



PROCESSES4PLANET

Processes Industry towards Climate Neutrality & Circularity in a Competitive Way

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Outlook



- Processes4Planet
 - Who are we?
 - Problems & Ambitions
 - SRIA
- How to proceed and the role of sustainable energy
- How to integrate?
- Summary

A.SPIRE: a vibrant community with a common strategic Vision

A.SPIRE – European cross-sectorial association



DG R&I
DG Grow



PROCESSES4PLANET

2050
Process
Industries

- ✓ Develop & deploy climate-neutral solutions
- ✓ Closing the energy and feedstock loops
- ✓ Achieve global leadership of the Process Industry
- ✓ Accelerate innovation & unlock public-private investments

of different stakeholders and welcoming Newcomers

tutions

- Public institutions
- Innovation Agencies
- MS and Regional representatives

- Partnerships & EITs
- Financial parties
- New sectors





PROCESSES4PLANET

ASPIRE



- +SMEs
- + RTOs,
- + Universities
- + NGOs
- + Innovation agencies et al...



DG R&I
DG Grow

€1,3 bn exclusively for projects
27% more than in H2020

New approach to European Partnerships

New generation of objective-driven and more ambitious partnerships in support of agreed EU policy objectives

Key features

- Simple architecture and toolbox
- Coherent life-cycle approach
- Strategic orientation

Co-programmed

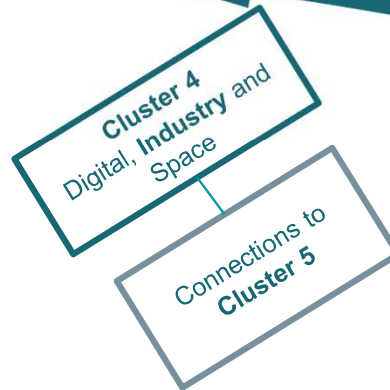
Based on Memoranda of Understanding / contractual arrangements; implemented independently by the partners and by Horizon Europe

Co-funded

Based on a joint programme agreed and implemented by partners; commitment of partners for financial and in-kind contributions

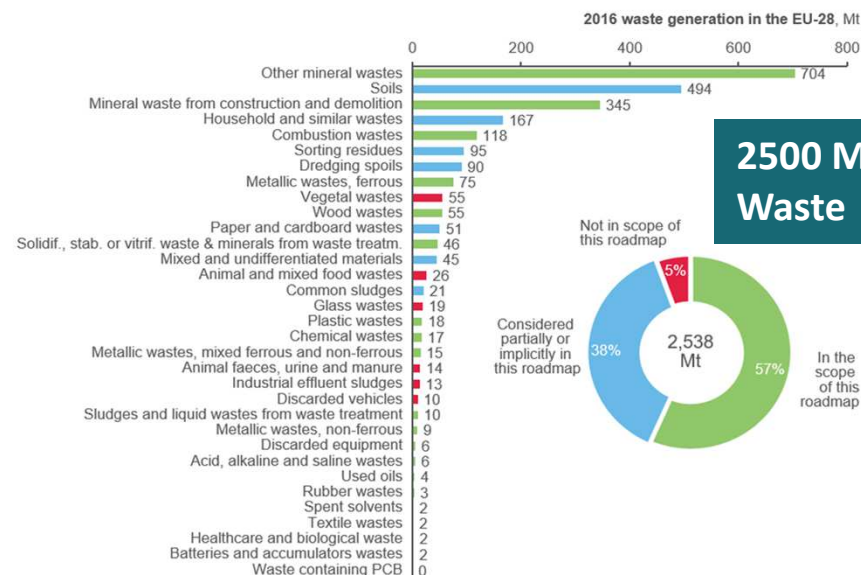
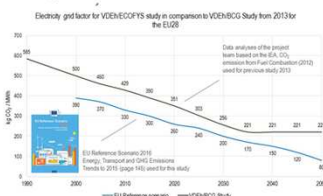
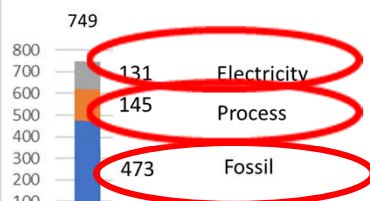
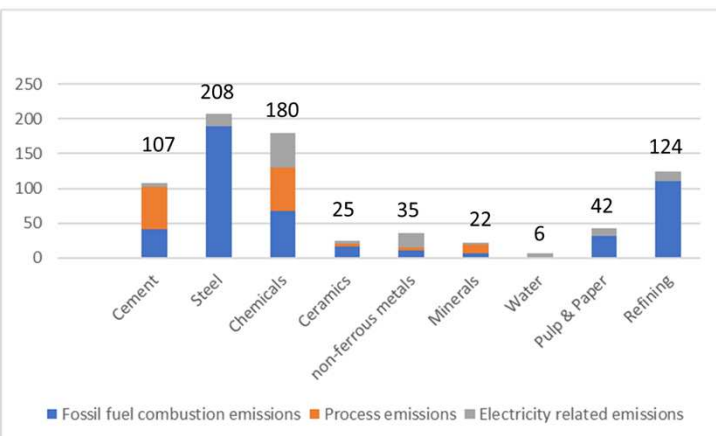
Institutionalised

Based on long-term dimension and need for high integration; partnerships based on Articles 185 / 187 of TFEU and the EIT-Regulation supported by Horizon Europe

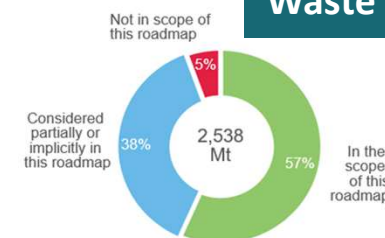


Process industry in Europe: Three problems

750 M tons CO2 emissions



2500 M tons Waste



Source: Eurostat

- > 2 trillion € turnover
- 8,5 Mln direct jobs
- 20 Mln indirect jobs
- 0,5 Mln enterprises
- 5% of the EU GDP

