



VII CICLO DE
**ECONOMÍA
CIRCULAR**

**BIOECONOMÍA SOSTENIBLE
Y COMPETITIVA**

30 de SEPTIEMBRE 2026

**DESARROLLO DE MERCADOS Y COMPETITIVIDAD INDUSTRIAL
DE PRODUCTOS BASADOS EN LA BIOECONOMÍA**

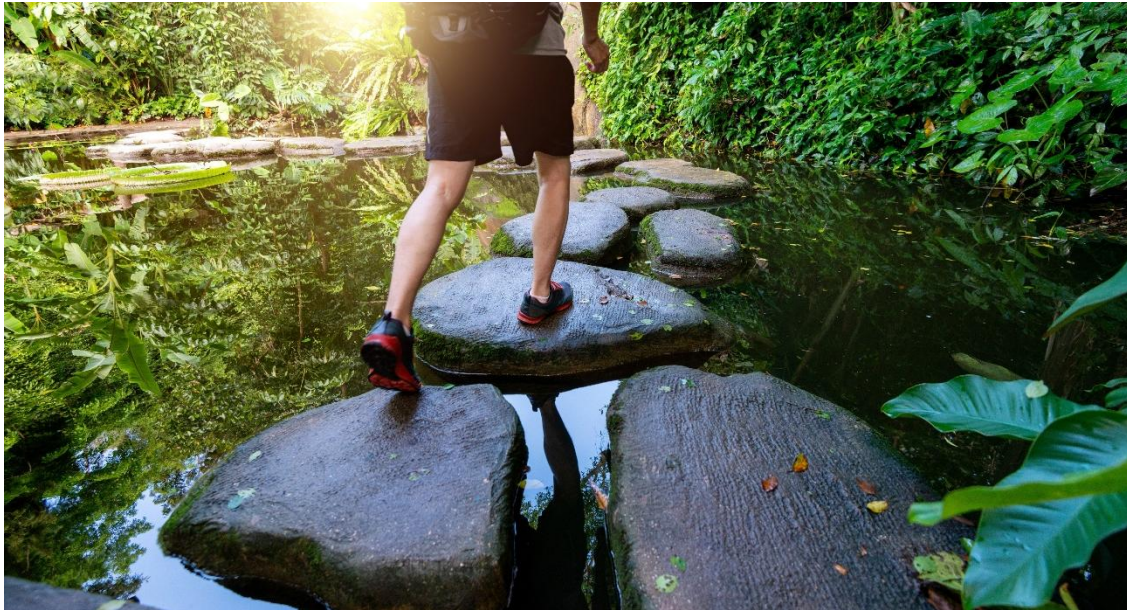
Eric van den Heuvel

Technical Coordinator, IEA-Bioenergy TCP



IEA Bioenergy
Technology Collaboration Programme

Towards a circular bioeconomy



Bioenergy as a stepping stone
towards a
circular biobased economy

Eric van den Heuvel, Technical Coordinator

Online, 30 September 2026

The IEA Bioenergy Technology Collaboration Programme (TCP) is organised under the auspices of the International Energy Agency (IEA) but is functionally and legally autonomous. Views, findings and publications of the IEA Bioenergy TCP do not necessarily represent the views or policies of the IEA Secretariat or its individual member countries.

IEA Bioenergy: Overview

Technology Collaboration Programme (TCP), functioning within a framework created by the International Energy Agency (IEA)

Goal:

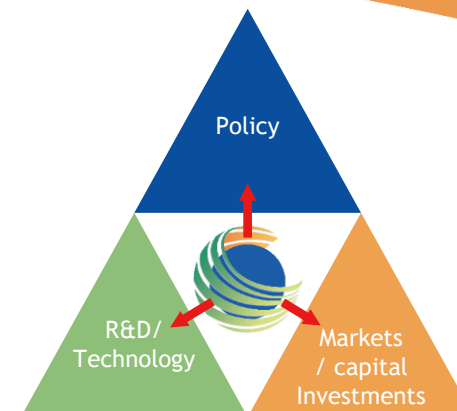
- International **collaboration** and **info exchange** on bioenergy research, technology development, demonstration, markets, and policy analysis
- Facilitate the commercialization and market deployment of sustainable bioenergy systems = **climate positive**, **environmentally sound**, **socially acceptable** and **cost-competitive** (incl. external costs)

Members:

14 European countries + EC, USA, Canada, Brazil, India, China, Japan, Korea, Australia, New Zealand, South Africa

Work programme:

Carried out through **Tasks** and **Strategic Projects**, covering the full value chain from feedstock to final energy product
(~200 experts worldwide involved)



IEA Bioenergy: Vision

- Modern bioenergy is, and will continue to be, an **essential form of renewable energy**, making an important contribution to energy security and achieving international climate goals
- Bioenergy is an integral part of developments towards a **circular biobased economy**
- By accelerating the sustainable production and efficient use of biomass, the **contribution to the Sustainable Development Goals** will be optimized
- This will result in more cost-competitive bioenergy and other bio-based applications and in **reduced, or even net-negative, greenhouse gas emissions**, while **safeguarding ecosystems**

IEA Bioenergy: Activities



TCP Coordination Group on
Thermal Networks



TCP **Transport**
Coordination Group



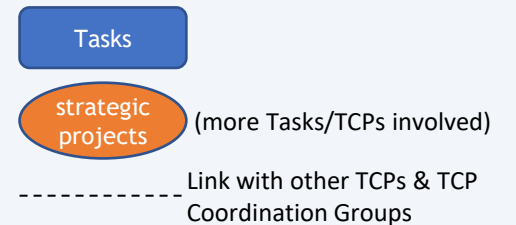
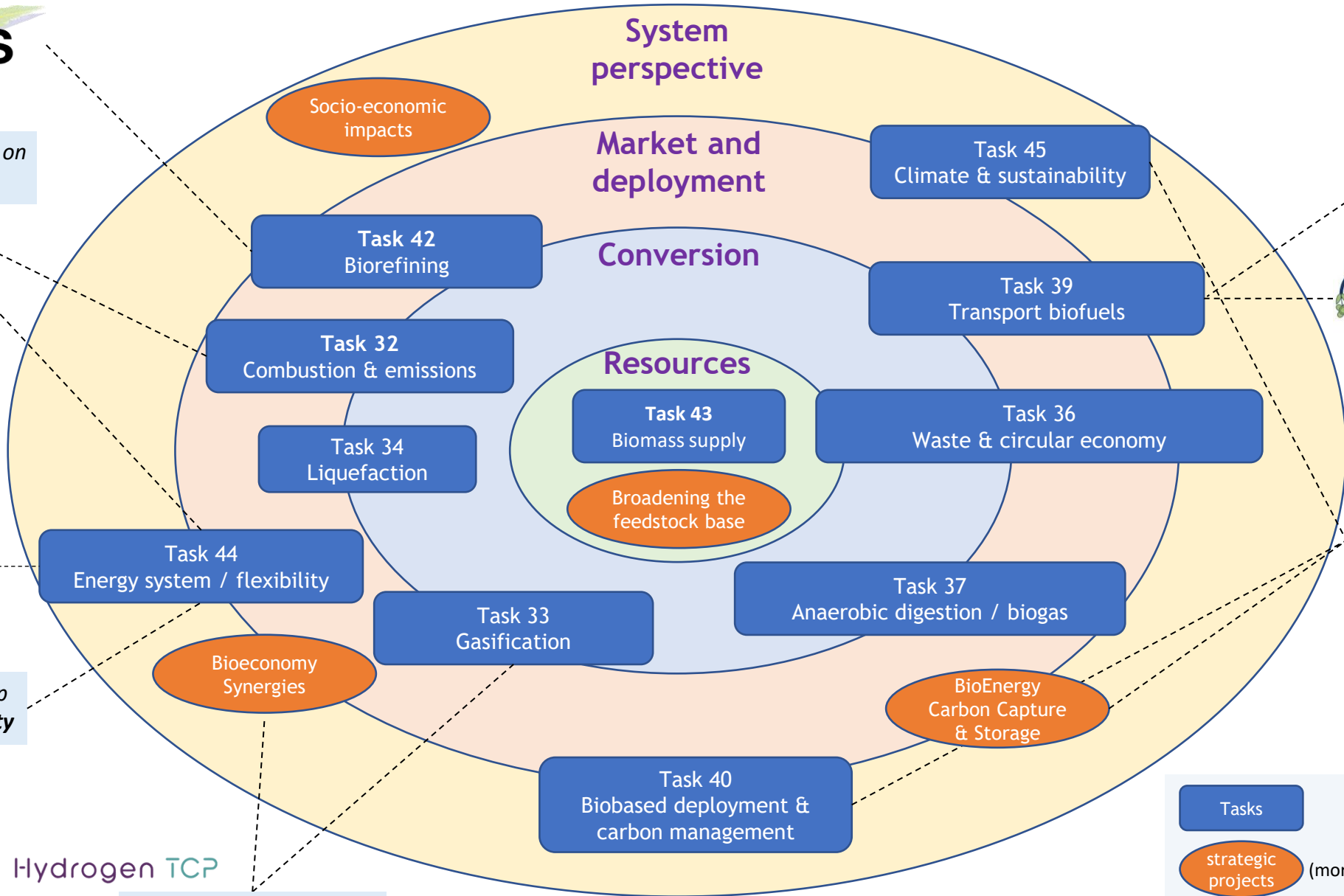
TCP Coordination Group
on **Carbon Management**



