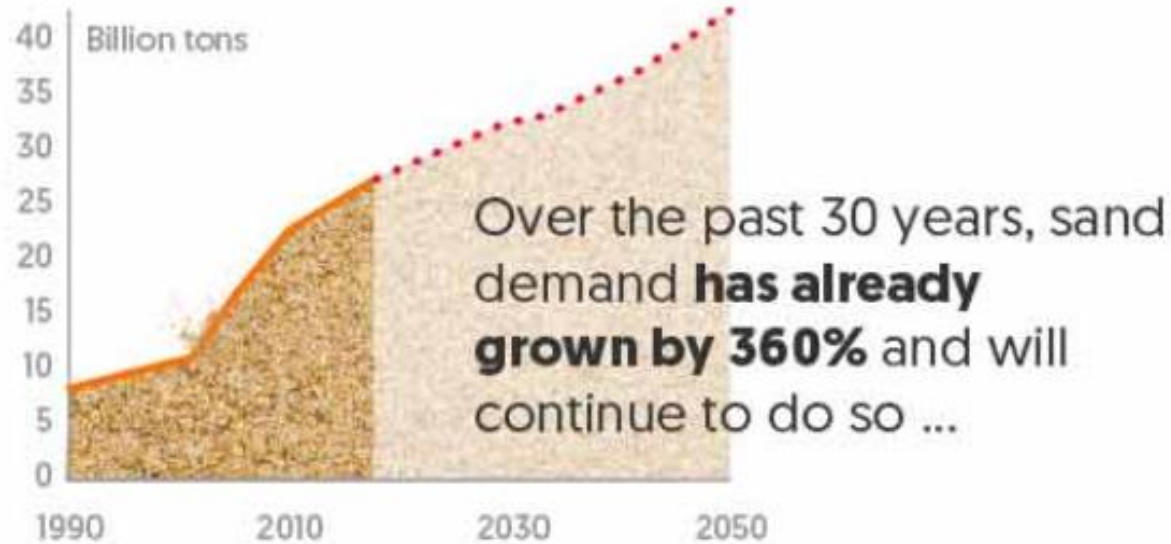
| Figure 2. Global material extraction, four main material categories, 1970 - 2017, million tons



# A quick look...



# Sand



... **mostly** driven by China

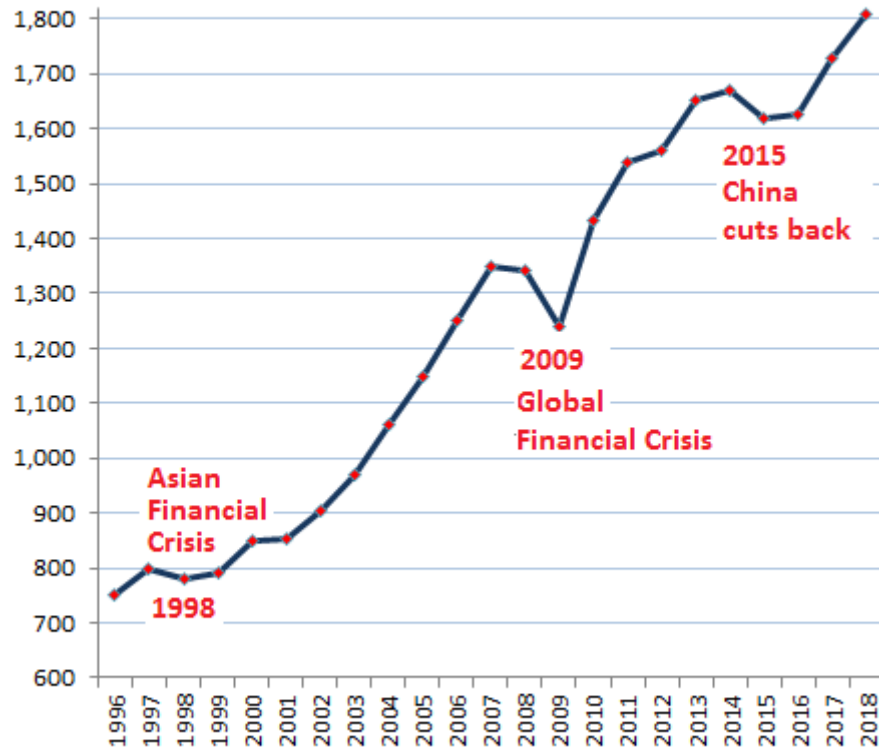


See Sand Infographics

<https://infographicjournal.com/why-the-world-is-running-out-of-sand/>

# Steel production in the world

**Steel Production in the World**  
Millions of tonnes, annual



Source: worldsteel

WOLFSTREET.com

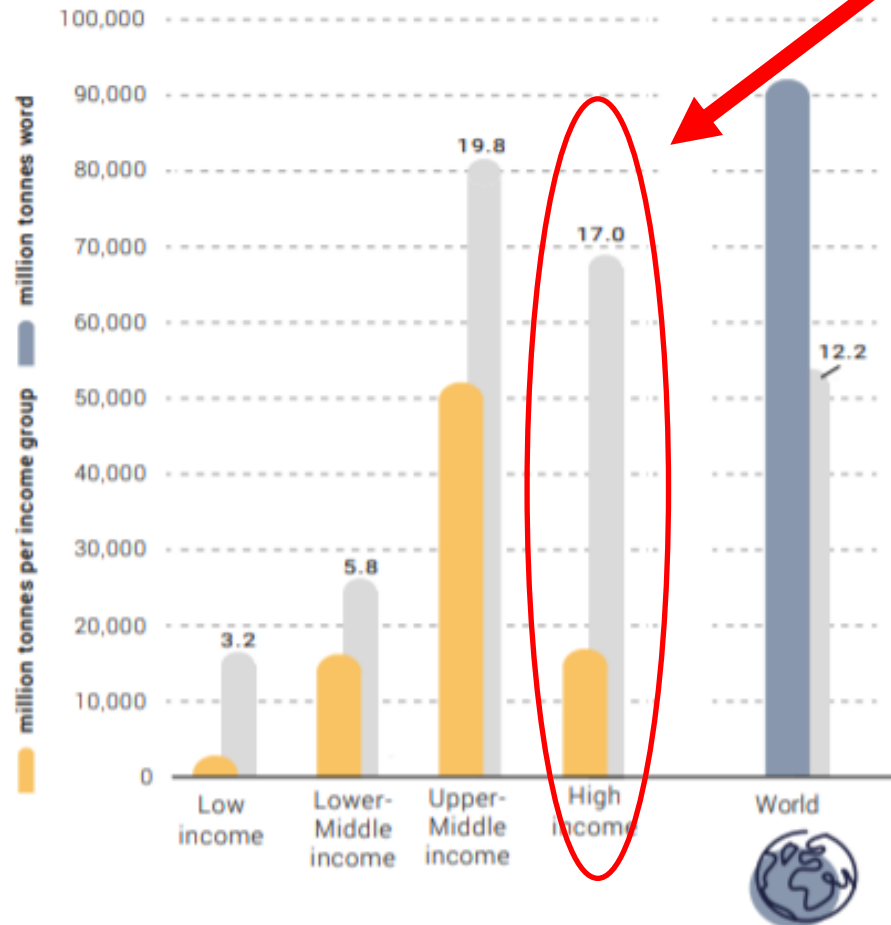
Rank	Country	Steel Production (2020, Mt)
#1	China	1,053.0
#2	India	99.6
#3	Japan	83.2
#4	Russia*	73.4
#5	United States	72.7
#6	South Korea	67.1
#7	Turkey	35.8
#8	Germany	35.7
#9	Brazil	31.0
#10	Iran*	29.0

Source: World Steel Association. \*Estimates.

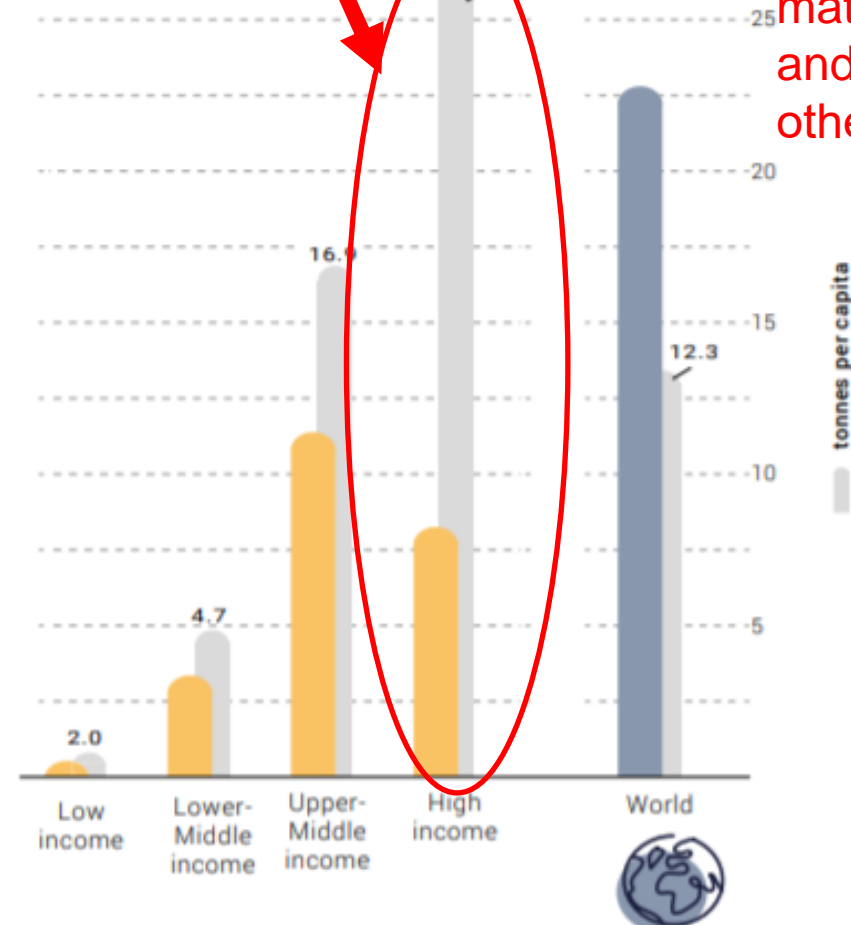
# Material consumption

Figure 3. Material consumption trends per country income groups in Material Footprints and Domestic Material Consumption in total and per capita

Domestic material consumption by country income, 2017



Material footprint by country income, 2017



Do you see the (big!) difference?

Rich countries export the “burden” of material extraction and processing to other countries...

# Extraction of materials – a note on two critical issues:

- increasing **difficulty and energy required** to extract and process materials
- increasing **environmental and social impacts**

# Lower grades require enormous scale and amounts of energy for extraction



Tar Sands in Canada, aka **Mordor** – to use the words of Maude Barlow, UN’s senior advisor on water. [From the *Lord of the Rings* - **Mordor** refers to the nearly barren, devastated, stinking land wherein, beyond the Black Gate, lies Sauron’s fortress of Barad-dûr and the fires of Mount Doom...]

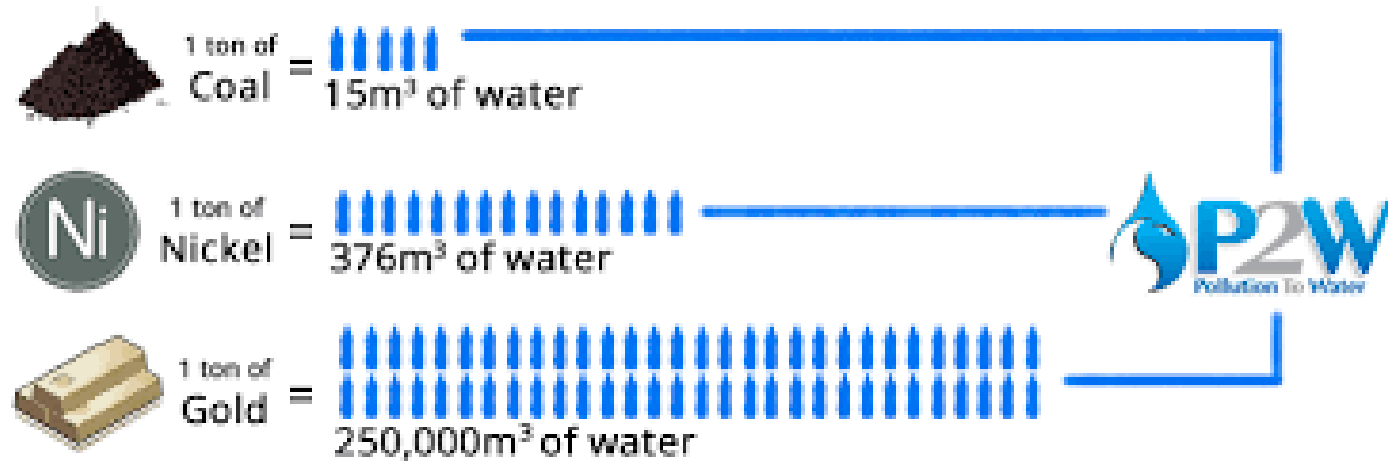


Escondida Copper mine – Chile – the largest copper mine in the world (1.24 billion tons extracted in 2018)

with huge environmental and social impacts



## Water Consumption for Mining



### Kalimantan, Indonesia – Gold mining

Globally, about 1000 tons of mercury enter annually into the environment

- Disposal of large quantities of waste (including contaminants)
- Use of toxic chemicals for ore processing
- Substantial use of water
- Disruption of ecosystems and communities

# Tailings dams catastrophies

The **Mariana dam disaster**, also known as the Bento Rodrigues or Samarco dam disaster, occurred on **5 November 2015**, when the Fundão tailings dam at the Germano iron ore mine of the Samarco Mariana Mining Complex near Mariana, Minas Gerais, Brazil, suffered a catastrophic failure.

The extent of the damage caused **by the tailings dam collapse is the largest ever recorded with pollutants spread along 668 kilometres (415 mi) of watercourses. The failure of the dam released 43.7 million cubic metres of mine tailings** into the Doce River, causing a toxic brown mudflow to pollute the river and beaches near the mouth when it reached the Atlantic Ocean 17 days later. The disaster created a humanitarian crisis as hundreds were displaced and cities along the Doce River suffered water shortages when their water supplies were polluted.

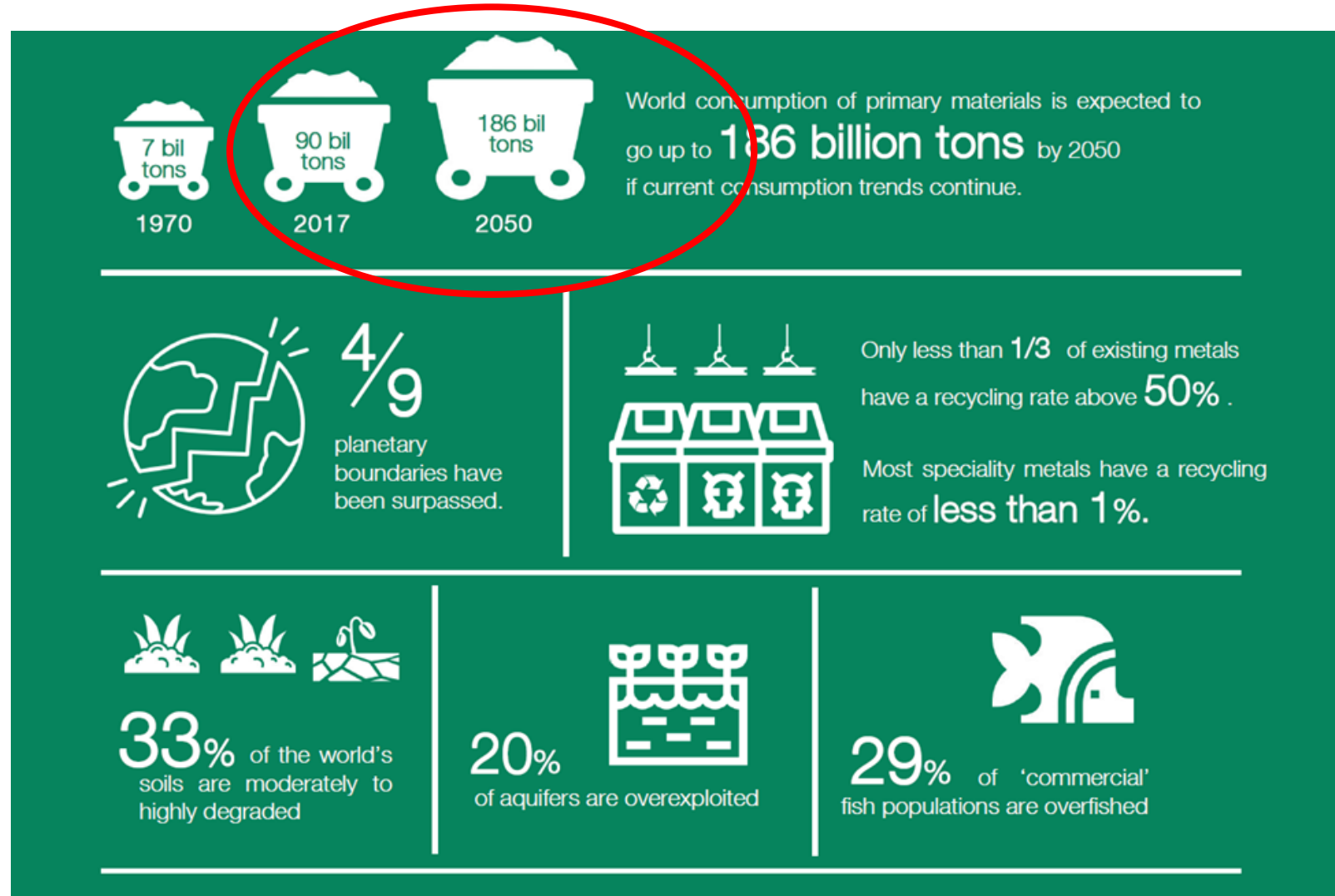
Mariana dam disaster



The village of Bento Rodrigues after the disaster

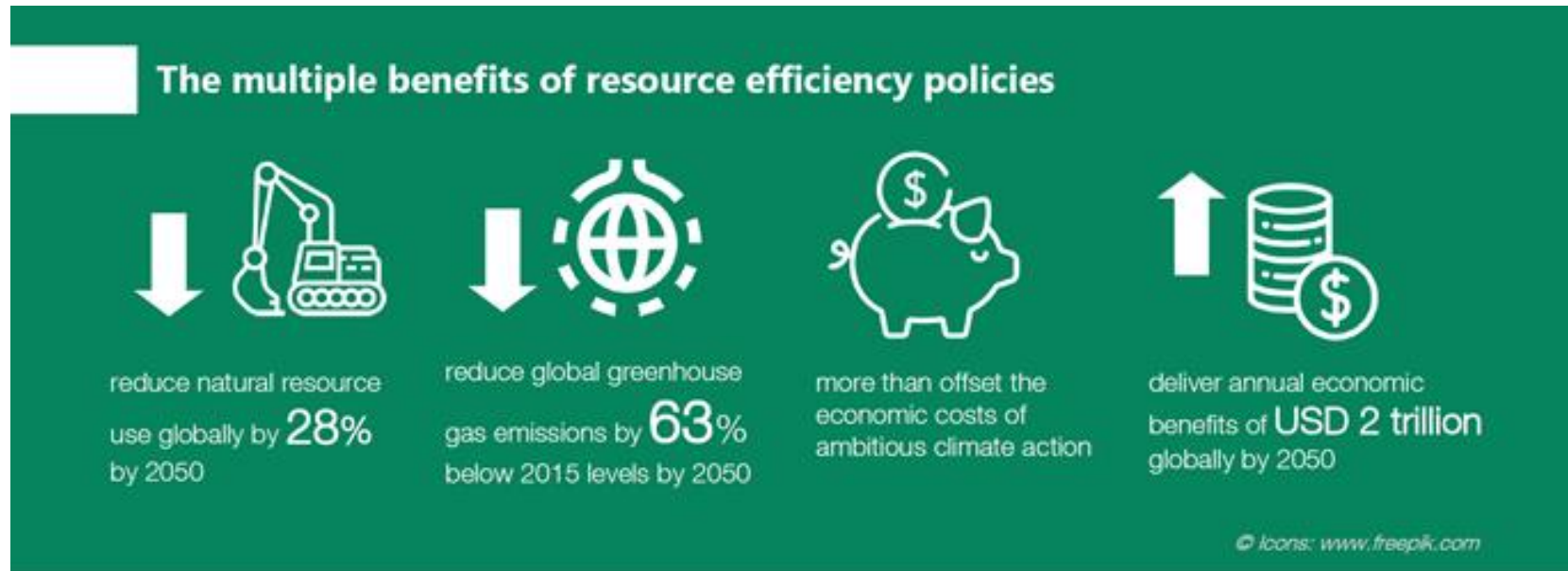
<b>Date</b>	5 November 2015
<b>Location</b>	Germano mine complex, Mariana, Minas Gerais, Brazil
<b>Coordinates</b>	 <span><span><span><span><span>20°13′53″S</span> <span>43°26′33″W</span></span></span><span><span>﻿</span> / <span>﻿</span></span><span><span><span><span>20.23139°S 43.44250°W</span><span><span>﻿</span> / <span>-20.23139; -43.44250</span></span><span><span>﻿</span> / <span>-20.23139; -43.44250</span></span></span></span></span></span></span>
<b>Type</b>	Dam failure
<b>Cause</b>	Unknown <sup>[1]</sup>
<b>Participants</b>	Samarco (Vale, BHP Billiton)
<b>Deaths</b>	19 <sup>[2]</sup>
<b>Non-fatal injuries</b>	16+ <sup>[1]</sup>
<b>Property damage</b>	Two villages devastated, <sup>[1]</sup> around 200 homes destroyed <sup>[3]</sup>

# Extraction and use of Materials global trends



# Materials and Energy Efficiency

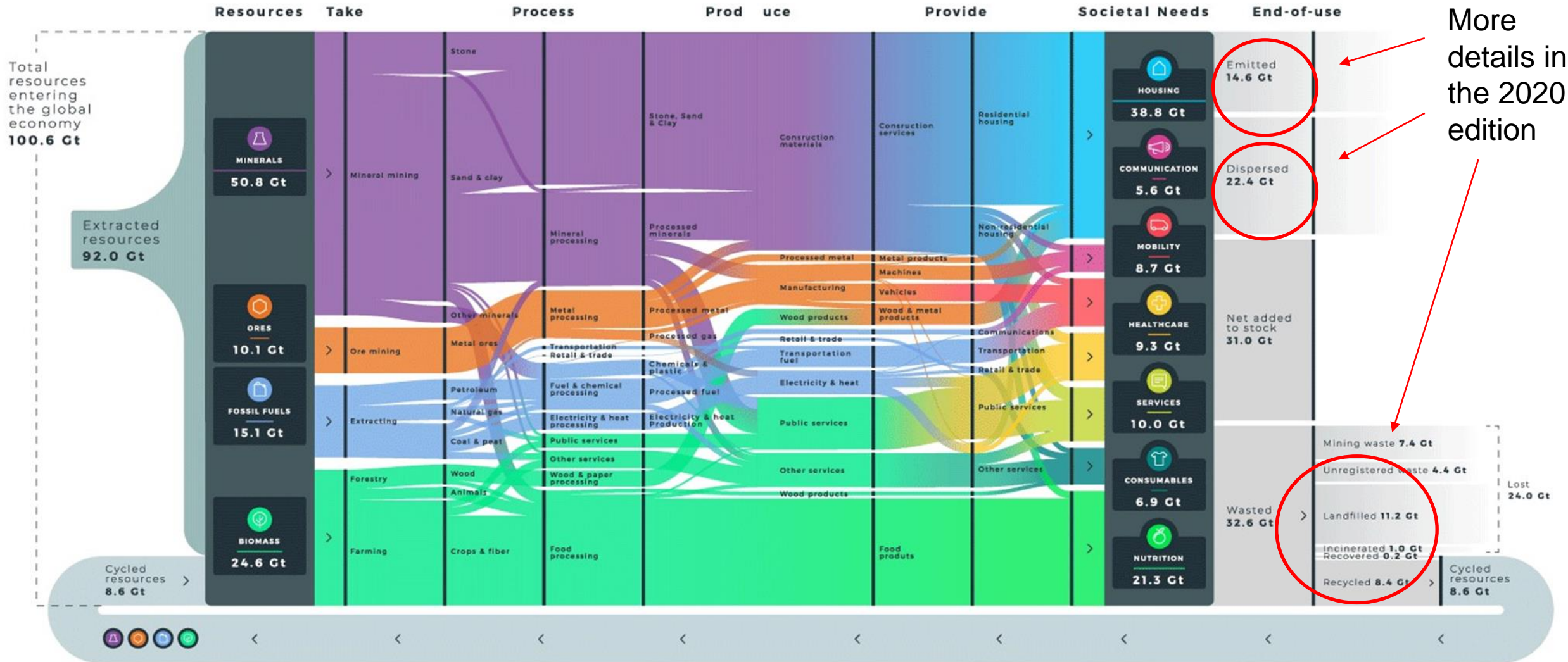
- Increased Resource Efficiency is imperative
- If properly applied, it also generates **net economic benefits**



Source: International Resource Panel, 2017

A second quick note on what happens to products at the end of life cycle (after product development and use)

# Circularity Gap Report 2020



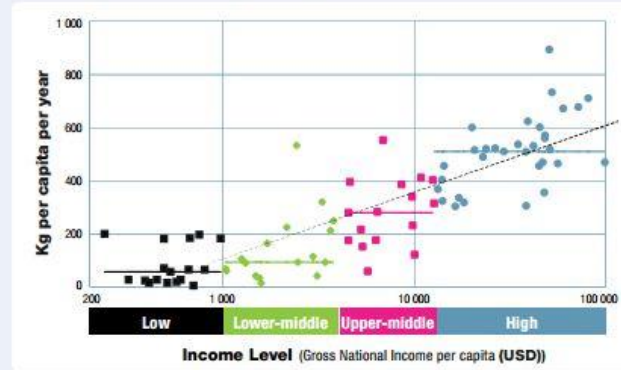
More details in the 2020 edition

# Waste

## THE FACTS

## The waste heap

Municipal solid waste per capita increases with income level



Note: Data for selected countries

### Developing countries

- Population continues to grow
- Waste per capita is rising as economies develop
- Migration from rural to urban areas continues
- Number and size of cities increases

### Developed countries

- Per capita rates doubled 1970-2000
- Rates stabilised since 2005
- 50% of total worldwide waste in 2012

Globalisation results in industrial and hazardous waste generation shifting to developing countries

**2 billion**  
tonnes per year  
of municipal solid waste

**7-10 billion tonnes**  
of 'urban' solid waste  
from households, commerce,  
industry and construction

**Worldwide quantities**  
increasing

**Lower income cities**  
in Africa and Asia will double  
their municipal solid waste  
generation within 15-20 years



URBAN  
DEVELOPMENT  
SERIES

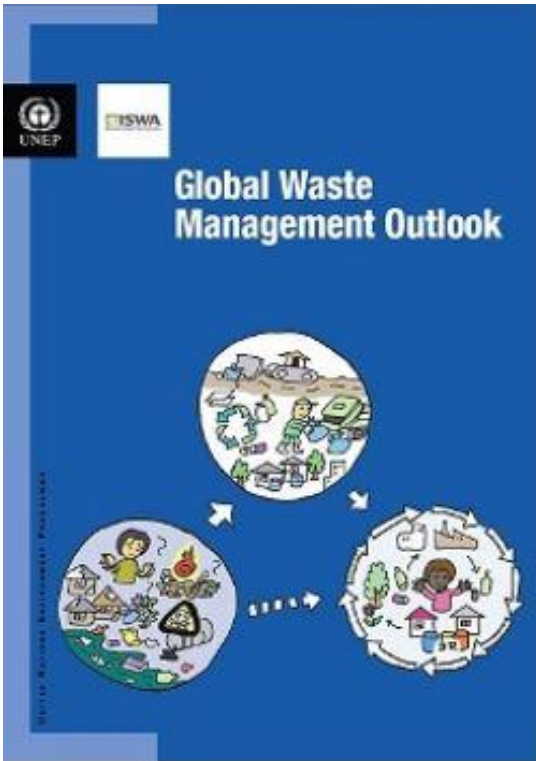
## WHAT A WASTE 2.0

A Global Snapshot of Solid Waste  
Management to 2050



Silpa Kaza, Lisa Yao, Perinaz Bhada-Tata, and Frank Van Woerden

WORLD BANK GROUP



# Fastest growing types of waste: plastics

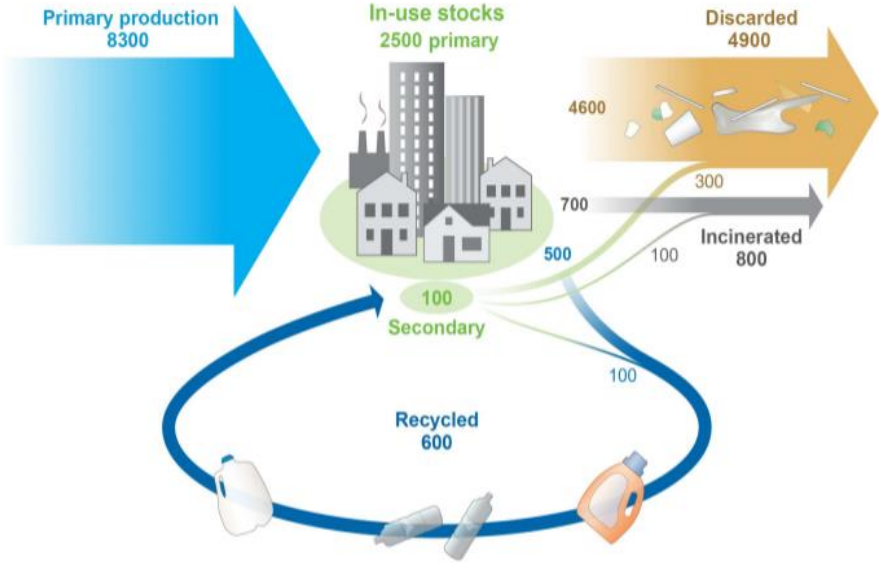
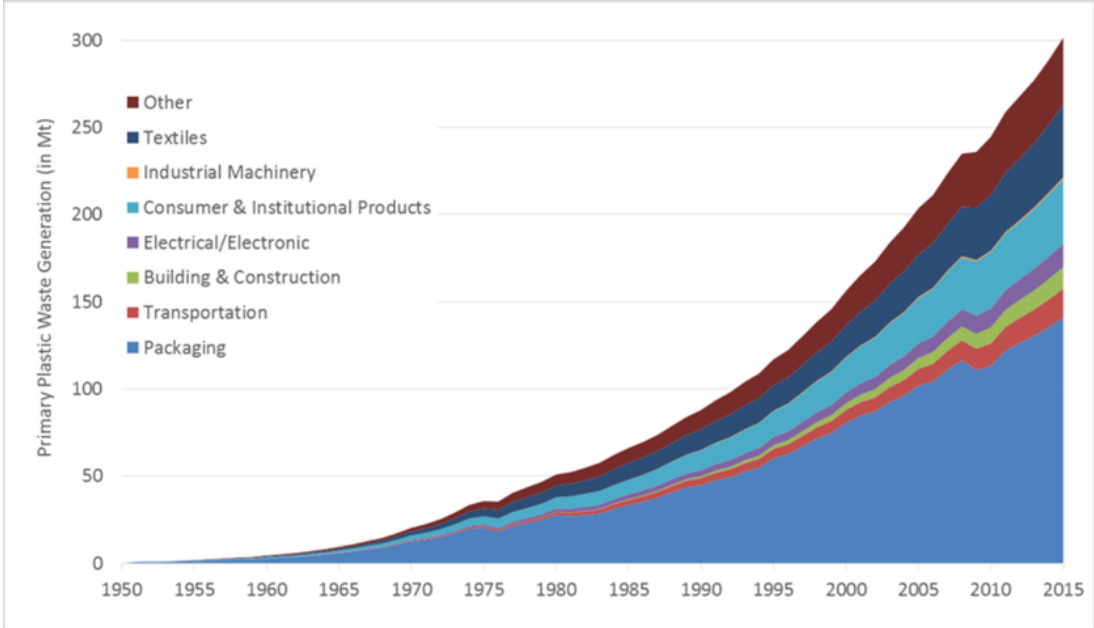


Fig. 2. Global production, use, and fate of polymer resins, synthetic fibers, and additives (1950 to 2015; in million metric tons).

Production, use, and fate of all plastics ever made, Geysler et al., 2017



Fastest growing types of waste: electrical and electronic products (e-waste)



[http://ewastemonitor.info/wp-content/uploads/2020/12/GEM\\_2020\\_def\\_dec\\_2020-1.pdf](http://ewastemonitor.info/wp-content/uploads/2020/12/GEM_2020_def_dec_2020-1.pdf)

# Global e-waste monitor



# E-waste landfills



E-waste dump, Agbogbloshie (Ghana)

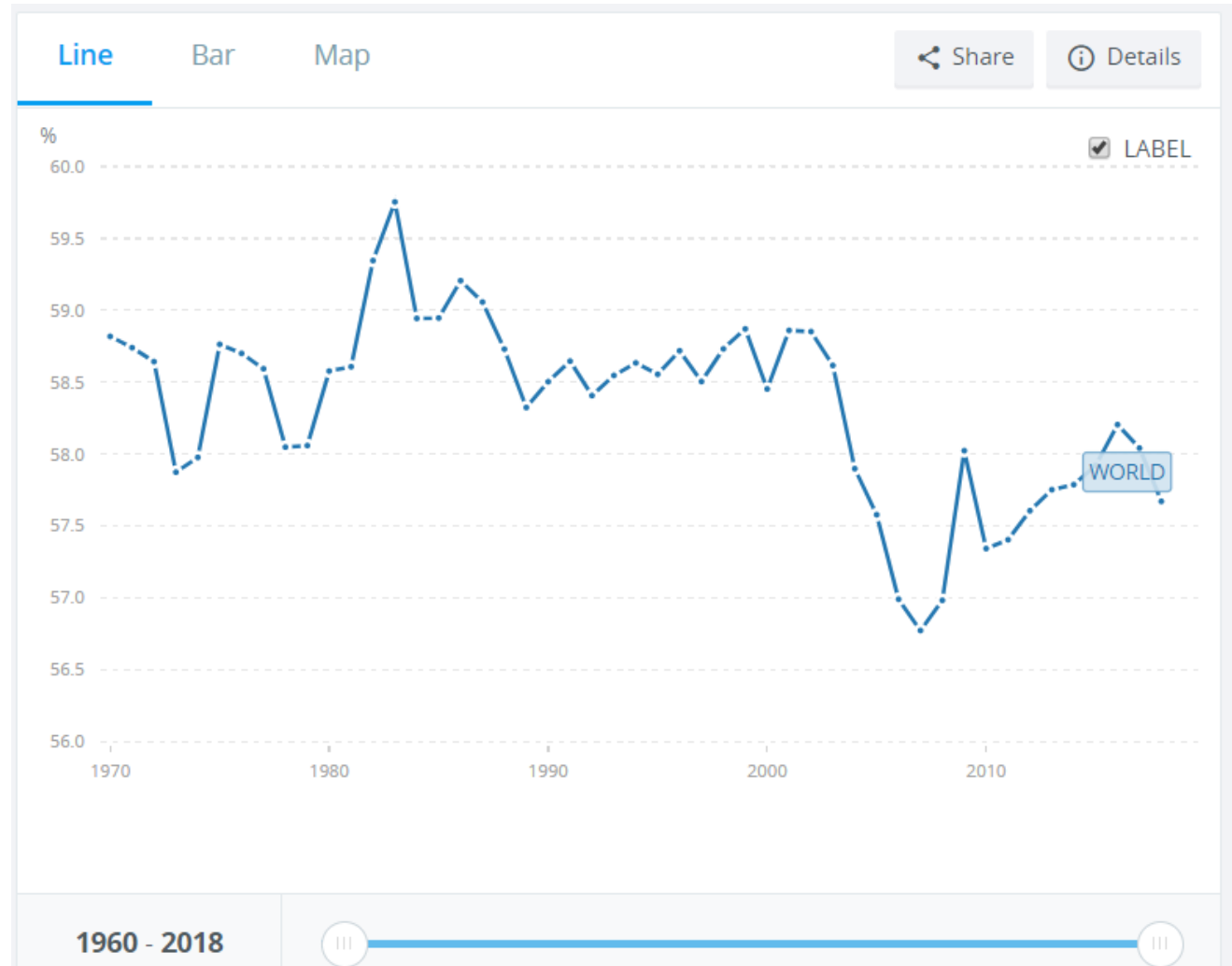


E-waste dump, Lagos (Nigeria)

# World consumer expenditures in % of GDP

Close to 60% of world GDP

...and it should not be forgot that, in addition, a significant share of investments are for means of production of consumer goods...



