

Decarbonization and Circular Economy

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- **Regenerative and restorative** economy that is **inclusive**
- Aims to **redesign the production and consumption systems**
- **Integrates social, environmental, economic and cultural aspects, especially behavioral change**

A paradigm shift

The Transition

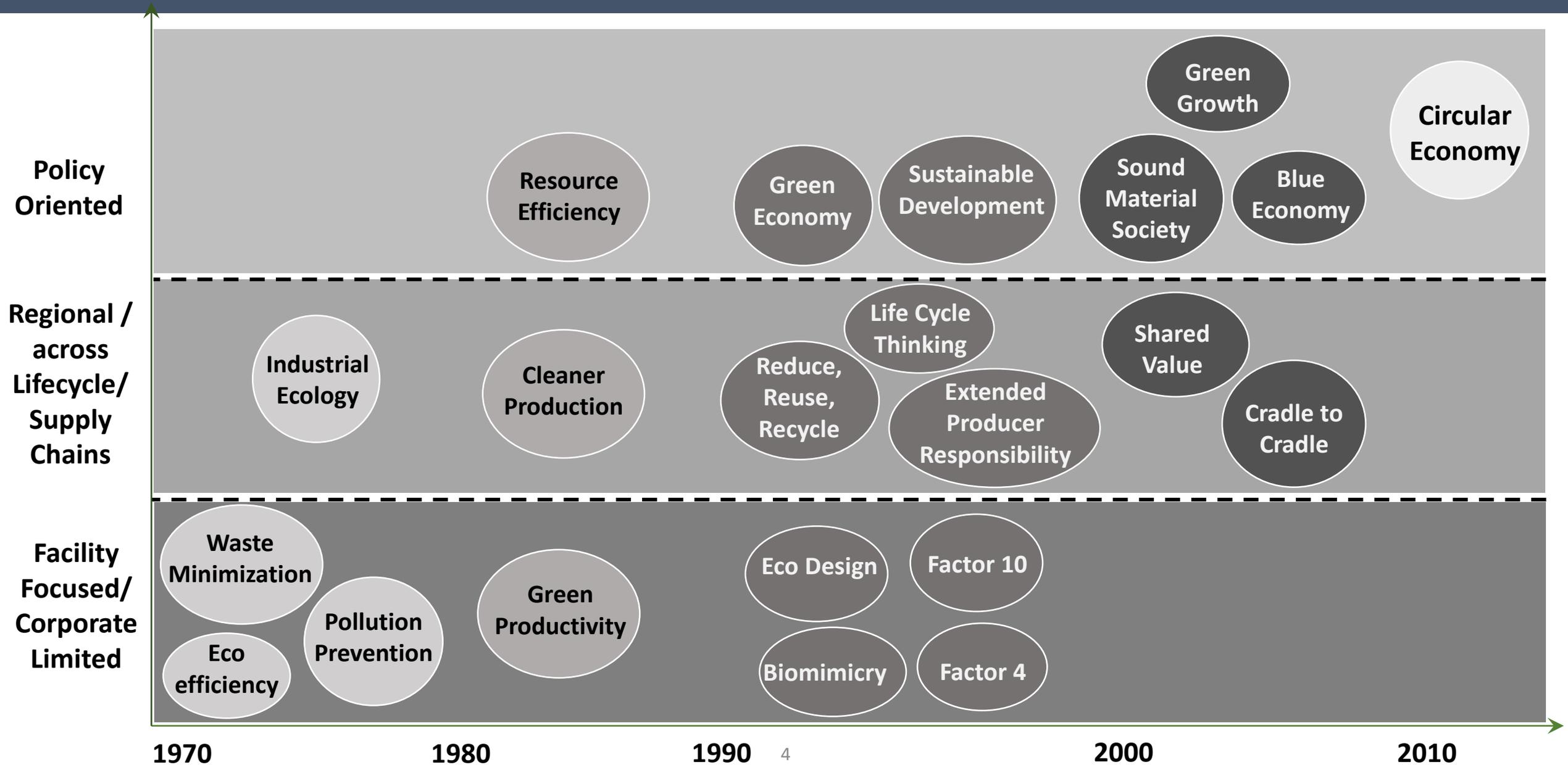
Linear Economy



Circular Economy



Related Concepts to Circular Economy



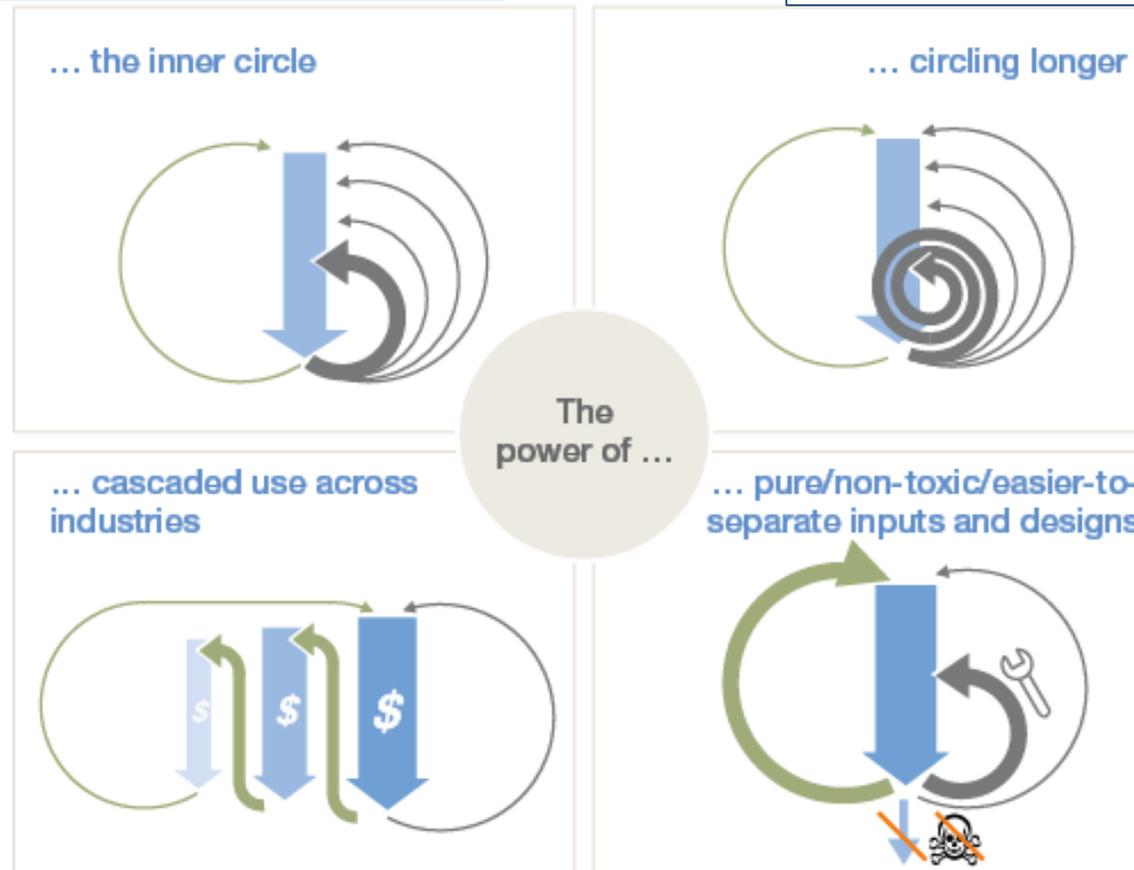
Key Strategies on Value creation while closing the loop