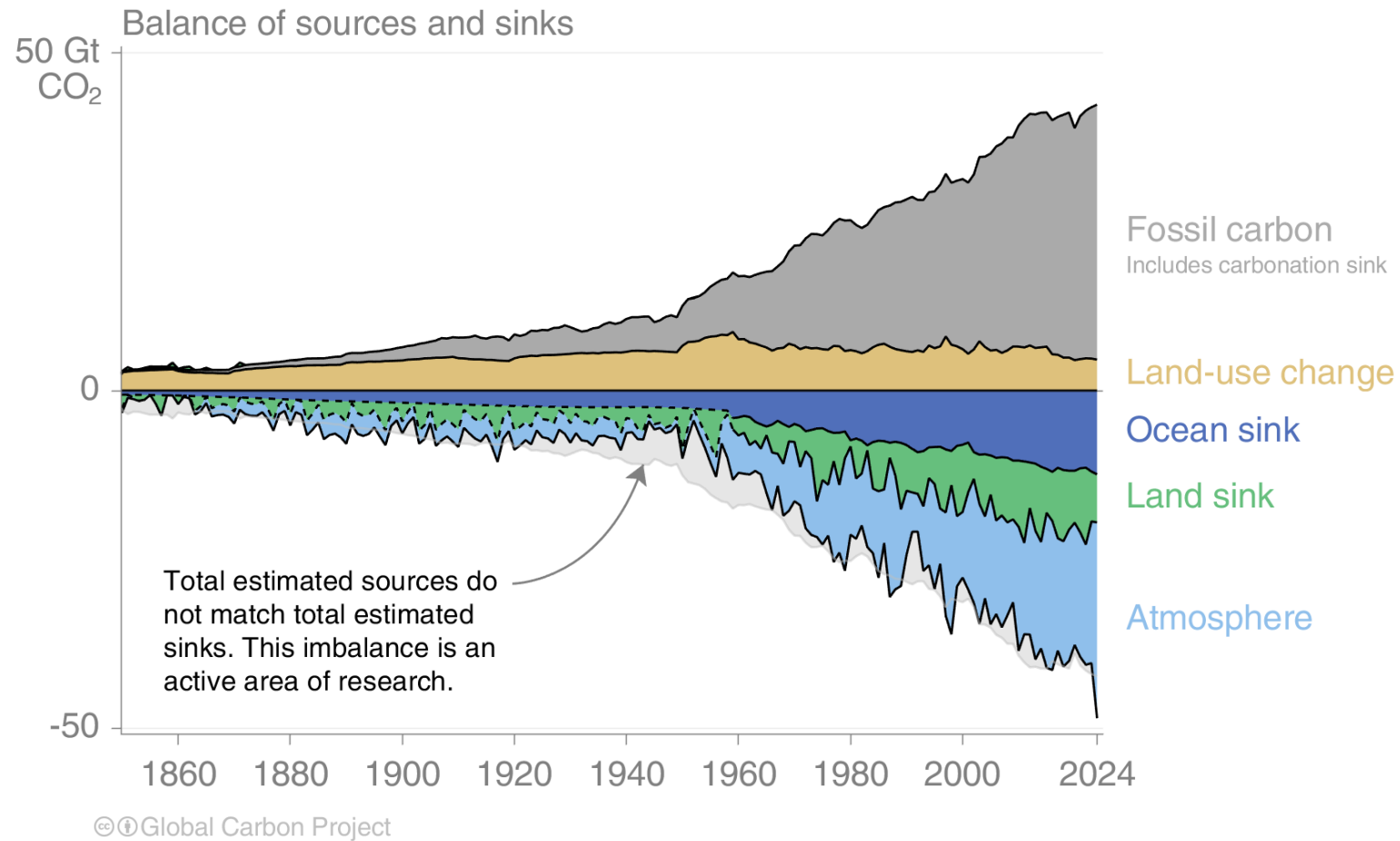
TCP Coordination Group
Energy System Flexibility



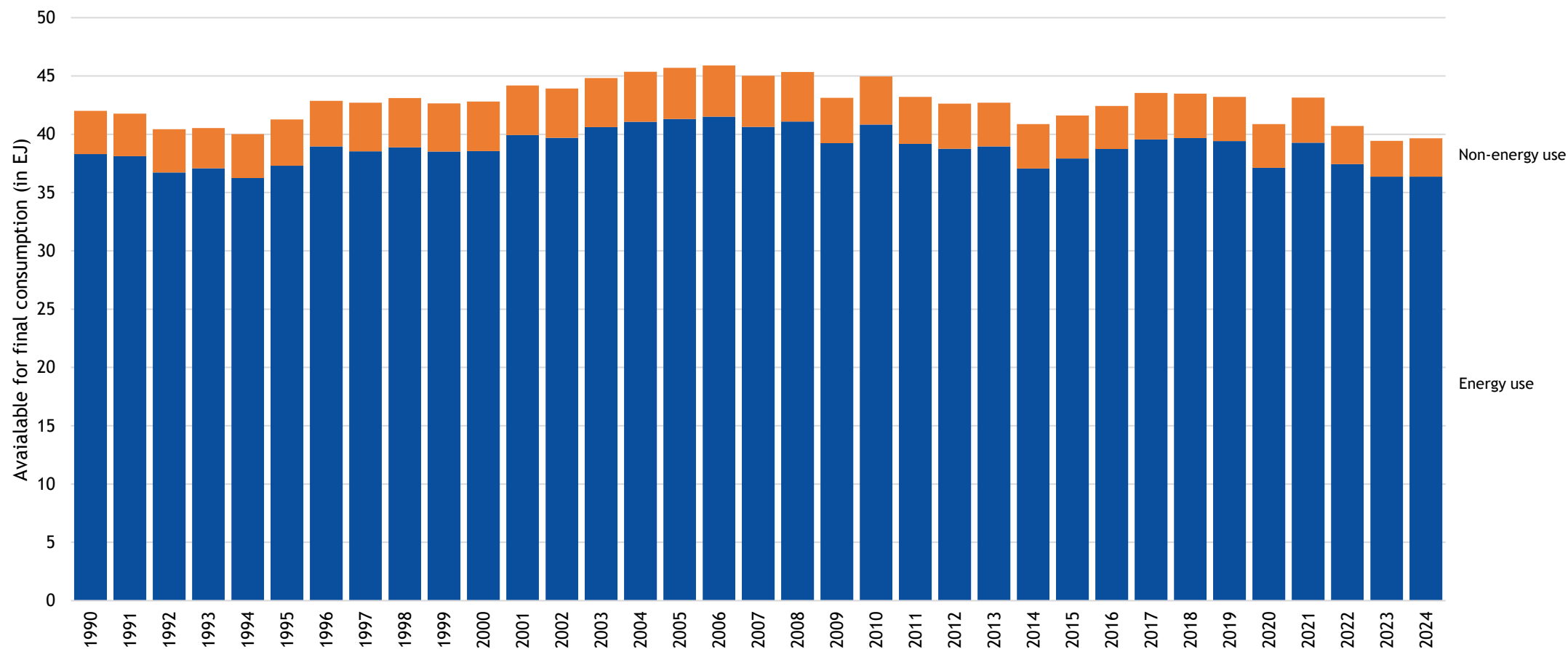
TCP Coordination Group
on **Hydrogen**



Climate policy is initially focused on mitigating fossil based carbon emissions

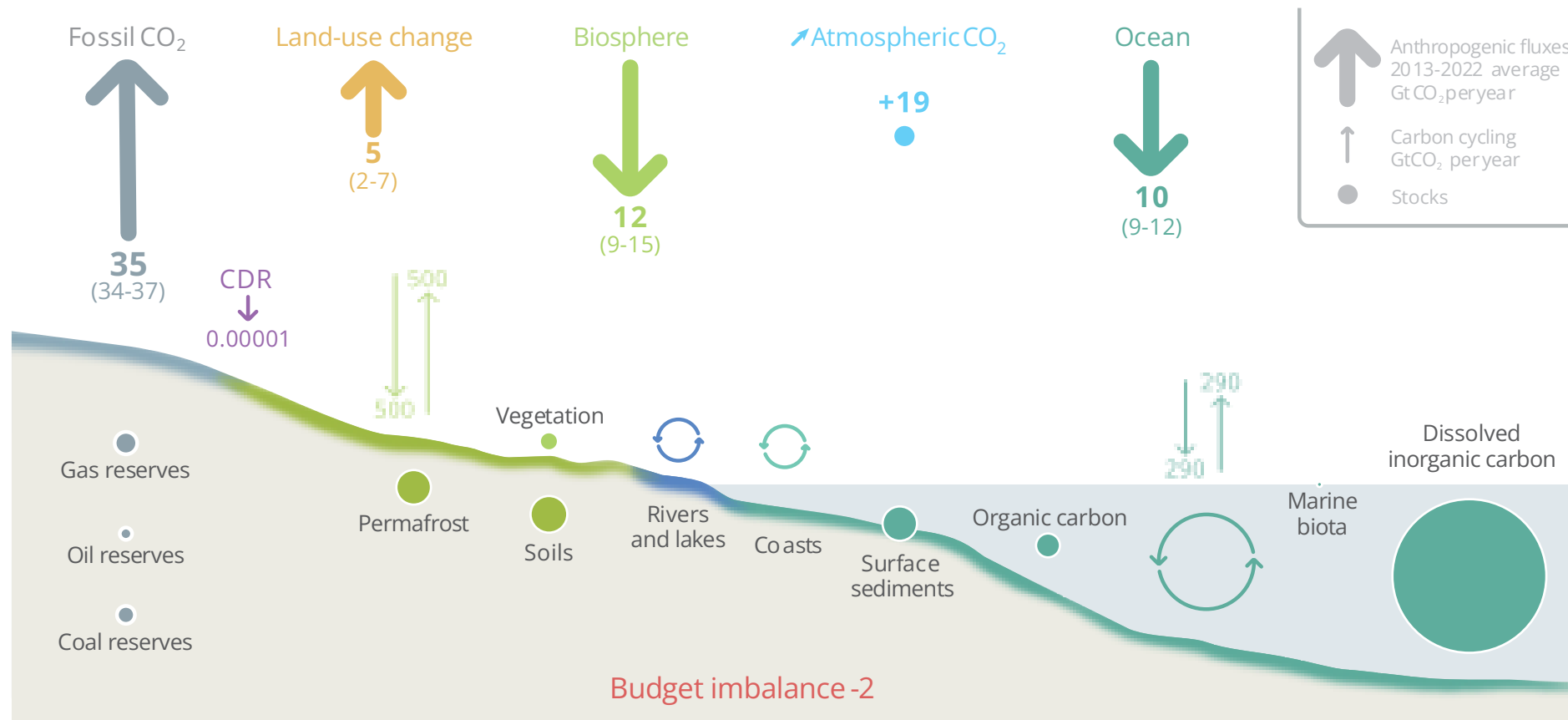


And energy is a primary target as >90% of fossil resources are used for energy functions



