

BIO-BASED INDUSTRIES JOINT UNDERTAKING (BBI JU)

2016

ANNUAL WORK PLAN and BUDGET

19 April 2016



In accordance with article 15 of the Statutes of the BBI JU annexed to Council Regulation (EU) No 560/2014 and with Article 31 of the Financial Rules of the BBI JU.

The annual work plan will be made publicly available after its adoption by the Governing Board.

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1. INTRODUCTION

1.1. About this document

This document establishes the 2016 Annual Work Plan (2016 AWP) outlining the scope and details of research and innovation activities prioritised for the Call for Proposals in 2016, the governance and activities and the corresponding expenditure estimated for 2016 of the Bio-Based Industries Joint Undertaking (BBI JU).

The document consists of 4 parts:

1. An introduction, including a description of BBI JU's background, objectives and mission
2. A description of the scope and details of research and innovation activities of the Call 2016, describing BBI JU's (support to) operations, call and project management rules, governance, and internal control framework.
3. The budget of 2016
4. A list of acronyms

1.2. BBI JU Background

The Bio-Based Industries Joint Undertaking (BBI JU) is a Public-Private Partnership between the European Union and the Bio-based Industries Consortium (BIC). Operating under Horizon 2020, it is driven by the Strategic Innovation and Research Agenda (SIRA¹).

The European Union is represented by the European Commission (EC). BIC is a non-profit organisation that was created to represent the industry group that supports the BBI JU. Its members cover the entire bio-based value chain and consist of large industries, small and medium-sized enterprises (SMEs), regional clusters, European trade associations, and European Technology Platforms. The aim of BIC is to ensure and promote the technological and economic development of the bio-based industries in Europe. Any interested stakeholders along the bio-based value chain may apply for membership. It applies general principles of openness and transparency regarding membership, ensuring a wide industrial involvement.

BIC developed the SIRA based on extensive consultation with public and private stakeholders. The SIRA describes the main technological and innovation challenges that need to be overcome in order to develop sustainable and competitive bio-based industries in Europe and identifies research, demonstration and deployment activities to be carried out by a Joint Technology Initiative on Bio-based Industries, the BBI JU.

The Commission Communication of 13 February 2012 entitled "Innovating for Sustainable Growth: A Bioeconomy for Europe", and in particular its Action Plan, calls for a public-private partnership to support the establishment of sustainable and competitive bio-based industries and value chains in Europe. In view of the move towards a post-petroleum society, the Communication aims to integrate better biomass producing and processing

¹ http://biconsortium.eu/sites/biconsortium.eu/files/downloads/BIC_BBI_SIRA_web.pdf

sectors in order to reconcile food security and natural resource scarcity and environmental objectives with the use of biomass for industrial and energy purposes.

The Commission Communication of 10 October 2012 entitled "A Stronger European Industry for Growth and Economic Recovery" confirms the strategic importance of bio-based industries for the future competitiveness of Europe, as identified in the Commission Communication of 21 December 2007 entitled "A lead market initiative for Europe", and stresses the need for the BBI Initiative.

On 6 May 2014, the Council adopted Regulation (EU) No 560/2014 establishing the Bio-based Industries Joint Undertaking (BBI Regulation). According to Article 19 of the Regulation, the Commission was responsible for the establishment and initial operation of the BBI JU until it reached the operational capacity to implement its own budget on 26 October 2015.

1.3. BBI JU Objectives

The objective of the BBI JU is to implement a programme of research and innovation activities in Europe that will assess the availability of renewable biological resources that can be used for the production of bio-based materials, and on that basis support the establishment of sustainable bio-based value chains. Those activities should be carried out through collaboration between stakeholders along the entire bio-based value chains, including primary production and processing industries, consumer brands, SMEs, research and technology centres and universities.

The objective of the BBI JU should be achieved by means of supporting research and innovation activities by using resources from the public and private sectors. To this end, the BBI JU should organise calls for proposals for supporting research, demonstration and deployment activities.

To achieve maximum impact, the BBI JU should develop close synergies with other Union programmes in areas such as education, environment, competitiveness and SMEs, and with the European Structural and Investment Fund (ESIF), which can specifically help to strengthen national and regional research and innovation capabilities in the context of smart specialisation strategies.

The objectives of the BBI JU, as mentioned in article 2 of the Council Regulation are:

(a) to contribute to the implementation of Regulation (EU) No 1291/2013 and in particular Part III of Decision 2013/743/EU.

(b) to contribute to a more resource-efficient and sustainable low-carbon economy and to increasing economic growth and employment, in particular in rural areas, by developing sustainable and competitive bio-based industries in Europe, based on advanced biorefineries that source their biomass sustainably, and in particular to:

- Demonstrate technologies that enable new chemical building blocks, new materials, and new consumer products from European biomass, which replace the need for fossil-based inputs;
- Develop business models that integrate economic actors along the value chain from supply of biomass to biorefinery plants to consumers of bio-based materials,

chemicals and fuels, including through creating new cross-sector interconnections and supporting cross-industry clusters; and

- Set-up flagship biorefinery plants that deploy the technologies and business models for bio-based materials, chemicals and fuels and demonstrate cost and performance improvements to levels that are competitive with fossil-based alternatives.

2. ANNUAL WORK PLAN YEAR 2016

2.1. Executive Summary

The 2016 AWP is the third AWP in a total of seven between 2014 and 2020. The critical path towards 2020 is the acceleration of the development of (new) sustainable value chains from biomass feedstock supply via efficient processing, to acceptance and application of bio-based products in the end-markets.

The AWP 2016 will refocus on the need to better integrate biomass feedstock suppliers on the front end of the chain to create a demand for biomass feedstock from biorefining processes. Similarly, the AWP will stimulate the formation of partnerships with end market actors to create a 'market pull' for bio-based products for identified applications.

Thus, the AWP 2016 will start to move away from a strict biomass feedstock 'push' based on the traditional value chains, towards a demand for biomass to enable processing to respond adequately to a 'pull' from the end markets.

The AWP 2016 retains the four strategic orientations from 2015, but now links them in a matrix with three 'vertical' orientations and an 'horizontal' one, cutting across the three vertical ones. The strategic orientation 'Cross-sectorial integration along and across value chains' is the *base mode of operation* for the bio-based industry in Europe, cross-cutting the 'vertical' orientations':

1. 'Sufficient and sustainable biomass feedstock supply' at affordable prices, incorporating the feedstock suppliers as partners in the value chains.
2. 'Development of biorefinery technologies' and processes to increase the competitive position of the bio-based industries in Europe.
3. 'Higher market demand and customer awareness' through the development of innovative products and applications in partnership with actors in the end consumer markets and setting the framework for successful market uptake.

To promote the strategic orientation 'Cross-sectorial integration along and across value chains' as the *base mode of operation* in the bio-based industry in Europe, the AWP 2016 will number its topics without a direct link to a specific (existing) value chain mentioned in



the Strategic Innovation and Research Agenda (SIRA). It is expected that this will entice actors in different sectors into seeking partnership for preparing project proposals.

2.2. Operations

2.2.1. Objectives and indicators of AWP2016

The expected result(s) and impact as a result of successful 2016 actions are indicated in the following table

Expected result(s) and impact as a result of successful 2016 actions	TARGET 2016	Addressed in AWP 2016		
		CSA	RIA	IA
A significant increase in private research & innovation investment with:				
– Five new building blocks for the chemical industry by 2020 (KPI 4)	8			D3
– Fifty new biobased materials by 2020 (KPI 5)	16		R1, R2, R3, R4, R5, R6, R7, R8, R9, R10, R11, R12	D5, D6, D7, F2
– Five flagship biorefinery plants by 2020 (KPI 7)	3			F1, F2
– Thirty new consumer products by 2020 (KPI 6)	3		R2, R3, R4, R5, R6, R7, R8, R9, R10, R11, R12	D5, D6, D7
A shorter time to market with:				
– Ten new bio-based value chains by 2020 (KPI 2)	8		R1, R4, R5, R6, R8, R9	D1, D2, D3, D4, D6, D8, F1, F2
– A broad participation of SMEs	20% Target H2020 EC contribution to SME			
<i>The methodology for monitoring the above expected results and impacts will be based on data collected from the continuous and periodic reporting, as well as on the close follow-up of the projects by the respective Project Officers. Each Project Officer will report annually during the preparation of the Annual Activity Report.</i>				
Indicators of results and impact				
– Monitoring of public (EC and other) and private funding;	Public funding: EUR 187.9 million. Private funding: incl. a minimum of EUR 110 million in-kind contributions in projects, and 0.75 million in cash.			
– Follow-up of additionality; (these are indicators for the overall impact of the BBI JU by 2020)*				



– New skilled jobs, of which a target share is in rural and currently underdeveloped areas*				
– Grow incomes of primary producers (farmers, forest owners) associated to BBI actions including additional margins with existing and currently underutilized residues*				
– Selection of projects and allocation of funding;		Time to grant and Time to pay in line with H2020		
– Technical monitoring against well-defined specific programme milestones; see expected results on KPIs above. In addition:				
<ul style="list-style-type: none"> 36 new cross-sector interconnections in bio-based economy clusters in 2020 (KPI 1). Monitoring methodology. Same as above indicated. 	11	S1	R1, R5, R6, R8	D1, D4, D6, D8, F1, F2
<ul style="list-style-type: none"> More than 200 cooperation projects through cross-industry clusters in 2020 (KPI 3). Monitoring methodology. Analysis of the call results. 	14		R1, R6, R8	D1, D2, D3, D4, D6, F1, F2
– Adherence to time schedule;		Budget committed; call launched		
– Quantified monitoring of market penetration in target sectors*				
– Bio-based chemicals and materials produced by BBI actions (see KPIs 4 and 5)				
– Advanced biofuels produced by BBI actions (see KPI 6)				
– Level of SME participation and of participation from the newer Member States;		20% BBI JU contribution to SMEs		
– Follow-up on sustainability; (these are indicators for the overall impact of the BBI JU by 2020)*				
<ul style="list-style-type: none"> The new bio-based products resulting from BBI JU have lower GHG emissions versus fossil alternatives (comparison based on LCAs). Increase sustainable biomass (including bio-waste) supply for bio-based industries (level of sustainability based on LCA/environmental impact assessment) The new bio-based products resulting from BBI JU have superior properties and characteristics than fossil based ones (e.g. biodegradability, recyclability, others etc.) 				

KPI numbers indicated above refer to Table 7 ‘BBI Key Objectives’ in the SIRA (page 28). KPIs labelled with an asterisk (*) are under development. In order to define the final set of KPIs, including the methodologies to estimate the targets and their monitoring, a working group has been set up in 2015 consisting of the Commission, BIC and BBI JU, with BBI JU having the lead. The short-term activities of the roadmap include: an event organised for the coordinators of the running projects (Call 2014) on “Impact and Deployment” (27 November 2015) and a workshop with external experts (Q1 2016). It is expected to finalise the KPI and start the consultations with the SC and the SRG in Q2 2016 with the objective to include revised KPIs in the AWP 2017.

2.2.2. Risk Management BBI JU Annual Work Plan 2016

The table below indicates the main risks associated with the programme activities and the financial administration of the JU, as well as the corresponding risk mitigation actions.



Process concerned	Risk Description	Mitigation action
Programme management	Conflicts of priorities may happen within industrial partners, when identifying the objectives and priorities for AWP2016, or they may change their strategy.	Early warning capability through regular meetings and alert at Governing Board level. Propose re-orientations when needed and possible.
Programme management	Public and private partners may not agree on BBI priorities for AWP2016	Early warning capability through regular meetings. Alert at Governing Board level. Close collaboration between EC and BIC at every step of the Work Plan preparation.
Call/Programme management	Taking into account the specificities of the BBI-JU calls and the expected higher number of proposals, there is a risk that an insufficient number of suitable evaluators is available in the H2020 experts database.	Proactive and timely, external communication (e.g. BBI and BIC websites, NCPs...) to promote the registration of experts with appropriate expertise in the H2020 database
Call/Programme management	Low response in RIA actions	Work Plan includes topics which are of interest to wider groups of stakeholders.
Call/Programme management	Low participation of industrial partners in RIA actions	Better communication and partnering events.Reinforcement of the impact part of the topics.
Programme management/ Communication activities	Low participation rate in the 2016 call	Definition of topics which are of interest to wider groups of stakeholders. Proactive and timely, external communication. Qualitative assessment of the participation rate.
Call/Programme management	Grant agreement is delayed or not signed due to disputes within the consortium	Availability and promotion of existing guidelines material on H2020 consortium agreements and use of IPR Help desk.
Communication activities	Lack of adequate dissemination of result may result in vague information to the end-user/interested party and could compromise the JU impact.	Standardise the dissemination plans. Monitor the dissemination actions. BBI JU promotes the project results.



Administration	Recruitment of all the Staff still undergoing, meaning that the BBI JU is not fully staff equipped at the time of the call publication.	Finalisation of key recruitment in Q1 of 2016, completion of all the recruitment by Q3 2016.
Financial administration (Running costs)	Actual total running costs exceed the total budgeted running costs	Governing Board to amend the budget (increasing the total running costs budget); extra funding to be asked from industry.
Financial administration (Running and Operational costs)	Possible loss of previous years' (2014 or 2015) unused operational commitment or payment appropriations	BBI JU to ensure that: 1) (For committed appropriations only) If feasible, the concerned unused appropriations are decoupled on due time from their original purpose (e.g. call 2014) so as to free them up AND 2) The free/freed unused appropriations are re-entered in a subsequent year's BBI JU Budget (max: within 3 years), such as for instance the BBI JU 2016 budget, using the n+3 rule

2.2.3. Scientific priorities and challenges.

The scientific priorities and impacts for the year 2016 have been identified through a wide consultation.

The consultation targeted industry members of the Bio-based Industries Consortium (BIC), BIC's associated members including universities, research and technical organisations, European Technology Platforms and European industry associations, and BBI JU's advisory bodies being the States Representatives Group and the Scientific Committee.

Focus and impacts for 2016 to address the strategic orientations

1. Sufficient and sustainable biomass feedstock supply at affordable price incorporating the feedstock suppliers as partners in the value chains

- Combat and/or adapt to the impacts of climate change on availability and quality of forest-based feedstock for the bio-based industries in EU.

Expected impacts include: increased forest productivity per hectare; rural development; increased job security; increased carbon storage; improved forest stability; stabilisation and



reduction of prices for timber raw material. Hence increased competitiveness of the European forestry sector.

Contribution to KPI 2². Contribution to BBI Direct Deliverable, according to the Strategic Innovation and Research Agenda (SIRA), '10% higher mobilisation of forest biomass by innovative technologies'.

- Improve competitiveness of farmers and forest owners by introducing new crops or adapting existing ones and/or tree varieties to less favourable growing conditions.

Expected impacts include: Increased cultivated ha of current marginal lands; increased agro-forest productivity per hectare; safety, quality and purity of the products in line with EU legislation for short-term market access; new green jobs in rural areas; improved competitiveness of local value chains.

Contribution to KPI 2. Contribution to BBI Direct Deliverables, according to the SIRA, '5 to 10 new/innovative species varieties'; '10% higher biomass yield by combining innovative cultivation methods with the regional most suitable crop rotation'.

- Overcome current hurdles for efficient extraction of feedstock at competitive price and at acceptable quality from bio-based industrial by-products and side streams, MSW and wastewater.

Expected impacts include: Reduced landfill volume; safety, quality and purity of the products in line with EU legislation for short-term market access; reduced CO₂-emissions from landfilling and incinerating.

Contribution to KPIs 1, 2 and 3.

- Set up new cooperation and business models to incorporate biomass producers including local farming communities, forest owners and operators, as partners in the whole value chain and other relevant stakeholders such as consumers, waste management operators, state and local administrations.

Expected impacts include: new cooperation projects involving farmers, industrial stakeholders and end-users; new green jobs in rural areas.

Contribution to KPIs 1 and 3.

² Key Performance Indicators (KPI) as per the SIRA



- Develop new and improve existing biomass supply chains through optimised transport and logistics and new forms of solid cross-sectorial cooperation at local and all levels.

Expected impacts include: improved competitiveness of local value chains, increased flexibility, efficiency and sustainability of supply from diverse biomass feedstocks.

Contribution to KPIs 1 and 3.

2. Development of biorefinery technologies and efficient processes to increase the competitive position of the bio-based industries in Europe

- Develop and implement technologies to enable the processing of a variety of biomass feedstock while applying the 'cascading use principle' where possible for the making of specific products or materials.

Expected impacts include: Year round operation of biorefineries leading to increased production capacity; reduced time-to-market of scalable processes to meet market demand for identified products; increased competitive position of the European bio-based industry.

Contribution to KPIs 5 and 6.

- Optimise production routes for 2nd generation bio-based chemicals and intermediates in order to effectively replace 1st generation sugars.

Expected impacts include: Increased production yield of biochemicals; reduced value chain energy consumption and achieving substantial CO₂-savings.

Contribution to KPIs 5 and 6.

Contribution to BBI Direct Deliverable, according to the SIRA, '10 functionalised chemicals and materials developed, with demonstration of their economic feasibility, lower environmental footprint and societal benefits'.

- Optimise bioprocesses, including bio-catalysis operations, by improving yields and cost-competitiveness as compared to state-of-the-art.

Expected impacts include: Reduced cost and CO₂-emissions as compared to first generation processes. Opening up possible new exploitation routes for organic side-streams.

Contribution to KPIs 5 and 6.

3. 'Higher market demand and customer awareness' through the development of innovative products and applications in partnership with actors in the end consumer markets, and setting the framework for successful market uptake.



- Develop, test and demonstrate bio-based products with new functionalities to meet evolving demand in end consumer products in the fields of food (smart) packaging, health and medical, (medicine delivery systems and equipment), feed/protein ingredients, food additives, construction, technical textiles and automotive while complying with sustainability requirements.

Expected impacts include: Cost reduction compared to on-market competing materials; opening new markets for new applications of bio-based materials.

Contribution to KPIs 2, 5 and 6.

Contribution to BBI Direct Deliverables, according to the SIRA, '10 functionalised chemicals and materials developed, with demonstration of their economic feasibility, lower environmental footprint and societal benefits' and '5 new biodegradable, compostable or recyclable bio based products and materials for short life application'.

- Produce sustainable and cost-competitive building block for chemicals and materials as a stepping stone to integrated biorefineries.

Expected impacts include: New biorefineries in rural areas; contribution to rural development; new green jobs in rural areas; reduced cost and environmental footprint; reduced waste generation by exploitation of side- and waste-streams.

Contribution to KPIs 4, 5 and 6.

- Develop bio-polymers and -plastics with advanced or new functionalities, meeting functional and market demand of the subject industrial sector.

Expected impacts include: Reduced environmental impact and CO₂-footprint when compared to traditional processes (either fossil-based and/or produced from 1st generation feedstock);

Contribution to BBI Direct Deliverables, according to the SIRA, 'bio-based polymers that have a 2-3 times higher value than current products from the same raw materials'; 'demonstration of at least 2 bio-based polymers that stand the competition with their fossil-based counterparts in terms of cost-competitiveness, sustainability and performance'.

Contribution to KPIs 5 and 6.

- Substitute hazardous or toxic fossil-based chemical compounds with safe bio-based alternatives.

