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Skills and competencies for a Circular Human Resources
Management in the Foundry sector

MANAGING BASIC TECHNICAL AND ENVIRONMENTAL CONCEPTS TOWARDS A CIRCULAR HRM MODEL

INTRODUCTION TO CIRCULAR ECONOMY



Topics

- Economy
- Linear economy
- Basic concept of circular economy
- Linear and circular economy



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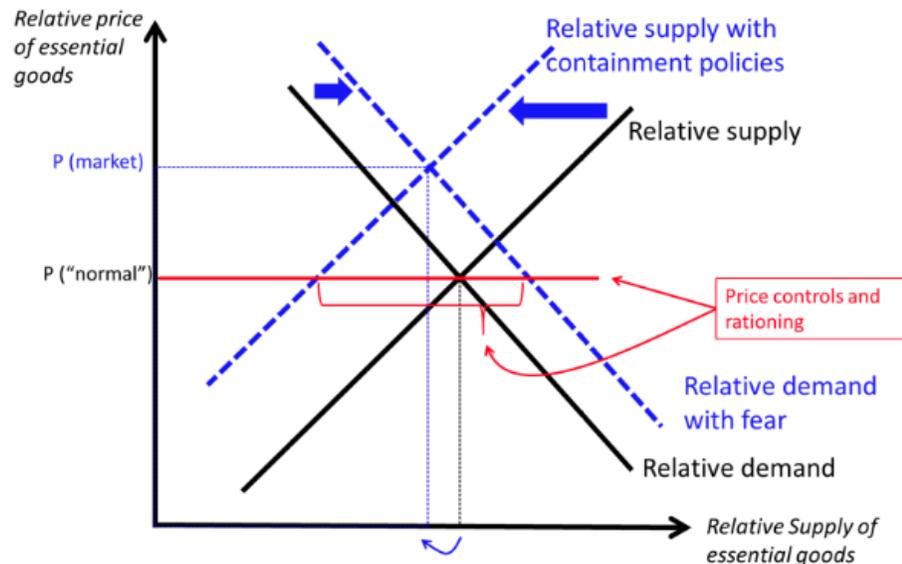
ECONOMY





Economy

- Inter-related activities between production, consumption, and exchange
- Resource allocation
- Product distribution



BUSINESS MODELS

- Linear
- Circular

Economic System

- Production
- Consumption
- Distribution of goods
- Services
- Operations
- Actions



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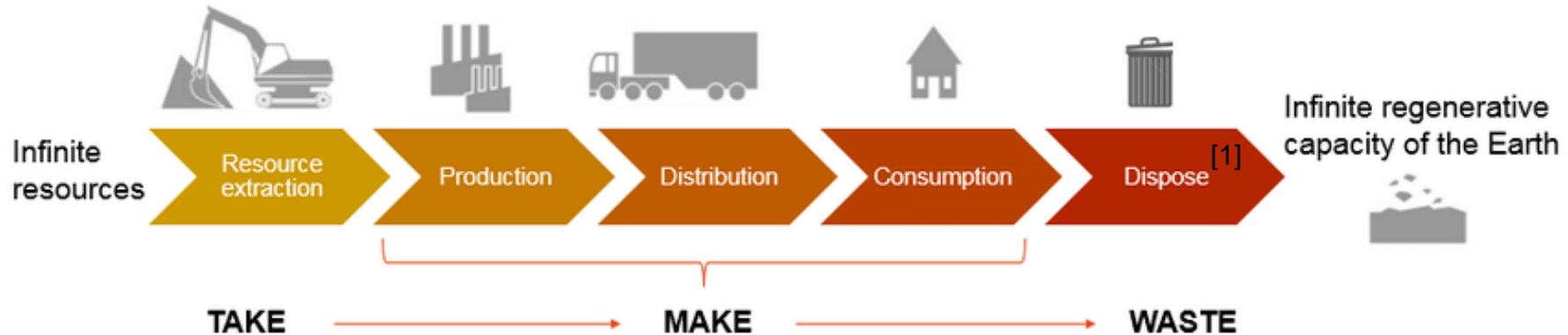
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LINEAR ECONOMY





Linear Economy



- ✓ Fast and cheap production
- ✓ Ease of implementation
- ✓ Finance based

- ✗ Uncontrolled wastes
- ✗ Harmful disposing methods
- ✗ Finance based

Linear throughput flow model in industry and other businesses has dominated the overall industrial development causing serious environmental pollution and extensive use of limited natural resources.

