



ANNUAL WORK PLAN and Budget 2018

for the

Bio-based Industries Joint Undertaking

In accordance with the Statutes of the BBI JU annexed to Council Regulation (EU) No 560/2014.

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This document establishes the 2018 Annual Work Plan and Budget, outlining the scope and details of research and innovation activities prioritised for the Call for Proposals in 2018, as well as the governance and activities of the Bio-Based Industries Joint Undertaking (BBI JU) foreseen for 2018. The drafting of this document is done via two separate processes covering the call topics and the rest of the document content. Call topics are developed via a collaboration between the Bio-based Industries Consortium (BIC), the European Commission and the BBI JU. The rest of the document is mainly drafted by BBI JU with input from the two members. The text is consulted in several phases with the BBI JU advisory bodies, and finally the Executive Director presents the document to the Governing Board which formally adopts it.

The document consists of four parts:

1. An introduction, including a description of BBI JU's background, objectives and mission.
2. The description of the scope and details of research and innovation activities of the Call 2018, call and project management rules, BBI JU's support to operations, governance and the internal control framework.
3. BBI JU's 2018 Budget including the staff establishment plan
4. A list of acronyms.

1. INTRODUCTION

1.1. BBI JU's Background

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 moving towards a post-petroleum society, the Communication aims to integrate better biomass producing and processing sectors in order to reconcile food security, natural resource scarcity and environmental objectives with the use of biomass for industrial and energy purposes.

Against this background, the BBI JU was established in 2014. It 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 (SIRA), published in March 2013 and updated on July 2017.

The European Union is represented by the European Commission (EC). BIC is a non-profit organisation that was created to represent the group of industries 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, universities, research and technology centres, European trade associations, and European Technology Platforms. BIC's aim 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 to BIC. It applies general principles of openness and transparency regarding membership, achieving a broad industrial involvement.

BIC and the EC developed the initial SIRA and the up-dated 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. It identifies research, demonstration and deployment activities to be carried out by a Joint Technology Initiative on bio-based industries, the BBI JU.

1.2. BBI JU's Objectives

The overall 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.

This objective should be achieved through the support of research and innovation activities, using resources from the public and private sectors. To this end, the BBI JU should organise calls for proposals aimed at supporting research, demonstration and deployment activities.

To achieve a 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.

Complementarities with other parts of Horizon 2020 such as Societal Challenge 2, the biotechnology area of the Leadership in Enabling and Industrial Technologies (LEIT) and SPIRE are to be encouraged.

The specific objectives of the BBI JU are to:

1. contribute to the implementation of Regulation (EU) No 1291/2013 and in particular Part III of Decision 2013/743/EU;
2. 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:
 - i. 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;
 - ii. develop business models that integrate economic actors along the whole 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
 - iii. 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 2018

2.1. Executive summary

The 2018 Annual Work Programme and Budget (AWP) is the fifth one on the critical path towards 2020; it continues to be based on the acceleration of the development of new sustainable value chains from biomass feedstock supply via efficient processing, to the acceptance and application of bio-based products in the end-markets.

The AWP 2018 will continue to focus on the need to better integrate biomass feedstock suppliers at the front end of the value chain, creating a demand for biomass feedstock from biorefining processes. Similarly, the AWP will stimulate the building of partnerships with end market actors to create a 'market pull' for bio-based products for identified applications.

The Strategic Innovation and Research Agenda (SIRA) of 2013 included the main defined technological and innovation challenges to developing sustainable and competitive bio-based industries in Europe . It was adjusted in 2017 namely through the addition of some new objectives that reflect the ambitions and objectives of the members of the Bio-based Industries Consortium (BIC) at the end of 2016. It confirmed the four strategic orientations that AWP of prior year was already referring to for the call 2017:

1. foster the supply of sustainable biomass feedstock to feed both existing and new value chains;
2. optimise efficient processing for integrated biorefineries through research, development and innovation;
3. develop innovative bio-based products for identified market applications;
4. create and accelerate the market-uptake of bio-based products and applications

In 2018 the call has an indicative budget of EUR 115 million for a total of 21 topics with 11 RIAs topics, 3 CSAs, 5 DEMOs and 2 FLAGs. For the first time in BBI JU Calls the RIAs include 6 RIA topics with the additional eligibility criterion that at least one participant of each consortium has to be a constituent entity of the Bio-based Industry Consortium (BIC).

The interim evaluation report of BBI JU published on 9 October 2017 highlights the impact of the programme on the structuring effect for the European Bio-based Industries sector, the high level of SME participation, the openness of the calls for proposals and underlined the actions favouring a widened participation. Following the recommendations of the experts, and on top of its core mission, the programme office of BBI JU's, together with its founding partners EC and BIC, will strengthen in 2018 its support with a particular emphasise in four areas:

1. promotion of the widening participation strategy targeting countries not enough represented;
2. further develop synergies and complementarities with other initiatives;
3. develop and implement a specific action plan towards SME participation;
4. business intelligence to monitor and analyse the current status and trends of the bio-based industries in Europe.

The communication and stakeholder management action plan 2018 will target a wider group of stakeholders, shifting from BBI "recognition" to "reputation". As a consequence, it should reinforce the strength of the PPP highlighting: the impact of the initiative through storytelling, the EU added value, the Industry commitment and the strategic alignment of the founding members.

2.2. Operations

2.2.1. Objectives and indicators of the AWP2018

In 2018, BBI JU will contribute to overcoming the main technological and innovation challenges described in the SIRA. To this end, it aims at achieving the targets set for the year 2020 on each of the specific KPIs defined in the Specific Programme implementing Horizon 2020, the Impact Assessment of the BBI JU, and the SIRA. Tables 1 and 2 show how the planned actions in 2018 are expected to contribute to the specific targets.

Table 1: Specific research and innovation objectives of BBI JU and related Key Performance Indicators (KPIs): Expected contributions of successful 2018 actions.

Objectives & KPIs		TARGET 2020	Addressed in AWP 2018			
			CSA	RIA	Demo	Flag
Objective	New cross-sector interconnections in the bio-based economy (new bridges creating cooperation between the different sectors and actors)					
KPI 1	Number of new cross-sector interconnections in BBI JU projects	36	0	6	5	4
Objective	New bio-based value chains					
KPI 2	Number of new bio-based value chains created/realised with BBI JU projects	10	0	5	5	5
Objective	New building blocks based on biomass of European origin					
KPI 4	Number of new bio-based building blocks developed (TRL 3), validated (TRL 4-5) or demonstrated (TRL 6-7) with BBI JU projects	5	0	0	0	0
Objective	New bio-based materials					
KPI 5	Number of new bio-based materials developed (TRL3), validated (TRL 4-5) or demonstrated (TRL 6-7-8) with BBI JU projects	50	0	3	0	3
Objective	New demonstrated ‘consumer’ products based on bio-based chemicals and materials					
KPI 6	Number of new bio-based ‘consumer’ products or bio-based applications demonstrated (TRL 6-7-8) with BBI JU projects	30	0	2	8	4
Objective	BBI flagship projects producing new bio-based intermediate products (materials, chemicals) or bio-based consumer products, which have proven to become cost-competitive with the alternatives based on fossil resources or other non-renewable resources					

Objectives & KPIs		TARGET 2020	Addressed in AWP 2018			
			CSA	RIA	Demo	Flag
KPI 7	Number of Flagship grant agreements signed between BBI JU and the project consortia	5	0	0	0	2
KPI 8	RIA 'TRL gain': validated, improved technologies that fill gaps in value chains and make for new chemical building blocks, new materials, new 'consumer' products or new applications.	20	0	6	0	0
Number of new and improved processing technologies validated with BBI projects. This KPI is complementary to KPIs 4, 5 and 6.						

Note: The description of the specific BBI JU objectives and KPIs is provided in the Impact Assessment of the BBI JU¹ and in the Strategic Innovation and Research Agenda (SIRA) developed by the industry, in collaboration with the EC (SIRA Version 2017, Table 7 'BBI Key Objectives' page 62-63).²

The monitoring of the above mentioned KPIs (table 1) will be based on data collected from the yearly periodic project reporting. The quantitative KPI information will be completed by qualitative information, e.g. details on interconnected sectors and co-operations' modes for KPI 1, details on what is new in value chains (KPI 2), and details on final markets and bio-based applications (for KPIs 4-6). KPI 3 (number of grant agreements) and KPI 7 (number of flagships) will be measured at programme level and the numbers will refer to successful projects, i.e. those that have signed Grant Agreements and have delivered the expected outcomes. BBI JU will report on the progress against KPIs in its Annual Activity Report.

¹ http://eur-lex.europa.eu/resource.html?uri=cellar:7959e353-eaf4-11e2-a22e-01aa75ed71a1.0001.01/DOC_1&format=PDF

² http://bbi-europe.eu/sites/default/files/documents/BBI_SIRA_web_0.pdf

Table 2: Overall and cross-cutting objectives of BBI JU Programme and related monitoring indicators: Expected contributions of successful 2018 actions.

Objectives & Indicators		Targets	
Objective	A broad participation of SMEs	Target at the end of BBI JU programme	
KPI	Share of EU financial contribution going to BBI JU beneficiaries flagged as SME at Grant Agreement signature stage	20% of EU contribution allocated to SMEs (Horizon 2020 target)	
Objective	Widening participation	Target at the end of BBI JU programme	
KPI	Share of participants and EU financial contribution going to BBI JU beneficiaries originating from newer Member States and Associated Countries, at Grant Agreement signature stage	Increased participation of less active countries ³	
Objective	Private funding to be provided according to BBI JU Regulation	Target at the end of BBI JU programme	Addressed in AWP 2018
KPI	PPP leverage: - financial contribution already committed by private members in project selected for funding	Programme level: See article 4 of the BBI JU Regulation	Public funding: EUR 113 million. Private funding: - EUR 45 million in kind contributions by the members other than the Union or their constituent entities consisting of the costs incurred by them in implementing indirect actions less the contribution of the BBI JU and any other Union contribution to those costs. - EUR 2 million financial contribution by the members other than the Union to the BBI JU operational costs counting towards the EUR 182 500 000 set out in

³ The participation will be monitored by 1) comparing the participation from a country in the current call with its participation in the previous BBI JU call as well as 2) analysing the evolution of its participation year by year.

Objectives & Indicators		Targets	
			the BBI JU Regulation Statutes.
Objective	Reach an appropriate balance between research, innovation and deployment	Target at the end of BBI JU programme	Addressed in AWP 2018
KPI	Indicative share (%) of RIAs, Demonstration Actions (IA), Flagship Actions (IA) and supporting Actions (CSA)	Programme level: reach a balance of RIA 30.5 % – DEMO 30.5 % – FLAG 35.5 % – CSA 3.5 % (of public funding)	RIA 35.7 % (EUR 41 million); IA – Demonstration Actions 26.1 % (EUR 30 million); IA – Flagship Actions 36.5 % (EUR 42 million) ; CSA 1.7 % (EUR 2 million

The indicators mentioned in Table 2 are part of a broader range of Horizon 2020 Performance Indicators⁴ and together with other indicators will also be included in the BBI JU's Annual Activity Report. Those indicators will be measured at both programme and project level. For example, participation statistics (applicants by country, SMEs) will be extracted at programme level from the general statistics based on the submission and Grant Agreement signature stage for past calls. This will be completed with further details from on-going projects based on data collected from the annual and / or periodic project reporting (e.g. share SMEs introducing innovations new to the company or the market).

In October 2017, the Experts Group Report on the Interim Evaluation of the Bio-based Industries Joint Undertaking (2014-2016) operating under Horizon 2020 was published⁵. The recommendations contained in the report will be addressed in an action plan to be approved by BBI JU GB in 2018. The BBI JU and its founding members are going to implement this Action Plan in 2018. Some of the recommendations are already included in this AWP.

BBI JU Office operational efficiency. BBI JU operates under Horizon 2020 rules and it therefore has the legal obligation to monitor, continually and systematically, the implementation of its programme, as well as to report and to disseminate the results of this monitoring on an annual basis.⁶ The operational monitoring is based on indicators which are common to all Horizon 2020 programmes and include for example the following: 1) time to inform (TTI) all applicants of the outcome of the evaluation of their application from the final date for submission of proposals (target TTI max: 153 calendar days); 2) time to grant (TTG) measured from the Call deadline to the grant signature (target TTG < 243 days). BBI JU will ensure the efficiency of all operations and the results of its operational monitoring will be included in the Annual Activity Report.

2.2.2. Risk Management BBI JU Annual Work Plan 2018

The BBI JU conducted a risk assessment exercise within the scope of the objectives and priorities set out in the AWP 2018. The risk identification and assessment evaluated the root causes of each risk and their potential consequences, taking into account the existing controls as well as the

⁴ Based on Annex II (PERFORMANCE INDICATORS) and Annex III (MONITORING) to Council Decision 2013/743/EU.

⁵ <http://ec.europa.eu/research/evaluations/pdf/bbi.pdf>

⁶ This legal requirement is set out in Article 31 of the Regulation (EU) No 1291/2013 establishing Horizon 2020.

convergences and inter-dependencies between risks. This process has been documented in the internal Risk Register of the organisation, which incorporates a description of the respective action plans, detailing the action owners and individual deadlines.

At the end of 2017 a total of 17 risks have been identified and described in the Risk Register with different degrees of importance, convergence and inter-dependency. None of these risks were assessed as being critical from an overall BBI JU perspective.

Compared to previous years, some threats have been absorbed and reduced by an increased internal control and experience matured over the core activities, as in particular is the case of the Horizon 2020 grant processes, notably on the evaluation and review processes.

Some other risks persist to appear in the remit of the Programme Office and the mitigating actions envisaged in the past will continue to be applied in 2018. This is the case also for those processes that are not fully implemented yet and where a closer monitoring will support the relevant control measures already in force.

The Risk Register remains an internal living document and the management of identified risks will be ensured through appropriate mitigating actions, wherever possible, and continuously monitored by BBI JU throughout the year.

2.2.3. Scientific priorities and challenges.

In continuation from 2017, the scientific priorities and impacts for the year 2018 were identified by BIC and the EC, in collaboration with BBI JU, via a wide consultation which targeted industry members of BIC, universities, RTOs, European Technology Platforms and European industry associations, and BBI JU's advisory bodies - the State Representative Group Committee (SRG) and the Scientific Committee (SC).

The scientific priorities are aligned with the adjusted SIRA, at the heart of which are the bio-based value chains and their composing four pillars. These four pillars form the four strategic orientations of the bio-based industry in Europe and hence of this AWP:

The strategic orientations for 2018 are⁷:

1. foster supply of sustainable biomass feedstock to feed both existing and new value chains;
2. optimise efficient processing for integrated biorefineries through research, development and innovation (R&D&I);
3. develop innovative bio-based products for identified market applications;
4. create and accelerate the market-uptake of bio-based products and applications.

1. Foster supply of sustainable biomass feedstock to feed both existing and new value chains

Strategies: expand and diversify the biomass feedstock portfolio through improving utilisation of existing sources and tapping into new sources.

Sub-orientations for this strategic orientation and their anticipated impacts⁸ are:

⁷ It should be noted that not all priorities given in the lists below have been taken up in this Annual Work Plan 2018, as the given strategic orientations are valid for both 2017 and 2018.

Improve the utilisation of existing feedstock sources from the agro-, forest-, marine, chemical and waste industry sectors, also in geographical areas with currently low bio-based activities. This includes feedstock from the paper and pulp and the food production and processing industries.

Expected impacts include: rural development; increased employment (green jobs) and job security in rural areas; higher income for farmers and forest owners; lower environmental impact.

Contribution to KPIs 1, 2, 3, 4, 5 and 6.

- Expand the utilisation of the organic fraction of municipal solid waste (MSW), sludge from the urban wastewater treatment, industrial organic waste and residues from perennial crops as feedstock source for the bio-based industry.

Expected impacts include: rural development; increased employment (green jobs) and job security in rural areas; lower environmental impact; lower CO₂-emissions from landfilling and incineration.

Contribution to KPIs 1, 2, 3 and 4.

- Exploit the opportunities of aquatic biomass as feedstock for the bio-based industry.

Expected impacts include: coastal development; increased employment (green jobs) and job security in coastal areas; lower environmental impact.

Contribution to KPIs 1, 2 and 3.

- Valorise co-products and residues from bio-based operations, including (existing) biorefineries.

Expected impacts include: lower environmental impact; lower CO₂-emissions.

Contribution to KPIs 1, 2 and 3.

2. Optimise efficient processing for integrated biorefineries through research, development and innovation (R&D&I)

Strategies: improve efficiency and sustainability of 'biorefining biomass into compounds for chemicals (including food and feed ingredients) and materials' and develop new, breakthrough processes.

Sub-orientations for this strategic orientation and their anticipated impacts⁹ are:

- Improve the effectiveness of pre-treatment steps.

⁸ The impacts refer to the Level 2 KPIs in the SIRA, measuring the effectiveness of implementing the BBI programme (see overview in Annex 1).

⁹ The impacts refer to the Level 2 KPIs in the SIRA, measuring the effectiveness of implementing the BBI programme (see overview in Annex 1)

Expected impacts include: higher production capacity; higher yields of bio-based building blocks; higher competitiveness of the EU bio-based industry; lower environmental impact.

Contribution to KPIs 1, 2 and 3.

- Further increase the efficiency of chemo- and bio-catalysis targeting better product quality, higher selectivity, higher output, lower cost and/or lower energy consumption.

Expected impacts include: increased production capacity; lower time-to-market of up-scalable processes for integrated biorefineries; higher yields of bio-based building blocks.

Contribution to KPIs 1, 2, 3 and 4.

3. Develop innovative bio-based products for identified market applications

Strategies: increase the applicability of high value-added bio-based products and avoid price competition with fossil-based products by pursuing advanced functionalities and unmatched performance.

Sub-orientations for this strategic orientation and their related anticipated impacts¹⁰ are:

- Bio-based materials that outperform fossil-based materials in comparable applications in the packaging, construction, agriculture, transportation, personal care and hygiene sectors.

Expected impacts include: efficient use of sustainable raw material; cost-effective, high added-value products with unmatched performance in desired applications.

Contribution to KPIs 1, 2, 3, 4, 5 and 6.

- Breakthrough bio-based chemicals that have no fossil-based counterpart or industrial scale production.

Expected impacts include: efficient use of sustainable raw material; cost-effective, high added-value products with unmatched performance in desired applications; higher competitiveness of the EU bio-based industry.

Contribution to KPIs 1, 2, 3 and 4.

- New bio-based chemicals and materials for high value applications meeting all safety and regulatory requirements.

Expected impacts include: new cooperation and business models with sustainable raw material; cost-effective, high added-value products with unmatched performance in desired applications.

Contribution to KPIs 1, 2, 3 and 4.

¹⁰ The impacts refer to the Level 2 KPIs in the SIRA, measuring the effectiveness of implementing the BBI programme (see overview in Annex 1)

- Proteins and bio-based additives from plants, residual streams in the food production and other (waste) streams that are rich on protein and high value molecules.

Expected impacts include: new cooperation and business models with sustainable raw material; cost-effective, high added-value products; lower environmental impact; higher competitiveness of the EU bio-based industry.

Contribution to KPIs 1, 2, 3, 4, 5 and 6.

- Bio-based plastics that are biodegradable/compostable or suitable for recycling.

Expected impacts include: lower environmental impact; higher competitiveness of the EU bio-based industry.

Contribution to KPIs 1, 2, 3, 4, 5 and 6.

4. Create and accelerate the market-uptake of bio-based products and applications

Strategies: Respond to the concerns of society about bio-based products by engaging in dialogue with societal and consumer groups on benefits and how potential risks are addressed and managed.

Sub-orientations for this strategic orientation and related anticipated impacts¹¹ are:

- Identify and propose solutions to remove (potential) hurdles to the increased use of the organic fraction of waste (specific co-products, side streams and residues from industrial and urban sources) for the bio-based industry.

Expected impacts include: accelerated establishment of regulatory framework to enable the expansion and diversification of biomass feedstock for the bio-based industry; higher competitiveness of the EU bio-based industry; lower environmental impact.

Contribution to KPIs 1, 2, 3, 4, 5, 6 and 7.

- Increase and improve communication and dialogue with all stakeholders on the benefits and possible risks of new bio-based products. These include materials for applications with food contact (such as nutraceuticals and packaging materials), in the pharmaceutical sector, and possibly also in the construction, agriculture, transportation, personal care and hygiene sectors.

Expected impacts include: higher awareness and acceptance of consumers and market sectors of bio-based materials and applications; higher competitiveness of the EU bio-based industry.

Contribution to KPIs 1, 2, 3, 4, 5, 6 and 7.

- Establish cooperation and partnership with brand owners and consumer representatives to improve market access of sustainable bio-based products.

¹¹ The impacts refer to the Level 2 KPIs in the SIRA, measuring the effectiveness of implementing the BBI programme (see overview in Annex 1)

Expected impacts include: higher awareness and acceptance of consumers and market sectors of bio-based materials and applications; larger spread of bio-based products and applications throughout the EU; higher competitiveness of the EU bio-based industry.

