



European  
Commission



# Bioeconomy: the European way to use our natural resources

*Action plan 2018*

## Bioeconomy: the European way to use our natural resources

### Action plan

European Commission  
Directorate-General for Research and Innovation  
Unit F – Bioeconomy

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EUROPEAN COMMISSION

# Bioeconomy: the European way to use our natural resources

Action plan 2018

# Europe's bioeconomy

weaving it all together

## MAIN PRIORITIES

### 1. STRENGTHEN AND SCALE-UP THE BIO-BASED SECTORS;

this will be done for example by:

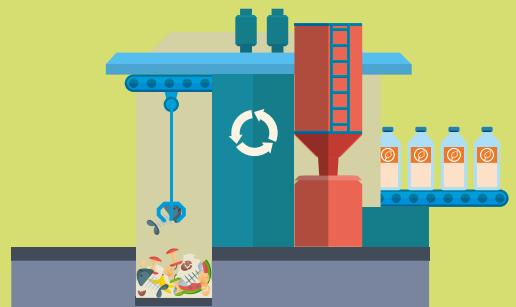
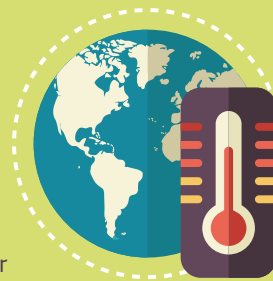
- unlocking investments and markets
- deploying innovative bio-based solutions, and
- developing substitutes to plastics that are bio-based, recyclable and marine biodegradable

## A Global Leadership to maintain

- Around **€2 trillion** in annual turnover, over **18 million people** employed in EU Bioeconomy
- **€621 billion added value**
- **4.2% of the EU's GDP**
- **76% of employment** (agriculture + food and drink manufacture).

## SUSTAINABLE AND CIRCULAR, THE EU BIOECONOMY CAN:

- **Preserve nature**, and restore **healthy ecosystems**
- Create **1 million new green jobs** by 2030, in particular in rural and coastal areas
- **Turn waste** from farming, cities, food & forests **into new added values products**
- Provide **additional income for farmers, foresters and fishermen**
- **Replace fossil** material with **renewable alternatives**
- **Increase the carbon sink capacity** of soil, forest and ocean
- Develop substitutes to fossil based materials that are **bio-based, recyclable and marine biodegradable**



## 2. RAPIDLY DEPLOY LOCAL BIOECONOMIES ACROSS THE WHOLE OF EUROPE

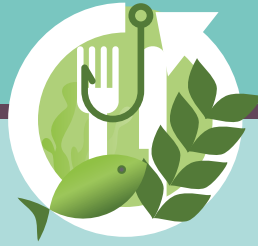
for example via the transition to:

- sustainable food and farming systems
- sustainable forestry, and
- more diversified revenues for farmers, foresters and fishermen

## 3. UNDERSTAND THE ECOLOGICAL BOUNDARIES OF THE BIOECONOMY

for example by:

- monitoring progress towards a sustainable bioeconomy, and
- enhancing benefits of biodiversity in primary production



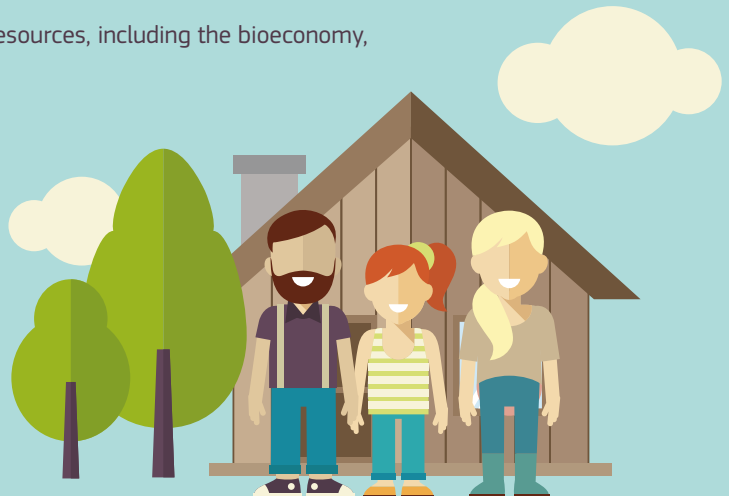
## WHAT'S EUROPE'S TAKE ON IT?