Inner Circle – Minimising comparative materials use, through re-use. The tighter the circle, the less it has to be changed to be returned to use (with higher savings)

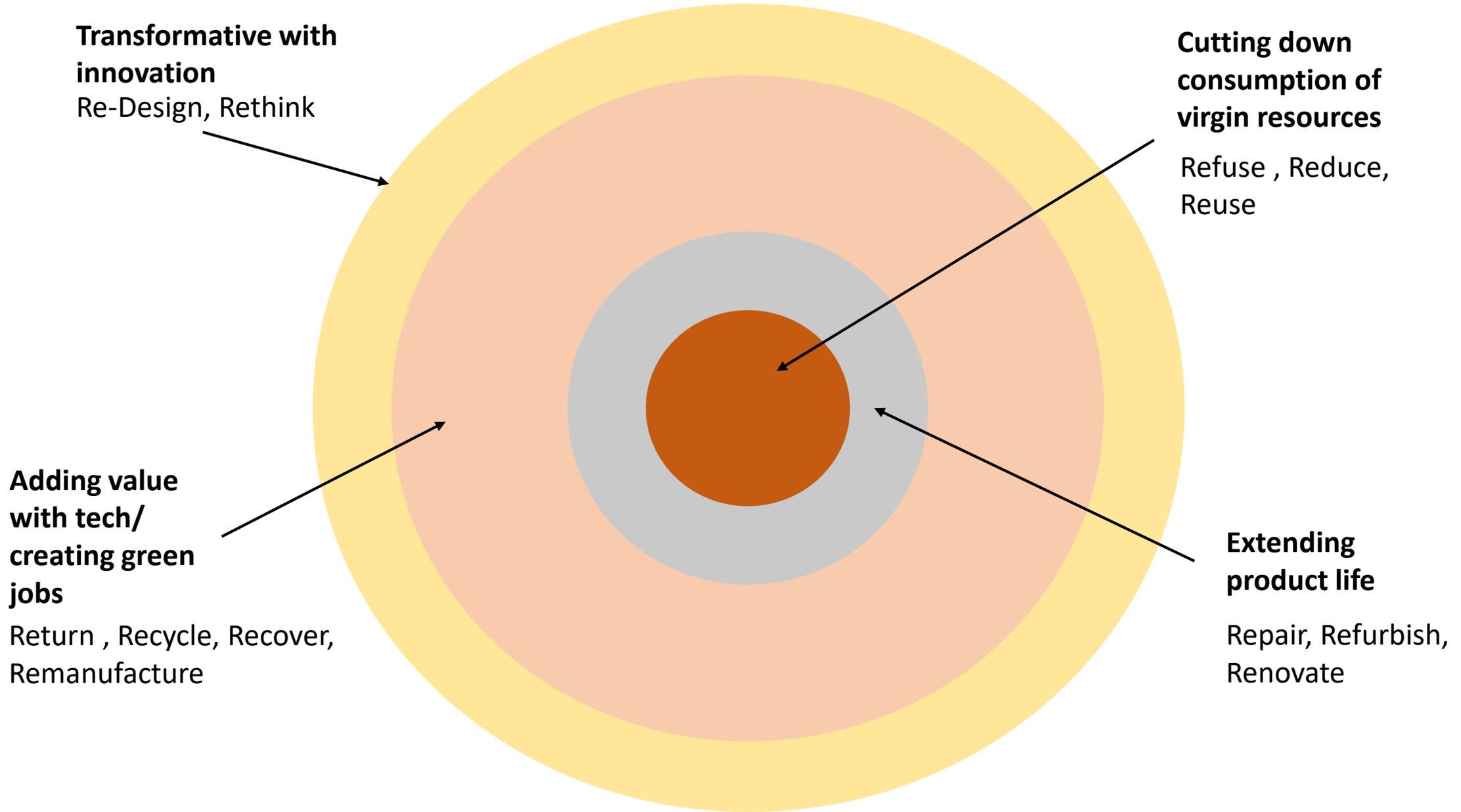
Circling Longer – Maximising the number of consecutive cycles of reuse, to avoid production of a new component

Cascading– Diversified re-use across the value chain, substituting previously used virgin materials with existing materials (including symbiosis)



Pure inputs – Avoidance of contaminated materials to increase collection and re-use efficiency whilst maintaining quality