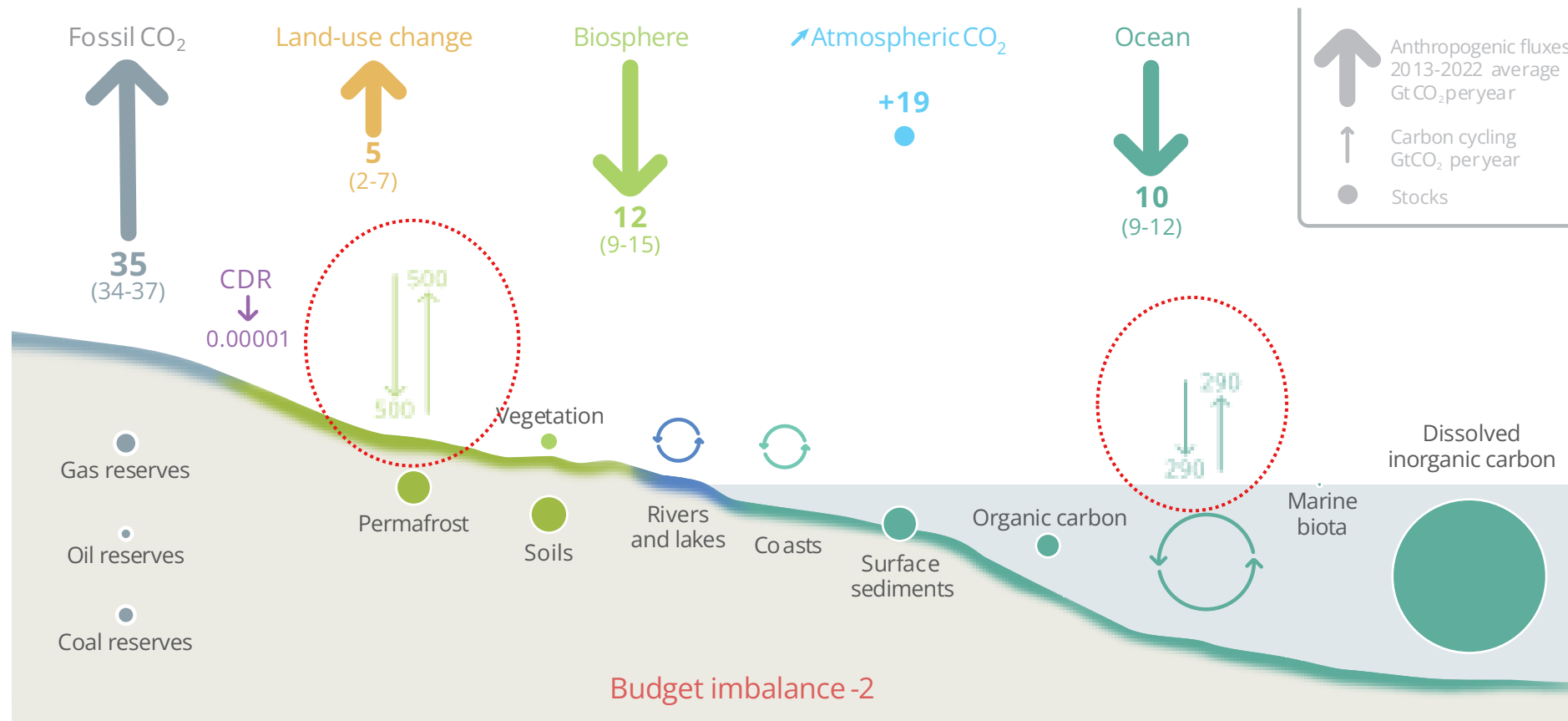
Source: EU, Eurostat, Complete Energy Balance database

The global anthropogenic carbon fluxes



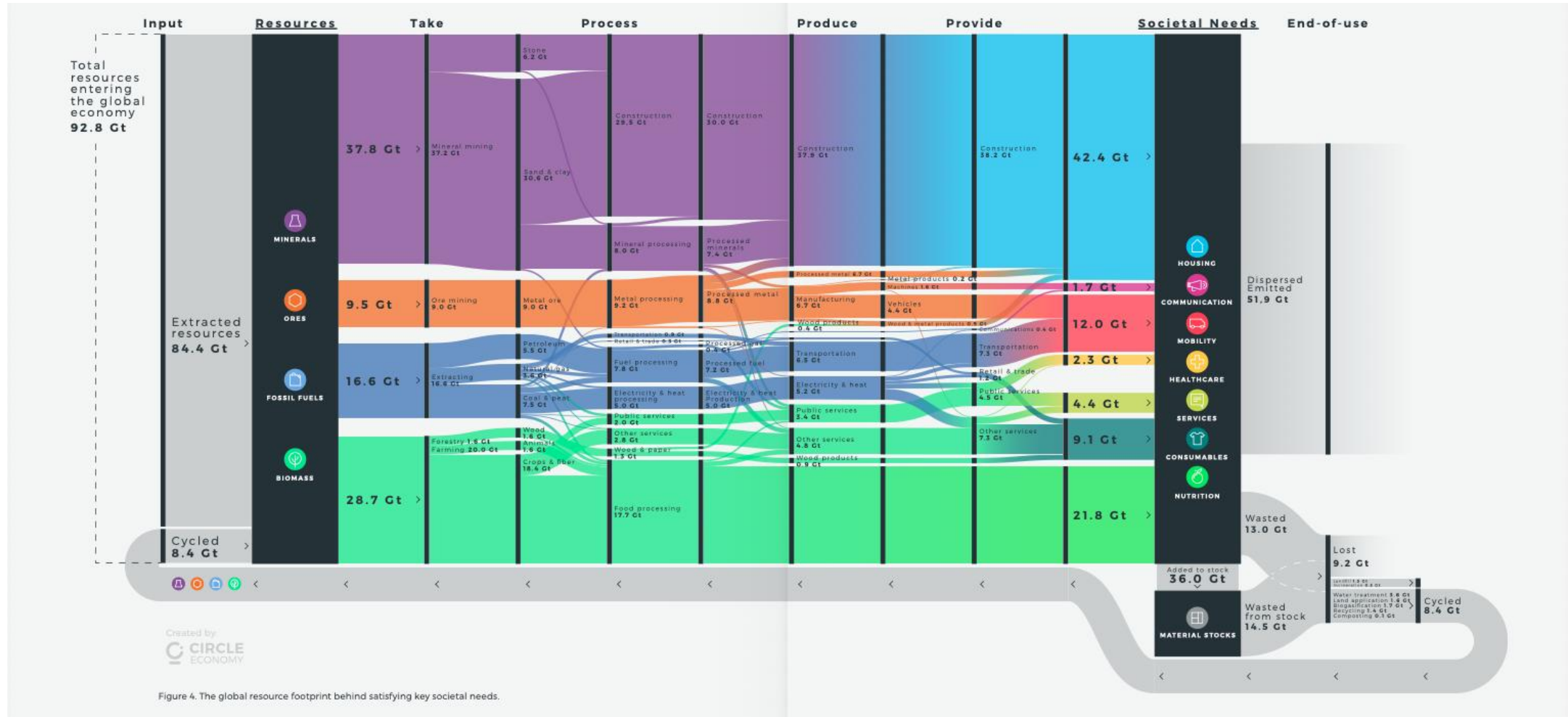
Source: Global Carbon Budget, 2025

The global anthropogenic carbon fluxes are relative small compared to the system-carbon cycles



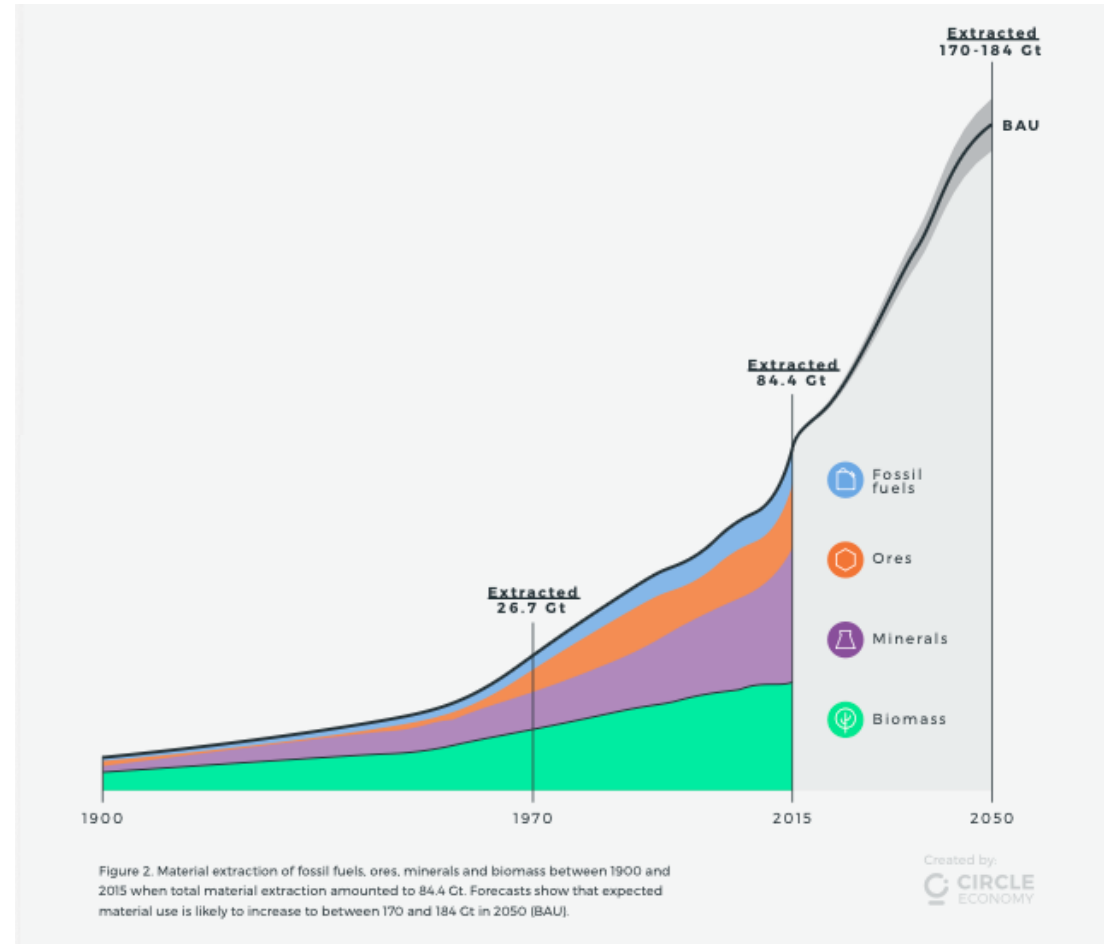
Source: Global Carbon Budget, 2025

The Circularity Gap report (2018) shows for which 'societal needs' the extracted resources are used and what the level of circularity is