Expected impacts include: Created higher added-value bio-based compounds that protect human health and the environment; substitution of hazardous or toxic substances in mass consumer products.



Contribution to KPIs 5 and 6.

Contribution to BBI Direct Deliverable, according to the SIRA, '10 functionalised chemicals and materials developed, with demonstration of their economic feasibility, lower environmental footprint and societal benefits'.

In addition to securing market demand by developing innovative bio-based products responding to societal needs, the AWP 2016 will include effective coordination and support actions (CSAs) to assist in setting the framework for a successful uptake of innovations and providing the industries with a favourable and predictable operating environment. These activities will complement the CSAs included in the AWP 2015 dedicated to boost the use of standards, address regulatory hurdles that hinder investments in bio-based industries and enhance the awareness of the broad public of bio-based products.

2.2.4. Implementation

As demonstrated by the outcome of the BBI 2014 call, with 25% of the participants in the granted projects being SME, the participation of SMEs is essential in developing specific services/technologies and capturing their potential to help further develop the bioeconomy. SMEs are therefore an integral element in the call development, as well as in the resultant successful actions in the implementation phase.

Other important aspects for the implementation of this AWP are (i) widening the participation of less experienced entities in less active Member States or regions and (ii) foster synergies between BBI JU actions and regional spending activities under the European Structural and Investment Funds (ESIF), as well as catering for the opportunities given by existing public financial instruments like the European Investment Bank (EIB) to address the funding gaps in the bio-based product economy and to boost private investment.

2.2.5. Follow-up of the 2015 calls for proposals

Call 2015.1 (Flagship Call) was closed on 15 September 2015. A total of 9 eligible proposals were received. The 9 proposals were evaluated by independent experts, first remotely from 25 September to 15 October 2015 and then centrally from 19 to 23 October 2015. A decision by the Governing Board on the list of projects to be funded and reserve lists was adopted on 3 December 2015.

Activities for the year 2016



Finalisation of the 2015-1 call management process (*)	
Finalisation of evaluations (information on outcome of the evaluation)	Q4 – 2015 / Q1 2016
Preparation and signature of the grant agreements for the selected proposals	Q1/Q2 - 2016
Pre-financing payments	Q2
Follow-up implementation of projects	Q2 /Q3

(*) maximum 8 months from the final final date for submission of completed proposals (15/09/2015), according to Horizon 2020 rules

Call 2015.2 (RIA-DEMO-CSA) was closed on 3 December 2015. A decision by the Governing Board on the list of projects to be funded and reserve lists is expected to be adopted by April 2016.

Finalisation of the 2015-2 call management process (*)	
Finalisation of evaluations (information on outcome of the evaluation)	Q1/Q2 - 2016
Preparation and signature of the grant agreements for the selected proposals	Q3/Q4 - 2016
Pre-financing payments	Q3/Q4 - 2016
Follow-up implementation of projects	Q3/Q4 - 2016

(*) maximum 8 months from the final date for submission of completed proposals (03/12/2015), according to Horizon 2020 rules



2.2.6. The 2016 Call for proposals

RESEARCH AND INNOVATION ACTIONS

BBI 2016.R1 - Valorisation of the organic content of wastewater as feedstock, contributing to the renewable circular economy

Specific challenge: Wastewater of agricultural, industrial as well as municipal origin contains organic matter, and/or nutrients that can lead to eutrophication if discharged to aquatic systems.

On the other hand, these types of sludge also contain potentially valuable components (chemicals, sugars, oils, bioactive compounds, proteins, etc.) for bio-based industries that are currently not exploited. Using wastewater as a source of bio-based feedstock contributes to unlocking alternative biomass feedstock sources and helps to create new value chains for a strong bioeconomy. Moreover, valorising wastewater streams into bio-based products contributes to realising the EU circular economy through agricultural and industrial symbiosis, i.e. collaboration between producers to use each other's by-products.

The challenge is to develop technologies for the recovery and conversion of the bio-based components in wastewater from industrial activities (chemical, pulp and paper, agro-food, etc.) or from municipal sewage to bio-based products.

Scope: Develop innovative processes and technologies for separation of wastewater organic content or of some relevant fractions, and transform these into bio-based products. Proposals must include recovery and valorisation of a significant fraction of the useable components in the subject wastewater, and associated sludge, minimising the production of waste to be disposed.

Proposals should show the impact on the full value chain, and include the end-products foreseen. When obtaining intermediate products, quality and purity of these intermediates must be such that they enable conversion into the targeted end-products without further purification steps.

Proposals should provide evidence of the relevance of the wastewater stream(s) chosen for experimental validation, ensuring high replicability of the developed solution across Europe. Proposals should present a credible cost estimate for the proposed processes with a preliminary assessment of their competitiveness when scaled up.



The Technology Readiness Level (TRL)³ covered by the projects should reach Level 5.

Proposals should also include a Life Cycle Assessment (LCA) in order to evaluate the environmental and socio-economic performance of the developed process.

It is considered that proposals with a total eligible budget in the range of EUR 2-5 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals with another budget.

Expected impacts:

- Validated comparable or better recovery rates as compared to competing technologies.
- Recycling or reuse of at least 10% in (dry) weight of the suspended solid fractions.
- Contribution to the BBI JU Key Performance Indicators (KPI), specifically:
 - Creation of at least 1 new cross-sectorial interconnection in bio-based economy clusters (KPI 1) and at least 1 new cooperation project through cross-industry clusters (KPI 3).
 - Set the foundation of at least 1 new bio-based value chain (KPI 2) and at least 1 new bio-based material (KPI 5).

Type of action: Research and Innovation Action

BBi 2016.R2 - Develop consolidated bioprocesses for direct fermentation into bio-compounds for chemicals and materials

Specific challenge: In recent years, various studies have identified efficiency improvements for the pre-treatment, fermentation and downstream phases of the biorefining processes. However, the relatively high costs for pre-treatment and enzymatic hydrolysis have limited a wide application at industrial levels. In particular, enzymes represent significant capital and operational cost in the operation of most of the biorefineries. There are consolidated bioprocesses that convert pre-treated biomass at lower scales in one step into valuable bio-products without using technical and specific enzymes. For example, there are processes converting pre-treated lignocellulosic biomass directly by using extremely thermophilic, hemi-cellulolytic and cellulolytic microorganisms. The latter are indeed able to grow directly

³ Technology Readiness Levels as defined in part G of the General Annexes to the Horizon 2020 Work Programme: http://ec.europa.eu/research/participants/data/ref/h2020/other/wp/2016-2017/annexes/h2020-wp1617-annex-ga_en.pdf



on pre-treated lignocellulose feedstock and convert a broad spectrum of substrates into a significant range of compounds. These are promising results that need to be further improved to allow implementation at industrial scale. The gains in processing costs and production yields offer sufficient room to be competitive with conventional biorefining technologies.

The challenge is to develop a conversion process based on a direct fermentation of the pre-treated biomass into bio-compounds that is competitive in terms of costs and yields with processes that include the separate enzymatic hydrolysis step.

Scope: Develop a consolidated conversion that includes hydrolysis of the pre-treated biomass and the fermentation into bio-chemicals in a single-step. This will require the use of tailored microorganisms that can either be the result of engineering a microbial strain able to obtain a targeted compound to produce specific enzymes-like cellulases and hemicellulases, or engineering a microorganism able to disrupt lignocellulose and capable of producing a selected chemical intermediate.

Proposals should validate the developed solution at lab scale, but include indications of feasibility for scale-up and replicability. Proposals should assure complementarity to existing EU-funded projects for synergies and to avoid overlaps. Proposals should target a specific marketable product and can utilise several biomass feedstock to develop a process based on tailored microorganisms' strains that is able to:

- produce with high efficiency, enzymes during the production of fermentable sugars from the polysaccharides of the starting lignocellulosic biomass;
- produce targeted compounds with satisfying results in terms of yields, titres and productivity levels via fermentation and conversion of hexoses and pentoses sugars;
- resist potential inhibitors mainly coming from the preceding pre-treatment step.

The projects should cover any Technology Readiness Level (TRL) from 3 to 5. In the case of a pilot scale project (TRL 5), proposals should present a credible cost estimate for the proposed processes with a preliminary assessment of their competitiveness when scaled up.

Proposals should also include an environmental and socio-economic assessment, for example with an LCA. In particular, when targeting TRL 5, proposals should include an LCA in order to evaluate the environmental and socio-economic performance of the developed processes.

Proposals should include a cost/benefit analysis, in particular highlighting the economic advantages of avoiding the enzymes production phase.



It is considered that proposals with a total eligible budget in the range of EUR 2-5 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals with another budget.

Expected Impacts:

- Reduction of the costs (capital and operational costs) as compared to two-steps biorefinery processes that include enzymes production and use.
- Introduction of new routes and technologies for bio-based processes with large potential for rapid scale-up and short time-to-market of the new bio-based products.
- Development of new microorganisms capable of processing different kinds of feedstock, while ensuring high yields of the targeted products.
- Higher competitiveness level of the new bio-based value chains as compared to value chains based on two-steps biorefining technologies.
- Reduction of the upstream costs by 10% of the overall economics of the biorefinery, focusing in particular on the gains from avoiding enzymatic hydrolysis.
- Contribution to the BBI JU Key Performance Indicators (KPI), specifically:
 - Set the basis for the realisation of new bio-based materials (KPI 5) and for new demonstrated consumer products based on bio-based chemicals and materials (KPI 6), or significantly improve the production process of existing ones.

Type of action: Research and Innovation Action

BBI 2016.R3 - Improve control over microorganism growth in bio-catalysis operations in order to reduce/avoid contamination without antibiotics

Specific challenge: With the introduction of several and different feedstock, the risk of contamination increases due to longer fermentation times and weaker genetically modified production organisms. This leads to more stringent requirements for control of contamination within the bio-catalysis reactor. The objective is to overcome this challenge without exacerbating cumbersome sterilisation procedures or increasing the use of antibiotics, which would spread antibiotic resistance in the microorganisms. The latter would reduce the overall efficiency of the processes and impose an increasing substitution of the currently utilised microorganisms with new and more resistant strains.

In addition, residual antibiotics found in biorefinery side-streams hinder their potential use as a secondary feedstock for food/feed applications, as the EU regulatory framework in place needs to be taken into full account.



Hence, the use of antibiotics in bio-catalytic processes, although beneficial in controlling microbial growth, presents several drawbacks mainly associated with the risk of increasing antibiotic microbial resistance, as well as with the reduction of market value of the side-streams containing traces of antibiotics because of regulatory aspects.

The challenge is to develop other methods to control contamination. Alternatives include for instance microbial consortia (including synthetic consortia), non-antibiotic antimicrobials (like phages), more robust production microorganisms and more suitable bio-reactor conditions. These new methods should lead to expanding the potential feedstock basis and promoting the market position of bio-catalytic processes by:

- improved tools, methods and production organisms;
- repressing contamination to the level that complies with the end-use of the products (e.g. compliant to limits in feed or food applications), while avoiding or reducing the use of antibiotics.

The result could be a wider market deployment of by-products and residues, and technical and environmental benefits from limiting antibiotics resistance.

Scope: Improve the techniques for microbial control in bio-catalysis. The improvements should include less cumbersome sterilisation steps and use of improved bio-catalyst microorganisms and process conditions to curb contamination, avoiding the use of antibiotics.

Proposals should provide process yields at least comparable to the *state-of-the-art*. Proposals should also result in relevant improvements of the market value of by-products and side-streams, as compared with the current technologies.

Proposals should assess the feasibility of scaling-up the developed solution and the potential for replication into a wide range of bio-catalytic processes and value chains, allowing a better and larger application of the innovative techniques with the aim of avoiding or controlling contamination.

In addition, proposals should include high levels of safety and sustainability, from technical, economic and environmental points of view, required for feasible scale-up towards demonstration levels.

The projects should cover any Technology Readiness Level (TRL) from 3 to 5. In the case of a pilot scale project (TRL 5), proposals should present a credible cost estimate for the proposed processes with a preliminary assessment of their competitiveness when scaled up.



Proposals should also include an environmental and socio-economic assessment, for example with an LCA. In particular, when targeting TRL 5, proposals should include an LCA in order to evaluate the environmental and socio-economic performance of the developed processes.

It is considered that proposals with a total eligible budget in the range of EUR 2-5 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals with another budget.

Expected impacts:

- New bio-catalytic tools, methods, processes and microorganisms with a greater resistance against contamination and capacity for longer duration fermentations, including continuous fermentation.
- Technical and economic improvements in the management activities of bio-catalytic processes, especially the reduction of 20% of the costs associated with the control of the microbial growth.
- Introduction of new routes and technologies for bio-based processes able to reduce their scale-up time as well as the time-to-market of the resultant products.
- Improved competitiveness of the new bio-based value chains as compared to the existing ones.
- Contribution to the BBI JU Key Performance Indicators (KPI), specifically:
 - Set the foundation of at least 1 new bio-based value chain (KPI 2).

Type of action: Research and Innovation Action

BBi 2016.R4 - Flexible biorefining technologies able to handle different feedstock, leading to new value chains or enlarging existing ones by using the same processing plant

Specific challenge: Dependence on a single source of feedstock is one of the main bottlenecks for biorefinery operations. If biorefineries have the ability to process multiple inputs or to switch to different raw materials, they would have a substantial higher degree of flexibility in coping with feedstock price and availability variations. They will be able to follow market trends of raw materials, compensate for raw material price fluctuations and control their impact on the overall economics of biorefinery processes.

Handling different feedstock also requires dealing with their availability and composition that are a result of seasonal and geographical aspects. Increasing the ability to process a



diverse supply of biomass feedstock at acceptable quality will allow a better utilisation of biorefinery capacity and improve its competitiveness.

The challenge is to develop flexible biorefining processes capable of handling feedstock of variable origin, composition and quantity without major investment in (new) equipment.

Scope: Develop and validate at lab or at pilot scale the operation of a flexible biorefinery, able to tune its processes to accommodate different feedstock (without major investments in new equipment/facilities) in order to fully exploit the potential of biomass produced locally during the four seasons.

Proposals can focus on broad 'one-fits-all' technologies processing different biomasses, or on fast customisation of process conditions, e.g. by using different and specific enzymatic cocktails, to accommodate different types of biomass. In particular, proposals should prove the feasibility to use the same processing plant to process different feedstock by modifying and tailoring the operative conditions according to the available input.

Proposals should assess the feasibility of scaling up the developed solutions to semi-industrial level as a next step and replication in different regions and areas. Proposals should prove high conversion efficiency of different biomass feedstock into valuable bio-products.

Proposals should show the impact on the full value chain. Therefore, proposals need to involve a relevant range of biomass suppliers, representing the different biomass feedstocks under consideration. Proposals should seek complementary with the projects funded under topic H2020 RUR-8-2016 to avoid overlap and promote synergies.

The projects should cover any Technology Readiness Level (TRL) from 3 to 5. In the case of a pilot scale project (TRL 5), proposals should present a credible cost estimate for the proposed processes with a preliminary assessment of their competitiveness when scaled up.

Proposals should also include an environmental and socio-economic assessment, for example with an LCA. In particular, when targeting TRL 5, proposals should include an LCA in order to evaluate the environmental and socio-economic performance of the developed processes.

It is considered that proposals with a total eligible budget in the range of EUR 2-5 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals with another budget.

Expected Impacts:



- When targeting currently discontinuous biorefinery operations: Increased annual productivity of the targeted products by 10-20% as compared to the current production routes, proving the relevance of the continuity of biorefinery operations during the whole year.
- Increased utilisation of biorefinery capacity during the year, thus reducing 'down time' that is mainly associated with fluctuations in biomass feedstock availability.
- Reduction of 10-20% of the feedstock-related costs of a biorefinery as compared to a single-source biorefinery operating part-time during the year.
- Biorefining capacity utilisation increase of 10-20% on annual basis.
- Contribution to the BBI JU Key Performance Indicators (KPI), specifically:
 - Set the foundation of at least 1 new bio-based value chain (KPI 2), new bio-based materials (KPI 5) and for new demonstrated consumer products based on bio-based chemicals and materials (KPI 6), or significantly improve existing ones.

Type of action: Research and Innovation Action - RIA



BBI 2016.R5 - Advanced biomaterials for smart food packaging

Specific challenge: Bio-based packaging materials with advanced functionalities are gaining ground as compared to traditional paper bags and board boxes and fossil-based plastic containers, films, wrappers and bottles. Users in the end-markets are increasingly demanding advanced, 'smart' and even 'active' packaging to help increase the shelf-life of food. Improved characteristics like barrier to oxygen and UV, physical strength, resistance to temperature variations can help reaching these goals. Society and users are also demanding to improve end-of-life options for packaging material (such as being biodegradable, compostable, and recyclable).

The interest in new and smart food packaging is increasing by both brand owners and consumers. The latter group is vesting more interest in healthy food and in functional food in its quest for a longer and healthy life. Brand owners are seeking to gain marketing edge by taking leadership in meeting these needs in their respective fields. The challenge is to convert these market developments into a sustainable supply of useable material with functionalities that will outperform existing packaging materials while assuring consumer confidence by addressing safety concerns.

A key challenge for ensuring market uptake and realising the full potential impact of bio-based materials useable in new food packaging concepts is to prove their ability to meet market demand. The hurdle of a significant 'first mover' risk must be taken by providing a *proof of concept* of their successful and sustainable production. Establishing such new value chains requires bio-based (manufacturing) industries to seek a closer cooperation with market actors to understand the specific market demands, and with biomass feedstock producers and suppliers to ensure the long-term supply of the required sustainable feedstock for the desired bio-based materials.

Scope: Develop bio-based materials with new functionalities for food packaging. The new materials need to provide the following objectives:

- Prove performances at least equal to existing, comparable packaging materials in terms of mechanical properties and temperature resistance or in terms of liquid/oxygen/UV/CO₂-barriers or antimicrobial activity.
- In order to improve end-of-life options:
 - provide biodegradable or compostable alternatives; or
 - provide mono-material (easily recyclable) alternatives while matching the same properties (e.g. barrier) of existing multi-material ones.

Proposals should address a small number of well-focused applications, identifying the benchmark products to prove the better characteristics of the developed materials.



Proposals should include the direct link with end-market actors to provide clear requirements of the developed products and materials. Proposals should comply with existing legislation for food contact.

For specific applications, biodegradable packaging should be the preferred route. *Design for recycling* at end-of-life must be part of the early development stages for non-biodegradable packaging material.

The projects should cover any Technology Readiness Level (TRL) from 3 to 5. In the case of a pilot scale project (TRL 5), proposals should present a credible cost estimate for the proposed processes with a preliminary assessment of their competitiveness when scaled up. The new bio-based material should be at a competitive price to enable subsequent downstream steps for the production of films and flexible food packaging to suit market applications.

Proposals should also include an environmental and socio-economic assessment, for example with an LCA. In particular, when targeting TRL 5, proposals should include an LCA in order to evaluate the environmental and socio-economic performance of the developed products, with particular focus on the end-of-life phase.

It is considered that proposals with a total eligible budget in the range of EUR 2-5 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals with another budget.