Contribution to KPIs 1, 2, 3, 4, 5, 6 and 7.

2.2.4. Follow-up of the 2017 calls for proposals

The 2017 call was closed on 7 September 2017. A total of 149 eligible proposals were received. The 149 proposals were evaluated by independent experts, first remotely as of 26 September and then centrally between 10 October and 10 November 2017 over three non-consecutive weeks. The ranking list of projects to be funded is expected to be adopted by the Governing Board at the end of 2017. In accordance with the established procedures, the Grant Agreement Preparation phase starts directly after the Governing Board decision and is expected to be concluded during May 2018.

Activities for 2018

Finalisation of the 2017 call management process (*)	
Finalisation of evaluations (information on outcome of the evaluation)	Q4 – 2017 / Q1 2018
Preparation and signature of the grant agreements for the selected proposals	Q1/Q2 - 2018
Pre-financing payments	Q2 – 2018
Follow-up of project implementation	Starting Q2 - 2018

(*) maximum 8 months from the final date for submission of completed proposals (7/09/2017), according to Horizon 2020 rules

2.2.5. The 2018 Call for proposals

Introduction

This Annual Work Plan follows the structure of the new edition of the Strategic Innovation and Research Agenda (SIRA)¹² of the Bio-based Industries Consortium (BIC). At the heart of the SIRA, and central to BIC's mission, are the bio-based value chains and the pillars around which they are structured, which aim to:

- foster supply of sustainable **biomass feedstock** to feed both existing and new value chains;
- optimise efficient **processing** for integrated biorefineries through research, development and innovation (R&D&I);
- develop **innovative bio-based products for identified market applications**; and
- create and accelerate the **market-uptake** of bio-based products and applications.

These pillars form the four strategic orientations of the bio-based industry in Europe. Each strategic orientation, or SO, has sub-orientations.

¹² Strategic Innovation and Research Agenda, May 2017; Bio-based industries for development and growth in Europe; see <http://biconsortium.eu/library/bic-documents>.

The key focus of a topic in the Annual Work Plan (AWP) for 2018 determines its positioning in a particular SO and relevant focal area. For example, if a topic focuses on a new technology for the conversion of biomass feedstock into compounds for further valorisation, the topic will be placed in SO2 (processing), however, this does not exclude using the resulting side streams as feedstock (SO1). The positioning of a topic in a specific SO does not mean that its scope is limited to that SO. On the contrary, all SOs together make up a value chain and any proposal for a topic in an SO must take the full value chain into consideration, with the objective to optimise the value chain. The extent to which this needs to happen depends on the type of action. A research and innovation action (RIA), for example, may focus on resolving a technological challenge in a value chain (placing it in SO2), but does so to make an existing full value chain operate better or make a totally new value chain possible. An innovation action (IA – demonstration and flagship) must cover a full value chain, from feedstock (SO1) to market uptake (SO4), even if it focuses on a specific SO.

All proposals must ensure that the biomass supply chain is sustainable, can integrate with and does not offer competition to the food chain, and causes neither indirect land use change (ILUC) nor water and soil health imbalances.

The topics contain requirements that should always be considered when drafting a proposal and may differ slightly depending on the topic. Here are some examples:

All proposals should specifically demonstrate the **benefits versus existing state-of-the-art** technologies. This might include evidence of new processing solutions and new products obtained.

Proposals focusing on integrating biomass feedstock supply should offer solutions to the hurdles and bottlenecks affecting logistics, transport modes and associated infrastructure in the targeted **biomass feedstock supply** systems. These hurdles and bottlenecks may include collection systems, intermediate storage and safety aspects. Dealing with these hurdles and bottlenecks should in particular be covered by the Innovation Actions – demonstration and flagship projects.

In the context of the BBI annual work plans, ‘bio-based chemicals and materials’ can include components and ingredients for food and feed. Proposals addressing bio-based chemicals and materials therefore should interpret these in a broad sense; they can include polymers, fibres, proteins, food and feed ingredients, bioactive chemicals, etc.

All proposals should commit to conducting, as part of the project, an **environmental assessment** using **life-cycle assessment (LCA)** methodologies based on available standards, certification, and accepted and validated approaches. Demonstration actions should also assess the economic impact. This means that when a consortium has developed a process or a product, an LCA should be performed to assess the environmental and other impacts of the developments. If applicable, proposals should also analyse social impacts.

Life-cycle thinking should also be a part of RIA topic proposals, even though the technology readiness level (TRL) at the end of the project is less than or equal to 5. For RIAs, the LCA may be limited so as to identify critical issues early on and steer the development process in the right direction. In this case, it is essential that the selection of the critical issues is carefully explained and justified in the proposal in order to allow for an assessment by the expert evaluators. Points to be addressed are, among others:

- the impact criteria, such as water, biomass resource and energy uses;

- LCA approach-related uncertainties, including the sensitivities of any modelling performed, limitations and data gaps;
- questions like: What is the function of this product? What is the anticipated target market? What are the necessary materials, products or processes? Is there more than one approach? Are there easily identifiable risks and what are the potential risks? Where will my product or material end up? Which are the (initial) bio-based specific considerations potentially relevant to this specific LCA (such as metrics; unknown eco-fate; lack of specific data of the chemical, bio-based material, product or process; functionality of the investigated product system; system boundaries).

LCAs should use the available Commission recommendations and the European norms, technical reports and technical specifications, especially those developed by CEN/TC 411 on bio-based products¹³. If applicable, the social impacts of the developed products or processes should be analysed as well.

RIA proposals should include an **economic viability performance check** (value chain and market analysis) of the developed products and processes, along with an analysis of **social impacts** where applicable.

Moreover, where relevant, proposals should include process and product safety (thus occupational and consumer safety) as elements for consideration in any value chain, especially when new products and materials are obtained (see, for example, topics within SO3). Any potential hazards associated with the developed processes and products should be analysed to ensure that the products comply fully with REACH¹⁴ legislation and other toxicity requirements, safety requirements and any relevant EU legislation.

If relevant, proposals should also allow for the **pre- and co-normative research** needed to develop the necessary product quality standards. Pre-normative research is the research carried out to establish the validity and reliability of the subject matter to be standardised, whilst co-normative research is the research that is necessary to quantify the repeatability, reproducibility and uncertainty of the procedures that are incorporated in the standard.

The **technology readiness level**¹⁵ (TRL) at the end of the project is always given in the topic description, and proposals should clearly state the starting TRL. It goes without saying that the

¹³ European Committee for Standardisation Technical Committee 411 on bio-based products (https://standards.cen.eu/dyn/www/f?p=204:32:0:::FSP_ORG_ID,FSP_LANG_ID:874780,25&cs=1D63BAA7EABE56EB230DDAA05D6F2CE70), which has published:

- EN 16751:2016 (Bio-based products – Sustainability criteria);
- EN 16760:2015 (Bio-based products – Life Cycle Assessment);
- CEN/TR 16957:2016 (Bio-based products – Guidelines for Life Cycle Inventory (LCI) for the End-of-life phase);

See also:

- the Commission Recommendation on the use of common methods to measure and communicate the life cycle environmental performance of products and organisations (2013/179/EU) at <http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32013H0179&from=EN>; and
- the International Reference Life Cycle Data System (ILCD) Handbook developed by the European Commission Joint Research Centre (http://eplca.jrc.ec.europa.eu/?page_id=86).

¹⁴ The Regulation for Registration, Evaluation, Authorisation and Restriction of Chemicals, effective since 1 June 2007.

¹⁵ Technology readiness levels as defined in annex G of the General Annexes to the Horizon 2020 Work Programme: http://ec.europa.eu/research/participants/data/ref/h2020/other/wp/2018-2020/annexes/h2020-wp1820-annex-ga_en.pdf

project proposal should enable the technology or system to achieve the end TRL within the project timeframe.

Regarding the **expected impacts**, proposals should include convincing evidence of the claimed impacts. The claimed impacts should be quantified and based on calculations, whether the expected impact in the topic is specified quantitatively (for example 'decrease biomass losses by x %') or not (like 'reduce residual streams'). In the latter case, proposals should define the level of improvement they will make and the impact that will have on specific KPIs.

Also, if not stated explicitly in a topic, proposals should always be **complementary with other projects** funded under FP7 and Horizon 2020 and other funding schemes, both ongoing and concluded. They should reflect awareness of the objectives of running projects in relevant fields to avoid overlap.

Unless otherwise specified in this AWP, 'Europe' and 'European' means 'Member States and Associated Countries'.

Strategic Orientation 1: Foster supply of sustainable biomass feedstock to feed both existing and new value chains

Improve the utilisation of existing feedstock sources

BBI 2018. SO1.D1 – Improve the logistical and pre-processing steps of locally sourced biomass to serve as feedstock for the bio-based industry

Specific challenge:

Getting biomass feedstock from its sources in rural¹⁶ and coastal areas to processing plants in the bio-based industry today has to contend with many hindrances. These relate to the (often varying) quality of the biomass, its quantity, location and distance from the operating facilities and state-of-the-art logistical systems and equipment.

Besides adding weight in transportation, high water content may cause the biomass to degrade during transportation and storage. Compacting or drying techniques to reduce weight, volume and moisture could modify the biomass composition and properties.

Also, residual biomass in particular often occurs in relatively small quantities in scattered locations, and its low value does not justify an efficient, modern logistical system for valorisation. Consequently, residues that are potential feedstock for the bio-based industry are left on the field or are burnt.

In many areas, too, the disconnect between actors in the rural and coastal areas and those in the bio-based operational stages prevents the introduction of new and innovative technologies and practices into the supply chain.

This lack of connection between the planning and resource management and downstream value chain operations often means that there is no business case for efficient integration of locally sourced feedstock with bio-based industry operations.

The **specific challenge** of this topic is to cost-effectively mobilise local biomass, from source to the gates of an advanced biorefinery, for further processing into value-added market applications, thereby avoiding losses in feedstock quantity or quality.

Scope:

Develop and demonstrate an efficient logistical system to mobilise (source and deliver) local and regional biomass to the gates of biorefining operations.

Proposals should address harvest and collection¹⁷, pre-processing, preservation, storage and transport of the biomass, aiming at an effective sourcing and delivery system with no or minimal losses due to biodegradation.

¹⁶ Rural areas include agricultural and forest areas, and also cover inland fisheries and aquaculture.

¹⁷ Also considering multi-modal harvest and transport systems, e.g. harvesters + lorry (including driverless lorries) + rail + canal/sea.

The delivered biomass should be 'storage-stable', of suitable quality and in adequate quantities for further processing. Proposals, therefore, should also include testing the biomass using existing or innovative standards or parameters and should address relevant safety aspects (see Introduction).

Proposals should reflect awareness of the objectives of running national and EU-funded projects^{18, 19} in this field to avoid overlap.

This topic covers all types of biomass.

Both the centralised large-scale biorefining model and the dispersed small biorefining network model could be considered, or a combination of the two, depending on the local conditions of biomass sourcing and overall economics.

Proposals should include steps **up to** the processing steps in an integrated biorefining set-up. However, as they relate to an innovation action – demonstration topic, proposals must be based on an express demand for the subject biomass, leading to conversion into identified market applications. Proposals will thus consider the full value chain.

Proposals should include cost-efficient and easy to operate technical solutions, including the associated equipment to allow their use at the required location (in the rural areas). Active participation and partnership with actors in the primary sector (agriculture and forestry, fisheries and aquaculture) are therefore a must. Proposal should also address contractual or business arrangements between the feedstock producers/suppliers and the feedstock users to secure biomass supply.

Proposals may aim both to set up new bio-based value chains and to improve the feedstock logistics in existing bio-based value chains. In the latter case, proposals should develop and demonstrate breakthroughs and innovative improvements, rather than incremental improvements.

Proposals should be based on a sound business case and business plan.

Proposals should commit to assessing the environmental and economic impacts of the developed products or processes, using LCA methodologies based on available standards, certification, accepted and validated approaches (see also Introduction)²⁰. If applicable, proposals should also analyse the social impacts.

If relevant, proposals should also allow for pre- and co-normative research necessary for developing the needed product quality standards.

The technology readiness level (TRL)¹⁵ at the end of the project should be 6-7. Proposals should clearly state the starting TRL.

¹⁸ Such as INFRES (Innovative and effective technology and logistics for forest residual biomass supply in the EU); LogistEC (Logistics for Energy Crops' Biomass); Europruning (Development and implementation of a new, and non-existent, logistics chain for biomass from pruning); AGROinLOG (integrated biomass logistics centres for the agro-industry).

More info about these projects at http://cordis.europa.eu/projects/home_en.html.

¹⁹ Such as those resulting from topic RUR-08-2016 'Demonstration of integrated logistics centres for food and non-food applications'.

²⁰ The LCA may focus on a set of critical issues early on to steer the development process in the right direction. In this case, it is essential that this selection is carefully explained in the proposal in order to allow for expert assessment. See also in the introduction.

Indicative funding:

It is considered that proposals requesting a maximum contribution of EUR 7 million would be able to address this specific challenge appropriately. However, this does not preclude the submission and selection of proposals requesting other amounts.

Expected impacts:

- contribute to **KPI 1**: create at least one new cross-sector interconnection in bio-based economy;
- contribute to **KPI 2**: set the basis for at least one new bio-based value chain;
- increase the income for biomass producers involved in the supply chain, as well as creating new job opportunities in rural and coastal areas;
- increase the overall resource efficiency;
- decrease biomass losses by 40 %;
- bring down transportation costs by 30 %;
- bring about a 20 % decrease in greenhouse gas emissions, thanks to modified transportation and storage phases, optimised pre-processing steps, etc.;
- increase the mobilisation rate²¹ by 20 %²².

Type of action: Innovation action – demonstration action.

Expand the exploitation of under-utilised or new feedstock for the bio-based industries**BBi 2018. SO1.R1 – Resolve logistical, infrastructural and technological challenges to valorise residual and side streams from aquaculture, fisheries and the aquatic biomass processing industries****Specific challenge:**

Residual streams from aquaculture, fisheries and the aquatic processing industries contain a varied mixture of bone, cartilage, skin and shells, liquid streams and other material. Some is processed into animal feed or fertilisers, but a large proportion is treated as waste, despite containing interesting molecules for cosmetics, nutraceutical and pharmaceutical applications, among others. Moreover, associated disposal costs are high.

Handling bycatch and residual streams at high seas, and storing and transporting them to land for valorisation into compounds for value-added applications, present many challenges. This sea-land connection needs to consist of sustainable steps to build value chains through market applications.

On land, further development and testing of (bio)technological processes is needed to efficiently convert the residual streams from aquaculture, fisheries and the aquatic processing industries before upscaling towards further valorisation steps. The initial stages of the valorisation processes

²¹ Mobilisation rate means the amount of feedstock **in theory** that is sustainably available, or is ready to be sourced on a certain area (e.g. within a 100-km radius of the biorefinery), compared with the amount of feedstock that **in reality** can be sourced. The difference between these two amounts is due to an insufficient or non-existing logistics/mobilisation system.

²² The proposal should present a convincing justification of the calculation of this rate, based on established econometric models and statistical data.

must identify and specify the potential of the different types of these residual streams to obtain sufficient compounds for next steps towards value-added applications.

The **specific challenge** for this topic is to resolve the logistical, infrastructural and technological challenges to efficiently deliver residual and side streams from the aquaculture, fisheries and the aquatic processing industries to biorefining operations.

Scope:

Develop and test an efficient and sustainable supply system for residual and side streams from aquaculture, fisheries and the aquatic processing industries to the bio-based industry for valorisation into more commercially viable applications.

Proposals should address the elimination of hurdles and bottlenecks regarding the logistics, transport modes and associated infrastructure in the targeted biomass feedstock supply systems. These include collection systems, intermediate storage and safety aspects (see Introduction).

Proposals should test the different biomass types by applying existing quality parameters and/or standards and by generating novel ones if needed.

Proposals should focus on selecting, extracting or producing specific compounds from these residual streams into products for further applications in the chemistry, pharmaceuticals, cosmetics and human or animal nutrition. Proposals may address more than one feedstock and production chain.

This topic excludes biomass from the agricultural and forestry sectors. It focuses on biomass other than algae (both micro and macro) and covers both fresh water and marine sources.

Proposals should include steps **through the selection, extraction or production** of at least two compounds with potential for further valorisation into market applications.

The industry should actively participate to demonstrate the potential for integrating the developed concepts into current industrial landscapes or existing plants so that the concepts can be deployed more quickly and scaled up to apply industrial-wide.

Proposals should specifically demonstrate the benefits versus the state-of-the-art and existing technologies. This could be done by providing evidence of new processing solutions and new products obtained.

Proposals should commit to assessing the environmental and economic impacts of the developed products or processes, using LCA methodologies based on available standards, certification, accepted and validated approaches (see also Introduction)²⁰.

Proposals should also include an economic viability performance check (value chain and market analysis) of the developed products and processes, along with an analysis of social impacts where applicable.

If relevant, proposals should also allow for pre- and co-normative research necessary for developing the needed product quality standards.

The technology readiness level (TRL)¹⁵ at the end of the project should be 4-5. Proposals should clearly state the starting TRL.

Indicative funding:

It is considered that proposals requesting a contribution of between EUR 2 million and EUR 5 million would be able to address this specific challenge appropriately. However, this does not preclude the submission and selection of proposals requesting other amounts.

Expected impacts:

- contribute to **KPI 1**: create at least one new cross-sector interconnection in bio-based economy;
- contribute to **KPI 2**: set the basis for at least one new bio-based value chain;
- contribute to **KPI 8**: validate at least one new and improved processing technology reflecting the 'TRL gain' since the start of the project;
- reduce quantities of landfilled/incinerated residues by 30 % as compared with the relevant benchmark;
- increase income and business opportunities for stakeholders and actors in the aquaculture, fisheries and seafood processing industries.

Type of action: Research and innovation action.

BBi 2018. SO1.D2 – Find solutions to dilution, pollution and content diversity challenges to turn mixed urban bio-waste²³ into sustainable feedstock for the bio-based industry**Specific challenge:**

In 2016, an estimated 54 % of the world's population lived in urban areas. That figure is projected to exceed 60 % in 2030²⁴. Cities, and the people living within them, produce an immense amount of solid waste and wastewater.

Despite the widespread availability of sorting practices, mixed waste streams going to landfill or for incineration still contain a large volume of biodegradable organic matter (for example, 60 % in the UK²⁵) that could well be used as feedstock for the bio-based industry. Furthermore, such a large amount of organic matter going to landfill falls short of the aim in Council Directive 1999/31/EC on the landfill of waste²⁶ of limiting the share of landfilled biodegradable waste to 35 % by 2020.

Wastewater contains several valuable components, including cellulose and nutrients, especially phosphorus. The content of municipal wastewater and the derived sewage sludge could cover around 15 % of the world's phosphorus demand²⁷. Every year the average citizen sends 10 kg of

²³ 'Urban bio-waste': biodegradable garden and park waste, food and kitchen waste from households, restaurants, caterers and retail premises and comparable waste from food processing plants (definition of 'bio-waste' in Directive 98/2008/EC on waste); urban waste water and sludge from its treatment.

²⁴ http://www.un.org/en/development/desa/population/publications/pdf/urbanization/the_worlds_cities_in_2016_data_booklet.pdf

²⁵ <http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52010SC0577&from=EN>

²⁶ <http://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:31999L0031>

²⁷ http://p-rex.eu/uploads/media/P-REX_Policy_Brief_final.pdf

toilet paper²⁸ into the sewage system. This would provide an enormous source of cellulose for further upgrade to chemical precursors and/or polymers.

High dilution and the wide variety of exploitable components in urban wastewater streams make it difficult to recover usable components at higher scale efficiently. As a result, urban wastewater treatment tends to focus on producing energy or biogas.

Even though their contaminant levels and diversity present challenges for valorisation, organic urban waste streams can provide a significant volume of feedstock for the bio-based industry all year round without any conflict with land use and food production.

The **specific challenge** of this topic is to utilise mixed waste streams, separately collected organic waste and the organic fraction of sewage sludge from wastewater treatment – all coming from urban sources – as sustainable feedstock for the bio-based industry, overcoming their high dilution level, pollution and disparity of content.

Scope:

Demonstrate effective, safe and efficient solutions to overcome dilution, pollution and diversity of content in different organic urban waste streams of urban origin and convert these into high value-added compounds for further use. These streams include mixed waste streams, separately collected organic waste, and the organic fraction of sewage sludge from wastewater treatment.

The scope is to tackle all constraints which today impede the conversion of such waste streams into chemical precursors, polymers, materials and/or fertilisers at yields that are promising for successful upscaling to pre-commercial levels. Energy or biogas valorisation is out of scope (see related paragraph on next page).

A cascade-type approach should be applied, aiming at valorising as much as possible of the target feedstock into a range of several products and materials. A flexible biorefinery concept should also be developed, to allow for the production of different end-products, depending on feedstock availability and features, seasonality, market demand, etc.