- A renewed **bioeconomy strategy** supporting the transition to a sustainable and circular bioeconomy.
- Fits wider **EU priorities and policies** (climate, circular, innovation, food, energy, trade, industry, agriculture, fisheries and marine, etc.).
- And fulfilling **global commitments** (SDGs, Paris Agreement, etc.)



## HOW MUCH SUPPORT SO FAR?

- €3.85 billion investment under **Horizon 2020** (2014-2020)
- €10 billion proposed for food and natural resources, including the bioeconomy, under **Horizon Europe** (2021-2027)



# Introduction

## *Sustainable and circular bioeconomy*

### 2018 updated Bioeconomy Strategy and its Action Plan

*The bioeconomy covers all sectors and systems that rely on biological resources – animals, plants, micro-organisms and derived biomass, including organic waste – as well as their functions and principles. It includes and interlinks: land and marine ecosystems and the services they provide; all primary production sectors that use and produce biological resources (agriculture, forestry, fisheries and aquaculture); and all economic and industrial sectors that use biological resources and processes to produce food, feed, bio-based products, energy and services.*

*To be successful, the European bioeconomy needs to have sustainability at its heart and be circular by definition. The purpose of the updated European Bioeconomy Strategy is therefore to further develop a bioeconomy that valorises and preserves ecosystems and biological resources, drives the renewal of our industries and the modernisation of our primary production systems through bio-based innovation, involves local stakeholders, protects the environment and enhances biodiversity.*

### Focused on a sustainable future

An update of the original Bioeconomy Strategy is necessary to accelerate the deployment of a sustainable European bioeconomy so as to maximise its contribution towards the 2030 Agenda and its Sustainable Development Goals (SDGs), as well as the Paris Agreement.

The update also responds to new European policy priorities, in particular the renewed Industrial Policy Strategy, the Circular Economy Action Plan and

the Communication on Accelerating Clean Energy Innovation, all of which highlight the importance of a sustainable, circular bioeconomy to achieve their objectives.

In order to address the evolution of the Bioeconomy Strategy's five objectives<sup>1</sup>, the update proposes a three-tiered action plan to:

- 1.** Strengthen and scale up the bio-based sectors, unlock investments and markets

<sup>1</sup>) COM(2012)60, *Innovating for Sustainable Growth: A Bioeconomy for Europe*, 13 February 2012

2. Deploy local bioeconomies rapidly across the whole of Europe
3. Understand the ecological boundaries of the bioeconomy.

The proposed action plan capitalises on – and goes beyond – previous successful research and innovation investments in order to create growth and job opportunities at the local level, reinforce the bio-based sector, contribute to the modernisation of EU industry, protect the environment and enhance the functions of ecosystems and biodiversity.

The plan applies a systems-based approach in order to increase the overall sustainability and circularity of the bioeconomy. It has been designed as a complementary and integrated framework where the whole is greater than the sum of its parts. It embraces multiple sectors and policies related to the bioeconomy, interlinks them and facilitates coherence and synergies. It addresses trade-offs – such as the competing use of biomass – and provides the EU with a blueprint to deliver effectively on many of its policy objectives.

## Five objectives from the original Bioeconomy Strategy

A comprehensive review<sup>2</sup> concluded that it has been a success, notably at mobilising research and innovation, boosting private investments, developing new value chains, promoting the uptake of national bioeconomy strategies and involving

stakeholders. However, it also found that while the initial five objectives of the Strategy remain valid, their scope needs to be adapted and the related actions need to be refocused in order to better use the potential of the bioeconomy to meet current and future EU priorities.