Expected impacts:

- Improved mechanical and/or functional properties of the developed packaging products in a specific field as compared with state-of-the-art.
- In case the project focuses on biodegradability or compostability: contribution to fulfilling the European objective of reducing the recyclable content in landfilled waste down to the targets as per the EC's Landfill Directive, by showing reduction in landfilling as end-of-life option for packaging material as compared to baseline. Biodegradability other than under industrial conditions⁴ should also be considered.
- Reduction of costs, on a life cycle analysis basis, as compared to on-market materials.
- In case the project focuses on the preservation of food products: Increase of at least 10% of the shelf-life of the targeted products.
- Opening new markets for new applications of biodegradable materials.
- Contribution to the BBI JU Key Performance Indicators (KPI), specifically:
 - Creation of at least 1 new cross-sectorial interconnection in bio-based economy clusters (KPI 1).

⁴ Biodegradability under industrial conditions is defined in European norm EN 13432.



- Set the basis for the creation of at least 1 new bio-based value chain based on the innovative products developed (KPI 2), new bio-based materials (KPI 5), and for new demonstrated consumer products based on bio-based chemicals and materials (KPI 6), or significantly improve the production process of existing ones.

Type of action: Research and Innovation Action

BBi 2016.R6 - Bio-based alternatives to improve protection of human health and the environment

Specific challenge: Consumers and producers start to become increasingly aware of the need to make consumer goods that require less finite resources and that protect human health and the environment. The latter is also the aim of the REACH⁵ legislation by placing the responsibility on industry to manage the risks from chemicals and to provide safety information on the substances. Introducing safe bio-based alternatives contributes to protecting human health and the environment.

The challenge is to develop suitable safe bio-based compounds and derivatives to meet the high technical and safety requirements of downstream applications, replacing existing potentially hazardous compounds or where bio-based alternatives significantly reduce the impact on human health and the environment (eco-toxicity).

Scope: Develop safe bio-based alternatives for chemicals, materials and additives in major application fields like polymers, paints and solvents to improve protection of human health and the environment. However, proposals are not limited to these application fields.

Proposals should show that replacing compounds by safe bio-based alternatives does not negatively impact the characteristics and performance of the application. The introduction of safe bio-based compounds needs to improve the protection of human health and the environment during the production, use and end-of-life handling of the product. Proposals should clearly specify benefits in terms of reduced or eliminated toxicity and environmental footprint versus existing and comparable products.

The accompanying business model should include concrete arguments to show that the new products containing the safe bio-based alternative (the 'application') are competitive with

⁵ REACH (Registration, evaluation, authorisation and restriction of chemicals). ([EC 1907/2006](http://ec.europa.eu/environment/chemicals/reach/reach_en.htm)). http://ec.europa.eu/environment/chemicals/reach/reach_en.htm



the targeted existing products. Market analysis and involvement of market actors should show potential market uptake based on technical, environmental and economic advantages.

Safety, quality and purity of the new products must be in line with commercial and/or regulatory requirements by actively building upon existing knowledge and standardisation activities.

The projects should cover any Technology Readiness Level (TRL) from 3 to 5. In the case of a pilot scale project (TRL 5), proposals should present a credible cost estimate for the proposed processes with a preliminary assessment of their competitiveness when scaled up.

Proposals should also include an environmental and socio-economic assessment, for example with an LCA. In particular, when targeting TRL 5, proposals should include an LCA in order to evaluate the environmental and socio-economic performance of the developed processes.

It is considered that proposals with a total eligible budget in the range of EUR 2-5 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals with another budget.

Expected impacts:

- Leading to the substitution of at least 2 hazardous or toxic substances in consumer products.
- Reduced costs and higher market potential as compared to existing substances.
- Increased bio-based content of end-products (through bio-based additives, plasticisers, epoxy and/or polyurethane resins, etc.), while maintaining comparable technical performance with substituted products.
- Contribution to the BBI JU Key Performance Indicators (KPI), specifically:
 - Creation of at least 1 new cross-sectorial interconnection in bio-based economy clusters (KPI 1).
 - Set the basis for the creation of at least 1 new bio-based value chain (KPI 2), at least 1 new cooperation project through cross-industry clusters (KPI 3), new bio-based materials (KPI 5), and new demonstrated consumer products based on bio-based chemicals and materials (KPI 6).

Type of action: Research and Innovation Action



BBi 2016.R7 - Biopolymers with advanced functionalities for high performance applications

Specific challenge: With an expected significant growth in the next 4 years, biopolymers represent one of the leading sectors for bio-based products. The main driver behind this trend has up to now been the need to substitute conventional fossil-based materials with more sustainable bio-based ones, in particular in large volume consumer products such as packaging.

The ability of bio-based polymers to achieve improved functionalities, surpassing those of fossil-based ones, or even realising functionalities that are not achievable by fossil-based polymers offers opportunities to expand market applications for biopolymers far beyond the current *state-of-play*. In particular, these opportunities exist in high value market niches that require advanced functionalities.

Scope: develop and validate biopolymers with advanced functionalities for demanding sectors such as (but not limited to):

- the biomedical sector, requiring biopolymers and derived materials with biocompatibility and/or surface functionalisation (such as for antibacterial purposes);
- the construction, automotive and aerospace sectors, in need of biopolymers to produce lightweight plastics and composites with excellent structural properties.

Proposals should lead to development of bio-based polymers and derived materials with unprecedented properties, clearly identifying the reference sectors and products and addressing the relevant product requirements (such as inhibit, suppress or delay the production of flames in aerospace applications). Proposal should aim to produce prototypes to be tested against relevant standards and applicable certifications.

The projects should cover any Technology Readiness Level (TRL) from 3 to 5. In the case of a pilot scale project (TRL 5), proposals should present a credible cost estimate for the proposed processes with a preliminary assessment of their competitiveness when scaled up.

Proposals should also include an environmental and socio-economic assessment, for example with an LCA. In particular, when targeting TRL 5, proposals should include an LCA in order to evaluate the environmental and socio-economic performance of the developed processes.

It is considered that proposals with a total eligible budget in the range of EUR 2-5 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals with another budget.



Expected impacts:

- Validated, enhanced properties with substantial advancements as compared to best available products:
 - New features to improve sustainability (for example reusability, recyclability and/or biodegradability) while still meeting all performance requirements; or
 - Completely new functionalities with clear added-value in new applications.
- Contribution to the BBI JU Key Performance Indicators (KPI), specifically:
 - Set the basis for the realisation of new bio-based materials (KPI 5) and new demonstrated consumer products based on bio-based chemicals and materials (KPI 6).

Type of action: Research and Innovation Action

BBI 2016.R8 - Emerging technologies for conversion of the organic content of Municipal Solid Waste and improving waste-to-chemicals value chains

Specific challenge: The organic fraction of Municipal Solid Waste (MSW) represents an abundant and cheap, albeit highly variable, bio-based feedstock. The advancements in sorting in the latest years have made bio-waste an extremely affordable feedstock (even available at negative price under some circumstances), attracting the interest of the biochemical industry. However, due to its high complexity in composition as well as the variability during the year, it is a challenging feedstock to be processed for bio-based applications.

Indeed, its utilisation has up to now been limited to mainly the production of biogas for co-production of thermal and electric energy and compost.

Conversion processes performance (in terms of yield, selectivity and titre) is hindered by the high variability of the input feedstock, resulting in the need of tailored sorting and pre-treatment of the feedstock. The latter steps reduce the presence of inhibitors for the downstream steps. However, the costs of the sorting and pre-treatment steps, combined with the need of high performance separation and purification, often hinder the overall economic feasibility of a waste-to-chemicals value chain.

Scope: Develop and validate at lab scale innovative processes for conversion of the organic fraction of MSW into chemical intermediates aiming at:



- maximising the yield of recovery of intermediates from the substrate;
- minimising the presence of inhibitors in order to enable achieving profitable yields from the conversion of intermediates into products.

The innovation should focus on production of intermediates at high yield and low impurity level.

Proposals should take into account seasonal and random variability of the MSW content and address several compositions of the organic fraction, focusing on representative case studies taking into account local economic, social and climate conditions.

The projects should cover any Technology Readiness Level (TRL) from 3 to 5. In the case of a pilot scale project (TRL 5), proposals should present a credible cost estimate for the proposed processes with a preliminary assessment of their competitiveness when scaled up.

Proposals should also include an environmental and socio-economic assessment, for example with an LCA. In particular, when targeting TRL 5, proposals should include an LCA in order to evaluate the environmental and socio-economic performance of the developed processes.

It is considered that proposals with a total eligible budget in the range of EUR 2-5 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals with another budget.

Expected impacts:

- Improved yield of intermediate extraction/recovery from the organic content of MSW by 20% with respect to *state-of-the-art* or exceed 80% yield of intermediates.
- Validated removal of inhibitors to such an extent that it allows cost-effective downstream processing.
- Validated process by comparison of the resulting product yield with the one obtained from lignocellulosic biomass. The difference in yield should not exceed 10%.
- Contribution to the BBI JU Key Performance Indicators (KPI), specifically:
 - Creation of at least 1 new cross-sectorial interconnection in bio-based economy clusters (KPI 1).
 - Set the basis for the creation of at least 1 new bio-based value chain (KPI 2).

Type of action: Research and Innovation Action



BBi 2016.R9 - Exploiting algae and other aquatic biomass for production of molecules for pharma, nutraceuticals, food additives and cosmetic applications

Specific challenge: Algae are important sources of specialty or fine chemicals that allow high added-value applications in several market segments. This has been possible thanks to the enormous variety in the composition of naturally occurring varieties.

Algae and other aquatic biomass thus could be excellent feedstock from aquatic/marine sources to produce chemical building blocks and materials for specific niche market applications. Exploiting aquatic/marine feedstock for the bio-based industries in principle does not claim land and does not compete with the food chain.

Scope: Validate the technology for the utilisation of algae and other aquatic/marine biomass for the production of ingredients and proteins for food and feed, and of chemicals for pharmaceutical, cosmetics and nutraceutical applications.

Proposals should address upstream (adaptation and selection of varieties, growing conditions) and downstream (separation, purification and/or extraction of compounds) processing steps, with the overall aim to maximise the production of compounds of interest.

The projects should cover any Technology Readiness Level (TRL) from 3 to 5. In the case of a pilot scale project (TRL 5), proposals should present a credible cost estimate for the proposed processes with a preliminary assessment of their competitiveness when scaled up.

Proposals should also include an environmental and socio-economic assessment, for example with an LCA. In particular, when targeting TRL 5, proposals should include an LCA in order to evaluate the environmental and socio-economic performance of the developed processes. Proposals should prove their industrial application taking into account existing EU regulatory framework.

It is considered that proposals with a total eligible budget in the range of EUR 2-5 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals with another budget.

Expected impacts:

- Achieved new process to separate, purify and/or extract the compounds of interest at a sufficiently high yield and low cost to allow a cost-effective scale-up of the process.
- Achieved improved yield per mass unit biomass-input, or improved cost effectiveness as compared to current routes towards same or comparable products.
- Contribution to the BBi JU Key Performance Indicators (KPI), specifically:



- Set the basis for the realisation of 1 new bio-based value chain (KPI 2), new bio-based materials (KPI 5) and new demonstrated consumer products based on bio-based chemicals and materials (KPI 6), or significantly improving the production process of existing ones.
- Safety, quality and purity of the (new) products are in line with EU legislation and proven to meet end-market requirements in order to facilitate future market access and commercialisation.

Type of action: Research and Innovation Action

BBi 2016.R10 – Industrial biotransformation for the production of bio-based chemicals

Specific challenge: Bio-catalysis enables transformation of starting biomass into bio-based products, often with higher selectivity and catalytic efficiency as well as requiring milder operational conditions versus chemical routes. Nevertheless, to establish industrial standards of bio-catalysis, microbial genomes need deep modulation to boost naturally occurring chemical reactions or induce new reactions that are of industrial interest.

The continuity of bio-based production, needed to increase the overall economic sustainability, is hindered by the drawbacks associated with the use of living microorganisms. Along with the quite long residence times often required and the limited suitable pH-ranges, the tendency of such microorganisms to accumulate mutations leads to a genetic drift which negatively impacts the production stability. In order to increase the industrial bio-catalysis production cycle, there is a need of microorganisms that maintain their bio-catalytic characteristics for longer period of time (meaning higher generation number). Also, further research is required to mitigate the impact of environmental microbial flora that may negatively affect the bio-production in terms of yield and/or quality of the products.

Scope: Improve the techniques for microbial construction and control, leading to an intensification of microbial bio-catalysis for the converting biomass into bio-based chemicals and avoiding the use of chemical additives in the production cycle in order to limit the environmental impact of the process. Proposal should also prove significant improvements in at least two of these aspects:

- Optimisation of the kinetics of the conversion process.
- Extension of the suitable pH-range.



- Maximisation of the yield of the biotransformation diminishing side-products /inhibitors that have a negative impact on subsequent process.

Through these activities, proposals should provide new robust strains with higher production yield for longer production cycle, as well as relevant improvements in the market value of by-products and side-streams. In particular, compliance with regulatory framework and commercial requirements of the valuable streams coming from the process must be validated and demonstrated.

Proposals should also assess the feasibility of scale-up and replication of the developed solutions into a wide range of bio-catalytic processes. This should allow for a better and broader application of the innovative techniques, with the aim of replacing current microbial strains within the value chains based on bio-catalysis. In addition, proposals should prove high levels of safety and sustainability, from technical, economic and environmental points of view, required for a feasible scale-up towards demonstration levels.

The projects should cover any Technology Readiness Level (TRL) from 3 to 5. In the case of a pilot scale project (TRL 5), proposals should also present a credible cost estimate for the proposed processes with a preliminary assessment of their competitiveness when scaled up.

Proposals should also include an environmental and socio-economic assessment, for example with an LCA. In particular, when targeting TRL 5, proposals should include an LCA in order to evaluate the environmental and socio-economic performance of the developed processes.

It is considered that proposals with a total eligible budget in the range of EUR 2-5 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals with another budget.

Expected impacts:

- Opening up possible new microbial bio-catalytic processes with longer production cycle.
- Developed more robust microbial strains presenting a broader bio-catalytic application spectrum in terms of both biomass' features and origin.
- Proven compliance with regulatory aspects, in particular EU legislation, of side-streams and by-products coming from the process, in view of their potential commercialisation and/or further industrial exploitation.
- Introduction of new routes and technologies for bio-based processes able to reduce their scale-up time as well as the time-to-market of the resultant products.
- Contribution to the BBI JU Key Performance Indicators (KPI), specifically:
 - Lead to the creation of at least 1 new cooperation project through cross-industry clusters (KPI 3).

Type of action: Research and Innovation Action



BBI 2016.R11 – Recover and reuse enzymes to reduce costs of existing industrial processes

Specific challenge: Enzyme cost is a significant part of the overall cost of biomass conversion. One notable example being the large amount of cellulase enzymes needed for the hydrolysis of cellulose. A possible way to optimise costs is a partial or total recycle of the enzymes, permitting the same batch to process more than one cycle and/or to reduce the need for input of ‘fresh’ enzymes per cycle. Some approaches have been proposed, but the yield and costs still need significant improvement to allow feasible industrial application.

Scope: Develop effective enzyme technologies and processes with a substantial reduction of fresh enzyme intake while still achieving the same targeted process or reaction yield. Proposals should carry out a side-by-side comparison with the currently used processes, to highlight the impact of the new process in terms of energy and water consumption, total solids concentrations, reaction volumes and composition of residues, besides the process or reaction yield.

The projects should cover any Technology Readiness Level (TRL) from 3 to 5. In the case of a pilot scale project (TRL 5), proposals should present a credible cost estimate for the proposed processes with a preliminary assessment of their competitiveness when scaled up.

Proposals should also include an environmental and socio-economic assessment, for example with an LCA. In particular, when targeting TRL 5, proposals should include an LCA in order to evaluate the environmental and socio-economic performance of the developed processes.

It is considered that proposals with a total eligible budget in the range of EUR 2-5 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals with another budget.

Expected impacts:

- Proven innovative technologies for improving enzyme-efficiency, achieving an improvement in reuse of at least 30%.
- Demonstrated continued efficiency of the enzyme-batch for several cycles with no or minimal input of fresh enzymes.
- Contribution to the BBI JU Key Performance Indicators (KPI), specifically:
 - Lead to the creation of at least 1 new cooperation project through cross-industry clusters (KPI 3).

Type of action: Research and Innovation Action



BBi 2016.R12 - Emerging technologies for separation and purification of fermentation products to obtain high grade bio-based molecules at industrial level

Specific challenge: Separation and purification of fermentation products can be a major bottleneck in terms of productivity and cost competitiveness. For lactic acid, for instance, this stage can account for up to 50% of the overall production cost.

Several technologies, based on reactive extraction, membrane technologies, electro-dialysis, ion exchange and distillation have been proposed, as well as approaches based on fermentation with simultaneous purification such as multistage fermentation or combination of fermentation with adsorption.

Nonetheless, a continued research effort is needed to improve separation and purification processes and to make them available for a wider range of products.

Scope: Select and advance suitable new technologies for separation and purification of fermentation products for feasible subsequent industrial application. Proposals should focus on a well-defined existing production route of a bio-based molecule of high industrial interest, and prove substantial improvement in the yield, cost- and time-effectiveness of the process.

The projects should cover any Technology Readiness Level (TRL) from 3 to 5. In the case of a pilot scale project (TRL 5), proposals should present a credible cost estimate for the proposed processes with a preliminary assessment of their competitiveness when scaled up.

Proposals should also include an environmental and socio-economic assessment, for example with an LCA. In particular, when targeting TRL 5, proposals should include an LCA in order to evaluate the environmental and socio-economic performance of the developed processes.

It is considered that proposals with a total eligible budget in the range of EUR 2-5 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals with another budget.

Expected impacts:

- Improved yield by 10% versus state-of-the-art applied to the same route (same feedstock and same product).
- Show 20% reduction in impurities as compared to state-of-the-art applied to the same route (same feedstock and same product).



- Contribution to the BBI JU Key Performance Indicators (KPI), specifically:
 - Lead to the creation of at least 1 new cooperation project through cross-industry clusters (KPI 3).

Type of action: Research and Innovation Action



INNOVATION ACTIONS – “DEMONSTRATION” ACTIONS

BBI 2016.D1 - Improve sustainability of value chains based on forest biomass and increase productivity and profitability on supply side by adapting forests to climate changes

Specific challenge: The demand for forest-based biomass for various applications is increasing. The markets of forest-based products are very competitive, with other regions (namely North and South America) leading in production efficiency. The European forest-based sector could improve its competitiveness by increasing the sustainable mobilisation of forest resources through better forest infrastructure, suitable machinery, consolidated ownerships and better management of undeveloped wood markets. Also, Europe needs a continued maintenance of forests, which yields benefits in terms of prevention of landslides, improved fire risk management, higher carbon capture by trees and other ecosystem services. A sustainable increase of the productivity of its forests will increase the value of forest land itself.

The need to increase the resilience of forests to climate change is a common issue all over Europe where rising temperatures and changing rainfall patterns are projected to affect the composition of forests. The change in forest composition also bears consequences on the local ecosystem and biodiversity, as well as on the role of forests as carbon sinks.