Proposals should address urban wastewater, separately collected organic waste, mixed solid municipal waste streams, or a combination thereof. They should focus on the technologies needed in processing target waste streams. Logistical steps and other arrangements with and within municipalities, while instrumental to the success of the project, must be considered as ‘additional activities’. Proposals should demonstrate the efficient preparation of mixed urban waste streams for valorisation into high value-added compounds. The successful application of these technologies should deliver biomass feedstock that can readily be further treated and produce large volumes of the desired compounds.

Proposals should also assess the technical feasibility and economics of wastewater containment systems to reduce leakage of for example methane. This assessment should also include high-volume filtration systems for the removal of useful chemical feed stocks such as phosphates.

Proposals should build on and seek to dovetail with the results from other finished or running projects that address the treatment of wastewaters and organic waste streams. Technologies used

²⁸ See for instance:

http://www.metsatissue.com/en/media/Wash_Your_Hand_And_Stay_Healthy/Pages/default.aspx

for the conversion of the organic fraction of municipal solid waste and/or wastewater should be different and new compared to those applied in the running projects²⁹.

Although energy or biogas valorisation is out of the main scope of the topic, proposals could seek cooperation with existing waste³⁰ and/or wastewater treatment plants including biogas reactors, targeting compounds and products that exceed state-of-the-art standards.

Proposals should involve waste management companies/agencies to ensure the availability of the appropriate urban waste streams. In addition, as they are aiming to create or improve value chains based on urban waste streams, proposals should involve end-users so that they can address public perception.

Proposals should be based on a sound business case and business plan, as well as an assessment of the market potential of the new compounds.

Proposals should commit to assessing the environmental and economic impacts of the developed products or processes, using LCA methodologies based on available standards, certification, accepted and validated approaches (see also Introduction)²⁰. If applicable, proposals should also analyse the social impacts.

Proposals should also allow for pre- and co-normative research necessary for developing the needed product quality standards and for ensuring safety of the end-products.

The technology readiness level (TRL)¹⁵ at the end of the project should be 7. Proposals should clearly state the starting TRL.

Indicative funding:

It is considered that proposals requesting a maximum contribution EUR 7 million would be able to address this specific challenge appropriately. However, this does not preclude the submission and selection of proposals requesting other amounts.

Expected impacts:

- contribute to **KPI 1**: create at least one new cross-sector interconnection in bio-based economy;
- contribute to **KPI 2**: set the basis for at least one new bio-based value chain;
- contribute to **KPI 6**: create at least two new demonstrated consumer products based on bio-based chemicals and materials that meet market requirements;
- increase the awareness among consumers and waste management companies of the opportunities associated with the valorisation of urban waste streams into a wide range of products and materials;
- in the case of wastewater, recycle or reuse of at least 30 % in (dry) weight of the suspended solid fractions;
- reduce the amount of landfilled organic waste by at least 20 % as compared with the disposal solution(s) currently implemented for the same type of waste stream.

²⁹ From the 2016 BBI Call: EMBRACED (<https://bbi-europe.eu/projects/embraced>), URBIOFIN (<https://bbi-europe.eu/projects/urbiofin>), AFTERLIFE (<https://bbi-europe.eu/projects/afterlife>). From H2020-CIRC-2016 Call: RES URBIS (<http://www.resurbis.eu/>).

³⁰ Includes mixed waste streams and separately collected organic waste.

Type of action: Innovation Action – demonstration action.

Strategic Orientation 2: Optimise efficient processing for integrated biorefineries through R&D&I

Conversion of pre-treated feedstocks to bio-based chemicals and materials

BBI 2018. SO2.R2 – Develop techniques and systems to improve the performance of biocatalysts

Specific challenge:

Biocatalysts – enzymes and the microorganisms that contain them – offer great potential for the large-scale production of high-value products from renewable, bio-based feedstock. Unlike the conventional chemical conversion processes, biocatalytic conversions typically take place under mild conditions and achieve higher selectivity of specific characteristics, such as chirality. In addition, biocatalysis can realise the targeted conversion of specific biomass fractions such as lignin.

Currently available methods to screen and engineer microbial strains to display the desired biocatalytic features are often time-consuming and expensive, due to the inherent complexity of the metabolic networks involved. A significant improvement of these steps would allow for optimising the biocatalytic conversion of specific feedstocks in well-defined operating conditions, and would help consolidate the competitive advantage of biocatalysis over traditional chemical processes.

Moreover, the success of using biocatalysts for conversion processes is often dependent on the type of the targeted biomass feedstock and the presence of bioprocess inhibitors therein. Feedstock with a mixed composition, like lignocellulose and residual biomass that also contains inhibitors, presents the greatest challenges to biocatalytic transformation. Consequently, for the optimisation and monitoring of a bioprocess there is a need for a detectable/selectable microbial phenotype that correlates biocatalytic activity to the formation of the desired chemical end-product.

The **specific challenge** of this topic is to phenotypically link the performance of biocatalysts to specific product formation, considering feedstock type and quality, and operating conditions including the presence of inhibitors.

Scope:

Apply innovative techniques to select the biocatalysts to optimally tackle specific feedstock type and composition for high selectivity and yield of the targeted product. If needed, these techniques should be further developed to improve the performance of the biocatalysts in dealing with inhibitors and the operating conditions.

These techniques should include both:

- selecting and screening systems linking a readily accessible phenotype to product formation; and

- techniques for analysing, selecting and improving the performance of microorganisms or enzymes to achieve higher efficiency of a given bioprocess.

Proposals should focus on either microorganisms or cell-free enzyme-based systems.

Metabolic and enzymatic engineering strategies may be pursued, as may microbial engineering through gene editing concepts.

Proposals should efficiently prove the innovativeness of the approaches for the purpose of subsequently applying the developed techniques at larger scales.

Proposals should deliver methods to achieve biocatalysis conversions that are more efficient than state-of-the-art alternatives. Proposals should seek to expand on projects already funded under Horizon 2020 and earlier projects to avoid overlap, promote synergies and advance beyond state-of-the-art methods.

The industry should actively participate to demonstrate the potential for integrating the developed concepts into current industrial landscapes or existing plants so that the concepts can be deployed more quickly and scaled up to apply industrial-wide.

Proposals should specifically demonstrate the benefits of the new approaches versus the state-of-the-art and existing technologies. This could be done by providing evidence of new or more efficient processing solutions and new products obtained.

Proposals should commit to assessing the environmental impacts of the developed processes or products using LCA methodologies based on available standards, certification, accepted and validated approaches (see also Introduction)²⁰.

Proposals should also include an economic viability performance check (value chain and market analysis) of the developed products and processes, along with an analysis of social impacts where applicable.

If relevant, proposals should also allow for pre- and co-normative research necessary for developing the needed product quality standards.

The technology readiness level (TRL)¹⁵ at the end of the project should be 4-5. Proposals should clearly state the starting TRL.

Indicative funding:

It is considered that proposals requesting a contribution of between EUR 2 million and EUR 5 million would be able to address this specific challenge appropriately. However, this does not preclude the submission and selection of proposals requesting other amounts.

Expected impacts:

- contribute to **KPI 1**: create at least one new cross-sector interconnection in bio-based economy;
- contribute to **KPI 8**: validate at least one new and improved processing technology reflecting the 'TRL gain' since the start of the project;

- achieve a yield of the desired product of at least 20 % higher than state-of-the-art alternatives producing the same or similar product;
- reduce the time and costs associated with microbial and/or enzymatic modification processes compared with the state-of-the-art.

Type of action: Research and innovation action.

BBI 2018. SO2.R3 – Introduce new technologies to make pulping operations more resource-efficient

Specific challenge:

The objective of wood pulping is to separate cellulose fibres from the other wood components (lignin, hemicelluloses, extractives, etc.). Those components end up as side streams, making up a considerable share of the pulp mill's output. For example, in the case of the dominant chemical pulping process (the kraft process, which accounts for roughly 90 % of the world's chemically produced pulp), around half of the initial wood substances degrades and dissolves into the cooking liquor or black liquor. Black liquor is concentrated and burnt to obtain energy. However, there are opportunities to obtain more value for the substances diverted to black liquor.

Moreover, the pulp and paper sector is focusing on reducing its environmental impact by consuming less energy, curbing its use of polluting chemical products and bringing down CO₂ emissions from its operations. Key to achieving this target is the development of new pulping processes that can be effective at lower temperatures, use fewer chemical agents and make better overall use of the biomass feedstock.

Several disruptive technologies have surfaced in recent years. A study by the Confederation of the European Paper Industries (CEPI) in November 2013³¹ singled out eight breakthrough concepts projected to change the face of pulp- and papermaking processes by 2050³².

The **specific challenge** of this topic is to bring breakthrough concepts in lignocellulosic pulping from lab scale to pilot scale and paving the way for further upscaling and industry uptake.

Scope:

Introduce breakthrough pulping technologies in a relevant environment at pilot scale, deriving maximum benefit from the feedstock with a significant increase in sustainability, cost- and resource-effectiveness.

This topic targets breakthrough innovation involving new technologies or equipment.

Proposals could also focus on better utilisation of the side streams through valorisation steps that outperform state-of-the-art alternatives in an integrated biorefinery approach.

The proposed solutions may introduce:

³¹

http://www.cepi.org/system/files/public/documents/publications/innovation/2013/finaltwoteamprojectreport_website_updated.pdf

³² PROVIDES, a BBI RIA project from the 2014 Call, addresses one of these technologies, concluding at TRL 3-4 in 2018. Overlaps have to be avoided.

- fundamental innovation in the pulping process itself, changing the way in which the components of wood are separated from each other; or
- technological steps before or during an established pulping process to obtain separate streams of side-products; or
- technological steps downstream of an established pulping process to recover the most promising components from the pulping effluents.

Proposals should focus on **one** of the three options above, but could address more of them. The chosen option should deliver separate streams that can be converted into compounds with a higher value than the current one, for further valorisation into market applications. These steps should therefore target required yields, quality and purity for further conversion steps.

To validate the concept, proposals should include at least a **first conversion step** to convert the promising components into usable compounds for further valorisation.

The new technological concepts should deliver a new product or create higher value through performance and sustainability criteria. Proposals should justify the selection of the technologies.

While a maximum conversion rate should be the aim, it is not mandatory to cover 100 % of the original wood components. Proposals opting to focus on a fraction of them should justify the exclusion of the others on grounds of cost, sustainability or technology readiness.

Proposals should include an assessment of the market potential of the promising components through the necessary subsequent processing steps.

The industry should actively participate to demonstrate the potential for integrating the developed concepts into current industrial landscapes or existing plants so that the concepts can be deployed more quickly and scaled up to apply industrial-wide.

Proposals should specifically demonstrate the benefits versus the state-of-the-art and existing technologies.

Proposals should commit to assessing the environmental impacts of the developed processes or products using LCA methodologies based on available standards, certification, accepted and validated approaches (see also Introduction)²⁰.

Proposals should also include an economic viability performance check (value chain and market analysis) of the developed products and processes, along with an analysis of social impacts where applicable.

If relevant, proposals should also allow for pre- and co-normative research necessary for developing the needed product quality standards.

The technology readiness level (TRL)¹⁵ at the end of the project should be 4-5. Proposals should clearly state the starting TRL.

Indicative funding:

It is considered that proposals requesting a contribution of between EUR 2 million and EUR 5 million would be able to address this specific challenge appropriately. However, this does not preclude the submission and selection of proposals requesting other amounts.

Expected impacts:

- contribute to **KPI 1**: create at least one new cross-sector interconnection in bio-based economy;
- contribute to **KPI 2**: set the basis for at least one new bio-based value chain;
- contribute to **KPI 8**: validate at least one new and improved processing technology reflecting the 'TRL gain' since the start of the project;
- reduce the pulping energy intensity by 40 %.

Type of action: Research and innovation action.

BBi 2018 S02.R4 – Apply advanced biotechnologies to convert biomass that contains inhibitors into high value-added chemicals and materials**Specific challenge:**

Residual streams from various bio-based operations contain, among others, low-molecular compounds that severely inhibit the growth of the currently known fermenting microorganisms. As a result, the yields and quality of the desired products are too low for a successful, large-scale application of fermentation pathways to valorise these residual streams. To solve these problems, microbes must be adapted to enable the desired conversion steps.

However, there are microorganisms that are resistant to inhibitors and can perform the desired conversion steps in inhibitor-containing streams. Using omics and other techniques to identify and isolate these microorganisms could lead to new systems producing value-added products through fermentation. Their performance may be further improved through metabolic engineering or any other advanced, new biotechnology in this field.

The **specific challenge** of this topic is to better exploit microorganisms that are resistant to inhibitors.

Scope:

Identify, isolate, where applicable engineer, and use inhibitor-resistant microorganisms, and set up the subsequent fermentation processes at lab scale to create added-value products.

This topic includes any operation that uses agriculture-based, forest-based, aquatic/marine-based or bio-waste feedstock to convert it into marketable products. This topic excludes any fossil-based operations and CO₂-feedstock. It also excludes any proposal that targets biofuels as the major or sole marketable products.

The scope specifically covers early-stage development proposals, the aim being to lay the groundwork for new technologies converting biomass into added-value products. Several biotechnological approaches may be used that are new or currently not widely used in biorefining operations producing chemicals and materials, including 'omics', metabolic engineering and synthetic biology.

Proposals should commit to assessing the environmental impacts of the developed processes or products using LCA methodologies based on available standards, certification, accepted and validated approaches (see also Introduction)²⁰.

Proposals should also include an economic viability performance check (value chain and market analysis) of the developed products and processes, along with an analysis of social impacts where applicable.

If relevant, proposals should also allow for pre- and co-normative research necessary for developing the needed product quality standards.

The technology readiness level (TRL)¹⁵ at the end of the project should be at least 3 for the bio-based value chain in question. Proposals should clearly state the starting TRL, which may be as low as 1 or 2.

The scope aims at assisting industry to further explore promising technologies to broaden and strengthen the bio-based industries in Europe.

Indicative funding:

It is considered that proposals requesting a BBI JU contribution of between EUR 1 million and EUR 2,5 million would allow the specific challenge to be addressed appropriately. However, this does not preclude the submission and selection of proposals requesting other amounts.

To be eligible for participation a consortium must contain at least one constituent entity of the Bio-based Industry Consortium that is a beneficiary not eligible for JU funding as laid down in Commission Delegated Regulation (EU) No 623/2014.

Expected impacts:

- increase opportunities for an efficient valorisation of residual streams from different sources;
- achieve a smaller environmental footprint and costs than those of existing pre-treatments to remove inhibitor compounds.

Expected duration: 1 to 4 years.

Type of action: Research and innovation action.

The conditions related to this topic are provided in the chapter 2.3.3.

BBI 2018 S02.R5 – Develop innovative single-step processes for conversion of a biomass feedstock into multiple readily usable intermediate streams

Specific challenge:

Due to the nature of most bio-based feedstocks, industry often faces a situation in which just a fraction of the feedstock is converted into a main product. The other fractions are discarded or routed through subsequent cascading steps to recover or produce useful compounds. These cascading operations allow for the recovery of useful materials, but require high capital and operating expenses.

The **specific challenge** of this topic is to achieve single-step technologies able to make biomass fractions and/or first conversion products available.

Scope:

Develop innovative technologies for conversion of a bio-based feedstock into intermediate streams that can readily be used by the bio-based industry. Such conversion should happen in a single step, not involving complex cascading schemes, and should tackle all fractions of the input biomass.

The scope of this topic covers any bio-based feedstock.

Proposals are encouraged to focus on existing value chains. If proposals focus on new value chains, they must provide a sound business case (including at least evidence of availability of the biomass and market demand for the intermediates produced).

Proposals should commit to assessing the environmental impacts of the developed processes or products using LCA methodologies based on available standards, certification, accepted and validated approaches (see also Introduction)²⁰.

Proposals should also include an economic viability performance check (value chain and market analysis) of the developed products and processes, along with an analysis of social impacts where applicable.

If relevant, proposals should also allow for pre- and co-normative research necessary for developing the needed product quality standards.

The technology readiness level (TRL)¹⁵ at the end of the project should be at least 3 for the bio-based value chain in question. Proposals should clearly state the starting TRL, which may be as low as 1 or 2.

The scope aims at assisting industry to further explore promising technologies to broaden and strengthen the bio-based industries in Europe. It also aims at reducing the environmental footprint of the total value chain.

Indicative funding:

It is considered that proposals requesting a BBI JU contribution of between EUR 1 million and EUR 2,5 million would allow the specific challenge to be addressed appropriately. However, this does not preclude the submission and selection of proposals requesting other amounts.

To be eligible for participation a consortium must contain at least one constituent entity of the Bio-based Industry Consortium that is a beneficiary not eligible for JU funding as laid down in Commission Delegated Regulation (EU) No 623/2014.

Expected impacts:

- reduce the capital and operating costs of converting biomass into usable compounds for further processing;
- reduce the environmental footprint of biorefining operations in terms of greenhouse gas emissions and the resource efficiency;
- reduce residual streams from biorefining operations.

Expected duration: 1 to 4 years.

Type of action: Research and innovation action.

The conditions related to this topic are provided in the chapter 2.3.3.

BBI 2018 S02.R6 – Apply emerging breakthrough technologies to improve existing value chains

Specific challenge:

The emerging bio-based industry in Europe is taking shape thanks to its many value chains, either built on existing value chains from the participating industrial sectors, or afresh, from new partnerships across sector boundaries. As the industry progresses, the existing situation offers opportunities to (further) improve existing value chains by integrating breakthrough technologies where applicable. The targeted improvement could be higher performance, lower costs, and/or enhanced sustainability.

The **specific challenge** of this topic is to identify possible technological improvements to existing value chains when breakthrough technologies are included.

Scope:

Adapt, and when needed, further develop innovative technologies for integration into an existing bio-based value chain to improve its performance in terms of efficiency, yield, cost and/or sustainability.

Proposals should describe the current bottleneck(s) and how the introduction of the new technological solutions could help enhance the technical performance and bring down costs, and/or reduce the environmental footprint.

This topic focuses on completely new breakthrough game-changing technologies. It excludes incremental innovations and continuous improvement.

Proposals should commit to assessing the environmental impacts of the developed processes or products using LCA methodologies based on available standards, certification, accepted and validated approaches (see also Introduction)²⁰.

Proposals should also include an economic viability performance check (value chain and market analysis) of the developed products and processes, along with an analysis of social impacts where applicable.

If relevant, proposals should also allow for pre- and co-normative research necessary for developing the needed product quality standards.

The technology readiness level (TRL)¹⁵ at the end of the project should be at least 3 for the bio-based value chain in question. Proposals should clearly state the starting TRL, which may be as low as 1 or 2.

The scope aims at assisting industry to further explore promising technologies to broaden and strengthen the bio-based industries in Europe. It also aims at reducing the environmental footprint of the total value chain.

Indicative funding:

It is considered that proposals requesting a BBI JU contribution of between EUR 1 million and EUR 2,5 million would allow the specific challenge to be addressed appropriately. However, this does not preclude the submission and selection of proposals requesting other amounts.

To be eligible for participation a consortium must contain at least one constituent entity of the Bio-based Industry Consortium that is a beneficiary not eligible for JU funding as laid down in Commission Delegated Regulation (EU) No 623/2014.

Expected impacts:

- improve technological performance of existing biorefining operations;
- reduce biorefineries' capital and operating costs;
- reduce the environmental footprint of biorefining operations in terms of greenhouse gas emissions and the resource efficiency.

Expected duration: 1 to 4 years.

Type of action: Research and innovation action.

The conditions related to this topic are provided in the chapter 2.3.3.

BBI 2018 S02.R7 – Electrochemical processes for bio-based monomers and polymers

Specific challenge:

Electrical energy prices fluctuate greatly, due to the widespread adoption of renewable sources. At peak production times – on sunny summer or windy winter days, for instance – energy can become virtually free. Electrochemical processes are becoming attractive, as they can be integrated into smart grid set-ups to exploit surplus energy and convert bio-based feedstock into chemicals and materials. This, in turn, may lead to considerably less expensive production than conventional routes can offer.

Moreover, smart electrochemical processes have the ability to setting the process conditions more precisely, providing a tool to 'custom-make' molecules with, for example, the desired molecular weights or specific functionalities. Depending on the biomass feedstock, the processes can produce various groups of intermediate bio-based platform molecules for direct use or further processing.

The **specific challenge** of this topic is to exploit surplus electric energy for the inexpensive electrochemical conversion of biomass feedstock and prepare this technology for upscaling.

Scope:

Develop electrochemical processes to convert bio-based feedstock into targeted monomers and/or polymers.

The scope of this topic includes any bio-based feedstock.

Processes should be able to easily start, stop and resume, so that they can be triggered to consume energy only when available at a negligible price, thereby allowing for inexpensive production. The developed processes should be suitable for upscaling.

Proposals should commit to assessing the environmental impacts of the developed processes or products using LCA methodologies based on available standards, certification, accepted and validated approaches (see also Introduction)²⁰.

Proposals should also include an economic viability performance check (value chain and market analysis) of the developed products and processes, along with an analysis of social impacts where applicable.

If relevant, proposals should also allow for pre- and co-normative research necessary for developing the needed product quality standards.