### 1. Ensuring food and nutrition security

Today's food and farming systems are a fundamental part of the bioeconomy. However, Europe needs to be more innovative due to the changing consumer demands for sustainable food production and consumption practices, the growing world population, the need to diversify biomass demand and sourcing, as well as climate change threats.

There is a need to step up efforts to support the transformation towards sustainable, healthy, resource-efficient, resilient, circular and inclusive food and farming systems. Significant opportunities for bio-based product and process innovation in agriculture, forestry, marine and food can be further realised, with equitable benefits for primary producers. These include small-scale biorefineries that could be established by primary producers alone or in cooperative business models.

### 2. Managing natural resources sustainably – now more important than ever amid increasing environmental pressures and biodiversity loss

Biodiversity is key to the preservation and productivity of healthy ecosystems in oceans, forests and soils. Timely action to avoid, reduce and reverse

<sup>2</sup>) SWD(2017)374, Review of the 2012 European Bioeconomy Strategy, 13 November 2017

land and sea ecosystem degradation can increase food and water security, as well as contribute substantially to the adaptation and mitigation of climate change. Further action and investment is needed to avoid land degradation, restore degraded ecosystems and ensure their resilience to climate change, and valorise natural resources and secondary raw materials.

### **3. Reducing dependence on non-renewable resources – vital to meeting the EU's energy and climate targets, maintaining and strengthening its industrial competitiveness and achieving a fully deployed circular economy**

The bioeconomy can contribute to meeting the binding EU-wide target of at least 32 % renewables for the year 2030 under sustainability criteria. It can also enhance our capacity to substitute fossil raw materials in very significant parts of European industry – construction, packaging, textiles, chemicals, cosmetics, pharma ingredients, consumer goods – in line with renewed industrial policy objectives. According to industry projections, the demand for industrial biotechnologies is expected to almost double by 2030. This requires supportive measures such as funding, innovation and regulatory frameworks.

### **4. Mitigating and adapting to climate change – the global challenge of this generation.**

A scaled-up and strengthened bio-based sector can accelerate non-renewable resources substitution in line with the EU's commitments under the Paris Agreement. The modern bioeconomy should

contribute to tackling climate change by combining an enhanced provision of ecosystem services regulating climate with a renewed bio-based industrial base, reducing energy demand and lowering emissions, and with more resource-efficient, sustainable primary production on land and sea.

### **5. Strengthening European competitiveness and creating jobs – a key driver of the bioeconomy**

Providing frameworks for innovation and deployment and fostering the development of markets for bio-based products – such as through public procurement, creation of standards, renewable energy policies and carbon pricing – will support the competitiveness and transformation of European industries and could lead to the creation of up to 1 million new jobs by 2030. Bio-based sectors will contribute to achieving the goals of the circular economy – for instance through the development of our capacity to turn organic waste, residues and side streams into valuable bio-based products.





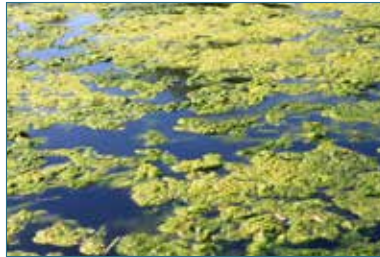
# NEW VALUE CHAINS

**OPPORTUNITIES:** Creation of new bio-based value chains

## PRIMARY SECTOR



*Sugar beets*



*Algae*



*Wood residues*



*Cosmetics*



*Textiles*



*Car dashboards*

## WASTE



*Biological waste*



*Fish waste*



*Bio-based plastics*



*Oils  
Pharmaceuticals*



## STRENGTHEN AND SCALE UP THE BIO-BASED SECTORS BY SUPPORTING INNOVATION AND UNLOCKING INVESTMENTS AND MARKETS

*“The EU is committed to fostering the further development and deployment of sustainable and circular bio-based solutions and will take a series of concrete steps to speed up this process.”*



Europe's bio-based sector has come a long way, creating innovative products and industrial processes that create jobs for people and promote a circular economy good for both the planet and growth.