Increasing forest mobilisation and adapt forests to climate changes are crucial to avoid their degradation and to harness possible changes in their composition and vertical structure. These are needed to retain their economic value and to maintain the sustainability of value chains based on forest-based biomass. Furthermore, increasing the resource, energy and process efficiency of wood processing within forest-based sectors, could enlarge the suitability of the various kinds of forest biomass with a wider range of marketable products.

Scope: Building on ongoing activities in the field of adapting forests to projected changes in climate, proposals need to demonstrate the techno-economic viability in forest-based value chains of breeding of varieties of current tree species as well as prospecting for new ones. This will require the plantation of several hectares of land. Proposals could also address the composition of forests by creating mixed forests with the introduction of allogeneic species. Forest owners should be involved in proposals.

Proposals should demonstrate the whole value chain based on the innovations introduced. Specifically, by introducing new tree varieties, the validation should show the economic benefits of increased sustainability and the suitability of the new forest-based biomass for downstream processing. The latter should ideally lead to the development of new products



with higher added-value than existing comparable products. The associated business model should include the upscaling of the selected approach to commercial levels.

Proposals should assess the impact of the proposed forest management innovations on the ecosystem, ensuring that the local biodiversity are not disturbed and the protection role of forests maintained as well.

Proposals should include field validation of the proposed approach on a representative surface (several hectares). Proposals should build on proven achievements at lab or pilot scale. Proposals should seek complementarity to the projects funded under topic H2020 SPIRE-03-2016⁶ and BB-03-07⁷ to avoid overlaps and promote synergies.

Proposals should achieve technology demonstrated in an industrial environment, or a system prototype demonstration in operational environment. Proposals need to address the whole value chain, from feedstock sourcing to market applications (Technology Readiness Levels 6-7).

Proposals should also include a Life Cycle Assessment (LCA) in order to evaluate the environmental and socio-economic performance of the whole value chain.

It is considered that proposals with a total eligible budget of up to EUR 15 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals with another budget.

Expected impacts:

- Increased forest wood biomass productivity per hectare by 20% or more.
- Stabilisation of supply for woody raw material, hence helping retain the competitiveness of the European forest-based sector, while achieving higher income for forest owners due to increased wood productivity and improved mobilisation.
- The result of projects under this topic should result in the demonstration of 1 new building block based on biomass of European origin validated at demonstration scale (KPI 4) and/or at least 1 new bio-based material (KPI 5).
- Contribution to other BBI JU Key Performance Indicators (KPI), specifically:
 - Creation of at least 1 new cross-sectorial interconnection in bio-based economy clusters (KPI 1).

⁶ See Horizon 2020 Work Programme 2016-2017: SUSTAINABLE PROCESS INDUSTRIES – SPIRE, SPIRE-03-2016 ‘Industrial technologies for the valorisation of European bio-resources into high added value process streams’ at: http://ec.europa.eu/research/participants/data/ref/h2020/wp/2016_2017/main/h2020-wp1617-focus_en.pdf

⁷ See Horizon 2020 – Work Programme 2016-2017 Call – Bio-based innovation for sustainable goods and services – Supporting the development of a European Bioeconomy: BB-03-07 at: http://ec.europa.eu/research/participants/data/ref/h2020/wp/2016_2017/main/h2020-wp1617-food_en.pdf



- Lead to the establishment of at least 1 new industrial bio-based value chain (KPI 2) and to the creation of at least 1 new cooperation project through cross-industry clusters (KPI 3).

Type of action: Innovation Action – “DEMONSTRATION” Action

BBi 2016.D2 – Improvement and adaptation of industrial crop varieties and novel sources of biomass to diversify biomass feedstock for biorefineries

Specific challenge: A strong bioeconomy requires a diverse biomass feedstock for the bio-based value chains. The bio-based industries are looking into diversification of their feedstock base by adding new sources. Dedicated, purposely grown industrial crops and novel sources of biomass to deliver specific compounds for further processing into chemicals and materials, present an attractive route to high value applications.

These new biomass feedstock sources from dedicated, purposely cultivated industrial crops and novel sources of biomass (cultures), promote the creation of new value chains, utilising the natural properties of the feedstock for new functionalities of the desired products.

The challenge is to demonstrate the sustainability of these new value chains on a larger scale. This includes the upscaling of the processes using the technologies for dedicated biomass production, in order to provide for a sustainable supply of the new feedstock and the conversion into useable products for application in specific market segments.

Demonstrating the benefits for the environment, the economy and the society will contribute to the market-uptake of the end-products and to an improvement of the competitive position of the European bioeconomy.

Scope: Demonstrate the techno-economic viability and sustainability of complete value chains based on utilisation of dedicated, purposely developed biomass production systems as feedstock for the bio-based industries.

Specifically, this topic focuses on non-food-conflicting biomass production systems:

- whose molecular structure or growing conditions are tailored in order to maximise the output of the desired molecules, and/or
- that are suitable for cultivation on unused, marginal or contaminated land that is currently not in use. Proposals addressing this point could also contain remediation actions for marginal or contaminated soils in order to convert or return these lands to use for agricultural purposes, and/or



- that can be cultivated in novel and highly resource-efficient conditions.

The sustainability of the entire value chain should include the ability to deliver products, meeting safety and quality requirements, at competitive price level versus those from existing value chains.

A sound business model should include the role of all actors in the value chain, from the feedstock supplier to the actors on the end-market. Furthermore, the model should show that the value chain does not interfere with the food chain.

Proposals should achieve technology demonstrated in an industrial environment, or a system prototype demonstration in operational environment. Proposals need to address the whole value chain, from feedstock sourcing to market applications (Technology Readiness Levels 6-7).

Proposals should also include a Life Cycle Assessment (LCA) in order to evaluate the environmental and socio-economic performance of the whole value chain.

It is considered that proposals with a total eligible budget of up to EUR 15 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals with another budget.

Expected impacts:

- Reduction of land use in comparison to the current productivity for the same product categories, when obtained from crops or other conventional primary biomass sources.
- When dealing with industrial crops, diversification and increase of farmers' revenues through access to new markets.
- Reduction of Europe's dependence on imports of the targeted product, where applicable.
- Safety, quality and purity of the (new) products are in line with EU legislation and proven to meet end-market requirements in order to facilitate future market access and commercialisation.
- Projects under this topic should result in 1 new building block based on biomass of European origin validated at demonstration scale (KPI 4) and/or at least 1 new bio-based material (KPI 5).
- Contribution to other BBI JU Key Performance Indicators (KPI), specifically:
 - the creation of at least 1 new industrial bio-based value chain (KPI 2) and at least 1 new cooperation project through cross-industry clusters (KPI 3).

Type of action: Innovation Action – “DEMONSTRATION” Action



BBI 2016.D3 - Valorisation of lignin and other side-streams to increase efficiency of biorefineries and increase sustainability of the whole value chain

Specific challenge: High costs of feedstock and energy in the EU require biorefineries to apply highly efficient processes to remain competitive. These include processes to handle and convert by- and co-products from different industrial and commercial activities. And they also include integrating own biorefining operations and maximising the use of intermediate- and side-streams, through recycling or next steps processing.

The predominant component of side-streams from lignocellulosic biomass processing is lignin. Other co-products may vary in content according to the plant: crystalline cellulose, complex polymers and dead cells have also high content in streams from the fermentation stage in biorefineries; while soaps, terpenes and sulphur compounds are found in pulp mills' black liquor (besides lignin). All these components represent, in various degrees, also potential sources of new feedstock for further valorisation.

At lab and small pilot scale, there are many examples of valorisation of lignin-rich streams.

The challenge is to demonstrate at a larger scale the feasibility and sustainability of valorisation of lignin-rich streams at the core of a full value chain in order to set the basis for a future market deployment of the obtained products.

Scope: Demonstrate the techno-economic viability of the efficient valorisation of lignin-rich side-streams from biorefineries or from black liquor streams from the pulp and paper industries. Besides lignin, other streams – such as crystalline cellulose, complex polymers and dead cells from the different stages of biorefineries and soaps, terpenes and sulphur compounds from pulp and paper mills – could be addressed.

In particular, applying the 'cascading use principle'⁸ (valorisation of the side-streams) where possible, aiming at realising an integrated, zero-waste biorefinery operation by maximising conversion of different streams available and of the corresponding different materials and compounds. This includes the recovery and recycling of process chemicals, obviating or minimising the need for new input thereof.

Proposals should encompass the whole value chain, proving innovative and efficient technologies and methods to improve sustainability. Proposals should also demonstrate replicability of the developed processes to different side-streams.

⁸ In the context of this topic the 'cascading use principle' means the valorisation of as many as possible fractions from the primary stream, in parallel or subsequent steps.



Proposals should also include regulatory aspects and the market pull of the targeted chemicals and material, in order to match legislation requirements and those by costumers and end-users, with technical, environmental and economic aspects linked to the bio-based value chain. These aspects include safety, quality and purity of the products by actively building upon existing knowledge and standardisation activities.

Proposals should achieve technology demonstrated in an industrial environment, or a system prototype demonstration in operational environment. Proposals need to address the whole value chain, from feedstock sourcing to market applications (Technology Readiness Levels 6-7).

Proposals should also include a Life Cycle Assessment (LCA) in order to evaluate the environmental and socio-economic performance of the whole value chain.

It is considered that proposals with a total eligible budget of up to EUR 15 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals with another budget.

Expected impacts:

- Safety, quality and purity of the (new) products are in line with EU legislation and proven to meet end-market requirements in order to facilitate future market access and commercialisation.
- Reduction of industrial side-streams routed to disposal as waste.
- Demonstrated operational- and energy-costs savings as compared to existing processes and technologies.
- Successful introduction of 'lignin – to – bio-product' concepts at semi-commercial scale.
- Projects under this topic should result in 1 new building block based on biomass of European origin validated at demonstration scale (KPI 4) and/or at least 1 new bio-based material (KPI 5).
- Contribution to other BBI JU Key Performance Indicators (KPI), specifically:
 - Creation of at least 1 new bio-based value chain (KPI 2) and at least 1 new cooperation project through cross-industry clusters (KPI 3).
 - Lead to new demonstrated consumer products based on bio-based chemicals and materials (KPI 6), or significantly improving the production process of existing ones.

Type of action: Innovation Action – “DEMONSTRATION” Action



BBI 2016.D4 - New and optimised biorefinery approaches enabling the creation of local value chains in underdeveloped or unexploited areas

Specific challenge: The European bioeconomy starts expanding to include new actors and less developed regions. This expansion is needed to build a bioeconomy at sufficiently large scale to sustain itself, and to fully exploit the European biomass potential. However, it also requires the removal of several hurdles in the development of new business approaches and models to realise the value chain build-up. Among the major challenges in expanding the bioeconomy in new areas is the scale of operation. Many innovative actors like SME's, spin-offs and start-ups, willing to play their role, do not have the resources to set up large plants even if these may have a high return of investment. Smaller, modular, ready-to-deploy model would be beneficial for unlocking this potential. Also, logistics constraints and supply chain uncertainties play a big role in ensuring the sustainability of new value chains.

The challenge is to design innovative models to enable the build-up of sustainable new, local bio-based value chains involving biomass producers, waste management operators, logistics operators, government administrations and the processing and end-market actors. Where necessary, actions need to compare with ongoing programmes in Horizon 2020 addressing Rural Renaissance⁹ to avoid overlap, but seeking synergies.

Scope: Demonstrate the techno-economic viability of local deployment of innovative modular and decentralised biorefinery concepts for the build-up of local value chains. A highly efficient, locally (in the close vicinity of the biomass source) deployed value chain model can minimise the impact of feedstock logistics on the economic and environmental sustainability of the value chain.

Proposals can address both the manufacture of end-products in low volume, high added-value applications as well as the production of intermediates to be transported to a central facility for further conversion. In the latter case proposals should demonstrate innovative approaches to logistics, transport and storage that enable the creation of a new value chain that would not have been possible (or competitive) otherwise.

Proposals should present a thorough business case for the new value chain, showing the integration of actors from the supply side through the end-market for the intended materials/products and its cost-competitiveness with existing competing solutions (if any).

Proposals should also include regulatory aspects and the market pull of the targeted chemicals, in order to match legislation requirements and those by costumers and end-

⁹ See Horizon 2020 Work Programme 2016-2017': Call – Rural Renaissance - Fostering innovation and business opportunities (H2020-RUR-2016-2017) at: http://ec.europa.eu/research/participants/data/ref/h2020/wp/2016_2017/main/h2020-wp1617-food_en.pdf



users, with technical, environmental and economic aspects linked to the bio-based value chain. These aspects include safety, quality and purity of the products by actively building upon existing knowledge and standardisation activities.

Proposals should achieve technology demonstrated in an industrial environment, or a system prototype demonstration in operational environment. Proposals need to address the whole value chain, from feedstock sourcing to market applications (Technology Readiness Levels 6-7).

Proposals should also include a Life Cycle Assessment (LCA) in order to evaluate the environmental and socio-economic performance of the whole value chain.

It is considered that proposals with a total eligible budget of up to EUR 15 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals with another budget.

Expected impacts:

- Diversification and increase of feedstock suppliers' revenues through access to new markets and increased mobilisation of biomass.
- Creation of new green jobs in rural areas.
- Reduction of 10% of logistic and transport costs in comparison with current similar value chains.
- Projects under this topic should result in 1 new building block based on biomass of European origin validated at demonstration scale (KPI 4) and/or at least 1 new bio-based material (KPI 5).
- Contribution to other BBI JU Key Performance Indicators (KPI), specifically:
 - Creation of at least 1 new cross-sectorial interconnection in bio-based economy clusters (KPI 1), at least 1 new bio-based value chain (KPI 2) and at least 1 new cooperation project involving farmers and biomass suppliers, industrial stakeholders and end-users (KPI 3).

Type of action: Innovation Action - DEMONSTRATION" Action



BBi 2016.D5 – Bio-based polymers/plastic materials with new functionalities for medical, construction, automotive and textile industries

Specific challenge: With a foreseen market growing around 300% during the next four years, bio-based plastics are a broad sector with the potential of expanding in virtually all fields presently dominated by fossil-based plastics. However, although the production of several polymers/plastic materials starting from renewable and bio-based sources has already been demonstrated, further improvements are still required in order to:

1. make bio-based products and the related value chains at least fully competitive in terms of functionalities, costs and sustainability, in comparison with the current fossil-based solutions; and
2. expand the range of bio-based polymers/plastic materials and of useable feedstock for their production.

The market-pull of bio-based products based on end-users' needs in different applications, calls for different properties: processability, lightness, flexibility, temperature-resistance and other mechanical features, all of which relate tightly to the purpose/application of each biopolymer and bioplastic. The demand for new and improved functionalities is increasing. The bio-based industries must be able to produce biopolymers and bioplastics with the specific, required functionalities in order to meet their projected high market demand and expand the range of application. The use of bio-based materials in some applications can add new and better properties to the targeted products, due to the inherent chemical structure of bio-based polymers and/or to the possible functionalisation of current polymers with bio-based additives (such as bio-fillers, wood, etc.).

The challenge is to demonstrate efficient production routes to bio-based polymers/plastic materials with identified functionalities that can outperform fossil-based processes and materials.

Scope: Demonstrate the techno-economic viability of the production of innovative biopolymers/bioplastic materials with functional properties matching the needs and requirements of well-identified applications in the fields of health and medical, construction, automotive, and textile markets.

Each proposal should focus on one of the abovementioned market sectors but can include more than one proposed solution for that market sector. Its subject products and materials need to demonstrate effective improvements in functionalities and savings in terms of operational costs and environmental impact.



Proposals should address a small number of well-focused applications and include the direct involvement of end-users of the developed products and materials, providing clear requirements and KPI's at the start of the proposal phase.

Proposals should demonstrate the sustainability of feedstock sourcing, material production and end-of-life handling through reusability, recyclability and/or biodegradability of the bio-plastics. The demonstrated sustainability involves the whole value chain, including actors in the supply chain, and costumers and end-users of the developed products.

Proposals should assess the feasibility of a wide application of the developed production solutions, in order to facilitate a relatively rapid scale-up and allowing a fast market deployment.

Safety, quality and purity of the products must be in line with commercial and/or regulatory requirements by actively building upon existing knowledge and standardisation activities.

Proposals should seek complementary to the projects funded under topic H2020 SPIRE-03-2016, to avoid overlaps and promote synergies.

Proposals should achieve technology demonstrated in an industrial environment, or a system prototype demonstration in operational environment. Proposals need to address the whole value chain, from feedstock sourcing to market applications (Technology Readiness Levels 6-7).

Proposals should also include a Life Cycle Assessment (LCA) in order to evaluate the environmental and socio-economic performance of the whole value chain.

It is considered that proposals with a total eligible budget of up to EUR 15 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals with another budget.

Expected impacts:

- Improved mechanical and/or functional properties of the developed products for a specific field in comparison to the current solutions.
- Eco-designed product to obtain recyclable material.
- Improved life cycle sustainability of products (including end-of-life) by 20% as compared to non bio-based counterparts.
- Reduction of environmental impact and CO₂-footprint as compared to traditional processes.
- Safety, quality and purity of the (new) products are in line with EU legislation and proven to meet end-market requirements in order to facilitate future market access and commercialisation.
- Contribution to the BBI JU Key Performance Indicators (KPI), specifically:



- Create at least 1 bio-based polymer/plastic material, showing favourable competition with fossil-based counterparts in terms of cost-competitiveness, sustainability and performance (KPI 5); and at least 2 business-to-business or consumer products based on the innovative biopolymers developed (KPI 6).

Type of action: Innovation Action – “DEMONSTRATION” Action

BBI 2016.D6 - Valorisation of the organic content of Municipal Solid Waste and contributing to the renewable circular economy

Specific challenge: Despite the improvements in sorting and recycling, a large fraction of Municipal Solid Waste (MSW) is still landfilled (31%) or incinerated (26%) across Europe¹⁰. This practice is posing environmental concerns, as well as wasting potentially useful resources contained in MSW. In particular, the abundance of sugars and other potentially interesting organic matter are identifying MSW as an alternative source of feedstock for the bioeconomy. Differentiating and enlarging the biomass feedstock portfolio are key objectives of the bio-based industries in Europe. Exploiting MSW, one of many residual streams in today’s economic activities, as a biomass feedstock source, contributes to these goals. At the same time, utilizing MSW as a feedstock source for biorefineries helps realising the EU circular economy through industrial symbiosis, i.e. collaboration between producers to use each other’s by-products.

Lab scale technologies have shown feasible treatment and subsequent conversion of the organic fraction of MSW into a number of products or intermediates for further use (fuels, chemical building blocks, polymers, additives, etc.). The challenge is to demonstrate the large-scale, economically competitive deployment of treatment and conversion technologies of the organic fraction of MSW into final or intermediate products for identified further use.

Scope: Demonstrate the techno-economic viability of the conversion of the organic fraction of MSW into chemical building blocks, polymers or additives. The developed approach should be robust and able to tackle the issues inherent to MSW treatment, such as variability in composition (among others seasonality and geographic location) and presence of inhibitors to downstream biotechnological processes.

¹⁰ Eurostat, 2013 data for EU28, <http://ec.europa.eu/eurostat/web/environment/waste/main-tables>



This topic does not focus on production of organic acids as that has been the subject of a topic in the AWP 2015 (BBI.VC4.D6.2015).