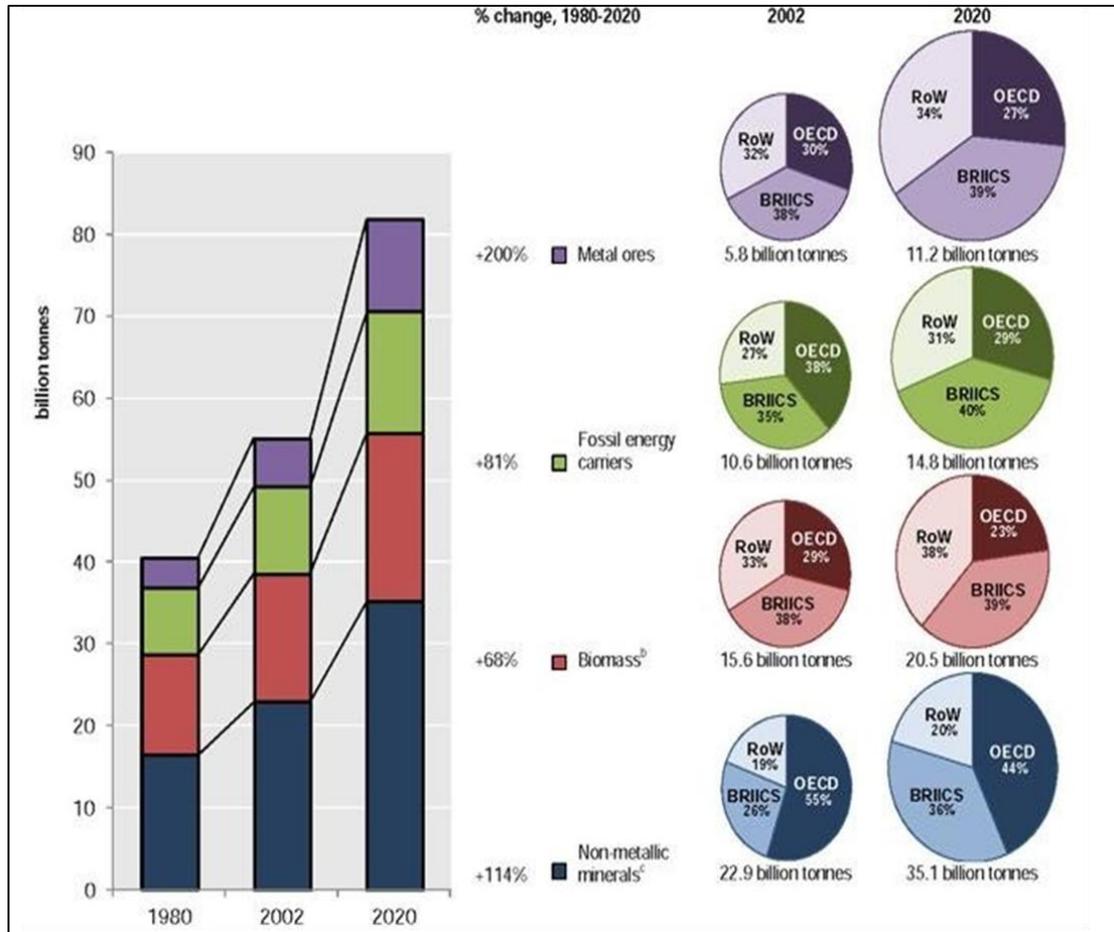
Four Circles of Circular Economy



Why Circular Economy



Increasing resource consumption

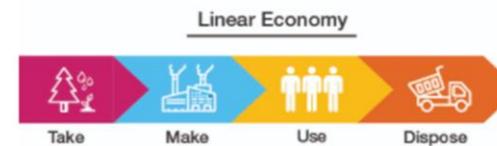


Source: Data from UNEP

Need for Changing the Course

Linear Economic growth

- Take-make-dispose model
- **Waste generated not put back in resources pool**



Circular Economic growth

- Product and materials are remained in circulation over long time
- Effectively put **back** into the resource pool

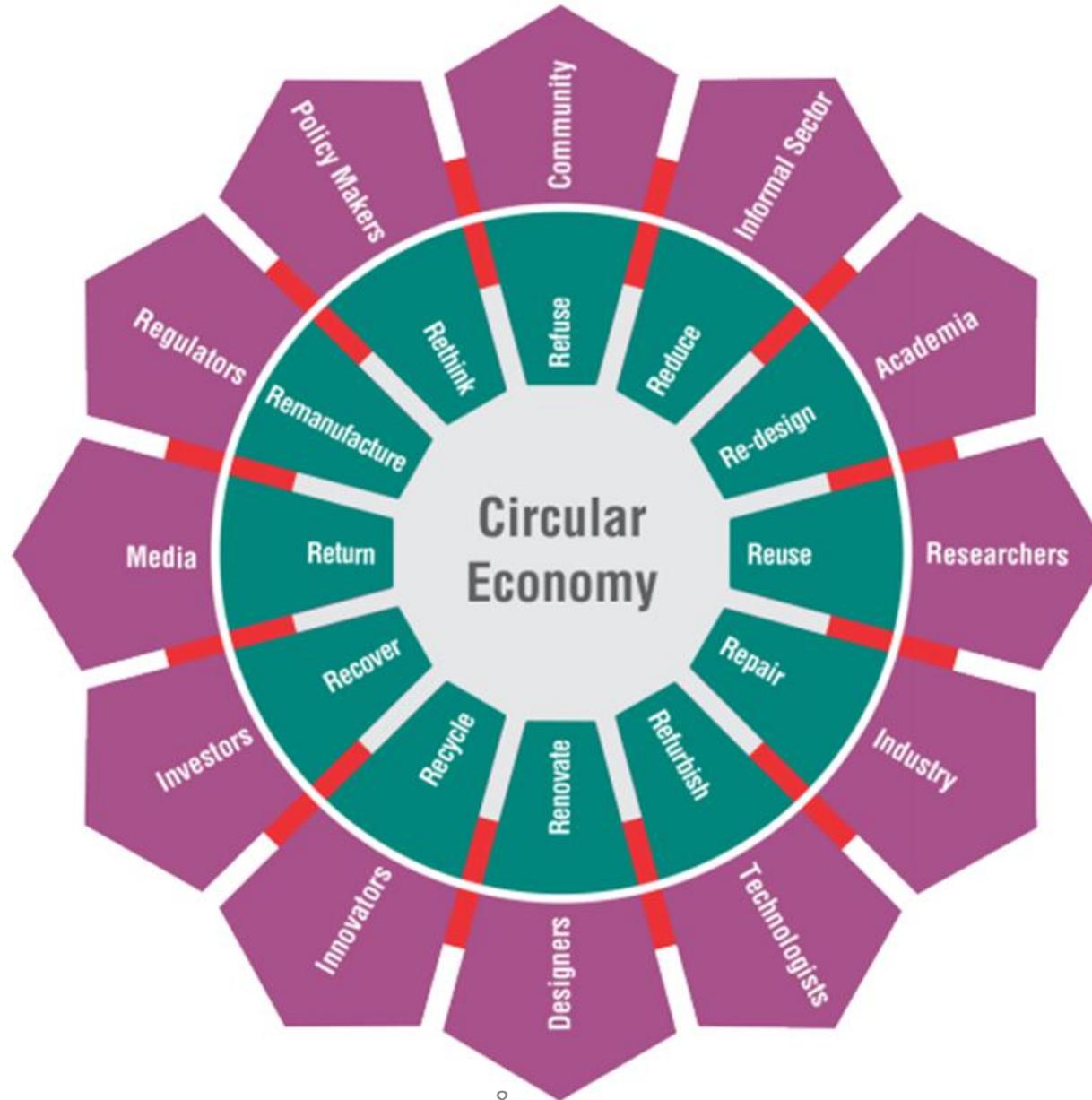


- Need for product cycles to become more efficient and closed in order to reach climate neutrality
- Circle Economy calculates: 62% of global GHG emissions (excluding those from land use and forestry) are released during the extraction, processing and manufacturing of goods to serve society's needs; only 38% emitted in the delivery and use of products and services