Linear Economy

Human Sources of Greenhouse Gas Emissions

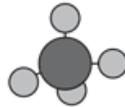
CO₂ carbon dioxide

Mainly from energy
Also cement making
& deforestation



CH₄ methane

Mainly from livestock
and rice paddies

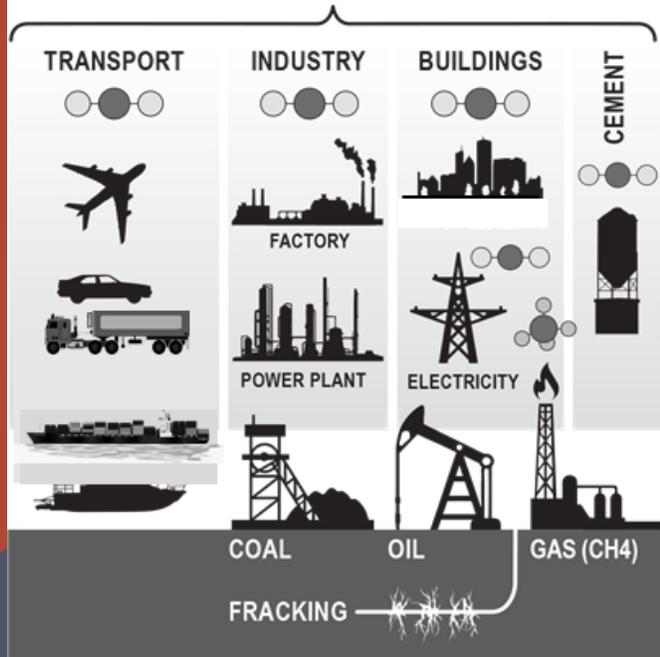


N₂O nitrous oxide

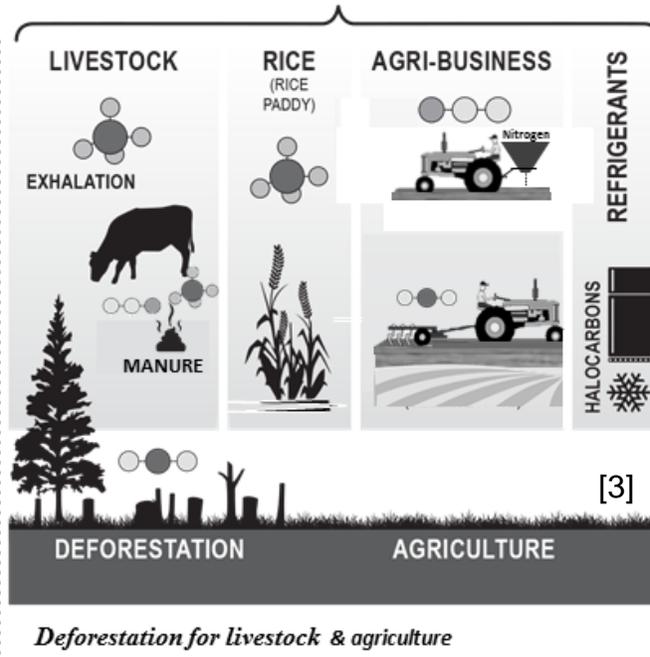
Mainly from nitrogen chemical fertilizer
Also livestock waste



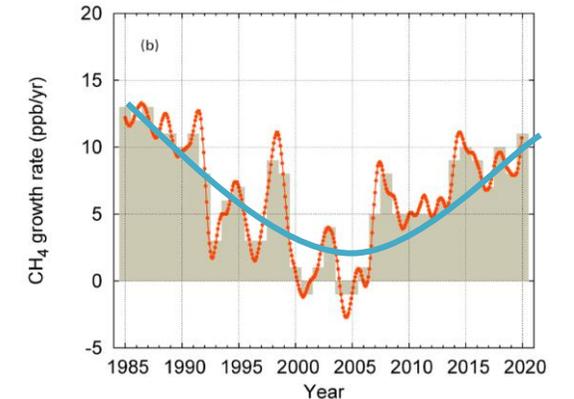
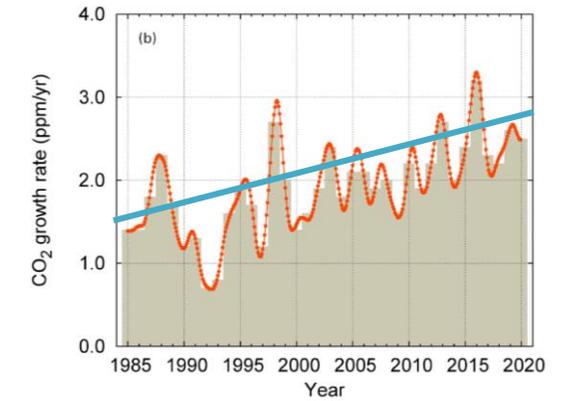
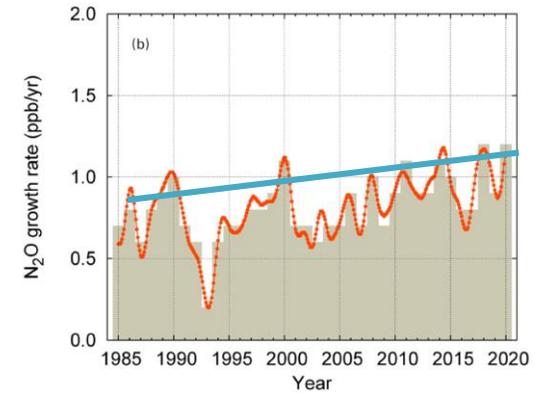
Energy Production & Use



Food Production & Supply



A habit dating back more than 150 years





Linear Economy

Consumer goods sector spends 80% of the US\$ 3.2 trillion material value irrecoverably each year because of linear economic approach.