Source: The World Bank

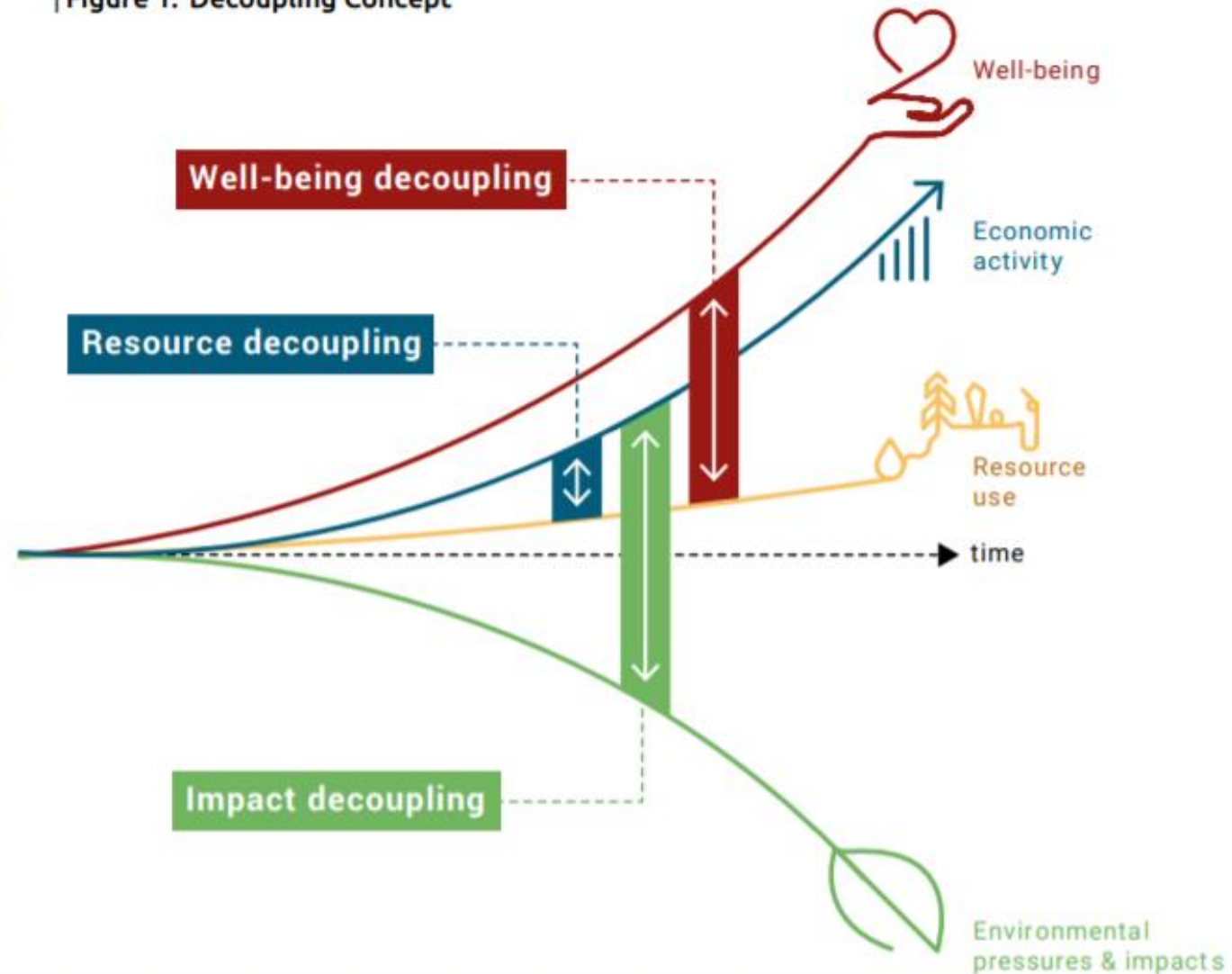
# Decoupling is imperative

## Box 1.

### Decoupling concept

The concept of decoupling describes the necessary conditions for an economy within the planetary boundaries. It means that resource use or a pressure on the environment or human well-being decreases or grows at a slower rate than the economic activity causing it (figure 1)

| Figure 1. Decoupling Concept

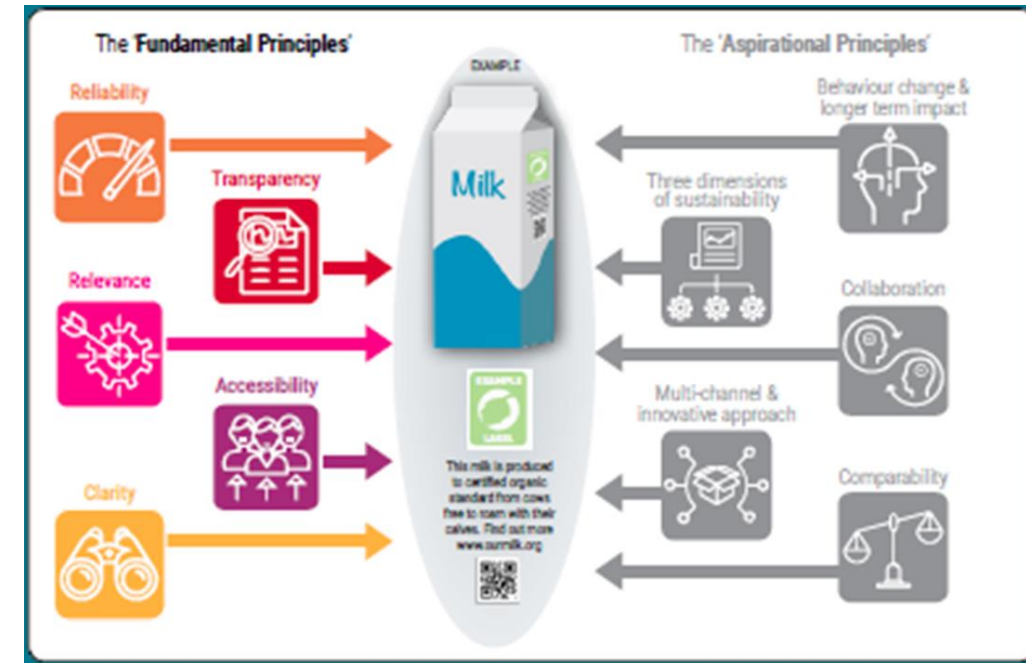
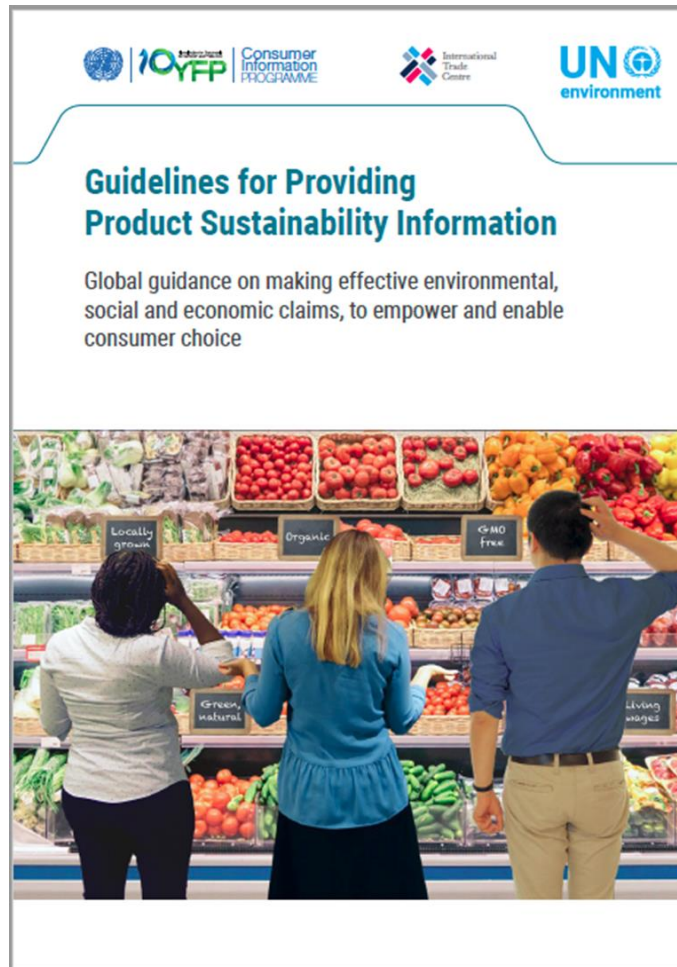




Promoting sustainable consumption and production patterns is key

# Consumer culture and attitudes are very important

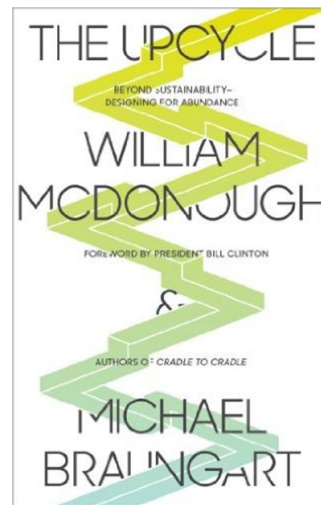
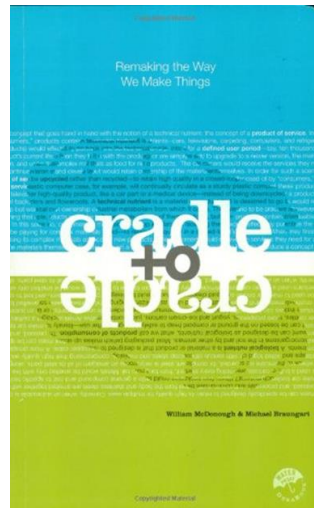
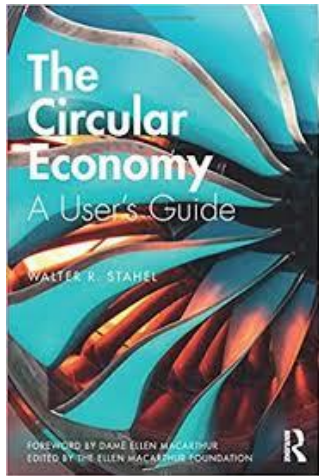
Information plays a key role to support wiser consumer choice and behavior



The Circular Economy is essential for a transition to sustainable production and consumption patterns

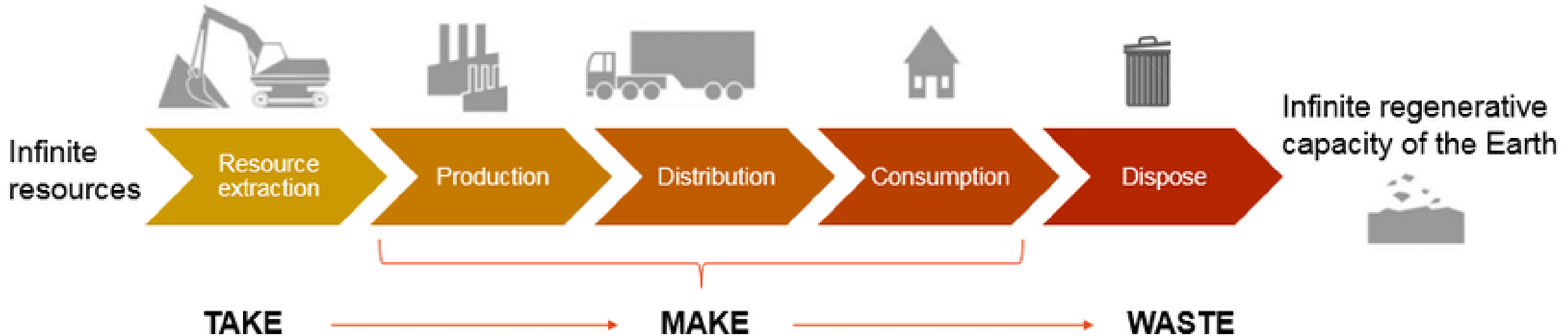
# The Circular Economy: what

# Circular Economy



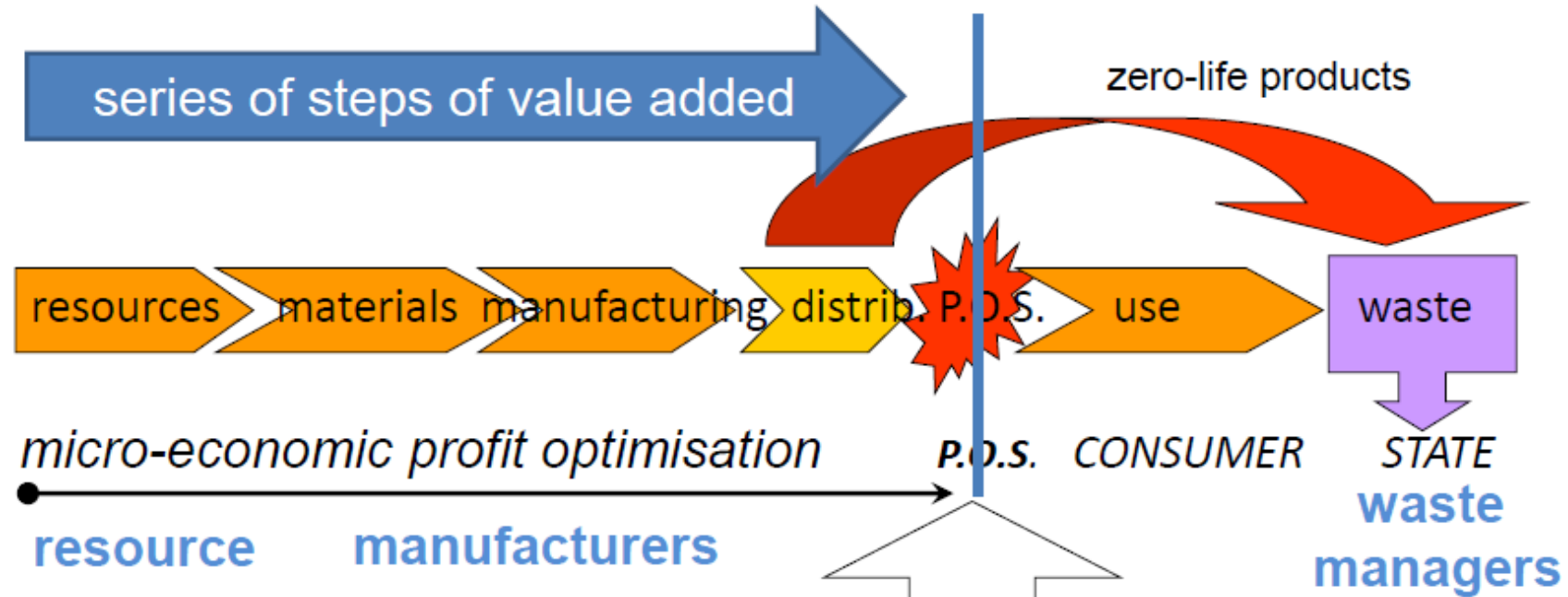
ELLEN  
MACARTHUR  
FOUNDATION  
Rethink the future

# Current linear economic model



# Walter Stahel's insight

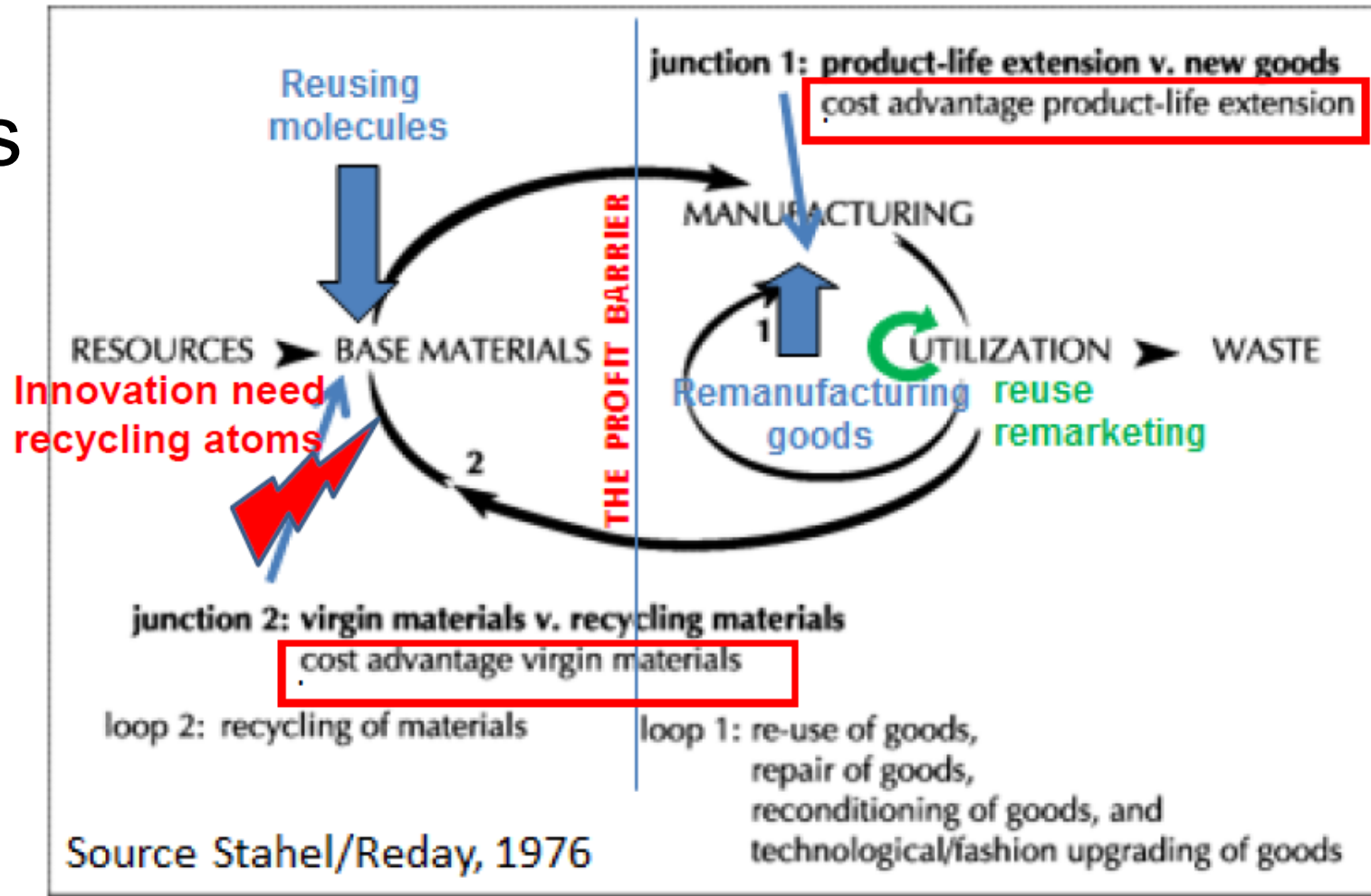
1 Today's linear industrial economy:  
*growth means more throughput (no liability?)*



***The manufacturer's liability for industrial goods concerns the manufacturing quality.***  
**Property and liability are transferred at P.O.S. to the CONSUMER (risk) and the State (waste)**

Managing performance over time - The Circular Economy:  
 reusing goods, remanufacturing goods and components (loop 1)  
 and reusing molecules (2)

Walter Stahel's  
 insight

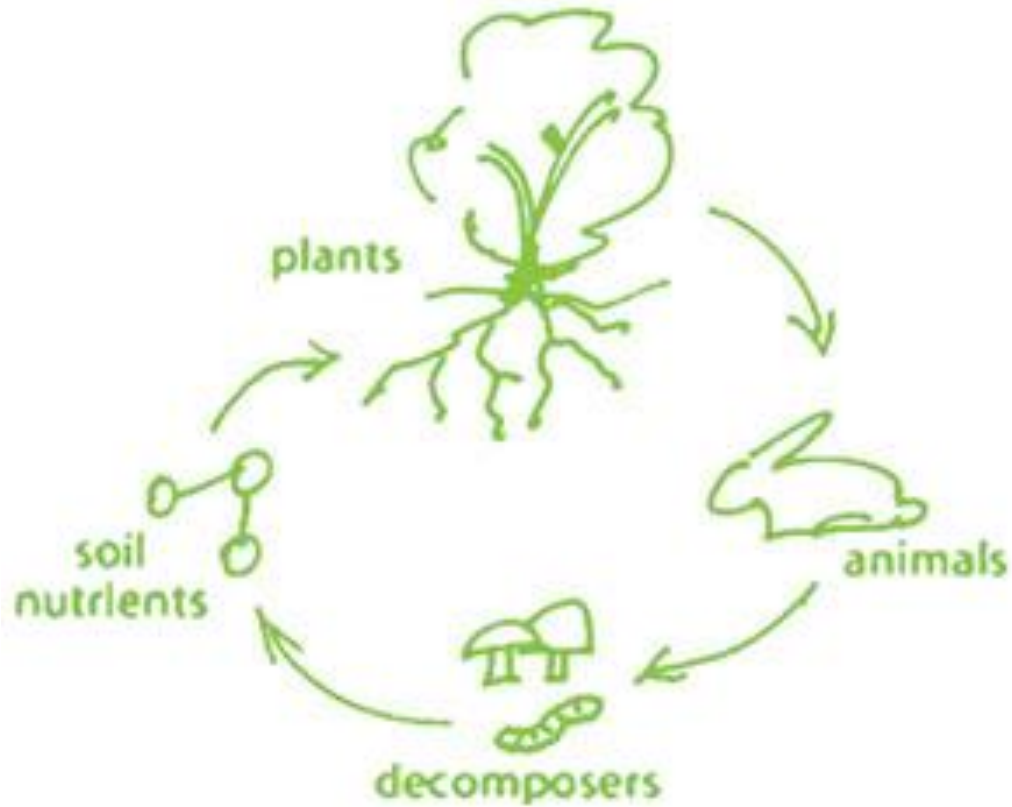


# Nature knows no waste

Then, a simple  
but very important  
observation



# Can we learn from nature?



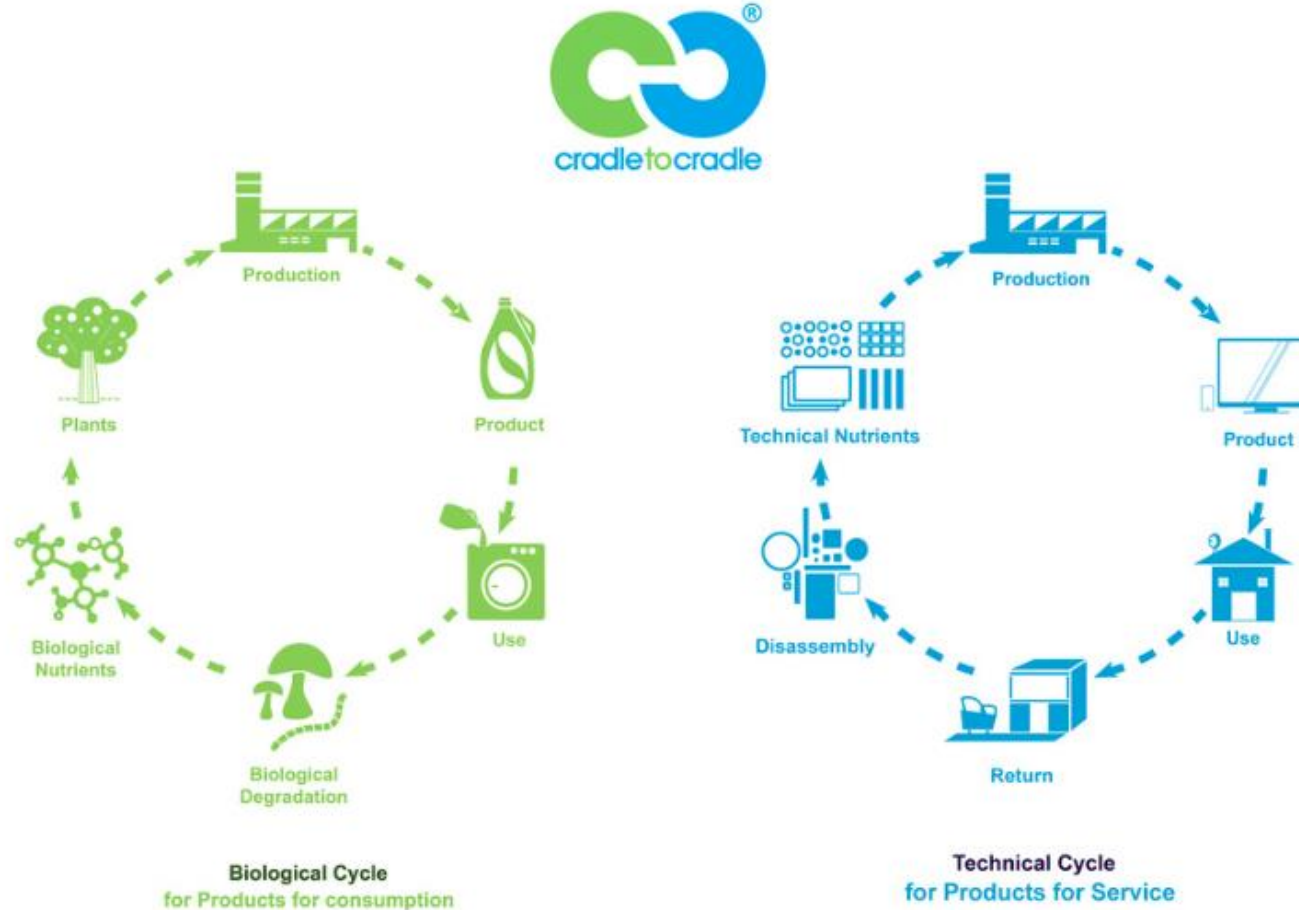
Biological Nutrient Cycle



Technical Nutrient Cycle

Braungart and Mc Donough's insight:  
the "*technosphere*" should work as the biosphere

# Circular Economy

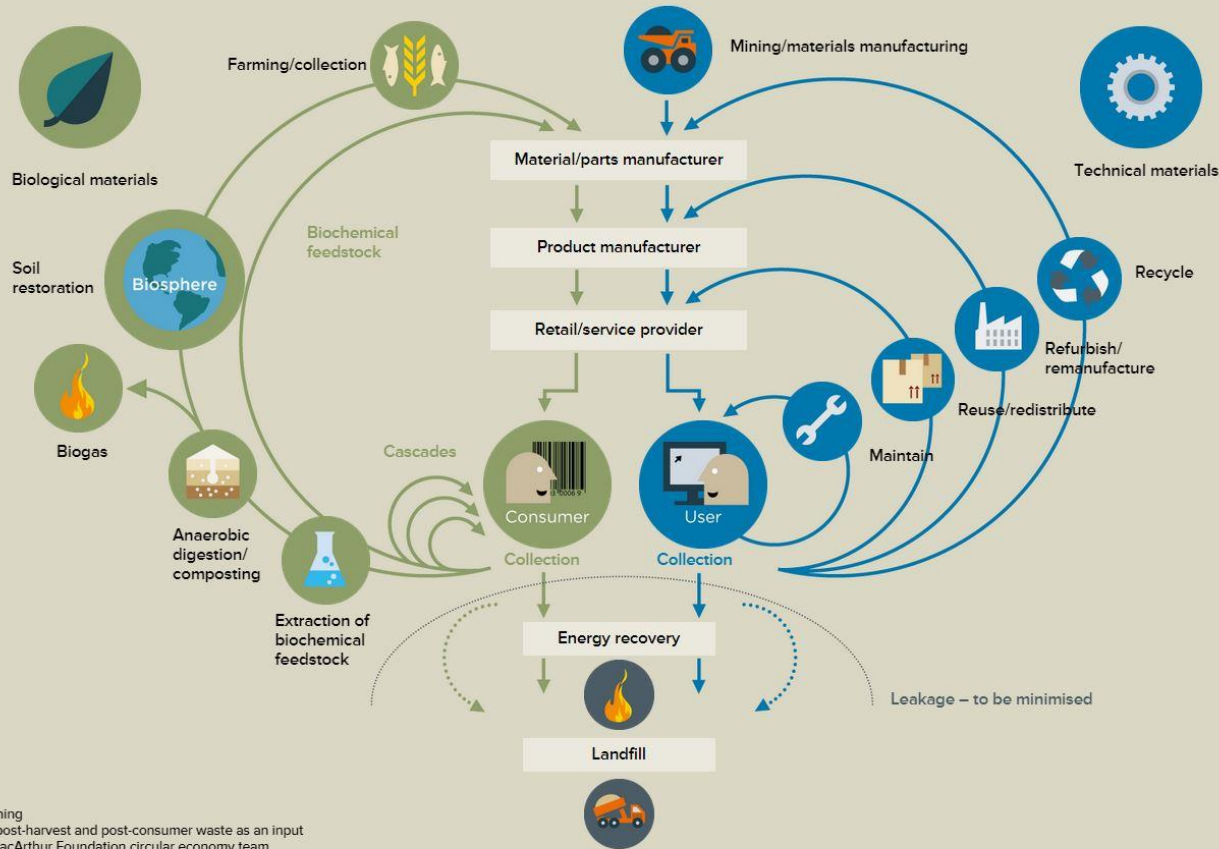


# Ellen MacArthur Foundation Circular Economy definition

*“A **Circular Economy** is restorative and regenerative by design, and aims to keep products, components, and materials at their highest utility and value at all times. The circular economy is a continuous, positive development cycle. It preserves and enhances natural capital, optimizes resource yields, and minimizes system risks by managing finite stocks and renewable flows. A circular economy works effectively at every scale.”*

# Circular Economy

THE CIRCULAR ECONOMY AN INDUSTRIAL SYSTEM THAT IS RESTORATIVE BY DESIGN



**Principle 1: Preserve and enhance natural capital**

...by controlling finite stocks and balancing renewable resource flows.

**Principle 2: Optimise resource yields**

...by circulating products, components, and materials at the highest utility at all times in both technical and biological cycles

**Principle 3: Foster system effectiveness**

...by revealing and designing out negative externalities

*The circular economy provides multiple value creation mechanisms that are decoupled from the consumption of finite resources. In a true circular economy, consumption happens only in effective bio cycles; elsewhere use replaces consumption.*



## PARTNERS

 <b>CISCO</b> Global Partner	 <b>Google</b> Global Partner	 <b>H&amp;M</b> Global Partner
 <b>Intesa Sanpaolo</b> Global Partner	 <b>Nike</b> Global Partner	 <b>Philips</b> Global Partner
 <b>Renault</b> Global Partner	 <b>Unilever</b> Global Partner	 <b>SUN</b> Core Philanthropic Partner
 <b>Arup</b> Knowledge Partner	 <b>IDEO</b> Knowledge Partner	

## CE 100


# Example of resources from the EMF



**ELLEN MACARTHUR FOUNDATION**

## Circulytics - measuring circularity

Circulytics® is the most comprehensive circularity measurement tool for companies

## The next big thing in design is circular.


**A RADICAL, RESTORATIVE, REGENERATIVE APPROACH TO BUSINESS**

A new mind-set for business is emerging. It's worth around a trillion dollars, will drive innovation in tomorrow's companies, and reshape every part of our lives.

But making the shift isn't easy. That's why we created this guide: to help innovators create more elegant, effective, creative solutions for the circular economy. Solutions that are invaluable for people, give businesses a competitive advantage, and are regenerative for our world.

