

FOOD, BIOECONOMY, NATURAL RESOURCES, AGRICULTURE AND ENVIRONMENT

What is this about?

This cluster addresses the interlinked challenges of safeguarding the natural resource base, resilient biodiversity and ecosystem services, restoring and sustaining the health of our planet, sustainable agricultural, forest, marine and fresh water production, promoting alternatives to fossil-based economies, sustainable consumption, closing nutrient cycles, and food and nutrition security.

At its heart is the circular economy, which aims to maintain the value of land, products, materials and resources for as long as possible through a cascade of dematerialisation and sustainable use by design, reuse, remanufacture and recycling of materials. It is an essential contribution to the EU's efforts to develop a sustainable, low-carbon, resource-efficient and competitive economy. A sustainable bioeconomy is the renewable segment of the circular economy.

The Commission has proposed that R&I priorities for Horizon Europe will be on Environmental Observation, Biodiversity and Natural Capital, Agriculture, Forestry and Rural Areas, Circular Systems, Bio-based Innovation Systems, Food Systems, and Seas, Oceans and Inland Waters. Together these priorities address key aspects and enablers within a circular and sustainable bioeconomy.

Some facts and figures

- Four of nine planetary boundaries have been crossed as a result of human activity: climate change, biodiversity loss, land-system change and altered nitrogen and phosphorus cycles.
- We are witnessing the sixth mass extinction, and loss of biodiversity. Today, 75% of terrestrial ecosystems, 40% of marine ecosystems and 50 % of freshwater streams have been severely altered.
- Agriculture and forestry cover 85% of EU territory, drive rural economies and provides €430 (billion?) in annual turnover in the EU.
- Food systems use 70% of our freshwater and 30% of our energy, and produce over 25% of our greenhouse gas emissions. Nearly 1 billion people suffer from hunger, while 2 billion overweight people are at risk of non-communicable diseases, and one third of our food is wasted. EU food systems provide 44 million post-farm jobs, 6% of GDP and 7% of exports.
- The bioeconomy provides about €2 trillion in annual turnover in the EU, over 18 million jobs, with one million new green jobs expected by 2030, for example by developing new biodegradable products.
- Circular economy: only 10% of material input and 40% of EU waste is reused or recycled. A circular economy can generate a net economic benefit of €1.8 trillion in Europe by 2030.

- The Ocean covers 70% of the Earth's surface and provides half of the oxygen we breathe. It has absorbed a quarter of our CO2 emissions, puts food on our plates, and hosts the greatest biodiversity of the planet. According to the most recent figures, the established sectors of the EU Blue Economy directly employed over 4 million people, generated €658 billion of turnover and €180 billion of gross value added in 2017.
- The overall environmental costs of all reactive nitrogen losses in Europe are estimated at €70-320 billion per year due to loss of air and water quality, and impacts on ecosystems and human health.
- The observation and monitoring of the Planet produces terabytes of data every day that are transformed into solutions for a healthier environment and contribute to the digital economy.

Key policies

- The 2018 updated Bioeconomy Strategy paves the way for the renewal of European industries and primary sectors through bio-based innovation, the provision of food and nutrition security and the valorisation and protection of ecosystems and biological resources. It addresses the twin challenges of achieving a climate-neutral economy by 2050 and preserving Europe's natural environment.
- FOOD 2030 is the EU R&I policy framework to drive sustainable, healthy and inclusive food systems and thus achieve co-benefits for nutrition, climate, circularity and communities through its 10 Pathways for Action to be deployed in Horizon Europe (food systems intervention area, missions and partnership on "Safe and Sustainable Food Systems for People Planet and Climate".)
- The Circular Economy Action Plan supports a circular economy in each step of the value chain. It gives a clear signal to economic operators and society on the way forward.
- A sustainable Blue Economy will allow sustainable growth in the marine and maritime sectors. As part of the Integrated Maritime Policy, the Blue Growth is the long-term strategy to support sustainable growth in the marine and maritime sectors, taking duly into account the environmental pillars embedded in the Integrated Maritime Policy.
- The EU R&I policy agenda on Nature-Based Solutions (NBS) aims to position the EU as a leader in 'Innovating with nature' for more sustainable and resilient societies.
- Supporting R&I on water would be necessary to support water, energy and climate related EU policies and the implementation of SDGs.
- 2030 EU biodiversity strategy as an integral and core element of the European Green Deal. A Communication to be delivered in the first 100 days of the new Commission.
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Example projects from Horizon 2020