- ! Waste production chain: OECD countries consumes over 21 billion tons of materials that are not used directly related with products (not counted in economic circle).
- ! End of life waste: 2.7 billion tons waste was generated 2010 in Europe and only 40% of them are re-enter the cycles.
- ! Erosion of ecosystem services: Last consumption results of world shows that consuming levels are exceeding the productivity of Earth's ecosystem and it leads breakage at sustainability.

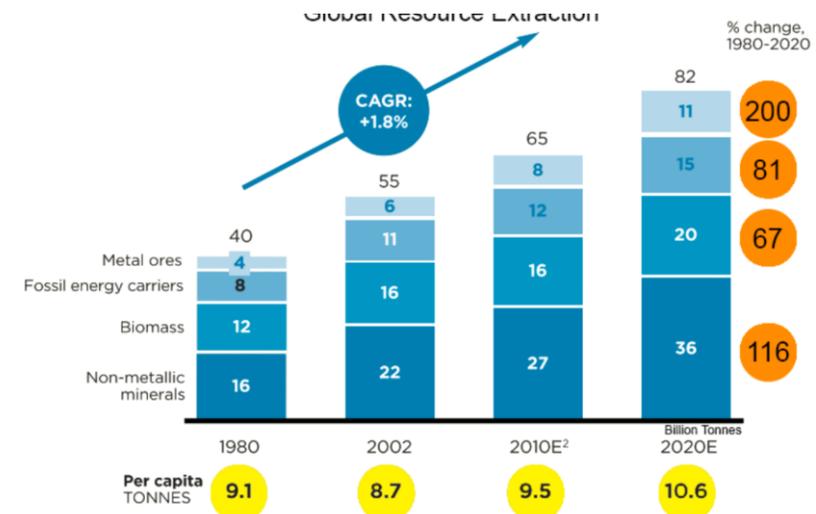


Linear Economy

Consumer goods sector spends 80% of the US\$ 3.2 trillion material value irrecoverably each year because of linear economic approach .

UNEP report shows that:

- 20 metal show global end-of-life recycling rate of 25% or more.
- Recycling of aluminium and copper was increased from 43 to 70% and 43 to 53%, respectively.

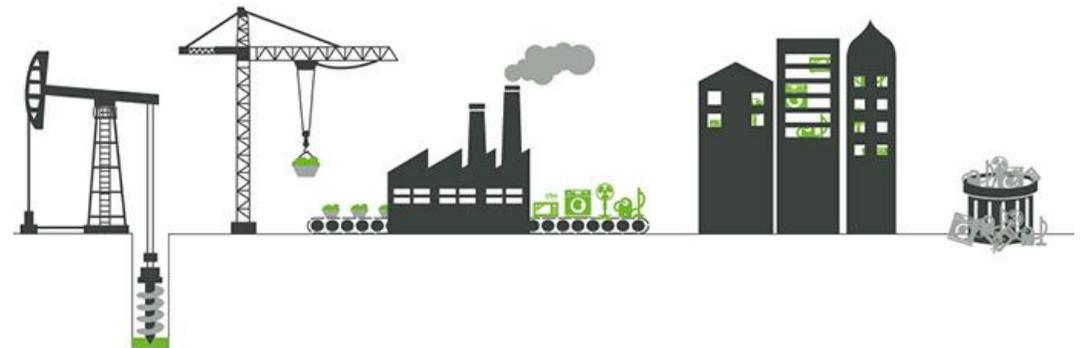




Linear Economy

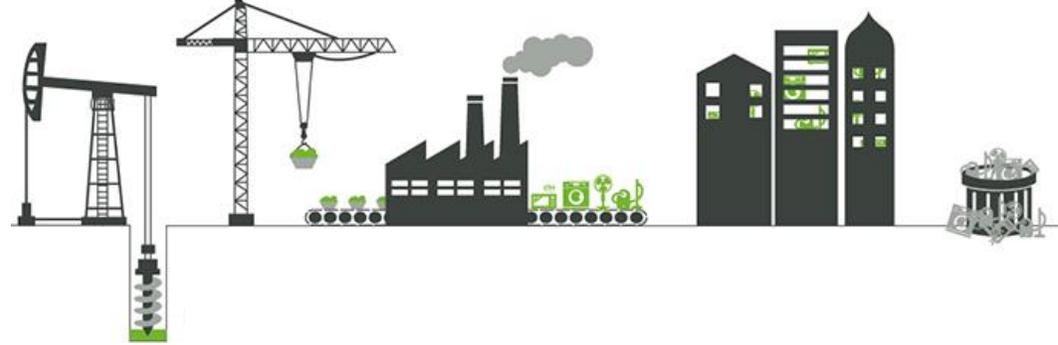
Limits of lineal economy:

- ⚠ Economic loss
- ⚠ Volatility of resource prices
- ⚠ Interruptions in supplies
- ⚠ Depletion of natural reserves
- ⚠ Increased regulations
- ⚠ Economic load of waste management and treatment





Linear Economy



Limits of lineal economy:

- Manufacturing: Efficiency increment can be provided via new methods and optimizations but gains are still insufficient for real competitive advantages or differentiations. Processes need excessive ecologic resource usages. However the getting operation license is found to be sensitive for local resource markets.
- Agriculture: Soil fertility and nutritional value of foods are decreasing and technological development rates are very slow for supply sufficient productivity.
- Developments at eco-friendly technologies are increasing the material and resource usages, multiple thinking innovations cannot be generated for an eco-friendly system.



