



01 THE CHALLENGE

Foresight

Foresight is the disciplined exploration of alternative futures. Policy makers use foresight techniques and conduct studies to explore different scenarios in a structured way to confront complex challenges and help create a better future.

Foresight helps to:

- Evaluate current policy priorities and potential new policy directions.
- See how the impact of possible policy decisions may combine with other developments.
- Inform, support and link policy-making in and across a range of sectors.
- Identify future directions, emerging technologies, new societal demands and challenges.
- Anticipate future developments, disruptive events, risks and opportunities.



Market studies and market roadmaps

Market studies and market roadmaps are organised efforts to gather information about target markets or customers. A market analysis studies the attractiveness and the dynamics of a special market within a special industry. A market roadmap is a market study projecting future market volumes and potentials.



02 HOW COORDINATION AND SUPPORT ACTIONS (CSAs) ADDRESS THE CHALLENGE

Foresight studies

SAT-BBE aimed to describe, monitor and model the bioeconomy by developing a system analyses tool to assess short- and long-term challenges for an effective and sustainable EU bioeconomy strategy. SAT-BBE demonstrated how existing data and quantitative models and their future extensions and improvements, as well as qualitative analyses (e.g. foresight analyses), can be used to describe the bioeconomy development, its interactions with the rest of the economy, and its impacts to environmental resources and their quality.

BISO produced a methodological framework, access to data sets and analysis of strategic sectors that enhanced the available knowledge and information about the state and potential of the EU bioeconomy¹. BISO established first EC platform dealing with Bioeconomy in horizontal way; setting the first bioeconomy-specific set of socio-economic indicators, enhancing the dialogue between stakeholders.

BioMonitor addresses the information gap in bioeconomy research by restructuring its existing data and modelling framework. The ultimate project goal is to get a clearer picture of how bioeconomy affects our lives. The BioMonitor consortium incorporates the key players of SAT-BBE and BISO and seeks to bring actionable knowledge and insights from both projects further together. In October 2019 it issued a conceptual analysis framework that the project will be using to quantify and analyse the EU bioeconomy.



¹ The BISO project (with had just one beneficiary i.e. the Joint Research Centre) no longer maintains a dedicated website. Project results are integrated in the data collection of JRC's Knowledge Centre on Bioeconomy.



Market research and modelling

BIO-TIC developed market projections for the main product segments of the industrial biotechnology sector, including an overview of the current business environment in the EU, presented a market vision for promising product segments and identified actions that are needed to reach this market vision. Market projections for the main industrial biotechnology product segments in 2030 were produced by mathematical modelling.

Five product groups were identified as being particularly promising based on their future market potential, the potential for that product to introduce cross cutting technology ideas and to respond to societal and customer needs: 1) Advanced biofuels (advanced bioethanol and bio-based jet fuels); 2) Platform biochemical building blocks; 3) Bio-based plastics; 4) Biosurfactants derived from fermentation; and 5) Novel products from conversion of fossil carbon dioxide by industrial biotechnology routes.

BISO developed the study of the EU bio-based industry, which identified some 133 relevant companies and the analysis of product types, production trends, sales, investment, R&D, employment and feedstock use. Additionally, the main drivers and barriers for the development of the bio-based industry were identified.

BIOPEN aims to support collaboration and knowledge sharing in the bio-based industry and to stimulate the set-up of co-innovation partnerships for the development of new products and markets.

BIOPEN delivered **prospective studies** on five bio-based value chains:

- 1) Novel bio-polymers and oligomers for plastics (PEF, PA12), rubber, adhesives, additives, surfactants and peptides for feed applications;
- 2) Environmentally friendly coatings and packaging materials for food, beverages and flowers to obtain prolonged preservation and consumer protection;
- 3) Products and applications based on lignocellulosic feedstock, mainly wood: technical timber products with enhanced construction properties and base chemicals and building blocks for the chemical industry;
- 4) Drop-in and functionalized bio-aromatics: greening the conventional aromatics market and offering a portfolio of new applications;
- 5) Micro and macro algae for the production of specialty chemicals and high end value added products for dietary supplements, cosmetics and pharmaceutical applications.



Beyond Coordination and Support Actions (CSAs)

An analysis of CSA projects and outcomes provides only a limited cover of the most relevant activities in the "Foresight, market studies and market roadmaps" domain. For the identification of gaps and recommendations the most recent and relevant market studies and market roadmaps initiated by European public and private actors and were also considered:

- The EC promoted various studies to support European research and innovation (R&I) policy in the area of bio-based products and services. The BIOSPRI consortium produced reports on 1) [LCAs and environmental footprint of bio-based products](#), 2) [Commercial and financial success stories of bio-based products](#), and 3) [Top 20 innovative bio-based products](#). The EC recently commissioned additional studies on (i) carbon economy, (ii) life and biological sciences and technologies, and (iii) biorefinery pathways;
- The Knowledge Centre for Bioeconomy, operated by the EC Joint Research Centre, identifies and filters relevant data and information about bioeconomy, including statistics, policy mapping, country profiles, data visualization and analytical reports. The KCB, in collaboration with nova-Institut, elaborated the "[dataset on jobs and wealth in the EU bioeconomy](#)", and in collaboration with BTG Biomass Technology Group, the report "[Insights into the European market for bio-based chemicals](#)";
- The BBI Joint Undertaking, in collaboration with nova-Institut, elaborated the "[Study on current situation and trends of the bio-based economy in Europe](#)", a meta review of the existing research on different (sub-)topics relevant to the bio-based economy;
- The Bio-based Industries Consortium (BIC), private partner in BBI JU, in collaboration with nova-Institut elaborated studies showing macroeconomic effects generated by the bioeconomy, for example [European bioeconomy in figures 2008-2015](#);
- BIC, together with BIC members, the BBI JU advisory bodies, and 17 further stakeholders, initiatives and committees, jointly developed the vision document "[The circular-bio society in 2050](#)";
- Studies promoted by individual companies in the bio-based industry, their trade associations and specialist market research agencies. For example, the bioeconomy working group of CEFIC (the European Chemical Industry Council) has set on further determining bio-based volumes in chemicals production.