But it still has much untapped potential.

The EU is committed to fostering the further development and deployment of sustainable and circular bio-based solutions and will take a series of concrete steps to speed up this process.

For one, the EU will continue to lead the mobilisation of public and private stakeholders to improve access to finance and build upon impressive successes achieved so far.

Case in point: the public-private partnership between the EU and the Bio-based Industries Consortium – Bio-based Joint Undertaking (BBI JU) – has been instrumental in the development and deployment of new bio-based value chains centred around the use of renewable resources – including waste.

The EU will also deploy targeted financial instruments such as the Circular Bioeconomy Thematic Investment Platform – which has an indicative budget of EUR 100 million – to lower private investment risks in bio-based projects.

EU instruments to boost market uptake and consumer confidence include labelling and standards based on reliable environmental performance information.

Overall, EU actions will contribute to the diversification, development and deployment of bio-based solutions, some of which could even help tackle plastic pollution. They will also facilitate the development of new sustainable biorefineries based on local resources and offer growth prospects for bio-based business models and products.



## AGRICHEMWHEY

The project – funded by the BBI JU under H2020 rules – aims to develop the world's first integrated biorefinery for converting dairy industry food-processing by-products – whey protein and delactosed whey protein – into products such as bio-based fertiliser and mineral supplements for human nutrition and bio-based fertiliser. The project creates jobs in rural areas and makes milk production more sustainable.

**WEB:** <https://www.agrichemwhey.com>

**COORDINATOR:** Glanbia Ireland Designated Activity Company, Ireland

**TOTAL COST:** EUR 29 949 323

**EC CONTRIBUTION:** EUR 22 007 931  
(EU/BBI JU contribution)

**START/END:** January 2018 to December 2021

**OTHER COUNTRIES:** Belgium,  
United Kingdom, Austria, Germany

## EXILVA

Microfibrillated cellulose is a performance additive made from wood pulp. While it could potentially be used in everything from cosmetics to concrete, its commercialisation has proven difficult. EXILVA – a project funded by the BBI JU under H2020 rules – aims to change this by transferring technology from a pilot production to a flagship plant and eventually scaling up to commercial levels.

**WEB:** <https://www.exilva.com>

**COORDINATOR:** Borregaard AS, Norway

**TOTAL COST:** EUR 44 698 676

**EC CONTRIBUTION:** EUR 27 433 610  
(EU/BBI JU contribution)

**START/END:** May 2016 to April 2019

**OTHER COUNTRIES:** United Kingdom, Greece,  
Sweden, France



## BIOVOICES

The project aims to tackle challenges linked to the bioeconomy by mobilising all stakeholders such as policymakers, researchers, the business community and civil society on a multi-stakeholder platform. The goal is to spark open dialogue and mutual learning, as well as co-creation, and promote the direct engagement of citizens.

**WEB:** [www.biovoices.eu](http://www.biovoices.eu)

**COORDINATOR:** Agenzia per la Promozione della Ricerca Europea, Italy

**TOTAL COST:** EUR 2 996 427

**EC CONTRIBUTION:** EUR 2 996 427

**START/END:** January 2018 to December 2020

**OTHER COUNTRIES:** Slovakia, Estonia, Portugal, Greece, Romania, Netherlands, United Kingdom, Spain, Germany



## UPCYCLINGTHEOCEANS

The project put litter to good fashion use and made high-quality clothes from plastic fished out of the Mediterranean. The idea was to raise awareness of plastic pollution and proactively address the problem. A feasibility study paved the way and now such sustainable apparel is sold in stores and online.

**WEB:** <https://ecoalf.com/upcycling-the-oceans>

**COORDINATOR:** Ecoalf SL, Spain

**TOTAL COST:** EUR 71 429

**EC CONTRIBUTION:** EUR 50 000

**START/END:** June 2015 to November 2015

**OTHER COUNTRIES:** None







# DEPLOY LOCAL BIOECONOMIES RAPIDLY ACROSS THE WHOLE OF EUROPE

*“ The EU is taking targeted action to ensure that all areas have the opportunity to fully tap into their local bioeconomy potential and reap the rewards ”*



All Europeans can – and should – benefit from having a vibrant bioeconomy nearby, no matter where they live.