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BASIC CONCEPTS OF CIRCULAR ECONOMY

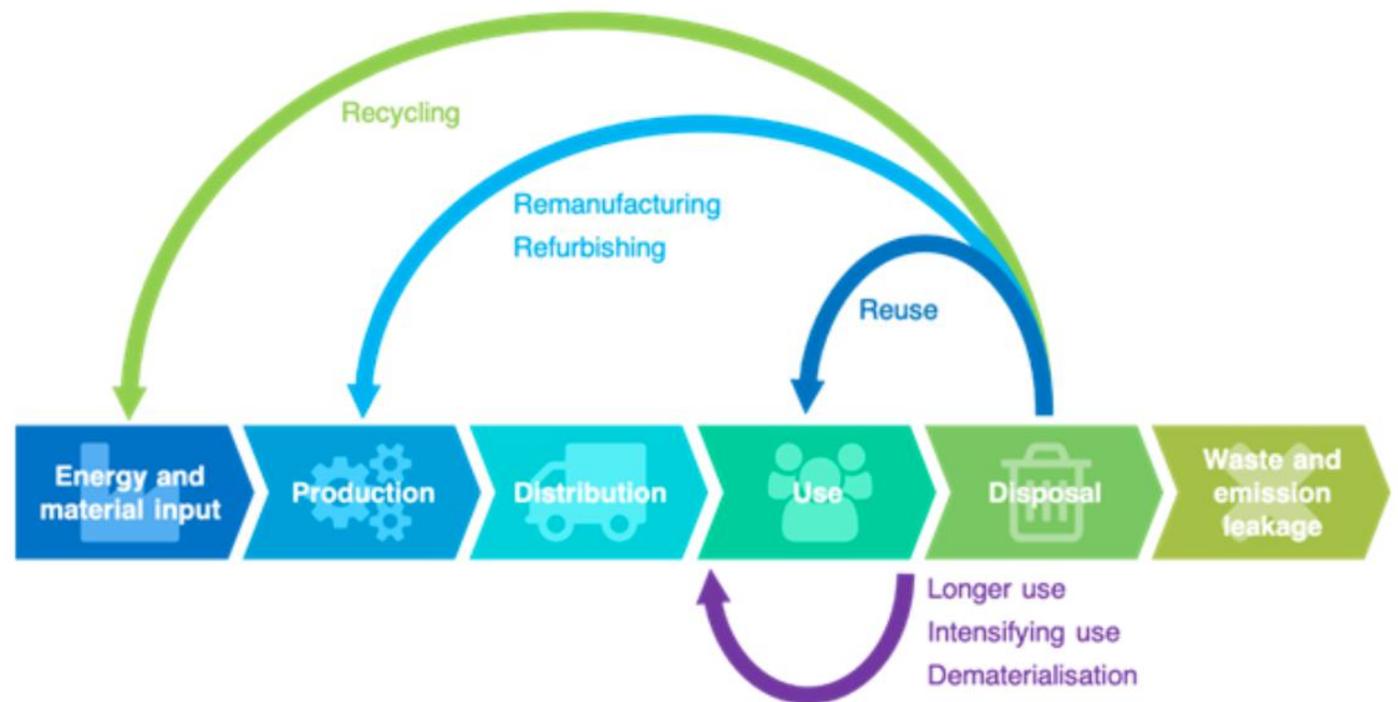




Circular Economy

Closing the loop

The Circular Economy model promotes the resiliency of natural resources. It aims to replace the traditional linear economy model of fast and cheap production and cheap disposal with the production of long lasting goods that can be repaired, or easily dismantled and recycled.