5

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12 Rs and the Ring of Stakeholders



Circular Supplies

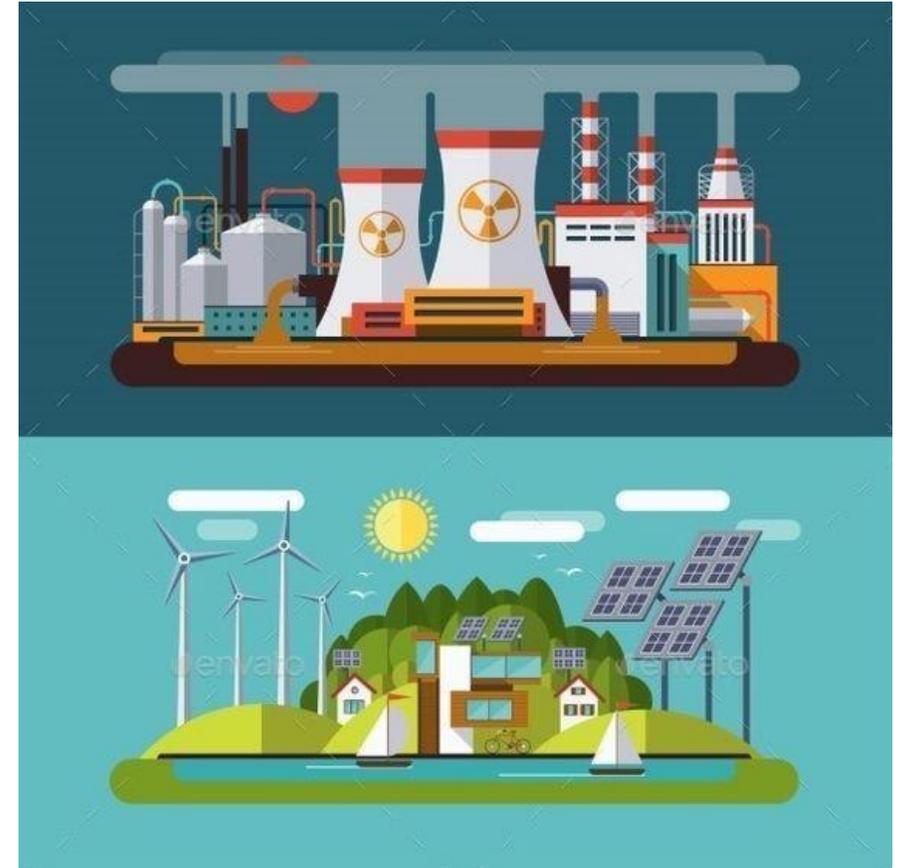


- Business models that supply fully renewable, **recyclable or biodegradable inputs/raw materials** to other industries
- Reduce demand for **virgin resources** benefiting over a long run

Traditional raw materials from virgin resources



Bio-based
Renewable
Recovered
resources



Fat hopes energy, Malaysia



- Uses **waste oil as a raw material** to produce biodiesel
- **Supply renewable bio-based fuels**, known as biodiesel, for industrial market
- 150,500,000 kg of waste oil converted to biofuel
- Revenue generation of 105,350,000 USD
- Provide services to 17,623 outlets



Ecoware, India



- Offers **sustainable food packaging solutions**
- Provide eco-friendly **alternatives to plastic** and styrofoam
- Plant biomass, also known as **agricultural residue** is utilized as raw material
- **Prevents air pollution** from burning post-harvest waste
- All products are biodegradable and easily compostable



Bio-Bus, U.K



- 40-seater bus, which runs on gas generated by treatment of **sewage and food waste**
- Can travel up to **300 km** on full tank of gas
- **Annual waste of around 5 people** can be used to generate **one full tank of gas**
- The sewage treatment plant treats **75 million cubic meter of sewage** and **35,000 tones of food waste** annually



Kloth Cares, Malaysia



Operating since 2013

Fabric recycling company

Aims to keep fabrics **and textiles out of the landfill**

Has set up more than 280 recycle bins across

Malaysia for collecting discarded/unwanted

garments

Have collected more than **4,35,268 kg of fabrics**

Work with more than 300 recycling partners



Kloth Cares 5R Principles

Mud Jeans, Netherlands



- Jeans made from **organic and recycled** cotton
- Uses 40% recycled cotton
- **75% sale and 25% lease**
- Partnered with **RE:Pack** for **returning** jeans after customer use
- **Free repairs**
- **Save 5500 litres** of water, **29 Kg of CO₂ (e)** emissions per jean



Pay-per-lux, Phillips, Netherlands



- Offers light-as-a-service
- ‘Pay-per-lux’ is an **intelligent lighting system** to fit the requirement of space and price
- **LightRec**, Philip’s partner responsible for the **reuse of lighting components**
- Improves energy efficiency and **reduces operational cost**
- Schiphol Airport, Netherlands benefits by **50% energy saving** through **installation, monitoring and optimization**



Repair Café



- Founded by **Martina Postma** in **2009** in **Amsterdam**
- Meeting place for people to **repair household, electronic** and other **personal belongings** together
- Learn and **exchange repair skills**
- As of today, more than **750 Repair Cafes** exist