Proposals should seek the complementarity to the projects funded under topic H2020 CIRC-05-2016¹¹ and to the projects funded under topic H2020 SPIRE-03-2016¹² to avoid overlaps and promote synergies.

Proposals should validate the whole value chain at demonstration scale, with the direct involvement of waste management authorities and end-users of the targeted products. Proposals should assess the feasibility of market deployment of the products, taking into account the issues tied to the legislative framework related to waste-to-product applications. A sound business model should be provided. In particular quality and cost of the products must be such to ensure market uptake, and in any case at least comparable with existing comparable products. An accompanying full cost/benefit analysis takes into account the savings associated with avoidance of disposing of waste.

Safety, quality and purity of the products must be validated in order to meet commercial and/or regulatory requirements by actively building upon existing knowledge and standardisation activities.

Proposals should achieve technology demonstrated in an industrial environment, or a system prototype demonstration in operational environment. Proposals need to address the whole value chain, from feedstock sourcing to market applications (Technology Readiness Levels 6-7).

Proposals should also include a Life Cycle Assessment (LCA) in order to evaluate the environmental and socio-economic performance of the whole value chain.

It is considered that proposals with a total eligible budget of up to EUR 15 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals with another budget.

Expected impacts:

- Demonstration of higher added-value production than current valorisation of the organic fraction of MSW (biogas and/or compost).
- Achieved competitive price of the developed products.

¹¹ See Horizon 2020 Work Programme 2016-2017': CIRCULAR ECONOMY, CIRC-05-2016 'Unlocking the potential of urban organic waste' at:

http://ec.europa.eu/research/participants/data/ref/h2020/wp/2016_2017/main/h2020-wp1617-focus_en.pdf

¹² See Horizon 2020 Work Programme 2016-2017': SUSTAINABLE PROCESS INDUSTRIES – SPIRE, SPIRE-03-2016 'Industrial technologies for the valorisation of European bio-resources into high added value process streams' at: http://ec.europa.eu/research/participants/data/ref/h2020/wp/2016_2017/main/h2020-wp1617-focus_en.pdf



- Safety, quality and purity of the (new) products are in line with EU legislation and proven to meet end-market requirements in order to facilitate future market access and commercialisation.
- Contribution to the BBI JU Key Performance Indicators (KPI), specifically:
 - Realisation of at least 1 new cross-sectorial interconnection in bio-based economy clusters (KPI 1), at least 1 new bio-based value chains (KPI 2), at least 1 new cooperation project through cross-industry clusters (KPI 3), at least 2 new bio-based materials (KPI 5), and at least 1 consumer product based on the obtained bio-based chemicals and materials (KPI 6).

Type of action: Innovation Action – “DEMONSTRATION” Action

BBI 2016.D7 - Optimise technical production routes to bio-based chemicals in bio- or chemo-catalytic processes

Specific challenge: Production of bio-based products (like chemicals or proteins) requires affordable high quality feedstock, industrial stable conversion and sufficiently high purity levels of product streams and yields to permit further downstream conversion steps. There are still various possibilities to optimise bio-based production routes not fully applied in the bioeconomy, i.e. minimising feedstock or nutrient losses over the whole process chain that are caused by either processing or partial use of the feedstock. The challenge is to find industrial viable solutions for the processes and reduce environmental footprints (such as CO₂-emissions) via optimisation of bio-based production routes.

The challenge is to specifically optimise technical bio-based production routes in a way that minimizes nutrient losses over the whole process chain caused by either processing and/or partial use of various feedstock. Solutions may include use of agricultural side streams as substrates, optimized process options with matched fermentation organisms or new solutions regarding nutrient management.

Scope: Demonstrate the techno-economic viability of the production of cost-competitive bio-based products, in both upstream and downstream steps versus traditional processes (*state-of-the-art*).

- In bio-catalytic processes, these could include optimising process options like optimised and/or matched fermentation organisms, feeding strategies or nutrient management;
- In chemo-catalytic processes, these could include optimising processes to produce di-carboxylic acids and/or diols at high purity levels and high product yields.



Proposals should show the sustainability of the value chain, including the required feedstock for the production process, and the potential market uptake of the products for specific applications. Proposals should show efficient feedstock provision to secure supply, and identify actors in the end-user markets for the intended market applications.

Proposals should clearly show the improvements in ecology and economy of the total biorefining operation, yielding high-value bio-based products.

Safety, quality and purity of the bio-based products must be in line with commercial and/or regulatory requirements by actively building upon existing knowledge and standards.

Proposals should achieve technology demonstrated in an industrial environment, or a system prototype demonstration in operational environment. Proposals need to address the whole value chain, from feedstock sourcing to market applications (Technology Readiness Levels 6-7).

Proposals should also include a Life Cycle Assessment (LCA) in order to evaluate the environmental and socio-economic performance of the whole value chain.

It is considered that proposals with a total eligible budget of up to EUR 15 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals with another budget.

Expected impacts:

- When addressing bio-catalytic or chemical processes:
 - Increased yield of targeted bio-based product(s) by more than 20%, compared to *state-of-the-art* processes.
 - Reduced production costs of bio-based products by 10-20%, compared to current market situation.
 - Reduction of energy consumption by more than 30% for bio-catalytic processes and by more than 20% for chemical processes, as compared to *state-of-the-art* production processes.
 - Savings in terms of CO₂-emissions per kg product by more than 20% for bio-catalytic processes and by more than 30% for chemical processes, as compared to *state-of-the-art* production routes for di-carboxylic acids or bio-based diols.
- Projects under this topic should result in 1 new building block based on biomass of European origin validated at demonstration scale (KPI 4) and at least 2 new bio-based materials (KPI 5).

Type of action: Innovation Action – “DEMONSTRATION” Action



BBI 2016.D8 - New sources of proteins for animal feed from co-products to address the EU protein gap

Specific challenge: Livestock feed production is the single largest land user in the world. The rapidly growing world population and increasingly demanding consumers are causing a huge rise in the demand for meat. This causes the necessity to identify alternative protein sources to ensure a more sustainable supply of proteins for animal feed. Research has identified several feedstock families as potential sources. These include low value biorefinery side-streams, residues from the agro-food industry (fruit, vegetables, cereals side-streams), seaweeds and algae or dry land crops.

The challenge is to demonstrate the sustainability and efficiency of the identified new protein sources at sufficiently large scale to meet market demands.

Scope: Demonstrate the techno-economic viability of the sustainable, cost-efficient and consistent conversion and upgrading of industry side-streams via biorefinery into suitable quality protein products, ensuring consistent end-product quality and quantity.

Proposals should cover the whole value chain, from identification and characterisation of available feedstock, to development of a process capable of ensuring acceptable efficiency and suitable quality and quantity levels of the targeted products. In particular, proposals should involve biomass suppliers as well as breeders and farmers in order to ensure the sustainability and feasibility of the developed value chain.

Proposals must validate safety, quality and purity of the products in order to meet commercial and/or regulatory requirements. Proteins and nutrients obtained should be comparable and competitive with those from the conventional sources of proteins used for animal feed (such as plants and crops).

A Life Cycle Assessment should be part of the proposal in order to evaluate the environmental and socio-economic performance of the whole value chain.

Proposals should achieve technology demonstrated in an industrial environment, or system prototype demonstration in operational environment (Technology Readiness Levels 6-7) of the whole value chain, from feedstock identification and supply through the identified suitable processing steps into the targeted protein products, and their utilisation in animal feed. Proposals for the conversion and upgrading steps therefore include the involvement of relevant actors in the feedstock supply sector as well as in the animal feed market sector.

Proposals should also include a Life Cycle Assessment (LCA) in order to evaluate the environmental and socio-economic performance of the whole value chain.



It is considered that proposals with a total eligible budget of up to EUR 15 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals with another budget.

Expected impacts:

- In the case of the agro-food industry side-streams, demonstrated increase of income for farmers and breeders as a result of the exploitation of residues.
- Demonstrated savings in terms of water and fertilisers consumption as well as of land use in comparison with the current animal feed production.
- Proven cost-efficient value chain and economically attractive proteins production at industrial scale facilitating market acceptance and uptake of the developed products (such as proteins, nutrients).
- Projects under this topic should result in 1 new building block based on biomass of European origin validated at demonstration scale (KPI 4) and/or at least 1 new bio-based material (KPI 5).
- Contribution to other BBI JU Key Performance Indicators (KPI), specifically:
 - Creation of at least 1 new cross-sectorial interconnection in bio-based economy clusters (KPI 1) and at least 1 new bio-based value chain incorporating feedstock suppliers and protein end-users (KPI 2).

Type of action: Innovation Action – “DEMONSTRATION” Action

BBI 2016.D9 - Biomass production on unused land for conversion into added-value products while ‘boosting rural and industrial development’

Specific challenge: Europe has substantial unused land. Some of this land is in this condition because of its inherent characteristics (difficult access, location, soil composition, climate). Other parts have once been profitable as farm land or otherwise, and now are abandoned as a result of overexploitation, pollution, climate change and/or exodus from rural areas.

The challenge is to put unused land back into production by cultivating dedicated industrial and forestry crops and their conversion into added-value products for identified applications. The challenge also includes establishing required logistics to ensure the supply of these crops to biorefineries, providing for a sustainable operation with minimal losses within the value chain.

Proposals should clearly show that there is no overlap with ongoing large scale initiatives such as the Flagship project FIRST2RUN funded under the AWP2014 call¹³), rather showing

¹³ See http://cordis.europa.eu/project/rcn/197323_it.html



complementarity in terms of feedstock, land and climate conditions, products, market and replication potential in Europe. Where necessary, actions need to compare with ongoing programmes in Horizon 2020 addressing Rural Renaissance to seek synergies with other projects in this field¹⁴.

Scope: Demonstrate the technical, economical and sustainable viability of the full system of converting dedicated industrial crops, cultivated on unused lands, into added-value products.

Proposals should identify the most suitable crop varieties for the selected environment, and implement sustainable agronomic practices to ensure long term land profitability. Proposals could also contain remediation actions for marginal or contaminated soils in order to convert or return these lands to use for agricultural purposes.

Proposals should not only include the (physical) identification of potentially available lands and the subject dedicated crops, but also the required logistics (handling, storage, transportation, etc.) for a sustainable delivery of feedstock at a biorefinery. Proposals should demonstrate that the quality of the biorefinery feedstock meets requirements for its further processing and conversion into added-value marketable products for application in specific end-market sectors.

Proposals thus cover the value chain up to the gates of a typical biorefinery and allow the implementation of a 'land-integrated biorefinery', embedding the supply chain within the total value chain and involving different partners in several sectors (feedstock suppliers, industrial players, end-customers, etc.).

Proposals should seek complementarity with activities funded under European Structural and Investment Funds (ESIF), for example with those related to biorefining or novel sources of biomass feedstocks, or bioeconomy capacity building.

Proposals include participation of all the different actors within the value chain contributing with their knowledge of the economical, technical and environmental aspects and opportunities associated with the implementation of circular economy.

Proposals should achieve technology demonstrated in an industrial environment, or a system prototype demonstration in operational environment. Proposals need to address the whole value chain, from feedstock sourcing to market applications (Technology Readiness Levels 6-7).

¹⁴ See Horizon 2020 Work Programme 2016-2017': Call – Rural Renaissance - Fostering innovation and business opportunities (H2020-RUR-2016-2017) at: http://ec.europa.eu/research/participants/data/ref/h2020/wp/2016_2017/main/h2020-wp1617-food_en.pdf



Proposals should also include a Life Cycle Assessment (LCA) in order to evaluate the environmental and socio-economic performance of the whole value chain. Especially, environmental considerations should be addressed when choosing marginal lands to be cultivated (such as conservation of biodiversity and continuity in the provision of ecosystem services).

It is considered that proposals with a total eligible budget of up to EUR 15 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals with another budget.

Expected impacts:

- Turn at least 2000 hectare of current marginal lands into cultivated lands.
- Diversification and increase of farmers'/forest owners' revenues through access to new markets, and/or creation of new primary agricultural jobs.
- Safety, quality and purity of the (new) products are in line with EU legislation and have been proven to meet end-market requirements in order to facilitate future market access and commercialisation.
- Creation of new green jobs in rural areas.
- Documented evidence from biorefinery investors in building industrial assets near the new feedstock supply.
- Validated suitability of the feedstock for the production of at least 1 new building block based on biomass of European origin validated at demonstration scale (KPI 4), and/or at least 2 new bio-based materials (KPI 5) for identified market applications.
- Contribution to other BBI JU Key Performance Indicators (KPI), specifically:
 - Creation of at least 1 new cross-sectorial interconnection in bio-based economy clusters (KPI 1), at least 1 new bio-based value chains (KPI 2) and at least 3 new cooperation projects involving farmers, industrial stakeholders and end-users (KPI 3).

Type of action: Innovation Action – “DEMONSTRATION” Action



INNOVATION ACTIONS – “FLAGSHIP” ACTIONS

BBI 2016.F1 - Valorisation of by-products or waste-streams from the food processing industry into high added-value products for market applications

Specific challenge: Around 100 Mt of food waste and residues from food processing industry are generated every year in the EU¹⁵. Around 38% thereof happens at processing stage¹⁶. The waste streams of the food industry include animal-based as well as plant-based streams. These waste streams or by-products are currently either unusable and go to disposal, or find only partial, low value utilisation. Significant amounts of compounds with potential for valorisation into high added-value products are lost in these by-products or waste-streams. Furthermore, disposing of these streams in landfill causes environmental issues due to their high landfill leachate and methane-emissions. Valorisation of food processing by-products or waste-streams hence represents both an opportunity and a necessity.

The challenge is to demonstrate viable large scale valorisation of by-products or waste-streams from the food processing industry, capable of handling a wide variety in composition.

In many cases, regulatory framework may also be an obstacle: animal residues (and also some plant-based waste-streams, such as citrus peels or winery effluents in some countries) are considered as potentially hazardous wastes and are subjected to strict regulation. This implies that disposal often represents the only viable option, resulting in high costs.

Scope: Demonstrate at industrial scale the recovery of valuable bio-molecules from food processing by-products or waste-streams and their conversion into high added-value products of suitable quality to meet market requirements.

Proposals should address the whole value chain from the existing by-products or waste-streams to the end-products, including where applicable the recursive feeding of products back into the original value chain in a circular model (e.g. organic fertilisers).

¹⁵ European Commission, ‘Stop food waste’ initiative, based on 2012 data (available at http://ec.europa.eu/food/safety/food_waste/stop/index_en.htm)

¹⁶ European Commission, 2011, Preparatory study on food waste across EU 27 (available at http://ec.europa.eu/environment/eusd/pdf/bio_foodwaste_report.pdf)



Proposals addressing waste-streams or by-products that fall under specific waste legislation must prove that the developed technologies and processes fulfil regulatory requirements and are able to deliver safe products both for human health and for the environment.

Proposals should encompass the model of integrated biorefinery, be able to use a biomass from various European sources as input and be capable of delivering a range of products, either novel or equivalent to existing products.

Safety, quality and purity of the products must be in line with commercial and/or regulatory requirements by actively building upon existing knowledge and standardisation activities.

Proposals should also include a Life Cycle Sustainability Assessment in order to evaluate the environmental, social and economic performance of the whole value chain.

Proposals should achieve a system complete and qualified for successful commercial operation (Technology Readiness Level 8).

It is considered that proposals with a total eligible budget of up to EUR 30 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals with another budget.

Expected impacts:

When addressing valorisation of waste-streams:

- Reduction of waste disposal by 20% in the selected value chain, as compared to the current situation.
- Contribution to the European objective of reducing the recyclable (including organic) content in landfilled waste down to 25% by 2025 as per the EC's Landfill Directive.
- Reduction of CO₂-emissions of at least 10% versus current waste disposal practices for the selected waste stream through operational efficiency in the whole value chain

When addressing valorisation of by-products:

- Production of high value products with an improved sustainability profile.

When addressing either waste streams or by-products:

- Safety, quality and purity of the (new) products are in line with EU legislation and have been proven to meet end-market requirements in order to facilitate future market access and commercialisation.
- Contribution to the BBI JU Key Performance Indicators (KPI), specifically:
 - Creation of at least 1 new cross-sectorial interconnection in bio-based economy clusters (KPI 1), at least 1 new bio-based value chains (KPI 2), at least 3 new cooperation projects involving relevant stakeholders, such as



farmers, industrial stakeholders and end-users (KPI 3) and the production of at least one or more different bio-products from food industry by-products or waste-streams, validated from technical, economic and environmental points of view (KPI 5).

Type of action: Innovation Action – “FLAGSHIP” actions

BBi 2016.F2 – Converting bio-based feedstocks via chemical building blocks into advanced materials for market applications

Specific Challenge: Terrestrial biomass is the most abundant resource of fixed renewable carbon on earth. It is present in resources such as food crops and woody crops, as well as in agricultural and forest residues. This enormous resource of fixed renewable carbon is an attractive feedstock-base for a bio-based industry, provided this is realised in a sustainable fashion, without loss of biodiversity, not causing indirect land use change (ILUC) nor negatively affecting food security. Tapping this resource in the EU for the production of bio-based chemicals and materials, will accelerate the establishment of an EU-wide bio-based industry and contributing to the goals of Europe 2020. Today, most polymers such as polyesters, polyamides and polyolefins depart from fossil-based chemicals as building blocks. However, there are also various routes to convert biomass or bio-based feedstocks into chemicals, polymers and materials.

Projects at demonstration level (Technology Readiness Levels 6-7) already pursue the establishment of these new value chains by using bio-chemical, chemical or other technologies and processes. However, the challenge lies in establishing at industrial scale (Technology Readiness Level 8) first-of-a-kind, cost-effective biorefineries that convert biomass into chemicals, polymers and materials for identified applications.

Scope: Demonstrate at industrial scale the techno-economic viability of transforming one or multiple bio-based feedstocks into one or more bio-based chemical building blocks (such as diacids and diols, but focussing on the ones not used for energy), targeting a production capacity of at least 5,000 ton/year. Proposals should also address their further conversion into bio-materials for identified applications, as part of an integrated biorefinery concept applying a cascading approach.

Proposals should pursue all possible means of industrial symbiosis within and beyond the bio-based industrial sector. Furthermore, proposals should aim at the integration of actors along the whole value chain and, wherever possible, make use of existing facilities.



Proposals should prove the sustainable and economical access to sufficient raw material to set up the whole value chain, and include activities to ensure the functioning/organisation of a sustainable supply chain.

Proposals will assess market demand of the targeted products and will consider market-pull related activities (for example standardisation and consumers' perception) aimed at facilitating their market uptake.

Proposals are expected to verify and validate safety, quality, sustainability and purity of end-products to meet commercial requirements. Benchmarking of the targeted products and processes against commercially existing alternatives from fossil origin should also be considered.

The leading role of relevant industrial partners is considered essential to achieve the full impact.

Proposals should include a Life Cycle Sustainability Analysis in order to evaluate the environmental, social and economic performance of the developed products and the whole value chain.

Proposals should achieve a system that is complete and qualified for successful commercial operation (Technology Readiness Level 8).

It is considered that proposals with a total eligible budget of up to EUR 35 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals with another budget.