Circular Economy

Closing the loop

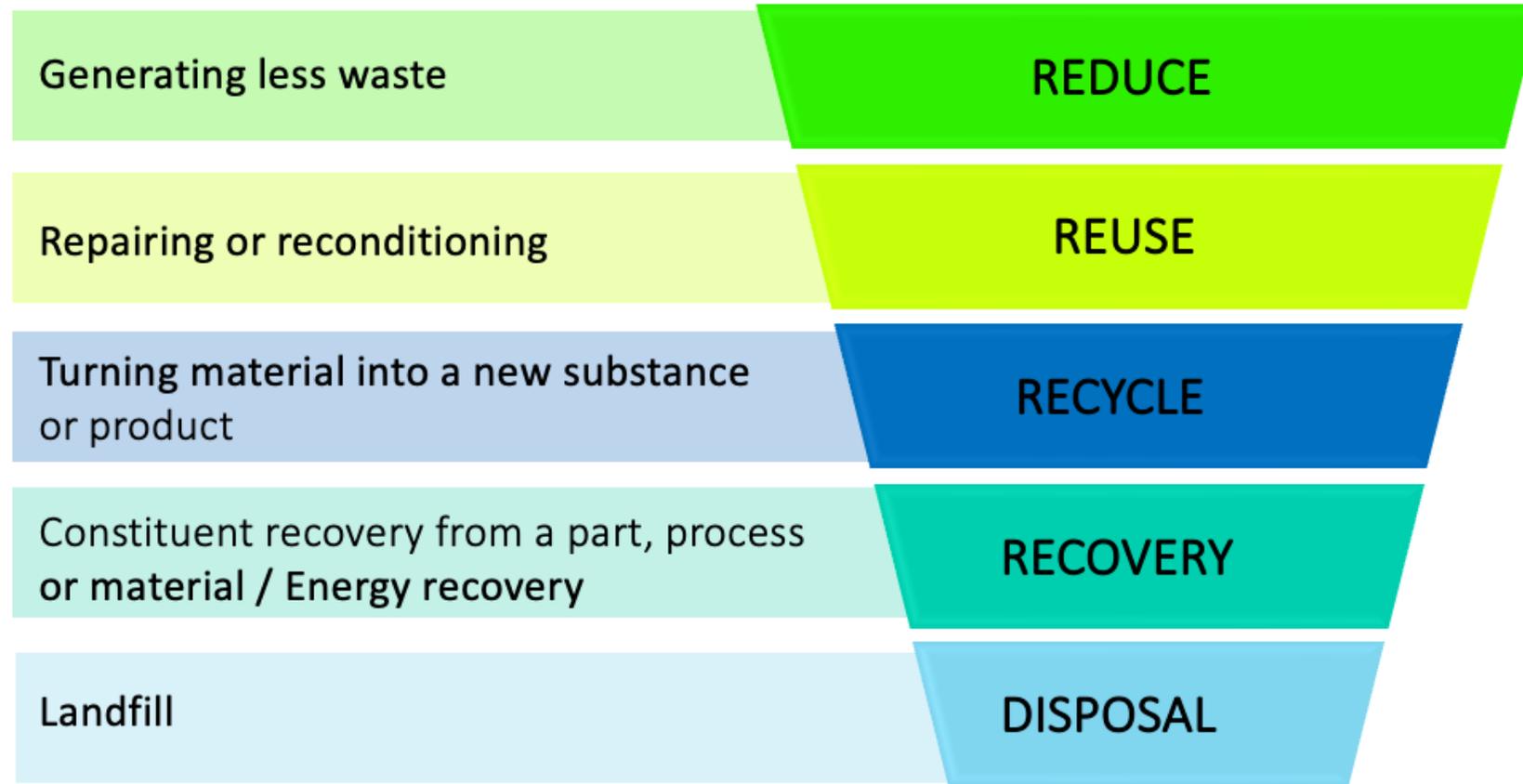
3R principles of circular economy:

- ⬡ **Reducing:** The new process and equipment designs reduce the consumption rates of resources. Also, waste management provides the decrement at wastes/pollutants of process.
- ⬡ **Reusing:** A whole or a part of product can be repaired, refurbished or remanufactured as a parts of other products or processes.
- ⬡ **Recycling:** Wastes/disposal can be used as a raw material after recovery.



Circular Economy

Closing the loop





Circular Economy

Closing the loop

According to MacArthur Foundation report, a circular economy is “an industrial economy that is restorative or regenerative by intention and design.” However Geissdoerfer and et. al. argue that a circular economy is “a regenerative system in which resource input and waste emission and energy leakage are minimized by slowing, closing and narrowing material and energy loops.”

Circular Economy concepts as an environmental protection method for economical approaches to reduce consumptions.

From zero to hero via transforming wastes to values!



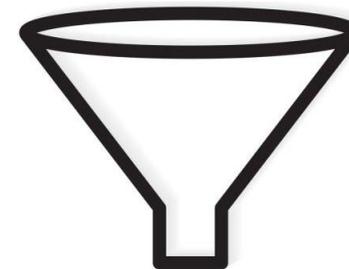
Circular Economy

Closing the loop

European production is ~50% casting for the automotive → Machined

Environmental challenges of foundries are virgin raw materials replacement, putting mineral side streams to use, energy consumption and gas emissions.

Recent developments are minimizing the gas outlet effects by using fluent based treatments that leads water pollution.