### The circular economy: a transformative Covid-19 recovery strategy

How policymakers can pave the way to a low carbon, prosperous future

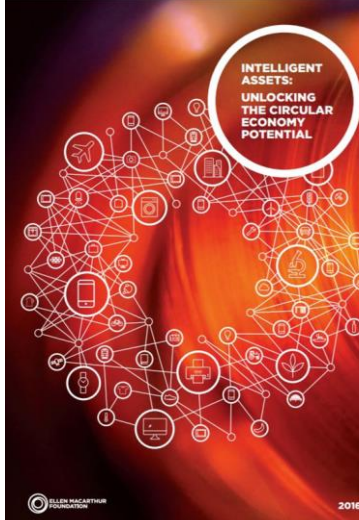


### Financing the circular economy

Capturing the opportunity



### INTELLIGENT ASSETS: UNLOCKING THE CIRCULAR ECONOMY POTENTIAL



2016

### ARTIFICIAL INTELLIGENCE AND THE CIRCULAR ECONOMY

AI AS A TOOL TO ACCELERATE THE TRANSITION



Google

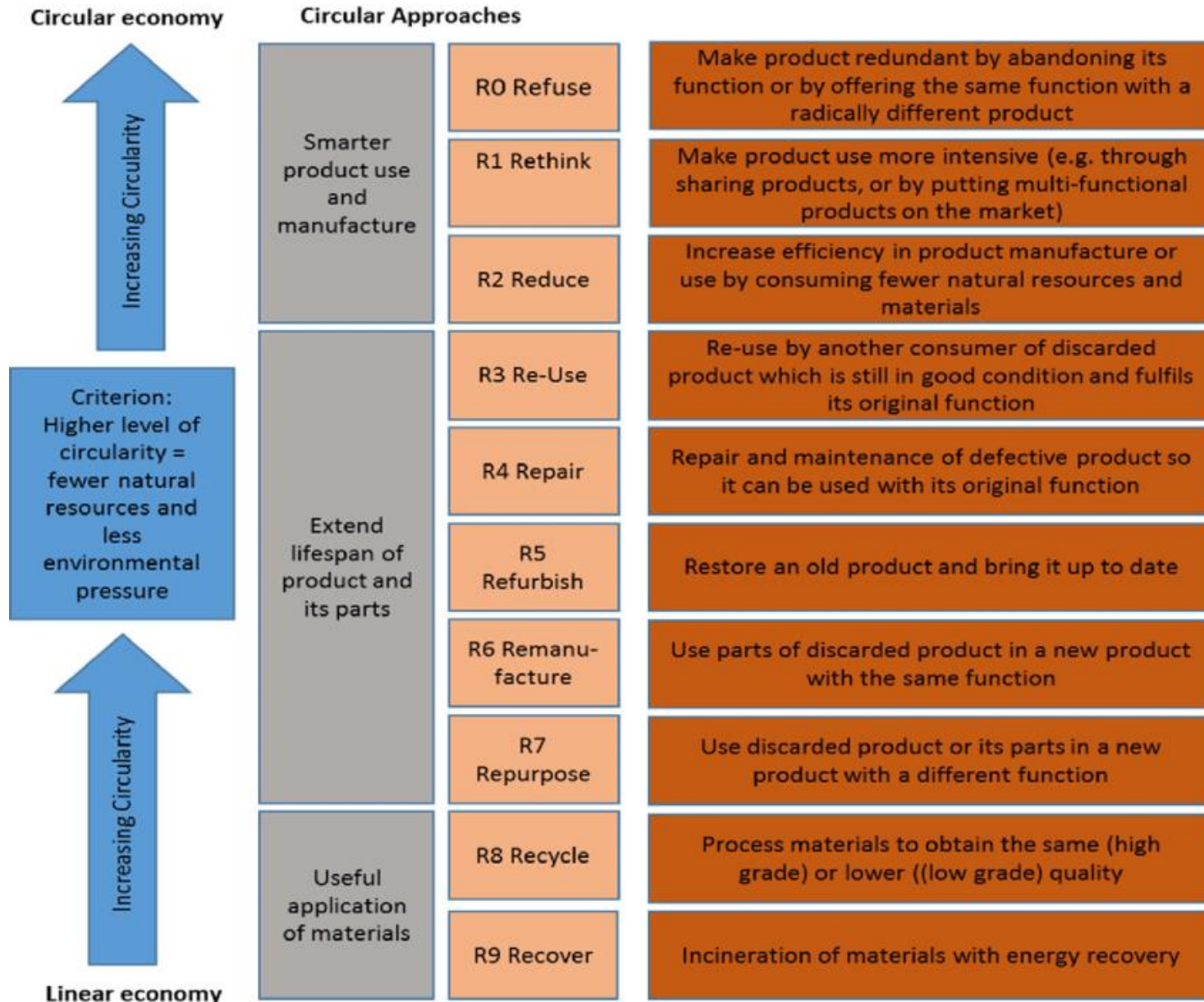
### THE NEW PLASTICS ECONOMY: RETHINKING THE FUTURE OF PLASTICS & CATALYSING ACTION



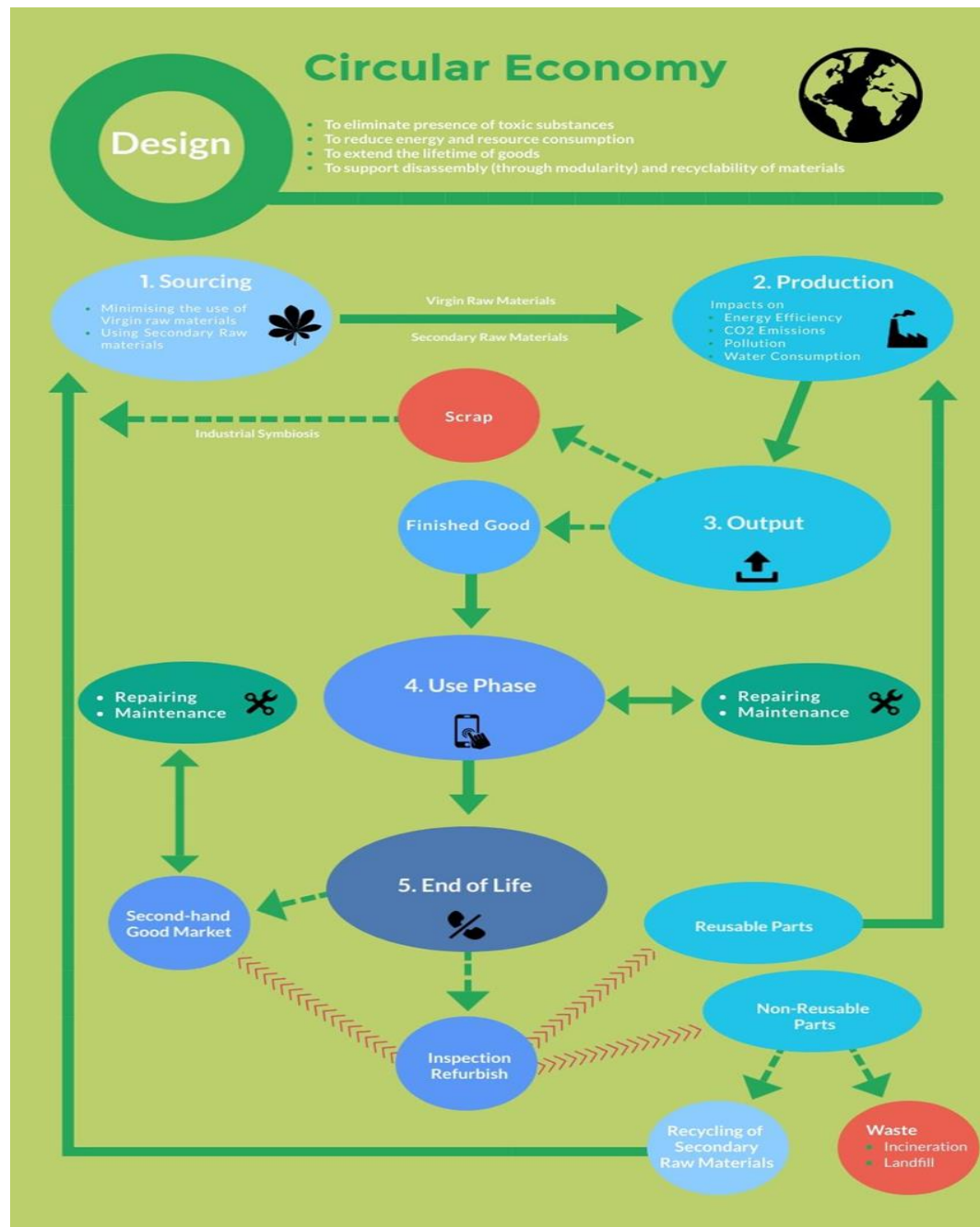
# The original “3 R’s” approaches of the Circular Economy



# Extended to “9 R’s” and more



# Circularity model for product lifecycle



# Approaches to circularity

- **Material resource efficiency**

- **Reduce**: design products requiring less materials (and avoid hazardous substances)
- **Reuse/Remanufacture**: refurbishing existing products, using components from existing products for new products
- Produce from the “**bottom-up**” (e.g. 3D printing **properly** applied)
- Use secondary raw materials (**SRM**)
- **Design for zero waste**: products that can be easily disassembled (to re-use components) and materials that can be efficiently recycled at EoL
- Implement processes supporting material efficiency (e.g. **reverse supply chains**)

# Approaches to circularity

- **Product life-cycle extension**

- Design products: with longer duration and to be easily repaired and upgraded
- Implement pre-emptive maintenance approaches
- Support market for second-hand goods

- **Energy efficiency and use of renewables**

- design products and production processes to minimize use of energy at each phase of the product life-cycle
- use renewable energy for material sourcing and production

- **Use of environmentally sound biological materials**

Derived from Agricultural waste and by-products, Organic municipal solid waste, or Bioengineered materials

# Approaches to circularity

- **Efficient use of waste** – starting from design coordinating with other companies in the value chain
- **Industrial symbiosis – industrial eco-parks** “*physical exchanges of materials, energy, water, and by-products*” between different co-located industrial facilities – the **waste** of one facility is **used as a resource** by another

# Approaches to circularity

- **Product as service** business model
  - B2B: equipment, machinery and components of infrastructure **can be leased** from specialized companies (e.g. transportation and construction sectors)
  - B2C: almost any type of durable product – the idea is to **provide users with the product functions** required over time, as opposed to the ownership of a product over its entire life-time (for intangible products – e.g. software or information services – the shift to subscription models is already mainstream)
- **Second-hand goods** market
- **Sharing economy** models
  - Aiming to optimize the use of goods/assets (e.g. cars, bikes, laundries, homes, etc.)

# Business Models

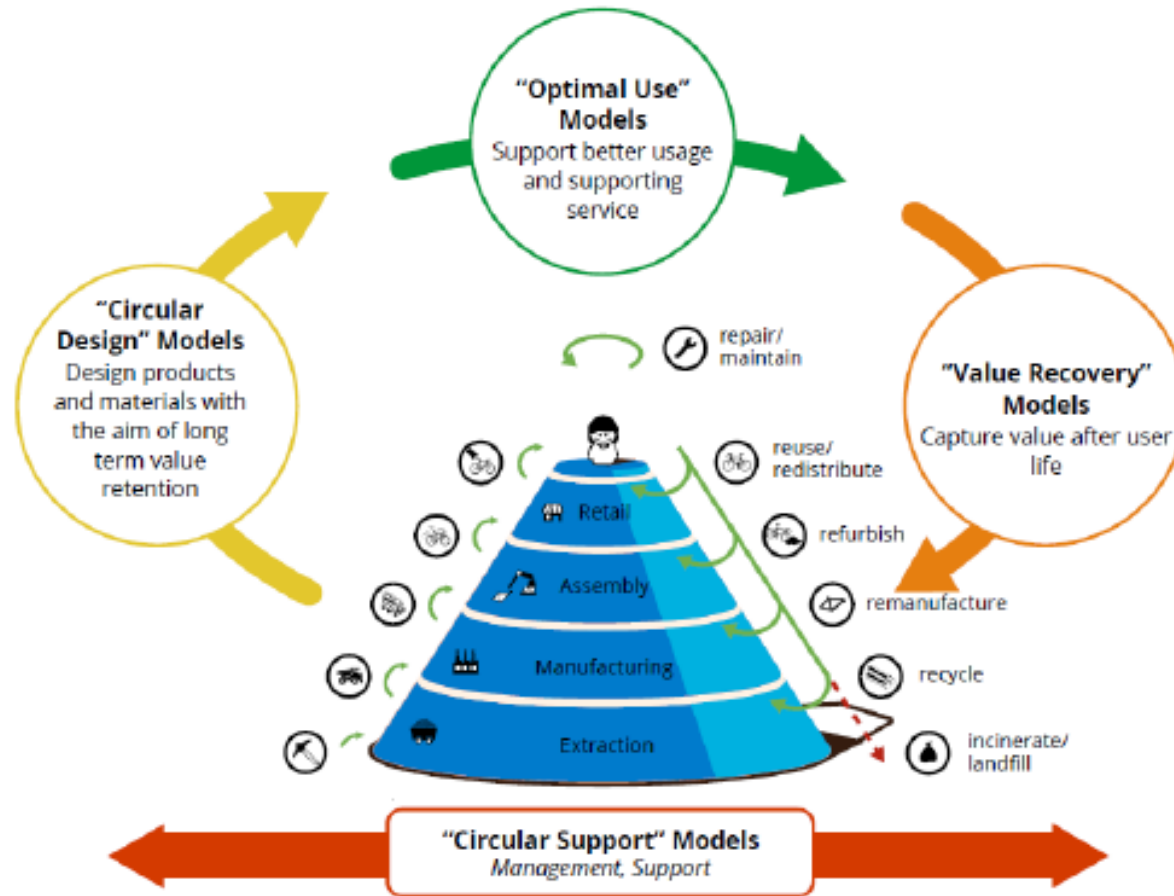


Figure 2: Circular economy business models in the Value Hill<sup>10</sup>

IMPORTANT

For the **European Investment Bank (EIB)**:

*“A project is considered to be substantially contributing to the circular economy if it falls under the four circular economy categories [highlighted in the picture]”*

*“Some projects may include innovative features and thus be considered eligible under the EIB’s innovation goals. Depending on the size of the client, circular economy projects may also be eligible under the Bank’s financing goals for small businesses and mid-cap companies.”*

# An insightful story

# Interface, Inc. – a world leader of CE



Ray Anderson, Founder & Chairman

The world's largest manufacturer of modular carpet for commercial and residential applications. Founded in 1973, based in Atlanta, Georgia.



# Interface journey: how it started

- For 21 years Interface operated under the traditional industrial model of ‘take-make-waste’
- “In 1994, while preparing remarks on Interface’s environmental vision for a company task force meeting, Ray Anderson, experienced a fundamental perspective change. Seeking inspiration for his speech, Ray read Paul Hawken’s “The Ecology of Commerce” and was deeply moved — an experience he has described as an epiphany. It awakened Ray to the urgent need to set a new course for Interface toward sustainability..”

Source: A Look Back: Interface's Sustainability Journey, Interface web site

# Interface's story

“David Oakey, Interface’s lead designer, reacted to Ray’s challenge to make a carpet that was recyclable and itself made of recycled materials, by saying, *“Boss, it can’t be done.”*”

"It has to be possible," Ray replied, "Nature does it."

Interface invested in a largely unknown biologist, **Janine Benyus**, and the corporate practice of **biomimicry** was born. Teaming with Oakey, Janine and the Dream Team innovated to close the company’s industrial loops and create an early example of the circular economy. When Oakey reported on his success at a Dream Team meeting, his eyes were big as saucers. *“God must be an environmentalist,”* he marveled. *“I said it couldn’t be done, but when we did it, it worked better, cost less, had every attribute we wanted and many we hadn’t thought to ask for.”*

*Source: Green Biz reads, September 2018 – Adapted from A Finer Future: Creating an Economy in Service to Life*

# Mission Zero and the 7 fronts

<b>Front 1 - Eliminate Waste:</b>	<b>Eliminate all forms of waste in every area of business.</b>
<b>Front 2 – Benign Emissions:</b>	Eliminate toxic substances from products, vehicles and facilities.
<b>Front 3 – Renewable Energy:</b>	Operate facilities with 100% renewable energy.
<b>Front 4 – Close The Loop:</b>	Redesign processes and products to close the technical loop using recovered and bio-based materials.
<b>Front 5 – Resource Efficient Transportation:</b>	Transport people and products efficiently to eliminate waste and emissions.
<b>Front 6 – Sensitize Stakeholders:</b>	Create a culture that uses sustainability principles to improve the lives and livelihoods of all of our stakeholders – employees, partners, suppliers, customers, investors and communities.
<b>Front 7 – Redesign Commerce:</b>	Create a new business model that demonstrates and supports the value of sustainability-based commerce.

# Interface business model (aspects)

Its **ReEntry**® programme reclaims, reuses carpet tiles in new flooring designs and recycles carpet tiles into new raw materials to create carpet as part of a closed technical loop.

**Net-Works**™ ensures Interface receives fully recycled nylon for carpet tiles, a true inclusive circular business model through which biodiversity in our oceans is restored by removing ghost nets and local communities have an additional income. Recently the company joined **NextWave**, a supply web, to ensure ocean plastic finds its way into circular supply chains and because of the value of the plastic, it doesn't end up in the ocean anymore

*Source: European Circular Economy Stakeholder Platform*

# Interface sustainability achievements

## Radical Reductions in Environmental Impacts



# Interface financial results – 2019

## Interface at a Glance

Interface is a global leader of commercial flooring solutions including carpet tile, luxury vinyl tile (LVT) and rubber flooring.

Headquartered in **Atlanta, GA**

7 manufacturing locations on 4 continents

4,100 global employees

Sales in over 110 countries

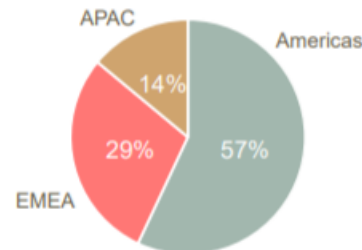
Over 1,100 Sales & Marketing professionals

All products are **Carbon Neutral**

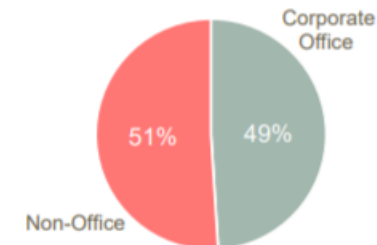
Global **Sustainability leader**

(\$ in millions, except EPS)	FYE 2018	FYE 2019	% growth
Net Sales	\$1,180	\$1,343	14%
Adj Operating Income*	\$134	\$150	12%
Adj EPS (Diluted)*	\$1.49	\$1.59	7%
Net Debt*	\$538	\$515	
Adj EBITDA*	\$186	\$200	
Net Debt / Adj EBITDA*	2.9x	2.6x	

REVENUE BY REGION

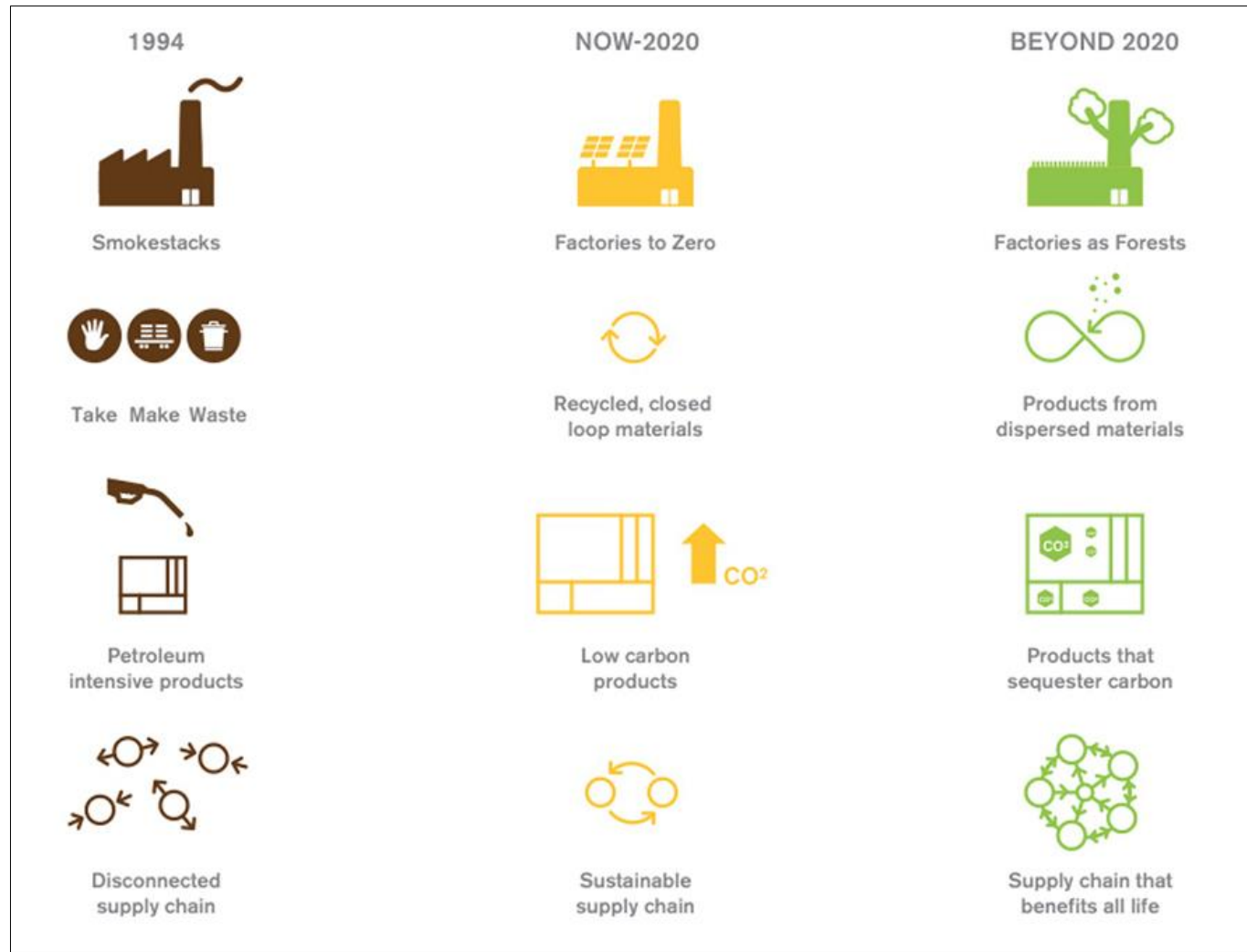


REVENUE BY VERTICAL



\* See Appendix for a reconciliation of Non-GAAP figures  
Note: Geographic breakdown and segment figures represent FYE 2019

# Interface's journey



# Interface new mission



CircuitBac™ Green backing. Manufactured in Europe and available on select products, this innovative backing **effectively stores more carbon during its life cycle than it emits**. It offers up to 87% total recycled and bio-based content, performs to the highest standards and installs with Interface's TacTiles® glue-free installation system.

Source: Interface web site

# CircuitBac Green

Carpet backing based on bio-plastics

**A more sustainable alternative**  
CircuitBac Green is a high-performing backing with increased biobased and recycled content, which decreases the carbon footprint of the finished carpet tile.

**A mix of natural materials**  
Natural oils and resins are used as a carbon-negative alternative to current backing materials.

**Mineral filler**  
Recycled limestone is used as an inert filler.

1/3

Twitter Pinterest LinkedIn

**CircuitBac Green**  
Carpet backing based on bio-plastics

**CircuitBac Green**  
Backing Process

**CircuitBac Green**  
Backing Construction

# Interface partnership with Carbon8



[HOME](#) [ABOUT US](#) [TECHNOLOGY](#) [C8A](#) [NEWS](#) [CONTACT](#) 

## Using carbon dioxide to give waste value

Carbon8 Systems is the first company to use Accelerated Carbonation Technology (ACT), a treatment for industrial wastes and contaminated soils.

# Walk the talk...

## DIRECT ADVOCACY TAKING A STAND FOR CIRCULAR ECONOMY LEGISLATION

In 2010, California became the first jurisdiction in the world to pass a law that made carpet makers responsible for establishing a landfill diversion program for carpet. It also established reuse and recycling as primary goals for end-of-life management.

The recycling rates established by the State of California were set as aggressive goals and five years in to the program, carpet makers were not meeting California's goals. In 2017 California began fining carpet makers for failing to comply with the law. Legislation was created to amend the original law to improve the program. The carpet industry saw an opportunity to try and repeal the law to end the program. When our trade association, the Carpet and Rug Institute, proposed to lobby against any changes to the plan and legislation, we asked them to reconsider. And when they continued regardless, with potential plans to defeat

it altogether, we stood up and left our trade association.

Going a step further, we hired an independent lobbyist, and joined forces with other California-based and national stakeholders ambitious to strengthen recycling law in the world's tenth largest economy. By October 2017, we had been instrumental in helping to update California's legislation (AB 1158) and improve the State's recycling program for carpets.

19

# Walk the talk...

## ENVIRONMENTAL PRODUCT DECLARATIONS TRANSPARENCY CAN DRIVE CHANGE INDUSTRY WIDE.

Telling the truth about our progress to become a more sustainable company, and how that is reflected in all our products, can only be done based on facts.

In 2004 we recognised the challenge of finding the facts amidst the sustainability stories had gotten hard for our customers. So we took a bold step, piloting something called an Environmental Product Declaration (EPD). It's like a nutrition label for products that details the environmental impacts based on the raw materials and manufacturing process of the product. We were the FIRST in our industry to embrace EPDs and scale

them across all of our global product portfolio. By pioneering EPDs in North America, we helped drive widespread adoption of EPDs in US Green Building Council's building rating program Leadership In Energy and Environmental Design (LEED) and other green building standards, so that it is now possible to use EPD data to design buildings and interiors with lower environment impacts.

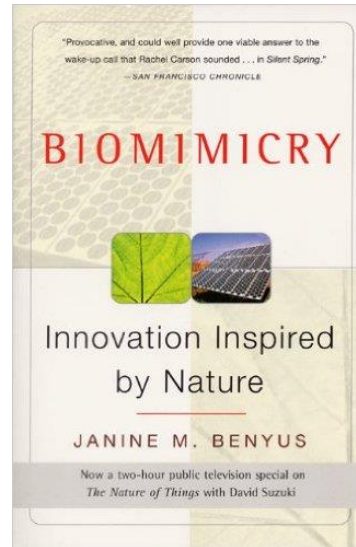
On their own, EPDs from only one company are not powerful. Their strength is that they have a common format that, when used by multiple suppliers, allow customers to compare products like-for-like, enabling decisions about greener products. There's a lot customers can learn from an EPD. In an era when every company says they are green, EPDs show whether their activities or certifications are actually reducing

environmental impact. But EPDs also allow product manufacturers to make choices about product ingredients and understand the impacts of those choices. EPDs allow us to understand whether recycled content really decreases life cycle environmental impact or just looks "green." For example, replacing virgin plastic in a product with recycled plastic is much more meaningful than replacing virgin mineral fillers with recycled fillers.

By using our EPDs to focus on our key areas of impact, oil, we have been able to change our supply chain and reduce our impacts. For example, using standard nylon systems with 75% and 95% recycled content has contributed to our reduction of our products carbon footprint by 69%.

25

# A (very important) digression...



The next big idea in sustainability is probably a million years old. Join the Biomimicry Institute to discover nature's wisdom.

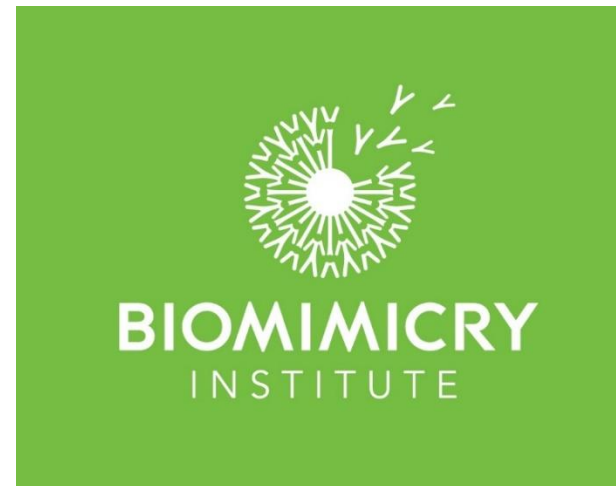


'How was it grown' is an expression of a Turing test for design gone right.

— **Nerl Oxman**, MIT Media Lab architect  
[Read more testimonials »](#)

What kind of member are you?

- Foundation Species →
- Pioneer Species →
- Keystone Species →



*Janine Benyus:  
9 Basic Principles of Biomimicry*

1. Nature runs on sunlight.
2. Nature uses only the energy it needs.
3. Nature fits form to function.
4. Nature recycles everything.
5. Nature rewards cooperation.
6. Nature banks on diversity.
7. Nature demands local expertise.
8. Nature curbs excesses from within.
9. Nature taps the power of limits."

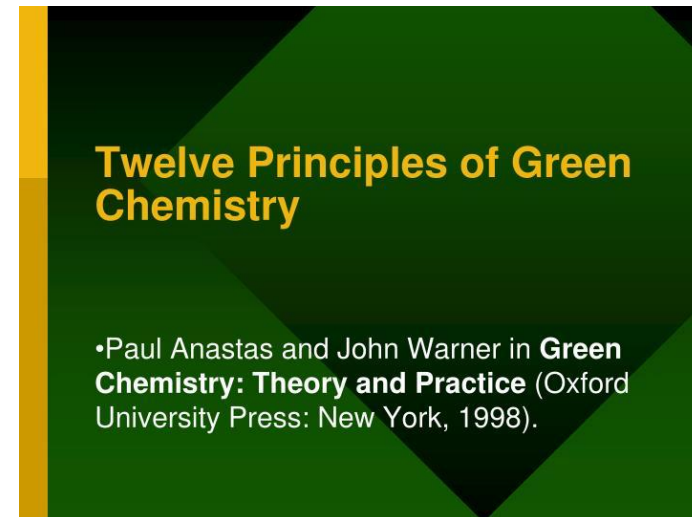
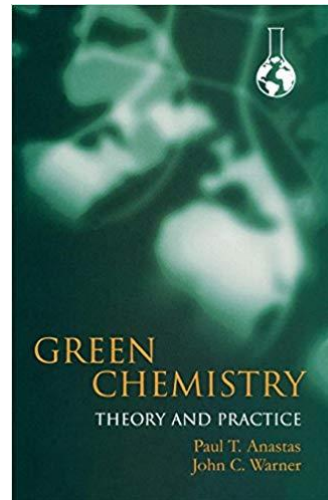
PermacultureVisions.com



# Further digression...



John Warner, winner of the 2014 SCI Perkin Medal - recognized as one of the highest honors given for outstanding work in applied chemistry in the United States



•Paul Anastas and John Warner in **Green Chemistry: Theory and Practice** (Oxford University Press: New York, 1998).

# An almost impossible challenge

# Fairphone

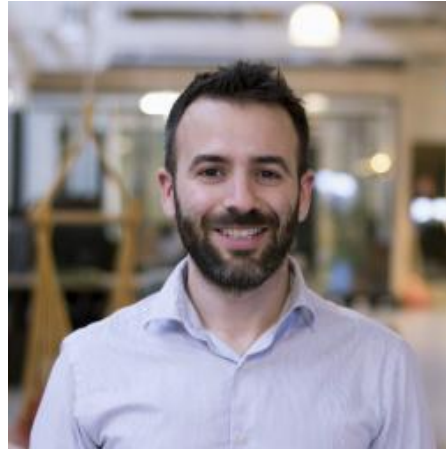
## Fairphone founders



Bas van Abel, CEO



Tessa Wernink



Miquel Ballester



A social enterprise company which aims to develop smartphones designed and produced with minimal environmental impact. The company was founded in January 2013 and is based in Amsterdam, Netherlands

*Fairphone started in 2010 as a project of Waag Society, Action Aid and Schrijf-Schrijf to raise awareness about conflict minerals in consumer electronics and the wars that the mining of these minerals is fueling in the DR Congo. The campaign and related research ran for three years. In 2013, Fairphone was officially established as a social enterprise.*

# Social and environmental goals

**FAIRPHONE**

Phone Story

## The modular phone that's built to last

We've created the world's first ethical, modular smartphone. You shouldn't have to choose between a great phone and a fair supply chain.

[Explore the Fairphone 2](#)

## Inspiring social change

We've taken the first steps toward creating a product that puts people first. You can help us to spread the word.



Long-Lasting Design >



Fair Materials >



Good Working Conditions >



Reuse and Recycling >

<https://www.fairphone.com/en/impact/>

# Responsible sourcing

## Fair Materials

We care about what we're putting in our phones. That's why we're tracking where our phone's parts come from and creating demand for materials that are better for people and planet.

The materials that go into your phone have an impact on people and the planet. We want to go straight to the source to make sure we're creating positive change.



### Industry first: Fairtrade gold certification

Gold is one of our key focus materials - an essential, but problematic material for the electronics industry.

[Read all about it >](#)



### In-depth: Materials scoping study

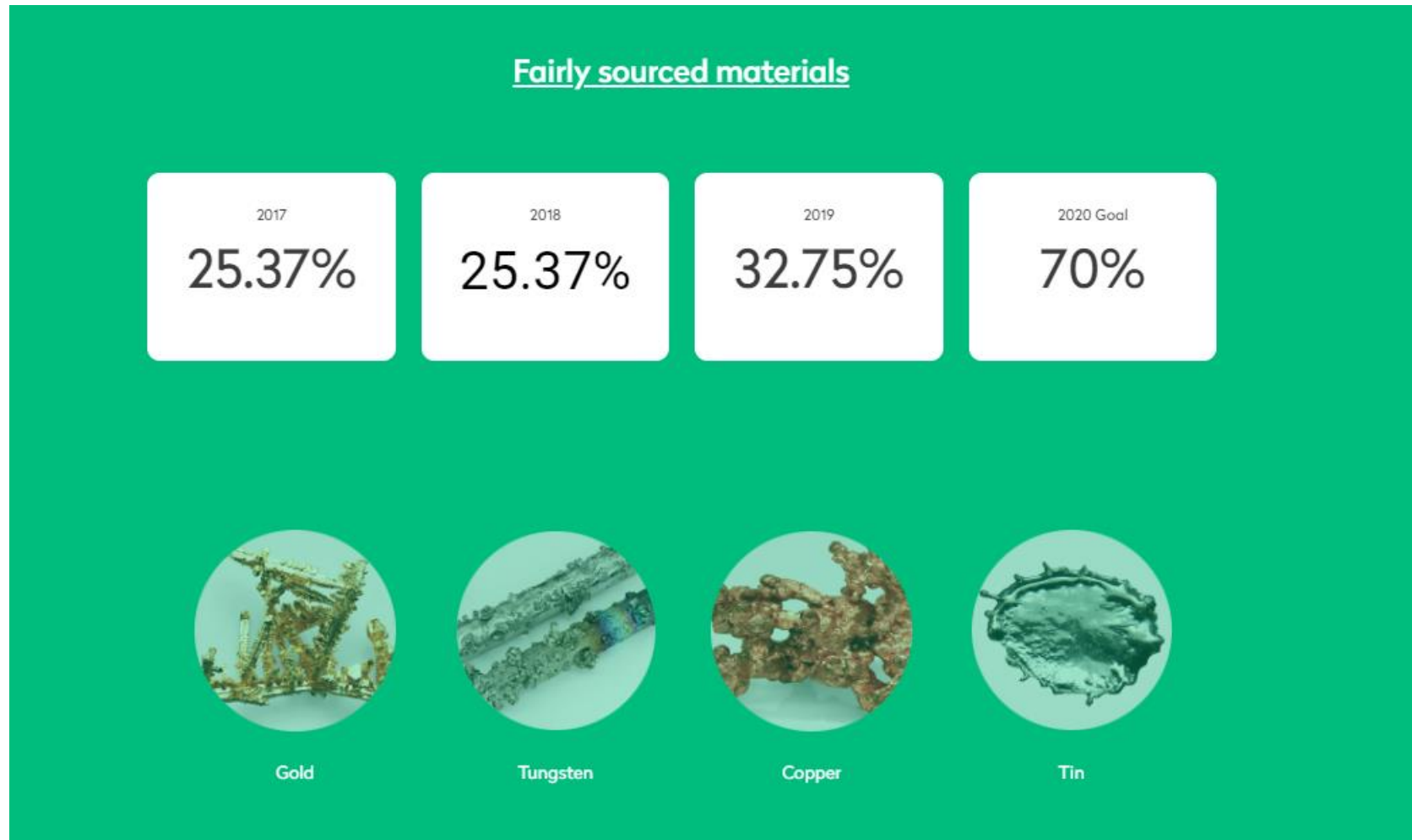
We started by looking at which materials are most used by the consumer electronics industry and how critical they are for phone functionality.



### Precious materials: From the earth to your phone

How do we go from sourcing materials to the assembly of the actual phone? Find out in one of our earliest blog articles.

# Responsible sourcing



# Modular design

This is how Fairphone is changing the electronic industry from the inside out



## Modular design makes a real difference

The Fairphone 2's modular design offers major benefits at every stage of its life. During the refurbishing process, it makes the phone easier to open and disassemble, saving time and reducing complexity when it comes to replacing parts. And modularity means you can also do repairs yourself to keep your phone in great condition for longer. Finally, it increases yields and efficiency during the recycling processes, allowing us to reuse the materials again and again.



# Fairphone 3 – modularity, durability, reparability

## Responsibly sourced materials

The Fairphone 3 supply chain contains Fairtrade gold, recycled copper, conflict-free tin and more.

## Modularity leads the way

6 easily replaced modules boost the Fairphone 3's longevity and minimize its footprint.

EcoVadis gold medal for sustainability, putting us in the top 1% of our industry.



We are the first smartphone company to support living wages for workers at our final assembly partner; we pay factory workers a bonus of €1.85 per Fairphone 3.

## Built to last: perfect 10 iFixit score

The only smartphone in the world to be awarded a perfect score for reparability.

B Corporation certified for using our business to address social and environmental issues.



# Further progress in upgradability

## Fairphone's new flagship, the 3+, costs just €70 as a modular upgrade

Natasha Lomas @riptari / 11:00 AM GMT+2 • August 27, 2020

Comment



“What we’ve been able to do is get that whole idea of plug and play to the consumer within the smartphone business,” says Fairphone co-founder **Bas van Abel** .

“That part is not trivial because you have to imagine that getting everything into that module and being able to put it into the old phone... Not only the hardware has to fit and everything has to connect in the right way in that previous kind of architecture but also the software.

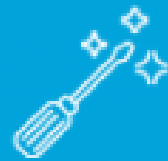
“But we’ve been able to do that, and it took some time but we’ve done it way faster than we were able to do it with the Fairphone 2. So we’re proud of that as well.”

“The most important part is it’s really also a signal towards the industry that it’s possible to do upgrades with your phone and not have to come out with a totally new phone every year,”

# Serious end of life approach

We make and sell phones. We take recycling seriously.

Find out what happens to your phones once they reach our recycling partner.