The technology readiness level (TRL)¹⁵ at the end of the project should be at least 3 for the bio-based value chain in question. Proposals should clearly state the starting TRL, which may be as low as 1 or 2.

Indicative funding:

It is considered that proposals requesting a BBI JU contribution of between EUR 1 million and EUR 2,5 million would allow the specific challenge to be addressed appropriately. However, this does not preclude the submission and selection of proposals requesting other amounts.

To be eligible for participation a consortium must contain at least one constituent entity of the Bio-based Industry Consortium that is a beneficiary not eligible for JU funding as laid down in Commission Delegated Regulation (EU) No 623/2014.

Expected impacts:

- benefit from surplus energy to convert biomass electrochemically into desired molecules for direct use or further processing;
- reduce the cost of obtaining bio-based monomers and polymers for specific applications compared with state-of-the-art alternatives;
- reduce the environmental footprint of the total value chain;
- assist industry to further explore promising technologies to broaden and strengthen the bio-based industries in Europe.

Expected duration: 1 to 4 years.

Type of action: Research and innovation action.

The conditions related to this topic are provided in the chapter 2.3.3.

BBI 2018. SO2.D3 – Valorise sugars from the cellulosic and/or hemicellulosic fractions of lignocellulosic biomass

Specific challenge:

The use of lignocellulosic feedstock to produce chemicals and materials for commercially viable applications usually focuses on valorising cellulose.

Current processes that use hydrolysis to convert carbohydrate chains into sugars mostly focus on glucose from cellulose for further processing, leaving the other sugars in hemicellulose unused. These include potentially valuable monomers such as xylose, mannose, galactose, arabinose and rhamnose. They could be used either directly, or fermented into compounds for high-value products. Valorising these co-products into specialty sugars or high-value products can significantly increase a biorefinery's profitability.

Unlike first-generation sugars³³, the sugars derived from lignocellulosic feedstock often suffer from low purity and/or high dilution levels. This makes fermenting these sugars into usable products and materials very difficult. They have less impact on the production of chemicals such as ethanol or other volatile compounds that can be easily purified and concentrated in the downstream processing steps. Several existing technological solutions to convert cellulose via sugar platforms into ethanol will soon be operating on a large scale³⁴. Other product types (bioplastics or non-volatile compounds, for example) with a complex post-conversion purification process require high-purity sugars.

While a great deal of work is ongoing to valorise lignin³⁵, valorising the third component of lignocellulose, hemicellulose, presents hurdles that need to be tackled.

The **specific challenge** of this topic is to better use the sugars from lignocellulosic feedstock in a sustainable way.

Scope:

Demonstrate innovative technologies and systems that can valorise sugars from hemicellulose and/or diluted or low-purity glucose streams from cellulose.

Proposals may apply biotechnological or non-biotechnological processes, or a combination thereof.

Proposals may target:

- purified / concentrated sugars from hemicellulose; or
- glucose from cellulose 'as is'; or
- separated hemicellulose 'as is'; or
- sugars or acids after hydrolysis and 'as is'; or
- fermentation or chemical catalysis of the hemicellulose's sugars into intermediate products.

Depending on the selected routes, proposals may include purification steps.

This topic covers lignocellulosic feedstock from any suitable and sustainable source. Proposals should demonstrate sufficient availability of usable feedstock throughout the year, while applying the cascading use of biomass where relevant for maximum resource efficiency.

Proposals should justify the choice of feedstock (wood types and species), molecules and processing method based on the projected market requirements and value of the end-products. Proposals

³³ First-generation sugars are produced from edible sources like sugar cane or sugar beet.

³⁴ See, for example, BBI projects BIOSKOH (<http://bioskoh.eu/>) and LIGNOFLAG (http://cordis.europa.eu/project/rcn/204324_en.html), but also other European or national projects.

³⁵ See, for example, BBI projects SmartLi (http://clcinnovation.fi/activity/smartli/#More_information), Greenlight (<http://www.innventia.com/greenlight>) and Valchem (<http://www.valchem.eu>).

should ensure the sustainability of the route from lignocellulose to sugars, which should be compared to alternatives (such as sugar from crops). Proposals should demonstrate the marketability of the end-products. Proposals should aim at maximising the percentage, in weight, of valorised feedstock, preferably covering more than one component and more than one product.

This topic excludes: (1) the conversion of lignocellulosic feedstock into ethanol³⁶; and (2) the pre-treatment and separation of lignocellulosic feedstock³⁷.

Proposals should address the elimination of hurdles and bottlenecks regarding the logistics, transport modes and associated infrastructure in the targeted biomass feedstock supply systems. These include collection systems, intermediate storage and safety aspects (see Introduction).

Proposals should be based on a sound business case and business plan.

Proposals should commit to assessing the environmental and economic impacts of the developed products or processes, using LCA methodologies based on available standards, certification, accepted and validated approaches (see also Introduction)³⁸. If applicable, proposals should also analyse the social impacts.

If relevant, proposals should also allow for pre- and co-normative research necessary for developing the needed product quality standards.

The technology readiness level (TRL)¹⁵ at the end of the project should be 6-7. Proposals should clearly state the starting TRL.

Indicative funding:

It is considered that proposals requesting a maximum contribution EUR 7 million would be able to address this specific challenge appropriately. However, this does not preclude the submission and selection of proposals requesting other amounts.

Expected impacts:

- contribute to **KPI 1**: create at least one new cross-sector interconnection in bio-based economy;
- contribute to **KPI 2**: set the basis for at least one new bio-based value chain;
- contribute to **KPI 6**: create at least two new demonstrated consumer products based on bio-based chemicals and materials that meet market requirements;
- obtain at least a 90 % conversion of glucose into the target products when addressing cellulose;
- convert at least 30 % in weight of the incoming hemicellulose stream when addressing hemicellulose;
- widen business and market opportunities associated with the use of lignocellulosic feedstock to obtain high-value products.

³⁶ Covered by projects LIGNOFLAG (http://cordis.europa.eu/project/rcn/204324_en.html) and BIOSKOH (<http://bioskoh.eu/>).

³⁷ Covered by a project selected from topic BBI 2017.R2.

³⁸ The LCA may focus on a set of critical issues early on to steer the development process in the right direction. In this case, it is essential that this selection is carefully explained in the proposal in order to allow for expert assessment.

Type of action: Innovation action – demonstration action.

Systems modelling

BBI 2018. SO2.R8 – Develop adequate computational systems for modelling the design, start-up, scaling-up and continuous improvement of bioprocesses involving microorganisms

Specific challenge:

The state-of-the-art approach to designing, scaling up and starting up bioprocesses is governed by ‘trial and error’ and replicating traditional manufacturing methods. These methods often cause scaling-up losses and start-up delays or failures. There are many variables that have an impact on the design and scaling-up of bioprocesses, making this a very complex exercise. Among the major causes of these variables are:

- an increasingly wider range of biomass feedstock and their varied and heterogeneous composition; and
- revolutionary developments in molecular biology producing more efficient microorganisms that can create a wider range of bio-products.

Both developments demand reliable modelling systems to cope with many variables in simulating the full value chain, from feedstock to products, in search of the most effective combinations.

The design phase should be long enough and have sufficient tools available to test different and radical concepts. And ultimately, in the scaled-up and (semi-)commercial operating phase, there should be guidelines for continuous improvement cycles.

Today’s methods for scaling-up often take a more limited view and do not look at the bigger picture, so that optimisation takes place at lab level, not at plant operation level.

Industry needs reliable modelling approaches, able to predict entire pathways from feedstock and energy intake to product output. This may mean designing tailor-made paths for each specific feedstock – from its intake and preparation, through the processing steps to the end-products.

Recent developments in computation-driven frameworks can help cope with many variables in designing optimal feedstock-organisms-bioprocess configurations and simulating scaling-up. These computation approaches are already standard in fields other than microbial technology and industrial biotechnology.

The **specific challenge** of this topic is to design and apply reliable and robust computational modelling approaches for bioprocesses.

Scope:

Develop modelling systems that contain experimental multi-omics data on microbial responses to conditions in large fermenters and that combine know-how of metabolic networks and large-scale fluid dynamics into an integral, computation-driven framework to help in the design, scale-up and start-up of bioprocesses.

The modelling approach should specify the ‘optimal’ use of the selected biomass – in terms of the environmental, economic and social sustainability of the value chain – and the resulting savings in cost and time during scaling-up and start-up. Proposals should therefore be developed in partnership with the operator of a (pre-)commercial-scale biorefinery or a pilot or demonstration plant, who should validate the results.

To achieve a fair assessment, adequate metrics will be needed to compare the results of modelling from different perspectives. The models should also make connectivity to Industry 4.0 and The Internet of Things possible for future use in a complete value chain.

Proposals should simulate a selected specific biomass feedstock and associated processing steps yielding targeted intermediary products.

Proposals may include different processing routes for the selected feedstock to show how the developed models may be replicated, scaled up and used in different value chains. This experimental validation should also include a sensitivity analysis to assess the models’ ability to cope with disruptions and non-uniform reaction mixtures. The validation should also specify all included assumptions and should yield information to quantify sensitivity and uncertainties alike.

The industry should actively participate to demonstrate the potential for integrating the developed concepts into current industrial landscapes or existing plants so that the concepts can be deployed more quickly and scaled up to apply industrial-wide.

Proposals should specifically demonstrate the benefits versus the state-of-the-art and existing technologies. This could be done by providing evidence of new processing solutions and new products obtained.

The technology readiness level (TRL)¹⁵ at the end of the project should be at least 3 for the bio-based value chain in question. Proposals should clearly state the starting TRL, which may be as low as 1 or 2.

Proposals should seek complementarity with projects funded under Horizon 2020 to avoid overlap, promote synergies and advance beyond the state-of-the-art.

Indicative funding:

It is considered that proposals requesting a BBI JU contribution of between EUR 1 million and EUR 2,5 million would allow the specific challenge to be addressed appropriately. However, this does not preclude the submission and selection of proposals requesting other amounts.

To be eligible for participation a consortium must contain at least one constituent entity of the Bio-based Industry Consortium that is a beneficiary not eligible for JU funding as laid down in Commission Delegated Regulation (EU) No 623/2014.

Expected impacts:

- help shorten the time to market for bio-based products;
- help realise savings in large-scale implementation of bio-based value chains in time, costs, material and energy requirements, environmental impacts, etc.;
- help establish more efficient bioprocesses and a higher strain performance.

Expected duration: 1 to 4 years.

Type of action: Research and innovation action.

The conditions related to this topic are provided in the chapter 2.3.3.

Strategic Orientation 3: Develop innovative bio-based products for identified market applications

Bio-based products that outperform fossil-based counterparts

BBI 2018. SO3.R9 – Develop functional molecules for bio-based coatings outperforming existing products and meeting market requirements

Specific challenge:

The global market for coatings is changing and growing as the requirements for the properties and performances of end-products (durability for packaging, wear resistance in machinery, etc.) become more demanding.

These changes open up interesting market prospects for bio-based coatings or coatings including bio-based components. However, generally speaking these coatings are not yet able to compete with traditional synthetic products on technical properties or cost. Although many research activities have been focusing on improving the characteristics of bio-based coatings, increasing their market share to meet new demand and to replace synthetic coatings is only just beginning.

Work to develop bio-based products to match the new high-performance requirements for coating applications should be speeded up to fill the projected gaps in quality and quantity.

The **specific challenge** of this topic is to employ bio-based formulations to meet the market requirements for the properties and performances of products used in coating applications.

Scope:

Develop innovative bio-based components for coating formulations to outperform state-of-the-art technical properties and sustainability aspects and meet new coating requirements in applications such as packaging materials for food, electronics, consumer goods, etc.

Proposals should look at applying the new bio-based components in either a fully or a partially bio-based coating to meet requested performance levels.

In both cases, proposals should include testing the developed solution in the targeted application to prove:

- better characteristics and properties than current identified benchmarks; and
- a smaller environmental footprint than that of the currently available products.

It also includes all relevant and applicable processing technologies in the (thermo)chemical, chemical catalysis and biotechnological areas.

Proposals should demonstrate at lab or pilot scale that the developed products and subsequent applications can make sustainable environmental and economic gains.

The industry should actively participate to demonstrate the potential for integrating the developed concepts into current industrial landscapes or existing plants so that the concepts can be deployed more quickly and scaled up to apply industrial-wide.

Proposals should specifically demonstrate the benefits versus the state-of-the-art and existing technologies. This could be done by providing evidence of new processing solutions and new products obtained.

Any potential hazards associated with the developed processes and products should be analysed to ensure that the products comply fully with REACH¹⁴ legislation and other toxicity requirements, safety requirements and any relevant EU legislation.

Proposals should commit to carrying out a full assessment of the environmental impacts of the developed processes or products using LCA methodologies based on available standards, certification, accepted and validated approaches. For this topic, the LCA must not be focused on a set of critical issues only.

Proposals should also include an economic viability performance check (value chain and market analysis) of the developed products and processes, along with an analysis of social impacts where applicable.

If relevant, proposals should also allow for pre- and co-normative research necessary for developing the needed product quality standards.

The technology readiness level (TRL)¹⁵ at the end of the project should be 5. Proposals should clearly state the starting TRL.

Proposals should seek complementarity with the existing projects funded under Horizon 2020 to avoid overlap, promote synergies and advance beyond the state-of-the-art.

Indicative funding:

It is considered that proposals requesting a contribution of between EUR 2 million and EUR 5 million would be able to address this specific challenge appropriately. However, this does not preclude the submission and selection of proposals requesting other amounts.

Expected impacts:

- contribute to **KPI 1**: create at least one new cross-sector interconnection in bio-based economy;
- contribute to **KPI 2**: set the basis for at least one new bio-based value chain;
- contribute to **KPI 5**: create at least two new bio-based materials including bio-based coatings in their formulation;
- contribute to **KPI 8**: validate at least one new and improved processing technology reflecting the 'TRL gain' since the start of the project;

- achieve lower environmental impacts for the developed coating formulations than state-of-the-art alternatives.

Type of action: Research and innovation action.

BBI 2018. SO3.R10 – Develop bio-based packaging products that are biodegradable/compostable and/or recyclable

Specific challenge:

Currently, most of the packaging used in a wide variety of applications in different market sectors – including food, pharmaceuticals and clothing – is not recyclable. It consists mostly of multi-layer packaging, with each layer composed of different polymers that perform specific functions, making it technically non-recyclable. The end-of-life phase for this packaging, therefore, is either incineration or landfill.

Moreover, the compostable bio-based packaging that is currently available mainly ends up in industrial composting facilities. This is because other biological waste treatment processes like anaerobic digestion and home composters are generally not suitable for most of the current compostable polymers.

Novel alternative solutions should ‘eco-design’ packaging products to avoid the incineration and landfill routes at their end-of-life phase, rerouting them instead towards approved and accepted applications, where they can add value without adding an environmental burden.

The **specific challenge** of this topic is to make the end-of-life phase for packaging significantly more sustainable.

Scope:

Design new processing systems for functional bio-based packaging products that are reusable, recyclable, and/or compostable and biodegradable, as an alternative to the current identified benchmark products.

Proposals should address the production process, including the necessary improvements to lamination and coating steps to obtain the target end-products and their specifications.

Proposals should prove that the target packaging products are recyclable or compostable/biodegradable in various environments to reduce their overall environmental footprint. This will make their production and use more circular.

The scope also includes multi-layer products. In that case, proposals should consider the feasibility of producing multi-layer/single-polymer solutions, instead of multi-layer/multi-polymer solutions, provided they meet all required functionalities and outperform state-of-the-art alternatives for sustainability.

Along with the environmental sustainability of the developed solutions, other factors – such as innovation in functionality and production – are considered an asset for the proposals. Any potential hazards associated with the developed processes and products should be analysed to ensure that

the products comply fully with REACH¹⁴ legislation and other toxicity requirements, safety requirements and any relevant EU legislation.

The industry should actively participate to demonstrate the potential for integrating the developed concepts into current industrial landscapes or existing plants so that the concepts can be deployed more quickly and scaled up to apply industrial-wide.

Proposals should specifically demonstrate the benefits versus the state-of-the-art and existing technologies. This could be done by providing evidence of new processing solutions and new products obtained. This step will need to involve consumer organisations, together with recyclers and composting plant representatives.

Proposals should commit to assessing the environmental impacts of the developed processes or products using LCA methodologies based on available standards, certification, accepted and validated approaches (see also Introduction)²⁰.

Proposals should also include an economic viability performance check (value chain and market analysis) of the developed products and processes, along with an analysis of social impacts where applicable.

If relevant, proposals should also allow for pre- and co-normative research necessary for developing the needed product quality standards.

The technology readiness level (TRL)¹⁵ at the end of the project should be 5. Proposals should clearly state the starting TRL.

Indicative funding:

It is considered that proposals requesting a contribution of between EUR 2 million and EUR 5 million would be able to address this specific challenge appropriately. However, this does not preclude the submission and selection of proposals requesting other amounts.

Expected impacts:

- contribute to **KPI 1**: create at least one new cross-sector interconnection in bio-based economy;
- contribute to **KPI 2**: set the basis for at least one new bio-based value chain;
- contribute to **KPI 6**: create at least two new demonstrated ‘consumer’ products based on bio-based chemicals and materials that meet market requirements;
- contribute to **KPI 8**: validate at least one new and improved processing technology reflecting the ‘TRL gain’ since the start of the project;
- reduce the environmental footprint associated with the end-of-life phase of developed packaging products by at least 30 % compared with existing products for similar applications;
- reduce the costs associated with the end-of-life phase of the developed packaging products by at least 30 % compared with the disposal costs for existing solutions for similar applications.

Type of action: Research and innovation action.

BBI 2018. S03.R11 – Develop technologies and systems to produce bio-based aromatics that outperform fossil-based counterparts

Specific challenge:

Aromatic building blocks make up a significant share of today's building blocks for a wide array of day-to-day products and applications, including nylons, polystyrene, resins and polycarbonates.

Current production routes from fossil-based feedstock are energy-intensive and have a significant environmental footprint.

Moreover, the gradual introduction of shale gas and other light feedstocks in oil refining and cracking operations is resulting in significant production cuts to building blocks heavier than ethylene.

Until now, production costs have been the prime obstacle to bio-based aromatics penetrating the market. The maturity of the petrochemical industry makes purely cost-based competition unrealistic for most bio-based aromatics, especially benzene, toluene, ethylbenzene and xylene. However, better performance at an acceptable premium price would increase the marketability of bio-based aromatics for mass consumption.

Composition complexity and other characteristics of various biomass feedstock hinder the exploitation of their enormous potential to produce aromatic compounds that could outperform petrochemical alternatives.

The **specific challenge** of this topic is to increase the process yields of aromatics from sustainable biomass sources able to outperform fossil-based counterparts.

Scope:

Develop innovative technologies and systems to produce bio-based aromatics with new functionalities, from sustainable sources at reasonable cost.

The new functionality could, for example, be displayed by bio-based aromatics that are isomers of petrochemical aromatics, and/or contain functional groups that are absent in petrochemical aromatics.

Proposals should prove that the properties of at least two products/applications are improved by using bio-based aromatics with a 'new functionality' compared to existing alternatives based on fossil-derived counterparts.

This topic includes all types of biomass excluding food and feed crops (but including agricultural residues), and allows biotechnological and chemical conversion technologies.

Proposals should deliver the required amounts of intermediate streams for efficient downstream steps to separate and purify the targeted bio-aromatics.

Proposals should specify potential application areas of the selected new bio-based aromatics.

The industry should actively participate to demonstrate the potential for integrating the developed concepts into current industrial landscapes or existing plants, so that the concepts can be deployed more quickly and scaled up to apply industry-wide.

Industry's participation should also guarantee that the applications are assessed as having properties relevant for industry (using well-known methods and standards).

Proposals should specifically demonstrate the benefits versus the state-of-the-art and existing technologies. This could be done by providing evidence of new processing solutions and new products obtained.

Proposals should commit to assessing the environmental impacts of the developed processes or products using LCA methodologies based on available standards, certification, accepted and validated approaches (see also in the introduction)²⁰. Any potential hazards associated with the developed processes and products should be analysed to ensure that the products comply fully with REACH¹⁴ legislation and other toxicity requirements, safety requirements and any relevant EU legislation.

Proposals should also include an economic viability performance check (value chain and market analysis) of the developed products and processes, along with an analysis of social impacts where applicable.

If relevant, proposals should also allow for pre- and co-normative research necessary for developing the needed product quality standards.

The technology readiness level (TRL)¹⁵ at the end of the project should be at least 3 for the bio-based value chain in question. Proposals should clearly state the starting TRL, which may be as low as 1 or 2.

Proposals should seek complementarity with the existing projects funded under Horizon 2020 to avoid overlap, promote synergies and advance beyond the state-of-the-art.

The scope aims at assisting industry to further explore promising technologies to broaden and strengthen the bio-based industries in Europe

Indicative funding:

It is considered that proposals requesting a BBI JU contribution of between EUR 1 million and EUR 2,5 million would allow the specific challenge to be addressed appropriately. However, this does not preclude the submission and selection of proposals requesting other amounts.