- Metal debris
- Sand and core
- Process gases

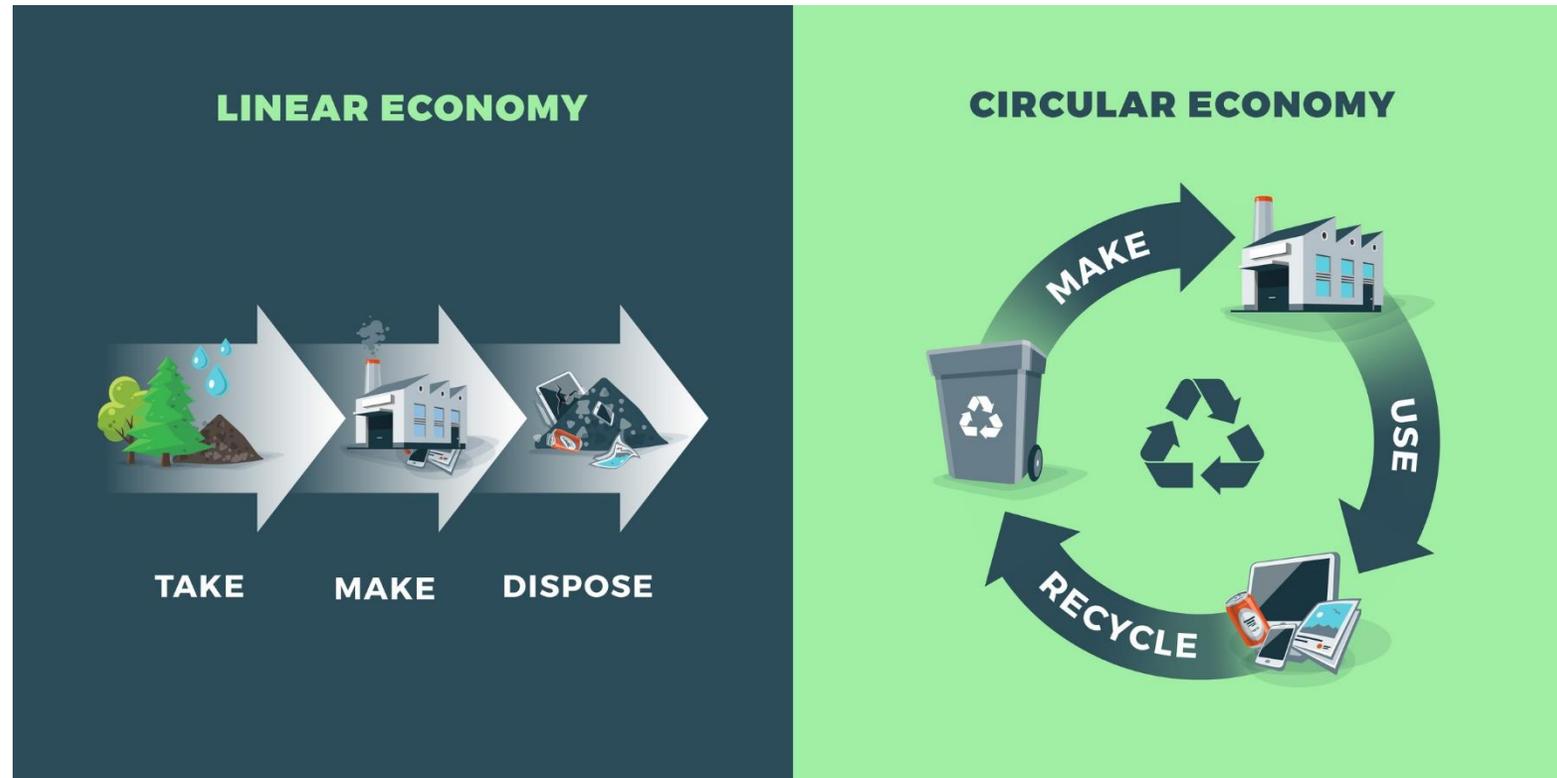
⊙ Water impact

⊙ Soil impact

⊙ Air impact

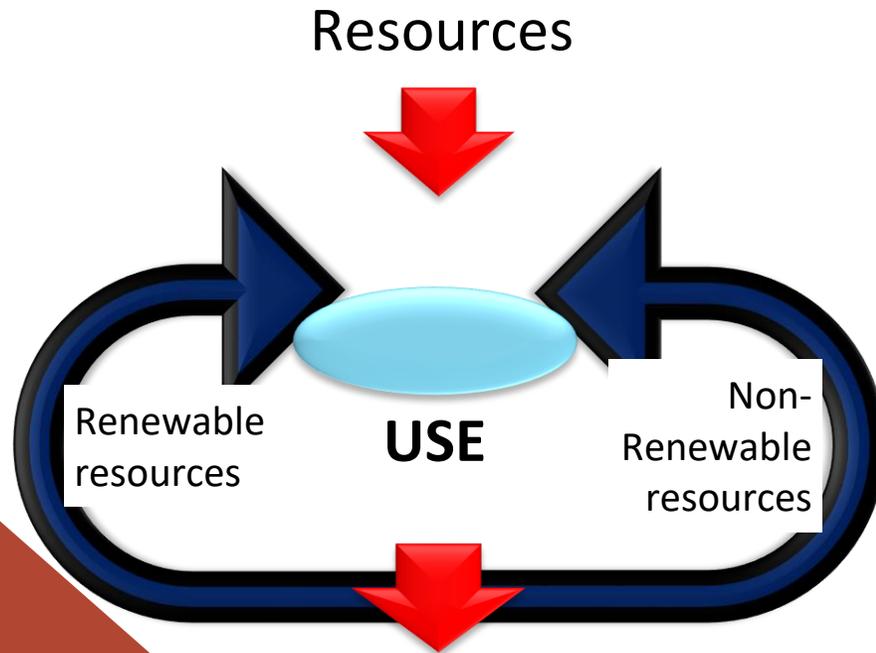


Linear and Circular Economy

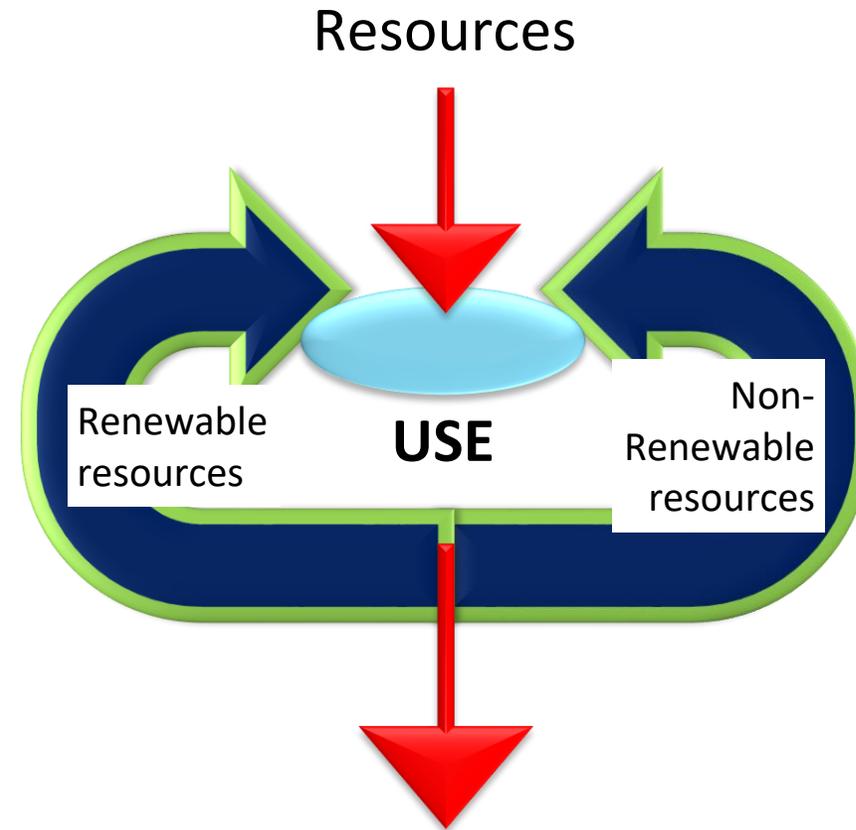




Linear versus Circular Economy



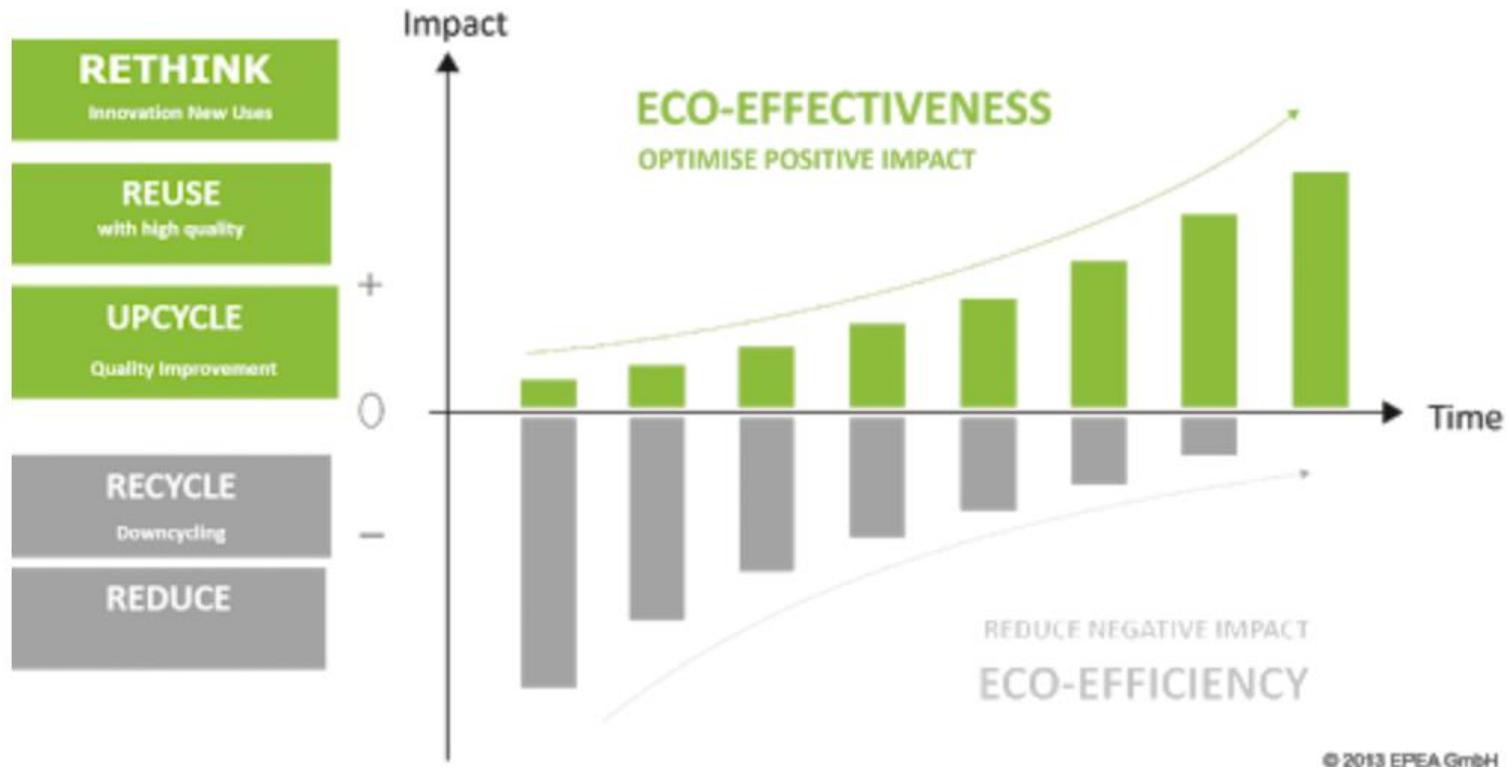
Disposal and incineration



Disposal and incineration



Linear versus Circular Economy



Focus on eco-effectivity to create a positive impact, we strengthen the ecological, economical and societal systems by using them.