Expected Impacts:

- Opening up of significant potential for job creation in rural areas. Creating green jobs and facilitating the development of entrepreneurial activities throughout the entire value chain, with advantages for the primary sector (agriculture and forestry), the secondary sector (such as logistics, bio-product transformation industry) and the tertiary sector.
- Improved cost-efficiency and sustainability of bio-based chemical building blocks (such as diacids or diols) as compared to fossil-based ones.
- Contributing to the BBI JU Key Performance Indicators (KPI), specifically:
 - Creation of at least 1 new cross-sectorial interconnection in bio-based economy clusters (KPI 1), a new local bio-based value chain (KPI 2) that maximises the use of virgin or processed biomass for the production of bio-based chemicals and materials, at least 3 new cooperation projects involving relevant stakeholders, such as farmers, forest-owners, industrial stakeholders and end-users (KPI 3), at least 2 bio-based materials (with at least 80% of bio-based content) validated from technical, economic and environmental perspectives (KPI 5).



- Contributing to realising the objectives of Biotechnology and/or other Key Enabling Technologies under Horizon 2020 and dedicated EU policy to address the development of scientific and technological know-how in key enabling technologies and its translation into industrial products and solutions to societal challenges.

Type of action: Innovation Action – "FLAGSHIP" actions

COORDINATION AND SUPPORT ACTIONS

BBi 2016.S1 – A roadmap for the chemical industry to a bioeconomy

Specific challenge: The chemical industry in Europe is facing a number of challenges that may affect its global competitive position. The top three among these challenges relate to the enormous growth of the market and subsequent investments and production in China; the production of chemicals and materials in the Middle East based on amply available oil and gas; and the 'shale gas revolution' in the USA providing the local industry a significant advantage in raw material and energy availability. As a result, the share of European chemical production has dropped around 50% in the last 20 years. In addition, major new investments in production capacity have been taking place in China and the USA, while chemicals from these areas are increasingly finding their way to the European market.

To meet these challenges, the chemical industry in Europe has stepped up its drive towards higher resources- (raw material and water) and energy-efficiency, and has focused on business and operational excellence towards sustainability. While safeguarding base chemicals production, the industry has started to utilise renewable raw materials, making 'drop-in' bio-based chemicals to replace fossil-based products where justified, and at the same time making new bio-based products with new functionalities for initial niche market applications.

During the past years, many successful production and subsequent use of bio-based building blocks have started up. However, their production and applications are limited. Aside from technical and operational challenges, there is a plethora of hurdles in the fields of regulation and acceptance hindering the chemical industry to increase its bio-based portfolio.

The challenge is to make a clear overview of the hurdles in the fields of regulation and acceptance, set up a plan for their removal and agree on a roadmap for the chemical industry to increase production of bio-based building blocks for market applications that meet societal needs. The roadmap will specify the benefits for the chemical industry along the path towards a bioeconomy.



Scope: Develop a roadmap for the chemical industry towards a higher bio-based portfolio and enjoying the benefits from the opportunities offered by the bioeconomy. The proposal will develop a roadmap for a better, faster, and more active contribution of the chemical industry in Europe towards the bioeconomy by 2030. The study should look at:

- Identification of ‘sweet spots’ for the chemical industry in the next 10 years (i.e. where can the chemical industry be more effective and beneficial).
- Competitiveness analysis between bio- and fossil-based products, including LCA’s to assess environmental and socio-economic benefits.
- Identification of new market segments for bio-based products.
- Compilation of regulatory barriers and a strategy to overcome them.
- Show contribution of bio-based products to meeting societal needs.
- Ways to communicate the benefits of bio-based products and increase public trust.
- Communicate the chemical industry’s role as a critical driver of change into the bio-based economy and society.
- Illustrate and interconnect up- and downstream players of the value chain.
- Identify mutual benefits of cooperation between fossil- and bio-based industries.
- Start up a process to strengthen the cooperation between the chemical industry, societal and governmental organisations.
- Spell out the contribution of the chemical industry in a bioeconomy in the framework of the circular economy.

Developing a roadmap for the chemical industry should involve all stakeholders, seek complementarity to ongoing communication and awareness programmes for the community at large and also include:

- Printed documents, events, workshops, showcases, and website to increase the awareness and importance of bio-based products.
- The creation of an expert network on bioeconomy, sustainability and policy issues.

The Bio-based Industries Consortium (BIC) will set up an industry expert group from among its members which will provide expertise in the implementation and follow-up of the different tasks and also provide support to the organisation of meetings or workshops. This expert group should be a central part of the governance structure of the project.

Indicative funding: *It is considered that proposals with a total eligible budget of up to EUR 1 million would allow this specific challenge to be addressed appropriately.*

Expected impacts:

- Provide a roadmap for the chemical industry in Europe towards a valued and beneficial contribution to a bioeconomy, including production of marketable bio-based products that meet societal needs in specific market segments.
- Provide a strategy by and for the chemical industry to unfold the full potential of bio-based products in Europe, including the challenges in rules and regulations that need



to be overcome in order to boost the chemical sector's participation in the bio-economy.

Number of projects: A maximum of 1 project will be funded under this topic.

Expected duration: Up to 2 years.

Type of action: Coordination and Support Action.



BBI 2016.S2 – Bioeconomy related open access research infrastructure and assessing its capabilities for industry driven development projects

Specific challenge: Today, there are some open access research infrastructures (including private) spread across Europe, where applicants or interested parties can ‘shop’ for equipment and facilities they may need to carry out lab, test or pilot work. There is also a limited number of open access multipurpose demonstration facilities which are seen as a crucial alternative to effectively reduce the high capital investment requirements for bio-based industries from invention to the market. These infrastructures are not well known in the broad R&D&I communities across Europe. Neither are these communities aware of the type and available equipment and facilities that the various infrastructures have to offer. There is not enough insight into the extent that the available infrastructure meets the needs by bio-based industries in their ambitions to set up and implement development projects and contribute to the goals of the Bio-based Industries JU.

In addition, there are specific needs for the agro- and the forest-based bioeconomy that have to be taken into account.

The challenge is two-fold:

- (i) improve access to existing bio-economy related open access research infrastructure in Europe, ‘interconnect’ these to create a Europe-wide open access infrastructure for the bio-based industry; and
- (ii) catalyse the expansion of capabilities of the infrastructure to cost-efficiently meet the (future) needs of bio-based industries. This should include multi-purpose demonstrators which enable SMEs and larger industries to progress from technology development to demonstration and subsequently into deployment and the commercialisation stage.

The Europe-wide open access infrastructure must be capable to protect IP Rights of users.

There are ongoing activities to open up key national and regional research infrastructures to all European researchers from academia and industry and ensuring their optimal use and joint development¹⁷. Actions within BBI JU should seek synergies with these activities. Additionally, BBI-actions should be complementary with results from FP7 project BRISK¹⁸.

Scope: Map the existing bio-economy related open access research infrastructure in Europe (equipment and supporting facilities), its current utilisation, major achievements, best practices and assess its main capabilities.

¹⁷ See the ‘infrastructure’ calls in the ‘Horizon 2020 Work Programme 2016-2017’: specifically INFRAIA-01-2016-2017 that includes a segment on Energy with a topic on ‘Research infrastructures for research on biomass conversion and biorefinery’: <https://ec.europa.eu/programmes/horizon2020/en/draft-work-programmes-2016-17>

¹⁸ See BRISK (Biofuels research infrastructure for sharing knowledge) at: <http://briskeu.com>



Share the obtained overview and insight for improved access. Analyse the demand for infrastructure by bio-based industries in the future (2020+), assess needed expansion of its capabilities to meet the demand and specify conditions to realise this. Proposals should address the following elements:

- Coordinate the interconnection of major European bio-economy related open access research infrastructure (including multipurpose demonstrators) into an efficient EU infrastructure that will create possibilities for complementarity and synergies and optimal circumstances for future investments.
- Improve access to existing infrastructure via communication, publishing the accessible inventory, etc. for the bio-based industry, including SME.
- Estimate the need for open access research infrastructure by the bio-based industries in the EU now and in the future (2020+).
- Assess the current capabilities, specific and in detail for each institute/unit of the existing infrastructure and define needed expansion to meet future demand.
- Exchange Best Practices on model contracts to safeguard IP rights and facilitate the use of open access infrastructures.
- Coordinate and build on H2020 programmes and Regional activities to achieve synergy.
- Assess the openings for the use public-private financing to make viable a number of multipurpose demonstrators.

The Bio-based Industries Consortium (BIC) will set up an industry expert group from among its members which will provide expertise in the implementation and follow-up of the different tasks and also provide support to the organisation of meetings or workshops. This expert group should be a central part of the governance structure of the project.

Indicative funding: *It is considered that proposals with a total eligible budget of up to EUR 1 million would allow this specific challenge to be addressed appropriately.*

Expected impacts:

- A transparent, globally competitive, open access research infrastructure Europe-wide that caters to the need of the bio-based industries in Europe departing from lignocellulosic biomass, by offering facilities cost-efficiently. The Europe-wide infrastructure will be capable of protecting IP rights of the users.
- Identified need for research infrastructure by the European bio-based industries and the capabilities of the existing infrastructure to meet the demand.
- Measured increase of utilisation of open access infrastructure by bio-based industries, in particular by SME.
- An efficient cooperation between established major RTD providers in Europe and the research infrastructure.
- Quantified the gap of public-private financing needed to create a viable number of multipurpose demonstrators.



Number of projects: A maximum of 1 project will be funded under this topic.

Expected duration: Up to 2 years.

Type of action: Coordination and Support Action.



BBI 2016.S3 – Open-innovation Platform strengthening cooperation and joint development of bio-based industries and downstream sectors

Specific challenge: As bio-based intermediates are becoming more mature, and entering new markets, one of the major hurdles to develop new bio-based solutions is the lack of adequate knowledge of the bio-based industries of the applications; and vice-versa the unawareness of down-stream industries of those new materials. Cross-sectorial exchanges and joint development are therefore essential to imagine tomorrow's products and solutions.

Scope: Structure the exchange of bio-based industries and downstream sectors in an open-innovation process. The proposal should focus on the establishment and facilitation of the operations of an open-innovation platform looking at:

- Build prospective on the development of bio-based products markets in collaboration with downstream sectors and brand owners (for sectors like packaging, automotive, construction, textile, personal care and cosmetics, etc.).
- Assemble an ecosystem of private companies along the bio-based value chain (including first, second transformation and downstream industry) and public organisations.
- Foster exchanges within the Open-innovation platform ecosystem to better understand market and societal needs and opportunities for bio-based products development.
- Facilitate the emergence of co-innovation partnerships across industries, value chains, and scientific fields, in order to develop new bio-based solutions for tomorrow's societal needs.

Such operations should include:

- Manage a network of academic, technological and prospective experts to further the open-innovation platform vision and perform prospective studies on upcoming technologies and downstream markets.
- Create and manage online communities of interest to bring together ideas within and across the value chains, and transform ideas into innovation projects, hand-in-hand with partners.
- Create a Knowledge and Innovation Centre, respecting confidentiality, collecting the prospective and insight of the community to provide high added-value content and tools to inform the co-innovation partnerships.
Organise specific events and workshops to dig deeper into bio-based industries prospective studies and to develop networking opportunities in view of generating co-innovation projects.

The Bio-based Industries Consortium (BIC) will set up an industry expert group from among its members which will provide expertise in the implementation and follow-up of the different tasks and also provide support to the organisation of meetings or workshops. This expert group should be a central part of the governance structure of the project.



Indicative funding: *It is considered that proposals with a total eligible budget of up to EUR 1 million EUR would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals with another budget.*

Expected impacts:

- An efficient collaborative and common platform, bringing together the professionals and scientific experts around bio-based products development and downstream applications, building a common vision and prospective of the challenge ahead.
- A Knowledge and Innovation Centre, with a web platform, accompanying scientist and economic operators in the development of new solutions suited to the markets current and future needs.
- At least three detailed prospective studies on major applications sectors of the bioeconomy.
- At least 10 new co-innovation partnerships.
- Ensure continuation of the Open Innovation Platform beyond the project.

Number of projects: A maximum of 1 project will be funded under this topic.

Expected duration: Up to 3 years.

Type of action: Coordination and Support Action.

BBI 2016.S4 – Clustering and networking for new value chains

Specific challenge: Effectively operating bio-based industries encompass a wide range of actors and stakeholders spread across several economic and industrial sectors and geographic locations. Each one of them has to-date traditionally been part of a well-defined value chain. This paradigm is undergoing major changes to incorporate the rise of new valorisation routes for bio-based feedstock.

In the new bioeconomy, actors in bio-based industries integrate in 'cross-sectorial' partnerships within their traditional value chains, and develop new value chains that lapse across the traditional ones. One significant result hereof is that intermediate 'by-product', 'waste' and 'residue' streams from separate value chains can be utilised as feedstock in other value chains through biorefining. This will imply an integrated biorefinery approach and establish a circular bioeconomy.

In addition, actors in bio-based industries have developed new schemes for cascading exploitation of biomass in order to maximise the efficient use of resources and the value of products. The challenge is to establish new industrial value chains across the EU (for



example, based on industrial side-streams including those of food industry, urban bio-waste or aquatic biomass, etc.), crossing boundaries of traditional sectors and value chains as well as enhancing the exploitation of local resources. This will encompass the interaction across sectors with different expertise and new different business and cooperation models. With this approach technical hurdles will be overcome through cooperation between the industrial sectors and innovative technology developers; all actors also need to combine forces to address non-technological hurdles (for example related to policies).

Clusters, being networks of cities/local authorities, waste operators, biomass producers (forest, agriculture), and regions across Member States, are instrumental to develop new value chains and support the development of new processes and materials.

Scope: Establish cooperation and integration across sectors, value chains and geographical borders to develop new bio-based value chains and facilitate market uptake.

Proposals should target actions on overcoming the existing sectorial thinking and proactively build bridges between different sectors and industries across Europe. Cooperating across boundaries of sectors, value chains and countries will exploit opportunities for symbiosis, synergies and complementarity in expertise and infrastructure.

Proposals should coordinate with on-going projects and activities that address bioeconomy regional strategies. For instance, the smart specialisation strategies, as coordination principle, could build more critical mass in the value chains valorising local resources.

The focus should be on the identification and establishment of concrete new networks resulting in new value chains involving the relevant actors. Proposals should also link to Horizon 2020 and EU initiatives that address similar needs. These are for example the European Innovation Partnerships (EIPs) 'Agricultural Productivity and Sustainability', 'Raw Materials' and 'Water Efficiency'.

Proposals should address the following elements:

- Linking producers of biomass, including 'alternative' biomass such as algae and other aquatic and terrestrial biomass, residues from food crops, agriculture and forest activities and bio-waste in general, with other stakeholders such as waste management operators, state and local administrations, to actors in biorefining and users of bio-based products.
- Establishing new clusters and networks of local authorities and stakeholders in the bio-based industries aiming at building new value chains that lapse across traditional value ones.
- Expanding the cooperation between existing (biorefinery) clusters across Europe to exploit opportunities for symbiosis, synergies and complementarity in expertise and infrastructure.
- Maximising the use of technologies for information exchange and knowledge transfer between actors in the value chains at a European level.



The Bio-based Industries Consortium (BIC) will set up an industry expert group from among its members which will provide expertise in the implementation and follow-up of the different tasks and also provide support to the organisation of meetings or workshops. This expert group should be a central part of the governance structure of the project.

Indicative funding: *It is considered that proposals with a total eligible budget of up to EUR 0.5 million would allow this specific challenge to be addressed appropriately.*

Expected impacts:

- New synergies among activities between the primary sector (agriculture, forestry, aquatic, etc.) and industries with biological waste and residues streams from processes, and the bio-based industries (KPI 1 and KPI 3).
- Concrete initiatives to identify and create new networks resulting in new bio-based value chains involving the relevant actors from different industrial sectors.
- Demonstrated more intense and specific knowledge transfer among industrial partners and other stakeholders in the bioeconomy.
- New clusters of bio-based knowledge and expertise across the EU, fostering the competitiveness of the European bioeconomy.

Type of action: Coordination and Support Action.



2.2.7. Call management

2.2.7.1. Conditions of the 2016 Call

Call identifier: H2020-BBI-JTI-2016

Publication date: 18-04-2016¹⁹

Deadline: 15-09-2016²⁰ 17:00:00 (Brussels local time) - (single stage call)

Indicative budget: 188.65 Million Euros^{21 2223}

Estimated value of the in kind contributions by the members other than the Union or their constituent entities (BIC): Minimum 110 Million Euros

INDICATIVE BUDGETS by type of actions

Topic	Indicative budget (million EUR)
Research and Innovation Actions	
BBI 2016.R1 - Valorisation of the organic content of wastewater as feedstock, contributing to the renewable circular economy	50.0
BBI 2016.R2 - Develop consolidated bioprocesses for direct fermentation into bio-compounds for chemicals and materials	
BBI 2016.R3 - Improve control over microorganism growth in bio-catalysis operations in order to reduce/avoid contamination without antibiotics	
BBI 2016.R4 - Flexible biorefining technologies able to handle different feedstock, leading to new value chains or enlarging existing ones by utilising the same processing plant	
BBI 2016.R5 - Advanced biomaterials for smart food packaging	
BBI 2016.R6 - Bio-based alternatives to improve protection of human health and the environment	
BBI 2016.R7 - Biopolymers with advanced functionalities for high performance applications	

¹⁹ The BBI JU Executive Director may decide to open the call up to one month prior to or after the envisaged date of opening.

²⁰ The BBI JU Executive Director may delay this deadline by up to two months.

²¹ In case the budget of a given line cannot be consumed (totally or partially) the corresponding budget will be allocated to the topics under the other budget lines

²² This figure refers to EUR 187.9 million of EU funding (incl. reactivations of unused operational appropriations from 2014 and 2015) and EUR 0.75 million by the members other than the Union.

²³ Subject to the adoption of the European Commission Financing Decision 2016 for the Bio-based Industries Joint Undertaking. The final total funding for projects includes EFTA contributions.