A simple repair like a new screen or battery is often all that's necessary to bring an old phone back to life!

## 55% get a new life

Phones that are still usable first get their data scrubbed. Then they're refurbished and sold through a trusted partner so that someone else can enjoy them.



There is 100 times more gold in a ton of e-waste than in a ton of gold ore!

## 45% are safely recycled

Phones that are no longer functional go to a European recycling facility where they're processed to recover the valuable resources inside.

Together, we can help cut down e-waste

Find an old phone you're not using, and send it our way.

# FaaS

## FAIRPHONE-AS-A-SERVICE BUSINESS MODEL

Table 1: Fairphone-as-a-Service vs Lease

Fairphone-as-a-Service	Lease
Focus on the service and experience	Focus on the product
Cash flow based financing (i.e. portfolio of contracts is key)	Asset based financing (i.e. collateral value of asset is key)
Possible for assets of medium to low value (e.g. like phones, consumer appliances, jeans)	Typically for assets of high value (e.g. cars, ships, heavy machinery)
Reuse opportunity (i.e. multiple uses and incentive to add value for successive use cycles)	Resale opportunity (i.e. single use and resale of assets on the 2nd hand market with no incentive for circular activities)



### MODULARITY

PREEMPTIVE MAINTENANCE

MODULE MANAGEMENT

TRACKING DEVICES, COMPONENTS, RESOURCES

### CIRCULAR SERVICE CONTRACT

### FINANCIAL MODEL

Aug 28, 2019, 02:57am EDT

# How Fairphone Beats Apple, Samsung And The Rest With The 'World's Most Sustainable' Phone



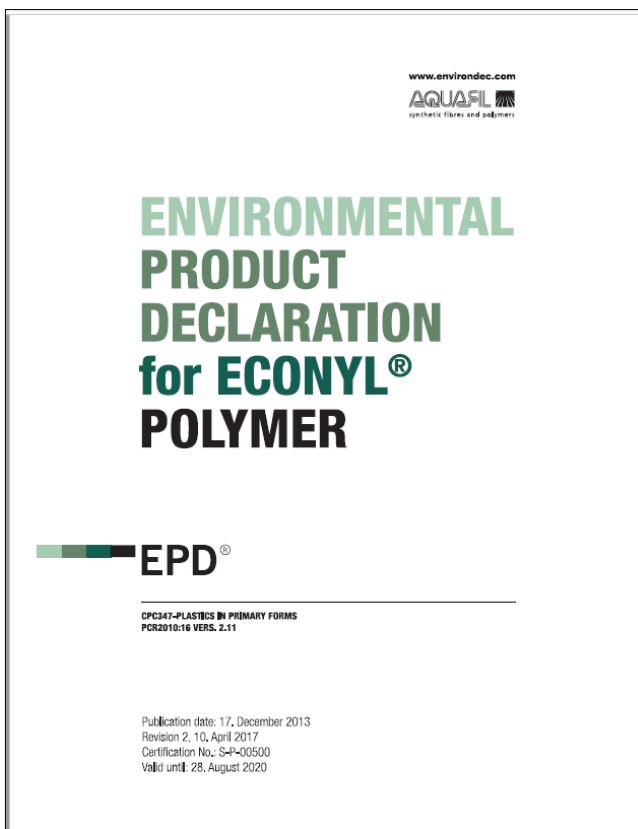
**Jeroen Kraaijenbrink** Contributor ⓘ

Leadership

*I write about leadership and strategy in the age of too much*

# Two more remarkable examples

# Two different approaches: chemical and mechanical recycling



## THE FUTURE IS CIRCULAR



ECONYL® regenerated nylon is a product that can help you close the loop. Made from waste, it's infinitely recyclable and can unleash infinite possibilities for makers, creators and consumers. It's all part of the ECONYL® brand vision to make the world a better place by pioneering closed loop regeneration processes and delivering sustainable products.

**“When I see a landfill, I see a goldmine.”**

Giulio Bonazzi, Aquafil's president and CEO, is a relentless innovator. And ECONYL® regenerated nylon is his dream that became a reality after four years of tireless research and development.



## Reference

# Aquafil partner and supplier of Interface



27 Aug 2019

**Interface redesigns Rolls-Royce's Data Experts Office in Derby. The carpet tiles are made with ECONYL® yarn.**

Modular flooring manufacturer Interface partnered with the design company Source8 to redesign Rolls-Royce's Data Experts Office in Derby. The challenge was to transform the 1,700m2 Data Experts Office, which covers one floor, into a multifunctional hub of creativity and productivity, creating a balance between the company's heritage – Rolls Royce established over 100 years ago [...]

[read more →](#)

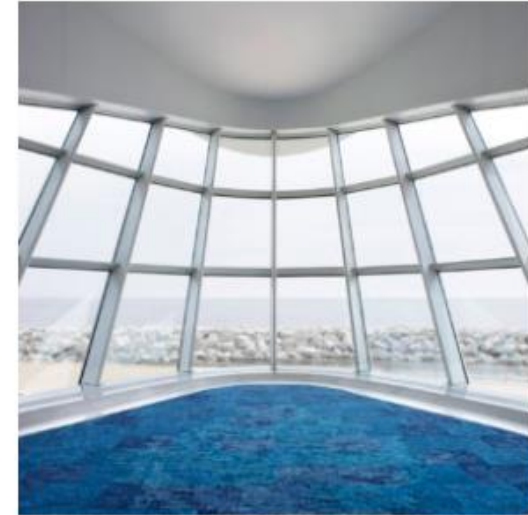


07 Jan 2014

**Interface: HUMAN NATURE™ COLLECTION**

Interface has been providing the carpet industry with premium products inspired by the earth's natural habitats for years. The 2014 Human Nature™ Collection by Interface is no exception. The collection, made with 100% regenerated ECONYL® fiber is made from 81% total recycled content. These innovative designs leave consumers and designers feeling as if they are [...]

[read more →](#)



04 Jan 2014

**Interface: NET EFFECT™ COLLECTION**

Interface is breaking through to new levels of environmental and social responsibility, sustainability and the next wave in product design. The Net Effect™ collection, made with 100% regenerated ECONYL® yarn, is inspired both by the ocean's life-giving power and its plight – marine life and habitats that are endangered by discarded fishing nets, acidification, over-fishing, [...]

[read more →](#)



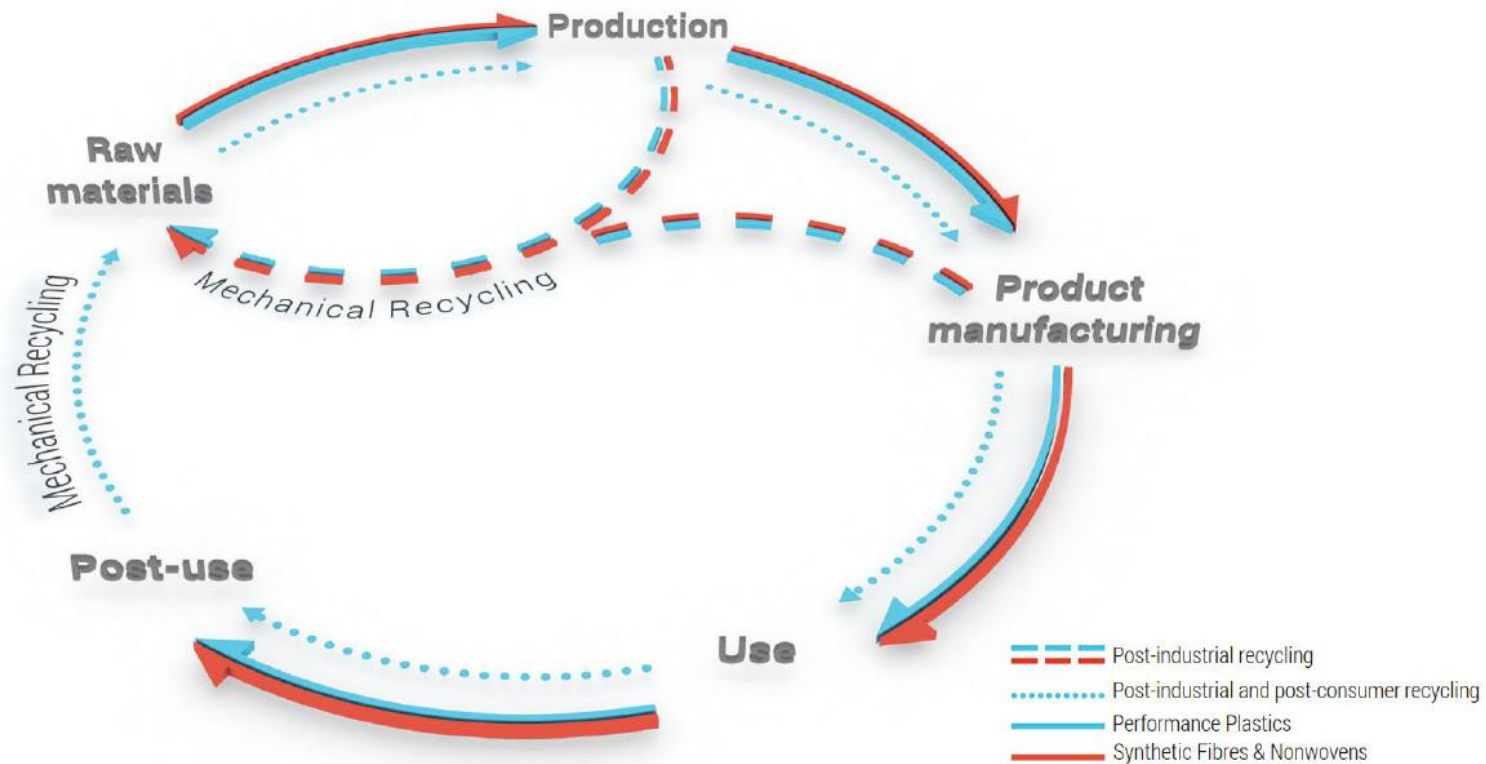
# Tarkett et Aquafil annoncent une avancée majeure pour le recyclage des dalles de moquette

🕒 21/11/2019 14:12 | ☰ Boursier | 👤 1248 | ★ Aucun vote sur cette news

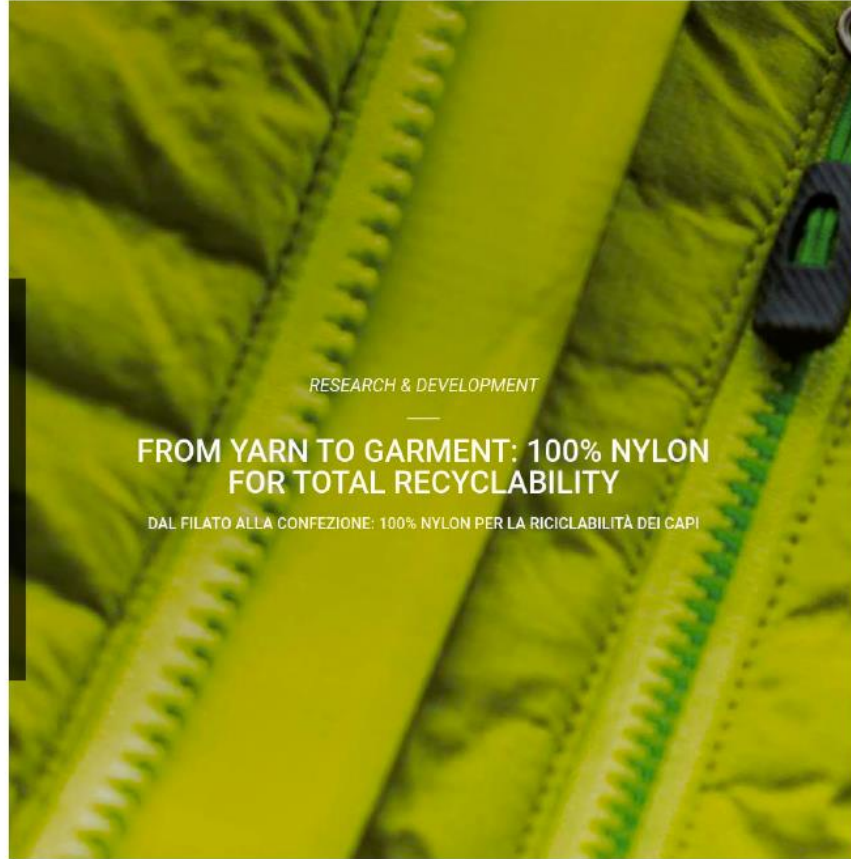


*Tarkett annonce aujourd'hui boucler la boucle du cycle de vie des dalles de moquette commerciale en Europe grâce à un partenariat inédit avec Aquafil...*

# CIRCULAR ECONOMY@RADICIGROUP



# “100% Nylon for the eco-design of the materials of the future”



## OUR TEAM

### A 100% NYLON, 100% RECYCLABLE GILET FOR THE RADICIGROUP SKI CLUB

UN GILET 100% NYLON, 100% RICICLABILE PER LO SCI CLUB RADICI GROUP



Introducing a new gilet made exclusively for the RadiciGroup Ski Club, but designed to soon become a “must have” garment for athletes and casual skiers alike.

The gilet is made of RadiciGroup **Raditek® Fine** yarn - a high-tenacity polyamide yarn patented for high technology applications, such as sails and parachutes - which endows the fabric with high tear and abrasion resistance, while keeping it lightweight (less than 40 gr/sqm of fabric). Furthermore, the yarn was developed to resist UV radiation and maintain its performance characteristics unchanged over time.

The fabric was woven in Germany, whereas all the other processing was done in the Region of Lombardy, Italy. Moreover, the fabric was enhanced with a PFC-free anti-drop treatment. The gilet features fibreball insulation with siliconized **Radilon®** staple fibre, another RadiciGroup product. This filling is an excellent alternative to goose down, provides effective warmth, and is lightweight and hypoallergenic.

As for the accessories, the zipper was made of polyamide, while the ropes were made of nylon with a minimal percentage of elastomer, so as not to jeopardize recyclability.

The clothing item was devised, designed and made according to the ecodesign concept: at the end of its useful life, the gilet will be shredded, ground, thermomechanically extruded, and finally compounded to give life to a new plastic material. In fact, one of the most important challenges today for RadiciGroup is to process all textile scraps and recycled materials into new plastic: this is the only way for the synthetic fibre textile industry to be truly sustainable.

The above collaboration among highly specialized companies making up a short and sustainable production chain made it possible to produce a sportswear garment, not only combining technical performance with comfort, style and ease of maintenance, but also incorporating a second life.

# Main components of a jacket

Part Number	Part identification	Meting T (°C)	Cristallization T from melt (°C)	Note	Part Number	Part identification	Meting T (°C)	Cristallization T from melt (°C)	Note
<b>1</b>	FILLING	219	184	PA 6	<b>13</b>	STOPPER	216	185	PA 6
<b>2</b>	FLAG LABELS	221	142	PA 6 + altro che disturba la cristallizzazione	<b>14</b>	CARE LABELS	215	156	PA 6 / PA 6 copo
<b>3</b>	MAIN LABEL	169 - 218	175	PA 6 + altro	<b>15</b>	CARE LABELS	209	160	PA 6 copo
<b>4</b>	MAIN LABEL	219	148	PA 6 cristallizzazione rallentata	<b>16</b>	PATCH FLAG	225	177	PA 6
<b>5</b>	PLASTIC HOOK	219	182	PA 6	<b>17</b>	PATCH	222	173	PA 6
<b>6</b>	FABRIC	218	184	PA 6	<b>18</b>	ZIP	220	184	PA 6
<b>7</b>	FABRIC	221	175	PA 6	<b>19</b>	NEW LIGHT TYPE	218	181	PA 6
<b>8</b>	BEADS	217	184	PA 6	<b>20</b>	FABRIC	214	174	PA 6 + PUR
<b>9</b>	CORD	220	177	PA 6	<b>21</b>	LAMINATED FABRIC	220	176	PA 6
<b>10</b>	VELCRO	221	157	PA 6 modificato (lenta cristallizzazione)	<b>22</b>	LINING	223	179	PA 6
<b>11</b>	SEWING YARN	228	175	PA 6	<b>23</b>	MINISTOP	221	181	PA 6
<b>12</b>	PULLER+STRING BLACK	145	90	PP?					



# Circular Economy in Europe

# Circular Economy in Europe

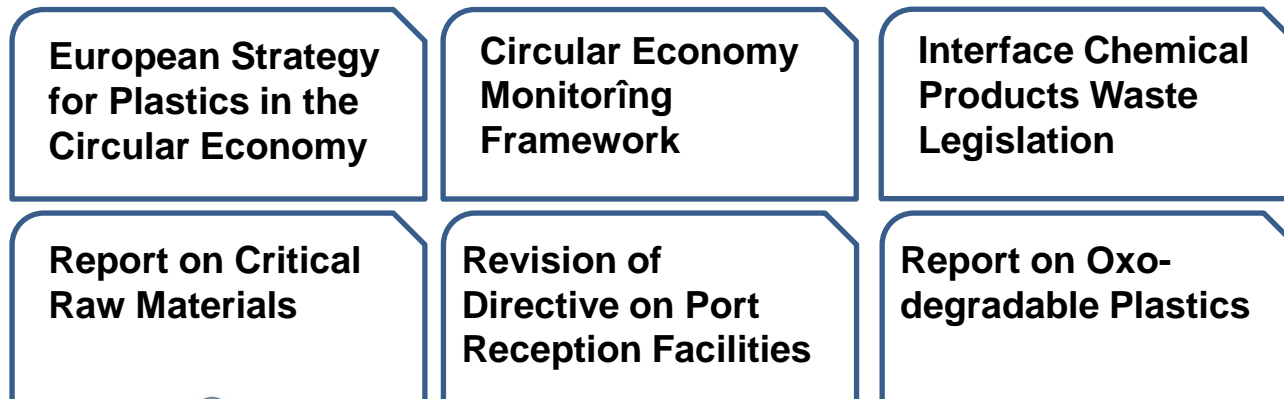
## Circular Economy Package 2015



Revised legislative framework entered into force in **July 2018**. It sets binding recycling and waste reduction targets and more stringent rules on waste management:

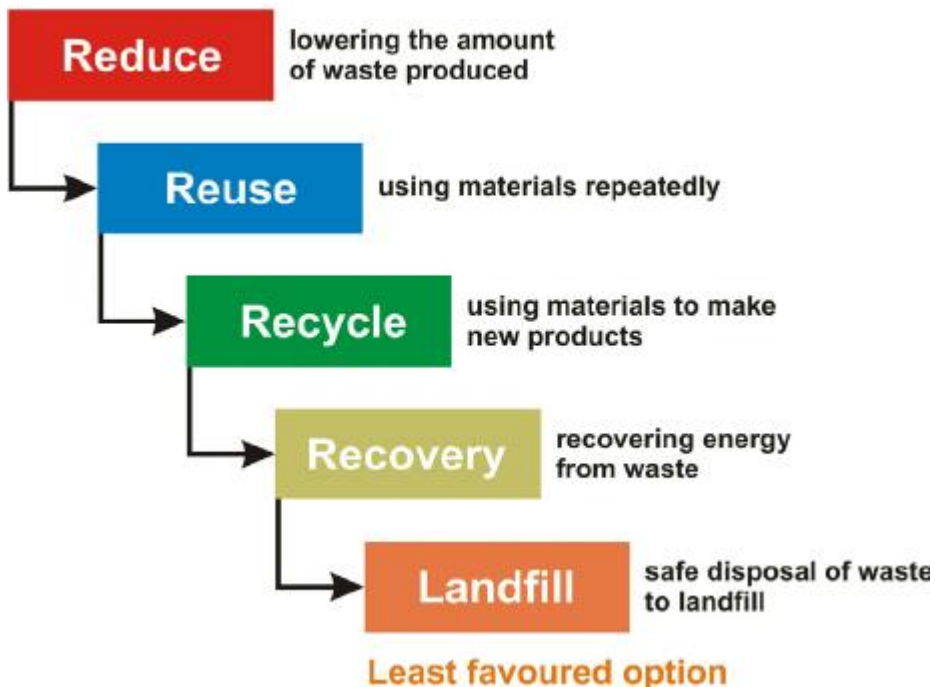
- Directive (EU) 2018/851 amending the **Waste Framework Directive** (2008/98/EC)
- Directive (EU) 2018/850 amending the **Landfill Directive** (1999/31/EC)
- Directive (EU) 2018/852 amending the **Packaging and packaging waste Directive** (94/62/EC)
- Directive (EU) 2018/849 amending the **End-of-life vehicles Directives** (2000/53/EC), the **Batteries and accumulators Directive** 2006/66/EC and the **WEEE Directive** (2012/19/EU – waste electrical and electronic equipment).

## Circular Economy Package 2018



# Updated legislative framework on waste

Most favoured option



Entered into force in **July 2018**. It sets binding recycling and waste reduction targets and more stringent rules on waste management:

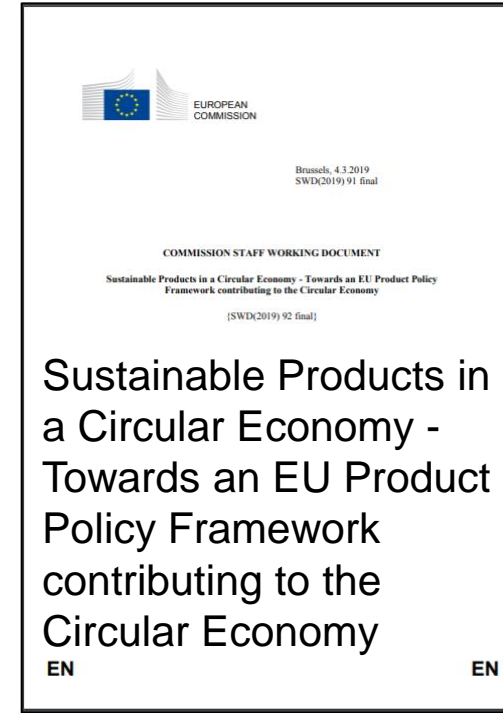
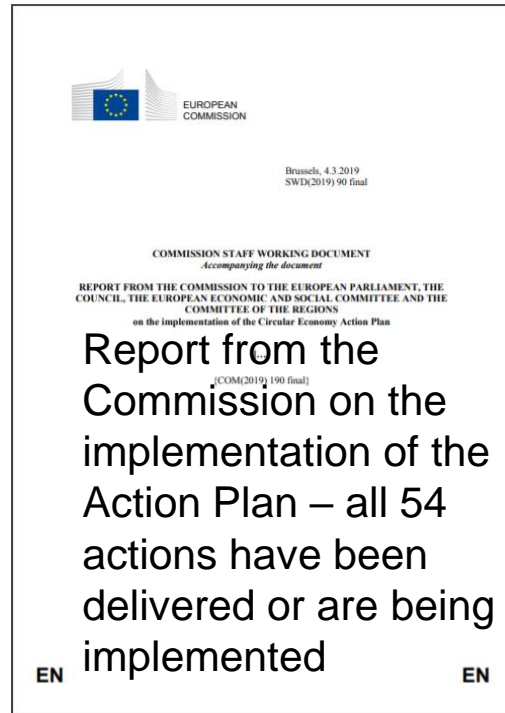
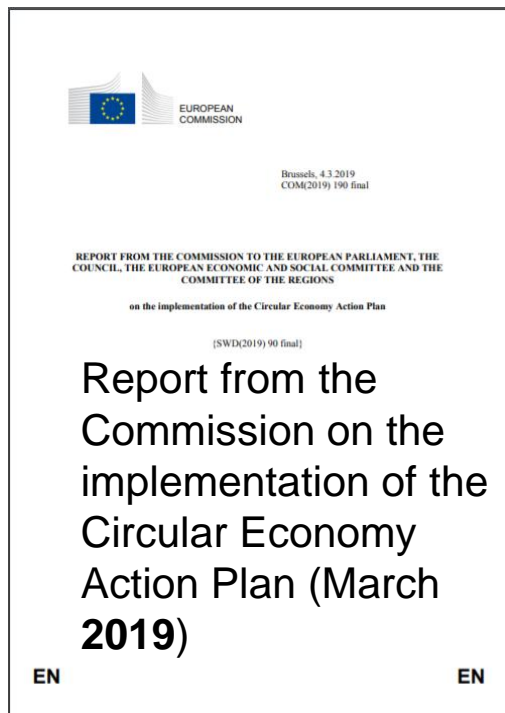
- Directive (EU) 2018/851 amending the **Waste Framework Directive** (2008/98/EC)
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# Plastics

**Directive (EU) 2019/904 of the European Parliament and of the Council of 5 June 2019 on the reduction of the impact of certain plastic products on the environment (Text with EEA relevance)**

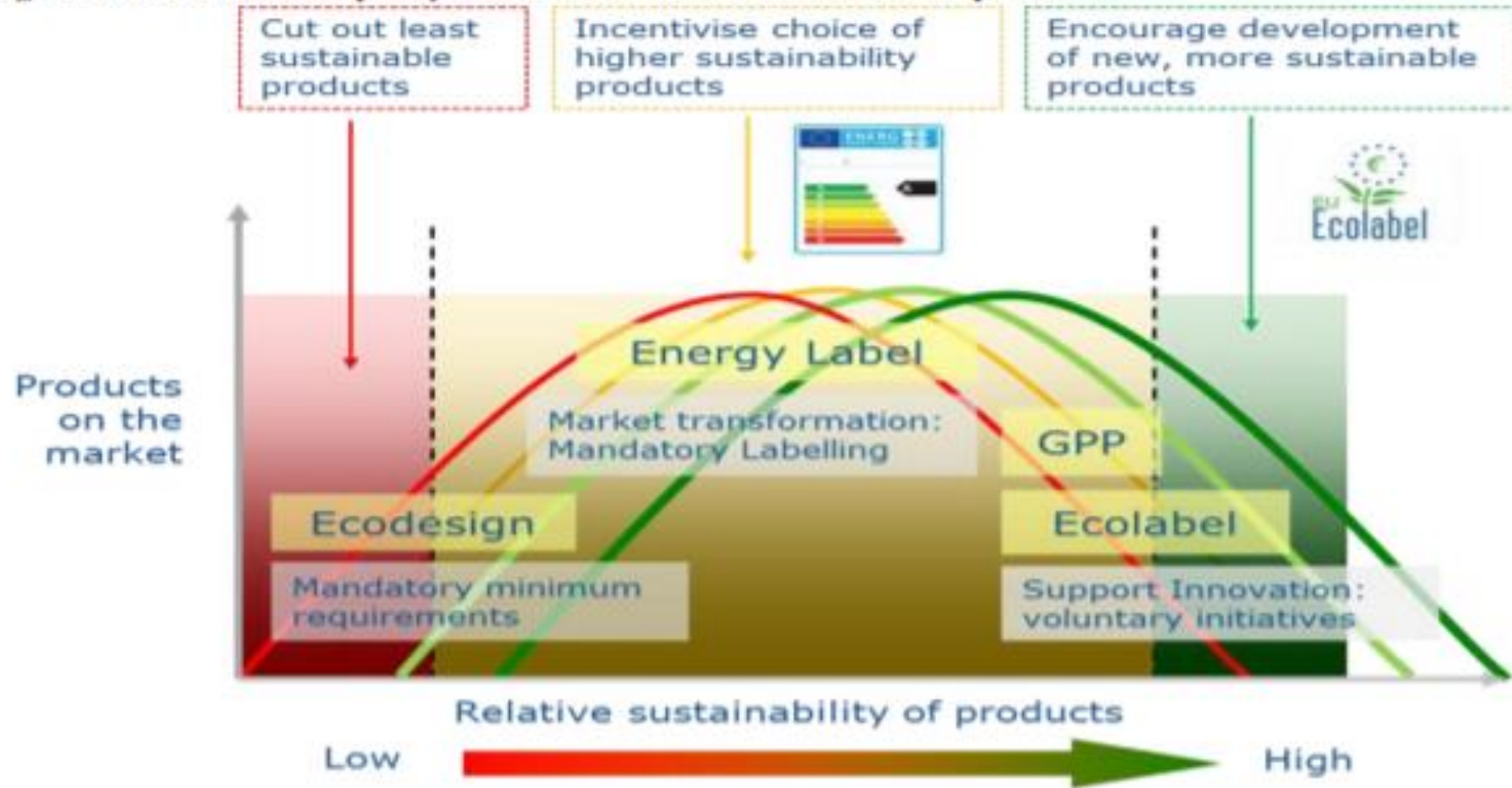


# CE in Europe: updates 2019



# Supporting sustainable products

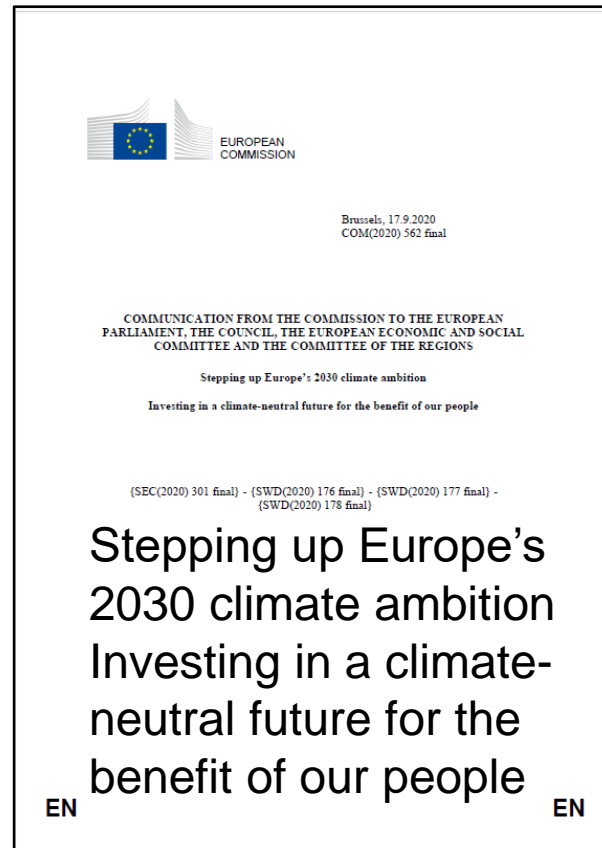
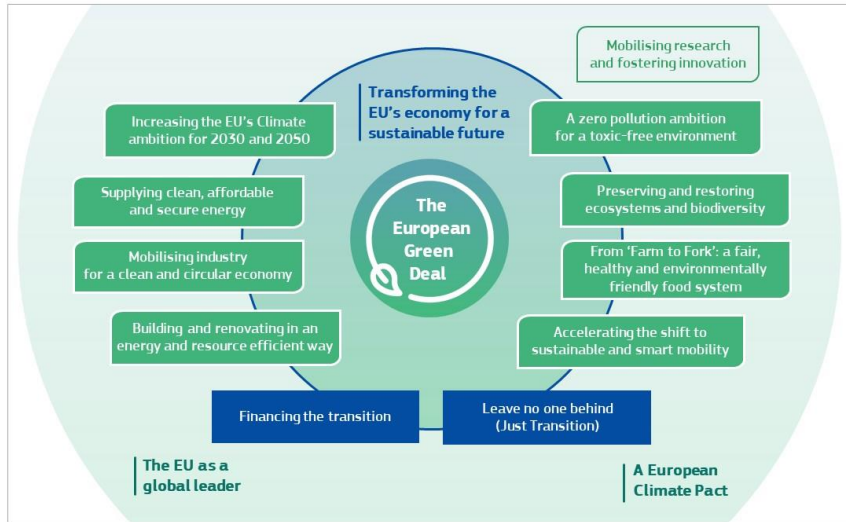
Figure 1: Illustration of policy instruments aimed at sustainable products



# EU Green Deal – December 2019



# Stepping up Europe's 2030 climate ambition – September 2020



Presents an EU-wide, economy-wide **greenhouse gas emissions reduction target by 2030 compared to 1990 of at least 55%** including emissions and removals..

The unprecedented European economic response to COVID-19 offers a unique opportunity to accelerate the transition to a climate-neutral economy investing in the necessary transformation and ensure it takes place in a just and socially fair manner. Next Generation EU and the Multiannual Financial Framework for 2021-2027, with their combined weight of over 1.8 trillion euros, provide significant firepower to help deliver the twin green and digital transitions that Europe aspires to.

# Green Deal – strong connections with CE

**Sustainable industry**  
The European Green Deal

December 2019  
#EUGreenDeal

Achieving the EU's climate and environmental goals requires a new industrial policy based on the circular economy.

3x From 1970 to 2017, the annual global extraction of materials tripled and it continues to grow.  
Source: The International Resource Panel, *Global Resource Outlook*, 2019

90% More than of biodiversity loss and water stress come from resource extraction and processing.  
Source: The International Resource Panel, *Global Resource Outlook*, 2019

20% EU's industry accounts for 20% of the EU's emissions.  
Source: European Commission, *EU Climate Action Progress Report 2018*

12% Only 12% of the materials used by EU industry come from recycling.  
Source: Eurostat, 2018 figures

In March 2020, the EU will adopt an industrial strategy that will support the green transformation.

- Industries must be helped to modernise and exploit opportunities domestically and globally.
- A key aim will be to stimulate the development of new markets for climate neutral and circular products.

The decarbonisation and modernisation of energy-intensive industries such as steel and cement is essential.

The Commission will make a proposal to support zero carbon steel-making by 2030.

**From Farm to Fork**  
The European Green Deal

Farmers and fishermen are key to managing the transition

The European Commission will work with Member States and stakeholders to:

- Ensure the transition is fair and just for everyone working in the European agricultural and maritime sector;
- Reduce significantly the dependency, risk and use of chemical pesticides, as well as of fertilisers, antibiotics;
- Develop innovative farming and fishing techniques that protect harvest from pests and diseases.

Farm to fork will also help combat food fraud by preventing, detecting and fighting it through coordination with Member States and non-EU countries.

Imported food products from third countries must comply with the EU's environmental standards.

Farm to Fork will contribute to achieving a circular economy – from production to consumption:

- Better informed citizens
- More efficient food production systems
- Better storage and packaging
- Healthy consumption and reduced food loss and waste

Working with Member States to ensure national strategic plans for agriculture should fully reflect the ambition of the European Green Deal and the Farm to Fork Strategy.

**Building and renovating**  
The European Green Deal

December 2019  
#EUGreenDeal

Start a 'renovation wave'

The construction, use and renovation of buildings require significant amounts of energy and resources, such as sand, gravel and cement.

Buildings account for 40% of energy consumed  
Source: Eurostat, *Energy Statistics 2019 edition*, final energy consumption in year 2017

The current rates of renovation of public and private buildings should at least double

Better energy performance of buildings

- Prices of different energy sources should incentivise energy-efficient buildings
- Design of buildings should be in line with the circular economy
- Increased digitalisation
- More climate-proofing of buildings
- Strict enforcement of rules on energy performance of buildings

# Green Deal – strong connections with CE

**EU Energy System Integration Strategy**  
#EUGreenDeal  
8 July 2020

This strategy will profoundly reform the European energy system. We are designing a more **efficient** and **integrated system** that links energy sources and infrastructure to support decarbonisation and build a **climate neutral EU** by 2050. It will help to build **modern infrastructure**, make European industry more **sustainable and competitive**, create **jobs**, and provide **clean energy** for citizens.