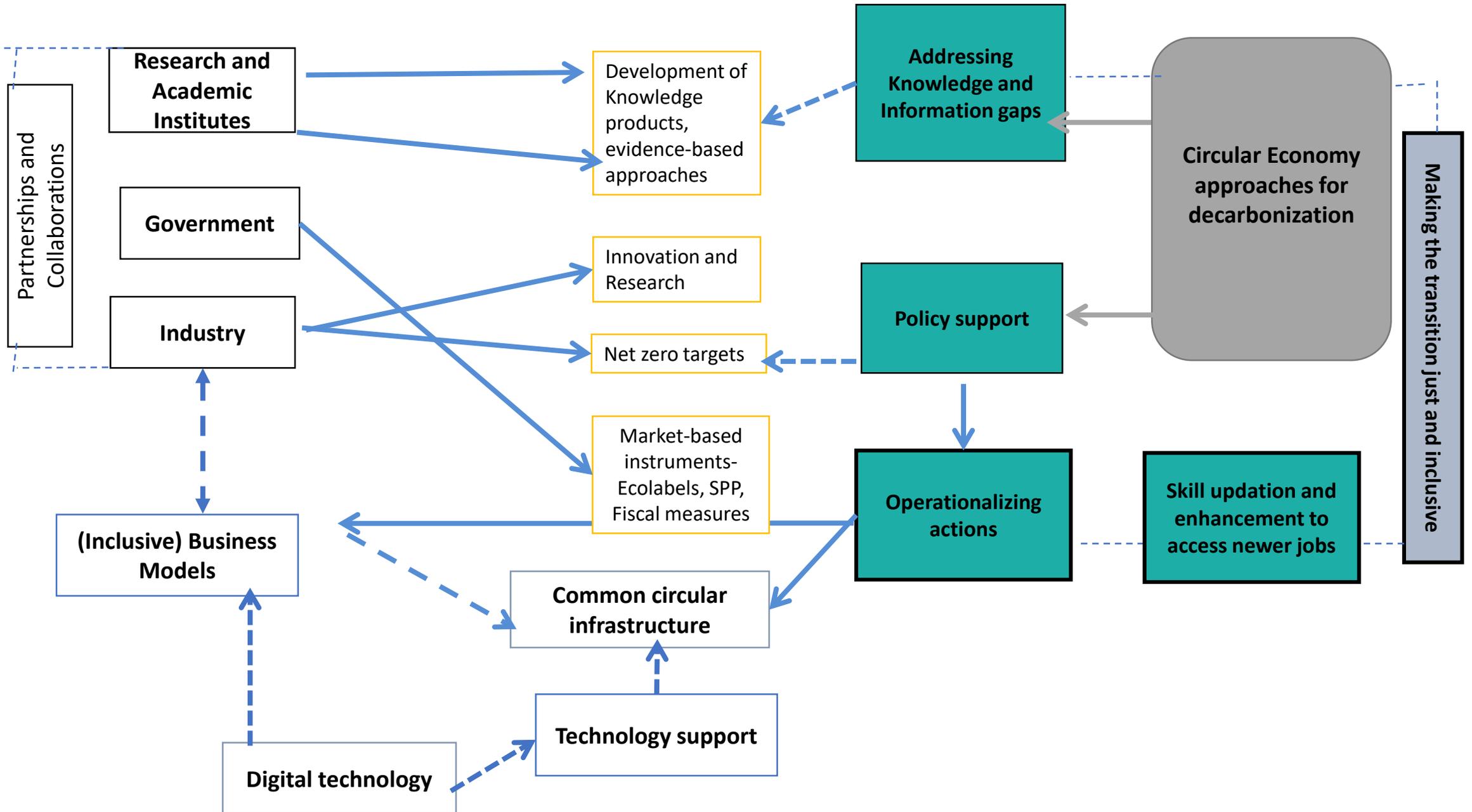


- Solution provider for waste management and recycling
- Introduces **'Internet of waste Things' (IoWT)**
- Consumers and organizations can clean, sort and pack non-food items/waste
- Put a 'iCycle' label on the bag and drop them in **collection bins**
- Online dashboard helps in tracking the nearest collection bins
- Get Rewarded with **recycling points (RP)** which are exchangeable for merchandise and cash vouchers