Topic	Indicative budget (million EUR)
BBI 2016.R8 - Emerging technologies for conversion of Municipal Solid Waste and improving waste-to-chemicals value chains	
BBI 2016.R9 – Exploiting algae and other aquatic biomass for the production of molecules for pharma, nutraceuticals, food additives and cosmetic applications	
BBI 2016.R10 – industrial biotransformation for the production of bio-based chemicals	
BBI 2016.R11 – Recover and reuse enzymes to reduce costs of existing industrial processes	
BBI 2016.R12 - Emerging technologies for separation and purification of fermentation products to obtain high grade bio-based monomers at industrial level	
Innovations Actions – “DEMONSTRATION” Actions	
BBI 2016.D1 - Improve sustainability of value chains based on forest biomass and increase productivity and profitability on supply side by adapting forests to climate changes	70.2
BBI 2016.D2 – Improvement and adaptation of industrial crop varieties and novel sources of biomass to diversify biomass feedstock for biorefineries	
BBI 2016.D3 - Valorisation of lignin and other side-streams to increase efficiency of biorefineries and increase sustainability of the whole value chain	
BBI 2016.D4 - New and optimised biorefinery approaches enabling the creation of local value chains in underdeveloped or unexploited areas	
BBI 2016.D5 – Bio-based polymers/plastic materials with new functionalities for medical, construction, automotive and textile industries	
BBI 2016.D6 - Valorisation of the organic content of Municipal Solid Waste and contributing to the renewable circular economy	
BBI 2016.D7 - Optimise technical production routes to bio-based chemicals in bio- or chemo-catalytic processes	
BBI 2016.D8 - New sources of proteins for animal feed from co-products to address the EU protein gap	
BBI 2016.D9 - Biomass production on unused land for conversion into added-value products while ‘boosting rural and industrial development	
Innovation Actions – “FLAGSHIP” Actions	
BBI 2016.F1 - Valorisation of by-products or waste streams from the food processing industry into high added-value products for market applications	40.0
BBI 2016.F2 – From biomass feedstocks to innovative chemicals and materials	25.0
Coordination and Support Actions	



Topic	Indicative budget (million EUR)
BBI 2016.S1 – A roadmap for the chemical industry to a bioeconomy	3.5
BBI 2016.S2 - Bioeconomy related open access research infrastructure and assessing its capabilities for industry driven development projects	
BBI 2016.S3 – Open-innovation Platform strengthening cooperation and joint development of bio-based industries and downstream sectors	
BBI 2016.S4 – Clustering and networking for new value chains	

- Indicative timetable for the evaluation and grant agreement

Information on the outcome of the evaluation	Indicative date for the signing of grant agreements
Maximum 5 months from the final date for submission	Maximum 8 months from the final date for submission



2.3. Call management rules

The BBI JU operates under the Horizon 2020 rules for participation, set out in Regulation (EU) No 1290/2013 of the European Parliament and of the Council of 11 December 2013 laying down the rules for participation and dissemination in "Horizon 2020 - the Framework Programme for Research and Innovation (2014-2020)" and repealing Regulation (EC) No 1906/2006.

The only derogation from Horizon 2020 Rules for Participation is described in the Commission delegated regulation (EU) No 623/2014 of 14 February 2014 establishing a derogation from Regulation (EU) No 1290/2013 of the European Parliament and of the Council laying down the rules for participation and dissemination in 'Horizon 2020 — the Framework Programme for Research and Innovation (2014-2020)' with regard to the BBI JU. According to the applicable above mentioned delegated regulation, for Research & Innovation Actions (RIAs) and Coordination & Support Actions (CSAs), only SMEs; secondary and higher education establishments; non-profit legal entities, including those carrying out research or technological development as one of their main objectives; the JRC; and international European interest organisations are eligible for funding.

2.3.1. List of countries eligible for funding

Part A of the General Annexes²⁴ to the Horizon 2020 Work Programme shall apply mutatis mutandis for the actions covered by this Work Plan with the following derogation:

Coordination and Support actions (CSA) and Research and Innovation Actions (RIA)	By way of derogation from Article 10(1) of Regulation (EU) No 1290/2013, with regard to the BBI JU only the following participants shall be eligible for funding from the BBI JU for actions in the area of bio-based industries other than innovation actions: <ul style="list-style-type: none"> (a) small and medium-sized enterprises; (b) secondary and higher education establishments; (c) non-profit legal entities, including those carrying out research or technological development as one of their main objectives; (d) the Joint Research Centre; (e) international European interest organisations.
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²⁴http://ec.europa.eu/research/participants/data/ref/h2020/other/wp/2016-2017/annexes/h2020-wp1617-annex-ga_en.pdf



2.3.2. Standard admissibility conditions and related requirements.

Part B of the General Annexes to the Horizon 2020 Work Programme shall apply for the actions covered by this Work Plan.

2.3.3. Standard eligibility conditions.

Part C of the General Annexes to the Horizon 2020 Work Programme shall apply for the actions covered by this Work Plan.

2.3.4. Types of action: specific provisions and funding rates

Part D of the General Annexes to the Horizon 2020 Work Programme shall apply for the actions (i.e. Coordination and Support Actions, Research and Innovation actions and Innovation Actions) covered by this Work Plan with the following additions:

Research and innovation actions

R&I actions aim to fill the technological gaps within specific value chains. The impact for the whole value chain must be clearly shown. R&I actions cover actions with TRL from 3 to 5.

Innovation actions

Innovation Actions should address the whole value chain from feedstock sourcing to the market applications.

A "demonstration" action moreover shall include the establishment of a demo-scale production facility in Europe, being it a new installation, substantial modification of an existing facility, or use of existing demo facilities. Demonstration projects cover TRL 6-7. This requires that access to European biomass is ensured. It also means that they need to include an exploitation plan, sustainability assessment and to address consumer engagement. Related costs at the level of the action are eligible for Horizon 2020 funding only within the limits of the applicable Horizon 2020 rules for innovation actions.

A "flagship" action²⁵ aims to support the first application/deployment in the market of an innovation that has already been demonstrated but not yet applied/deployed in the market

²⁵ Flagship action complies with the definition of H2020 market replication actions as described in Part D of the General Annexes of the H2020 Work Programme.



due to market failure/barriers to uptake²⁶. Proposers for a flagship project shall provide clear evidence of previous validation of the proposed process at demonstration scale. First means new at least to Europe or to the application sector in question. A flagship action shall address a complete value chain from procurement, growth, supply of feedstock material to the final product(s). It shall include the establishment of a large scale production facility in Europe or a substantial modification of an existing facility, or reconversion of old or abandoned industrial facilities. Related costs at the level of the action are eligible for Horizon 2020 funding only within the limits of the applicable Horizon 2020 rules for innovation actions. Flagships actions cover TRL 8. Projects may include limited research and development activities. Flagship initiatives are required to ensure deployment of technologies in biorefineries, and bring new bio-based products to the market, achieve the creation of new jobs and reduction of environmental impact.

Coordination and support actions

Coordination and Support Actions can address cross-sectorial challenges and supporting value chains through knowledge development (studies) and networking.

2.3.5. Technology readiness levels (TRL)

Part G of the General Annexes to the Horizon 2020 Work Programme shall apply for the actions covered by this Work Plan.

2.3.6. Evaluation Rules

Part H of the General Annexes to the Horizon 2020 Work Programme shall apply for the actions covered by this Work Plan.

The evaluation criteria are applied as set out in the table below (different from Part H of the General Annexes):

Type of action	Excellence	Impact	Quality and efficiency of the implementation
Coordination and Support	Clarity and pertinence	The extent to which the outputs of the	Quality and effectiveness of the work plan,

²⁶ Market replication' does not cover multiple applications in the market of an innovation that has already been applied successfully once in the market. 'First' means new at least to Europe or new at least to the application sector in question. Often such projects involve a validation of technical and economic performance at system level in real life operating conditions provided by the market.



<p>Actions (CSA)</p>	<p>of the objectives;</p> <p>Soundness of the concept and, credibility of the proposed methodology;</p> <p>Quality of the proposed coordination and/or support measures.</p>	<p>project would contribute to each of the expected impacts mentioned in the work plan under the relevant topic;</p> <p>Quality of the proposed measures to:</p> <ul style="list-style-type: none"> • Exploit and disseminate the project results (including management of IPR), and to manage research data where relevant. • Communicate the project activities to different target audiences 	<p>including extent to which the resources assigned to work packages are in line with their objectives and deliverables;</p> <p>Appropriateness of the allocation of tasks, ensuring that all participants have a valid role and adequate resources in the project to fulfil that role.</p> <p>Complementarity of the participants and extent to which the consortium as whole brings together the necessary expertise (if relevant);</p> <p>Appropriateness of the management structures and procedures, including risk and innovation management;</p>
<p>Research and Innovation Actions (RIA)</p>	<p>Clarity and pertinence of the objectives;</p> <p>Soundness of the concept and, credibility of the proposed methodology;</p> <p>Extent that the proposed work is beyond the state of the art, and</p>	<p>The extent to which the outputs of the project would contribute to each of the expected impacts mentioned in the work plan under the relevant topic;</p> <p>Any substantial impacts not mentioned in the work plan, that would</p>	<p>Quality and effectiveness of the work plan, including extent to which the resources assigned to work packages are in line with their objectives and deliverables;</p> <p>Appropriateness of the management structures and procedures, including risk and</p>



	<p>demonstrates innovation potential (e.g. ground-breaking objectives, novel concepts and approaches, new products, services or business and organisational models)</p> <p>Appropriate consideration of interdisciplinary approaches and, where relevant, use of stakeholder knowledge.</p>	<p>enhance innovation capacity, create new market opportunities, strengthen competitiveness and growth of companies, address issues related to climate change or the environment, or bring other important benefits for society;</p> <p>Quality of the proposed measures to:</p> <ul style="list-style-type: none"> • Exploit and disseminate the project results (including management of IPR), and to manage research data where relevant. • Communicate the project activities to different target audiences <p>Extent to which the proposed consortium own contribution will help maximising the impact of the action.</p>	<p>innovation management</p> <p>Complementarity of the participants and extent to which the consortium as whole brings together the necessary expertise (if relevant);</p> <p>Appropriateness of the allocation of tasks, ensuring that all participants have a valid role and adequate resources in the project to fulfil that role.</p>
Innovation Actions (IA)	<p>Clarity and pertinence of the objectives;</p> <p>Soundness of the concept and, credibility of the proposed</p>	<p>The extent to which the outputs of the project would contribute to each of the expected impacts mentioned in the work plan under the</p>	<p>Quality and effectiveness of the work plan, including extent to which the resources assigned to work packages are in line with their objectives and deliverables;</p>



	<p>methodology;</p> <p>Coverage of the value chain (raw materials, equipment and technology suppliers and end-users);</p> <p>Extent that the proposed work is beyond the state of the art, and demonstrates innovation potential (e.g. ground-breaking objectives, novel concepts and approaches, new products, services or business and organisational models) Appropriate consideration of interdisciplinary approaches and, where relevant, use of stakeholder knowledge.</p>	<p>relevant topic;</p> <p>Any substantial impacts not mentioned in the work plan, that would enhance innovation capacity, create new market opportunities, strengthen competitiveness and growth of companies, address issues related to climate change or the environment, or bring other important benefits for society;</p> <p>Quality of the proposed measures to:</p> <ul style="list-style-type: none"> • Exploit and disseminate the project results (including management of IPR), and to manage research data where relevant. • Communicate the project activities to different target audiences <p>Extent to which the proposed consortium own contribution, including additional</p>	<p>Appropriateness of the management structures and procedures, including risk and innovation management</p> <p>Appropriateness of the allocation of tasks, ensuring that all participants have a valid role and adequate resources in the project to fulfil that role.</p> <p>Complementarity of the participants and extent to which the consortium as whole brings together the necessary expertise (if relevant);</p> <p>Soundness of the business case and business plan;</p> <p>Readiness of the technology for the implementation of the pilot phase, demonstration or flagship²⁷.</p>
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²⁷ Applicants should demonstrate the readiness of the technology for the implementation of the pilot phase. In particular, for flagships applicants must demonstrate that by the time of the submission of their application they have been operating relative demonstration scale plants at a significant production capacity (justification shall be provided in the proposal).



		investments, will help maximising the impact of the action	
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Scoring and weighting

Unless otherwise specified in the call conditions:

- a. Evaluation scores will be awarded for the criteria, and not for the different aspects listed in the above table. For full proposals, each criterion will be scored out of 5. The threshold for "excellence" and "implementation" criteria will be 3, whereas for the "impact" criterion the threshold will be 4. The overall threshold, applying to the sum of the three individual scores, will be 11.
- b. For Innovation Actions, to determine the ranking, the score for the criterion "impact" will be given a weight of 1.5.

Only for the Flagship topics 2016 (H2020-BBI-JTI-2016): As part of the panel review, the BBI JU may organise hearings with applicants of proposals, If hearings are held, the proposals that have passed the individual thresholds must be invited (even if they fell short of the overall threshold).

2.3.7. Budget flexibility

Part I of the General Annexes to the Horizon 2020 Work Programme shall apply for the actions covered by this Work Plan, meaning that the budget set out in this Work Plan are indicative. Unless otherwise stated, final budgets may vary following evaluation. The final figures may vary by up to 20% compared to those indicated in this Work Plan, for the following budgeted activities:

- total expenditure for calls (up to 20% of the total expenditure for each call);
- repartition of call budgets within a call (up to 20% of the total expenditure of the call);
- evaluation and monitoring (up to 20% of the total expenditure for all these activities);
- other individual actions not implemented through calls for proposals (up to 20% for each one).

Changes within these limits shall not be considered to be substantial within the meaning of Article 94(4) of Delegated Regulation (EU, Euratom) No 1268/2012.



2.3.8. Consortium agreement

The legal entities wishing to participate in a project shall form a consortium and appoint one of its members to act as its coordinator. They will conclude a Consortium Agreement among themselves prior to the signature of the Grant Agreement.

2.3.9. Dissemination and information about projects results

The results of the Call 2015.2 and 2016 proposal evaluation will be disseminated by BBI JU via press releases, presentations at internal (EC, BIC, Governing Board, Scientific Committee, States Representatives Group) and external (e.g. info day) stakeholder events, Twitter, as well as the BBI website (e.g. the 'Projects' part of the website which is expected to be operational in Q1 2016).

These channels will also be used to disseminate and communicate about significant results of on-going BBI JU projects funded via the 2014 and 2015 Calls for proposals.



2.4. Support to Operations

2.4.1. Communication activities and events

BBI JU's communication policy is aimed at ensuring political and public awareness of ongoing BBI JU projects and activities, in order to gain acceptance and support from various audiences at the European and national level.

For this reason, the role of all BBI JU stakeholders will be essential, especially the State Representatives Group, as the interface towards Member States, national and regional policies and programmes. In order to achieve these objectives, a communication strategy, including a short and long-term plan for the BBI JU, will include specific actions in order to ensure outreach to both stakeholders and public. This communication strategy will be developed and co-managed by the BBI JU Communication & Stakeholders Relationships Officer, who will become operational in Q1 2016.

The main communication objectives are to:

- Raise awareness of the BBI JU among key stakeholders across Europe, especially in those countries where participation in the bio-based field is still low. This objective will require work meetings and site visits in targeted regions as well as an established network among the European regions through the European Regions Research and Innovation Network, the Committee of Regions and policy makers.
- Promote stakeholders' engagement along and across the value chains in order to facilitate cooperation and knowledge exchange. This objective will require the organization of and/or participation in fora, conferences on specific topics of the value chains as well as the use of a partnering platform to stimulate internal information flows.
- Promote BBI JU within the EU institutional arena. This objective consists of gaining political support for BBI from the EU institutions and EU Member States through the promotion of BBI JU, its objectives and achievements. Target audiences for this objective include the European Parliament and/or the Council and Policy makers in EU Member States. This objective will require the organization of events inside the European Parliament, the participation in high-visibility events such as exhibitions, Open Days, as well as publications/ presentations of key BBI JU achievements.
- Establish and develop a media network of press and media contacts in order to achieve considerable visibility in both specialized and general media. This network



could be useful for producing real-time press releases and specific articles for publication.

- Pro-actively publish communication material in regards to external events, meetings, etc. related to BBI JU. A broad dissemination of factsheets, leaflets, etc. will enhance the visibility of BBI JU towards other stakeholders, including the general public.
- Mobilise applicants for BBI JU Calls for proposals. This objective aims at expanding the type and amount of applicants for future BBI JU calls. In this context particular attention will be paid to facilitate networking among potential applicants, for instance by improving the BBI Partnering Portal tool as well as by attracting participants from Countries with low participation.
- Manage the BBI JU website and Twitter account in order to stimulate public interaction on key issues and improve public awareness on BBI JU activities.

The BBI JU will leverage the following main channels in order to reach its goals:

- Both internal and external events (Conferences and Forums)
- Website
- Partnering Platform
- Newsletter
- Media (articles etc.)
- Publications of factsheets, leaflets
- Info Day

In the last quarter of 2015, the BBI JU together with BIC and EC has discussed a strategy including specific measures to widen the participation of member states, associated countries, regions and stakeholders in the BBI JU programme to leverage the full potential of the EU bio-based industrial sector. Since the BBI initiative was launched some countries, regions and stakeholders have proven to be less active (e.g. marginal participation in Calls; limited contribution to consultation processes; low participation in general promotional activities such as the BBI JU Info Days; geographical imbalance reflected in Bio-based Industries Consortium (BIC) membership). During 2016 it is expected to launch specific actions to address these aspects. . It is envisaged that the engagement of Industry, European Commission and Member States would be required for successful implementation of this strategy. Maximising the potential of the SRG and Horizon 2020 NCPs is deemed very important.

Finally, it is expected strengthening the participation of the BBI JU staff in relevant conferences, workshops, events to the bio-based industrial sector during 2016. The aim is to promote and raise awareness on the BBI JU programme and activities.



An Info Day for the 2016 call for proposals it is also planned to be held enough time in advance of the deadline to submit proposals. Back to back to the 2016 Info Day is expected to organise a brokerage event.

2.4.2. Procurement and contracts

In 2015 BBI JU has requested to participate in various Framework contracts that will be concluded by the end 2015 beginning of 2016.

This includes:

- New Framework contract with PMO for business cards, according to the estimated provided by PMO it will be concluded in Q2 2016.
- New Framework contracts with DIGIT for IT equipment and software.
- New Framework contract with DG BUDG for the delivery of Financial Trainings, according to the timetable provided by DG BUDG it will concluded before Q3 2016.

All the JUs will conclude in 2016 a joint procurement for the engagement of interim staff. The procurement has been published in the official journal in October 2015 and it will be concluded in Q1 2016.

Also a negotiated procedure will concluded by February 2016 for the BBI JU online partnering platform.

In general BBI JU will follow and request when relevant to be part of the Framework contract launched by the European Commission.

2.4.3. IT and logistics

For the 2016 call for proposals, the Commission H2020 IT systems will be used for the publication of the call, the submission and evaluation of proposals as well as for the grant agreement preparation and project management. The BBI JU will explore the possibilities in accordance with the Common Support Centre (CSC) to adapt the submission and reporting guidelines and templates to its own needs. The CSC has been established to harmonise application and evaluation procedures for Horizon 2020 and bring legal, auditing and IT services together in one place.



About logistics, BBI JU will use the evaluation platform managed by REA to evaluate all the proposals submitted to its calls.

A business continuity plan (BCP) and disaster recovery plan (DRP) must also be put in place. As part of this process business impact analysis (BIA) and threat and risk analysis (TRA) must be performed.

The Joint Undertakings located in the White Atrium building are all determined to develop a long-term IT strategic plan.

2.4.4. JU Executive Team – HR matters

MANAGEMENT OF THE PROGRAMME OFFICE

The Programme Office will implement its activities in compliance with the applicable rules and procedures to support the appropriate management of public and private funds, under the leadership of the Executive Director who is the Chief Executive responsible for the day-to-day management of the BBI JU in accordance with the decisions of the Governing Board.

Staff implementation

In order to implement the strategy defined by the present work plan for 2016, the following needs of the Programme Office in terms of staff and recruitment (see Staff Establishment Plan in section 3.2.) will be addressed:

- A Head of Finance and Administration will be recruited in 2016. He/she will have responsibility over the following sectors: Human Resources, Budget/Finance, Contracting and IT. He/she shall ensure that the different teams under his/her supervision deliver professional and efficient services at the BBI JU.
- A Head of Programme will be recruited in 2016. He/she will support and manage the team of 6 programme managers recruited in 2015.
- A Personal Assistant to the Executive Director will also be recruited in 2016. He/she will assist the Executive Director in the daily management of the Programme Office.
- 3 Assistants will be recruited in order to reinforce the Programme Office and cope with the increased volume of work.