**The energy system today** : linear and wasteful flows of energy, in one direction only

**Future EU integrated energy system** : energy flows between users and producers, reducing wasted resources and money

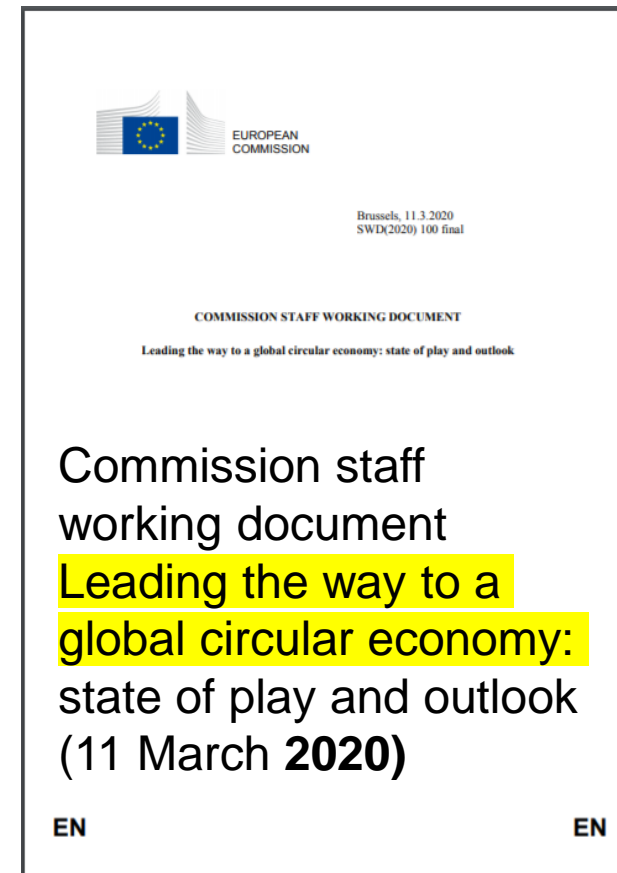
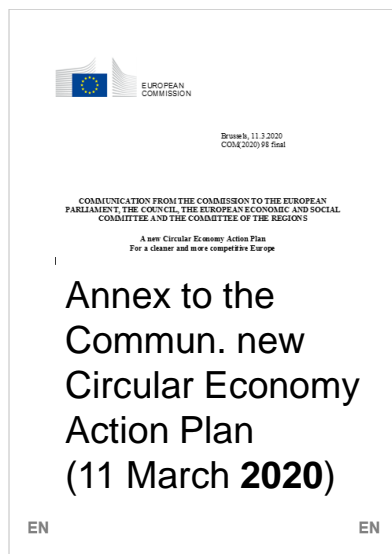
An Integrated EU Energy System will have **three main characteristics**:

- A more **efficient** and **"circular"** system, where waste energy is captured and re-used for heating of buildings and transport.
- A **cleaner fuel system**, for hard-to-electrify sectors like heavy industry or transport

**Main points of the proposal**

- **Create a more circular energy system.** Too much energy or resources are wasted in our current system. We require a new approach to reduce these losses and direct them to other purposes.
  - Promote energy efficiency
  - Encourage the reuse of waste heat from industrial sites and data centres
  - Improve synergies between energy infrastructures with the revision of the **Trans-European Network in Energy Regulation**
  - Incentivise the use of agriculture residues to produce sustainable biogas and biofuels
- **Accelerate the use of electricity produced from renewable sources.** To meet our emissions reduction goals we need to generate more electricity from renewables to power buildings, industry, and transport, which traditionally relied on fossil fuels.
  - Increase the generation of renewable electricity
  - Increase the use of renewable electricity in buildings, transport and industry for instance through heat pumps, electric vehicles and furnaces
  - Accelerate the development of charging stations for electric vehicles and the injection of renewable electricity in the network
- **Promote renewable and low-carbon fuels, including hydrogen, for sectors that are hard to decarbonise.** Some sectors, like heavy transport and industry, are harder to convert to electricity, so we need to invest in cleaner fuels to power them.
  - Unlock the potential of sustainable biomass and biofuels, green hydrogen, and synthetic fuels
  - Enable carbon capture, storage and use to support deep decarbonisation, for example in cement production
  - Clearly define and classify different fuels to support market uptake and transparency
  - Promote innovative projects based on low-carbon fuels, such as hydrogen-fuelled clean steel plants
- **Adapt energy markets and infrastructure to a more complex, integrated energy system.** In an integrated energy system, consumers and investors should be able to choose the option that best matches their need, based on prices that reflect the true cost and efficiency.
  - Ensure equal treatment for all energy carriers, making electricity and gas markets fit for decarbonisation, for example with respect to taxation
  - Better inform consumers about their options to interact with the energy market and the sustainability of the products they consume
  - Support digital energy services, including smart meters for homes and smart chargers for electric vehicles
  - Support research and innovation to create new synergies in the energy system

# CE in Europe: updates 2020



# CE in Europe: updates 2020

STUDY  
Requested by the IMCO committee




## Promoting product longevity

How can the EU product safety and compliance framework help promote product durability and tackle planned obsolescence, foster the production of more sustainable products, and achieve more transparent supply chains for consumers?



Policy Department for Economic, Scientific and Quality of Life Policies  
Directorate-General for Internal Policies  
Authors: J. Scott MARCUS et al.  
PE 648.767 - March 2020

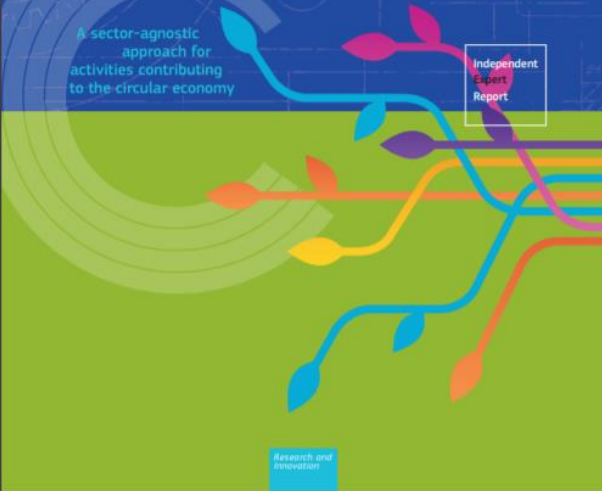
EN




## CATEGORISATION SYSTEM FOR THE CIRCULAR ECONOMY

A sector-agnostic approach for activities contributing to the circular economy

Independent Expert Report



Research and Innovation





## The EIB Circular Economy Guide

Supporting the circular transition



## >€1 TRILLION FOR <1.5°C

CLIMATE AND ENVIRONMENTAL AMBITIONS OF THE EUROPEAN INVESTMENT BANK GROUP



# EU CEAP 2020

## A new vision for Europe



### *35 actions along the entire life cycle of products, to:*

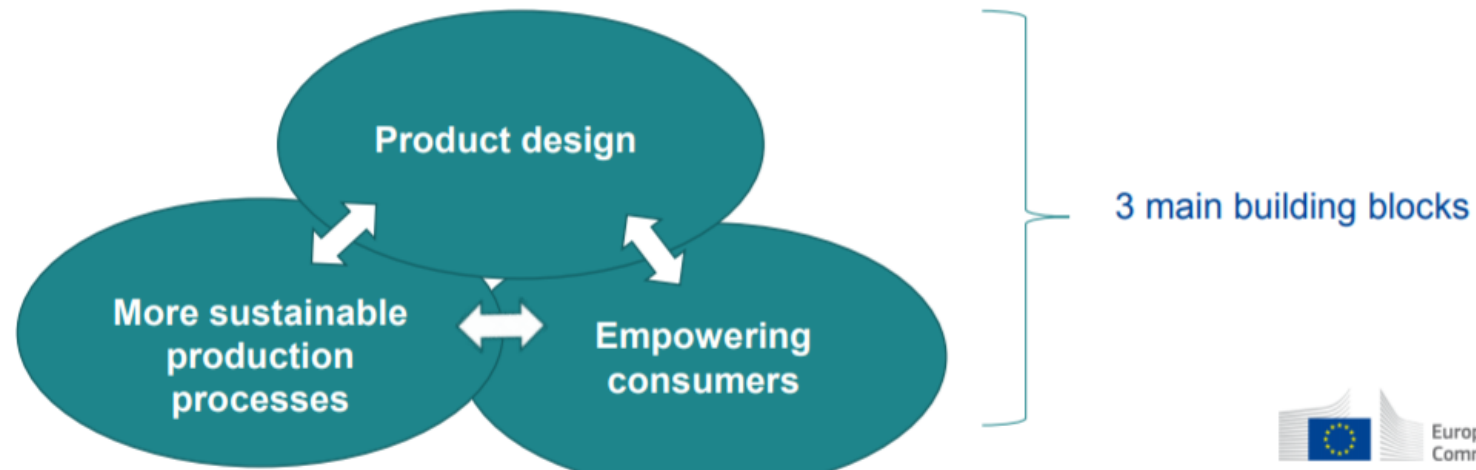
- Make **sustainable products** the norm in the EU
- **Empower** consumers and public buyers
- **Focus also on key product value chains:** electronics and ICT; batteries and vehicles; packaging; plastics; textiles; construction and buildings; food; water and nutrients
- Ensure **less waste**
- Make circularity work for **people, regions** and **cities**
- **Lead global efforts** on circular economy



# EU CEAP 2020

## Towards a Sustainable Product Policy Framework

- A new overarching framework addressing all products placed on the EU market, supporting more sustainable patterns of consumption and cutting waste by e.g. promoting better design
- A central role will be played by the **Legislative proposal for a sustainable product policy initiative**



# EU CEAP 2020

## Key product value chains



# EU CEAP 2020

## Less waste, more value



- Preventing waste from being created in the first place is key
- Once waste has been created, it needs to be transformed into high-quality resources

- Enhancing circularity in a toxic-free environment
- Working to create a well-functioning EU market for secondary raw materials



# EU CEAP 2020

## Making circularity work for people, regions and cities

A joint agenda, a transition where no one is left behind



Main actions:

- Revision of the Skills Agenda
- A new Pact for Skills
- Cohesion policy funds  
(to help regions implement CE strategies & reinforce their industrial fabric)
- Just Transition Mechanism
- Urban initiatives



**4 million jobs**

linked to the  
circular economy  
in the EU



European

# EU CEAP 2020

## Leading efforts at global level



- Global agreement on plastics
- Global Circular Economy Alliance
- Free trade agreements
- Outreach activities – e.g. Circular Economy Missions
- Regional focus: Africa, Western Balkans



[See Staff working document:  
'Leading the way to a global circular economy: state of play and outlook'](#)



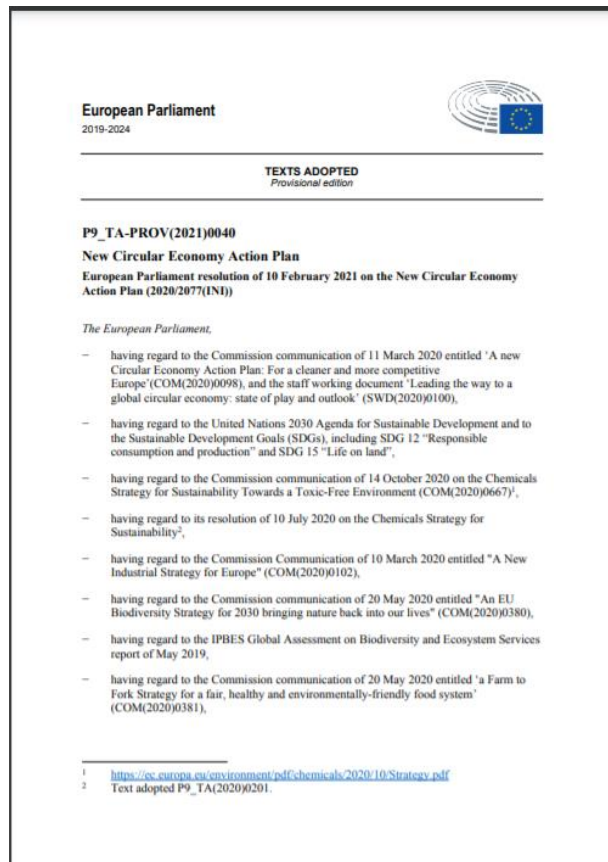
# EU CEAP 2020

## Monitoring progress

Measuring progress at EU and national level in the transition to a circular economy

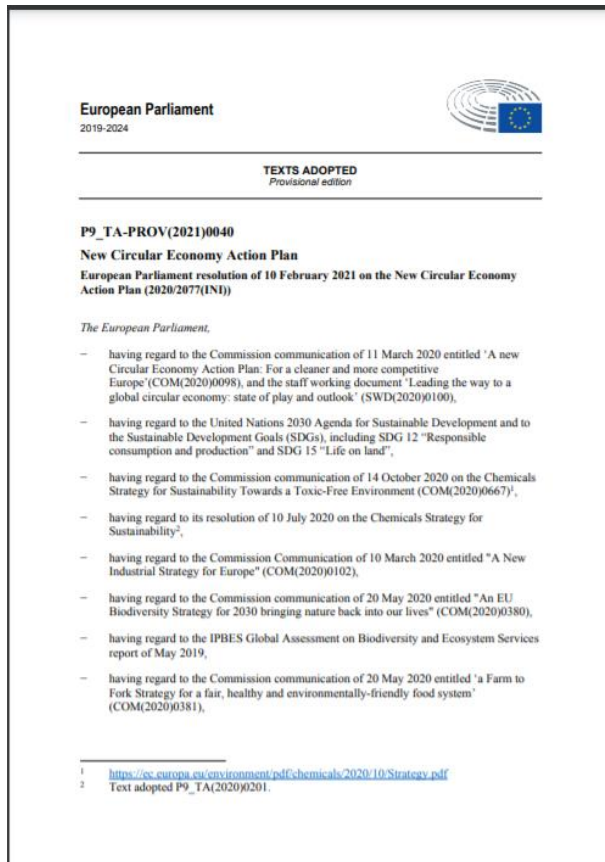


# European Parliament resolution of **10 February 2021** on the New Circular Economy Action Plan (2020/2077(INI))



- MEPs are looking to further **accelerate Europe's push against the throwaway economy**
- MEPs called for **the introduction of two legally binding targets to significantly reduce the EU's material and consumption footprints by 2030**. The targets would help curb Europe's consumption and material footprints, bringing consumption and production patterns within planetary boundaries by 2050
- MEPs recommend using legal and market instruments to **reduce costs of using recycled raw materials** (e.g. via product-specific legally binding targets for recycled content or a CO2 rewards system).
- MEPs call for **expanding the EcoDesign directive**, which demands *implementing recyclability already at the design stage* also for non-energy-related products such as packaging.

# European Parliament resolution of **10 February 2021** on the New Circular Economy Action Plan (2020/2077(INI))



Other notable amendments approved by the EU Parliament push for:

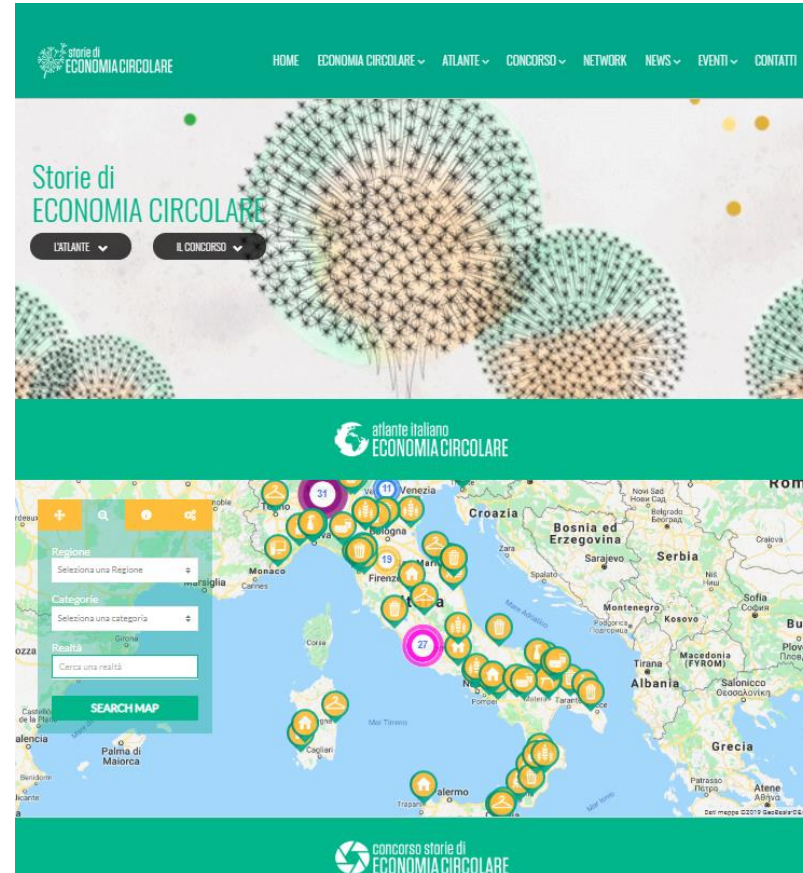
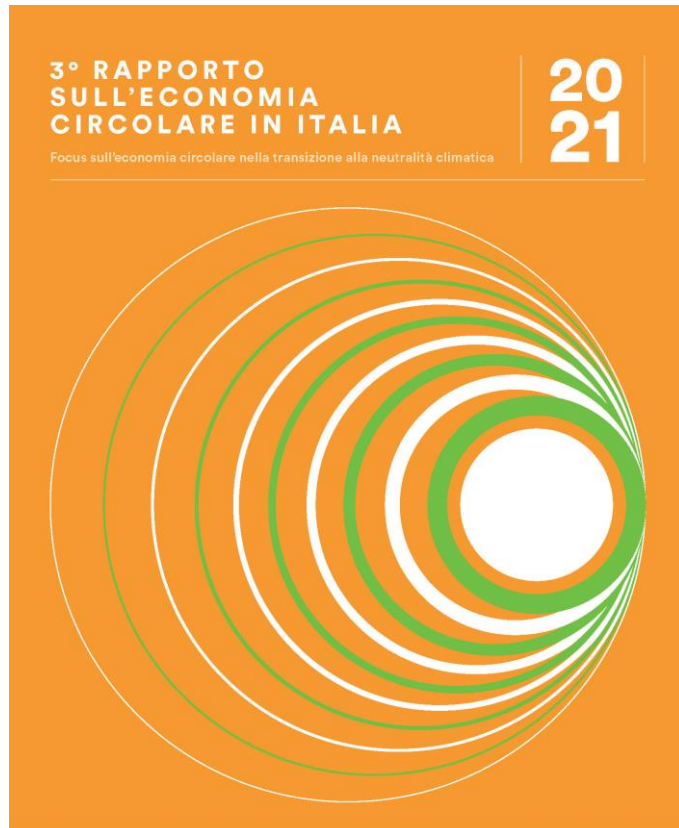
- An ambitious policy making **sustainable products placed on the EU market the norm** and the affordable choice. In this regard, MEPs support the development of a **product passport**;
- Measures aimed at putting an **end to planned obsolescence** in everyday products.
- **Binding targets to reduce and cap the generation of waste**, and to prevent waste. The Parliament also wants an additional target to boost the preparation of products for reuse
- Measures aimed at **reducing waste incineration and landfilling**. These include a 10% landfill target to be set on a baseline year and kg of waste per person a year in order to prevent diversion from landfilling to waste incineration

# Circular Economy in Italy

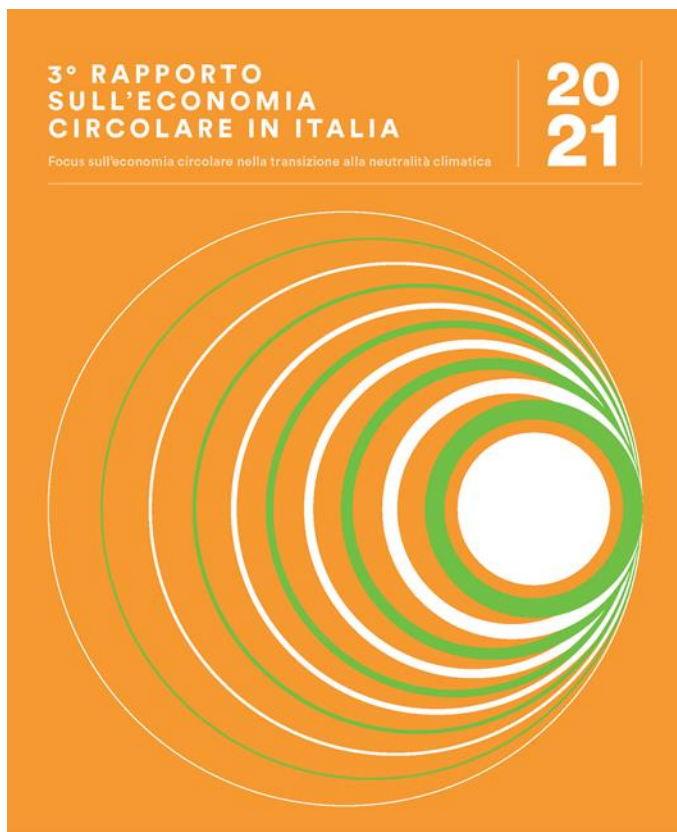
# Circular Economy in Italy

<https://circularenetwork.it/> / <http://www.economicircolare.com/>

[http://www.symbola.net/assets/files/100storie\\_DEF\\_Web\\_pag%20singole\\_25-05-18\\_1527247969.pdf](http://www.symbola.net/assets/files/100storie_DEF_Web_pag%20singole_25-05-18_1527247969.pdf)



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# Circular Economy in Italy

Rapporto sull'Economia Circolare in Italia – 2021 – Home page

<https://circulareconomynetwork.it/rapporto-2021/>

# Areas of excellence

Packaging recycling



Biogas and composting



Tackling food waste



Second Hand Goods Market



# Packaging (and more): a network of consortia

- CONAI, Consorzio Nazionale Imballaggi, coordinates the activities of collection and recycling of six packaging materials: steel, aluminium, paper and cardboard, wood, plastics and glass
- Over **850.000 enterprises**, producers or users of packaging, are affiliated to CONAI
- CONAI collaborates with Municipalities (7.000) according to specific agreements governed by the ANCI-CONAI National Framework Agreement
- CONAI directs the activities and guarantees the recovery results of **6 Consortia**: steel (Ricrea), aluminium (Cial), paper/cardboard (Comieco), wood (Rilegno), plastic (Corepla) and glass (Coreve),



209 companies  
47.800 tons (68.8%)  
recycled in 2017



3.400 companies  
3.2 M tons (80%)  
recycled in 2017



2.606 companies  
1 M tons (43%)  
recycled in 2017



73 companies  
1,77 M tons (73%)  
recycled in 2017



281 companies  
0.36 M tons (75%)  
recycled in 2017



2.637 companies  
1 M t recycled  
material (60%) 0.73  
Mt regenerated pallets



# Imballaggi: dati 2018/2019

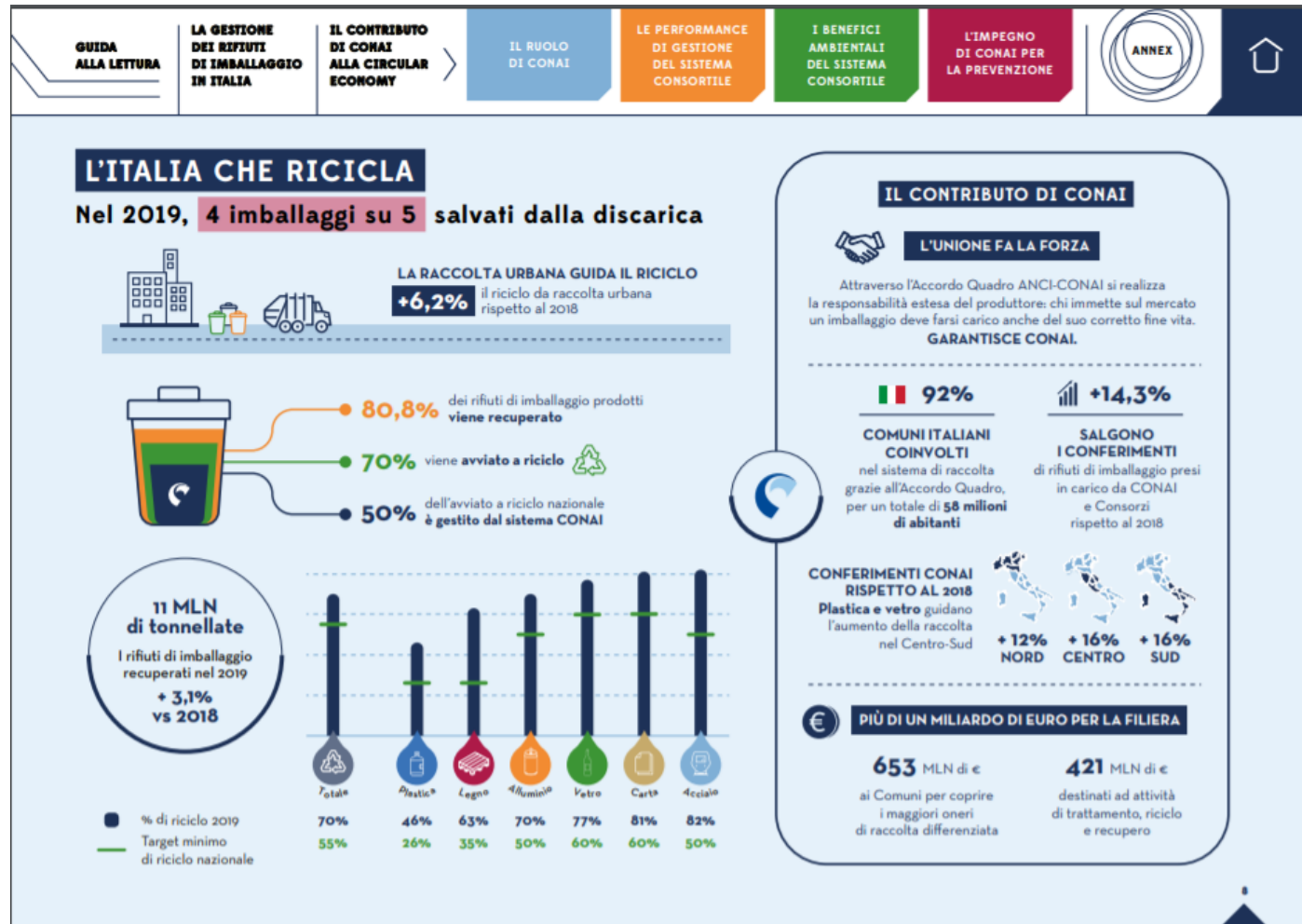


**Tabella 1** Avvio a riciclo degli imballaggi (kt e % su immesso al consumo) - 2018/2019

	2018		2019		Variazione % delle quantità 2019/2018	Variazione punti percentuali 2019/2018
	kt	%	kt	%		
Acciaio	387	79	399	82	3	4
Alluminio	54	78	51	70	-5	-8
Carta	3.981	80	3.989	81	0	1
Legno	1.945	62	1.997	63	3	1
Plastica	1.005	44	1.054	46	5	2
Vetro	1.886	73	2.069	77	10	4
<b>Totale</b>	<b>9.258</b>	<b>70</b>	<b>9.559</b>	<b>70</b>	<b>3</b>	<b>0</b>

Fonte: Elaborazione Fondazione per lo sviluppo sostenibile su dati CONAI

# CONAI Green report 2019

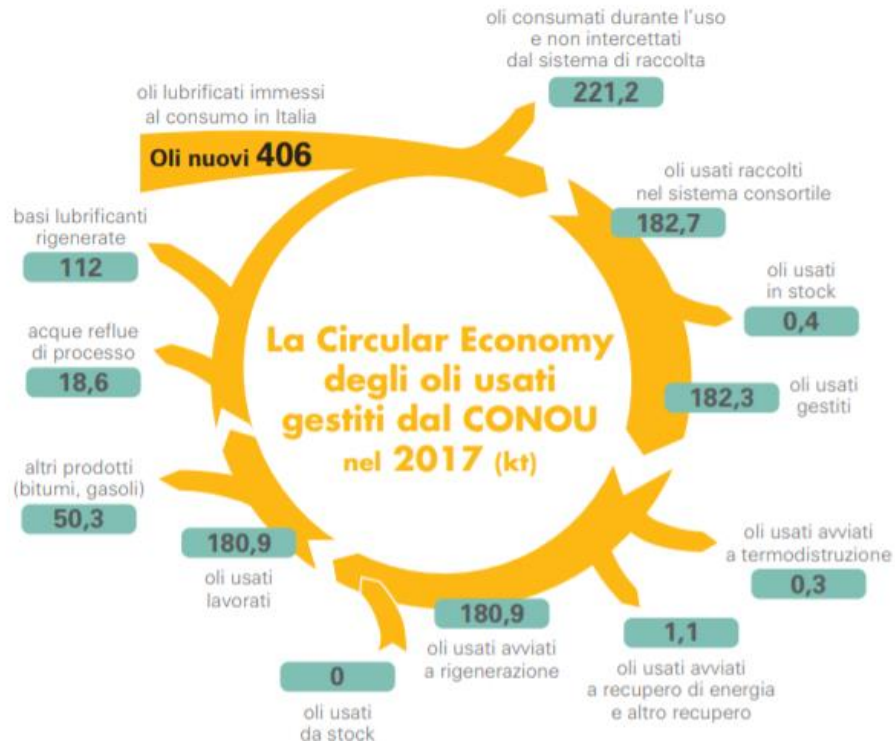


# Other important consortia



**CONSORZIO NAZIONALE PER LA GESTIONE, RACCOLTA E TRATTAMENTO DEGLI OLI MINERALI USATI**

74 collecting companies  
3 regeneration plants



- 296.000 tons collected in 2017 (36%)
- 4,076 collection points

- 218.000 tons (industrial accumulators) treated in 2017 (72%)
- 9.500 tons (batteries and portable accumulators) collected in 2017 (37%)



# BIOGAS in Italy

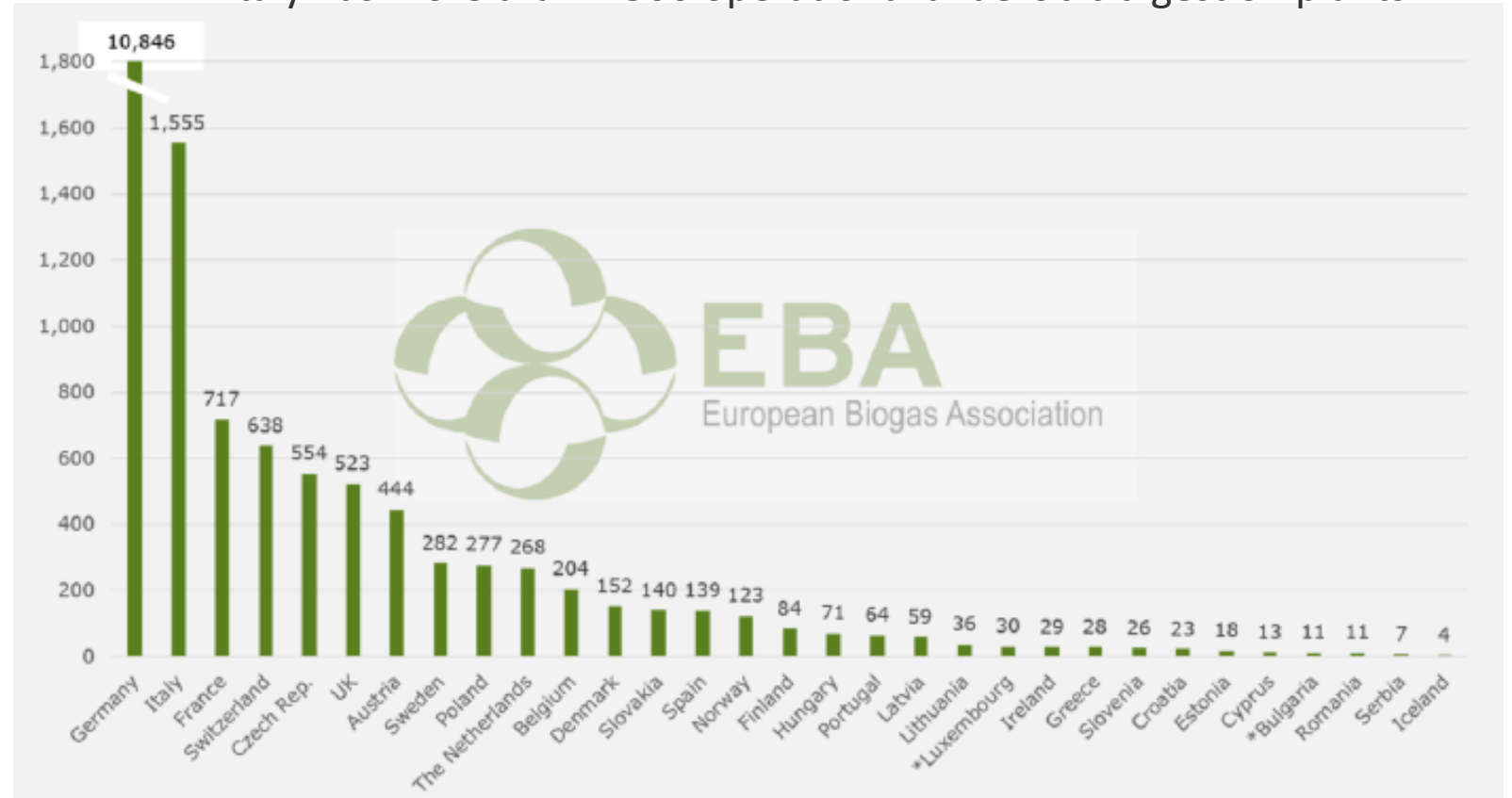
Italy has more than 1 500 operational anaerobic digestion plants



Over 700 members

128 members

The Italian biogas sector is the second largest agriculture biogas sector worldwide after Germany and has significant potential for further development



The highest soil usage efficiency (lowest amount of arable land needed), is achieved by the **Biogasdoneright (BDR)** approach. BDR uses large shares of **integration biomasses** (i.e. sequential crops harvested as silages before or after main crops; livestock effluents and agriculture residues and agro-industrial by-products) over a small amount of monocrop biomass for feeding the anaerobic digestion (AD) plants

# BIOGAS in Italy: potential (\*)

In the next years for the Italian row crops and livestock sector (2/3 about of the Italian agriculture) a revolution is needed.