Focused on that goal, the EU is taking targeted action to ensure that all areas have the opportunity to fully tap into their local bioeconomy potential and reap the rewards.

Concretely, the EU will set up a European bioeconomy policy support facility, as well as a European Bioeconomy Forum. Both seek to help EU countries develop national and regional bioeconomy strategies.

In addition, a strategic bioeconomy deployment agenda for sustainable food and farming systems, forestry and bio-based production will provide a long-term vision on pathways to sustainably expand and scale up the bioeconomy. This systemic approach will address, among others, the future-proofing of food and farming systems (terrestrial and aquatic) by addressing, for example, food waste, losses and by-products (including nutrient recycling), increasing the resilience of food systems, responding to the need for nutrition-sensitive food production, more food from the sustainable use of seas and oceans with an increased share of EU aquaculture production and market uptake.

Specific interventions under the EU's Common Agricultural Policy, as well as support from the European Maritime and Fisheries Fund, will help unlock the bioeconomy's vast potential for promoting rural and coastal area development.

EU Structural Funds will help the bioeconomy take root in Europe's regions and cities. And funding from LIFE – the EU's financial instrument supporting environmental, nature conservation and climate action projects – will go towards piloting innovative bioeconomy solutions.

In urban areas, the EU will back efforts to turn organic waste from a societal problem into a valuable resource for the production of bio-based products. The EU will also support the piloting of up to 10 European bioeconomy cities. Furthermore, the rehabilitation of brownfields and the application of circular bioeconomy processes and technology within such areas should be further developed to diversify the sustainable sourcing of biomass and create new business opportunities.

The EU will also address bioeconomy-related education and skills gaps, as well as raise public awareness through stepped-up communication campaigns.





## LIBBIO

The Andean lupin is grown in Ecuador, Peru and Bolivia. This plant is also suitable for cultivation in Europe where it can thrive on what is currently marginal land. By growing lupin on such land and transforming it into a number of products, including food applications (based on lupin oil and seed protein) and some cosmetic uses, LIBBIO – a project funded by the BBI JU under H2020 rules – provides new bio-based products for consumers and offers new opportunities for farmers at the local level.

**WEB:** <http://www.libbio.net>

**COORDINATOR:** Innovation Center Iceland, Iceland

**TOTAL COST:** EUR 4 923 750

**EC CONTRIBUTION:** EUR 4 923 750  
(EU/BBI JU contribution)

**START/END:** October 2016 to September 2020

**OTHER COUNTRIES:** NETHERlands, Germany, Spain, Portugal, Greece, Romania, Austria



## VALERIE

Although there is a lot of research on agriculture and forestry, it often does not reach farmers and foresters who want information about growing crops and managing woodlands. They need to optimise yields and use resources more efficiently while cutting fuel consumption, labour and costs. VALERIE focused on building bridges – via an online tool – between new scientific discoveries and practical realities.

**WEB:** <http://www.valerie.eu>

**COORDINATOR:** Stichting Wageningen Research, the Netherlands

**TOTAL COST:** EUR 3 821 714

**EC CONTRIBUTION:** EUR 2 989 056

**START/END:** January 2014 to December 2017

**OTHER COUNTRIES:** Finland, France, Italy, United Kingdom, Germany, Spain



## RES URBIS

The project is designing facilities to turn bio-waste generated in our cities – by homes restaurants and shops – into bio-plastic and a number of related products. Types of bio-waste being considered include not only food and kitchen waste but also sludge from the treatment of waste water, residue from gardens and parks, as well as nappies.