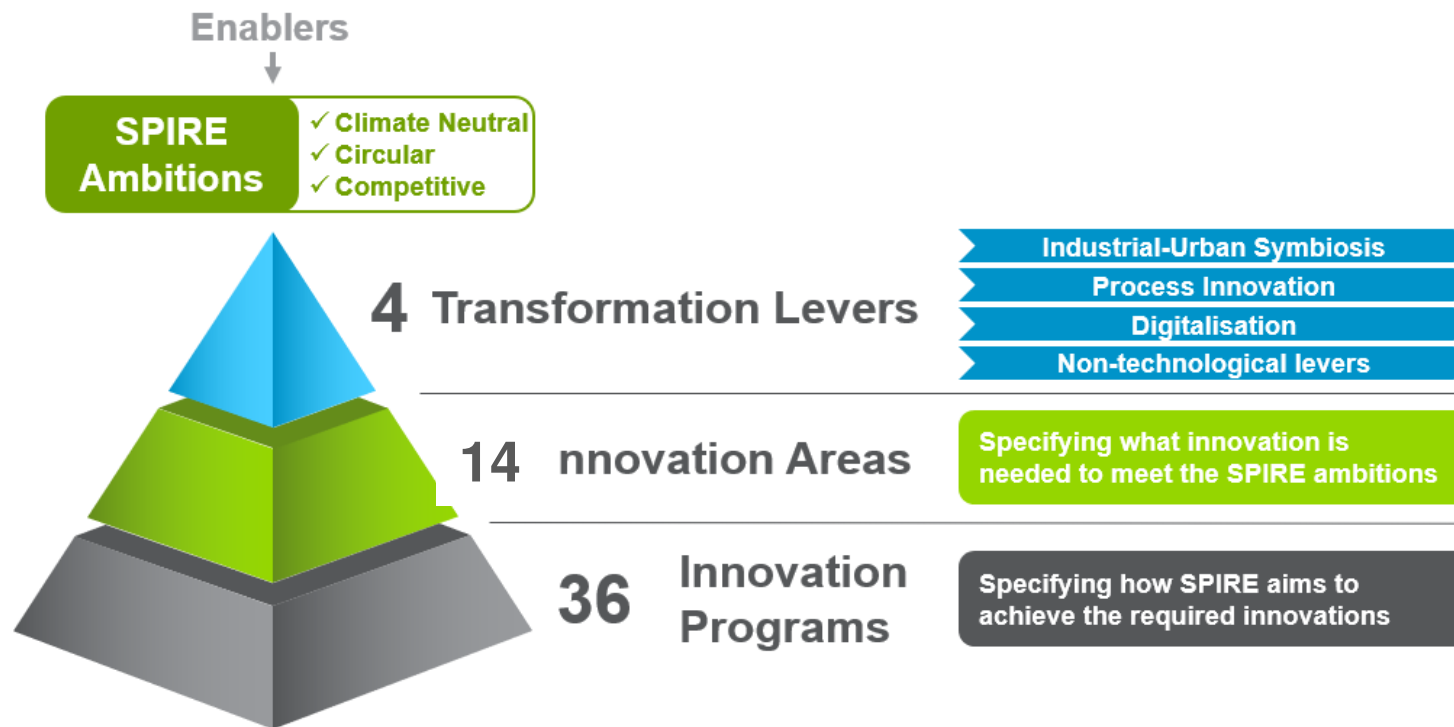


Competitiveness

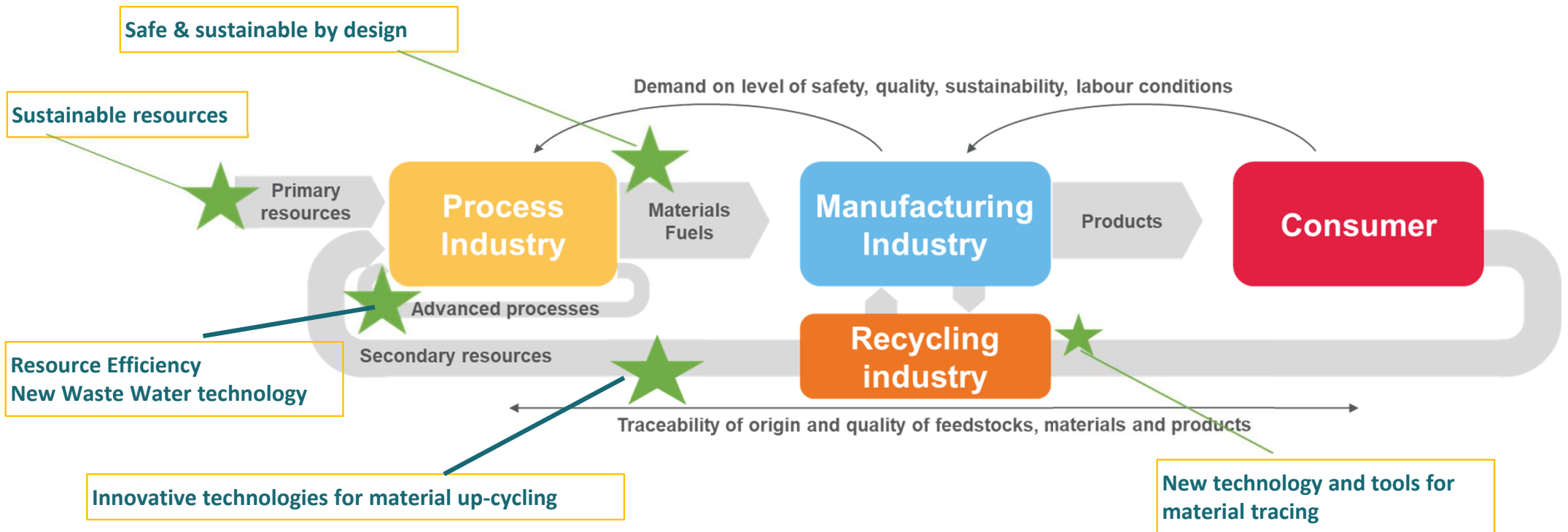
Transformation levers and tools to enable P4Planet to achieve its...

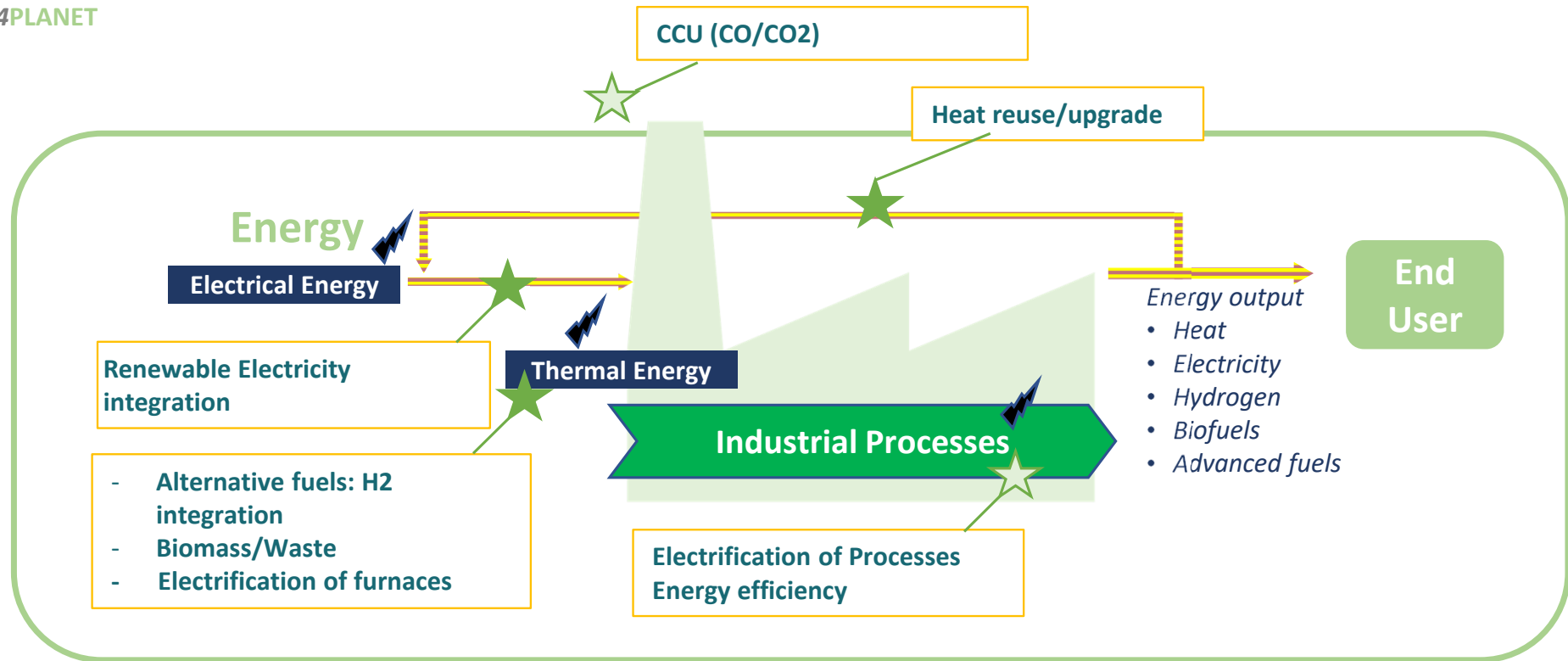
AMBITIONS

for Society and the Planet

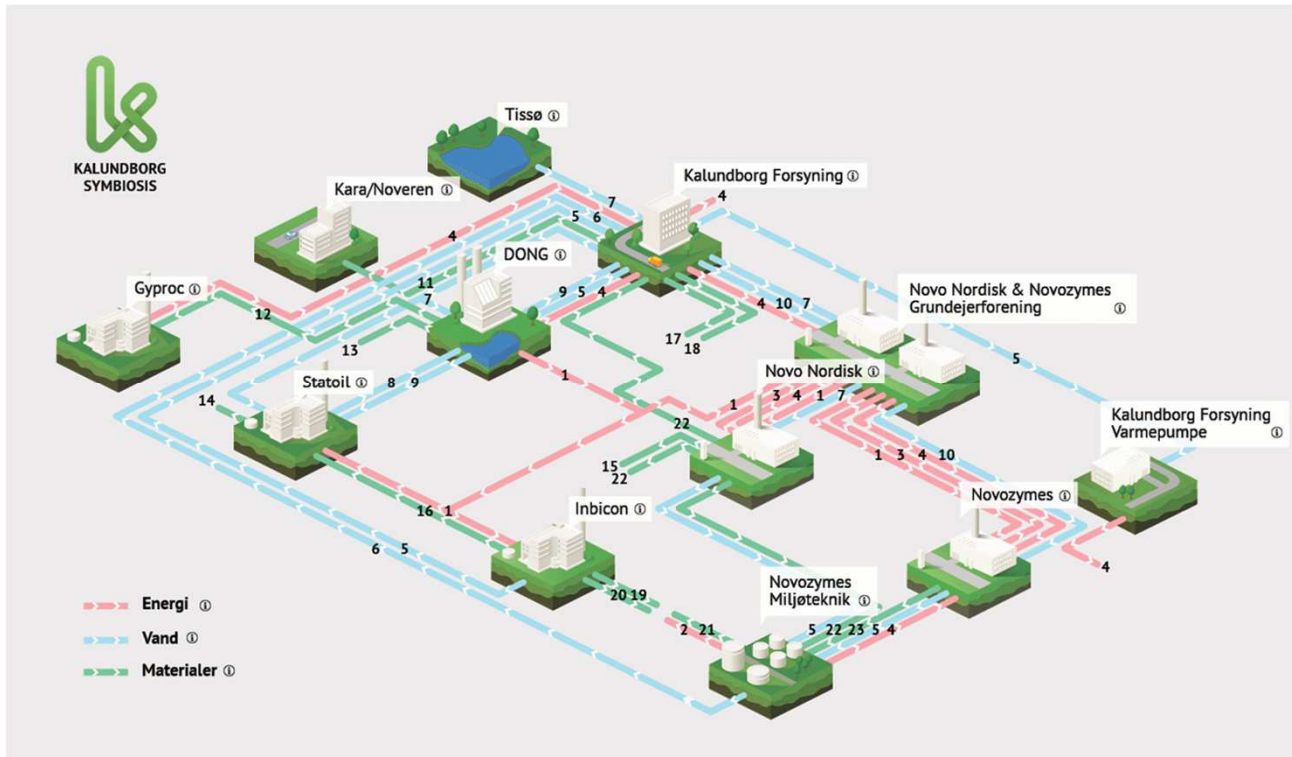


From feedstock to consumer product and back





Industrial symbiosis via Hubs 4 Circularity

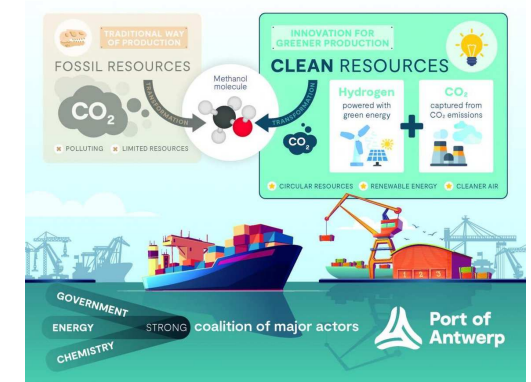


Kalundborg, Source of image: <http://www.energycrossroads.org/industrial-symbiosis-circular-economy>