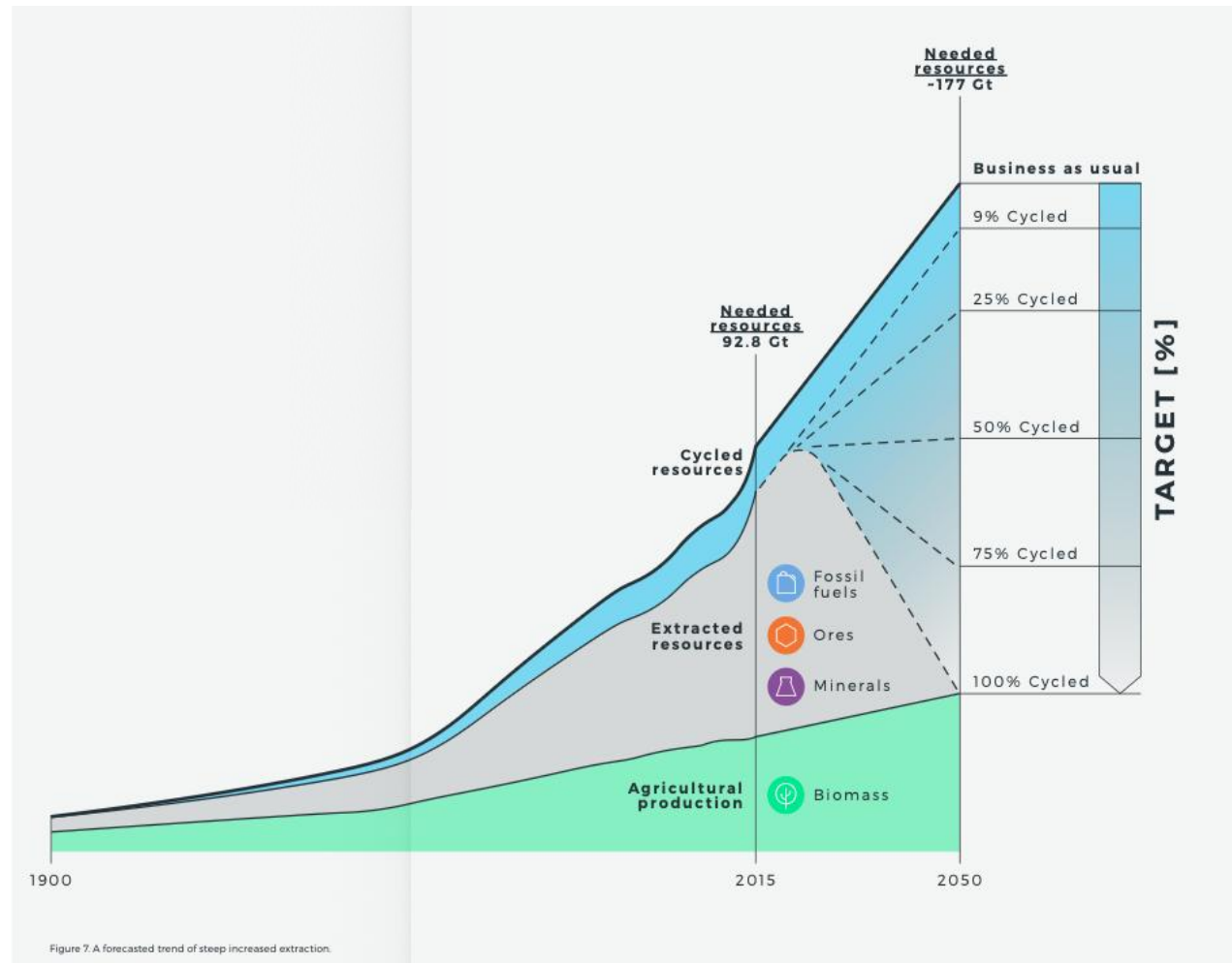
Source: Circle Economy, 2018_The circularity gap report

Unchanged trend of material extraction from fossil, ores, minerals and biomass might lead to further doubling by 2050 compared to 2015



Source: Circle Economy, 2018_The circularity gap report

A drastic shift to recycled and regenerated resources is needed and that would require clear sustainability standards



Source: Circle Economy, 2018_The circularity gap report

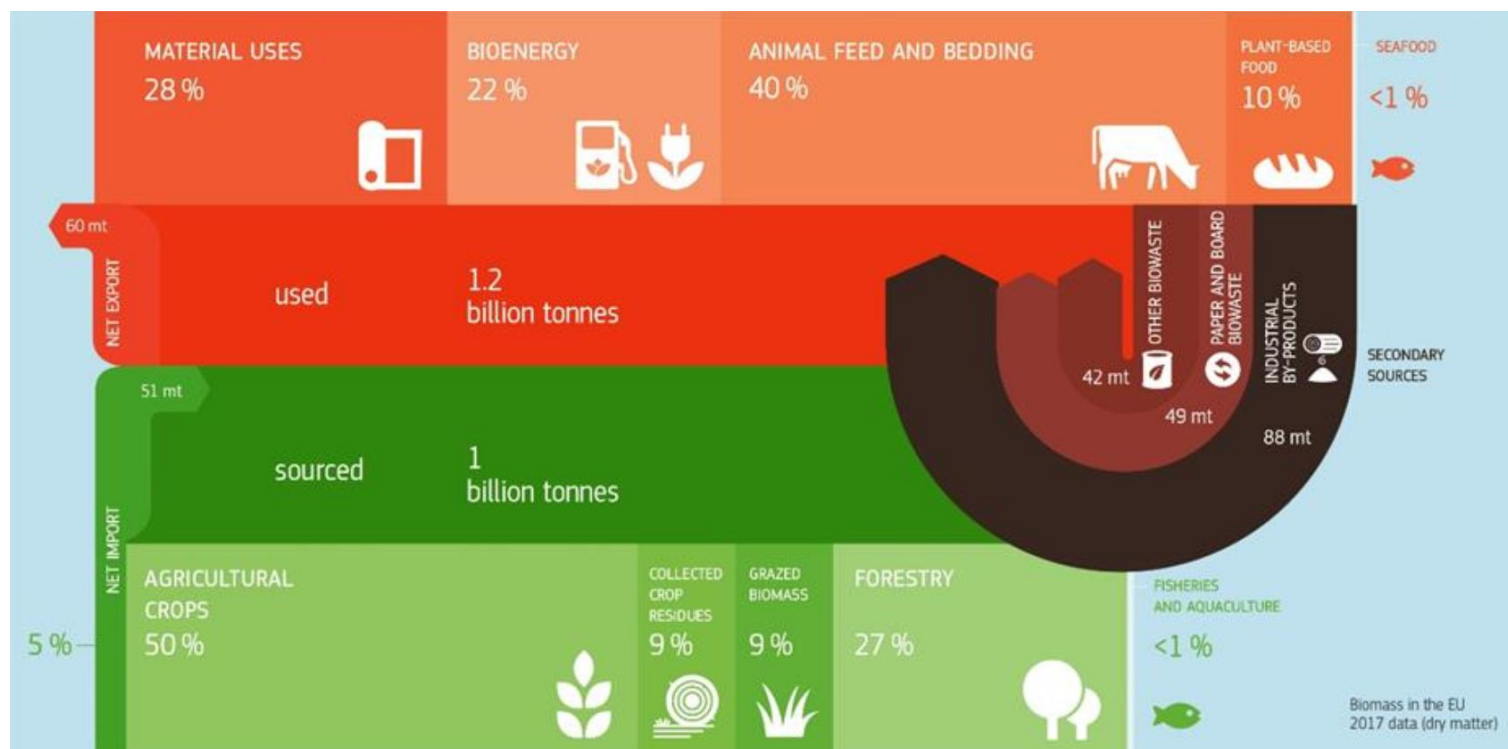
In the meantime, the EU is already a bioeconomy

- Total **sources** of biomass in the EU-27:

- **±1 billion tonnes** of dry matter
- includes domestic production and net imports
- 70% origins from agricultural sector

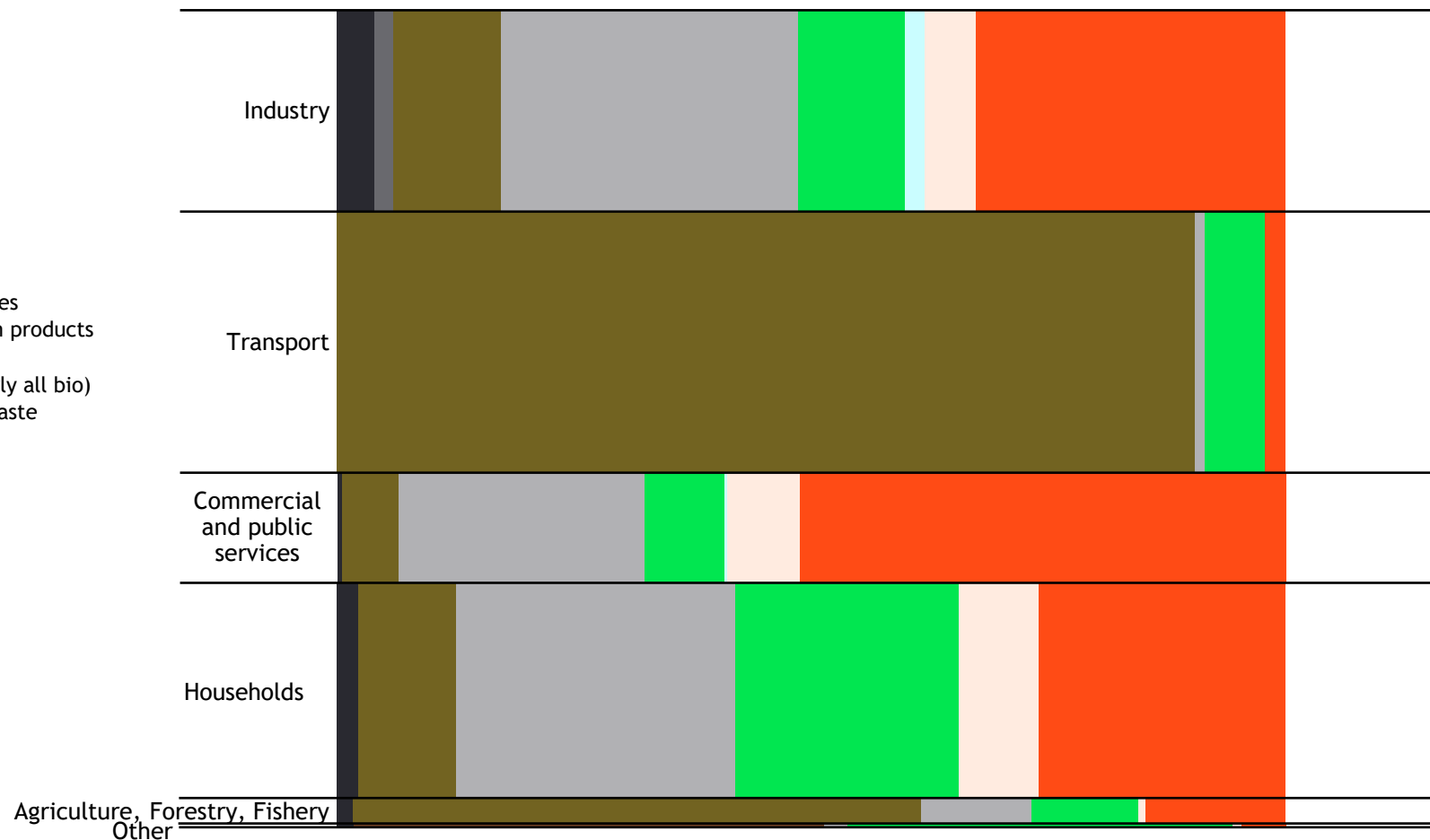
- Total **uses** amounts to:

- **±1.2 billion tdm**
- Additional volume due to recovery of waste from industries and households