Linear versus Circular Economy

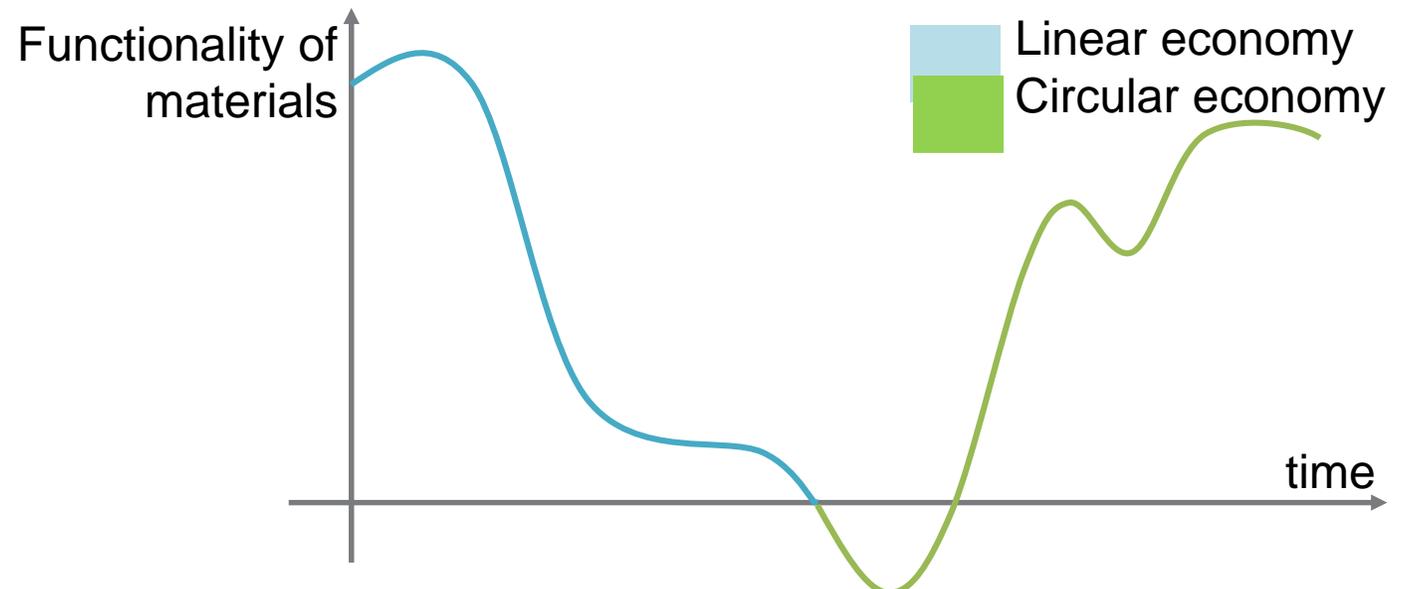
Efficiency - effectiveness

	Kind of supply chain	General purpose	Main idea	Focus	Product design	Key indicator	Waste management
-Efficient	Open and close loop supply chain	Improving ecological and economic efficiency	Zero waste emission, zero resource use and zero toxicity	Doing things right	Cradle to grave design	Integrated economic and environmental indicators	Recycling
-Effective	Only close loop supply chain	Improving product in life cycle from cradle to cradle (C2C)	Quality in life cycle	Doing right things	Cradle to cradle design	Indicators in life cycle from C2C	Upcycling



Linear versus Circular Economy

	Linear	Circular
Step plan	Take → Make → Dispose	Reduce, Recycle, Reuse
Focus	Eco-efficiency	Eco-effectivity
System boundaries	Short-term from purchase to sales	Long-term, multiple life cycles
Reuse	Down-cycling	Upcycling, cascading and high grade recycling





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