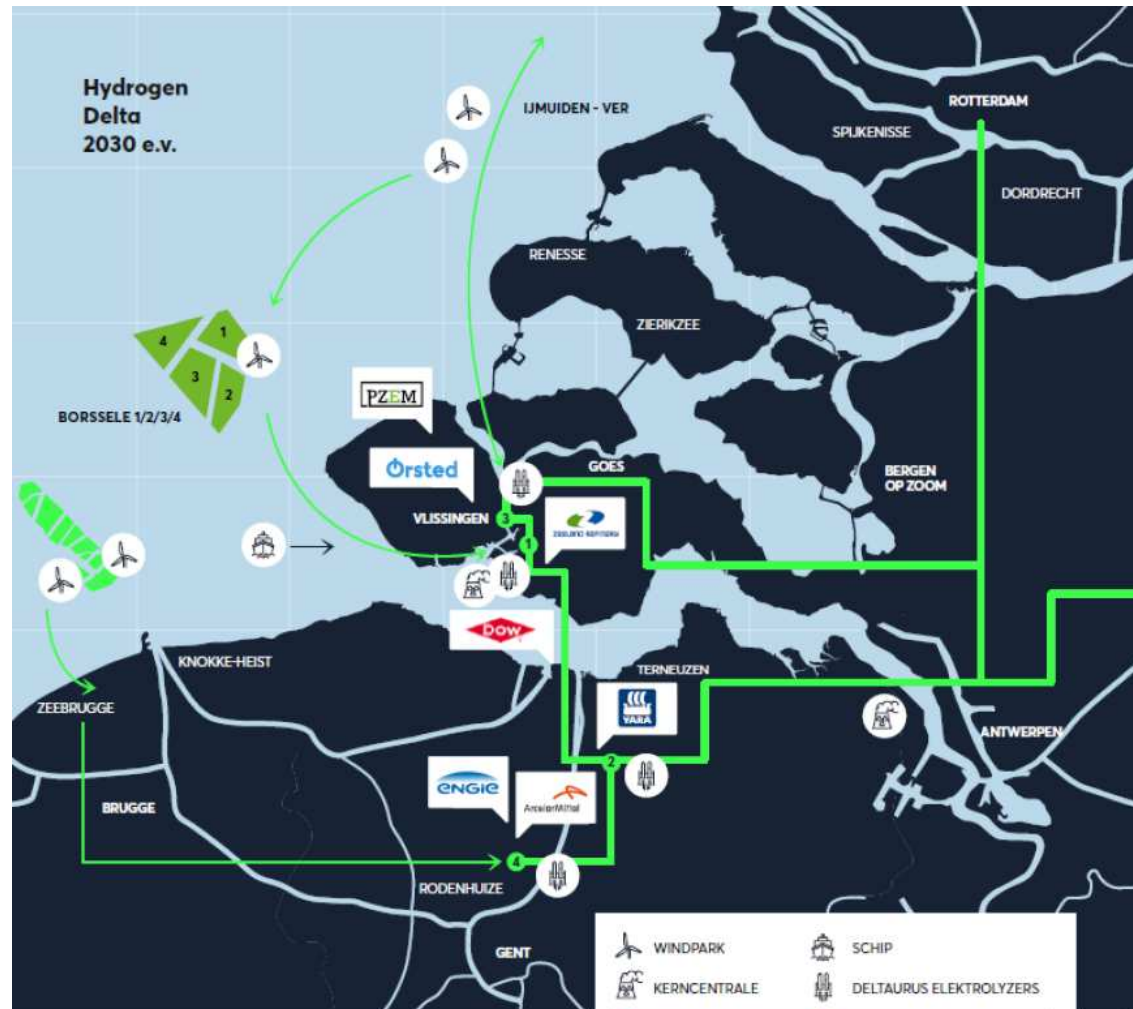
Connection of **geographically close units** to keep resources in the loop as long as possible

*Self-sustaining economic industrial ecosystems for **full-scale Industrial-Urban Symbiosis and Circular Economy**, closing **energy, resource and data loops** and bringing together all relevant stakeholders, technologies, infrastructures, tools and instruments necessary for their incubation, implementation, evolution and management.*

- Symbiosis with Urban systems
 - EOL to secondary feedstock
 - Waste to energy
 - Excess heat to district heating
 - Waste water recycling
- Symbiosis with energy production systems
 - On shore or off shore windmill parks
 - Hydrogen Valleys
 - Off shore windmill parks, hydrogen production and CCU or CCS
 - PV-parks
 - Solar energy parks
- Symbiosis with industry
 - Excess heat to power or steam
 - CO2 to CCU
 - CO2 to common purification for CCS
 - Side products as feedstock