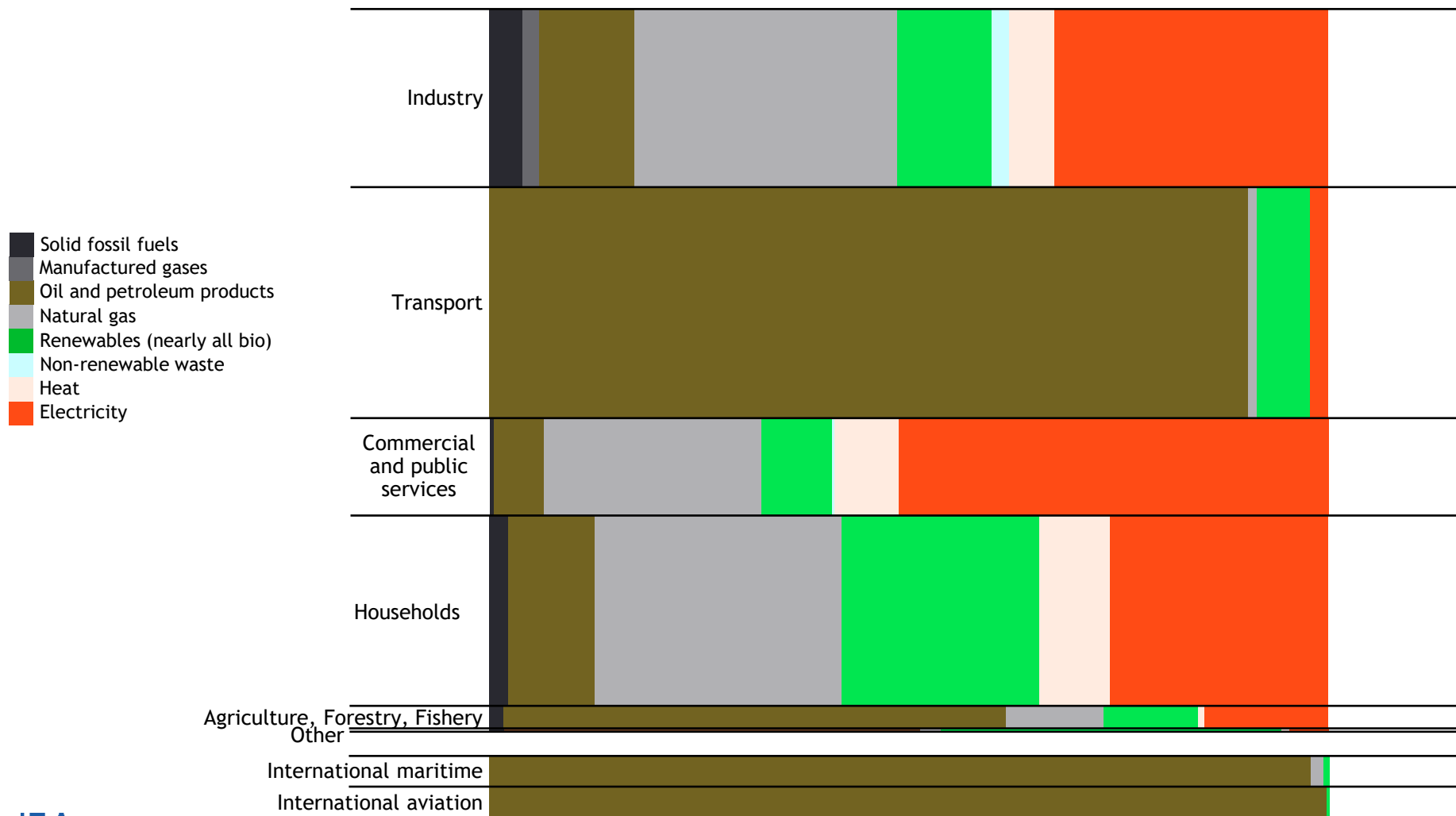


Source: JRC, 2023, Biomass production supply uses and flows in the European Union

But at the same time the energy consumption in the EU27 (in 2023) is still very much fossil based: 873 Mtoe / 36,5 EJ (excl. int. aviation and maritime)



But at the same time the energy consumption in the EU27 (in 2023) is still very much fossil based: 950 Mtoe / 39,8 EJ (incl. int. aviation and maritime)

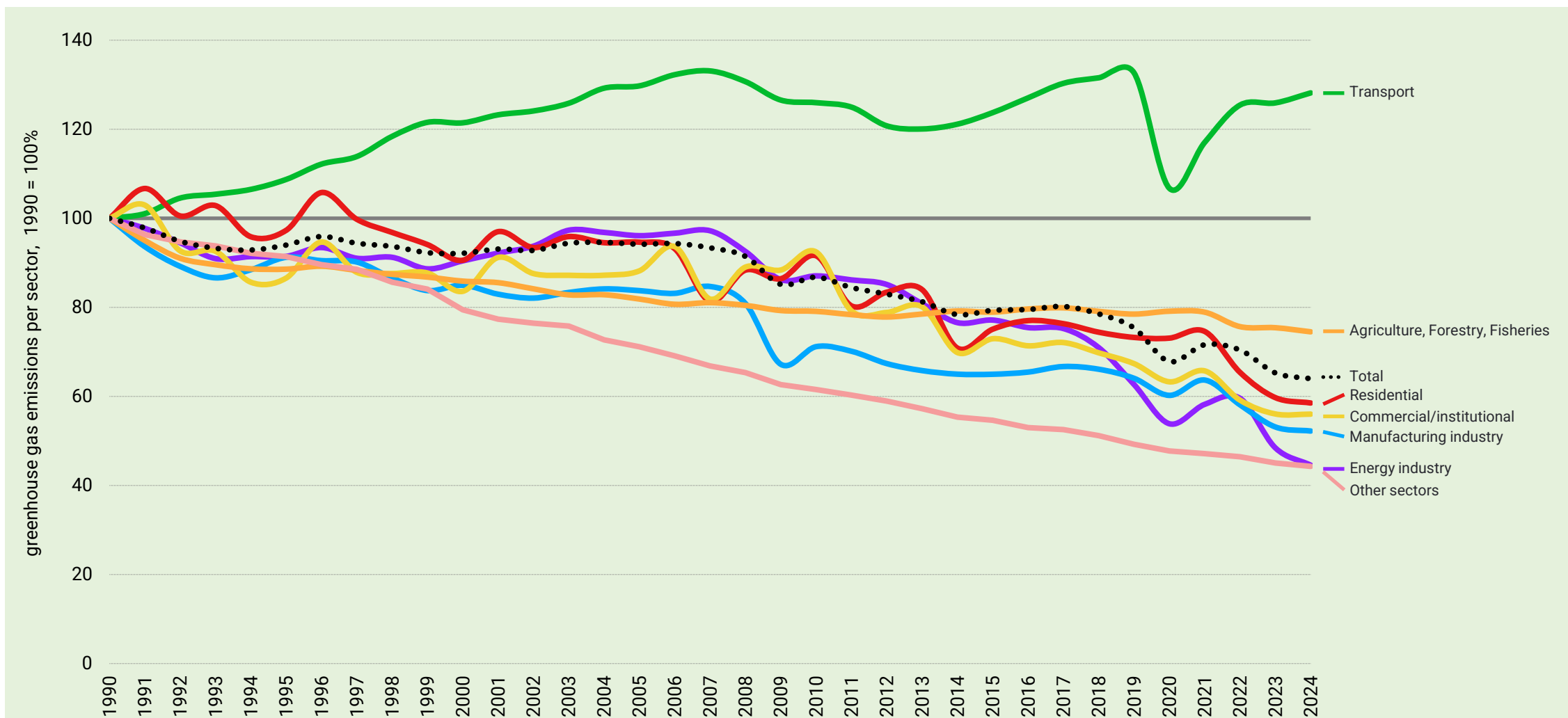


Source: Eurostat, Energy Balance, 2023 data. Data are excluding international aviation and maritime bunkering, graph created by studio Gear Up

The shifting focus in EU policy

- Initially on energy security
- Since COP in Kyoto (1990) gradual focus to Renewable Energy
- All instruments addressed reducing fossil fuel carbon dioxide emissions
 - E.g. the EU emission Trading Scheme, focusing on energy sector and energy use industry
 - Focus on Reduced energy consumption and energy efficiency

The greenhouse gas emissions in the economic sectors went down



Source: EC, 2025, Transport in Figures - Pocketbook

The shifting focus in EU policy

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 - Focus on Reduced energy consumption and energy efficiency
 - Attent for also Scope 3 emissions (e.g. in ETS2 for transport and built environment)
- Recently the focus shifted to:
 - Strategic autonomy
 - Reducing dependency of import of resources, more focus on bioeconomy and recycling wastes
 - Shifting to Clean Industry, Innovation and Competitiveness

In that light the EC developed a strategic framework for a Competitive and Sustainable EU Bioeconomy in 2025

- Builds on earlier documents published 2011 and 2018
- The bioeconomy represent a **strategic opportunity** of the 21st century
- Definition of bioeconomy: activities that deliver sustainable solutions based on **biological resources to create added value**
- Responsible and efficient use of biomass remains key for **long-term competitiveness, supply stability** and **eco-system health**

The strategy charts a way forward to build a sustainable and a nature-positive bioeconomy by:

- Scaling innovation and investments
- Building new lead markets for bio-based materials and technologies
- Ensuring sustainable biomass supply across value chains
- Harnessing global opportunities

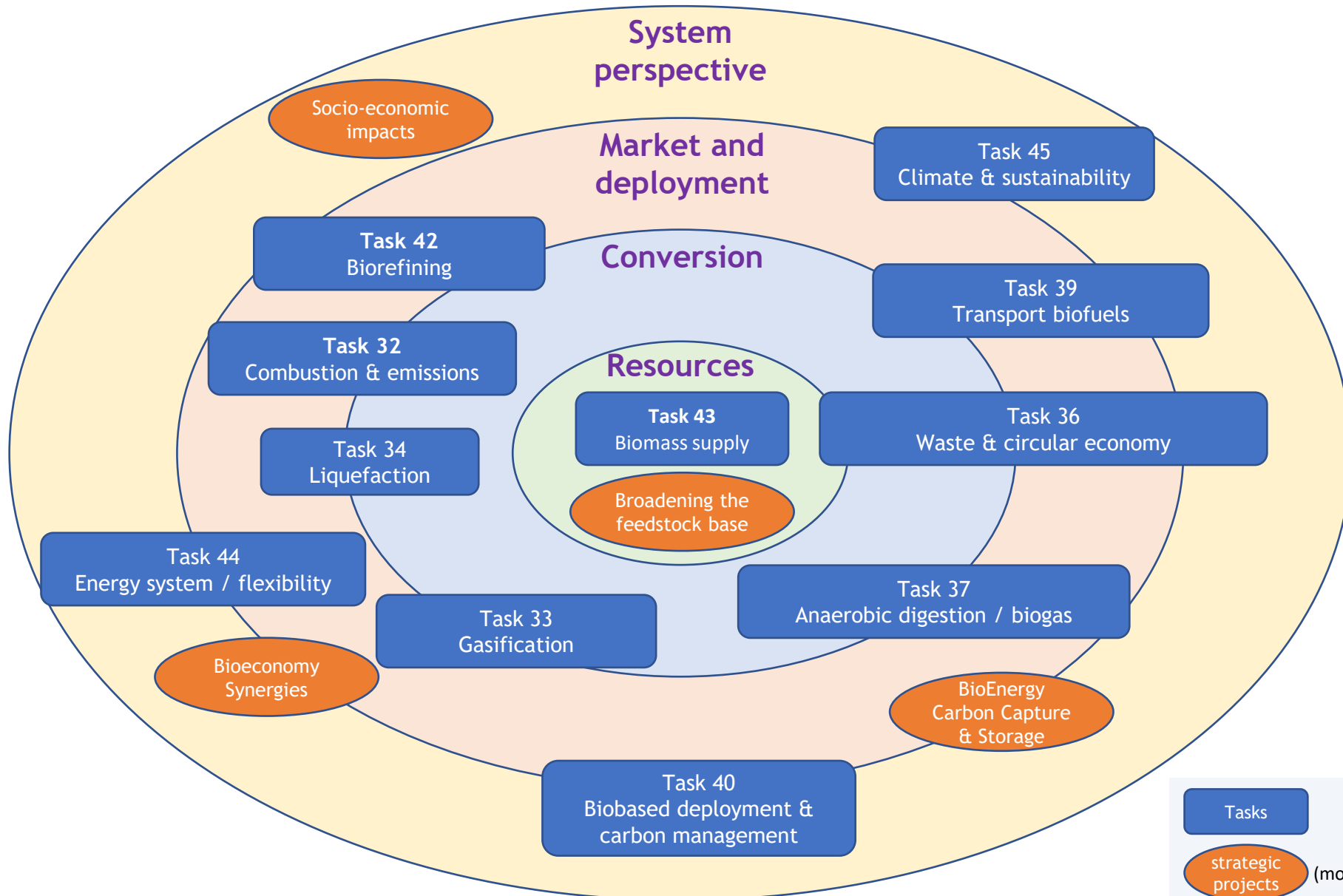
The Bioeconomy Strategy addresses efficient use of biomass