To be eligible for participation a consortium must contain at least one constituent entity of the Bio-based Industry Consortium that is a beneficiary not eligible for JU funding as laid down in Commission Delegated Regulation (EU) No 623/2014.

Expected impacts:

- contribute to **KPI 1**: create at least one new cross-sector interconnection in bio-based economy;
- contribute to **KPI 2**: set the basis for at least one new bio-based value chain;
- contribute to **KPI 5**: create at least one new bio-based material starting from bio-based aromatic compounds;
- contribute to **KPI 8**: validate at least one new and improved processing technology reflecting the 'TRL gain' since the start of the project;

- lay the groundwork for a significant reduction in greenhouse gas emissions from the proposed solutions compared with the benchmark fossil-based alternatives for aromatics production;
- develop at least two applications utilising 'outperforming' bio-based aromatics, with improved properties compared to the current alternatives based on fossil-based counterparts.

Expected duration: 1 to 4 years.

Type of action: Research and innovation action.

The conditions related to this topic are provided in the chapter 2.3.3.

BBI 2018. SO3.D4 – Produce biopesticides or bio-based fertilisers as components of sustainable agricultural management plans³⁹

Specific challenge:

Biopesticides are pesticides derived from natural materials such as animals, plants, bacteria and certain minerals.⁴⁰ They can improve the management of pests for sustainable agricultural management programmes, by combatting only the targeted pest and closely related organisms, making them sometimes more selective than conventional pesticides. If in addition they are effective in small quantities and decompose quickly, they can greatly reduce the use of conventional (synthetic) pesticides.

The components that can be used to produce biopesticides have also anti-pathogenic capabilities: they are able to prevent biomass degradation by fungi, bacteria or other kinds of pathogenic agents. Upscaling their use for biopesticides requires sustainable supply and optimum production.

Sustainable agricultural management programmes also entail the supply of nutrients to crops. The existing supply of nutrients can be expanded and diversified by tapping side streams from bio-based operations. These streams are nutrient-rich and moreover, are a zero-ILUC (indirect land use change) feedstock for fertilisers⁴¹, nutrients and plant biostimulants. However, current practice is to spread them on the land with little pre-treatment. This practice is wasting a potentially valuable resource and is often not the most effective and efficient way to add nutrients and carbon to the soil. Further

³⁹ See also Horizon 2020 SC2 topic CE-RUR-08-2018-2019-2020 C[2020]: Bio-based fertilisers from other by-products of the agro-food, fisheries, aquaculture or forestry sectors (IA).

⁴⁰ According to the UK Health and Safety Executive, "biopesticides are plant protection products which contain biological control agents (microbials, pheromones, plant extracts etc.) for use as agricultural, horticultural and home garden pesticides." The FAO describes biopesticides (biological pesticides) as "a generic term, not specifically definable, but generally applied to a biological control agent, usually a pathogen, formulated and applied in a manner similar to a chemical pesticide, and normally used for the rapid reduction of a pest population for short-term pest control". [International Standards for Phytosanitary Measures 1 to 24, 2005]

⁴¹ The term 'fertilisers' should be understood in a broad sense. The Commission proposal for the revised Fertiliser Regulation COM(2016) 157 provides access to the internal market to a broad range of fertilising products including mineral, organo-mineral and organic fertilisers, soil improvers, growing media and plant biostimulants. Certain substances, mixtures and micro-organisms, commonly referred to as plant biostimulants, are not as such nutrients, but nevertheless stimulate plants' nutrition processes by improving plant nutrition efficiency, plant resistance to abiotic stress, and crop quality. They could play a significant role to improve the sustainability of arable land.

development work is needed to optimise the separation and purification of these streams and expand their use in nutrient mixtures for the targeted soil conditions.

Sustainable agricultural management can greatly benefit from the contribution of new, bio-based pesticides and fertilisers.

The **specific challenge** of this topic is to overcome hurdles in the production of biopesticides and bio-based fertilisers to benefit sustainable agricultural management.

Scope:

Demonstrate the production of effective and cost-efficient biopesticides or fertilisers from sustainable biomass sources. Proposals should address **either** biopesticides **or** fertilisers.

Proposals should tackle the efficient sourcing, biochemical characterisation and extraction of appropriate fractions or compounds; the separation and purification of the desired stream; and the optimal and safe production of the standardised final bioactive products.

Proposals should include an experimental validation stage, assessing the effect of the developed products on the targeted crop(s). Proposals should also compare the application of the developed bio-products and conventional (synthetic) products to relevant soil types and growing conditions.

Proposals should address the elimination of hurdles and bottlenecks, transport modes regarding the logistics and associated infrastructure in the targeted biomass feedstock supply systems. These include collection systems, intermediate storage and safety aspects (see Introduction).

Proposals should carefully assess the potential occupational health risks and environmental impacts associated with the production and use of the developed products. Any potential hazards associated with the developed processes and products should be analysed to ensure that the products comply fully with REACH¹⁴ legislation and other toxicity requirements, safety requirements and any relevant EU legislation.

Proposals should commit to assessing the environmental and economic impacts of the developed products or processes, using LCA methodologies based on available standards, certification, accepted and validated approaches (see also Introduction)⁴². If applicable, proposals should also analyse the social impacts.

Proposals should be based on a sound business case and business plan.

If relevant, proposals should also allow for pre- and co-normative research necessary for developing the needed product quality standards.

The technology readiness level (TRL)¹⁵ at the end of the project should be 6. Proposals should clearly state the starting TRL.

Indicative funding:

⁴² The LCA may focus on a set of critical issues early on to steer the development process in the right direction. In this case, it is essential that this selection is carefully explained in the proposal in order to allow for expert assessment.

It is considered that proposals requesting a maximum contribution EUR 7 million would be able to address this specific challenge appropriately. However, this does not preclude the submission and selection of proposals requesting other amounts.

Expected impacts:

- contribute to **KPI 1**: create at least one new cross-sector interconnection in bio-based economy;
- contribute to **KPI 2**: set the basis for at least one new bio-based value chain;
- contribute to **KPI 6**: create at least two new demonstrated 'consumer' products based on bio-based chemicals and materials that meet market requirements;
- improve the overall sustainability of the value chains addressed;
- when tackling biopesticides: demonstrate at least the same efficiency in pest control as the best available conventional pesticides for the same service; if there is no comparable conventional pesticide available for a targeted service, the new biopesticides should reduce feedstock loss by at least 10 %;
- when tackling fertilisers: demonstrate at least the same efficiency in soil conditioning as the best available conventional fertilisers for the same service.

Type of action: Innovation action – demonstration action.

BBI 2018. SO3.F1 – Produce on a large scale competitive bio-based building blocks, polymers and materials that outperform existing alternatives in identified market applications

Specific challenge:

Research and demonstration activities have applied innovative technologies and processes to obtain novel bio-based building blocks, polymers and materials with improved functionalities and performances for packaging, coatings, resins and paints, additives, composites, fibres, cosmetics and others.

These innovative products can outperform state-of-the-art products, both fossil-based and current bio-based in comparable applications, in terms of performance and sustainability. However, despite their better performance and the high interest from the market in benefiting from this, their higher production costs and consequent higher prices slow down market uptake.

The **specific challenge** of this topic is to realise the high market potential of innovative bio-based building blocks, polymers and materials at a competitive level with benchmark products.

Scope:

Produce, at commercial level, bio-based building blocks, polymers and materials that outperform existing alternatives in comparable applications on performance and sustainability, by scaling up an optimised value chain, with demonstrated technologies and systems in an operational environment.

This topic builds on a successful demonstration of an optimised value chain at TRL 6-7, producing building blocks, polymers and materials with the potential to scale up. Proposals can also exploit natural bio-polymers where feasible.

Proposals should deliver a *first-of-a-kind* biorefinery, fully integrating feedstock supply and processing technologies to deliver products with target functionalities to meet identified market demand at competitive prices. The biorefinery should demonstrate effective and cost-efficient operation at a commercial level, applying where relevant the cascading use of biomass to maximise resource efficiency.

This topic includes any biomass feedstock that can be supplied sustainably to a large-scale biorefinery while providing economic, social and environmental benefits along the supply chain.

This topic may include any processing technology that has been demonstrated in an optimised value chain, and should encompass all processing stages leading to intermediate and end-products.

Proposals should address the elimination of hurdles and bottlenecks regarding the logistics, transport modes and associated infrastructure in the targeted biomass feedstock supply systems. These include collection systems, intermediate storage and safety aspects (see Introduction).

Proposals should include a performance validation of the obtained products in their respective applications, whether applied by themselves or combined with other products, to demonstrate better performance of the applications versus state-of-the-art alternatives.

Proposals should be based on a sound business case and business plan.

Proposals should include a full assessment of the environmental, economic and social impacts of the developed products or processes, using LCSA methodologies based on available standards, certification, accepted and validated approaches (see also Introduction).

Any potential hazards associated with the developed processes and products should be analysed to ensure that the products comply fully with REACH¹⁴ legislation and other toxicity requirements, safety requirements and any relevant EU legislation.

If relevant, proposals should also allow for pre- and co-normative research necessary for developing the needed product quality standards.

The technology readiness level (TRL)¹⁵ at the end of the project should be 8. Proposals should clearly state the starting TRL.

Indicative funding:

It is considered that proposals requesting a maximum contribution of EUR 21 million would be able to address this specific challenge appropriately. However, this does not preclude the submission and selection of proposals requesting other amounts.

Expected impacts:

- contribute to **KPI 1**: create at least two new cross-sector interconnections in bio-based economy; contribute to **KPI 2**: establish at least three new bio-based value chains;
- contribute to **KPI 5**: create at least three new bio-based materials;
- contribute to **KPI 6**: create at least two new demonstrated ‘consumer’ products based on bio-based chemicals and materials that meet market requirements.

Type of action: Innovation action – flagship action.

Proteins and active ingredients for feed/food, pharma and cosmetics

BBI 2018. SO3.D5 – Produce sustainable and cost-efficient high-performance functional ingredients from alternative sources

Specific challenge:

Boosted by the increasing world population and the subsequent growth in demand for functional products for food, feed, nutraceuticals, cosmetics, pharma, etc., industry and academia are looking at alternative sources for bio-active ingredients that can provide functionality.

In looking at alternative sources, R&I efforts have been focusing on secondary biomass sources such as agro-food residues and alternative primary biomass sources like algae, microorganisms and invertebrates. However, to-date none of them has been able to establish itself as a large-scale alternative to food crops due to cost, technology readiness and regulatory hurdles.

The seasonality and high variability in the composition of some potential alternative feedstocks (such as residual biomass from agricultural, food or forest sectors, or seasonal aquatic biomass) are preventing them from being a sustainable source of bio-active compounds.

The **specific challenge** of this topic is to help meet the increasing demand for high-performance functional ingredients for various applications through the use of sustainable alternative sources.

Scope:

Demonstrate the cost-effective, efficient and sustainable production of high-performance functional ingredients that meet market demand and safety standards for target sectors such as food, feed, nutraceuticals, cosmetics, pharmaceuticals, etc. (see Introduction).

This topic covers all bio-active ingredients except proteins⁴³.

Proposals should use biomass sources that can provide cost-effective, efficient and sustainable solutions to deliver functional ingredients in sustainable circular economy production systems. This topic includes different sources and streams of plant and animal origins as feedstock, such as agricultural or forest residues, food processing residual streams, non-seed plants, aquatic biomass, and invertebrates. It excludes food crops.

Proposals should address the elimination of hurdles and bottlenecks regarding the logistics, transport modes and associated infrastructure in the targeted biomass feedstock supply systems. These include collection systems, intermediate storage and safety aspects.

The topic includes chemical or biotechnological processes or a combination thereof.

Proposals should be based on a sound business case and business plan.

Proposals should commit to assessing the environmental and economic impacts of the developed products or processes, using LCA methodologies based on available standards, certification,

⁴³ Proteins are covered in other topics of AWP2017 and AWP2018.

accepted and validated approaches (see also Introduction)⁴⁴. If applicable, proposals should also analyse the social impacts.

Any potential hazards associated with the developed processes and products should be analysed to ensure that the products comply fully with REACH¹⁴ legislation and other toxicity requirements, safety requirements and any relevant EU legislation.

If relevant, proposals should also allow for pre- and co-normative research necessary for developing the needed product quality standards and for ensuring safety of the end-products.

The technology readiness level (TRL)¹⁵ at the end of the project should be 6-7. Proposals should clearly state the starting TRL.

Proposals should seek complementarity with the former and ongoing projects funded under FP7 and Horizon 2020 to avoid overlap, promote synergies and advance beyond the state-of-the-art, in particular related to the calls on 'Sustainable Food Security' (SFS) of Horizon 2020 Societal Challenge 2.

Indicative funding:

It is considered that proposals requesting a maximum contribution EUR 7 million would be able to address this specific challenge appropriately. However, this does not preclude the submission and selection of proposals requesting other amounts.

Expected impacts:

- contribute to **KPI 1**: create at least one new cross-sector interconnection in bio-based economy;
- contribute to **KPI 2**: set the basis for at least one new bio-based value chain;
- contribute to **KPI 6**: create at least two new demonstrated consumer products based on bio-based chemicals and materials that meet market requirements;
- obtain at least 20 % more value from the used new/alternative feedstock than state-of-the-art methods.

Type of action: Innovation action – demonstration action

BBi 2018. SO3.F2 – Large-scale production of proteins for food and feed applications from alternative, sustainable sources

Specific challenge:

The worldwide demand for protein is progressively expanding due to strong growth in the world's population. Improvements in the standard of living in large parts of the world are adding to the protein demand⁴⁵. Forecasts to 2050 show that current protein availability will not be sufficient to meet protein demand for food purposes. At the same time, Europe is highly dependent on imports

⁴⁴ The LCA may focus on a set of critical issues early on to steer the development process in the right direction. In this case, it is essential that this selection is carefully explained in the proposal in order to allow for expert assessment.

⁴⁵ <http://www.fao.org/docrep/013/i2050e/i2050e.pdf>

of protein-rich material for feeding livestock: About 70 % of the total amount required is imported. Already 60-70 % of global arable land is used for animal feed to meet animal protein demand.

Consequently, the exploitation of new protein sources is necessary to meet the worldwide demand. European crops, together with residues and co-products from primary biomass cultivation, are valuable sources of proteins. Residues from animal processing, fisheries, aquaculture and algae industries also offer a potential, albeit currently underexploited, source of proteins. The bio-based industry could help to expand the production of protein-rich ingredients by valorising existing alternative sources from food/feed value chains and by taking full advantage of the successes of earlier (and ongoing) R&D and small-scale industrial operations⁴⁶.

The **specific challenge** is to increase the availability of sustainable, safe proteins sourced from alternative, sustainable sources.

Scope:

Successfully operate a large-scale, first-of-its-kind bio-based value chain producing sustainable, safe food- and/or feed-grade proteins sourced from alternative, sustainable sources, such as residual streams from agriculture, other biomass production and related residual streams (like aquaculture, fisheries, or seaweed), or food industry side streams, through a cascading approach where applicable. 47

Proposals should include the whole value chain from the feedstock supply to processing and production steps for the targeted high added-value products. All relevant technologies in the different steps are applicable, provided they have been already proven at a significant scale (preferably demonstration levels TRLs 6-7, but at least pilot plant level TRL 5).

Proposals should focus primarily on proteins for food and feed applications. However, proposals could also consider functional proteins and other applications that may make it possible to generate new incomes and hence increase the overall sustainability of the value chains. Proposals should include extra valorisation steps through an integrated biorefinery setup.

Proposals should address the elimination of hurdles and bottlenecks regarding the logistics, transport modes and associated infrastructure in the targeted biomass feedstock supply systems. These include collection systems, intermediate storage and safety aspects.

Proposals need to take into account legislative limitations over the origin of the biomass feedstock when dealing with proteins for human or livestock nutrition. Proposals should include an assessment on safety, quality and purity for the target products, comparing them with the current (imported) proteins used for the same applications and end-products.

Proposals should also provide sound business case and business plan showing that sustainably produced feedstock streams are available in Europe, allowing to increase protein production in Europe and to reduce the imports of protein-rich products.

⁴⁶ Two projects on algae biorefineries have been selected in Call 2016 of Horizon 2020 Societal Challenge 2: Genialg (http://cordis.europa.eu/project/rcn/206026_en.html) and Sabana (http://cordis.europa.eu/project/rcn/205995_en.html)

⁴⁷ For a Research and Innovation Action on proteins see Topic BBI 2017.R4.

Proposals should specifically demonstrate the benefits versus the state-of-the-art and existing technologies. This could be done by providing evidence of new processing solutions and new products obtained. Proposals should demonstrate the techno-economic feasibility of the large-scale deployment of sustainable and efficient European value chains for proteins production.

Proposals should include a full assessment of the environmental, economic and social impacts of the developed products or processes, using LCSA methodologies based on available standards, certification, accepted and validated approaches (see also Introduction).

Any potential hazards associated with the developed processes and products should be analysed to ensure that the products comply fully with REACH¹⁴ legislation and other toxicity requirements, safety requirements and any relevant EU legislation.

If relevant, proposals should also allow for pre- and co-normative research necessary for developing the needed product quality standards.

The technology readiness level (TRL)¹⁵ at the end of the project should be 8. Proposals should clearly state the starting TRL. The proposed work should enable the technology to achieve TRL 8 within the timeframe of the project.

Indicative funding:

It is considered that proposals requesting a maximum contribution of EUR 21 million would be able to address this specific challenge appropriately. Nonetheless, this does not preclude the submission and selection of proposals requesting other amounts.

Expected impacts:

- contribute to **KPI 1**: create at least two new cross-sector interconnections in bio-based economy;
- contribute to **KPI 2**: set the basis for at least two new bio-based value chains;
- contribute to **KPI 6**: create at least two new ‘consumer’ products produced from bio-based chemicals and materials;
- reduce the carbon footprint of the considered bio-based operation by at least 20 % compared with the existing protein.

Type of action: Innovation action – flagship action.

Strategic Orientation 4: Create and accelerate the market-uptake of bio-based products and applications

BBI 2018. SO4.S1 – Benefit from previous and current work to create a coherent and stimulating ‘environment’ for a sustainable bio-based industry in Europe

Specific challenge:

Coordination and support actions (CSAs) funded by the 6th and 7th Framework Programmes⁴⁸, Horizon 2020 including the BBI JU, various Interreg⁴⁹ and other European programmes have addressed many aspects related to the bio-based industry. These include: standardisation; awareness and communication; identifying regulatory hurdles; technological and non-technological road-mapping; foresight and market studies; biomass availability; sustainability; and analysing bio-based industries in Member States and regions. Current CSAs continue to address similar and different aspects to help the bio-based industry.

However, there is no ‘global overview’ of the results of completed work, the objectives of ongoing actions or a gap analysis versus long-term objectives. Moreover, these results and analyses are not collected or made available centrally for use in follow-up and future work. More needs to be done to communicate these results to the relevant stakeholders and a wider public.

The ***specific challenge*** of this topic is to benefit from the results from previous projects and from ongoing actions in the bio-based industry at the regional, national and European levels.

Scope:

Map the (completed and running) CSA projects of all European programmes during the past ten years that address non-technological aspects for a bio-based industry in Europe.

Proposals should interlink the CSA projects where relevant, showing how they can work together and build on each other’s strengths.

Proposals should collect the results from studies and projects that address the bio-based industry, especially those funded under the BBI JU programme, displayed in a transparent, readily available and user-friendly fashion to facilitate their use in future work and communication activities.

Proposals should also identify what more needs to be done by different stakeholders (policy-makers, business, investors, the scientific community and others) to ensure a sustainable, strong and competitive bio-based industry in Europe, including the successful development of new markets for bio-based products and applications. The recommendations given in the BBI JU Interim evaluation report⁵⁰ have to be taken into consideration as well.

This exercise should not be limited to pinpointing issues to address relating to legislation, standards, legal or fiscal policies, end-users’ concerns, etc., in a single sector or application area. It should also address the bio-based industry in its broad sense, looking especially at long-term EU-added value and job creation potentials, as presented in the BIC SIRA. It should also address possible business cases to stimulate and expand private investment in the bio-based industry. Analysing and presenting these issues in an industry-led CSA within the BBI framework will provide the basis for a comprehensive set of proposals from an industry perspective.

Proposals should include provision for dialogue with different stakeholders, including the scientific community, investors, trade unions and civil society, and ways should be found to reflect diverging

⁴⁸ See BIO-TIC integrated roadmap as an example: <http://www.industrialbiotech-europe.eu/new/wp-content/uploads/2015/08/BIO-TIC-roadmap.pdf>

⁴⁹ A series of programmes since 1989 to stimulate cooperation between regions in the EU, funded by the European Regional Development Fund.

⁵⁰ <http://ec.europa.eu/research/evaluations/pdf/bbi.pdf>

views in the project results. Proposals should contain a communication plan to share the results of the project throughout Europe.

Proposals should lead the way towards creating a Europe-wide network of bio-based expertise that can play a significant role in setting strategic guidelines for the bio-based industry in Europe, feeding and tapping into related Member State and associated country strategies. This will position Europe as the leader in building a society where economic growth is decoupled from resource depletion and environmental impact.