**WEB:** <http://www.resurbis.eu>

**COORDINATOR:** Universita Degli Studi Roma La Sapienza, Italy

**TOTAL COST:** EUR 3 377 915

**EC CONTRIBUTION:** EUR 2 996 688

**START/END:** January 2017 to December 2019

**OTHER COUNTRIES:** Denmark, Portugal, Italy, Spain, Croatia, Switzerland, United Kingdom, France



## CERES

Climate change will affect both Europe's inland and marine waters. Models will be used to estimate future productivity and consequences for the sector based on projected changes in physical conditions in European inland and marine waters, and the related physiological and ecological responses of certain species.

**WEB:** <https://ceresproject.eu/>

**COORDINATOR:** Universität Hamburg, Germany

**TOTAL COST:** EUR 5 586 851

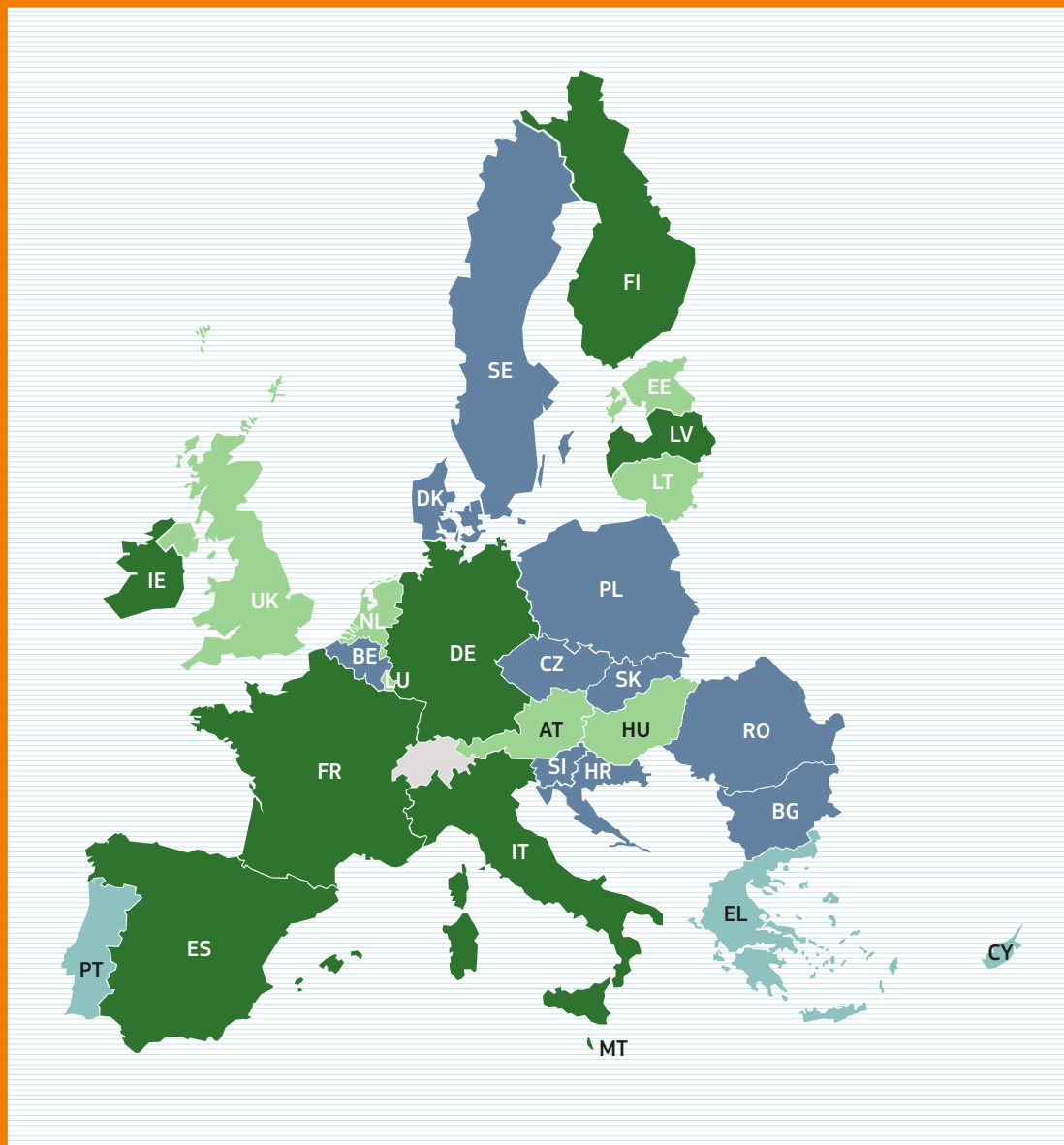
**EC CONTRIBUTION:** EUR 5 586 851

**START/END:** March 2016 to February 2020





**OTHER COUNTRIES:** United Kingdom, Italy, Denmark, Greece, Spain, France, Ireland, Sweden, Poland, Portugal, the Netherlands, Norway, Romania, Turkey

# STRATEGIES AND OTHER POLICY INITIATIVES DEDICATED TO THE BIOECONOMY IN THE EU MEMBER STATES

(status of March 2018)



## Status:

-  Dedicated Bioeconomy Strategy at national level
-  Dedicated Bioeconomy Strategy at national level under development\*
-  Other policy initiatives dedicated to the bioeconomy
-  Other related strategies at national level

\* Survey of 2018. In the meantime UK has adopted a Bioeconomy Strategy in December 2018.

# UNDERSTAND THE ECOLOGICAL BOUNDARIES OF THE BIOECONOMY

*“The bioeconomy is Europe's response to key environmental challenges facing our planet.”*

.....

**T**he bioeconomy is Europe's response to key environmental challenges facing our planet.

As such, we must keep a close eye on the world around us as we transition to a more sustainable future.

Boosting our knowledge about the bioeconomy knowledge base will come from acquiring more information on the resilience and status of specific areas including on their biodiversity, as well as land- and sea-based ecosystems. The status and management of forest ecosystems, in addition to the availability of sustainable biomass, will also yield important insight.