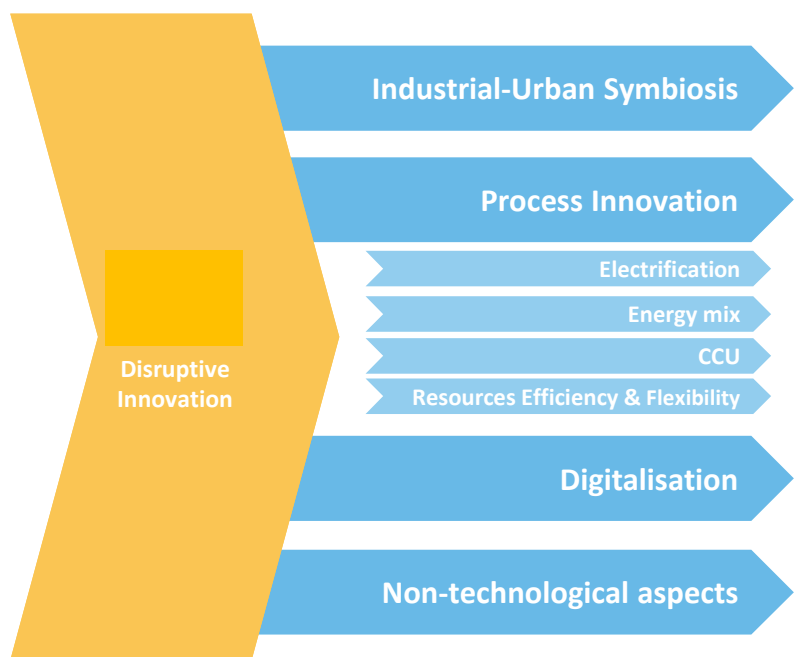


Smart Delta Resources: Hydrogen Delta



Afbeelding 6: Weergave Hydrogen Delta Programma 2030

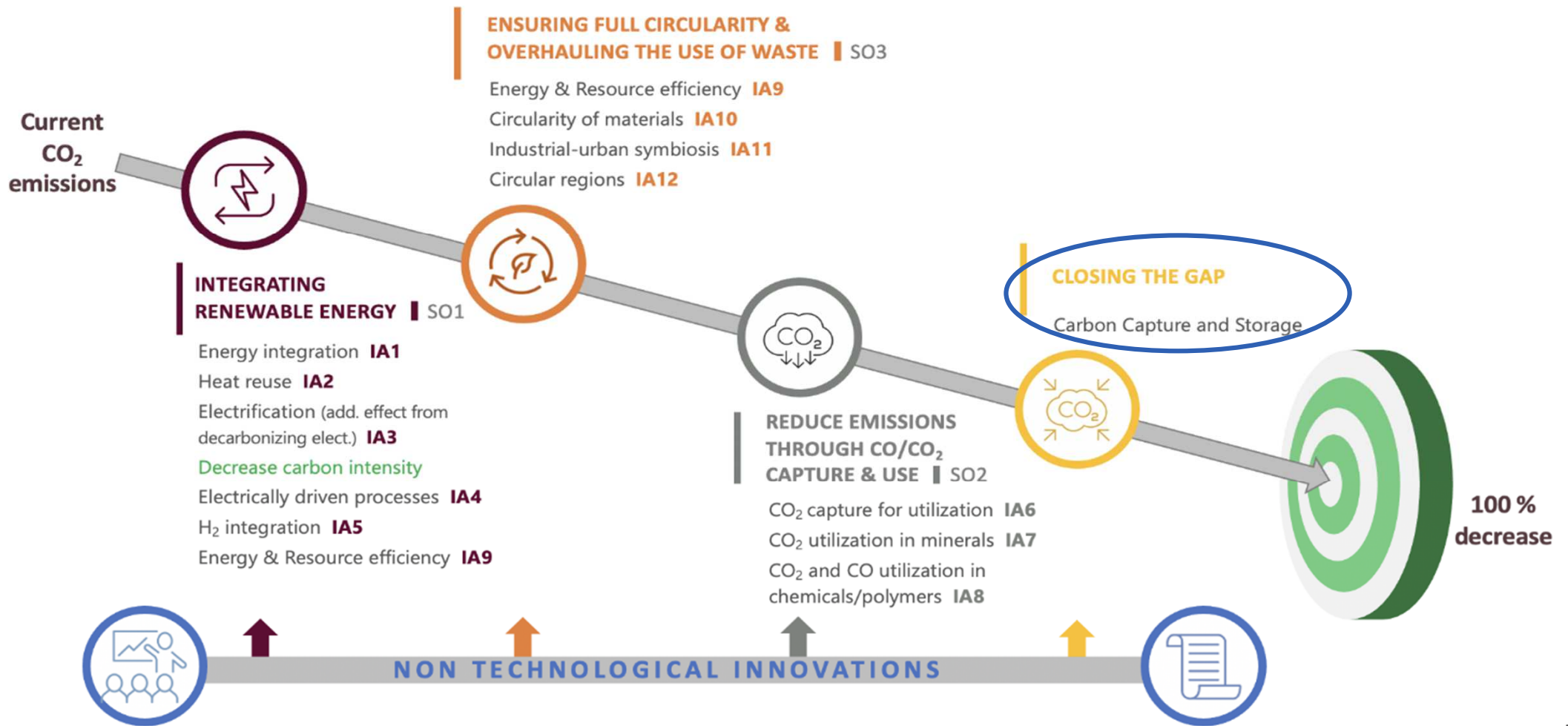
3 ambitions, 14 Innovation areas

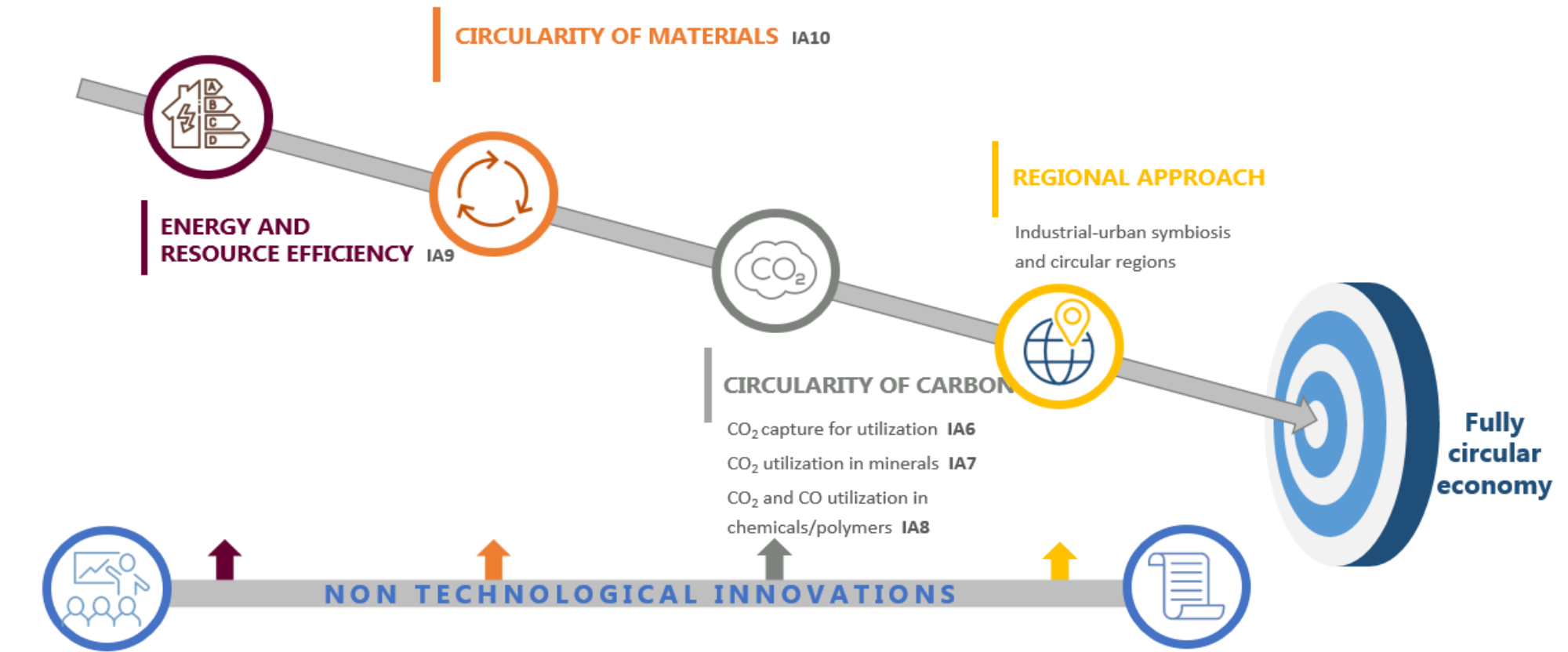


Innovation area	Progress up until milestone year ¹			
	2024	2030	2040	2050
Renewable energy integration				
Heat reuse				
Electrification of thermal processes				
Electrically-driven processes				
Hydrogen integration				
CO ₂ capture for utilisation				
CO ₂ utilisation in minerals				
CO ₂ & CO utilisation in chemicals and fuels				
Energy and resource efficiency				
Circularity of materials				
Industrial-Urban symbiosis				
Circular regions				
Digitalisation				
Non-technological aspects				

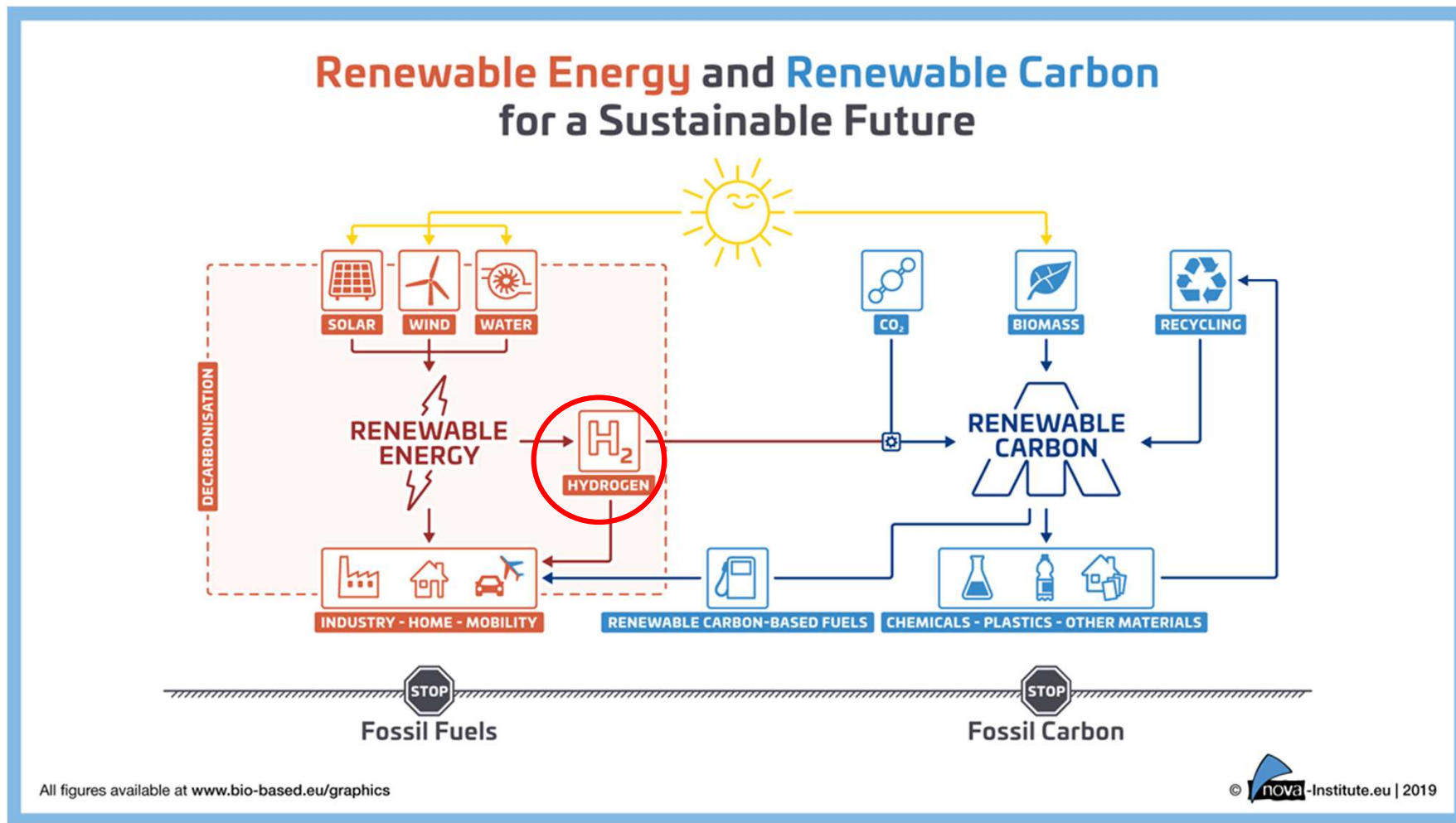
¹ Progress is depicted here as % of total TRL9 projects programmed in each area, and for circular regions, digitalisation, and non-technological aspects % of total investment needs until 2050