Directing it to higher-value applications and reducing pressures on ecosystems, while reflecting local conditions and market realities:

- **Food and nutrition security** while maintaining and improving ecosystem services
- Where feasible, biomass should be used for **higher-value products and materials**, that **store carbon longer** and **substitute fossil-based materials**
- **Residual and secondary streams can be used for energy**, particularly where not alternative decarbonisation solutions exists, or where it ensures energy security and energy affordability

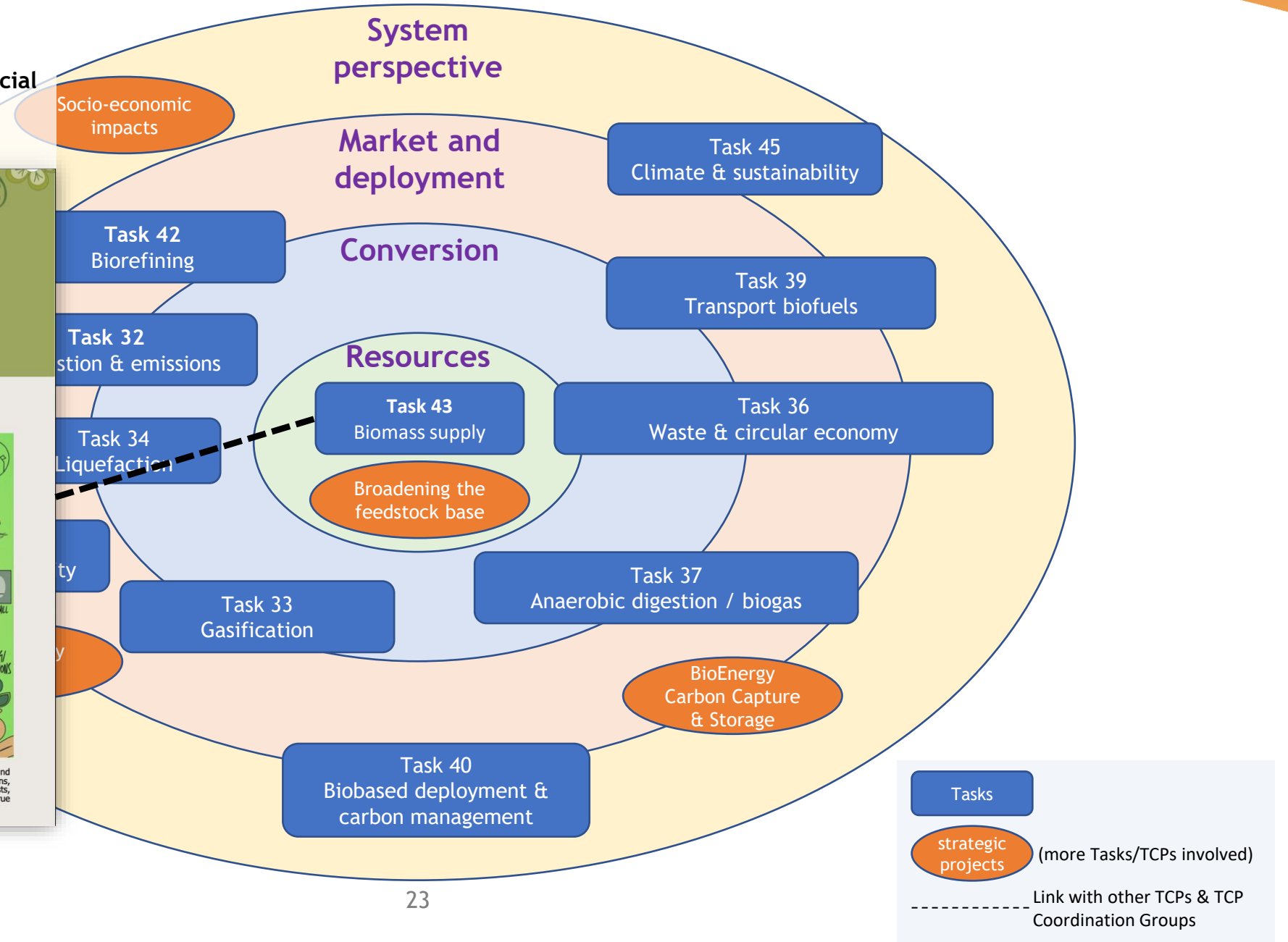
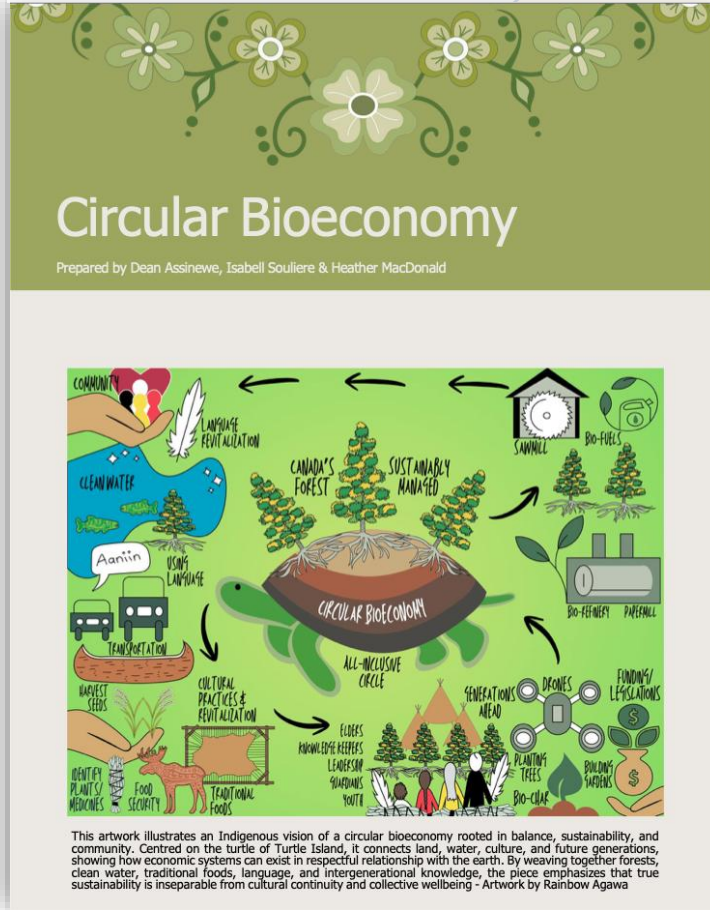
This is where the current experiences with **biomass for energy** can act as **stepping stone** and establish **enhanced synergies**

Let's see some connections

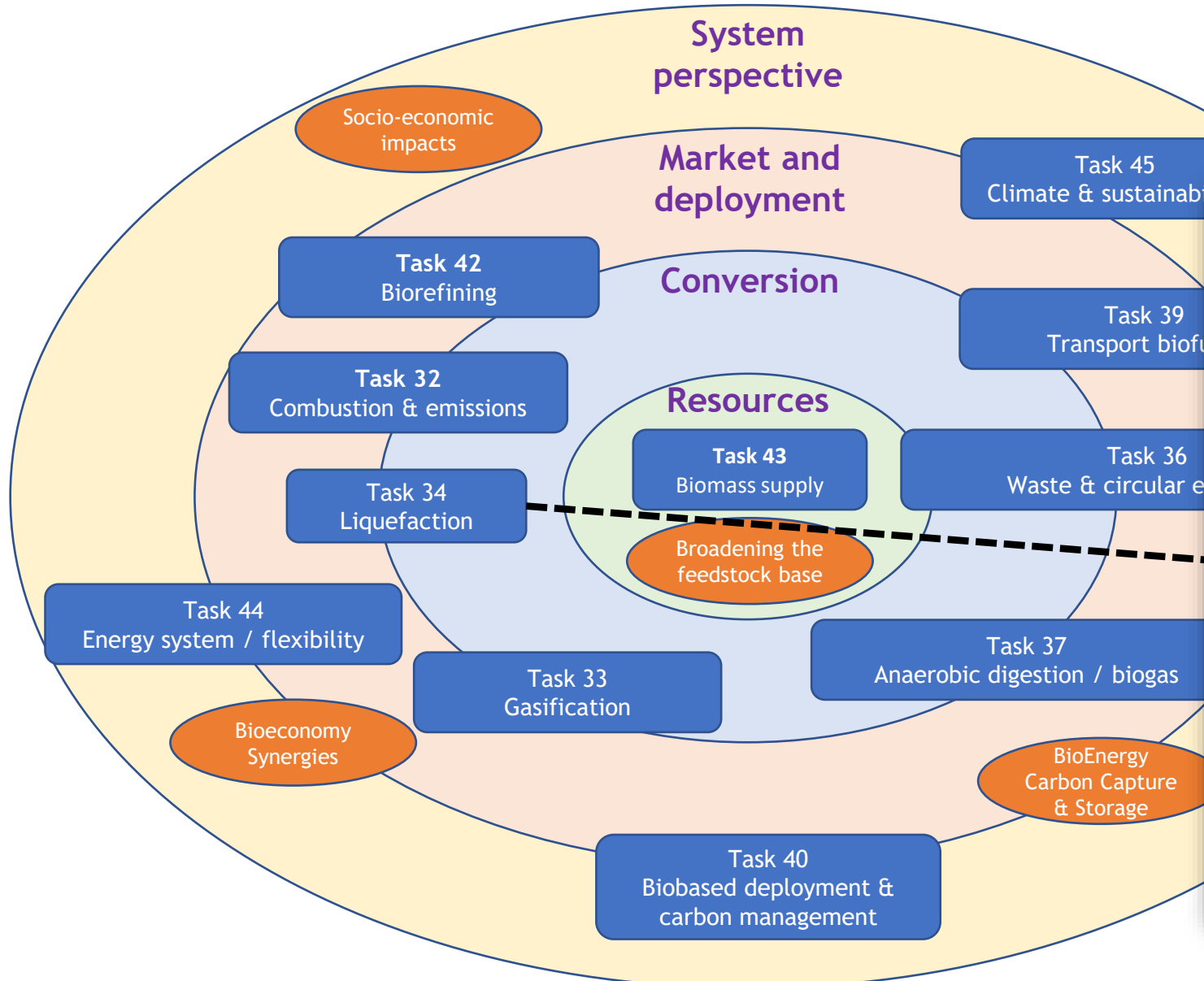


Let's see some connections

Indigenous-led Circular Bioeconomies: Social and Economic Impacts and Social Perceptions