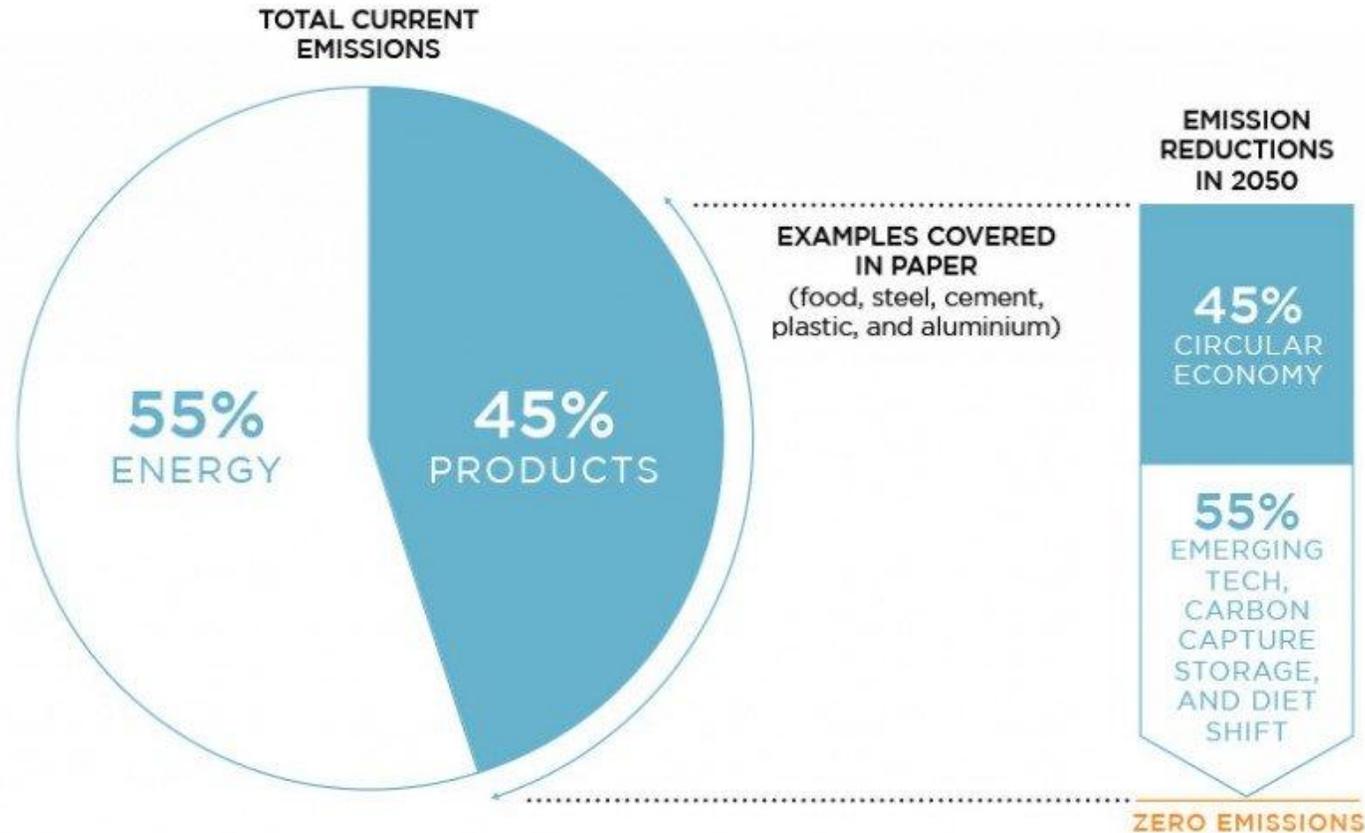


- The Circularity Gap Report 2021 by Circle Economy highlighted that the majority (70%) of GHG emissions are associated with material handling and use.
 - *Housing, nutrition, mobility, communications, services, consumables and healthcare as the seven core societal needs with big potential to cut down attributed emissions and resource use once circular interventions are implemented*
- Research by Ellen MacArthur Foundation in the global context has shown that with existing technologies, transition to renewable energy will only address 55% of the emissions, and the remaining 45% decrease to achieve net zero goal will need to come through the transition to a circular economy.
 - *Focusing on five key sectors (cement, plastics, steel, aluminium, and food), the study illustrates how circular strategies can reduce GHG emissions while making the sectors resource efficient and competitive.*

Integrated Approach towards Circular Economy and Decarbonization



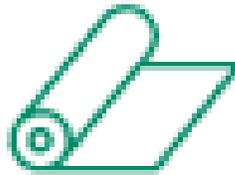
Circular economy –Critical role in Climate Mitigation Action



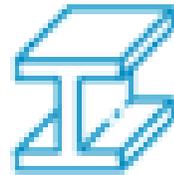
Creating a circular economy for **5 KEY SECTORS**



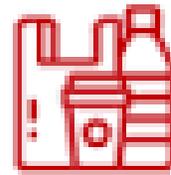
CEMENT



ALUMINUM



STEEL



PLASTICS



FOOD

could cut CO2 emissions by **3.7 BILLION TONS IN 2050**

Source: The Ellen MacArthur Foundation
2019/20



WORLD RESOURCES INSTITUTE

Material Efficiency Strategies for Climate Action



Using less
material by design

Material substitution

Fabrication yield
improvements

More Intensive
use

Enhanced end-of-life
recovery and recycling of
materials

Product life
extension

Recovery, reuse
and
remanufacturing
components

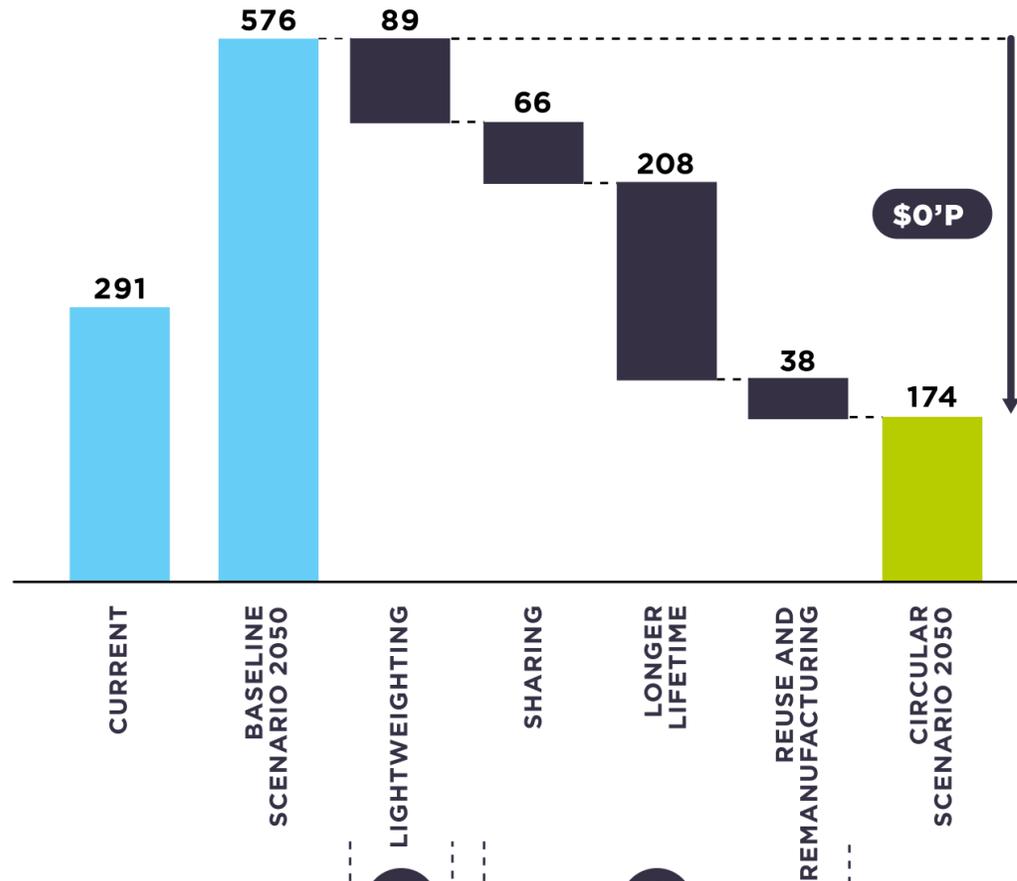
Material efficiency is an **essential part of the circular economy**
Consists of **the preservation of materials by making products more durable and repairable and facilitating** recovery and recycling of material at the end of the product life