The indicative length of time needed to achieve these objectives is approximately one year. This will involve delivering results at the latest in May 2020, so that hurdles can be addressed in the AWP 2020.

The Bio-based Industries Consortium (BIC) will set up an industry expert group from among its members to provide expertise in the implementation and follow-up of the different tasks and help organise meetings. This expert group should have an advisory role in the project, but as such is not a beneficiary in the consortium.

Indicative funding:

It is considered that proposals requesting a maximum of EUR 250 000 and a planned duration of not more than one year would be able to address this specific challenge appropriately. However, this does not preclude the submission and selection of proposals requesting other amounts or durations.

Expected impacts:

- Put all different stakeholders (policy-makers, business, investors, the scientific community and others) in a better position to ensure a sustainable, strong and competitive bio-based industry in Europe;
- Put a stepping stone towards positioning (and making visible) Europe as the leader towards a society where economic growth is decoupled from resource depletion and environmental impact.

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

Expected duration: Up to one year.

Type of action: Coordination and support action.

BBI 2018. SO4.S2 – Expand the bio-based industry across Europe

Specific challenge:

The level of activities of the Bio-based Industries Consortium (BIC) is not balanced throughout Europe. This is particularly the case in 'moderate/modest innovator' countries according to the European Innovation Scoreboard.⁵¹ This may be the result of insufficient knowledge of the potential for the bio-based industry in these countries, by actors in bio-based activities in these countries as

⁵¹ http://ec.europa.eu/growth/industry/innovation/facts-figures/scoreboards_en

well as by BIC. Additionally, actors in these countries may not be fully aware of the opportunities offered by BIC and the Bio-based Industries Initiative.

In order to explore how to remediate this situation, BIC has started in 2017 a pilot study in Portugal, Romania and Poland, identifying opportunities to expand the bio-based industry into these countries on a sustainable basis. This pilot study includes mapping local biomass sources that potentially could be used as sustainable feedstock for the bio-based industry, and mapping the major actors in the various relevant sectors. Additionally, the study sets up an action plan that seeks to establish interest and commitment from the actors and governmental institutions in the countries for expanding their industrial bio-based activities. BIC will continue this work in 2018 for Estonia, Latvia and Lithuania.

Similar work needs to be done in other countries, building on the ongoing work.

The **specific challenge** of this topic is to increase bio-based industrial activities in countries where these activities are relatively low.⁵²

Scope:

Map the available and potential biomass feedstock, actors and opportunities for industrial bio-based activities in selected countries, and specify an action plan to arouse interest and commitment from local actors to increase and/or create the bio-based activities in their respective countries.

The scope of this topic is fully in line with current EU policies and the Bioeconomy Strategy. It covers all local biomass sources that could serve as feedstock for bio-based industrial activities in an integrated fashion with the food chain, and do not cause indirect land use change nor any damage to the ecosystems.

The scope also covers all major actors (biomass providers and processors) in the respective countries who could help advance sustainable bio-based activities and investments in their countries.

Proposals should target five (5) countries from the following list, with a justification of the selection: Albania, Bulgaria, Bosnia Herzegovina, Croatia, Czech Republic, Greece, Macedonia, Montenegro, Serbia, Slovakia, Slovenia and Hungary.

Proposals should build on the work completed by BIC for Portugal, Romania and Poland in 2017 and the subsequent action plans⁵³.

The Bio-based Industries Consortium (BIC) will set up an industry expert group from among its members to provide expertise in the implementation and follow-up of the different tasks and help organise meetings. This expert group should have an advisory role in the project, but as such is not a beneficiary in the consortium.

Indicative funding:

It is considered that proposals requesting a maximum of EUR 750 000 and a planned duration of not more than one year would be able to address this specific challenge appropriately. However, this does not preclude the submission and selection of proposals requesting other amounts.

⁵² See also the SC2 topic RUR-09-2018 Realising the potential of regional and local bio-based economies.

⁵³ The final reports will be available on <http://biconsortium.eu>.

Expected impacts:

- concrete opportunities to expand and/or create industrial bio-based activities in the selected countries;
- first-pass indication of benefits to the local economies, environment and society by establishing industrial bio-based activities in the targeted countries.

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

Expected duration: Up to one year.

Type of action: Coordination and support action.

BBI 2018. SO4.S3 – Identify opportunities to promote careers, education and research activities in the European bio-based industry

Specific challenge:

Crossing the boundaries between existing and new industrial sectors and involving partners in a variety of fields entails working in areas where different academic disciplines cross paths and in diverse teams to speed up innovation. Adequately skilled people will be needed to operate innovative value chains while establishing and sustaining a bio-based industry in Europe. The bio-based industry is looking to forge a true partnership with academia that delivers the right skills for the 21st century. This partnership should also raise the profile of career opportunities in the bio-based industry and related academic fields.

In recent years a number of sectors have carried out many activities and programmes to address a rising skills mismatch and prevent a widening skills gap in the future. These programmes are running at the regional, national and European levels⁵⁴. The bio-based industry does not have such programmes at European level. As the bio-based sector is expected to bring growth and jobs, particularly in rural and coastal areas, it could play a significant role in tackling unemployment in areas such as southern Europe, where youth unemployment is high⁵⁵. Often this may require retraining to provide the skills needed.

The **specific challenge** of this topic is to identify education needs and gaps in Europe's bio-based sector and point to career opportunities in research and the industry.

Scope:

Identify opportunities and gaps to promote careers in the bio-based industry, education and research (applied and fundamental) at regional, national and European level, building upon earlier activities.

⁵⁴ See, for example, the European Commission's *New Skills Agenda for Europe*. The 2017 blueprint includes six pilot sectors: automotive; defence; maritime technology; space (geo information); textile, leather, clothing and footwear; and tourism. The pulp and paper sector is a candidate for the second round. See also the chemical industry's 'Educate to Innovate' programme and topic FCH-04.2-2015: Novel Education and Training Tools of the Fuel Cells and Hydrogen Joint Undertaking, <http://www.fch.europa.eu/sites/default/files/Annex%201%20-%20AWP2015%20final%20.pdf>.

⁵⁵ <https://www.statista.com/statistics/266228/youth-unemployment-rate-in-eu-countries/>.

Proposals must be the collective result of cooperation bringing together industry actors, both large and small, and educational and research institutions and associations, including technical colleges. The objective is to further align education and research to provide the skilled people needed to build a sustainable bio-based industry in Europe.

A broader approach, including a vision for reaching young students in the early stages of the educational system as well as specialists already working in the industry, each with appropriate approaches, will be an asset to the proposal.

Proposals should be based on an overview of new and ongoing programmes at the national, regional, European and key international levels that address bio-based activities and the bioeconomy so as to avoid overlaps, utilise results and lessons learned where applicable, and build on strengths at European level.

The Bio-based Industries Consortium (BIC) will set up an industry expert group from among its members to provide expertise in the implementation and follow-up of the different tasks and help organise meetings. This expert group should have an advisory role in the project, but as such is not a beneficiary in the consortium.

Indicative funding:

It is considered that proposals requesting a maximum of EUR 1 million and a planned duration of not more than one year would be able to address this specific challenge appropriately. However, this does not preclude the submission and selection of proposals requesting other amounts or durations.

Expected impacts:

- provide the bio-based industry and sector with an overview of completed and ongoing programmes addressing curricula that involve bio-based activities;
- provide the bio-based industry and sector with a basis for promoting careers in the bio-based sector;
- promote an improved and efficient alignment and interaction among industry and educational and research institutions, focusing on the needed skills and potential job opportunities in the bio-based sector.

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

Expected duration: Up to one year.

Type of action: Coordination and support action.

2.2.6. Conditions of the 2018 Call

Call identifier: H2020-BBI-JTI-2018

Publication date: 11 April 2018⁵⁶

⁵⁶ The BBI JU Executive Director may decide to open the call up to one month prior to or after the envisaged date of opening.

Indicative deadline: 6 September 2018⁵⁷ 17:00:00 (Brussels local time) - (single stage call).

Indicative budget: EUR 115 million^{58,59,60}

Estimated value of the in-kind contributions by the members other than the Union or their constituent entities (BIC): Minimum EUR 45 million.

Indicative budgets by type of actions

Topic	Indicative budget (million EUR)
Research and innovation actions	
BBI 2018. SO1.R1 – Resolve logistical, infrastructural and technological challenges to valorise residual and side streams from aquaculture, fisheries and the aquatic biomass processing industries	26
BBI 2018. SO3.R2 – Develop techniques and systems to improve the performance of biocatalysts	
BBI 2018. SO2.R3 – Introduce new technologies to make pulping operations more resource-efficient	
BBI 2018. SO3.R9 – Develop functional molecules for bio-based coatings outperforming existing products and meeting market requirements	
BBI 2018. SO3.R10 – Develop bio-based packaging products that are biodegradable/compostable and/or recyclable	
BBI 2018. SO2.R4 – Apply advanced biotechnologies to convert biomass that contains inhibitors into high value-added chemicals and materials	15
BBI 2018. SO2.R5 – Develop innovative single-step processes for conversion of a biomass feedstock into multiple readily usable intermediate streams	
BBI 2018. SO2.R6 – Apply emerging breakthrough technologies to improve existing value chains	
BBI 2018. SO2.R7 – Electrochemical processes for bio-based monomers and polymers	
BBI 2018. SO2.R8 – Develop adequate computational systems for	

⁵⁷ The BBI JU Executive Director may delay this deadline by up to two months.

⁵⁸ 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

⁵⁹ Subject to the adoption of the European Commission Financing Decision 2018 for the Bio-based Industries Joint Undertaking. The final total funding for projects includes EFTA contributions.

⁶⁰ The call budget may be topped up by unused BBI JU appropriations from previous years within the limit set in the call budget flexibility section below.

modelling the design, start-up, scaling-up and continuous improvement of bioprocesses involving microorganisms	
BBI 2018. SO3.R11 – Develop technologies and systems to produce bio-based aromatics that outperform fossil-based counterparts	
Innovations actions – demonstration actions	
BBI 2018. SO1.D1 – Improve the logistical and pre-processing steps of locally sourced biomass to serve as feedstock for the bio-based industry	30
BBI 2018. SO1.D2 – Find solutions to dilution, pollution and content diversity challenges to turn urban bio-waste into sustainable feedstock for the bio-based industry	
BBI 2018. SO2.D3 – Valorise sugars from the cellulosic and/or hemicellulosic fractions of lignocellulosic biomass	
BBI 2018. SO3.D4 – Produce biopesticides or bio-based fertilisers as components of sustainable agricultural management plans	
BBI 2018. SO3.D5 – Develop sustainable and cost-efficient high-performance functional ingredients from alternative sources for a wide array of applications	
Innovation actions – flagship actions	
BBI 2018. SO3.F1 – Produce on a large scale competitive bio-based building blocks, polymers and materials that outperform existing alternatives in identified market applications	42
BBI 2018. SO3.F2 – Large-scale production of proteins for food and feed applications from alternative, sustainable sources	
Coordination and support actions	
BBI 2018. SO4.S1 – Benefit from previous and current work to create a coherent and stimulating ‘environment’ for a sustainable bio-based industry in Europe	2
BBI 2018. SO4.S2 – Expand the bio-based industry across Europe	
BBI 2018. SO4.S3 – Identify opportunities to promote careers, education and research activities in the European bio-based industry	
Total	115

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 the following are eligible for funding: 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.

Subject to the amended BBI JU Regulation entering into force in early 2018, the financial contributions to be delivered by BIC or its constituent entities pursuant to Article 12(3)(b) of the amended BBI Statutes shall be made as payments to the BBI JU or as financial contributions to indirect actions funded by the BBI JU. In order to enable the practical implementation of such payments to indirect actions, the BBI JU will adapt its Model Grant Agreement accordingly. This will be accompanied by complementary guidelines to BBI JU beneficiaries. The updated Model Grant Agreement as well as the complementary guidelines shall be ready by end of Q1 of 2018, in time for the launch of the 2018 Call for Proposals.

2.3.1. List of countries eligible for funding

Part A of the General Annexes⁶¹ to the Horizon 2020 Work Programme 2018-2020 shall apply *mutatis mutandis* to the actions covered by this Work Plan with the following derogation:⁶²

Coordination and Support actions (CSA) and Research and Innovation Actions (RIA)	<p>By way of derogation from Article 10(1) of Regulation (EU) No 1290/2013, with regard to the Bio-Based Industries Joint Undertaking only the following participants shall be eligible for funding from the Bio-Based Industries Joint Undertaking for actions in the area of bio-based industries other than innovation actions:</p> <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
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⁶¹ http://ec.europa.eu/research/participants/data/ref/h2020/other/wp/2018-2020/annexes/h2020-wp1820-annex-ga_en.pdf

⁶² OJ L 174, 13.6.2014, p. 12.

	<p>technological development as one of their main objectives;</p> <p>(d) the Joint Research Centre;</p> <p>(e) international European interest organisations.</p>
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2.3.2. Standard Admissibility conditions and related requirements

Part B of the General Annexes to the Horizon 2020 Work Programme 2018-2020 shall apply *mutatis mutandis* to the actions covered by this Work Plan.

2.3.3 Eligibility conditions

Part C of the General Annexes to the Horizon 2020 Work Programme 2018-2020 shall apply *mutatis mutandis* to the actions covered by this Work Plan. The following exceptions apply:

- 1) According to Article 9(5) of the Horizon 2020 Rules for Participation⁶³ the annual work plan where appropriate and duly justified, may provide for additional conditions according to specific policy requirements or to the nature and objectives of the action, including inter alia conditions regarding the number of participants, the type of participant and the place of establishment.
- 2) Several topics implemented as research and innovation actions should enable the projects to particularly benefit from the practical knowledge and technical capabilities of relevant industrial actors in the bio-based industry. BIC members have in-depth knowledge of the sector of the bio-based industry in Europe as well as high technical capabilities; their participation in these actions, as beneficiaries not eligible for JU funding according to Commission Delegated Regulation (EU) No 623/2014, would enable an essential pooling of resources and better integration among economic actors along the value chain, thereby maximising the impact of the BBI JU projects.
- 3) In line with Article 9(5) of the Horizon 2020 Rules for Participation, these topics require, as an additional condition for participation, that among the participants in the consortium there is at least one constituent entity of the Bio-based Industry Consortium (BIC) by the call deadline. Actions will be eligible for funding on the condition that at least one constituent entity of BIC participates in the action. These topics are:

BBI 2018 SO2.R4 – Apply advanced biotechnologies to convert biomass that contains inhibitors into high value-added chemicals and materials

This topic is strategic for the conversion at potentially commercial yield levels of a wide variety of residual biomass streams that contain inhibitors to fermentation. Results from projects that successfully address the challenges will provide a significant step towards commercially valorising residual streams from the agriculture, forest, aquatic/marine and bio-waste sectors. The participation of at least one large industry member of BIC guarantees an alignment with the long-term objectives of the Bio-based Industries Initiative and a commitment to adhere to these objectives during the project.

⁶³ Regulation (EU) No 1290/2013 laying down the rules for participation and dissemination in Horizon 2020.

BBI 2018. SO2.R5 – Develop innovative single-step processes for conversion of a biomass feedstock into multiple readily usable intermediate streams

This topic aims at reducing investment and operational costs, as well as environmental impacts associated with current complex cascading operations, to obtain valuable intermediate streams from bio-based feedstocks. Innovative single-step processes to replace such complex cascading schemes would significantly increase the competitiveness of the bio-based industry. The active involvement of large enterprises represented in BIC ensures a well-defined focus on the relevant issues associated with the complex operations currently performed at large scale.

BBI 2018. SO2.R6 – Apply emerging breakthrough technologies to improve existing value chains

This topic is relevant for the efficient integration of innovative, breakthrough, game-changing technologies into existing value chains, aiming to improve them from the technical, economic and/or environmental perspective(s). Based on their knowledge of potential innovative technological solutions like the ones developed within the on-going BBI projects, as well as of the challenges or needed improvements already identified in the value chains, large industry members of BIC contribute to speeding up the technological uptake of breakthrough technologies into existing value chains.

BBI 2018. SO2.R7 – Electrochemical processes for bio-based monomers and polymers

This topic explores application of a pioneering concept that could enable deployment of small-scale decentralised plants able to exploit a surplus of electricity production for conversion of biomass into chemical building blocks. This could significantly change the bio-based industry landscape, in particular its relationship with energy supply. Industrial leadership from BIC's large members is critical in ensuring that the technology and, more importantly, the resulting operation model suit the needs of the bio-based industry.

BBI 2018. SO2.R8 – Develop adequate computational systems for modelling the design, start-up, scaling-up and continuous improvement of bioprocesses involving microorganisms

Availability of reliable modelling approaches for bioprocesses is crucial for cutting development cost and time. In turn, this is critical to bring the bio-based value chains on par with their fossil-based counterparts. Participation of at least one large industry member of BIC in a leading position is instrumental to ensuring that the developed methods encompass all relevant process design elements and can thus serve the purpose of the bio-based industry.

BBI 2018. SO3.R11 – Develop technologies and systems to produce bio-based aromatics that outperform fossil-based counterparts

Due to the large use of aromatic building blocks in several applications, this topic brings great opportunities to improve the competitiveness of the bio-based industry by obtaining high-demand products able to outperform their fossil-based alternatives. In this framework, the participation of at least one large industry member of BIC facilitates the development of commercially feasible, new aromatic compounds, efficiently demonstrates their properties and performance in existing industrial landscapes, and accelerates the market uptake of these innovative products. This will be made possible thanks to the very direct link to the market and to the final target applications of the involved large industrial actors.

2.3.4 Types of action: specific provisions and funding rates

Part D of the General Annexes to the Horizon 2020 Work Programme 2018-2020 shall apply *mutatis mutandis* to the actions covered by this Work Plan with the following additions:

Research and Innovation Actions

RIA actions aim to fill the technological gaps within specific value chains. The impact for the whole value chain must be clearly shown. For RIA actions the Technology Readiness Level (TRL)⁶⁴ at the end of the project should be in the range of 4 to 5 (specified per topic), except for some topics where another TRL is given.

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. Proposals should clearly state the starting and target TRLs. For Demonstration projects, the TRL at the end of the project should be in the range of 6 to 7 (specified per topic). 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**' action 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 due to market failure/barriers to uptake. 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. Proposals should clearly state the starting and target TRLs. For Flagship actions, the TRL at the end of the project should be 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.

It has to be understood that additional activities: (i) are outside the Work Plan and hence outside the scope of this call for proposals; (ii) may be taken into consideration in the context of the impact criterion, as part of the additional investments that can be made by any participant; (iii) should not be part of the proposals themselves.

Coordination and support actions

⁶⁴ Technology readiness levels as defined in annex G of the General Annexes to the Horizon 2020 Work Programme: http://ec.europa.eu/research/participants/data/ref/h2020/other/wp/2018-2020/annexes/h2020-wp1820-annex-ga_en.pdf

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 2018-2020 shall apply *mutatis mutandis* to the actions covered by this Work Plan.

2.3.6 Evaluation Rules

Part H of the General Annexes to the Horizon 2020 Work Programme 2018-2020 shall apply *mutatis mutandis* to the actions covered by this Work Plan, only as regards the selection criteria.

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 Actions (CSA)	<p>Clarity and pertinence 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>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>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>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 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>
Research and Innovation Actions (RIA)	<p>Clarity and pertinence of the objectives;</p> <p>Soundness of the</p>	<p>The extent to which the outputs of the project would contribute to each of the expected impacts</p>	<p>Quality and effectiveness of the work plan, including extent to which the resources assigned to work</p>

Type of action	Excellence	Impact	Quality and efficiency of the implementation
	<p>concept and, credibility of the proposed methodology;</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)</p> <p>Appropriate consideration of interdisciplinary approaches and, where relevant, use of stakeholder knowledge.</p>	<p>mentioned in the work plan under the 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 will help maximising the impact of the action.</p>	<p>packages are in line with their objectives and deliverables;</p> <p>Appropriateness of the management structures and procedures, including risk and 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 methodology;</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</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</p>

Type of action	Excellence	Impact	Quality and efficiency of the implementation
	<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)</p> <p>Appropriate consideration of interdisciplinary approaches and, where relevant, use of stakeholder knowledge.</p>	<p>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 investments⁶⁵, will help maximising the impact of the action</p>	<p>deliverables;</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 flagship⁶⁶.</p>

⁶⁵ Additional investments related to the action, not to be confused with 'additional activities' referred to in Article 4(2)(b) of the BBI JU Regulation.

⁶⁶ 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).

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 thresholds for the criteria 'excellence' and 'implementation' will be 3, whereas for the criterion 'impact' 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: As part of the panel review, the BBI JU will organise hearings with applicants of all proposals.

2.3.7. Call Budget flexibility

Part I of the General Annexes to the Horizon 2020 Work Programme 2018-2020 shall apply *mutatis mutandis* to the actions covered by this Work Plan. Final budgets may change following evaluation. The final figures may change 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).