Let's see some connections

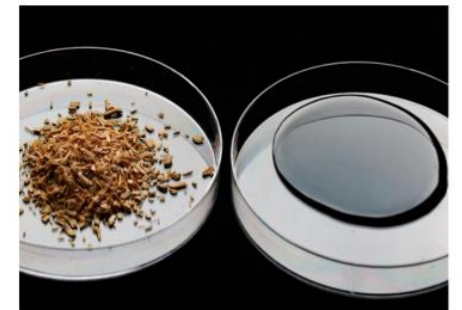


Commercial status of direct thermochemical liquefaction technologies



Commercial status of direct thermochemical liquefaction technologies

IEA Bioenergy: Task 34
June 2026



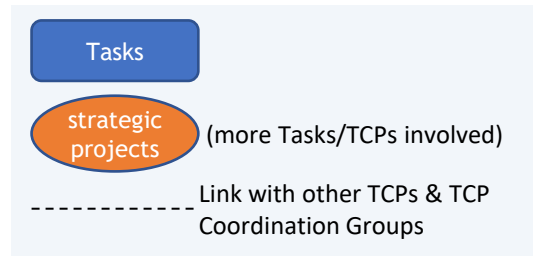
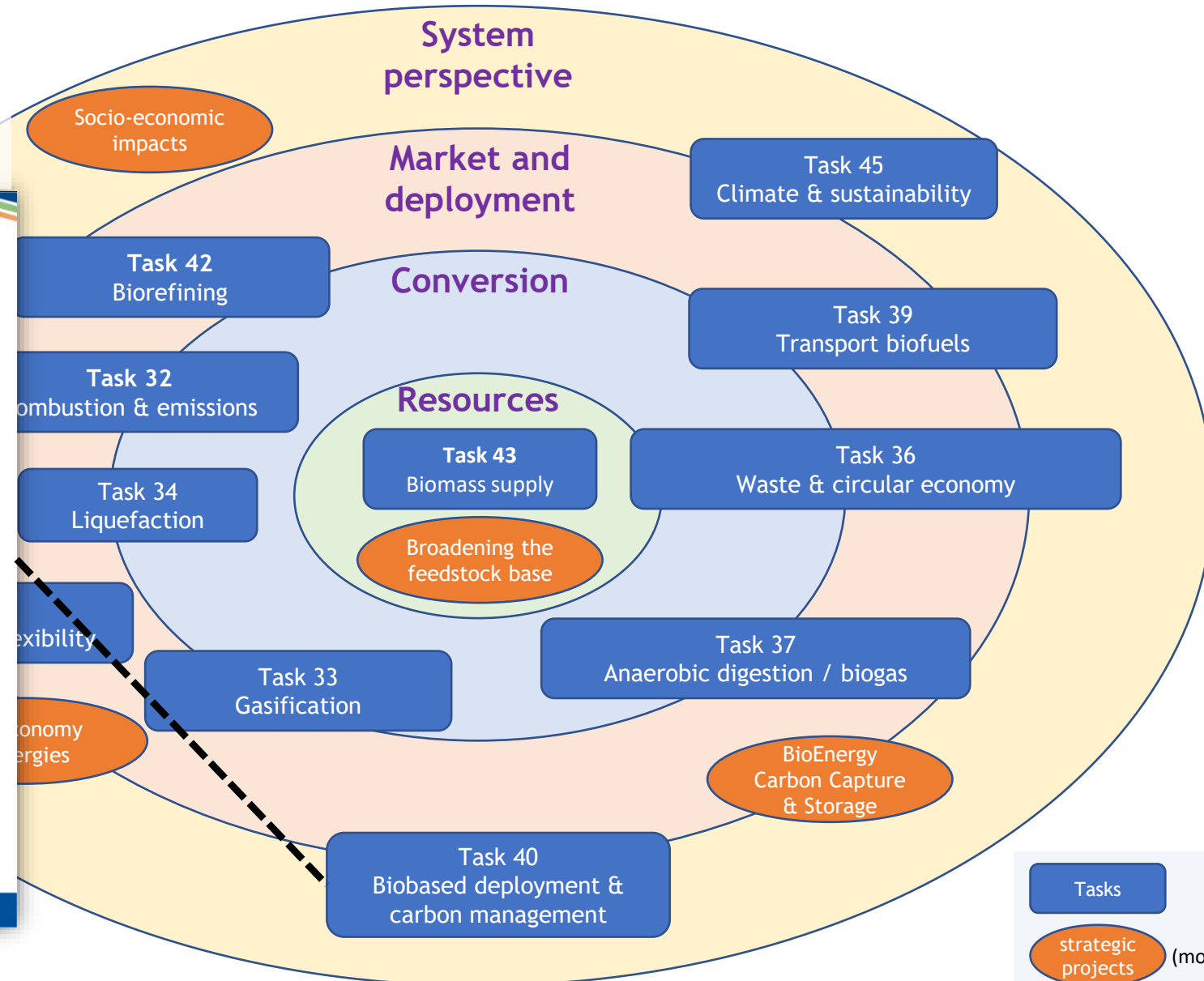
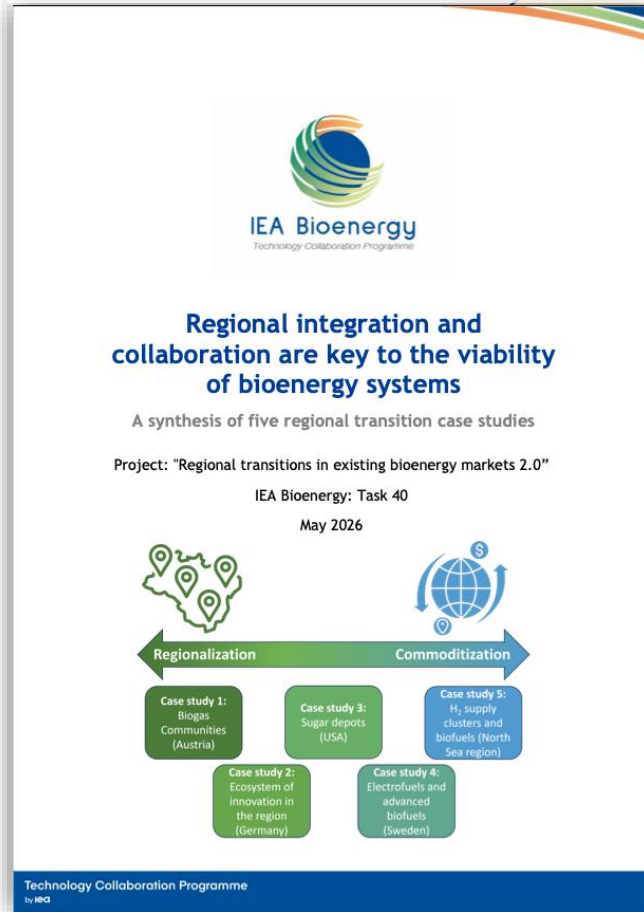
Technology Collaboration Programme
by IEA

strategic projects (more Tasks/TCPs involved)

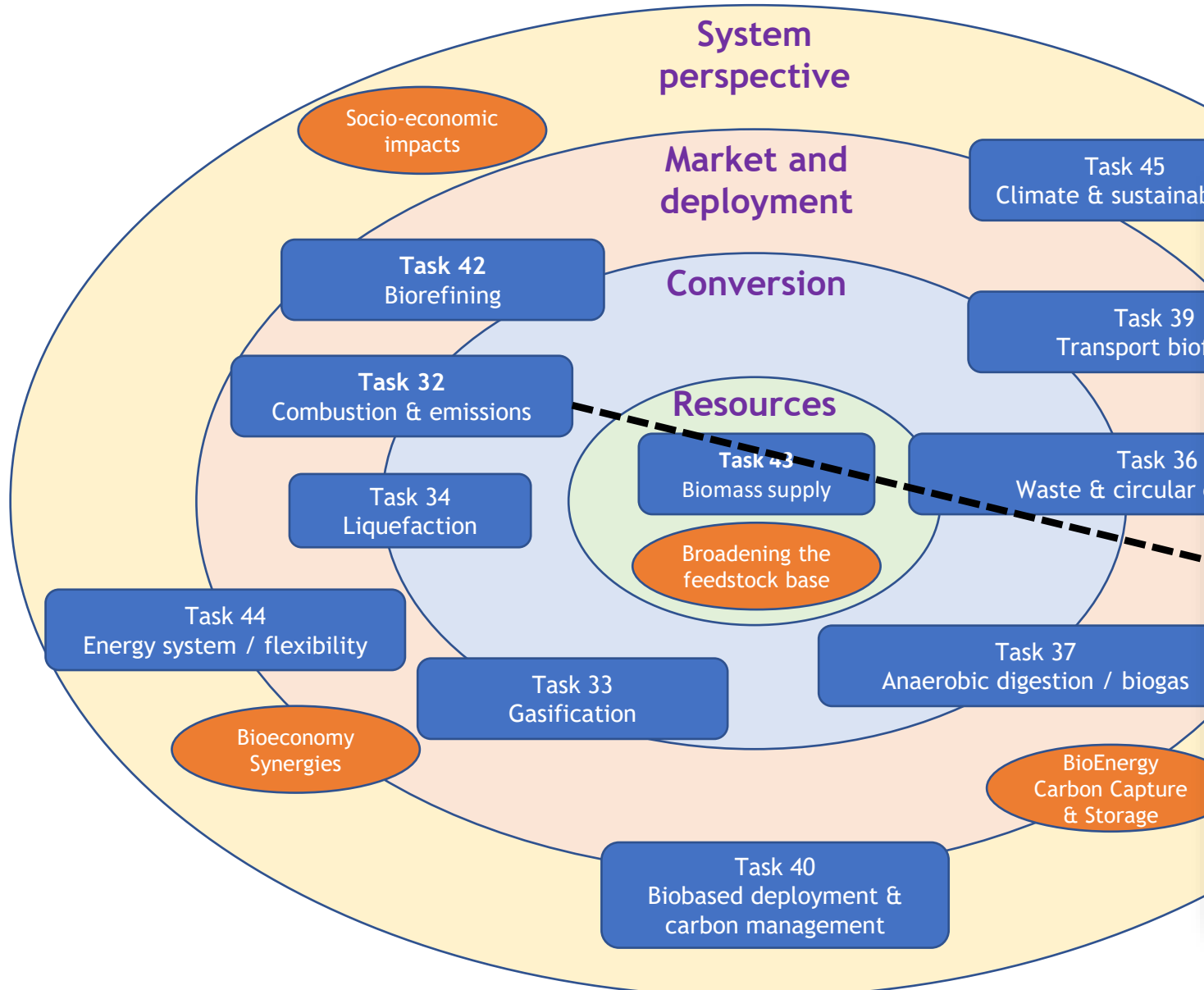
----- Link with other TCPs & TCP Coordination Groups