**BDR** is an important tool to improve the economics and sustainability of the farms and food sector

	2015	2020	2025	2030	2040	2050
BIOMETHANE FROM OMW	500,000,000	650,000,000	750,000,000	900,000,000	1,200,000,000	1,500,000,000
AGRICULTURAL BIOMETHANE	2,000,000,000	3,550,000,000	5,500,000,000	8,000,000,000	13,000,000,000	18,500,000,000
RENEWABLE GAS FROM NO BIOGENIC SOURCES AND BIOMETHANE FROM GASIFICATION			50,000,000	1,100,000,000	5,800,000,000	15,000,000,000
<b>TOTAL Nm<sup>3</sup> CH<sub>4</sub> bio</b>	<b>2,500,000,000</b>	<b>4,200,000,000</b>	<b>6,300,000,000</b>	<b>10,000,000,000</b>	<b>20,000,000,000</b>	<b>35,000,000,000</b>
<b>TWh th</b>	<b>25</b>	<b>42</b>	<b>63</b>	<b>100</b>	<b>200</b>	<b>350</b>
	2015	2020	2025	2030	2040	2050
<b>BEST PRODUCTION COSTS PROJECTION FOB ANTE GRID INJECTION</b>						
AGRICULTURAL BIOGAS ( MWh th )	€ 60	€ 50	€ 45	€ 40	€ 35	€ 30
AGRICULTURAL BIOMETHANE ANTE INJECTION ( €/MWh th )	€ 75	€ 62	€ 56	€ 50	€ 43	€ 37
RENEWABLE GAS ( €/MWh th )			€ 100	€ 70	€ 60	€ 50

The Italian Biomethane decree signed **on March 2, 2018** (which allocates **4.7 billion EUR** of funds) aimed at promoting the production of biomethane to increase the share of green fuels in the transportation sector in Italy

(\*) Source: Stefano Bozzetto, Christian Curlisi et al. – *THE DEVELOPMENT OF BIOMETHANE: A SUSTAINABLE CHOICE FOR THE ECONOMY AND THE ENVIRONMENT -- Notes for the elaboration of a road map for the development of biogas done right and biogas refinery technologies in Italy*, 2017

# Tackling food waste



## Le eccedenze alimentari in Italia



Fonte Dati: Politecnico di Milano

- **Law No. 166/2016 (“Gadda Law”)** concerning provisions on the donation and distribution of food and pharmaceutical to limit food waste: significant impact on donations from Large Retailers (GDO)
- Actions/campaigns of central and local government, private sector, NGOs aiming to raise awareness and promote improvement of consumer, distribution and restauration behavior



- Established in 1989
- 90.000 tons of food distributed in 2017
- To over 8.000 charity centers
- 8.200 tons of food collected on the “Colletta Alimentare Day” with the engagement of 145.000 volunteers and the collaboration of 13.000 supermarkets

# Second hand goods market in Italy

*Secondo l'Osservatorio 2017 Second Hand Economy condotto da DOXA per Subito, la compravendita dell'usato cresce dell'11% sul 2016, trainata dall'online. Ammonta a 1.030 € il guadagno medio per ogni italiano che ha venduto online nel 2017*



- La Second Hand Economy vale nel 2017 € 21 miliardi, pari a 1,2% del PIL Italiano (vs € 19 miliardi nel 2016), con una **crescita anno su anno dell'11%**
- La crescita è **guidata** soprattutto **dall'online**, che pesa € 9,3 miliardi (+31% vs 2016 con 7,1 miliardi e +72% rispetto al 2014 con € 5,4 miliardi)
- Il **48% degli italiani ha comprato e/o venduto usato nel 2017**, il 42% l'ha fatto online
- I **settori** più importanti in termini di valore sono **Motori** (€ 15 mld), seguiti da **Casa&Persona** (€ 3,6 mld) e **Elettronica** (€ 1,3 mld)
- Chi ha venduto oggetti usati online ha **guadagnato in media € 1.030 all'anno** (+22% vs 2016)
- **Scelta consapevole (53%), guadagno e risparmio (54%) e libertà (42%)** sono i tre asset valoriali della second hand



# Important considerations for enterprises

# Businesses engaging in CE (1)

- “The biggest decision businesses wanting to promote the circular economy can take is to develop **business models for taking back and re-marketing their own products**. This involves designing products for their full life cycle, through modular conception using standardized components, and system solutions instead of products.
- [...] if a business doesn't take back its goods, then it can't profit from its goods at the end of their life. There is little incentive to design things to be environmentally friendly if it increases your costs but doesn't bring much in return. Why produce smart goods if somebody else will profit from them? If instead **a company switches to selling the *performance* of its products**, which means retaining the ownership of them, and logically also their embodied resources, and may substantially increase its future profits.”

*Source: Walter Stahel, Making.it Magazine, 2013*

## Businesses engaging in CE (2)

- Shifting to a “product as service” model is one of the main strategies - but it is not the only one (and sometimes not even the most important). Consider carefully all of the following:
  - Take **a fresh look at materials and processes** – and re-think the company’s business from the perspective of sustainability. This can lead to substantial improvements (and unexpected discoveries). This is especially true when technologies and market dynamics move fast
  - **Remove hazardous substances from products and processes**. This is also very attractive proposition: in particular, because it eliminates all the associated technical and administrative (regulatory) burdens
  - There are many ways of profiting from extended product-life – e.g. offering a **variety of services**, supporting a **second-hand goods market** and so on
  - And there are many **opportunities to partner** with suppliers and buyers at various stages of the product life, including EoL

# Dynamic, forward looking companies

- Should think “out-of-the-box”
- **Must** pursue innovation supporting sustainability and circularity (and more, aiming at **radical innovations**). In this way they will be “good citizens” and may gain **substantial competitive advantage**, because they can:
  - Lead developments that are, unavoidably, going to be mainstream
  - Anticipate regulators
  - Be able to capture (and shape) evolving consumer preferences
  - Achieve substantial performance improvements
- Can **leverage** (or support/lead the development of) **standards and QI services**, whenever applicable, to strengthen customers and authorities’ confidence and reach critical mass

All this is **especially important now** - in relation to the post COVID-19 recovery, EU programmes and funding!

# Circular Economy and Cities



## **Circular cities: thriving, liveable, resilient**

### **Why cities are crucial to a circular economy**

Cities have a high concentration of resources, capital, data, and talent spread over a relatively small geographic area and are centres for innovation.

By 2050 two thirds of us will live in cities, consuming 75% of the world's natural resources, producing 50% of global waste and over 60% of greenhouse gas emissions.

Developments in circular manufacturing, fashion, transport, food and procurement are already being led from urban areas. Now is the time to take full advantage of the wealth of opportunities in cities to create a system that can work long-term for the economy, society, and the environment.

# THE TRANSITION TO CIRCULAR CITIES



<https://www.youtube.com/watch?v=6N95hM-owjU>





**CIRCULARCITIES  
DECLARATION**

# Circular Cities Declaration - Definition

*A circular city is one that promotes the transition from a linear to a circular economy in an integrated way across all its functions in collaboration with citizens, businesses and the research community.*

*This means in practice fostering business models and economic behaviour which decouple resource use from economic activity by maintaining the value and utility of products, components, materials and nutrients for as long as possible in order to close material loops and minimise harmful resource use and waste generation.*

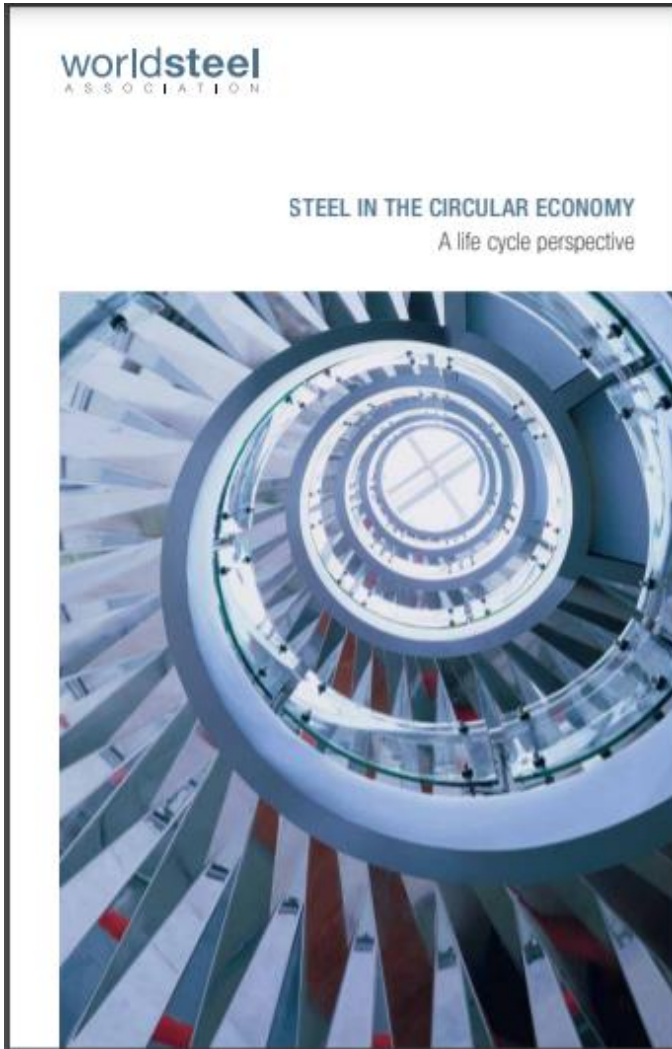
*Through this transition, cities seek to improve human well-being, reduce emissions, protect and enhance biodiversity, and promote social justice, in line with the Sustainable Development Goals.*

# European Investment Bank guidance



[https://www.eib.org/attachments/thematic/circular\\_economy\\_15\\_steps\\_for\\_cities\\_en.pdf](https://www.eib.org/attachments/thematic/circular_economy_15_steps_for_cities_en.pdf)

What about your sector, now?  
(I use the example of Steel)



## LIFE CYCLE THINKING

The quality and relevance of LCI/LCA results, and the extent to which they can be applied and interpreted, depend on the methodology used. The International Organisation for Standardisation (ISO) has developed standards which provide guidance on methodological choices and set down rules for transparency and reporting. The relevant ISO standards on LCA are covered in:

- ISO 14040: 2006 - Environmental management - Life cycle assessment - Principles and framework
- ISO 14044: 2006 - Environmental management - Life cycle assessment - Requirements and guidelines

These standards form the basis of a number of other standards which focus on specific issues related to LCA. Some examples include:

- Technical Specification ISO TS 14067: 2013 - carbon footprints
- ISO 14046: 2014 - water footprints
- ISO 14025: 2006 - environmental labels and declarations
- ISO 21930: 2007 - sustainability in building construction (currently being updated)
- GHG Protocol (WRI/WBCSD)

Product Category Rules (PCRs) are becoming increasingly important as these are documents that define the rules and requirements for Environmental Product Declarations (EPDs) of a specified product category. Following ISO 14025: 2006 (Type III environmental labels and declarations), PCRs are vital to ensure transparency and comparability between different EPDs based on the same PCR.

State of the Union 2021: Green Deal must work for everybody, with right conditions in place to support steel's decarbonisation

**EUROFER**  
The European Steel Association



<https://www.eurofer.eu/press-releases/state-of-the-union-2021-green-deal-must-work-for-everybody-with-right-conditions-in-place-to-support-steels-decarbonisation/>

# Two main strategic directions

1. Focus on **your product(s) lifecycle**

2. Investigate **how your products/services may contribute** to the sustainability of the target user sectors

Think out of the box – don't be shy!

..for this, **start** always thinking about supply:

- analyze your own bill of materials and its environmental footprint (how can it be reduced?)
- if you use hazardous substances, assess carefully the possibility of substitution
- consider all options for industrial symbiosis

and then processes:

- how can they be optimized in terms of energy consumption and GHG emissions?
- How can you maximize use of renewable energy?

..for this, focus the attention on:

- products with **highest** environmental footprint (from a LCA perspective)
- partnerships with users that are technically/economically feasible
- Low hanging fruits...

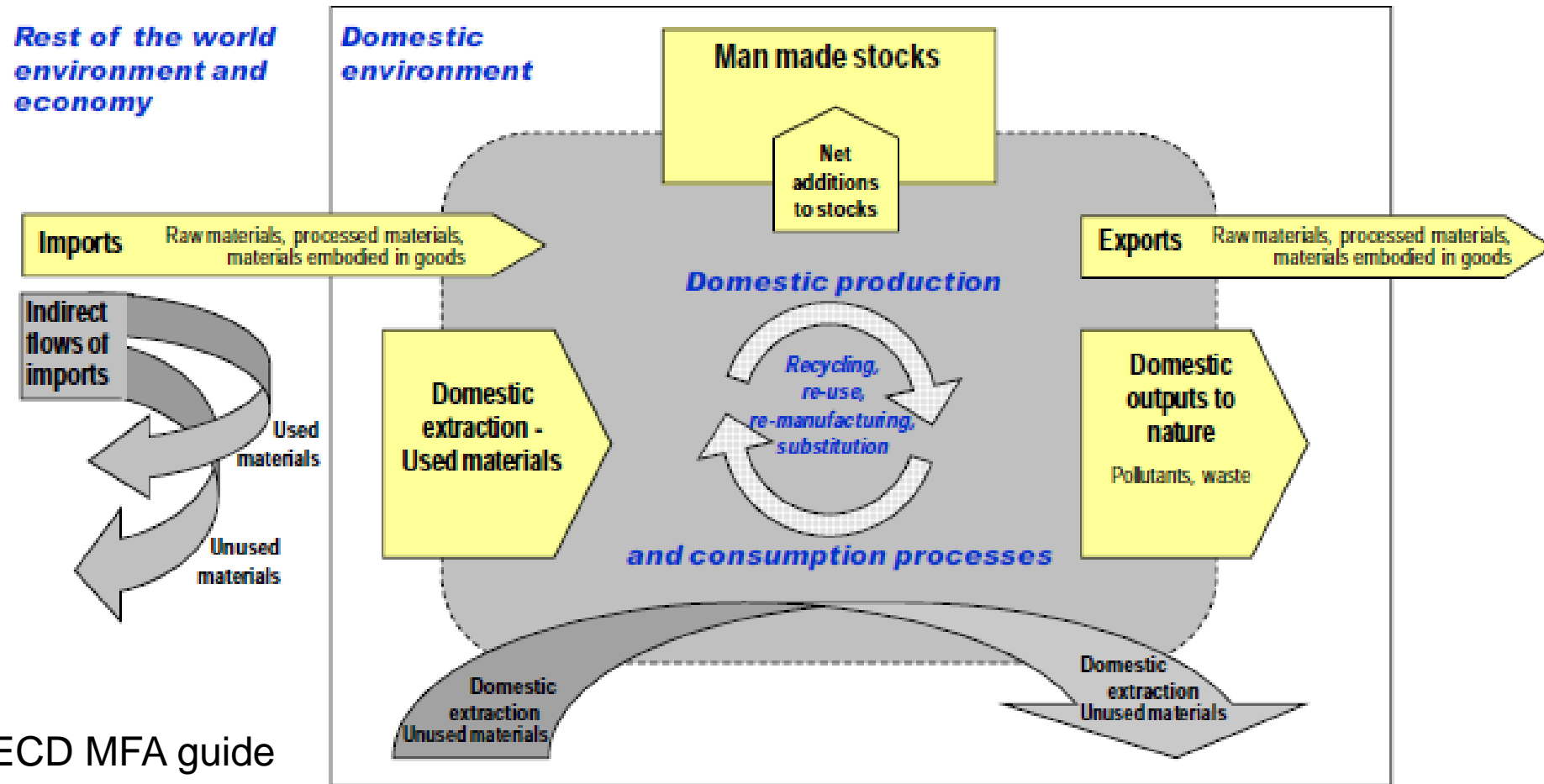
# Circular Economy: Indicators

# Approaches

- **Material Flow Analysis** – underlying method followed in some way by most of the indicator frameworks for the CE
  - several SDG targets
  - all main macro-level indicator frameworks addressing economic systems: national, regional and global (*with variations in the selection of indicators and possible focus on specific quantities, e.g. food waste, secondary raw materials, etc.*)
- **Product (and sector) Circularity**
  - Indicators to assess the “circularity” of products: i.e. how products perform in terms of defined circularity principles or criteria
  - Product or material “passports”;
- **Company circularity**
- **Hybrid models**
  - Including indicators pertaining to the MFA combined with indicators addressing policy issues (e.g. GPP), producers or consumers’ behaviour and attitudes, and more (e.g. business models, investments, strategic orientations, consumption patterns, etc.)

# Material Flow Analysis

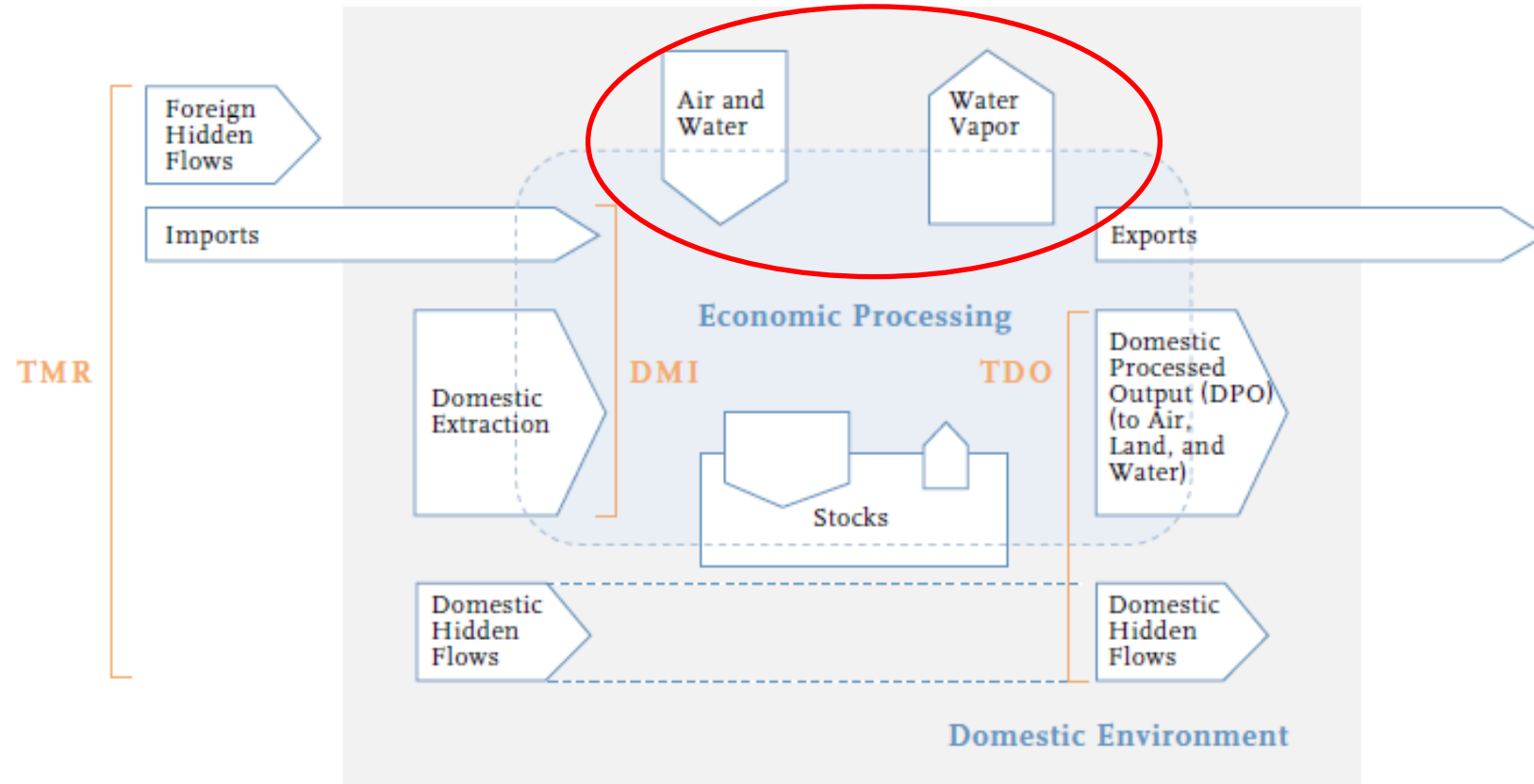
## Economy-wide material balance scheme



Source: OECD MFA guide

# Material Flow Analysis

FIGURE 1 | THE MATERIAL CYCLE

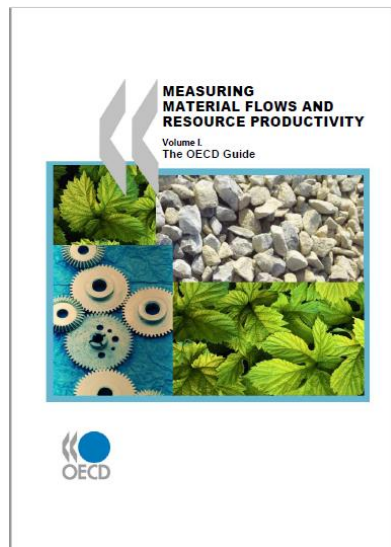


Source: WRI, the weight of nations

# MFA Basics (source: OECD)

- **Material resources** used in an economy **stem from raw materials extracted from natural resource stocks** in the country (domestic material extraction) or extracted from natural resource stocks abroad and imported in the form of raw materials, semi-finished materials and materials embodied in manufactured goods.
- Material resources are **extracted** from the sub-soil and water bodies, or harvested from forests and farm land. The usable parts of these resources enter the economy as material inputs where they become priced goods that are traded, processed and used. Other parts remain unused in the environment. These materials are called "unused materials" or "unused extraction". Examples include mining overburden, soil and rock excavated during construction and not used elsewhere, dredged sediments from harbours, harvest residues. [*These are called "hidden flows" in the WRI model*]
- **Some materials accumulate in the economy** where they are stored in the form of buildings, transport infrastructure or durable and semidurable goods, such as cars, industrial machinery or household appliances. These materials are sooner or later released back to the environment in the form of demolition waste, end-of-life vehicles, e-waste, bulky household waste, etc.
- **After use** in production and consumption activities, the **materials leave the economy as an output** either to the environment in the form of residuals (pollution, waste), or to the rest of the world as exports in the form of raw materials, semi-finished materials and materials embodied in manufactured goods.
- **When materials are imported** for use in an economy, their upstream production is associated with unused materials that remain abroad, and with the generation of residuals (pollution, waste). These "indirect flows" of materials take into account the life-cycle dimension of the production chain, but are not physically imported. Their environmental consequences occur in countries from which the imports originate.

# MFA Basics 2 (source: OECD)



The analysis of material flows usually builds on methodically organised accounts in physical units. These **Material flow accounts** (MFAcc) use already available production, consumption and trade data in combination with environment statistics (on waste, emissions, etc.), and improved modelling. They provide a **coherent, multi-purpose database** at the bottom of the information pyramid. They form a basis for many types of analysis and enable the calculation of various types of indicators

**MFAcc** are physical flow accounts as described in the **System of integrated Environmental Economic Accounting (SEEA)**. Unlike other physical flow accounts, MFAcc track both direct flows (i.e. flows physically entering the economy) and indirect and unused flows (i.e. flows not entering the economy, but associated to resource exploitation and to the up-stream production process of a product, and of relevance from an environmental point of view).



# Glossary (source: Eurostat)

**Material flows** present the amounts of materials in physical weight (excluding water and air) that are available to an economy. These material flows comprise the extraction of materials inside the economy and the physical imports and exports (i.e. the mass weight of goods imported or exported). Air and water are generally excluded.

**Domestic extraction (DE)** is the amount of raw material (excluding water and air), in physical weight, extracted from the natural environment for use in the economy.

**Physical imports** are the imports into the economy, in physical weight

**Direct material input (DMI)** is the input of materials for use in an economy, in other words, all materials which are of economic value and which are available for use in production and consumption activities.

**Physical exports** are the exports from the economy into other economies, in physical weight

**Domestic material consumption (DMC)**, measures the total amount of materials used by an economy and is defined as the quantity of raw materials extracted from the domestic territory, plus all physical imports minus all physical exports.

*Direct material input = Domestic extraction + Physical imports*

*Domestic material consumption = Domestic extraction + Physical imports - Physical exports = Direct material input - Physical exports*

# Glossary 2 (source: Eurostat)

The simple weight of traded goods provides an incomplete picture as it does not take into account the raw materials originally necessary to produce these traded goods. A more comprehensive picture on the 'material footprints' can be obtained by converting the traded goods into their **raw material equivalents (RME)**, i.e. the amounts of raw materials required to provide the respective traded goods. Especially for finished and semi-finished products, imports and exports in RME are much higher than their corresponding physical weight.

**Imports in RME** are the amount of raw material required to produce the goods imported into the economy

**Exports in RME** are the amount of raw material required to produce the goods exported from the economy

**Raw material input (RMI)** is the amount of raw materials required to produce the goods which are available for use in production and consumption activities of the economy.

**Raw material consumption (RMC)**, measures the total amount of raw materials required to produce the goods used by the economy (also called '**material footprint**').

*Raw material input = Domestic extraction + Imports in RME*

*Raw material consumption = Domestic extraction + Imports in RME - Exports in RME = Raw material input - Exports in RME*

# Glossary 3 (source: IRP)

The **physical trade balance (PTB)** is an indicator of whether a country or region is a net importer or exporter of primary materials and gives an idea of a country's position and role in global supply chains. PTB is calculated as **physical imports** minus **physical exports**.

Where PTB gives the balances of direct physical tonnages traded, the **raw material trade balance (RTB)** metric considers the embodiment of materials that did not physically cross borders with traded goods, but that were nevertheless required for their production.

*[The method by which extracted materials are attributed to final consumption is rather complex [...] but in general terms, monetary flows in the world's economy are used as proxies to attribute parallel material flows to final demand.]*

**Material Productivity** – US\$ of GDP per kg of material use

**Energy productivity** – US\$ of GDP per megajoule (MJ) of primary energy use

**GHG Emission Productivity** – US\$ of GDP per kg of CO<sub>2</sub> equivalent emissions

**Labour productivity** – US\$ of GDP per hour of work

# Glossary 4 (source: IRP)

## Resource Productivity

- **Material Productivity** = USD (or EUR) of GDP per kg of material use
- **Energy productivity** = USD (or EUR) of GDP per megajoule (MJ) of primary energy use
- **GHG Emission Productivity** = USD (or EUR) of GDP per kg of CO2 equivalent emissions
- **Labour productivity** = USD (or EUR) of GDP per hour of work

## Material Intensity of Production and Consumption

- **Material intensity (MI)** = DMC/GDP (it is the inverse of material productivity).
- **Adjusted Material intensity (Adjusted MI)** – MF/GDP (i.e. material footprint/GDP)

## IPAT formula

- $I = P * A * T$

I stands for environmental **Impact** (MF) P **Population**, A is **Affluence** (GDP/P) and T is a **Technological** coefficient, which usually just translates as the intensity of I per unit of money used in the Affluence term (MF/GDP)

# SDG targets and indicators relevant to CE



SDG 8	Targets
8.4	Improve progressively, through 2030, <b>global resource efficiency</b> in consumption and production and endeavour to decouple economic growth from environmental degradation, in accordance with the 10-year framework of programmes on sustainable consumption and production
8.4.1	<b>Material footprint</b> , material footprint per capita, and material footprint per GDP
8.4.2	<b>Domestic material consumption</b> , domestic material consumption per capita, and domestic material consumption per GDP

# SDGs...continued

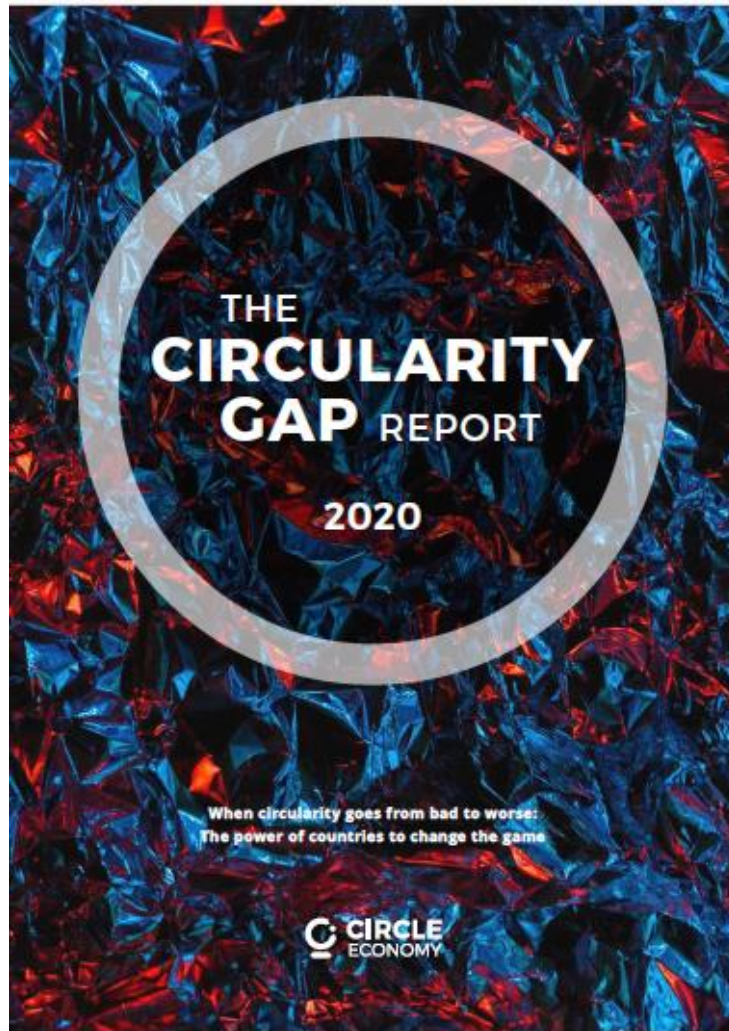


SDG12	Targets
12.2	By 2030, achieve the sustainable management and efficient use of natural resources
12.2.1	<b>Material footprint</b> , material footprint per capita, and material footprint per GDP
12.2.2	<b>Domestic material consumption</b> , domestic material consumption per capita, and domestic material consumption per GDP
12.3	By 2030, halve per capita <b>global food waste</b> at the retail and consumer levels and reduce food losses along production and supply chains, including post-harvest losses
12.3.1	<b>Global food loss index</b>
12.4	By 2020, achieve the <b>environmentally sound management of chemicals and all wastes</b> throughout their life cycle, in accordance with agreed international frameworks, and significantly reduce their release to air, water and soil in order to minimize their adverse impacts on human health and the environment
12.4.1	Number of parties to international multilateral environmental agreements on hazardous waste, and other chemicals that meet their commitments and obligations in transmitting information as required by each relevant agreement
12.4.2	<b>Hazardous waste generated per capita and proportion of hazardous waste treated</b> , by type of treatment

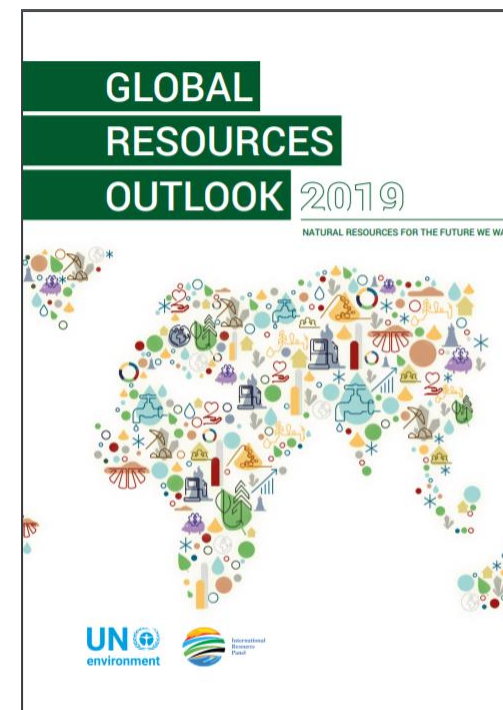
# SDGs...continued

SDG12	Targets
12.5	By 2030, substantially <b>reduce waste generation</b> through prevention, reduction, recycling and reuse
12.5.1	<b>National recycling rate, tons of material recycled</b>
12.7	Promote <b>public procurement practices</b> that are sustainable, in accordance with national policies and priorities
12.7.1	Number of countries implementing sustainable public procurement policies and action plans
12. C	<b>Rationalize inefficient fossil-fuel subsidies</b> that encourage wasteful consumption by removing market distortions, in accordance with national circumstances, including by restructuring taxation and phasing out those harmful subsidies, where they exist, to reflect their environmental impacts, taking fully into account the specific needs and conditions of developing countries and minimizing the possible adverse impacts on their development in a manner that protects the poor and the affected communities
12. C1	<b>Amount of fossil-fuel subsidies per unit of GDP</b> (production and consumption) and as a proportion of total national expenditure on fossil fuels

# 1. Circularity Gap Report



It is founded in the **System of Environmental-Economic Accounting (SEEA)**, applies an Economy-wide Material Flow Analysis (EW-MFA) built upon the work of Aguilar-Hernandez et al. (2019) and uses as a reference the **IRP assessments** (data on material extractions) and other primary data sources, notably the **EXIOBASE** database

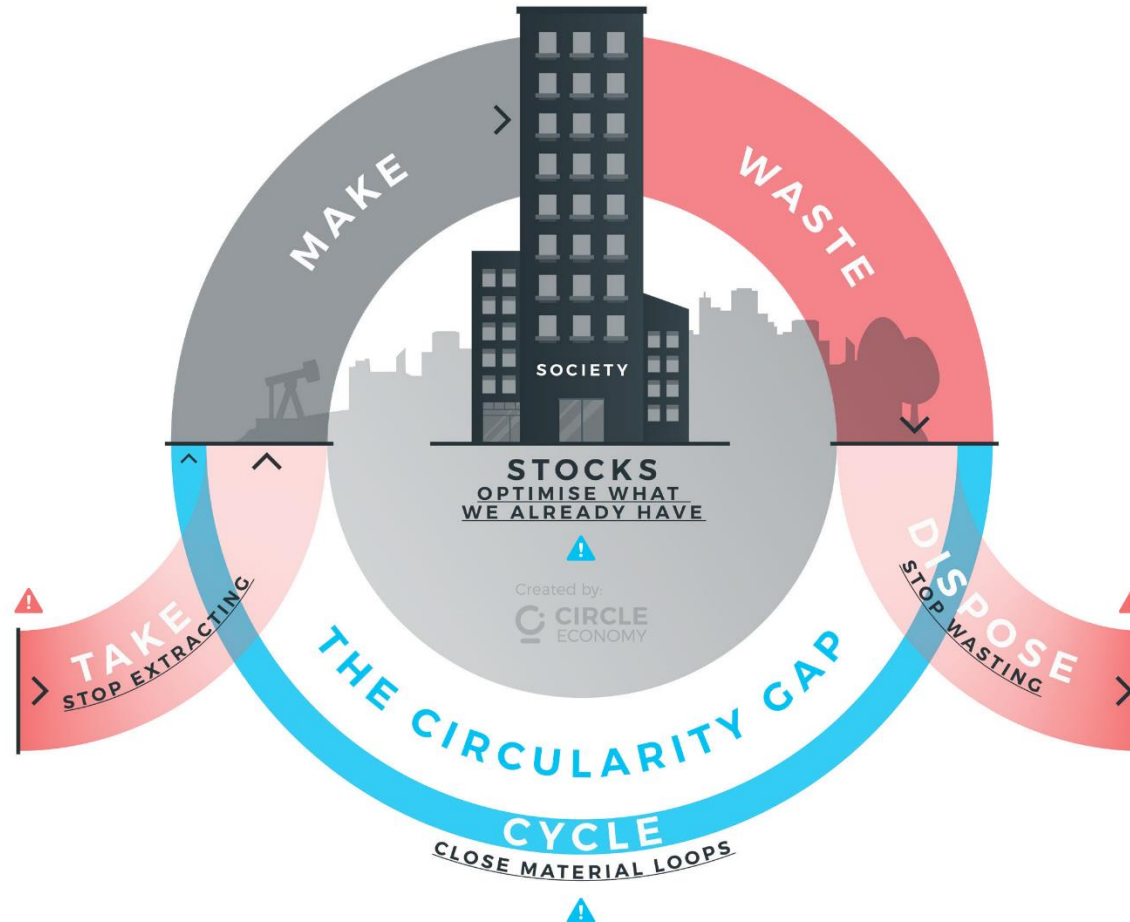




# Circularity Gap Report

TO BRIDGE **THE CIRCULARITY GAP** WE NEED TO:

⚠ Stop extracting ⚠ Stop wasting ⚠ Optimise what we already have ⚠ Cycle more and better



According to the CGR 2020, today the global economy is only **8.6% circular** — just two years ago it was 9.1%. The global circularity gap is widening.