A tapestry of innovations to achieve climate neutrality

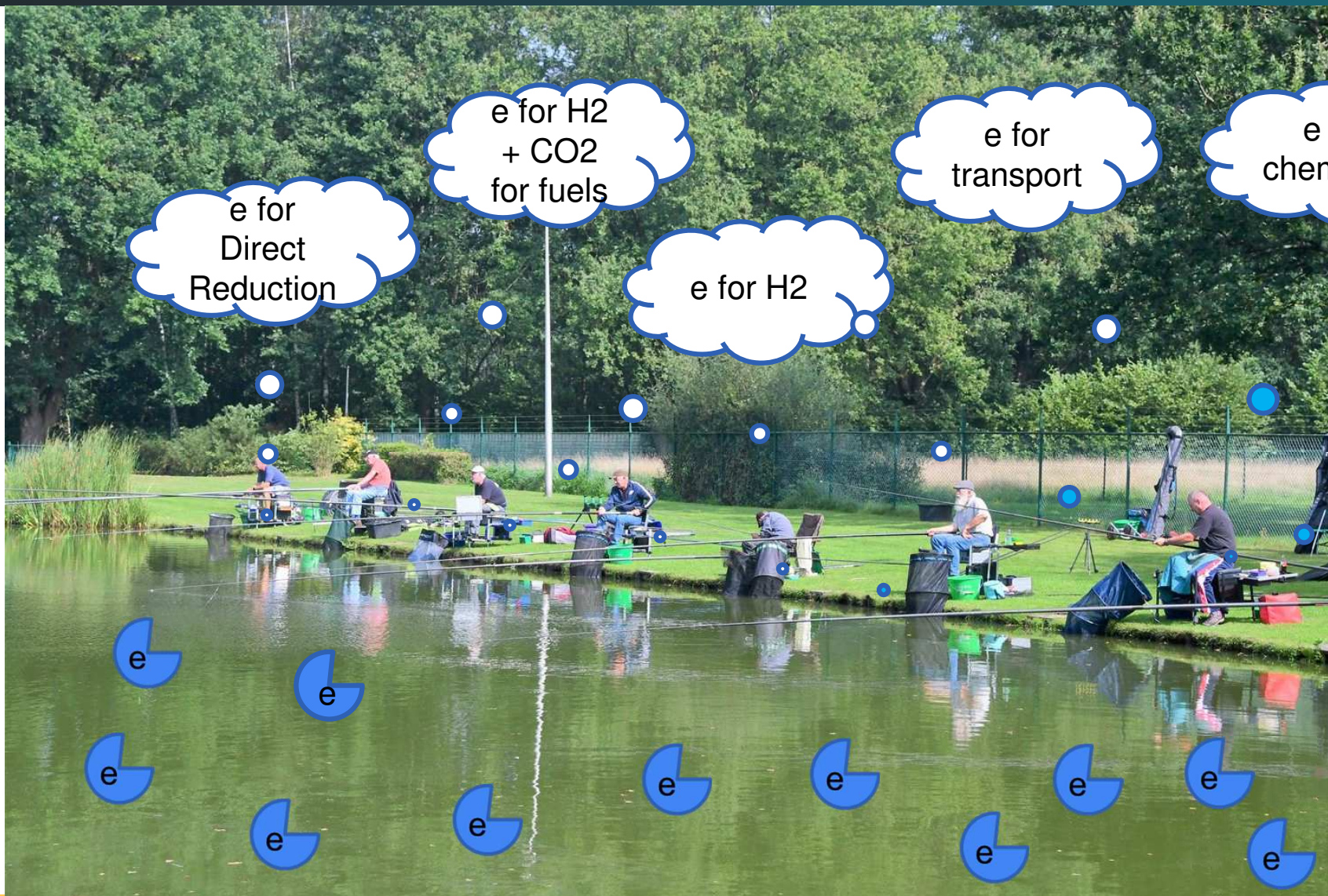




Carbon from atmosphere, biosphere or technosphere



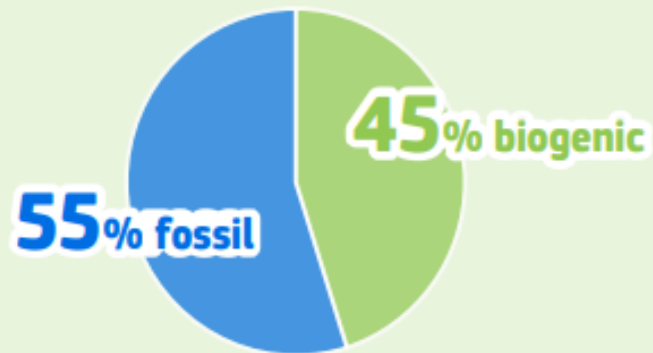
All fishing in the same electron pool



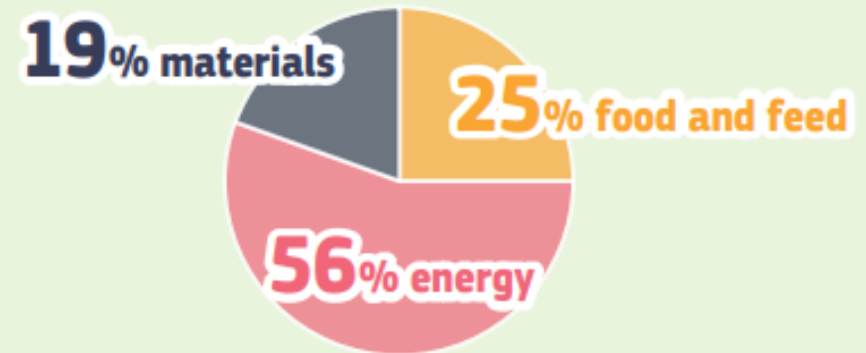
e for electric furnaces/crackers

e for H2 for transport

The EU consumed around one billion tonnes of carbon in the economy 2018