Let's see some connections

Regional integration and collaboration are key to replace centralised fossil systems



Let's see some connections



research on the quantification of reactive nitrogen flows along the whole biomass combustion cycle, including biomass growth and harvesting



Nitrogen flows in biomass combustion systems

Part II: Options for maximising reactive nitrogen capture and case studies

May 2025



Technology Collaboration Programme

strategic projects (more Tasks/TCPs involved)

----- Link with other TCPs & TCP Coordination Groups

Let's see some connections

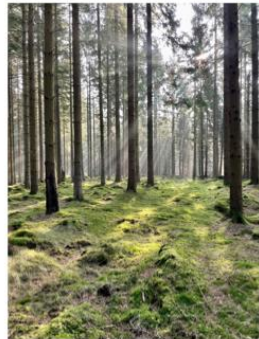
Overview of current progress in assessing biodiversity impacts and using assessment outcomes to inform decisions affecting land-use and land-use change



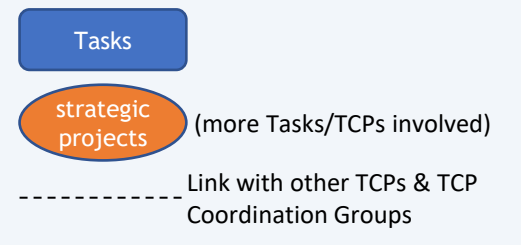
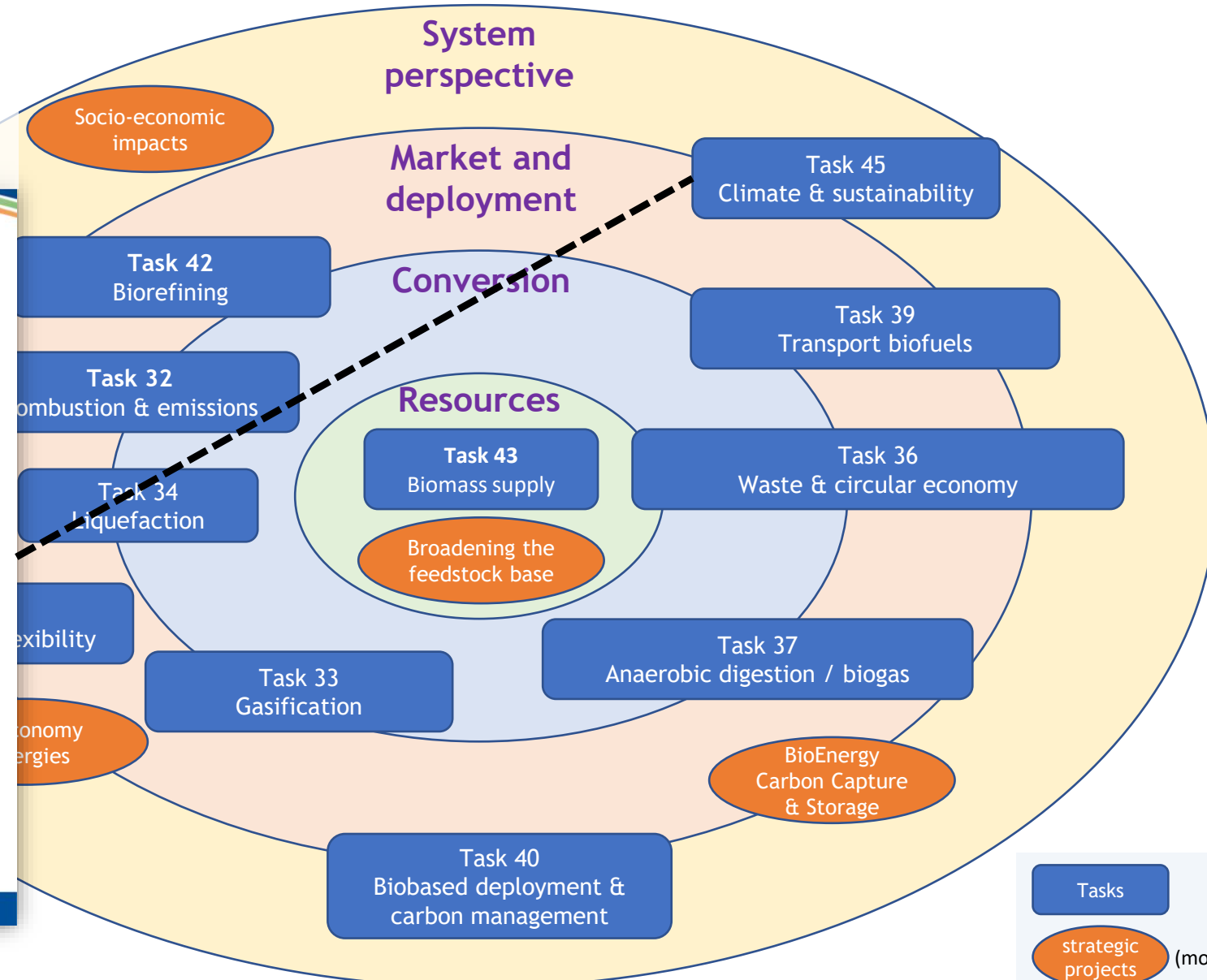
Quantifying biodiversity impacts of bioenergy system

Latest developments in the scope of LCA

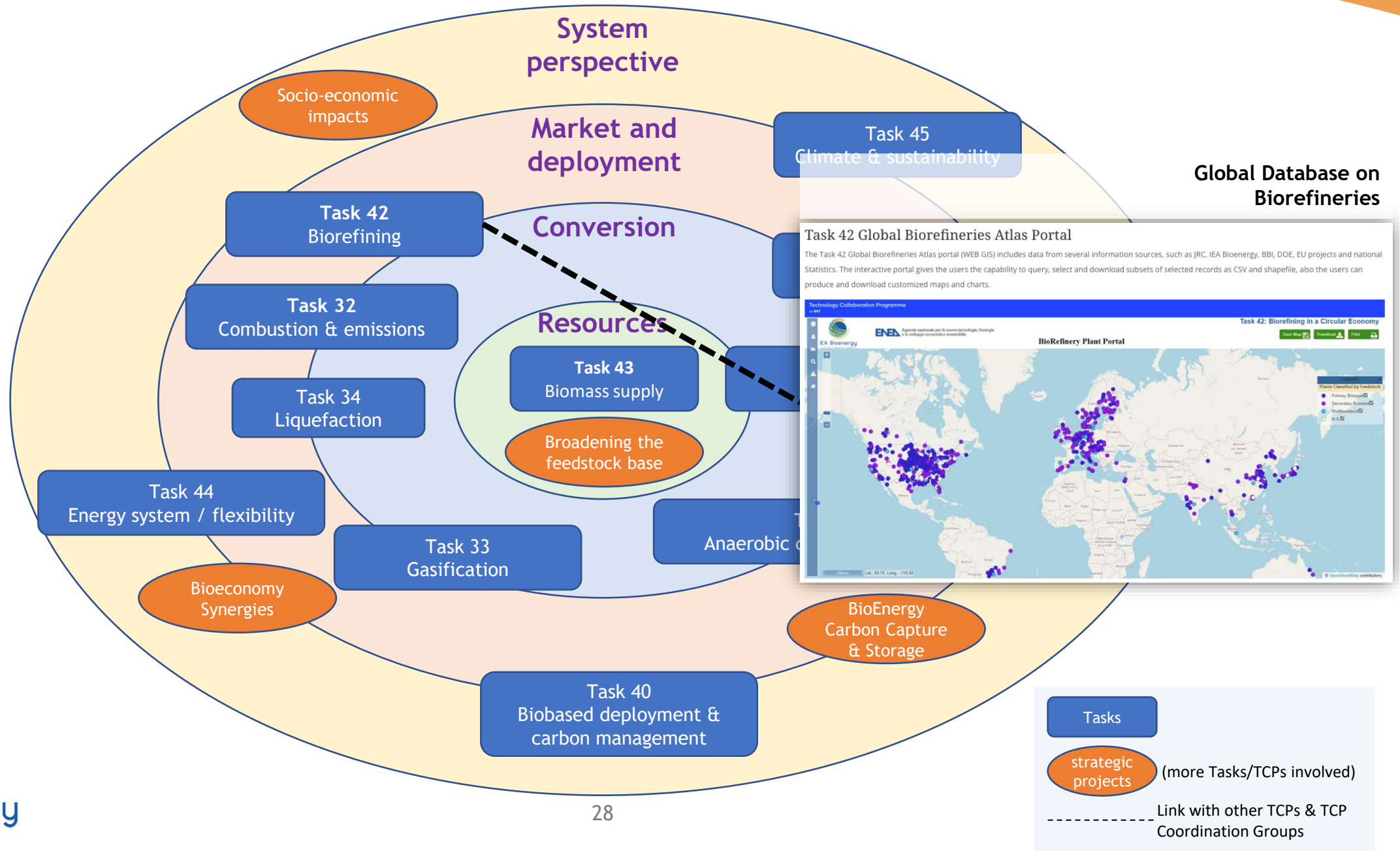
IEA Bioenergy: Task 45 & Mistra BIOPATH
August 2025



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Let's see some connections



Upcoming event:

**EXCO98 WORKSHOP**

Scaling Asia-Pacific Bioeconomies

Supporting fuel security and the net-zero transition

15 OCTOBER 2026 • MORETON BAY, AUSTRALIA

Join government, industry, finance, research and international organisations to identify barriers, define priority actions and shape future collaboration.

SAVE THE DATE

Registration details to follow • Remote participation possible

AI GENERATED

Workshop focus

- Sustainable biomass supply
- Renewable fuels & molecules
- Policy, trade & investment
- Sustainability and certification
- Infrastructure and markets

Expert talks • Panel • Rotating breakouts • Consensus priorities

Technology Collaboration Programme
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Workshop hosted by IEA Bioenergy in partnership with Bioenergy Australia,
following the Queensland Summit "Scaling Bioenergy for Energy Security and Resilience" (Moreton Bay, 14 October 2026)

Some reflections

- The volumes of biomass resources currently deployed for energy can be shifted in near future to biorefineries for chemicals and product
- The biobased value-added pyramid of lower-to-higher value improves in feasibility when establishing optimal value added when the total portfolio of products server several end-use markets
- The design parameters for a circular biobased economy are different -and probably not yet fully discovered - than those parameters that have shaped the linear fossil economy
 - Collective intelligence and collaboration in different networks and ecosystems might accelerate developing these parameters
- Strive for synthesis of electrons and molecules
- Strive for synthesis of energy, fuels and materials
 - prevent competition among the biobased resources



Questions?

Eric van den Heuvel
Technical Coordinator
+31-6-83223098
eric.tc.ieabioenergy@studiogearup.com



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