The cumulated changes above may not exceed 20 % of the maximum contribution provided for this Work Plan, as set out in Article 2 of the related Commission Decision on the Union financial contribution to the BBI JU for 2018.

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 project results

The results of the projects from Call 2018 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 JU website. BBI JU will ensure that the requirement of the grant agreement regarding dissemination and exploitation are met, monitoring the dissemination activities related to the projects performed by the beneficiaries, during their implementation, according to the applicable periodicity and certainly at the final reporting.

2.3.10 Open access to research data and research data management

As regards open access to research data, Part L of the General Annexes to the Horizon 2020 Work Programme 2018-2020 shall apply *mutatis mutandis* for the actions covered in this Work Plan.

2.3.11 Horizontal Actions to support the implementation of the Programme

The implementation of the BBI JU work programme is further supported by key horizontal activities in the following areas:

- SME participation
- Widening participation
- Synergies with other relevant funding programmes
- Business Intelligence

The related action plans are discussed with the two advisory bodies SC and SRG. For 2018 onwards they also based on the recommendations of the BBI JU interim evaluation report⁶⁷ published on 9 October 2017.

The overall objective of the work undertaken in the context of the abovementioned activities is to ensure the successful implementation of BBI JU's core operations, in line with the objectives set out in the 'BBI Regulation' as well as with the overall objectives for the initiative set out in the SIRA.

The activities related to SME participation and widening participation entail thorough monitoring and analysis of the participation of SMEs as well as underrepresented countries in BBI JU calls.

BBI JU will continue to analyse the impact of its consolidated portfolio focusing on the aspects and indicators that are most relevant to the BBI JU, such as environmental and socio-economic impacts, development and trends of bio-based industrial sectors, new products and markets and regional potential.

Finally, in order to achieve maximum impact, the BBI JU together with the European Commission and BIC, will continue to work on promoting synergies with other initiatives that also offer opportunities for the growth of the bio-based industrial sector in Europe.

These activities are closely monitored by the BBI JU advisory bodies and Governing Board, to which regular progress updates will be reported.

2.4. Support to Operations

2.4.1. Communication activities

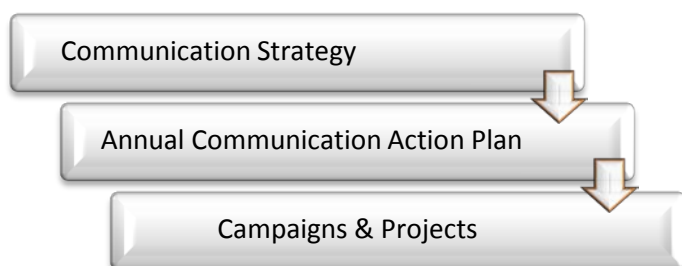
From strategy to action plan:

The BBI JU pursues its communications activities in line with its communication strategy presented to the GB in 2016. The 2018 communications action plan will focus on the impact of the initiative as a key instrument for the development of a sustainable bio-based industry in Europe, supporting the transition of BBI JU from 'recognition' to 'reputation'.

⁶⁷ <http://ec.europa.eu/research/evaluations/pdf/bbi.pdf>

The effective use of the right communication tools through identified communication channels will demonstrate the programme's impact through storytelling. The use of digital and printed materials will augment and illustrate the key messages. As requested by its founding partners, in 2018, the communication activities will focus strongly on the EU added value the programme's impact and the value for citizens.

BBI's communication activities are organised in different layers, with different documents on each layer. Figure 1 gives an overview:



The communication strategy was developed and presented to BBI JU GB in 2016. It includes a section describing the base of the stakeholder management strategy for BBI. In 2017 the communication strategy was turned into a communication action plan organised around campaigns and projects using identified communication channels.

For 2018 the communication action plan was presented to the BBI JU GB in September 2017 together with the corresponding budget. In 2018 the stakeholder management action will address a wider group of stakeholder requesting a specific action plan which will be presented to the BBI JU GB in December 2017. It will ensure that these stakeholders are aware of the benefits and impact of a programme like BBI JU for the European Union and its citizens.

BBI JU stakeholders are extremely diversified with an array of interests and influences over the potential the BBI JU's potential for success. BBI JU also has different paths to influence the different groups of stakeholders. Managing their expectations through communication and outreach activities is essential to engage them. The stakeholders' power/influence and the resources BBI JU has to target these stakeholders have been mapped and identified according to their priority for achieving BBI JU's stated organisational mission. The stakeholder action plan will be focussed on tailored and targeted key messages which it can promote using all available tools and channels.

Communication channels

Communication channel	Description	Focus
Press and other media	Media and press engagement plan, communication materials	Ensure wider access to stakeholders, storytelling, disseminate key messages, outreach
Ambassadors, multipliers and intermediaries	Centres of influence, key individuals, influencers	Outreach to targeted stakeholder groups, formal networks, advisory bodies

Communication events	Please see detailed list below	reinforce the programme's messages, direct contact with priority stakeholders, maximise impact for BBI JU's outreach
Internet	Website review, partnering platform, social media, newsletter	Improve project dissemination, favour networking, consolidate presence/influence on social media, raise visibility, storytelling
Public relations	Bilateral meetings, presentations	advocacy and public relations actions, improve recognition of the BBI JU programme

The actions to implement the communication action plan for 2018 will continue to place a strong emphasis on ensuring a coordinated and collaborative approach to its communication-related activities, taking advantage of complementarities and avoiding duplication with other initiatives.

Support to horizontal activities

In addition to the main activities outlined above, the BBI JU communication team will provide support to the horizontal programme activities described in 2.1.6, such as the widening participation strategy, the SMEs participation strategy and actions to identify synergies with other programmes.

Communication action plan for 2018

The communication action plan for 2018 will consist of the following:

- Development and implementation of a comprehensive press & media plan, to include the public procurement of **media and press agency services and of media monitoring services**.
- Procurement of **new materials** to develop and execute our multi-media communication and dissemination campaigns to communicate the programme's activities, impacts, results and to engage with its priority stakeholders. BBI JU will continue also to develop its range of **short promotional videos** to tell the success stories and disseminate information about the programme using the BBI JU projects.
- BBI JU will conduct a user review and implement improvement through development of the BBI JU **partnering platform**. The ongoing contract with the current provider will continue to host, manage & provide technical support for the partnering platform. This includes the management of the meeting platform during BBI JU's annual brokerage event to help potential participants to network around the annual Call for proposals.
- **User review** and subsequent improvements and development of the BBI JU **public website** procuring the services of expert consultants to support the user surveys, user testing, and liaison with website manager. The BBI JU website will also be moved to hosting & management services under a service level agreement with DG DIGIT.
- **Organisation and sponsorship of relevant events with BBI JU direct or indirect involvement**, including paid advertising, sponsorship of awards and relevant marketing activities which build BBI JU's corporate reputation in line with its mission and objectives.
 - The **Open Info Day** and brokerage event to support the annual Call for proposals will be held in EC premises

- The BBI JU will hold a **second Stakeholder Forum in** December 2018 which may take place in an external venue, due to the nature of the event which determines the type of accommodation required.
- As on-going but also up-coming policy developments closely impacting BBI JU's current and future activities, the focus will remain on targeting the European institutions and through the **participation in events** like Biotech Week (Q3), Knowledge4Innovation (Q3), European Week of Cities and Regions (Q3) etc.
- In the context of its stakeholder management plan priorities for 2018 addition, BBI JU will also participate in the **sponsorship of several awards, prizes and industry related events**: the Parliament Magazine's MEP Awards Research & Innovation prize, the EUCYS bio-based prize for 2018, World Biomarkets 2018 and EFIB 2018.

Indicative list of events involving BBI JU participation in 2018:

Event title	Date(s)	Place	BBI JU expected role
AAAS Congress 2018	15-18 February	Texas, USA	BBI JU panel session
World Bio Market 2018	20-21 March	Amsterdam, NL	Sponsorship and speaking slots
MEP Awards	21 March	Brussels, BE	Sponsor Research & Innovation Prize
BBI – UNESCO Bioeconomy meeting (TBC)	11 April	Paris, FR	Co-organiser with speaking slots
BBI JU Open Info Day & Brokerage event	17 April	Brussels, BE	Organiser
Global Bioeconomy Summit 2018 (TBC)	19-20 April	Berlin, DE	Co-organiser with speaking slots
Member States/Regional Open Info Days	Various	Various	Speaker
Bulgarian Presidency Food 2030 (TBC)	TBC	Sofia, BG	Speaker and exhibition
Bio World Congress 2018	16 – 19 July	Philadelphia, USA	Speaker
EUCYS 2018	14 – 17 September	Dublin, Ireland	Prize award
EFIB 2018	October	TBC	Shared exhibitor with BIC and speaker
Ecomondo 2018	October	Rimini, IT	Speaker
BBI 2nd Stakeholder Forum 2018	December	Brussels, BE	Organiser

Overview of 2018 activities and indicative budget

The table below provides an overview of the activities outlined above, the timeline and the indicative budget foreseen:

Activity	Indicative timeline	Indicative budget	Expected procurement procedure
Media and press agency monitoring	End Q1	EUR 45 000	Public procurement
Public relations and media campaigns	Q2	EUR 95 000	Framework contract/SLA (if available to BBI JU) or public procurement

Communication materials: publications, leaflets, posters, banners and related promotional items of low value	Q1-Q4	EUR 53 000	Framework contract/SLA (if available to BBI JU) or public procurement
Promotional videos	By Q2	EUR 60 000	Framework contract/SLA (if available to BBI JU) or public procurement
Partnering platform	Q2	EUR 20 000	Existing contract
Public website	Q2-Q3	EUR 45 000	SLA with DIGIT for webhosting, public procurement for Website review
Open Info Day	By Q2	EUR 50 000	Public procurement (various low value contracts)
Second Stakeholder Forum	Q4	EUR 145 000	Framework contract (if available to BBI JU) or public procurement
Participation to events	Q3	EUR 25 000	Framework contract/SLA (if available to BBI JU) or public procurement
Sponsoring	Q1-Q4	EUR 25 000	Public procurement (low value contracts)

2.4.2. Procurement and contracts

For the year 2018 BBI JU will implement its administrative budget also by means of procurement procedures and contracts, supporting the administrative and operations services in accordance with its financial rules⁶⁸. It is essential that BBI JU makes the most efficient use of its resources by using existing framework contracts and service level agreements (SLA) with EC services. The extensive use of the existing contracts provides a lighter solution in terms of workload and the possibility to rely on quality service providers.

When framework contracts or SLAs are not available, BBI JU will need to launch individual procurement procedures in order to obtain desired services and implement its AWP effectively.

The table below provides a summary of tenders planned for 2018 under administrative budget and the related procurement procedure expected to be used on the basis of the information currently available. It may be subject to modifications.

Subject	Indicative/Maximum amount	Type of procedure	Indicative timeline
Interim agents recruitment ⁶⁹	Up to EUR 180 000	Inter JU Framework contract with Start People	Entry into force January 2018
BBI JU stakeholder	Up to EUR 145 000	Open procedure	Q2 2018

⁶⁸ https://www.bbi-europe.eu/sites/default/files/bbi_ju-financial_rules.pdf

⁶⁹ Recruitment of interim agents is needed to support the Programme office in high workload periods, to cover long term absences and to guarantee business continuity. The budgeted amount is calculated to include indicatively 4 interim agents for 10 months each. The duration of the recruitment might vary depending on the professional profiles; e.g. project officers or legal officers have higher hourly cost and they could be recruited for shorter periods respecting the budgetary envelope.

forum 2018 ⁷⁰			
Communications Materials	Up to EUR 113 000	Various low value procedures and one mid value.	Q1-Q4
Communication tools	Up to EUR 65 000	Mid value	Q1-Q2
Public relations including media support	Up to EUR 95 000	Mid value	Q1-Q2
Media monitoring service	Up to EUR 45 000	Mid value	Q1-Q2
External audit services	Up to EUR 50 000	FWC managed by DG BUDG	Q3

2.4.3. IT and logistics

Corporate IT Tools – HR Management / SYSPER

In 2016 the BBI JU applied to participate in the project covering the rollout of the Commission's corporate HR management application suite called "Sysper", and has since been accepted. The aim is to have a comprehensive and efficient tool supporting human resources, in line with the European Commission standards and regulations.

The project was kicked off in January 2017 and is has progressed since then. According to the planning, by the end of 2017, all the participating entities will be grouped into clusters and a per-cluster project plan is going to be implemented in 2018. This was also confirmed during the Heads of Agencies meeting in Parma in July 2017.

Corporate IT Tools – Records Management / ARES

Negotiations with the Commission have started in the context of the rollout of ARES to the EU Agencies and JUs. ARES is the web application used by all the Commission's Services, the Cabinets, the Executive Agencies, the European External Action Service and EU Delegations to register, file and store their documents in the common repository for electronic documents. Access to this IT tool is essential to be able to guarantee that key information is delivered and received by all players involved. ARES is also fundamental to updating the BBI JU document management policy.

Based on preliminary information from the Secretary General (Business Process Owner of ARES) of the European Commission, the project could be launched in Q4 2017, so the implementation can be foreseen for 2018.

⁷⁰ BBI JU is part of the FWC for events leaded by RTD that is expected to be signed by Q4 2017. If this FWC finalise does not materialise BBI JU will launch a procurement procedure.

ICT Operations and Support Services Contract

The current common framework contract concluded in this domain with RealDolmen is going to end on 3 December 2018. By that date the Joint Undertakings must find a way to provide continuation of services. There are multiple options to choose from at this point: conducting a call for tenders resulting in a new framework contract; joining one or more of the European Commission's framework contracts in the given domains; joining one or more of the EU Agencies' framework contracts. This choice will be made in collaboration with the other Joint Undertakings, ensuring the best choice in terms of workload and cost/quality of services provided.

2.4.4. JU Executive Team – HR matters

Management of the programme office

The Programme Office will continue to 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.

In the HR domain, BBI JU aims to achieve its goals through effective recruitment procedures, proper allocation and administration of resources and in developing, motivating and retaining valuable/high qualified staff while maintaining an optimal and efficient working environment.

This objective will be implemented in four main HR areas:

Staff implementation and recruitment

Recruitment will continue to be a key element of the HR function as staff turnover and inter agency mobility are expected to increase. In 2018, the BBI JU will reach its complete Staff Establishment Plan. With the adoption of the AWP 2018 and its related budget the BBI JU Staff Establishment Plan is being modified by splitting one temporary agent position (AST7) into two posts (one temporary agent AST2 and one contract agent FGIII) with no budgetary impact. The recruitment procedure for these posts will be launched in 2018. In addition to this, the unforeseen departure of staff may occur and new recruitments could be launched.

The total number of staff will remain within the Staff Establishment Plan despite the increased workload, especially during specific periods. In order to cope with these peaks of work, BBI JU will recruit interim staff to provide occasional additional support and guarantee business continuity for critical periods.

Given the success of its traineeship programme, in 2018 BBI JU will give the opportunity to additional trainees to acquire a first-hand experience of the BBI JU as well as an understanding of its objectives and activities. With these traineeships BBI JU will benefit from the input of enthusiastic young graduates, who can give a fresh point of view and up-to-date academic knowledge, which will further enhance the everyday work of the JU. BBI JU also will explore in 2018 the possibility of joining the European Commission "Blue book" system that provides EC services and agencies with top quality interns.

Administrative/legal matters

In 2018, BBI JU will continue to develop its internal guidelines and strengthen its legal framework, paying particular attention to how EC implementing rules apply to the JU particularities. The programme office will also organise an annual appraisal and reclassification exercise.

The following implementing rules are expected to be adopted in 2018 in consultation with DG HR and the Standing Working Party.⁷¹

- Conditions of employment of Contract Agents 3a;
- Whistleblowing;
- Function of Adviser;
- Middle management;
- Disciplinary procedures.

Additional implementing rules could be adopted, depending on the ongoing negotiations within the Standing Working party.

Learning and development opportunities for better efficiency and staff motivation

The BBI JU promotes the continuous development of its staff to ensure that they are competent in their roles and can respond to the challenges of their job. This is also a tool to motivate staff, ensuring their professional growth. The JU promotes opportunities for long-term career development where this meets individual and BBI JU needs. Therefore, in 2018 HR will continue to develop a learning and development policy taking into consideration the training impact assessment organised in 2017, where the opinion of staff has been gathered to evaluate the benefit of training, both for the staff and for the JU as a whole. BBI JU will also organise coaching opportunities for specific key functions and team coaching to help staff to develop their growth and potential within the organisation. Moreover, teambuilding activities will be organised in order to foster and promote team spirit and strengthen the collaboration among staff members. In addition to this, a workshop on “BBI JU values” will be organised in 2018.

Inter JU/Agency network cooperation

In 2018, BBI JU will continue to closely collaborate with the other JUs, the agency network and the EC HR support services. In this context, BBI JU will work on the implementation and use of the EC IT tool “SYSPER” in 2018. Access to this tool will facilitate the management of the HR activities.

In order to implement the policy on the protection of the dignity of the person and prevention of psychological and sexual harassment at the workplace, it has been decided to create a common JU network of confidential counsellors. Staff members, who feel they are victims of psychological or sexual harassment can contact, in full confidentiality, a confidential counsellor of their choice from the JUs network.

2.4.5. Data protection

The BBI JU, and specifically the Data Protection Officer (DPO), continues to ensure and apply the data protection legal framework within the Joint Undertaking, as stated in Regulation 45/2001, and the European Data Protection Supervisor’s (EDPS) “Position Paper on the role of Data Protection Officers in ensuring effective compliance with Regulation (EC) 45/2001”.

2018 will be a particularly intense year for data protection, as the new regulation⁷² will apply from 25 May 2018. BBI JU will closely follow the guidelines of the EDPS.

⁷¹ The Standing Working Party, composed of DG HR, representatives of agencies and partner DGs, has been created by the Commission to discuss and draft implementing rules to the Staff Regulations in agencies, allowing the harmonisation of HR rules in the agencies network.

In particular, the BBI JU's DPO will undertake the following activities:

- Preparation of the data protection framework in view of the entry into force of the General Data Protection Regulation in 2018.
Regular update of notifications, inventory/registry, privacy notices and legal notices in website.
- Continuing support to BBI JU data controllers so they can fulfil their obligations.
- Maintaining awareness, among all BBI JU staff, about data protection issues in relation to the implementation of the accountability of the EDPS, via internal training and ad hoc meetings.
- Participation in external activities such as meetings with the EDPS and other DPOs and various training activities.

2.5. Governance

2.5.1. Governing board

BBI JU's Governing Board has overall responsibility for the strategic orientation and the operations of the BBI Joint Undertaking and shall supervise the implementation of its activities in accordance with Article 7 of the Statutes⁷³.

The GB is composed of 5 representatives of the European Commission on behalf of the EU, and 5 representatives of BIC.

The GB is planning to hold four ordinary meetings (every quarter) during 2018. In addition, BBI JU sends monthly reports and quarterly monitoring reports to the GB members to keep a continuous information loop.

The key activities of the GB for the 2018 are listed below:

Key activities in 2018 – Timetable	
Adopt the Annual Activity Report 2017 and its assessment by the GB	Q2
Adopt an opinion on the final accounts 2017	Q2
Approve the list of proposals selected for funding after the evaluation of Call 2018	Q4
Adopt the AWP and Budget 2019	Q4
Approve the Additional Activities Plan 2019	Q4

⁷² Regulation (EU) 2016/679 of the European Parliament and of the Council of 27 April 2016 on the protection of natural persons with regard to the processing of personal data and on the free movement of such data, and repealing Directive 95/46/EC (General Data Protection Regulation)

⁷³ Annex to the Council Regulation (EU) No 560/2014 of 6 May 2014 establishing the Bio-based Industries Joint Undertaking ("BBI Regulation").

2.5.2. Executive Director

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.

In September 2017 the Executive Director presented to the Governing Board the BBIJU priorities for the year 2018. These priorities are translated into yearly objectives for BBI JU Programme Office team and then cascaded into individual objectives for all BBI JU staff members during the months of January 2018.

For the year 2017 the priorities were to:

- Continue the building an effective and well-balanced project portfolio in the continuity of 2016 where the AAR showed KPIs on the right track.
- Keep the operational excellence built in 2016 at the full capacity of the organisation while strictly respecting the Horizon 2020 rule for participation of transparency, openness and excellence.
- Confirm the industry commitment via its call participation and financial contribution.
- Move the activities in support of programme implementation in another dimension well above the promotion of the programme with for consequence to move from awareness of BBI JU to recognition towards a wider range of stakeholder.
- Launch action plans related to Horizontal tasks around the widening participation strategy, the SME strategy and the synergies with other initiatives.

For 2018, the executive Director and his management team presented on 26th September 2017 to the BBI JU GB five priorities.