# Circularity Gap Report 2021

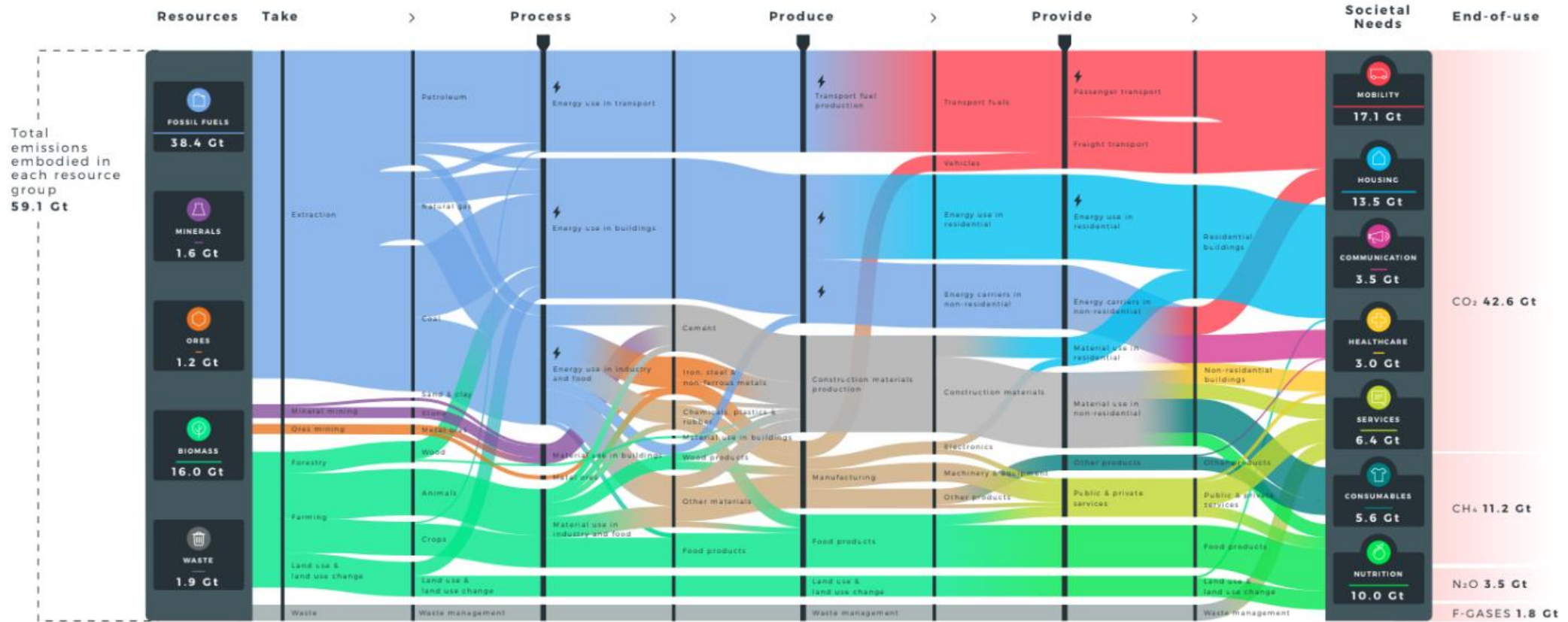
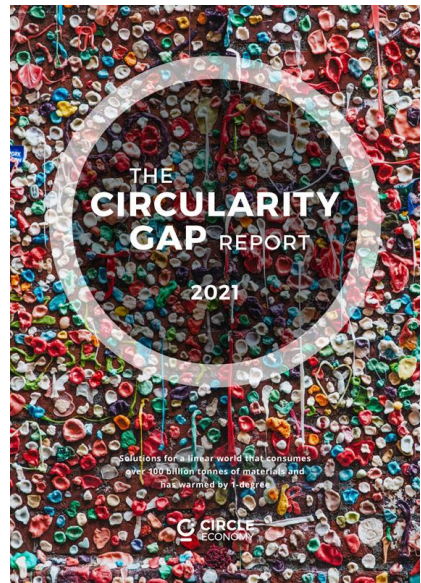


Figure One X-ray of global greenhouse gas emissions behind

<https://drive.google.com/file/d/1MP7EhRU-N8n1S3zpzqlshNWxqFR2hznd/edit>

# Circularity Gap Report 2021

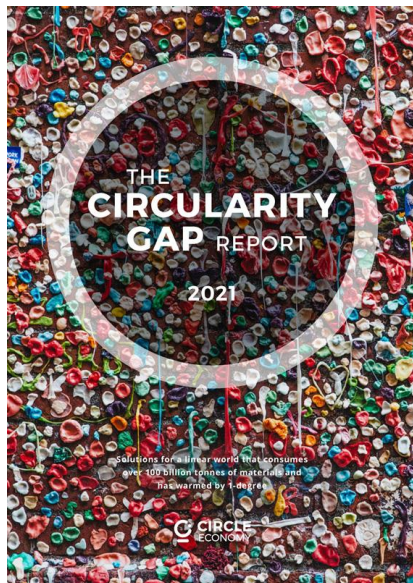


Figure Two The global resource and emissions footprint behind meeting key societal needs, side by side. Units in billion tonnes (Gt).

## 2. EU - CE monitoring framework

### Circular economy monitoring framework

#### 1 EU self-sufficiency for raw materials

The share of a selection of key materials (including critical raw materials) used in the EU that are produced within the EU

#### 2 Green public procurement

The share of major public procurements in the EU that include environmental requirements

#### 3a-c Waste generation

Generation of municipal waste per capita; total waste generation (excluding major mineral waste) per GDP unit and in relation to domestic material consumption

#### 4 Food waste

Amount of food waste generated

#### 7a-b Contribution of recycled materials to raw materials demand

Secondary raw materials' share of overall materials demand - for specific materials and for the whole economy

#### 8 Trade in recyclable raw materials

Imports and exports of selected recyclable raw materials

#### 5a-b Overall recycling rates

Recycling rate of municipal waste and of all waste except major mineral waste

#### 6a-f Recycling rates for specific waste streams

Recycling rate of overall packaging waste, plastic packaging, wood packaging, waste electrical and electronic equipment, recycled biowaste per capita and recovery rate of construction and demolition waste

#### 9a-c Private investments, jobs and gross value added

Private investments, number of persons employed and gross value added in the circular economy sectors

#### 10 Patents

Number of patents related to waste management and recycling



These 10 indicators, for which data is available in the [database](#), are divided into the following four thematic areas:

# EU - CE monitoring framework

**CIRCULAR ECONOMY**

**INDICATORS: INFORMATION**

Which indicators are used to monitor the progress towards a circular economy?

The monitoring framework on the circular economy as set up by the European Commission consists of 10 indicators, some of which are broken down in sub-indicators.

> read more

These 10 indicators, for which data is available in the database, are divided into the following four thematic areas:

- Production and consumption**  
This area comprises 4 indicators:
  - Self-sufficiency of raw materials for production in the EU;
  - Green public procurement (as an indicator for financing aspects);
  - Waste generation (as an indicator for consumption aspects);
  - Food waste.> read more
- Waste management**  
This area comprises 2 indicators:
  - Recycling rates (the share of waste which is recycled);
  - Specific waste streams (packaging waste, biowaste, e-waste, etc.).> read more
- Secondary raw materials**  
This area comprises 2 indicators:
  - Contribution of recycled materials to raw materials demand;
  - Trade of recyclable raw materials between the EU Member States and with the rest of the world.> read more
- Competitiveness and innovation**  
This area comprises 2 indicators:
  - Private investments, jobs and gross value added;
  - Patents related to recycling and secondary raw materials as a proxy for innovation.> read more

## Production and consumption - 4 indicators:

1. Self-sufficiency of raw materials for production in the EU;
2. Green public procurement (as an indicator for financing aspects);
3. Waste generation (as an indicator for consumption aspects);
4. Food waste.

## Waste management - 4 indicators:

5. Recycling rates (the share of waste which is recycled);
6. Specific waste streams (packaging waste, biowaste, e-waste, etc.).

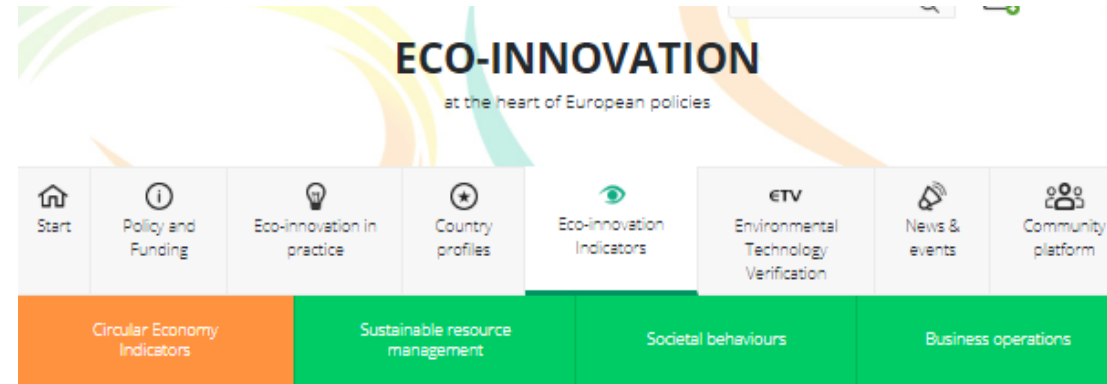
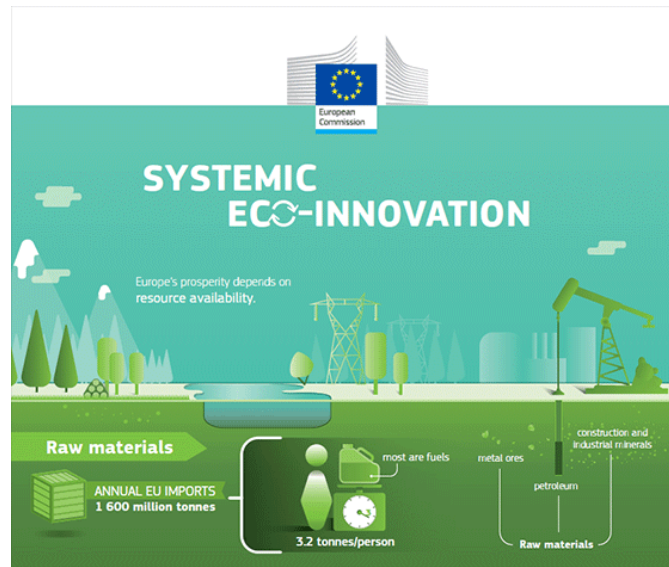
## Secondary raw materials - 4 indicators:

7. Contribution of recycled materials to raw materials demand;
8. Trade of recyclable raw materials between the EU Member States and with the rest of the world.

## Competitiveness and innovation - 2 indicators:

9. Private investments, jobs and gross value added;
10. Patents related to recycling and secondary raw materials as a proxy for innovation.

# Other EU references...



## CIRCULAR ECONOMY INDICATORS

The basic concept of a circular economy depicts a production and consumption system that relies on the recycling, re-use, repair, remanufacturing, sharing of products, changing the consumption patterns and new business models and systems.

There is no indicator that can be a single measurement for the Circular Economy. However a number of existing indicators can help to measure performance in several areas that directly or indirectly contribute to the Circular Economy development. They can be grouped into the following groups:

### SUSTAINABLE RESOURCE MANAGEMENT

This set of indicators examines the performance of the EU Member States in transforming their economies toward circularity by lowering resource demands, thereby increasing resource security and lowering pressures on the environment domestically and abroad.

### SOCIETAL BEHAVIOUR

This set of indicators reflect citizen awareness, engagement and participation in the circular economy. Citizen engagement, behaviour change and social norms are integral to the success of a circular economy transition. This means that people participate in new forms of consumption (e.g. sharing, product-service systems, willingness to pay more for durability), re-use (requiring changed mindsets regarding repair and refurbishment), and disposal (separating waste streams and bringing "waste" to remanufacturing/recycling/sorting sites).

### BUSINESS OPERATIONS

This set of indicators depicts eco-innovation activities toward changing and adapting business models according to the principles of a circular economy. Businesses are the engine behind the circular economy transition. They foster circularity across the life-cycle of material use, beginning with how and what materials are sourced (quality, environmental and health standards). The design stage is particularly crucial to enabling re-use / re-manufacturing / recycling and raising the durability of goods for keeping within the economy longer. Remanufacturing and recycling are key business operations critical to scaling up the circular economy.

# Other EU references...

European Commission

ENVIRONMENT

European Commission > Environment > Resource Efficiency

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Resource Efficiency

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European Resource Efficiency Platform

Targets and Indicators

Introduction

The Roadmap's approach (2011)

Stakeholder consultation process (2012)

Scoreboard (2014)

Ongoing work

Resource Efficiency

The Roadmap's approach to resource efficiency indicators

**Three-layer approach**

Annex 6 of the [Resource Efficiency Roadmap](#) set out a provisional indicator set organised in a 3 layer approach:

1. One headline indicator,
2. a dashboard of complementary macro indicators, and
3. a set of theme specific indicators to measure progress towards the specific objectives and actions.

**First layer / lead indicator: focus on resource productivity**

Measured by GDP divided by Domestic Material Consumption (euro/tonne) the Commission proposed to continue to use 'resource productivity', as the lead indicator.

However, even though this indicator is felt to be the most appropriate indicator available, it still has some considerable shortcomings:

- GDP/DMC as an indicator takes a national production perspective, which implies that it is insensitive to changes in environmental pressures that occur outside the national borders.
- DMC measures resources by weight, which impedes telling the full story of resources' scarcity and economic value and the environmental impact of their use.

**Second layer / dashboard: focus on resource and its environmental impacts**

The Commission chose to complement the lead indicator with a concise dashboard of macro consumption and production indicators on materials, water, land and carbon. This dashboard of indicators – in conjunction with the lead indicator – has the advantage that it focuses on clear stocks or flows of main resources. As such it can be easily understood, measured and communicated.

**Third layer: thematic indicators to monitor policy effectiveness**

To measure performance on the actions and milestones proposed in the Roadmap the Commission proposed a wide range of thematic indicators. Here the approach was to limit the number of indicators to one relevant indicator per theme.

**Further details**

Read the relevant sections in the [Roadmap](#)

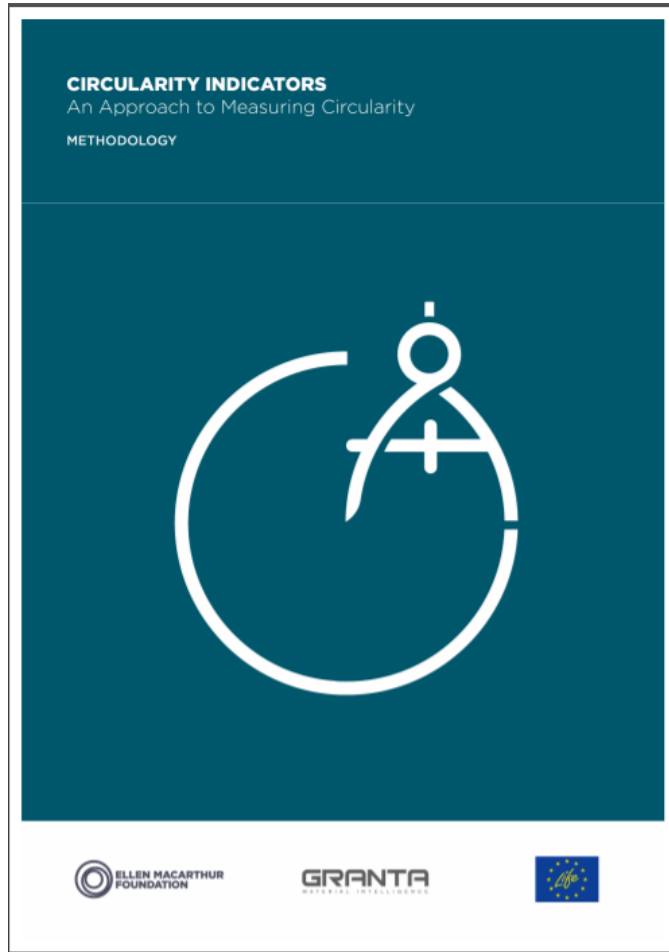
European Commission

European Innovation Partnership on Raw Materials

## Raw Materials Scoreboard

RAW MATERIALS 2018

# 3. EMF Material Circularity Indicator (MCI)



The Ellen Macarthur Foundation **Material Circularity Indicator (MCI)** focuses on the **restoration of material flows at company levels** and is based on the following four principles:

- i. using feedstock from reused or recycled sources
- ii. reusing components or recycling materials after the use of the product
- iii. keeping products in use longer (e.g., by reuse/redistribution)
- iv. making more intensive use of products (e.g. via service or performance models)

The proportion of the product being restored (through component reuse and recycling, i.e. principles i) and ii)) and coming from reused or recycled sources is described as the **restorative part of the flow**, while the **linear part** of the flow is the proportion coming from **virgin materials** and ending up as landfill (or energy recovery). Principles iii) and iv) are treated as improvements on the utility of a product..

# EMF Material Circularity Indicator (MCI)

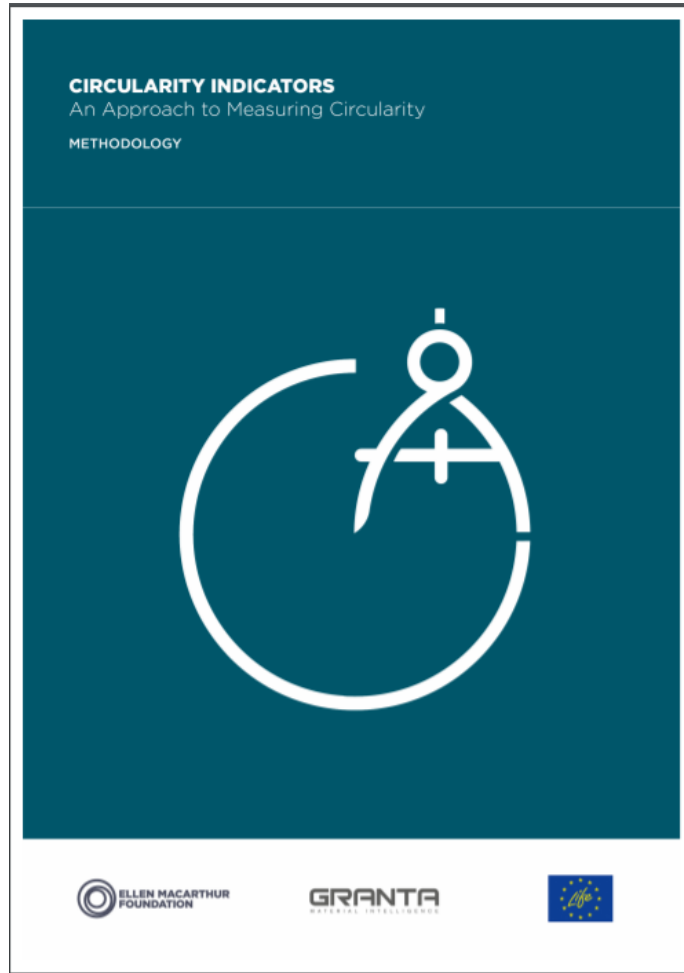


While the MCI provides an indication of how much a product's materials circulate, it neither takes into account what these materials are, nor does it provide information on other impacts of the product

MCI should therefore be used in combination with complementary indicators to identify relevant risks and impacts. These are of two types:

- Risk indicators. These include, for example, measures of **material scarcity** (which has a substantial impact on the value of recovering the materials) and a **measure of toxicity** (which impacts the risks and costs of manufacture reverse logistics and public safety liabilities)
- Impact indicators. They include, for example, a measure of **GHG** emissions, **energy** and **water** impacts of a given setup.

# EMF Material Circularity Indicator (MCI)



The MCI presents the following differences and communalities with Life-Cycle Assessment (LCA) methodologies:

- An LCA focuses on deriving the environmental impacts throughout the life cycle of a product for different scenarios, whereas the MCI concentrates on the flow of materials throughout the life cycle of a product. It specifically encourages the use of recycled or reused material and recycling or reusing it at the end of use, while recognising increased utility of a product (i.e. durability and usage intensity).
- Many of the input data required for an LCA are the same as for the MCI and the complementary impact indicators may indeed be derived from an LCA approach (e.g. relevant standards to assess the Carbon footprint of a product).

# EMF Material Circularity Indicator (MCI)

## THE MATERIAL CIRCULARITY INDICATOR FOR PRODUCTS

The diagram below shows the material flows taken into account to arrive at the **Material Circularity Indicator** of a product. The MCI gives a **value between 0 and 1 where higher values indicate a higher circularity**.

More specifically, the following inputs are used to calculate the MCI:

- **Input in the production process:** How much input is coming from virgin and recycled materials and reused components?
- **Utility during use phase:** How long and intensely is the product used compared to an industry average product of similar

type? This takes into account increased durability of products, but also repair/maintenance and shared consumption business models.

- **Destination after use:** How much material goes into landfill (or energy recovery), how much is collected for recycling, which components are collected for reuse?
- **Efficiency of recycling:** How efficient are the recycling processes used to produce recycled input and to recycle material after use?

A detailed **bill of materials** for the product is needed to compute the MCI, listing the above data for all its components and materials.

## COMPLEMENTARY RISK AND IMPACT INDICATORS FOR PRODUCTS

The complementary indicators are optional indicators that can be used alongside the MCI to offer additional business management insight into the product:

- **Complementary risk indicators** may provide further insights into potential risks in relation to business priorities.
- **Complementary impact indicators** may provide additional information to evaluate

how changing the level of material circularity affects other impacts of interest to businesses and their stakeholders.

Examples for complementary risk indicators include **material price variation, material supply chain risks, material scarcity and toxicity**. Complementary impact indicators can include, for example, **energy usage and CO<sub>2</sub> emissions**.



# 4. EMF Circulytics

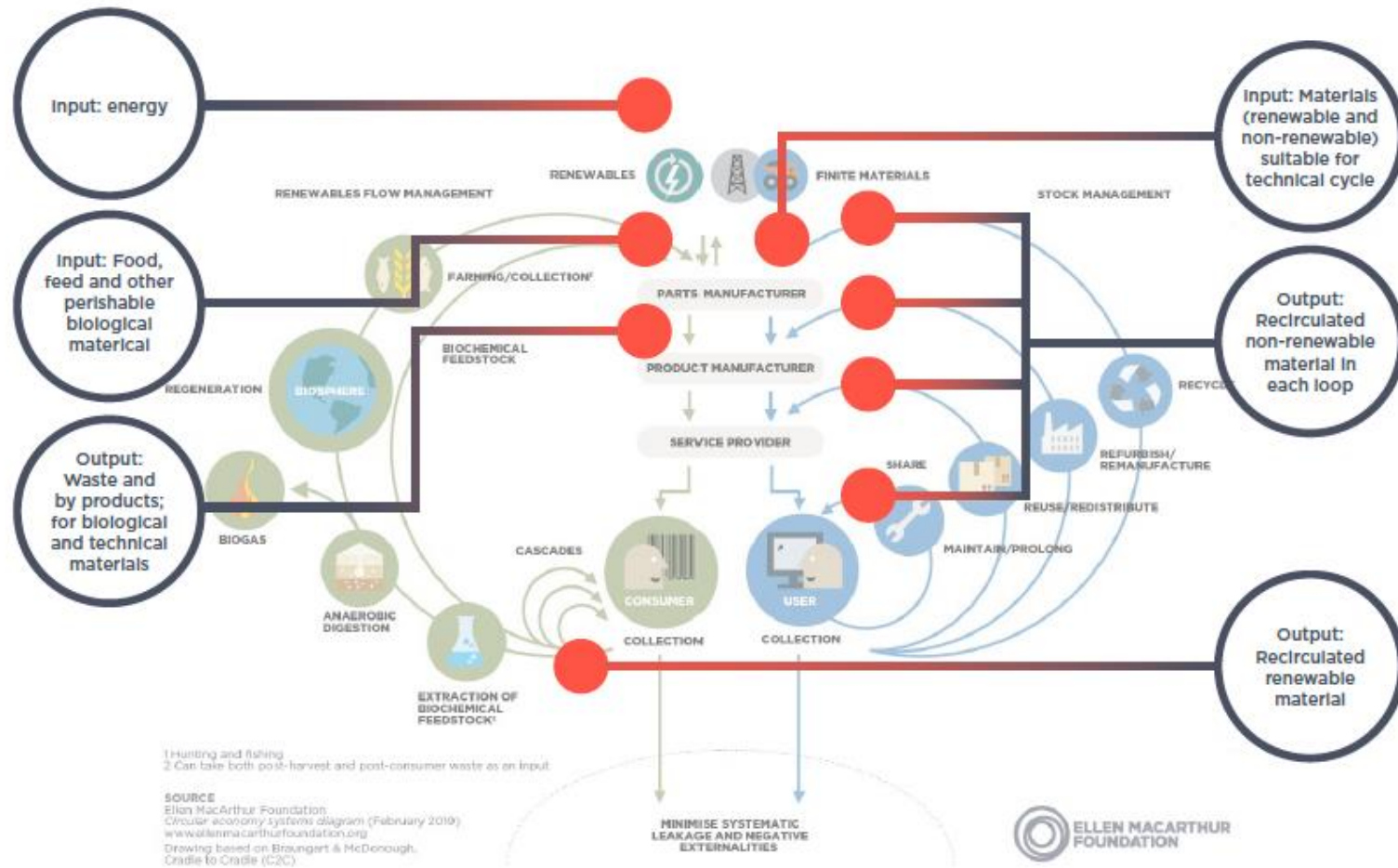


The purpose of Circulytics is to support companies' transition to a circular economy by, for example:

- **Measuring the entire company's circularity**, not just products and material flows.
- Supporting decision making and strategy development for circular economy adoption. Circulytics score is presented in a score card, which is confidentially shared with each company and is designed to help increase understanding of strengths and areas for further Development
- Highlighting inspiring case studies of companies who have found creative solutions to adopting circular economy principles, by the Ellen MacArthur Foundation (the Foundation will not disclose company scores, including in case studies).

- In the future, **Circulytics will be used to generate industry benchmarks**. This requires a sufficient number of companies completing the survey per industry. Completing Circulytics allows the Ellen MacArthur Foundation to generate an overall circularity score, based on the data provided via an online survey, which is available on the Foundation's website. Circulytics has been developed by the Ellen MacArthur Foundation in collaboration with 13 Global Partners and CE100 member organisations, and tested by over 30 companies before launch in 2020.

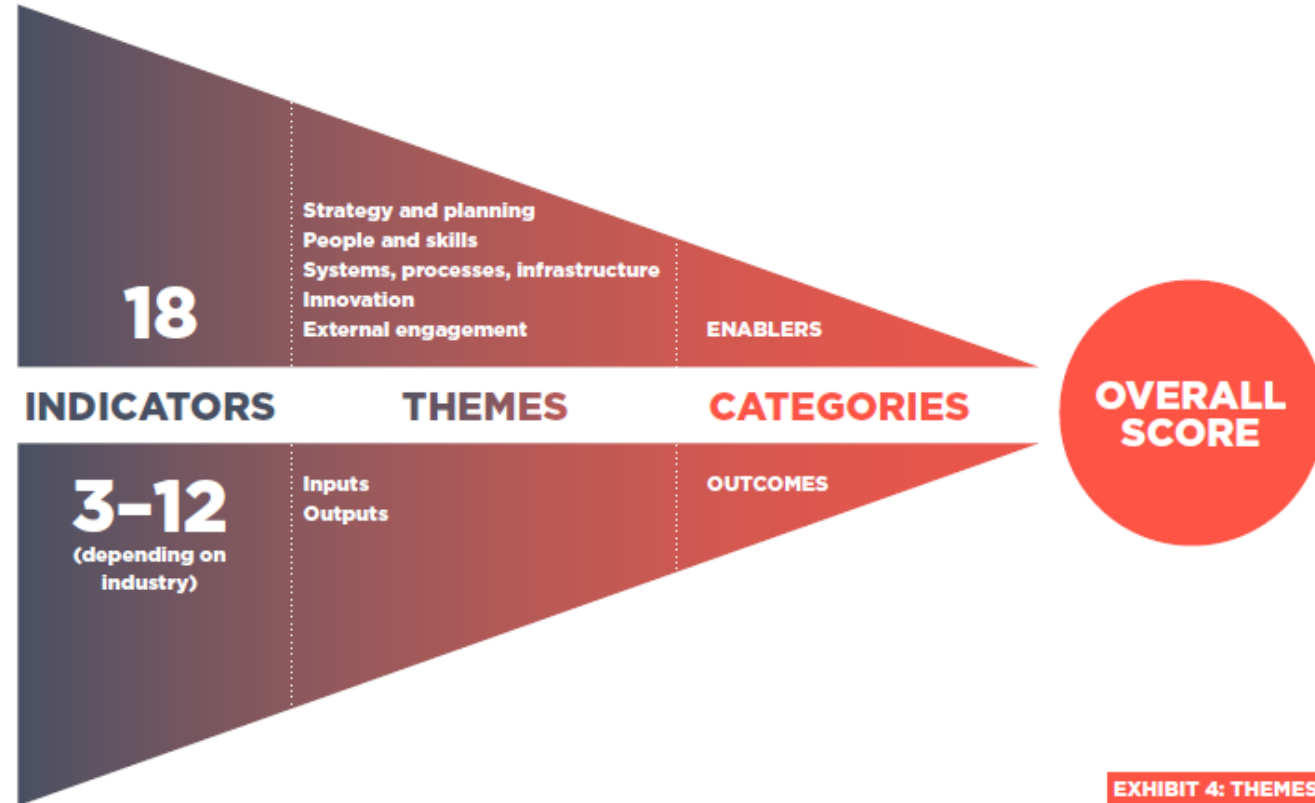
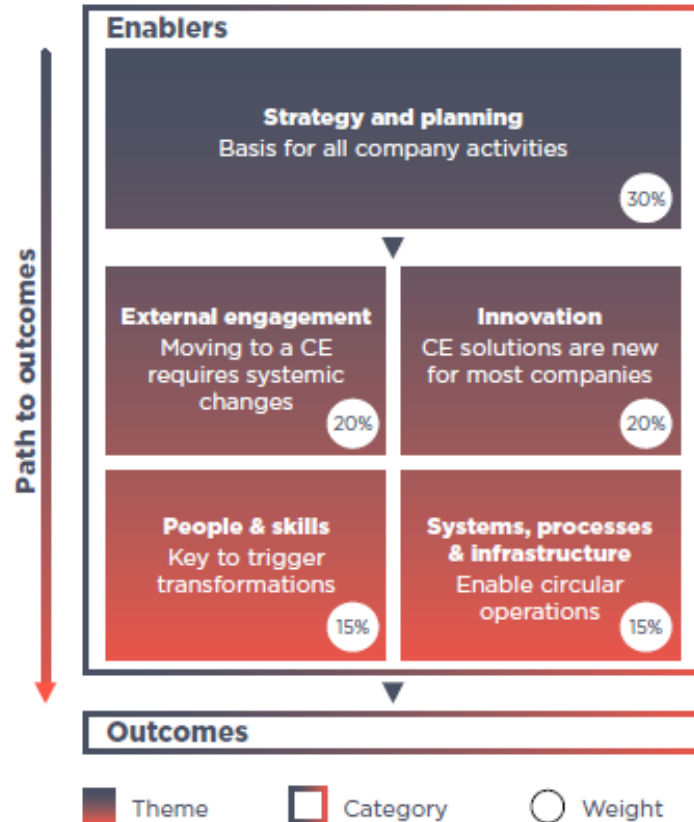
# EMF Circulytics



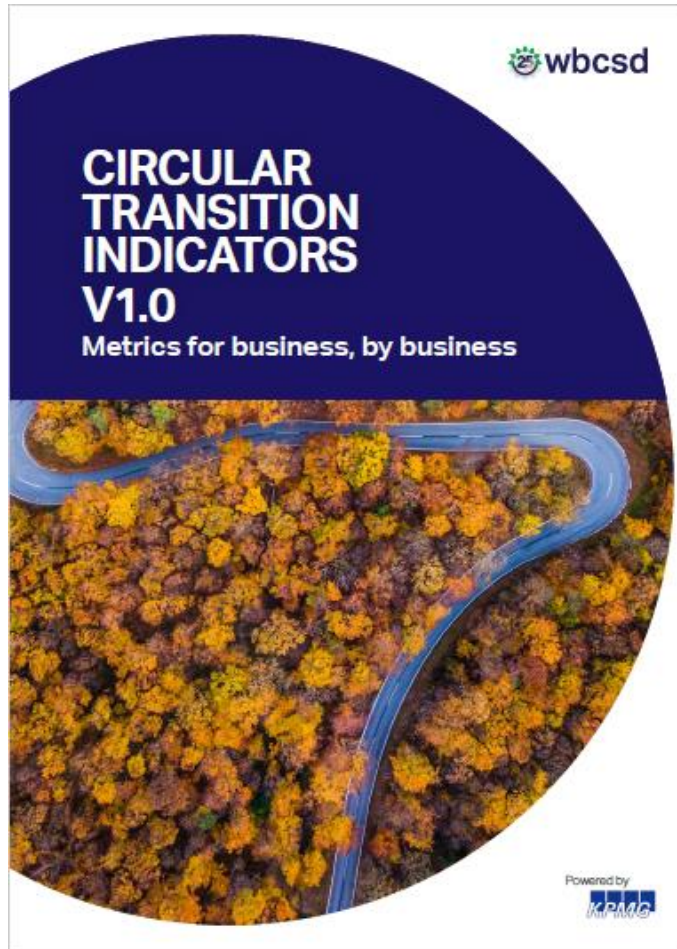
**EXHIBIT 5: OUTCOME THEMES AND INDICATORS ON CIRCULAR ECONOMY SYSTEM DIAGRAM**

# EMF Circulytics

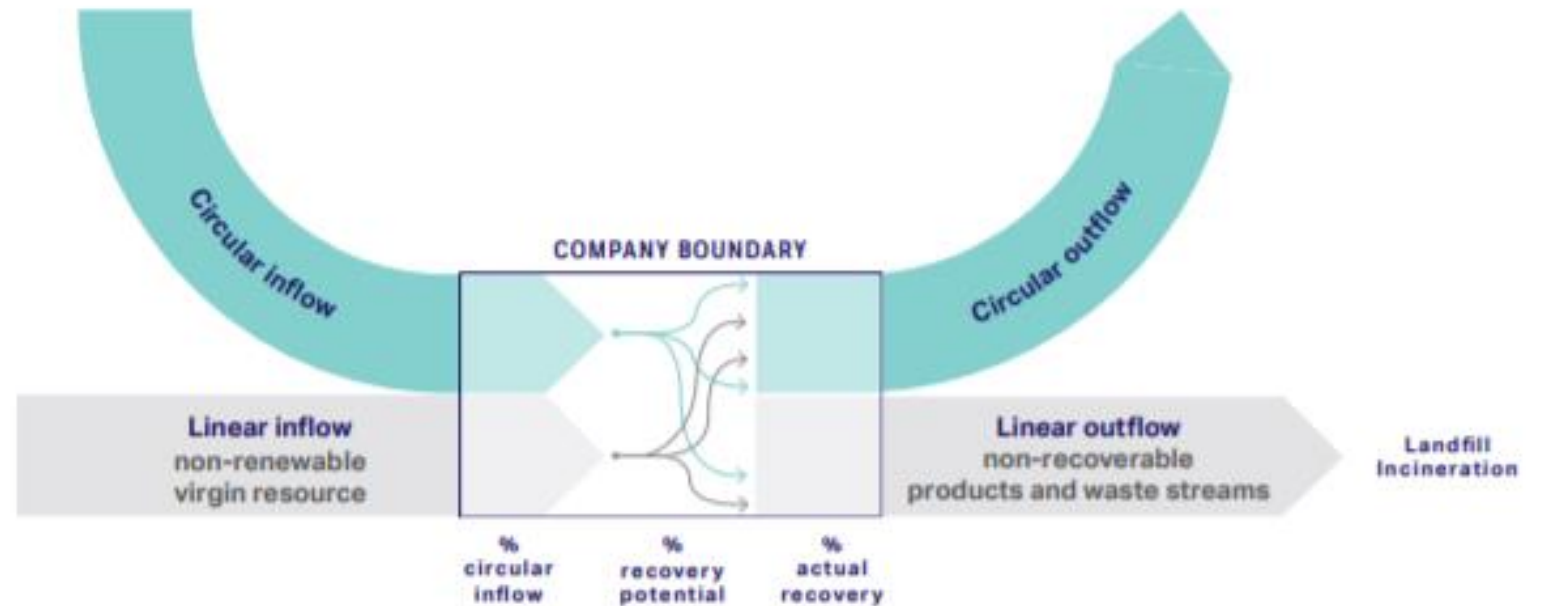
EXHIBIT 3: PATH FROM ENABLERS TO OUTCOMES



# 5. WBCSD Circular Transition Indicators



## The CTI methodology logic



The CTI framework is based on an assessment of material flows within company boundaries, combined with additional indicators on resource efficiency and efficacy, as well as the value added by circular business.

