

# INDUSTRIAL SYMBIOSIS

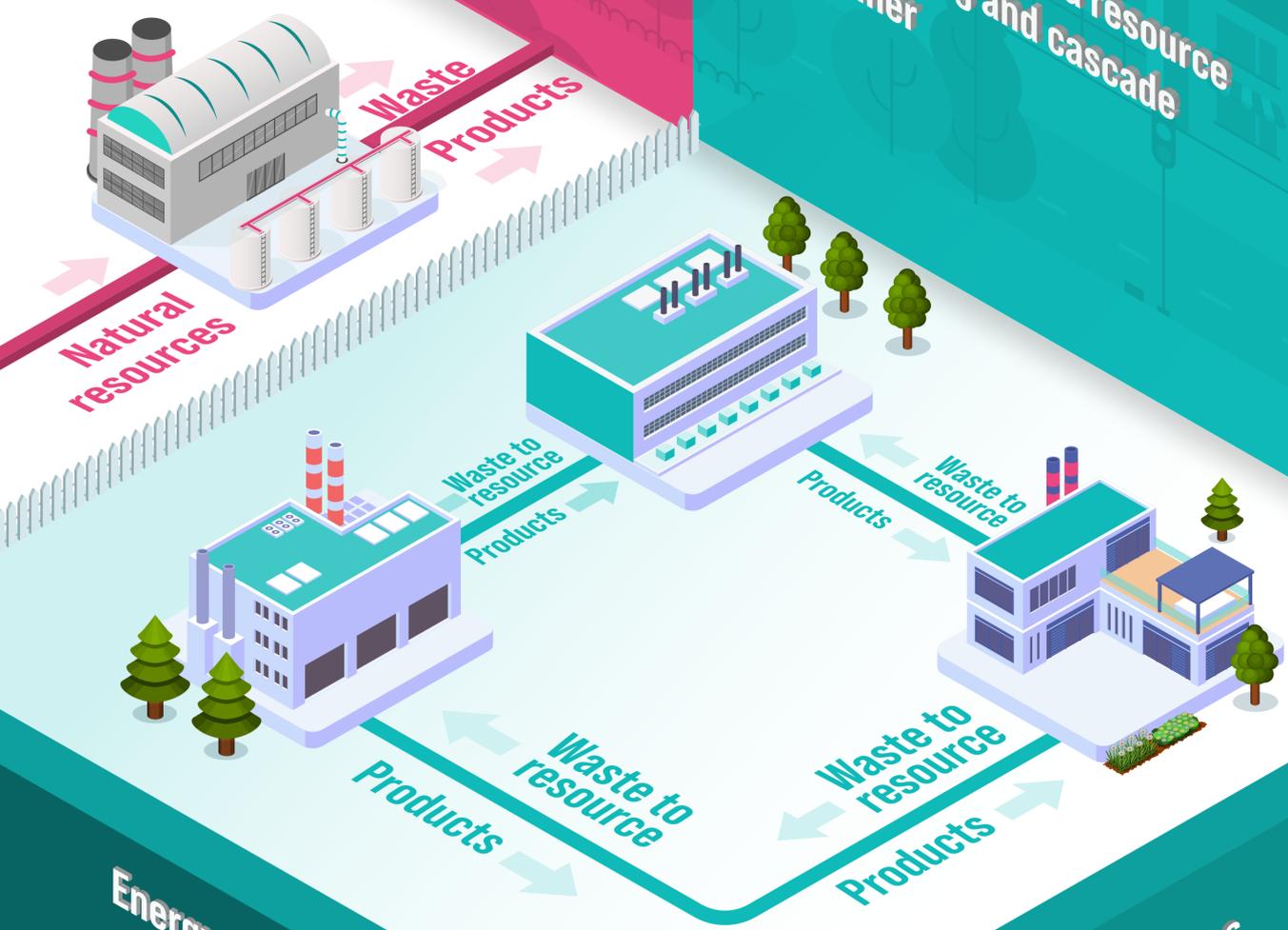
process by which **wastes or by-products** of one industry or industrial process **become raw materials** for another.

## LINEAR ECONOMY

Uses natural resources to produce products and waste

## CIRCULAR ECONOMY

Waste is used as a resource in a cycling and cascade manner



Energy and materials cycle continually and no waste is produced

One of the stepping stones of Circular economy.

## WHY?

### Economic benefits:

- Increase in profitability and competitiveness by reducing cost of resources
- Decrease cost of waste disposal
- Creation of market for by-products
- Materials remain economically valuable for longer

### Environmental benefits:

- Reduction of environmental footprint of industries
- Reduction of usage of raw materials
- Reduction of landfill waste disposal
- Reduction in greenhouse emissions

### Social benefits:

- Less strain on local resources
- Stronger regional economies
- Increased employment opportunities
- Encouraging of sustainability

## EXAMPLES

- Waste heat from one industry is used to warm greenhouses for food production.
- Car tire shavings are used for production of construction blocks.
- Slush from fish farms is used as fertilizer.

## HOW?

Industrial symbiosis creates interconnected network that mimics ecological systems.

### USEFUL STEPS:

- 1 Mapping of material flows on local and regional level
- 2 Creating mutual trust and "ideology" between compatible industries
- 3 Ensuring long-term public support (state, regional, local)
- 4 Helping companies find relevant partners by establishing regional clusters or hubs
- 5 Eco-industrial park - built for the purpose of creating symbiotic models and recycling

## Citycircle pilot in Udine (Italy)

Feasibility study regarding the waste and water cycles for the creation of an **industrial symbiosis** between two plants: **waste management plant** AND **water management plant**. Both produce waste heat that could supply electric and thermal energy to local agricultural market and part of the city.

**Partners:**  
The University of Udine, stakeholder of the Citycircle project, collaborates with the Italian partners Municipality of Udine and APE FVG to develop the study.