Circular economy leading to emission reduction: Potential for Mobility Sector

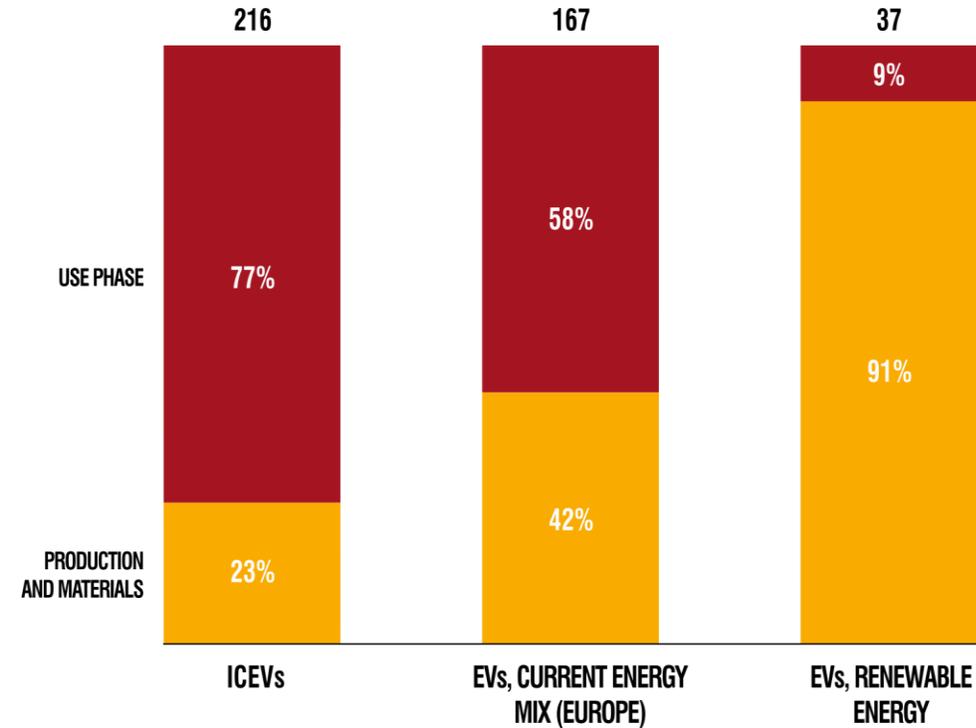


Circular scenario for passenger cars could reduce global CO₂e emissions by 70%

EMISSIONS FROM ALL MATERIALS USED IN PASSENGER CARS
MILLION TONNES OF CO₂e PER YEAR, GLOBALLY



Lifecycle CO₂ emissions from ICEVs versus EVs (g CO₂ per car km)

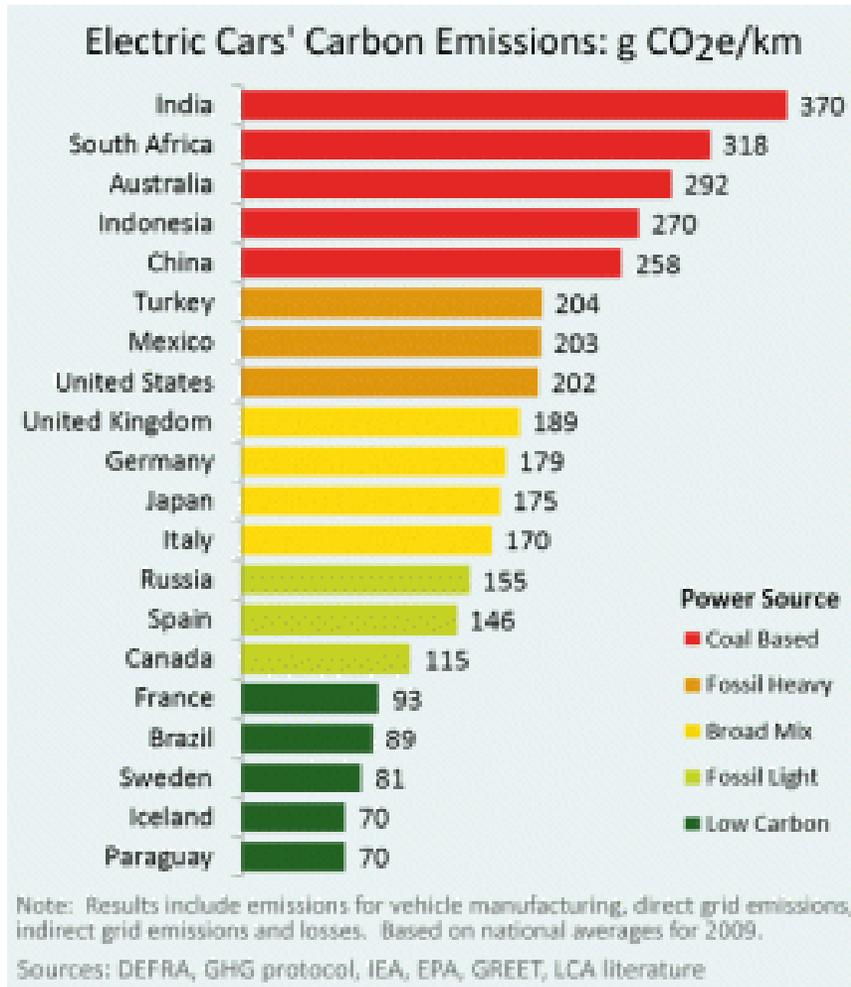


Source: Material Economics. The Circular Economy. A Powerful Force for Climate Mitigation

Source: Completing the Picture: How the Circular Economy Tackles Climate Change. Ellen MacArthur Foundation and Materials Economics.
<https://www.ellenmacarthurfoundation.org/publications/completing-the-picture-climate-change>

- **Incorporating the circular economy in electrification of transport**
 - Circular approaches can ensure that the dramatic increases in battery production required incorporate reuse and remanufacturing principles from the outset
- **Expanding shared mobility**
 - Emphasizing shared mobility (e.g. public transport)
 - Ensuring transport connectivity are central to promoting zero-emission urban transportation systems.

Put your thinking caps: Are electric cars really greener?