¹ Studies (in 3 lots) on Support to R&I Policy in the Area of Bio-Based Products and Services. Tender info: <https://etendering.ted.europa.eu/cft/cft-display.html?cftId=4574>



03 MAIN OUTCOMES FROM THE COORDINATION AND SUPPORT ACTIONS (CSAs)

- Foresight studies and anticipating scenarios to guide political and industrial agendas.
- Macroeconomic models and methodologies to monitor the development of the bioeconomy.
- Market volumes, data sets and projections for selected product groups and bio-based value chains.
- Success stories of bio-based products.

04 GAPS TO BE ADDRESSED

- Due to the complexity and diversity of the bioeconomy domains the available data are often qualitatively insufficient, unclear, incomplete, unreliable, and not up-to-date.
- Need to continuously refine existing and develop new methodologies and parameters to monitor and document progress and developments in the bioeconomy.
- Relevant data on the bioeconomy are missing. Traditional statistics are often insufficient to monitor bio-based products and sectors that use both bio-based and





fossil-based raw materials. Ad hoc surveys and other sources of information gathering need to be considered (e.g. expert estimations of bio-based shares, private sector data, web, crowdsourcing) to collect such data, enabling the estimation of bio-based shares in hybrid sectors.

- Lack of willingness/readiness of stakeholders including (a) industries and other economic actors along the value chain (b) public organisations to get involved, to provide (market) data and/or to validate study findings.
- Poor availability/affordability of market studies (many are private and/or costly).

05 RECOMMENDATIONS

- **Identify** important (data, indicators and methodology) **gaps**, and **promote initiatives** filling these gaps;
- Make the already collected data (for/by the JRC's Knowledge Centre for Bioeconomy and others) **easier accessible and searchable**;
- Provide **continuous monitoring** of the market, trends, evolutions and projections for bio-based sectors and value chains;
- Facilitate stakeholders' **knowledge sharing and debate** to better elaborate foresight scenarios including their perspectives;
- Make market information and knowledge **easier accessible to SMEs and start-ups**.

06 COORDINATION AND SUPPORT ACTIONS (CSAs) IN A NUTSHELL

Acronym/logo	Programme	Duration	Website
	BBI JU	Oct 2012 - Mar 2015	www3.lei.wur.nl/satbbe/default.aspx
BISO	FP7	Mar 2013 - Feb 2016	biobs.jrc.ec.europa.eu/
 Monitoring the Bioeconomy	H2020	Jun 2018 - May 2022	biomonitor.eu
	H2020	Aug 2012 - Jul 2015	industrialbiotech-europe.eu
	BBI JU	May 2017 - Oct 2019	www.biopen-project.eu/



07 RESOURCES

Framework for measuring the size and development of the bioeconomy (September 2019) **BioMonitor project**
http://biomonitor.eu/wp-content/uploads/2019/10/BioMonitor_Deliverable_1.1_Update_1.pdf

Overcoming hurdles for innovation in industrial biotechnology. Market Roadmap. **BIO-TIC project.**
<http://www.industrialbiotech-europe.eu/wp-content/uploads/2015/10/Market-Roadmap-Final-1-OCT-2015.pdf>

The EU bio-based industry: Results from a survey (2016) **BISO project** (JRC - Joint Research Centre)
<https://publications.jrc.ec.europa.eu/repository/bitstream/JRC100357/jrc100357.pdf>

Report on the five prospective studies on new bio-based products and markets. (April 2018) **BIOPEN project**
<https://www.ec.europa.eu/research/participants/documents/downloadPublic?documentIds=080166e5c301d449&appId=PPGMS>

Dataset on jobs and wealth in the EU bioeconomy (April 2018). - **JRC Joint Research Centre – Bioeconomics and nova-Institut.**
<http://data.europa.eu/euodp/en/data/dataset/7d7d5481-2d02-4b36-8e79-697b04fa4278>

Insights into the European market for bio-based chemicals. (2019). **JRC (Joint Research Centre) and BTG Biomass Technology Group.**
<https://publications.jrc.ec.europa.eu/repository/handle/JRC112989>

European Bioeconomy in Figures 2008-2015 (April 2018) **Bio-based industries Consortium (BIC) and nova-Institut.**
https://biconsortium.eu/sites/biconsortium.eu/files/documents/European_Bioeconomy_in_Figures_2008-2015_06042018.pdf

Current situation and trends of the bio-based industries in Europe with a focus on bio-based materials. (June 2017) **nova-Institut and Bio-based Industries Joint Undertaking (BBIJU).**
<https://www.bbi-europe.eu/sites/default/files/media/bbiju-pilotstudy.pdf>

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This factsheet has been developed by the LIFT project with the information collected from desk research and interviews to the Coordination and Support Actions or similar projects funded by European programmes such as FP7, H2020, BBIJU and Interreg.

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This project has received funding from the Bio Based Industries Joint Undertaking under the European Union's Horizon 2020 research and innovation programme under grant agreement No 837858