Use of carbon in the economy



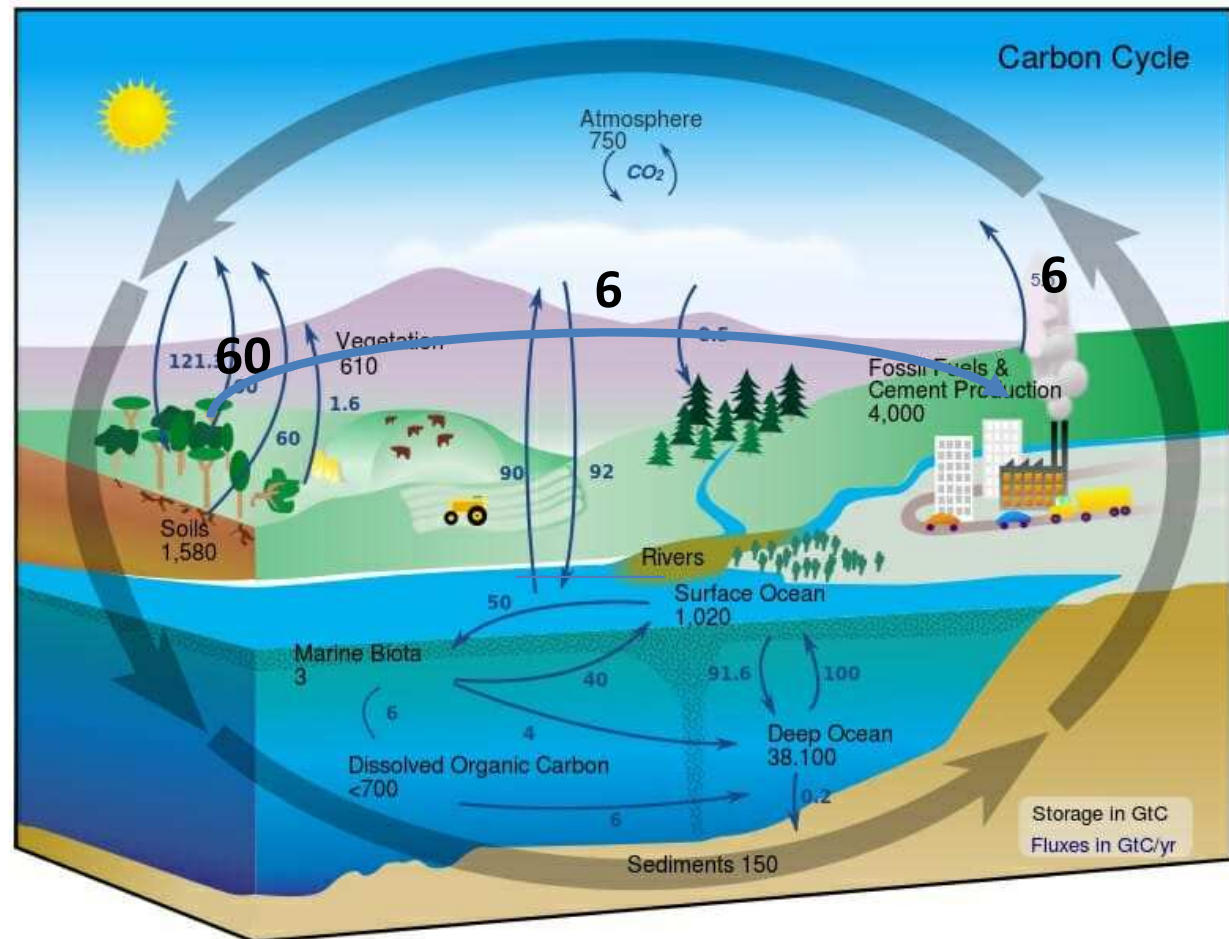
Carbon cycles today

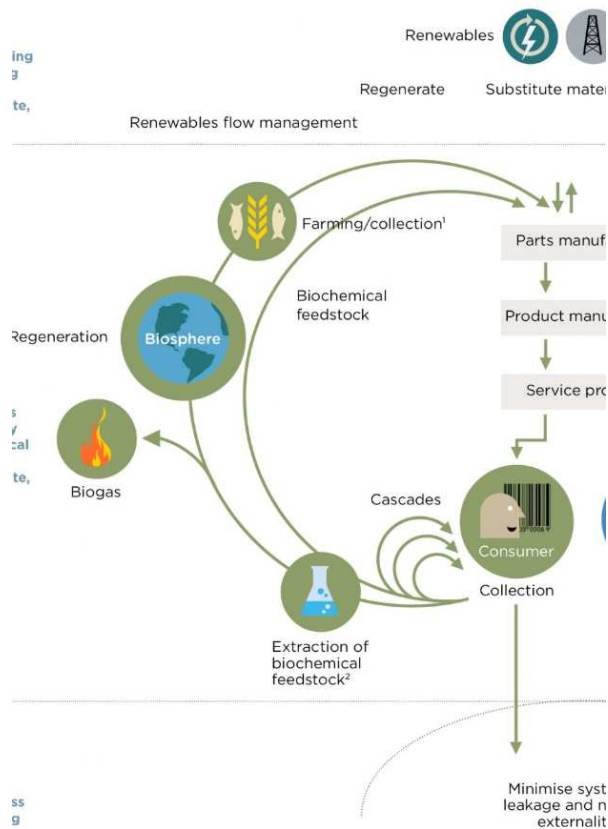
It is possible to close the carbon cycle by using plants as a carbon source.

It would be enough to prevent

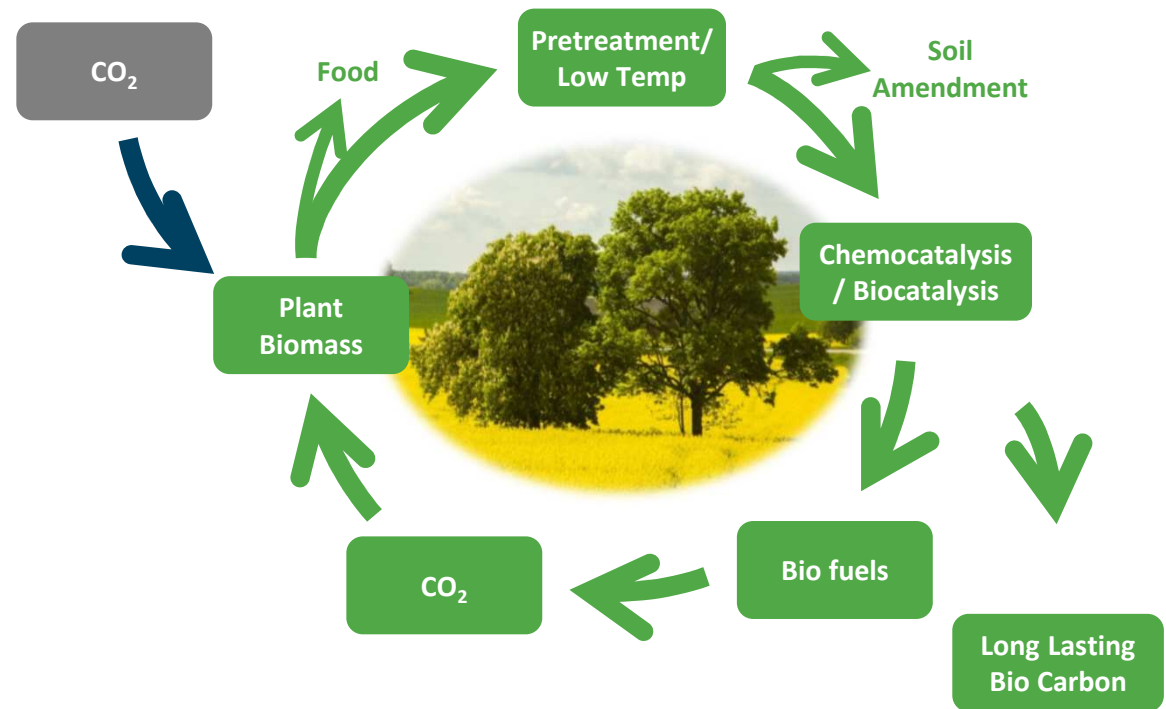
10%

of the biomass from decaying.



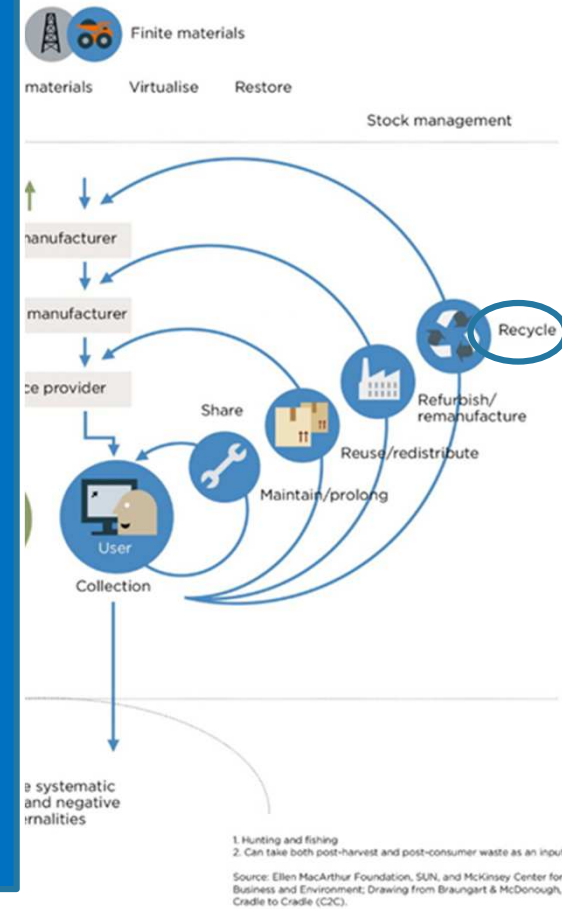
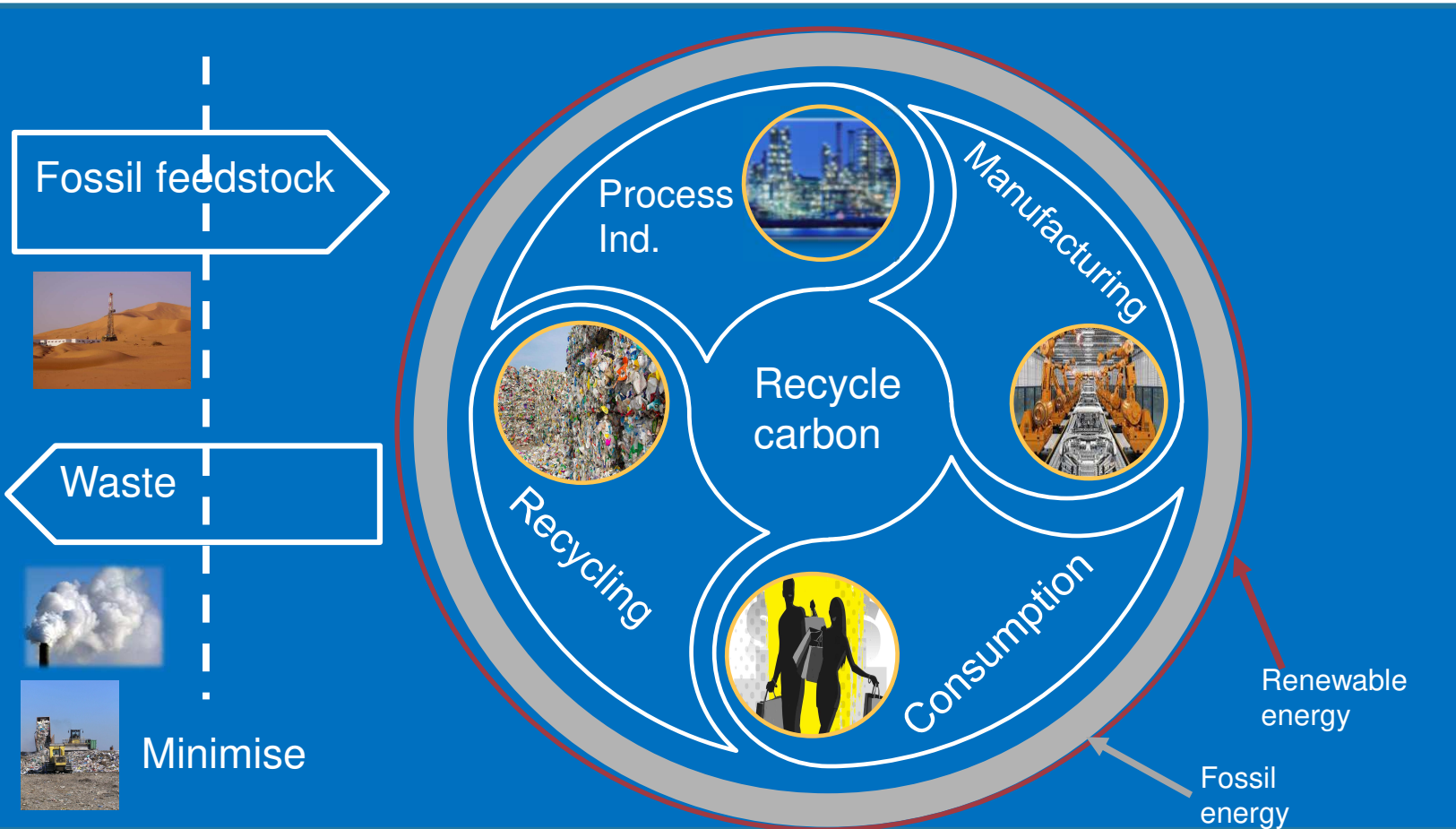