# 6. In Italia

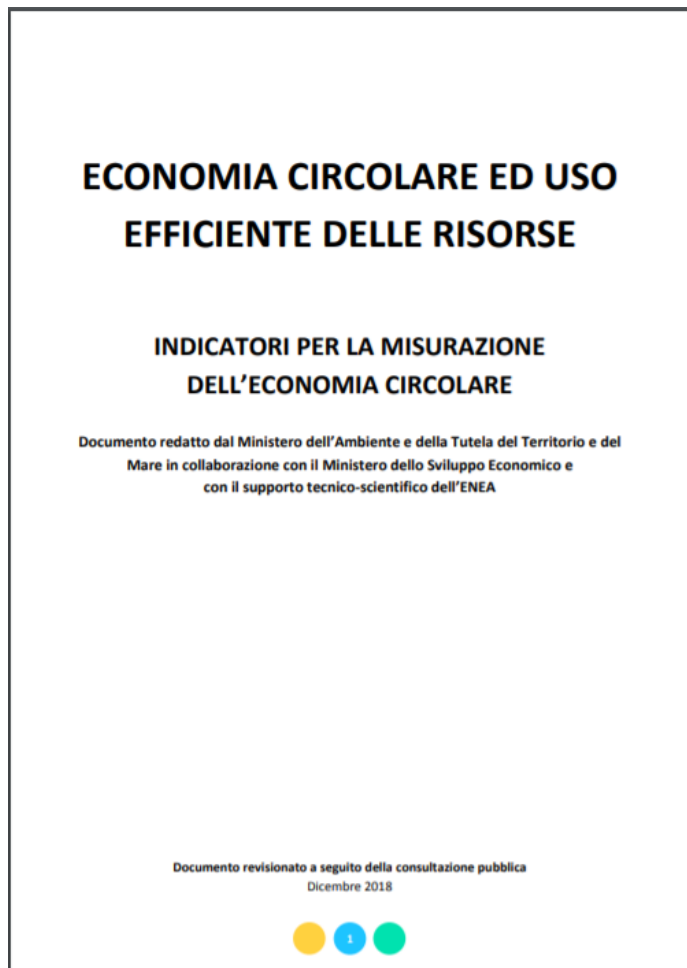


Tabella 1. Coerenza degli indicatori individuati nel presente documento e quelli individuati dalla Commissione Europea nel "Quadro di monitoraggio per l'economia circolare".

Indicatore "Quadro di monitoraggio dell'economia circolare"	Indicatore individuato nel presente documento
Autosufficienza dell'UE riguardo alle materie prime	Contabilità delle risorse
	Import/export di materie prime
	Consumo di materie prime
	Bilancio import/export materico
Appalti pubblici Verdi (GPP)	Input e output di risorse
	Consumo di materie prime seconde
Produzione di rifiuti urbani pro capite Produzione totale di rifiuti per unità di PIL Produzione totale di rifiuti in relazione al consumo interno di materie	Produzione pro capite dei rifiuti urbani
	Produzione dei rifiuti per unità di PIL
	Produzione di rifiuti per unità di DMC (Domestic Material Consumption)
Tassi di riciclaggio complessivi	Quantità della raccolta differenziata (%RD)
	Riciclaggio dei rifiuti urbani
	Qualità della raccolta differenziata
	Compostaggio domestico e di comunità
	Consumo di rifiuti
	Distanza dall'obiettivo del 10% di conferimento in discarica
	Prestazioni della raccolta rispetto all'immesso al consumo (per le filiere tracciate)
Tassi di riciclaggio per flussi di rifiuti specifici (imballaggi, imballaggi in plastic, RAEE, imballaggi in legno, rifiuti organici, rifiuti da costruzione e demolizione)	Quantità della raccolta differenziata (%RD)
	Riciclaggio dei rifiuti di imballaggio
	Recupero di materia da rifiuti speciali
	Qualità della raccolta differenziata
	Distanza dall'obiettivo del 10% di conferimento in discarica
	Consumo di rifiuti
	Consumo di materie prime seconde
Contributo dei materiali riciclati al soddisfacimento della domanda di materie prime	Quantità di prodotti di seconda mano o riutilizzati sul totale immesso
	Quota di materie seconde che entrano nei sistemi di produzione di beni e servizi sul totale input produzione beni e servizi
	Bilancio import/export di materie prime seconde
Commercio di materie prime riciclate	Bilancio import/export sottoprodotti
	Bilanci delle risorse (materie prime seconde, rifiuti, prodotti, sottoprodotti)
	Investimenti in ricerca ed ecoinnovazione
Investimenti privati, occupazione e valore aggiunto lordo	Investimenti in ecoinnovazione e nuove tecnologie
	Ecoinnovazione di processo
	Ecoprogettazione
Brevetti	Investimenti in ecoinnovazione e nuove tecnologie

# The role of standards (and more in general the QI) in support of Sustainability and Circularity – just a few examples

# Standards and sustainability

- Standards can contribute to sustainability:
  - *Directly*: when they specifically address sustainability issues
  - *Indirectly*: when they relate to testing, products, procedures, services, management systems that impact sustainability in specific areas
- Many organizations are active in this domain – Standards bodies, IGOs, NGOs, think tanks, ...
- **A lot to be done!!!**

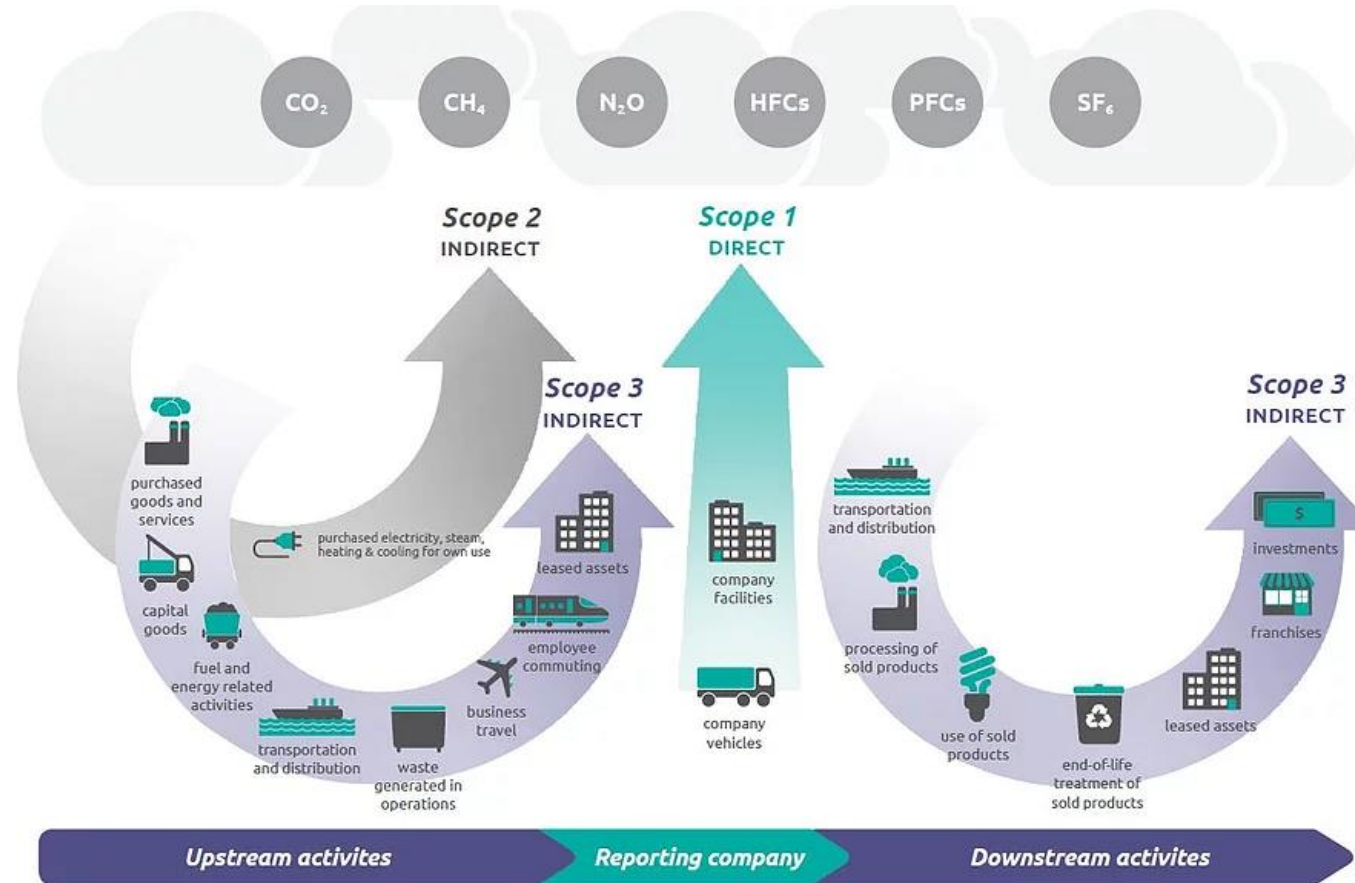


# A reminder: «Quality Infrastructure»

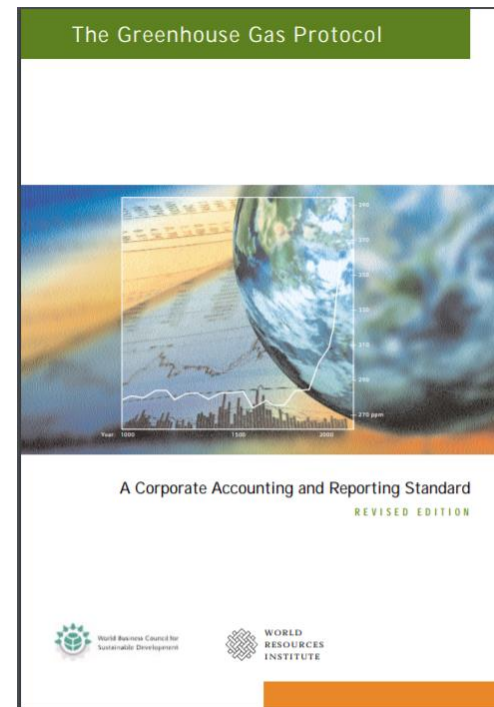
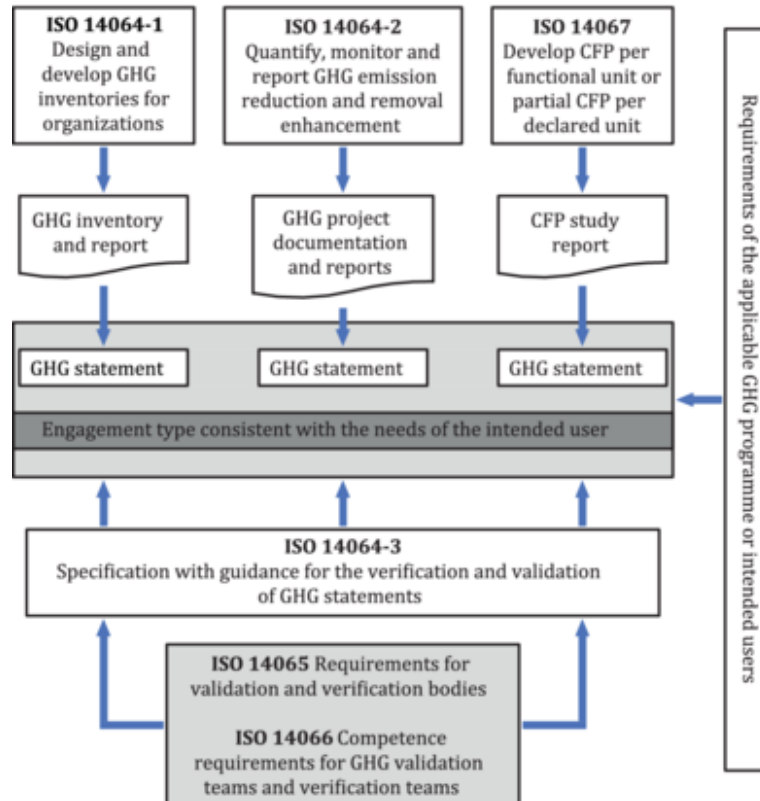
- “The **system** comprising the organizations (public and private) together with the policies, relevant legal and regulatory framework, and practices needed to support and enhance the **quality, safety and environmental soundness** of goods, services and processes.
- The quality infrastructure is required for the **effective operation of domestic markets**, and its international recognition is important to enable **access to foreign markets**. It is a critical element in promoting and sustaining economic development, as well as environmental and social wellbeing. It relies on:
  - **metrology**,
  - **standardisation**,
  - **accreditation**,
  - **conformity assessment**, and
  - **market surveillance**”

Source: INetQI (International Network of Quality Infrastructure), 2017

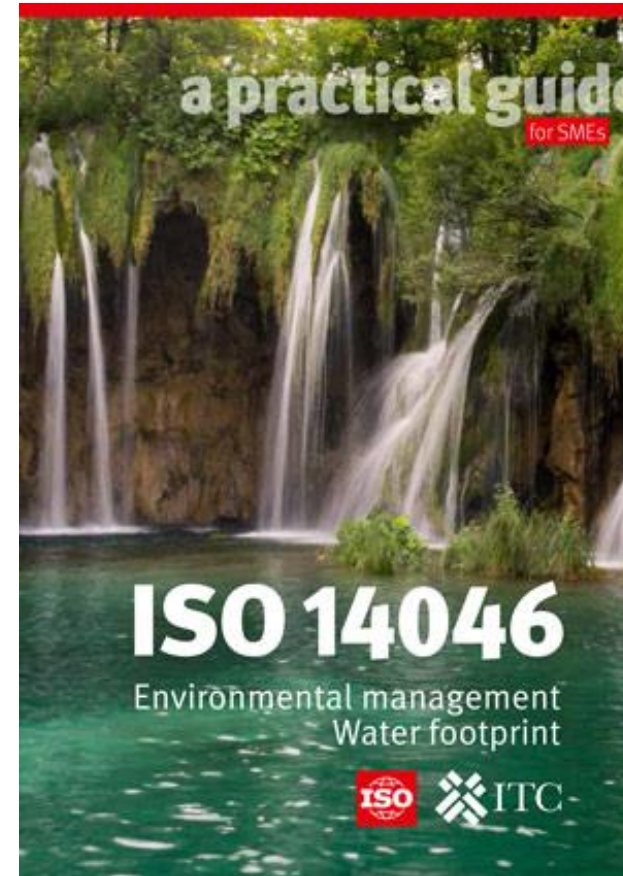
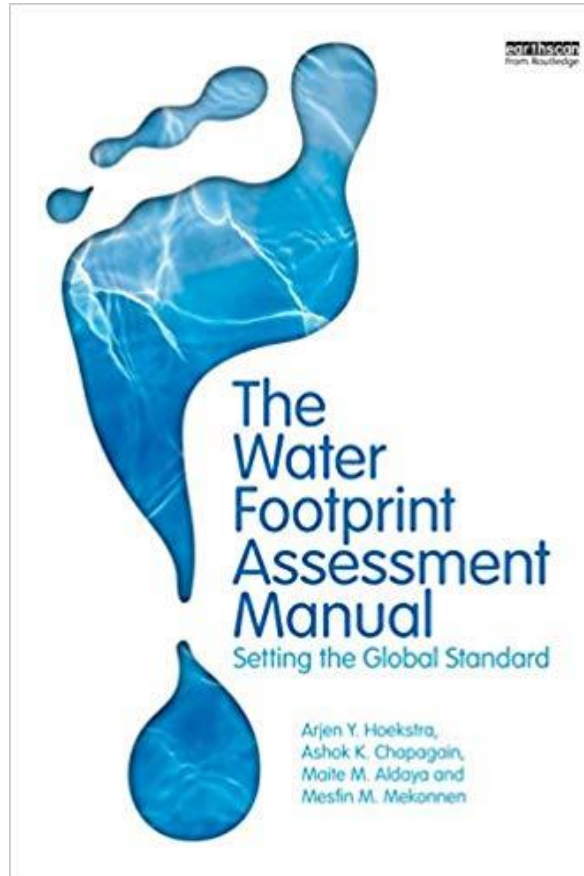
# Methods and frameworks to assess and report GHG emissions



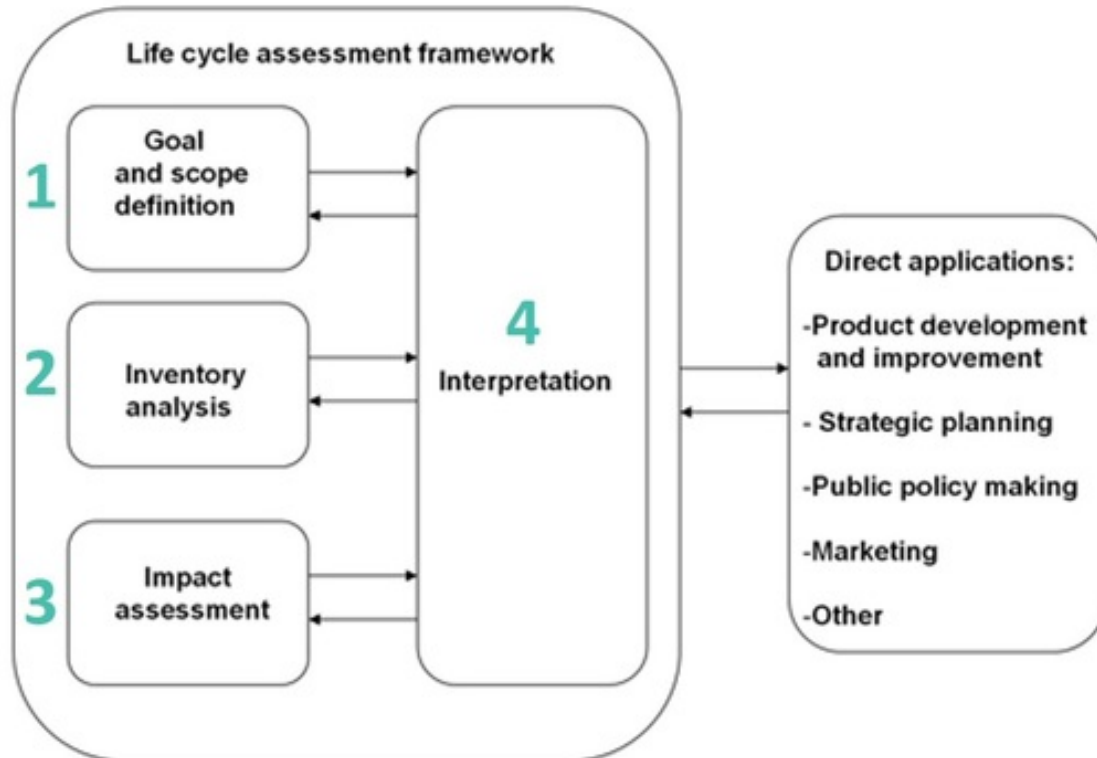
# Methods and frameworks to assess and report GHG emissions



# Methods and frameworks to assess environmental impact: water footprint



# Methods and frameworks to assess environmental impact: LCA



**ISO 14040:2006** - Environmental management - **Life cycle assessment** - Principles and framework

**ISO 14044:2006** - Environmental management - **Life cycle assessment** - Requirements and guidelines

# Methods and frameworks based on LCA



## Product Environmental Footprint (PEF)

- **PEF** is a multi-criteria measure of the environmental performance of a product or service throughout its life cycle
- **The PEF Guide** provides a method for modelling the environmental impacts of the flows of material/energy and the emissions and waste streams linked with a product
- **The PEF Guide** gives guidance on how to calculate a PEF, how to develop Product Environmental Footprint Category Rules (PEFCRs)
- **The PEF Guide** available in English and other official EU-languages



# Empowering users/consumers

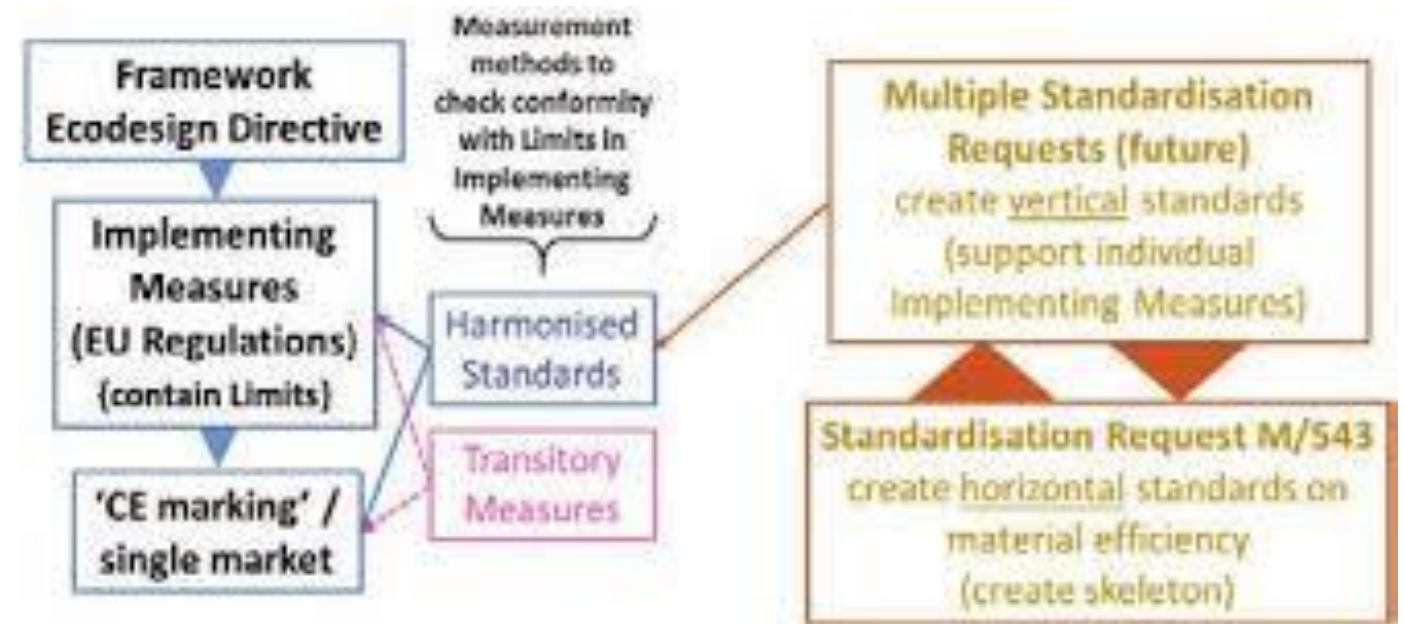
- The **Product Environmental Footprint (PEF)** and **Organisation Environmental Footprint (OEF)** methods developed by the Commission can enable companies to make environmental claims that are reliable, reproducible and comparable. The methods allow the identification of environmental hotspots and support companies in greening their supply chain and in becoming more sustainable and circular. Consumers will also be able to make informed choices based on reliable information.
- About 300 companies from 27 different sectors and more than 2,000 stakeholders worked for 5 years to test these methods that they consider a best practice in Life Cycle Assessment.

# Circular Design and Production Processes

- Circularity also means adapting industrial processes. The European Commission has introduced circularity aspects (energy consumption and material use, waste prevention, recycling and reduction of hazardous chemicals) in specific **Best Available Techniques Reference Documents (BREFs)** under the Industrial Emissions directive, turning them into reference standards for Member States when granting permits for industrial plants.

# Methods and frameworks to improve environmental performances

## Standards and CA procedures supporting Ecological Design



# Standards and Guides supporting trustworthy information on product and process-related sustainability information

## Ecolabelling



Types of eco-labels according to ISO	
Type I	A voluntary, multi-attribute eco-label developed by a third party that indicates an environmentally preferable product within a particular product category, e.g., Green Seal. (For more information, see ISO 14024)
Type II	Self-declared claims about an environmental aspect of a product or service that can be substantiated with evidence, e.g., 'made from 100% recycled material'. (For more information, see ISO 14021)
Type III	An environmental product declaration (EPD) is an extensive LCA of a product. The entire assessment must be peer reviewed by interested parties, and the results of this peer review are included in the public documentation of the study. (For more information, see ISO 14025)



THE INTERNATIONAL EPD® SYSTEM

# CE Management standards

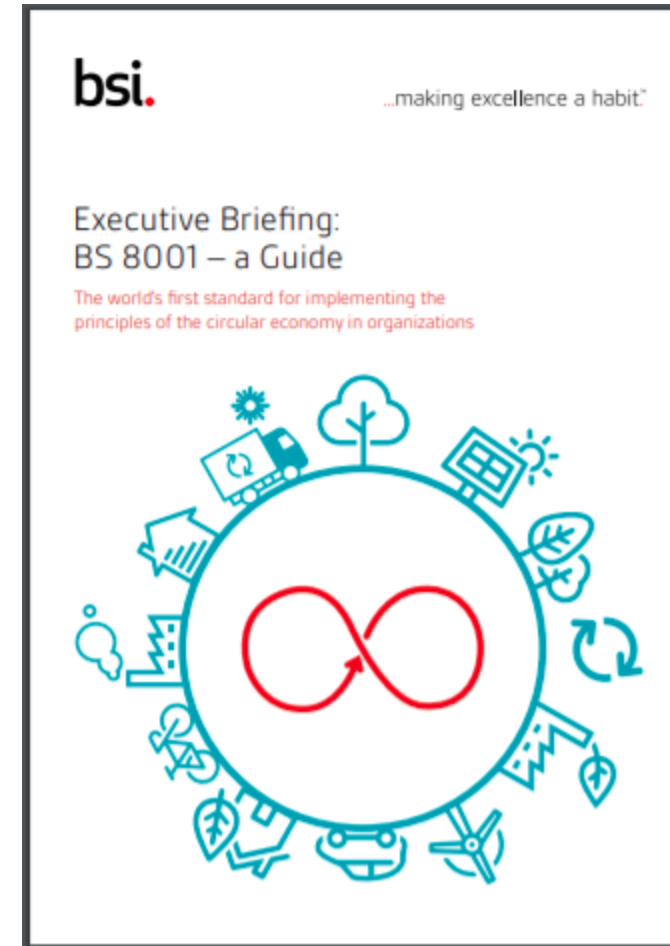


**XP X30-901 October 2018**

X30-901

Circular economy - Circular economy project management system - Requirements and guidelines - Economie circulaire - Système de management de projet d'économie circulaire - Exigences et lignes directrices

# CE Management standards



# 6. Cradle to Cradle

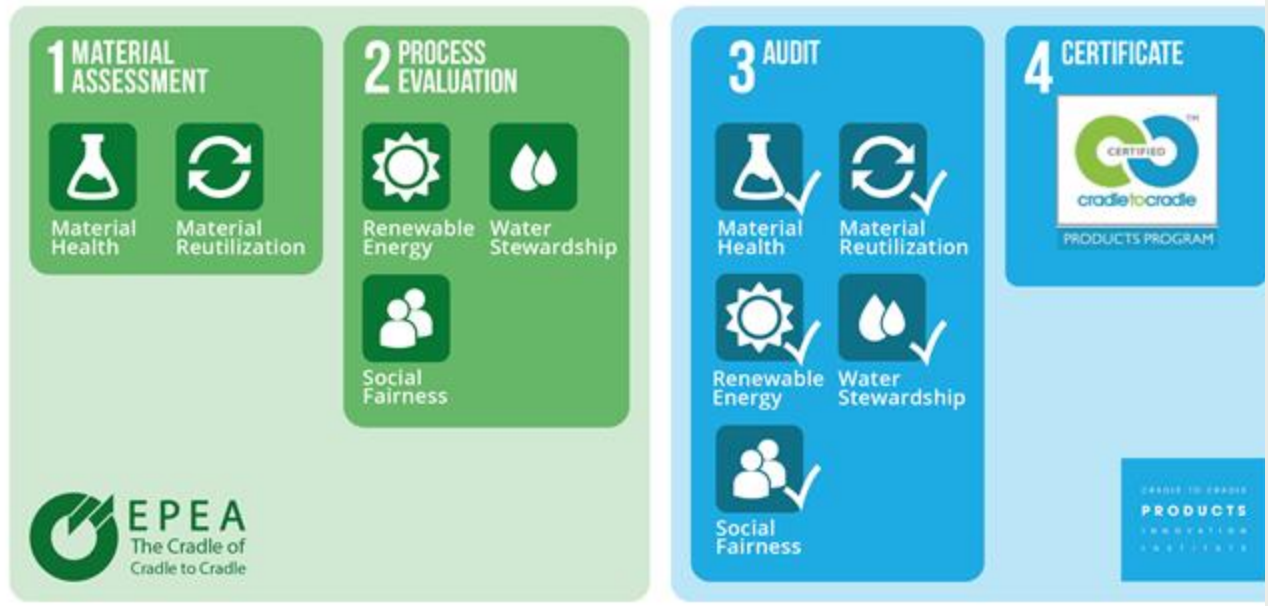


Table 1 Example Product Scorecard

	PRODUCT NAME Company Name Standard Version				
	BASIC	BRONZE	SILVER	GOLD	PLATINUM
MATERIAL HEALTH			✓		
MATERIAL REUTILIZATION			✓	✓	
RENEWABLE ENERGY		✓	✓		
WATER STEWARDSHIP			✓		
SOCIAL FAIRNESS			✓	✓	

# Cradle to Cradle Certification

## CRADLE TO CRADLE CERTIFIED™ – PROCESS



## Get Cradle to Cradle Certified™

The *Cradle to Cradle Certified™ Product Standard*—administered by the Cradle to Cradle Products Innovation Institute—provides a continuous improvement pathway toward the development of quality products.

- ✓ Products are assessed across five quality categories
- ✓ Product certification is awarded at five levels
- ✓ Continuous improvement platform

## Get a Material Health Certificate

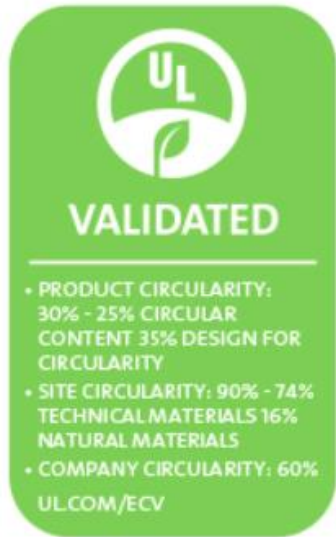
A new offering—the Material Health Certificate—will provide manufacturers with a trusted way to communicate their efforts to identify and replace chemicals of concern in their products.

- ✓ The requirements for the Material Health Certificate are identical to those of Section 3, Material Health of the *Cradle to Cradle Certified™ Product Standard*, Version 3.0
- ✓ Assessments are conducted by Accredited Assessment Bodies that have been trained and audited by the Institute

# UL Launches Circularity Facts Program to Help Companies Evolve their Sustainability Efforts



## Circularity Facts Program



### Recycled Content and Closed Cycle Recycled Content

Validates the post-consumer, pre-consumer (post-industrial) or total recycled content of a product by means of auditing.

[View Procedure](#)

### Byproduct Synergy

Validates the byproduct synergy sourced content of a product by means of auditing.

[View Procedure](#)

### Recyclability

Evaluates a product's recyclability through testing or auditing.

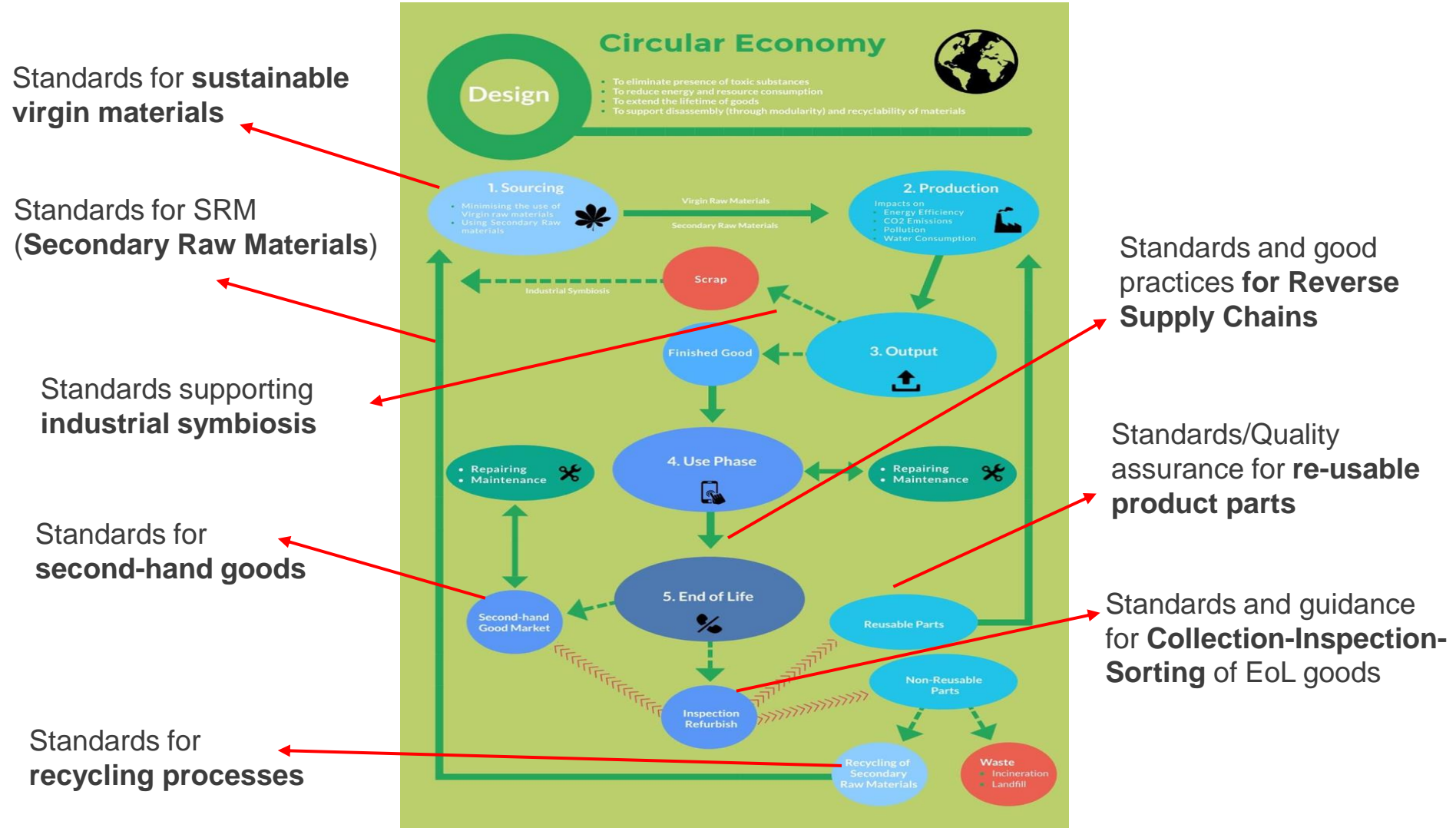
[View Procedure](#)

### Landfill Waste Diversion

Validates a company's waste diversion claims to a variety of levels through auditing.

[View Procedure](#)

# To support the transition to the CE, many types of standards required!!!



# Thank you!



**UNITRAIN**  
Conoscere e applicare gli standard

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