The recruitment of these positions (Temporary Agents and Contract Agents) does not change the volume of staff appropriations or the limit of the total number of authorised posts as foreseen in the BBI JU staff establishment plan.

In order to cope with peak periods of work the BBI JU, in collaboration with the 5 other Joint Undertakings present in the White Atrium building, will launch a joint procurement procedure to cover the provision of interim staff in 2016.

Administrative/legal matters



In 2016, BBI JU HR function will continue to develop its internal guidelines and strengthen its legal framework, paying particular attention to how EC implementing rules apply to the BBI JU particularities.

The BBI JU HR function will also develop in 2016 a learning and development policy. The BBI JU values the continuous development of its staff to ensure that they are competent in their roles and can respond to changing requirements.

The BBI JU wants to promote opportunities for long-term career development where this meets individual and BBI JU needs.

2.4.5. Administrative budget and finance

The European Commission's Accrual Based Accounting system (ABAC) is used for accounting purposes.

Furthermore, the specific Financial Rules, adopted by the BBI JU Governing Board on 27 June 2014 and amended on 9 December 2014, define powers and responsibility of the BBI JU Accounting Officer, making explicit reference to the possibility that this function could be attributed to the EU Commission Accounting Officer.

2.4.6. Data protection

BBI JU applies the relevant EU legislation about data protection and access to information. The role of the Data protection officer is fulfilled by the Legal Manager.

2.5. Governance

The BBI JU supervisory and executive bodies are the Governing Board (GB) and the Executive Director. In addition, there are two advisory bodies: the Scientific Committee and the States Representatives Group.

2.5.1. Governing board



The Governing Board has overall responsibility for the strategic orientation and the operations of the BBI JU and shall supervise the implementation of its activities, in accordance with Article 7 of the BBI JU Statutes²⁸.

The EC and BIC each have five representatives with the same voting rights.

The Governing Board was established at its first meeting on 27 June 2014. In 2016, the Governing Board is planning to hold three ordinary meetings and a telephone conference. One of the ordinary meetings will take place at Utrecht on 11 April 2016, following BIC's initiative of having a GB meeting in the context of the Dutch Presidency of the EU.

The key activities are listed below:

Key activities in 2016 – timetable	
Adopt/approve the key documents for the BBI JU's operations: 2015 Annual Activity Report, reference documents relating to Call for proposals, 2015 Annual accounts, etc.	Q1
Approve the list of actions selected for funding on the basis of the ranking list produced by a panel of independent experts of the 2015 Call for proposals	Q1 –Q3
Adopt/approve the key documents for the BBI JU's operations in 2016: 2016 Annual Work Plan, 2016 budget and staff establishment plan	Q4

2.5.2. Executive Director

According to Article 9 of the BBI JU Statutes, the Executive Director is the chief executive responsible for the day-to-day management of the BBI JU in accordance with the decisions of the Governing Board. The Executive Director is the legal representative of the BBI JU. The Executive Director is accountable to the Governing Board. He is supported by the staff of the Programme Office.

The BBI JU Director was appointed on 1 September 2015. He took up his duties on 1 October 2015. Autonomy of BBI JU was reached on 26 October 2015.

2.5.3. Scientific Committee

²⁸ Annex to the Council Regulation (EU) No 560/2014 of 6 May 2014 establishing the Bio-based Industries Joint Undertaking ("BBI Regulation").



According to Article 10 of the BBI JU Statutes, the Scientific Committee is an advisory body to the Governing Board. It was established at its first meeting on 1 September 2014. It conducts its activities in close liaison and with the support of the Programme Office.

The members reflect a balanced representation of world-wide recognised experts from academia, industry, SMEs, non-governmental organisations and regulatory bodies. Collectively, the Scientific Committee members have the necessary scientific competencies and expertise covering the technical domain needed to make science-based recommendations to the BBI JU. At present, the Scientific Committee consists of twelve members. It can be composed of no more than fifteen members.

The Scientific Committee carries out the following tasks:

- (a) advise on the scientific priorities to be addressed in the annual work plans;
- (b) advise on the scientific achievements described in the annual activity report.

The Scientific Committee was consulted on the preparation of this Work Plan.

During the year 2016, at least two meetings of the Scientific Committee are planned. They are expected in Q1/Q2 and Q3/Q4. Additional meetings could take place to address major issues.

Key activities in 2016 - timetable	
4 th Meeting of the SC. The SC would: <ul style="list-style-type: none"> - Provide advice on the scientific achievements described in the annual activity report 2015 - Provide advice on the detailed plan of the research and innovation activities for 2016 Call 	Q1/Q2
5 th Meeting of the SC. The SC would: <ul style="list-style-type: none"> - Advise on the scientific priorities to be addressed in the annual work plan 2017 - Provide advice to the GB on the programme progress of the BBI (in relation to work plan 2016) and other strategic issues 	Q3/Q4

During 2016 it is expected to enlarge the SC up to 15 members in order to make the most of this committee ensuring full coverage of all the required expertise.



2.5.4. States Representatives Group

The States Representatives Group (SRG) was established at its first meeting on 3 September 2014. According to Article 11 of the BBI JU Statutes, the States Representatives Group consists of one representative of each Member State and of each country associated to Horizon 2020. It elected a chair and a vice-chair among its members.

The States Representatives Group is consulted and, in particular, reviews information and provides opinions on the following matters:

- (a) programme progress of the BBI JU and achievement of its targets, including the calls for proposals and proposals evaluation process;
- (b) updating of strategic orientation;
- (c) links to Horizon 2020;
- (d) annual work plans;
- (e) involvement of SMEs.

The States Representatives Group was consulted on this Annual Work Plan.

The States Representatives Group also provides information to, and acts as an interface within, the BBI JU on the following matters:

- (a) the status of relevant national or regional research and innovation programmes and identification of potential areas of cooperation, including deployment of relevant technologies, to allow synergies and avoid overlaps;
- (b) specific measures taken at national or regional level with regard to dissemination events, dedicated technical workshops and communication activities;
- (c) specific measures taken at national or regional level with regard to deployment activities in relation to the BBI Initiative.

The States Representatives Group may issue, on its own initiative, recommendations or proposals to the Governing Board on technical, managerial and financial matters as well as on annual plans, in particular when those matters affect national or regional interests.

During the year 2016, at least two meetings of the States Representatives Group are planned (Q1/Q2 and Q3/Q4). Additional meetings could take place to address major issues.



Key activities in 2016 - timetable	
<p>4th Meeting of the SRG. The SRG would:</p> <ul style="list-style-type: none"> - Selection of the Vice-Chair - Provide an opinion or recommendations on the BBI JU programme progress and achievement of targets and other strategic issues. Specific discussion on the widening participation strategy - Provide updated information on regional and national research and innovation programmes; dissemination and communication activities; and deployment activities in relation to BBI. Follow-up of the questionnaire sent for the preparation of the SRG meeting on 28/10/2015. - Discuss initiatives to improve the promotion and the deployment of the BBI JU initiative and the participation of national stakeholders in BBI JU call for proposals at national level and allow synergies with the BBI JU activities. Presentation of the work carried out by a task force on deployment activities within the SRG. 	Q1/Q2
<p>5th Meeting of the SRG. The SRG would:</p> <ul style="list-style-type: none"> - Provide an opinion on the 2017 draft Annual Work Plan - Issue recommendations on the BBI JU programme progress and achievement of targets and other strategic issues - Provide updated information and discuss initiatives on: regional and national research and innovation programmes to allow synergies; dissemination and communication activities; and deployment activities in relation to BBI. 	Q3/Q4

2.6. Internal Control framework

BBI JU adopted in September 2015 its internal control framework.

During 2016, the Programme Office will develop and implement this framework further to ensure that critical risks are appropriately mitigated, key priorities are achieved, legal and regulatory requirements are complied with, and evolving stakeholders' expectations are met.



More specifically, throughout 2016, the Programme Office plans to:

- Establish and monitor the annual action plan for the implementation of BBI's internal control system, which is based on ICSs that have been prioritised for the year as well as on implementation of
- Maintain an integrated and systematic risk management process in its annual planning cycle, including the conduct of an annual full risk assessment exercise;
- Assess and formally report on BBI's compliance with the ICS and on the overall effectiveness of the internal control framework. The results of this exercise will also contribute to the annual reporting and declaration of reasonable assurance of the Executive Director.

The following ICSs have been prioritised for the year 2016:

-ICS 3 and ICS 7 (Staff allocation and Organisational structure)

During 2016 BBI JU will complete its recruitment procedures, having by Summer 2016 a stable and complete structure. These recruitments will have an impact on the organisation of the Programme Office that will need to be followed up closely.

-ICS 6 (Risk management)

The transition towards a fully autonomous body imply, per se, a number of risks that need to be carefully monitored and addressed both at operational level (Programme Office) and at Governing Board level. A risk assessment will be part of the annual programming cycle. A risk register and action plan will be implemented. The risk management action plan will be realistic and will take into account the cost/benefit aspects in order to avoid disproportionate control measures. Processes will be put in place to ensure that actions are implemented according to plan and continue to be relevant.

-ICS 8 and 9 (Processes and procedures and management supervision)

BBI JU operating procedures will need to be further developed, and adapted them to the new reality of BBI's autonomy.

Anti-fraud strategy

BBI JU will implement an anti-fraud strategy in line with the European Commission Anti-Fraud Strategy (COM(2011)376) applicable to its services and also extended to agencies and other EU bodies. Anti-fraud measures are an essential part of sound financial management required under the EU Financial Regulation.



2.6.1. Financial procedures

The BBI JU has adopted a Manual of Financial Procedures that includes the description of the Financial Circuits. Also, the Internal Control framework with its Action Plan has been adopted.

2.6.2. Ex-ante and ex-post controls

The BBI JU follows the ex-ante and ex-post control established in its Financial Rules.

2.6.3. Audits

The internal audit function it is performed by the Commission's internal auditor.

Regarding ex-post audits BBI JU is part of the H2020 common Audit Strategy, developed and implemented by the Common Audit Service of the Commission. First ex-post audit are expected to be concluded in 2017.

The BBI JU and its bodies shall avoid any conflict of interest in the implementation of the activities.

According to Article 26 of the Financial Rules, the internal audit function shall be performed by the Commission's internal auditor. The internal auditor shall advise the BBI JU on dealing with risks, by issuing independent opinions on the quality of management and control systems and by issuing recommendations for improving the conditions of implementation of operations and promoting sound financial management. The first visit of the Internal Auditor is scheduled for 2016 Q1.

The BBI JU shall protect the financial interests of the members and implement anti-fraud measures. In particular, the BBI JU shall ensure that the financial interests of its members are adequately protected by carrying out or commissioning appropriate internal and external controls.

Furthermore, the Internal Control Standards from the Commission have been adapted for the purpose of the BBI JU and a Manual of Procedures has been also adopted.



2.6.4. Annual activity report

The Annual Activity Report (AAR) presents the progress made by the BBI JU in each calendar year, in particular in relation to the Annual Work Plan for that year.

It will include information on the performed activities, the costs and the contribution of the BBI JU for any individual project, the participation of SMEs and any other activities during the previous year, with the corresponding expenditure.

The AAR for 2015, together with the annual accounts and balance sheets, will be presented in 2016 to the Governing Board by the Executive Director. Once approved by the Governing Board, it will be made public.





3. BUDGET 2016²⁹

3.1. Budget information

I - Statement of revenue:

Heading	Amended.1 Budget 2016 Commitment appropriations (in €)	Amended.1 Budget 2016 Payment appropriations (in €)	Budget 2015 Commitment appropriations (in €)	Comments on 2016 figures
EU contribution excl. EFTA	158,082,500	62,095,038	201,908,289	
of which Administrative	1,946,263	1,946,263	1,412,372	Council regulation of 6 May 2014 establishing the Bio-Based Industries Joint Undertaking
of which Operational	156,136,237	60,148,775	200,495,917	Council regulation of 6 May 2014 establishing the Bio-Based Industries Joint Undertaking
EFTA contribution ³	4,315,652	1,695,195	5,941,622	
of which Administrative	53,133	53,133	47,042	Council regulation of 6 May 2014 establishing the Bio-Based Industries Joint Undertaking
of which Operational	4,262,519	1,642,062	5,894,580	Council regulation of 6 May 2014 establishing the Bio-Based Industries Joint Undertaking
Industry (cash) contribution	2,943,315	2,193,315	1,572,886	
of which Administrative (incl. 2/6 compensation for 2014)	2,193,315	2,193,315	1,572,886	Council regulation of 6 May 2014 establishing the Bio-Based Industries Joint Undertaking
of which Operational ²	750,000	0	0	Council regulation of 6 May 2014 establishing the Bio-Based Industries Joint Undertaking
SUB-TOTAL title revenues	165,341,467	65,983,548	0	
C2 reactivation of unused appropriations from administrative expenditure (2015)	1,108,111	1,212,639	0	Reactivation using the n+3 rule.

²⁹ Subject to the adoption of the European Commission Financing Decision 2016 for the Bio-based industries Joint Undertaking.



C2 reactivation of unused appropriations from operational expenditure (2014)	1,846,292	0	0	Reactivation using the n+3 rule. Unused appropriations from call 2014 (not contracted by any project).
C2 reactivation of unused appropriations from operational expenditure (2015)	26,000,000	0	0	Reactivation using the n+3 rule. Unused appropriations from call 2015.1 (not contracted by any project).
SUB-TOTAL reactivations	28,954,403	1,212,639	0	
GRAND TOTAL	194,295,870	67,196,187	209,422,797	

1. As non-industry partners alone committed the full BBI JU estimated administrative costs in 2014 (revised version of BBI JU budget 2014 = 581,758€), industry has agreed to compensate as of 2015 (onwards) by committing the same amount. In 2016, industry will therefore commit 2/6 of the 2014 amount which was due from them for these costs (agreement signed in April 2015). This amount is then subtracted from the 2016 total BBI JU administrative costs and the remaining balance is split on an equal basis between industry and non-industry partners.
2. BIC's cash contribution to BBI JU 2016 commitment appropriations for operational expenditure.
3. EFTA % = 2.73% for 2016.

II - Statement of expenditure

Title Chapter	Heading	Amended.1 Budget 2016 Commitment appropriations (in €)	Amended.1 Budget 2016 Payment appropriations (in €)	Budget 2015 Commitment appropriations (in €)	(Adapted ²) Budget 2015 Payment appropriations (in €)	Comments on 2016 figures
1	Staff Expenditure	3,357,069	3,403,334	1,500,100	1,500,100	



1 1	Staff in active employment	2,966,572	2,978,572	1,243,200	1,243,200	Amongst which: basic salaries, family allowances, expatriation, insurances against sickness/accidents and occupational diseases for Temporary and Contractual agents; Annual travel costs from the place of employment to the place of origin; SLA with PMO for administrative services
1 2	Staff recruitment / Miscellaneous expenditure	160,739	165,892	158,300	158,300	Amongst which: cost to cover potential replacement
1 3	Mission and duty travels	168,798	171,565	60,000	60,000	Amongst which: mission expenses, duty travel expenses and other ancillary expenditure
1 4	Other staff costs (socio-medical structure)	52,960	78,853	33,600	33,600	Amongst which: Medical services; Mobility costs and other social expenses; Training expenses
1 5	Entertainment and representation expenses	8,000	8,452	5,000	5,000	Amongst which: Costs incurred by authorised staff in meeting the JU's obligations in respect of representation in the interests of the service
2	Other administrative expenditure	1,943,753	2,002,016	1,532,200	1,532,200	
2 0	Rental of buildings and associated costs	314,178	314,178	263,000	263,000	Amongst which: Rents; Provisions for charges
2 1	Administrative information technology	156,155	195,932	158,300	158,300	Amongst which: Hardware purchases; Software development & purchases; Day-to-day maintenance; sTesta connection; various ABAC fees; Printer related expenses
2 2	Movable property and associated costs	55,099	55,099	25,000	25,000	Amongst which: The purchase / maintenance of office equipment
2 3	Current administrative expenditure	28,889	42,524	16,100	16,100	Amongst which: Stationery and office supplies; Petty expenditure; Documentation and library expenditure, subscriptions; Translation, interpretation
2 4	Telecommunications and postal charges	24,588	28,500	9,700	9,700	Amongst which: postage, telephones, internet and mobile communication expenses
2 5	Expenditure on formal meetings	170,388	147,921	100,300	100,300	Amongst which: Governing Boards, SRG meetings, SC meetings
2 6	External communication, information, publicity	356,445	379,153	190,000	190,000	Amongst which: All communication costs of the JU including the Stakeholder Forum
2 7	Studies	110,000	110,000	10,000	10,000	Amongst which: All studies (incl. audit) costs of the JU
2 8	Experts contracts and evaluations	728,011	728,709	759,800	759,800	Amongst which: All expert and meeting costs for evaluations and project reviews
3	Operational expenditure	188,995,048	61,790,837	206,390,497	18,042,892	Amongst which: All operational costs of the JU
3 0	Previous years' calls	0	61,790,837			
3 1	Addition to call 2015.2	341,071	0			
3 2	Call 2016	188,653,977	0			
	EXPENDITURE	194,295,870	67,196,187	209,422,797	21,075,192	



1. Adapted version of BBI JU 2015 budget (adopted by Governing Board on 09/12/14) where EU and EFTA operational payment appropriations have been updated (from total = 18,086,227€ to 18,042,892€) to take into account Jan 2015 small cut in EU general 2015 budget.



3.2. Staff Establishment Plan

Function group and grade	2016			
	Request of the Joint Undertaking		Draft Budget Request	
	Permanent posts	Temporary Posts	Permanent posts	Temporary Posts
AD 16				
AD 15				
AD 14		1		1
AD 13		1		1
AD 12				
AD 11		2		2
AD 10		2		2
AD 9				
AD 8		2		2
AD 7		2		2
AD 6				
AD 5				
AD total		10		10
AST 11				
AST 10				
AST 9				
AST 8				
AST 7		3		3
AST 6				
AST 5				
AST 4				
AST 3				
AST 2				
AST 1				
AST total		3		3
AST/SC 6				
AST/SC 5				
AST/SC 4				
AST/SC 3				
AST/SC 2				
AST/SC 1				
AST/SC total				
TOTAL		13		13
GRAND TOTAL		13		13

Staff resources also include 5 GF IV and 4 GF III contract agents.



4. LIST OF ACRONYMS

2016 AWP	2016 Annual Work Plan
BBI JU	Bio-Based Industries Joint Undertaking
BIC	Bio-based Industries Consortium
SIRA	Strategic Innovation and Research Agenda
EC	European Commission
GB	Governing Board of the BBI JU
SC	Scientific Committee of the BBI JU
SRG	States Representatives Group of the BBI JU
SMEs	Small and Medium-Size Enterprises
AAR	Annual Activity Report
NCPs	National Contact Points in Horizon 2020
CSC	Common Support Centre
REA	Research Executive Agency