...to tomorrows Circular Economy



Friedrich Streffer

Circular economy: minimize new feedstocks and losses



Combine the natural & technical cycle

OUTLINE OF A CIRCULAR ECONOMY

PRINCIPLE 1

1

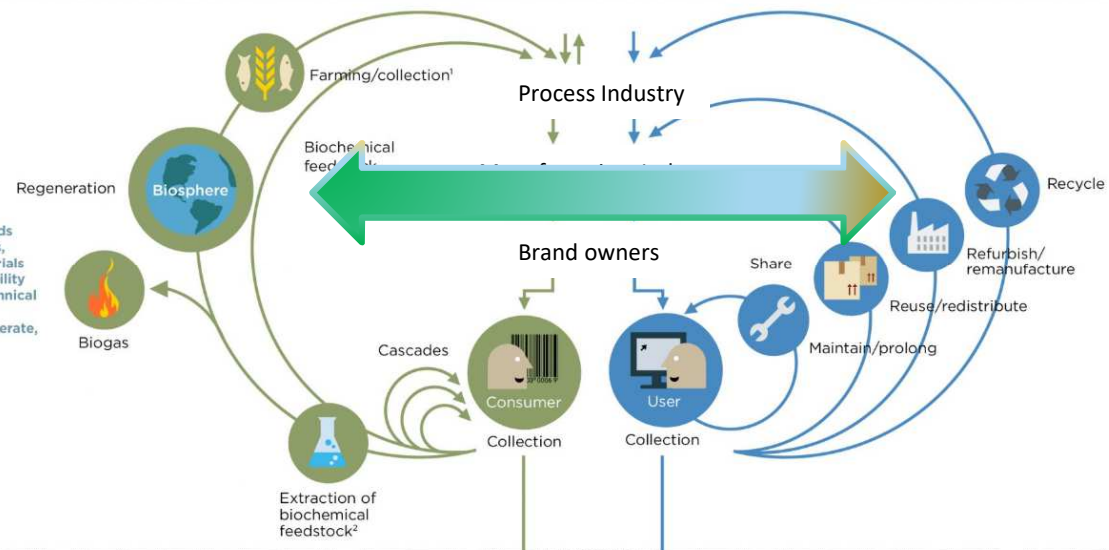
Preserve and enhance natural capital by controlling finite stocks and balancing renewable resource flows
 ReSOLVE levels: regenerate, virtualise, exchange



PRINCIPLE 2

2

Optimise resource yields by circulating products, components and materials in use at the highest utility at all times in both technical and biological cycles
 ReSOLVE levels: regenerate, share, optimise, loop