The European Commission is taking concrete steps in this area and will implement an EU-wide, internationally coherent monitoring system to track the progress of the bioeconomy in Europe from an economic, social and environmental point of view.

The EU will also monitor the status of degraded areas and land at risk of climate change effects such as desertification.

Actions in this context will complement existing efforts at EU, national and international levels to strengthen the resilience of ecosystems, including

by addressing knowledge gaps, enhancing observation, modelling, measurement, monitoring and reporting capabilities, and by providing guidance to bioeconomy operators.

Such steps seek to contribute to meeting the EU target of restoring at least 15 % of degraded ecosystems by 2020. They also aim to help meet the Sustainable Development Goal of achieving land degradation neutrality by 2030.

The Commission has also created the Bioeconomy Knowledge Centre for Bioeconomy (KCB) to strengthen its overall response to the opportunities and challenges linked to the bioeconomy. The KCB aims to become a central knowledge hub supporting the bioeconomy-related work of the European Commission services and other stakeholders.



**WEB:** <https://biobs.jrc.ec.europa.eu/>



## SMARTBEES

Global beekeeping is facing an unprecedented crisis. The SMARTBEES project aims to protect our natural honeybee heritage by characterising the genetic background of honeybee resistance mechanisms and developing breeding strategies to increase the frequency of such valuable traits in local populations.

**WEB:** <http://www.smartbees-fp7.eu>

**COORDINATOR:** Länderinstitut für Bienenkunde Hohen Neuendorf EV, Germany

**TOTAL COST:** EUR 7 762 260

**EC CONTRIBUTION:** EUR 5 998 866

**START/END:** November 2014 to October 2018

**OTHER COUNTRIES:** France, Denmark, Greece, Germany, Spain, United Kingdom, Romania, Poland, Norway, Sweden, Italy



## ECO-FCE

The project developed strategies and tools to improve feed-use efficiency in the pig and broiler chicken industries – both key contributors to the European economy – and make them more ecologically friendly. One outcome is a searchable web tool that enables relevant stakeholders to understand, manage and measure the impact of different factors on feed use efficiency and the environment.