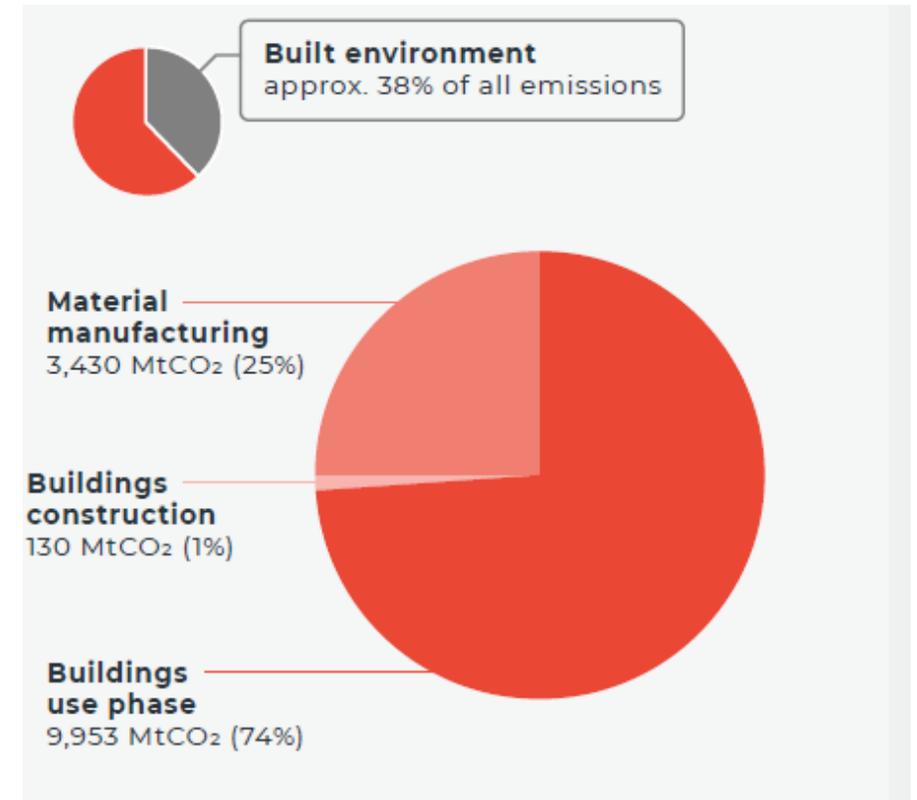


- Variation across countries
- Country's energy mix affects the environmental advantage of EVs.
- Even dependence on time of the day for charging- night-time electricity is less dependent on coal
- Recycling of special materials and components- need technology and finance
 - Recycling EV batteries is an asset-intensive business in which high utilization is critical to operating efficiency

Should the focus be on development of a circular ecosystem for EVs?

- Urban planning - nature-based solutions integrating green infrastructure and ecosystem services into the built environment to further boost resilience
- Circular nature-based solutions is based on use of renewable resources, reuse or repurpose other resource streams and avoid unwanted by-products.
 - Nature-based solutions also make adaptation measures circular and smarter by promoting multifunctional areas in cities. For example, green spaces in Stockholm are used for both heatwave protection and recreational activities
- Supply chain management and raw material security
- Future proofs society and businesses

- Adoption of circular design principles - minimise waste, optimise buildings for energy efficiency and for usage, using regenerative materials and components (cross-laminated timber (CLT)), recycled (such as circular aggregates) or reused
- Maximize their utilization, improving their energy efficiency and preventing their demolition through adaptive reuse, circular refurbishment and retrofitting
- Circular construction and demolition criteria or green infrastructure—such as rainwater harvesting systems or green roofs—also present important opportunities both for material use reduction and to reach net-zero emissions.



Carbon footprint of built environment globally

Enablers

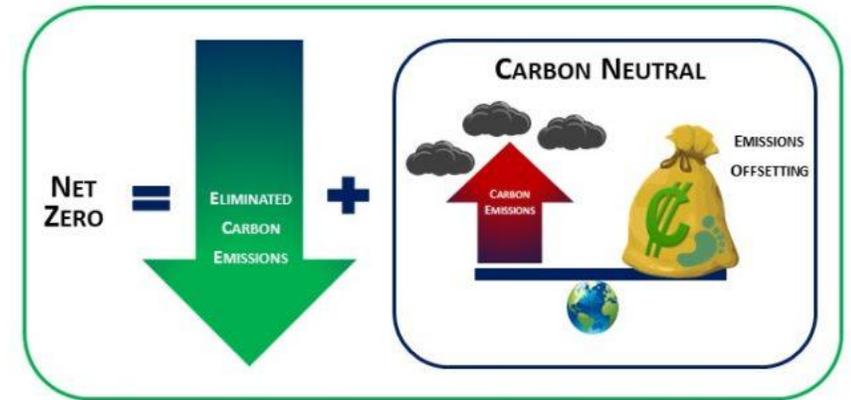


Innovation	Regulation	Market instruments including Fiscal Measures	Procurement	Information	Partnerships and Collaborations	Infrastructure
<p>Partnership Innovation</p> <p>Process Innovation</p> <p>Product Innovation</p> <p>Packaging Innovation</p> <p>Proposition Innovation</p> <p>Digital Innovation</p> <p>Source: Supporting Net Zero Through a Circular Economy - Anthesis (anthesisgroup.com)</p>	<p>Extended Producer Responsibility with mandated recovery and recycling targets</p> <p>Regulation of pollution from recycling activities (for example in case of auto recycling)</p> <p>Regulations around right to repair</p> <p>Recycled content in product mandates</p>	<p>Incentives for sharing models of products and services</p> <p>Carbon tax</p> <p>Subsidies</p>	<p>Preferential purchasing by government departments and agencies of circular, and low embodied carbon content products</p> <p>Procurement of refurbished or remanufactured products</p> <p>Products as service model and extended warranties</p> <p>Responsible disposal</p>	<p>Labelling and Certification for reuse and remanufacturing</p> <p>Peer nudges to change behaviour</p> <p>Product information about carbon intensity</p>	<p>Voluntary commitments</p> <p>Sectoral strategies engaging key stakeholders</p>	<p>Common circular infrastructure</p> <p>Science, Research and Technology parks</p> <p>Infrastructure to support emerging/new technologies (for example, charging infrastructure for EVs)</p>

Circular Economy for Net Zero Targets



- Net zero – key emerging sustainability trend
- To meet net zero targets, circular economy approach can be part of the trajectory to meet net zero targets
- Can be included in company strategy and governance in the form of mission statements, commitments, targets and plans, city plans, tapping circular opportunities in rural areas
- Pilots, incubators and demonstration projects to test business solutions that address the twin objectives of circular economy and decarbonization
- One-third of NDCs updated and submitted this year, largely across Europe and some other G20 countries, include mention of a circular economy (the Netherlands, Finland and Chile are few examples).



[Circular economy, carbon neutrality and net zero :
Yorkshire Circular Lab \(leeds.ac.uk\)](https://www.leeds.ac.uk/yorkshire-circular-lab)

**CLEAN
DISRUPTION**

Tony Seba at the IDB

**Will Electric Utilities and Conventional
Cars be Obsolete by 2030?**

Debating the future of infrastructure services in LAC
Live in 2 days
May 24, 9:10 PM

Reminder on May 24 | 3PM

Presented by the Infrastructure and Energy Sector

Talks
Innovation
in Infrastructure

Not just technology,
market creation and financing

Is COVID-19 the time?
Will Behavior Change drive?
Will the change sustain?

Shouldn't Climate Change Lead?



MORE CIRCULARITY
LESS CARBON
-25% BY 2025