PRINCIPLE 3

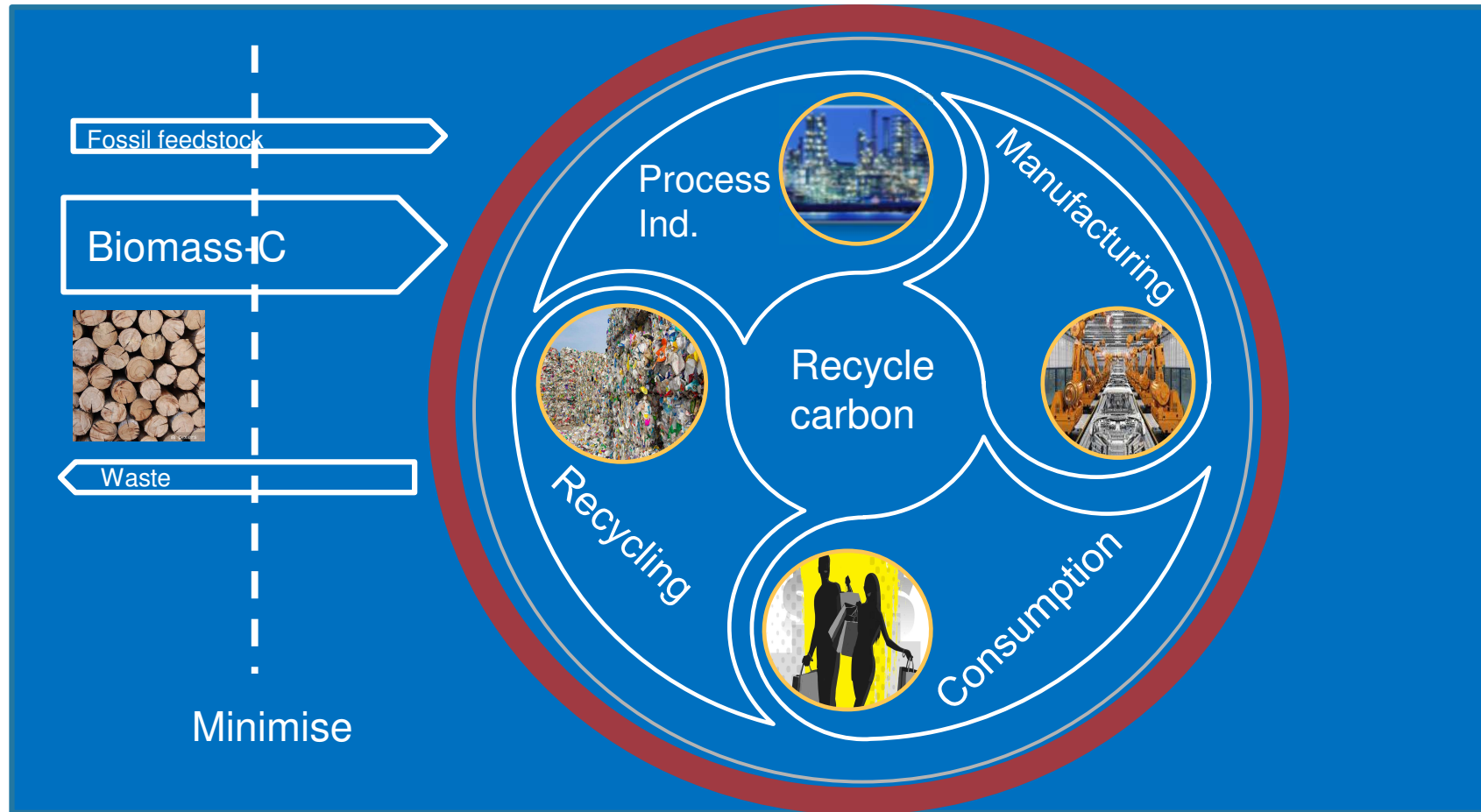
3

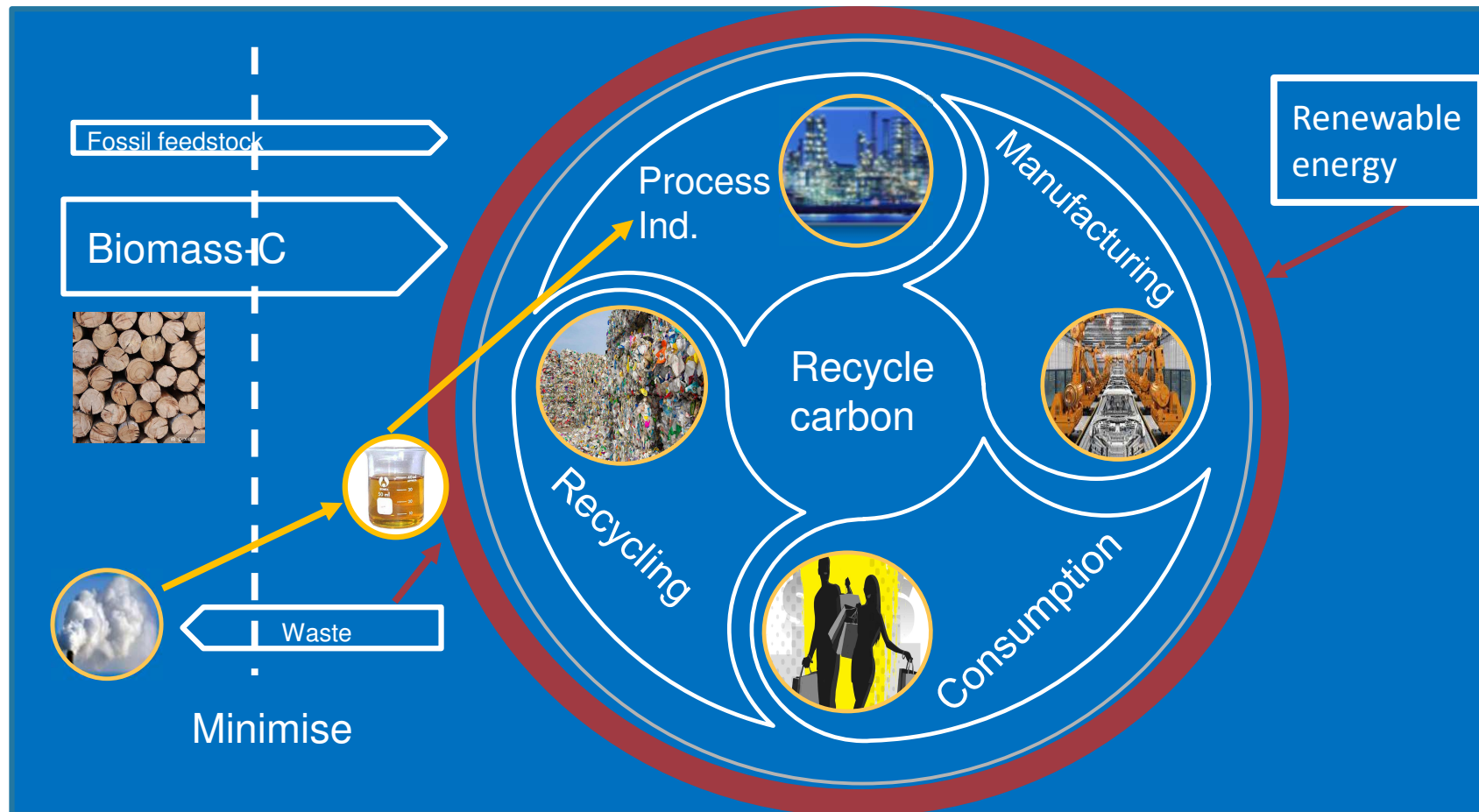
Foster system effectiveness by revealing and designing out negative externalities
 All ReSOLVE levels

Minimise systematic leakage and negative externalities

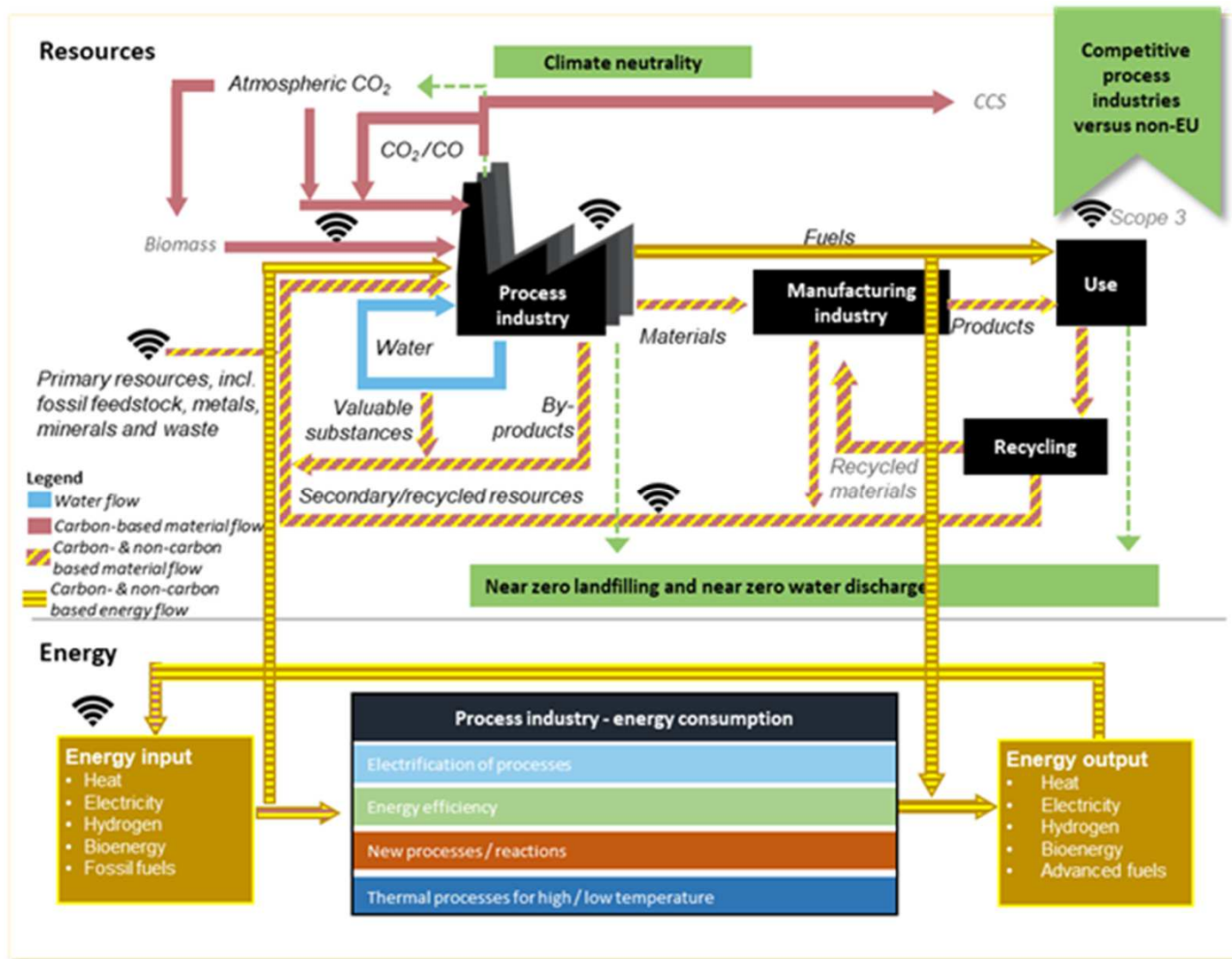
1. Hunting and fishing
 2. Can take both post-harvest and post-consumer waste as an input
 Source: Ellen MacArthur Foundation, SUN, and McKinsey Center for Business and Environment; Drawing from Braungart & McDonough, Cradle to Cradle (C2C).

Replace fossil by bio via long lasting circularity





The integrated approach



THE WAY IS LONG, WE NEED TO START NOW



Innovation area	Progress up until milestone year ¹			
	2024	2030	2040	2050
Renewable energy integration	○	○	○	○
Heat reuse	○	○	○	○
Electrification of thermal processes	○	○	○	○
Electrically-driven processes	○	○	○	○
Hydrogen integration	○	○	○	○
CO ₂ capture for utilisation	○	○	○	○
CO ₂ utilisation in minerals	○	○	○	○
CO ₂ & CO utilisation in chemicals and fuels	○	○	○	○
Energy and resource efficiency	○	○	○	○
Circularity of materials	○	○	○	○
Industrial-Urban symbiosis	○	○	○	○
Circular regions	○	○	○	○
Digitalisation	○	○	○	○
Non-technological aspects	○	○	○	○

¹ Progress is depicted here as % of total TRL9 projects programmed in each area, and for circular regions, digitalisation, and non-technological aspects % of total investment needs until 2050

36 innovation programmes to FILL the GAP

+ Skills, Jobs, Competitive gap analysis, Framework/Standards



First-of-a-kind plants

Hubs for Circularity



Ambitions to enable Prosperity for all



Climate neutrality



Near zero landfilling and near zero water discharge



Competitive EU process industries

Unique cross-sectoral community

- Energy efficiency
- Electrification
- Energy mix
- Hydrogen
- Excess heat
- Symbiosis
- Resource efficiency
- Circularity of materials
 - Biomass
 - CCU
 - Recycle
- CCS

New calls in Work Program 2023-2024



Thank you



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