**WEB:** <http://www.eco-fce.eu>

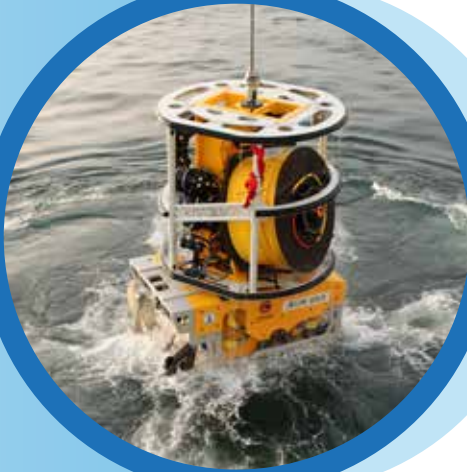
**COORDINATOR:** Queen's University of Belfast, United Kingdom

**TOTAL COST:** EUR 7 852 656

**EC CONTRIBUTION:** EUR 5 999 814

**START/END:** January 2013 to January 2017

**OTHER COUNTRIES:** Ireland, Spain, Austria, Poland, Switzerland, Denmark, Germany



## SPONGES

Deep-sea sponges perform an important cleaning function – by filtering water through their pores, they recycle waste and produce valuable nutrients for other marine organisms. To better protect our oceans, the SPONGES project seeks to fill knowledge gaps on how to preserve and sustainably use these fragile yet functional organisms.

**WEB:** <http://www.deepseasponges.org>

**COORDINATOR:** Universitetet i Bergen, Norway

**TOTAL COST:** EUR 10 225 865

**EC CONTRIBUTION:** EUR 9 994 302

**START/END:** March 2016 to February 2020

**OTHER COUNTRIES:** United States, Spain, Sweden, United Kingdom, Netherlands, Portugal, Canada, Germany, Italy





# 14 key actions of the Bioeconomy Strategy Action Plan

1

## STRENGTHEN AND SCALE-UP THE BIO-BASED SECTORS, UNLOCK INVESTMENTS AND MARKETS



Mobilise stakeholders in **development** and **deployment** of sustainable bio-based solutions



Launch the **EUR 100 million** Circular Bioeconomy Thematic Investment Platform



Analyse enablers and bottlenecks for the deployment of bio-based innovations



Promote and develop standards, labels and market uptake of bio-based products



Facilitate the development of new sustainable biorefineries



Develop substitutes to fossil based materials that are bio-based, recyclable and marine biodegradable

2

## DEPLOY LOCAL BIOECONOMIES RAPIDLY ACROSS EUROPE



Launch a **Strategic Deployment Agenda** for sustainable food and farming systems, forestry and bio-based products



Launch pilot actions for the development of bioeconomies in rural, coastal and urban areas



Support regions and Member States to develop Bioeconomy Strategies



Promote education, training and skills across the bioeconomy

3

## UNDERSTAND THE ECOLOGICAL BOUNDARIES OF THE BIOECONOMY



Enhance knowledge on biodiversity and ecosystems



Monitor progress towards a sustainable bioeconomy



Promote good practices to operate the bioeconomy within safe ecological limits



Enhance the benefits of biodiversity in primary production



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The EU Open Data Portal (<http://data.europa.eu/euodp/en>) provides access to datasets from the EU. Data can be downloaded and reused for free, both for commercial and non-commercial purposes.

This updated Bioeconomy Strategy proposes actions to scale up and deploy the bioeconomy locally, capitalising on and going beyond the previous successful research and innovation investments in order to create growth and job opportunities at the local level, to reinforce the bio-based sector and contribute to the modernisation of Europe's industry, to protect the environment and enhance ecosystems' functions and biodiversity. The Strategy focuses on a system approach in order to increase the overall sustainability and circularity of the bioeconomy. It offers a complementary and integrative framework that cuts across multiple sectors and policies concerned with the bioeconomy, interlinks them, facilitates synergies, addresses trade-offs and helps deliver various policy objectives, with greater coherence.

*Research and Innovation Policy*