- RESYNTEX demonstrates how to avoid the incineration and landfilling of textile waste through chemical recycling of unwearable blends in a textile recycling pilot plant.
- PROTEIN creates an ICT-based system for providing personalised nutrition based on the collection and analysis of large volumes of data relating to users' dietary patterns, physical activity and individual parameters.
- RES URBIS designs facilities to turn bio-waste generated in our cities – by homes, restaurants and shops – into bioplastic and a number of related products.
- SABANA will develop a large-scale integrated microalgae-based biorefinery for the production of biostimulants, biopesticides and feed additives, in addition to biofertilisers and aquafeed, using only marine water and nutrients from wastewaters.
- MASLOWATEN has demonstrated the technical reliability, economic performance and environmental benefits of innovative photovoltaic irrigation systems, using 100% renewable energy, saving 34% in water consumption and between 61% to 79% in the electricity cost.
- POWERSTEP focused on converting sewage treatment plants in power production facilities while still achieving a high effluent quality for the treated wastewater. It showcased that state-of-the-art plants can either power themselves or feed surplus (upgraded) biogas into the gas grid, therefore turning WWTPs into producers of renewable or “green” energy. SYSTEMIC has 5 large-scale demonstration plants that aim at a transition towards a more circular economy and closed nutrient cycles by recycling nutrients from organic waste streams (manure, sewage sludge, food waste) and turning them into bio-based fertilisers.
- BMX-11 has developed a potent "green" biocide that improves water quality and reduce hazardous chemicals from antifouling additives in marine paints.
- Naturvation: NATure-based URban aims to develop our understanding of what nature-based solutions can achieve in cities realising its potential for responding to urban sustainability challenges.

Key (existing) partnerships and initiatives

- The Bio-Based Industries Joint Undertaking (BBI JU) is a €3.7 billion public-private partnership initiative aiming at creation of new value chains from sustainable biomass development of biorefining technologies, to transform renewable resources into bio-based products, materials and fuels, and developing markets for innovative bio-based products.
- Joint Programming Initiatives (JPI) where EU Member States align their R&I agendas in the areas of health and nutrition (JPI-HDHL); food, agriculture and climate (JPI-FACCE); sustainable water systems (JPI Water); oceans (JPI-Oceans) and urban sustainability (JPI-Urban), , EIT FOOD is fostering a knowledge triangle approach to build up skills and education, and foster entrepreneurship in sustainable and healthy food systems.
- The European Circular Economy Finance Platform brings together public and private investors in order to improve access for finance for circular economy projects.
- The Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) provides scientific assessments of the planet's biodiversity, ecosystems, and the benefits they provide to people, plus tools and methods for protecting vital natural assets. (1)

- Oppla is an EU nature-based solutions knowledge repository. It shares the latest thinking and resources on natural capital, ecosystem services, nature-based solutions and related approaches. (2)
- The Group on Earth Observation (GEO) is an international partnership that delivers information and data necessary to cope with nine global societal challenges including biodiversity and ecosystem sustainability, food security and sustainable agriculture. (3)
- BiodivERsA - the network programming and funding research on biodiversity and ecosystem services across European countries and territories. It constitutes the core for the future European Partnership on Biodiversity.(3)
- The Partnership for Research and Innovation in the Mediterranean Area (PRIMA) is an Article 185 initiative bringing together approximately € 500 million from the EU and 19 participating countries (11 being EU MS) to address challenges related to water management, agriculture and food systems in this area.

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