1. **Reinforce the PPP highlighting the impact of the initiative, the EU added value, the Industry commitment and the strategic alignment of its founding members.** BBI JU will present a set of success stories highlighting the impact of BBI JU, the EU added value and the structuring effect of the initiative. It will report specifically on the socio-economic and environmental impact of BBI project portfolio. The evolution of the leverage effect will be monitored as well to check if it stays on the right track. The programme office will continue to provide effective support to DG RTD for its policy activities, while optimising access to the data in concordance with the guidance of the CSC.
2. **Consolidate the BBI JU projects portfolio in line with the up-dated SIRA and BBI JU Council Regulation objectives.** The objective is to maintain the balance among the type of actions and the four strategic orientations, ensuring optimal coverage of the (now obsolete) value chains (plus the aquatic biomass chain) together with a confirmation of good operational KPI on projects outcome. BBI JU will continue its effort on the widening participation action plan, the SME strategy and the synergies with other initiatives, and report results with concrete impact in 2018.
3. **Continue running BBI JU operations ensuring the highest standards in terms of quality and efficiency.** BBI JU will monitor the compliance, the effectiveness and efficiency of its processes and procedures in cooperation with the Internal Audit Service. The Programme office will keep the efficient management of its growing project portfolio including reporting, progress review, payments and effective monitoring of its progress, monitored by H2020 efficiency KPIs. The Executive Director will ensure that all the procedures are in place

to achieve a smooth ECA audit for the year 2017, and getting the discharge by the European Parliament for the year 2016 accounts. The Executive Director coordinates the implementation of the findings of the ex post audit strategy and analyses its results to improve ex ante controls when relevant and possible. The Executive Director will implement proper internal quality control and anticipate as much as possible consultation for documents and reports developed by BBI JU.

4. Successfully implement suitable solutions addressing **for In Kind Additional Activities (IKAA) and In Kind Operational Activities (IKOP)** reporting and financial contribution at project level.⁷⁴

One objective is to timely implement IKOP reporting allowing IKOP 2017 to be included in the draft AAR by end February 2018 and ensure IKOP certification for the projects ending in 2018.

The new IKAA methodology implementation will enable to have the IKAA plan 2019 adopted by the GB in December 2018 and the Certified IKAA report 2017 on time to be included in the final version of the AAR2017.

The call 2018 includes six RIA topics with the additional eligibility criterion that at least one participant of each consortium has to be a constituent entity of the Bio-based Industry Consortium (BIC), which will be specifically promoted by the programme office. Furthermore, subject to the amended BBI Regulation entering into force in early 2018, the BBI JU will reinforce the message that BIC needs to reach the level of contributions to BBI JU required by the BBI JU Regulation and that BIC members are welcome to support the development of the bio-based industries in Europe, through their financial contributions in all types of actions (CSAs, RIAs, DEMOs and FLAGS). The BBI JU is going to draft specific guidelines for applicants on this issue.

5. **Implement the communication and stakeholder management action plan towards a wider group of stakeholders; shifting from BBI “recognition” to “reputation”.** The BBI call 2018 will be promoted with a particular emphasis on underrepresented countries or macro-Regions in synergy with other EU and BIC initiatives. Communication events and campaigns will be organised to communicate the impact of the BBI initiative as a key instrument for the development of a sustainable Bio-based industry in EU. The stakeholder management action plan will be implemented to widen the understanding and recognition of BBI towards a wider group of prioritized key stakeholders from the EU institutions, relevant federations, Governmental & NGOs. Finally, in 2018, the communication action plan will be extended to third countries where win-win strategies have been identified.

The AWP 2018 has been built around those priorities and its related objectives.

⁷⁴ Council Regulation (EU) No 560/2014 defines two types of in kind contributions to be delivered by the private member of the BBI JU, i.e.

- in kind contributions by the members other than the Union or their constituent entities consisting of the costs incurred by them in implementing indirect actions less the contribution of the BBI Joint Undertaking and any other Union contribution to those costs (Art. 12 (3) of the Statutes) – IKOP;
- in kind contributions of at least EUR 1 755 000 000 by the members other than the Union or their constituent entities consisting of the costs incurred by them in implementing additional activities outside the work plan of the BBI JU contributing to the objectives of the BBI Initiative (Art. 4(2)(b)) – IKAA.

2.5.3. Scientific Committee

According to Article 4(2) 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 BBI JU 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 fifteen members. The SC members have elected a chair and a vice-chair.

The Scientific Committee carries out the following tasks:

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

The Scientific Committee was consulted on this 2018 AWP in two stages:

- provision of input to the priorities for AWP2017 and 2018;
- provision of recommendations to the draft of the AWP2018 (including topic texts and budget).

During the year 2018, at least two meetings of the Scientific Committee are planned (Q2 and Q3/Q4). Additional meetings could take place to address major issues.

Key activities in 2018 – Timetable	
8th Meeting of the SC. The SC would: - Provide advice on the BBI JU programme progress and achievement of targets and other strategic issues. The BBI will provide information on the main achievements in the implementation of the 2017 annual work plan, participation in the call for proposals and evaluation results of the Call 2017, on-going projects, etc. - Provide advice on the scientific priorities to be addressed in the annual work plan 2019. A consultation will be organised before the SC meeting and the provided input will be discussed, and the advice communicated to the SRG and the funding partners (BIC and EC).	Q2
9th Meeting of the SC. The SC would: - Provide advice on the draft of the Annual Work Plan 2019 - Provide advice on the BBI JU programme progress and achievement of targets and other strategic issues. The BBI will provide information on the 2018 annual work plan implementation, participation in the call for proposals 2018, on-going projects, etc.	Q3/Q4

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 SRG consists of one representative of each Member State and of each country associated to Horizon 2020. It has elected a chair and two vice-chairs from among its members.

The SRG is being consulted and, in particular, reviews information and provides opinions on the following matters:

- programme progress of the BBI Joint Undertaking and achievement of its targets, including the calls for proposals and proposals evaluation process;
- updating of strategic orientation;
- links to Horizon 2020;
- annual work plans;
- involvement of SMEs.

The States Representatives Group was consulted on this 2018 Annual Work Plan in two stages: i) first draft of AWP with the list of topics in May 2017, (ii) pre-final full version to the draft of the AWP2017 in October 2017.

The SRG also provides information to, and acts as an interface within, the BBI Joint Undertaking on the following matters:

- 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;
- specific measures taken at national or regional level with regard to dissemination events, dedicated technical workshops and communication activities;
- 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 2018, at least two meetings of the States Representatives Group are planned (Q2 and Q3/Q4). Additional meetings could take place to address major issues.

Key activities in 2018 – Timetable	
<p>8th Meeting of the SRG. The SRG would:</p> <ul style="list-style-type: none"> - Elect a Vice-Chair (the 2 years election period of one of the current Vice-chair, the Italian representative, finishes in May 2018). - Provide recommendations on the BBI JU programme progress and achievement of targets and other strategic issues. The BBI will provide information on the programme progress and main achievements since the last meeting, participation in the call for proposals and evaluation results of the Call 2017, on-going projects, communication activities, synergies with other initiatives, etc. - Provide SRG position on the priority paper - Provide updated information on regional and national research and innovation programmes in order to ensure synergies with BBI JU. Discussion on the basis of the questionnaire on national activities. 	Q2

<ul style="list-style-type: none"> - Discuss initiatives to improve the promotion, dissemination and communication of the BBI Initiative and the participation of national stakeholders in BBI JU call for proposals. 	
<p>9th Meeting of the SRG. The SRG would:</p> <ul style="list-style-type: none"> - Elect the Chair (the 2 years re-election period of the Chair finishes on October 2018). - Provide an opinion on the 2019 pre-final draft AWP - Issue recommendations on the BBI JU programme progress and achievement of targets and other strategic issues. The BBI will provide information on the 2018 annual work plan implementation, participation in the 2018 call for proposals (submission statistics), on-going projects, etc. - 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 JU. 	Q3/Q4

2.6 Internal Control framework

BBI JU adopted in September 2015 its internal control framework in order to provide reasonable assurance to the Governing Board regarding the achievement of its objectives:

- Ensure that operational activities are effective and efficient. The BBI JU meets its objectives defined in the Annual Work Plan using the adequate human and financial resources.
- Ensure that legal and regulatory requirements are met. BBI JU operates in full accordance with all legal and regulatory requirements.
- Ensure that reporting is reliable. BBI JU management produces regular, reliable and easily accessible management information on financial management, use of resources and progress on the achievement of operational objectives.
- Ensure that assets and information are safeguarded. BBI JU managers take the measures necessary to ensure the completeness and preserve the integrity of the data on which management decisions are taken and reports are issued.

All BBI JU management process and functions concur to these four objectives granting the largest possible preventive, detective and corrective controls in line with the available resources.

In 2018 BBI JU will continue to run its operations by improving the quality level of programme implementation while integrating corrective actions identified in 2017. Main activities that will be performed include the following:

- Ensure awareness and implementation of BBI JU Internal Control Standards (ICS) and prepare the transition to a new principle-based system in line with the most recent practice of the EU bodies;
- Report on compliance and effectiveness of internal control in the annual activity report;
- Carry out periodic review of risks at least yearly in the context of preparing the annual work programme;
- Coordinate visits of the European Court of Auditors;
- Liaise with the auditors of the Internal Audit Service;
- Follow up on the implementation of action plans on audit recommendations and on observations of the discharge authority;
- Ensure a smooth implementation of the findings of the ex post audit strategy and analyse its results to improve ex ante controls when relevant and possible.

2.6.1 Financial procedures

For what concerns the grant management side, BBI JU will continue the consolidation of its financial procedures in line with the evolution of the corporate IT tools. In fact, a larger number of operations are dealt with through the SYGMA/COMPASS suite. While staff is becoming familiar with these evolving instrument, still complex operations will need to be performed directly within the EC accounting system ABAC.

Administration and finance unit and the programme unit will further collaborate in order to ensure common understanding and implementation of financial rules of Horizon 2020 grants, in line with the practices of DG RTD.

BBI JU will deal with its first payment of the balance for an ongoing grant; this will imply also the process of certification of costs (through the certificate of financial statement) and the certification of the in-kind contribution of beneficiaries during the project. These certificates imply the development of dedicated controls in 2018.

For what concerns the implementation of the administrative budget, improved business procedures are in place in order to maximise the efficiency of financial performance and in order to provide consolidated rules. Further simplifications will be ensured on the basis of the experience accumulated in 2017 and reinforced controls will be put in place where needed.

2.6.2 Ex ante and ex post controls

Ex ante controls:

BBI JU has already adopted a full set of processes and procedures whose regular application in 2018 will continue to provide reasonable assurance that the principles of sound financial management

have been applied to each transaction. In particular ex ante controls on operational expenditure will be implemented by BBI JU in line with the adopted Horizon 2020 ex ante control strategy.

In order to implement ex ante controls, desk reviews are performed by BB JU Programme Office; on top of this reviews on periodic reports will be carried out by external experts and ad-hoc technical reviews can also be launched when deemed necessary. BBI JU will continue to update and develop internal procedures defining the ex ante controls to be performed and taking into account risk-based and cost-effectiveness considerations.

In 2018 BBI JU will continue to cooperate with the Fraud and Irregularities network of Horizon 2020 research family. Relevant Programme Office staff has received training on fraud detection and prevention; the possibility to deepen the knowledge in this field will continue to be promoted within the learning and development framework of the BBI JU.

For what concerns the prevention of possible double funding, BBI JU will continue to collaborate with EC services and the Research Executive Agency in order to detect at an early stage possible overlapping during the grant agreement preparation, subsequent to the adoption of the ranking list by the Governing Board. Any possible overlapping at the level of topic definition is monitored by EC services responsible for the preparation of relevant work plans. Regarding possible double funding controls during the project implementation, the Programme Office will follow closely the development of tailored Horizon 2020 corporate IT tools and will employ them according to its own resources.

Ex post controls:

Ex post controls on operational expenditures are implemented through the ex post audit process. The main objectives of the ex post audits are:

1. Assessing the legality and regularity of cost claims approved by the Programme Unit;
2. providing the basis for corrective and recovery activities, if necessary.

The Horizon 2020 Audit Strategy defines how the ex post audits are carried out. The Common Audit Service (CAS) implements the Horizon 2020 Audit Strategy. The CAS serves the Horizon 2020 implementing entities like the BBI JU through a corporate approach for the audit cycle: audit selection, planning, relations with beneficiaries and management of information about the audit process.

For BBI JU the priority actions for 2018 are ensuring:

- a smooth launch of a representative second batch of ex post Audit in BBI JU projects;
- the implementation of audit findings, by correction or by recovery of funds unduly paid.

2.6.3 Audits

The audit environment is an assurance and accountability pillar within BBI JU's internal control framework since it provides reasonable assurance about the state of effectiveness of risk management and control processes and serves as a building block for the annual Declaration of Assurance of the Executive Director.

BBI JU will ensure coordination and support to the audits carried out by the Internal Audit Service (IAS) and by the Court of Auditors (ECA) and will follow up and confirm the implementation of the relevant recommendations.

The IAS will continue performing the internal audit function and implementing the Strategic Internal Audit Plan 2017-2019 from 2016. The IAS will review and update this plan at the beginning of 2018 to prioritise one of the following possible audit topics:

- Horizon 2020 grant process (from the identification of the call topics to the signature of the grant agreement);
- Performance management of the BBI JU activities.

3. BUDGET 2018⁷⁵

3.1 Budget information

Please note that the BBI JU 2018 budget may be subject to modifications in the EU General Budget for 2018, if any, and would thus be updated accordingly.
Please see also the notes below each of the statements.

I Statement of revenue⁷⁶

Heading	Budget 2018 CA (in €)	Budget 2018 PA (in €)	Amended Budget 2017 CA (in €)	Amended Budget 2017 PA (in €)	Amended Budget 2016 CA (in €)	Amended Budget 2016 PA (in €)
EU contribution (excl. third countries contribution/EFTA)	112,487,038	111,138,458	80,956,777	83,654,005	157,991,971	62,004,509
of which Administrative	2,223,726	2,223,726	2,067,467	2,067,467	1,855,734	1,855,734
of which Operational	110,263,312	108,914,732	78,889,310	81,586,538	156,136,237	60,148,775
Third countries contribution (including EFTA)	2,820,948	2,789,526	2,198,345	1,905,507	4,406,181	1,785,724
of which Administrative EFTA ⁷⁷	51,813	51,813	50,446	50,446	50,662	50,662

⁷⁵ Subject to the adoption of the European Commission Financing Decision 2018 for the Bio-based industries Joint Undertaking.

⁷⁶ For the year 2018: an indicative amount of € 550,000 (including any EFTA/RO appropriations this amount may contain) – that may need to be transferred by the EU, on the BBI JU behalf, in commitment and payment appropriations, to the REA for the contracting and payment of its experts-evaluators 2018 – is included in the JU's Budget (included in the Revenue for 2018 and included in Expenditure chapter 28). However, the BBI JU will not request the EU to transfer the corresponding appropriations to this amount in its Accrual Based Accounting system, since the contracting and payment of expert evaluators will be managed by the REA, except if the accounting officers of the EU and of the BBI JU would decide otherwise during the course of 2018. This principle would also apply to the reactivated appropriations from 2017 for an indicative amount of €450,000, which may be needed for the contracting and payment of expert evaluators (included in the Expenditure chapter 28).

Heading	Budget 2018 CA (in	Budget 2018 PA (in	Amended Budget	Amended Budget	Amended Budget	Amended Budget
Of which administrative third countries excluding EFTA ^{78, 79, 80}	200,000	200,000	223,000	223,000	93,000	93,000
of which Operational EFTA	2,569,135	2,537,713	1,924,899	1,632,061	4,262,519	1,642,062
Industry (financial) contribution	4,475,539	2,975,539	3,115,280	3,365,280	2,943,315	2,193,315
of which Administrative ⁸¹	2,475,539	2,475,539	2,615,280	2,615,280	2,193,315	2,193,315
of which Operational	2,000,000	500,000 ⁸²	500,000	750,000	750,000	0
SUB-TOTAL revenues	119,783,525	116,903,523	86,270,402	88,924,792	165,341,467	65,983,548
C2 reactivation of unused appropriations from administrative expenditure	450,000	450,000	2,546,249	2,774,974	1,108,111	1,212,639
of which from 2015	0	0	989,945	431,673	1,108,111	1,212,639
of which from 2016	0	0	1,556,304	2,343,301		

⁷⁷ For the year 2018: EFTA contribution computed on the EU contribution (excl. third countries/EFTA) to the BBI JU administrative expenditure 2018. EFTA rate for 2018 is 2.33 %.

⁷⁸ For the year 2018: Third country contribution to be transferred by the EC to the REA on behalf of BBI JU for the contracting and management of its expert evaluators 2018. This amount is indicative only; however any change in this amount along the year 2018 would not impact the total EU contribution (incl. 3rd countries/EFTA contribution) to BBI JU administrative expenditure 2018 since it would be automatically offset by an equal increase or decrease in the amount of EU (excl. 3rd countries/EFTA contribution) to BBI JU administrative expenditure 2018.

⁷⁹ For the year 2017: from 08.025001.6-R0-RTD 847 F0 (BBI) to 08.025001.6-R0-REA.

⁸⁰ For the year 2016: from 08.025001.6-R0-RTD 837 F0 (SC2) to 08.025001.6-R0-REA.

⁸¹ For the year 2018: BIC's 50% contribution to BBI JU 2018 administrative expenditure (matching total EU contribution including third countries/EFTA).

⁸² For the year 2018: BIC financial contribution to BBI JU appropriations for operational expenditure 2018: the payment appropriations relate to the 2017 call contribution.

Heading	Budget 2018 CA (in	Budget 2018 PA (in	Amended Budget	Amended Budget	Amended Budget	Amended Budget
of which from 2017 ⁸³⁸⁴	450,000	450,000	0	0		
C2 reactivation of unused appropriations from operational expenditure	0	486,657	4,450,657	328,920	27,846,292	0
of which from 2014	0	0	0	0	1,846,292	0
of which from 2015	0	0	1,353,523	328,920	26,000,000	0
of which from 2016	0	0	3,097,134	0		
of which from 2017 ⁸⁵	0	486,657	0	0		
SUB-TOTAL reactivations	450,000	936,657	6,996,906	3,103,894	28,954,403	1,212,639
TOTAL REVENUES	120,233,525	117,840,180	93,267,308	92,028,686	194,295,870	67,196,187

⁸³ For the year 2018: Prudent estimate of part of the 2017 year-end surplus of administrative budget to be reactivated in 2018 as C2 appropriations. This amount will already be allocated to chapter 28 of the budget ("experts contracts and evaluations"), where it is most likely to be needed. If this amount is actually needed for the experts-evaluators 2018, it would then be transferred by the EU, on the BBI JU behalf, in commitment and payment appropriations, to the REA. The BBI JU will make sure that their accounts fully reflect the related budgetary execution.

⁸⁴ For the year 2018: The remaining part (i.e. after the C2 reactivations in 2018) of the estimated 2017 surplus amounts to €2,000,000 will be reactivated in 2019 following the orientation provided by the BBI JU governing board of 26 of September 2017.

⁸⁵ For the year 2018: Actual amount of year-end surplus of operational payment appropriations to be reactivated in 2018 as C2 appropriations, and paid in early 2018 (the payment was originally due to be paid by end 2017, but there was a timing issue with one project which delayed the payment by several months).

II Statement of expenditure

Title									
chapter	Heading	Budget 2018 CA (in €)	Budget 2018 PA (in €)	Amended Budget 2017 CA (in €)	Amended Budget 2017 PA (in €)	Amended Budget 2016 executed CA (in €)	% comparing 2018 CA vs 2016	Amended Budget 2016 executed PA (in €)	% comparing 2018 PA vs 2016
1	Staff Expenditure	2,780,568	2,780,568	4,448,150	4,458,785	1,807,295	53.9%	1,747,743	59.1%
1 1	Staff in active employment	2,414,308	2,414,308	3,946,044	3,986,217	1,555,009	55.3%	1,549,151	55.8%
1 2	Staff recruitment / Miscellaneous expenditure	66,400	66,400	96,169	61,754	114,945	-42.2%	95,585	-30.5%
1 3	Mission and duty travels	80,000	80,000	159,349	184,412	54,593	46.5%	52,501	52.4%
1 4	Other staff costs (socio-medical structure)	209,860	209,860	223,366	216,300	74,948	180.0%	42,625	392.3%
1 5	Entertainment and representation expenses	10,000	10,000	23,222	10,102	7,800	28.2%	7,881	26.9%
2	Other administrative expenditure	2,620,510	2,620,510	3,054,292	3,272,382	1,448,619	49.8%	1,309,625	65.7%
2 0	Rental of buildings and associated costs	290,000	290,000	310,220	348,887	263,035	10.3%	263,035	10.3%
2 1	Administrative information technology	252,100	252,100	259,847	306,546	150,692	67.3%	177,599	41.9%
2 2	Movable property and associated costs	5,000	5,000	25,082	90,863	64,218	-92.2%	58,218	-91.4%
2 3	Current administrative expenditure	29,000	29,000	50,661	55,400	8,439	243.6%	19,773	46.7%
2 4	Telecommunications and postal charges	13,600	13,600	13,550	22,926	15,850	-14.2%	12,831	6.0%
2 5	Expenditure on formal meetings	113,000	113,000	153,032	177,271	37,094	204.6%	37,094	204.6%

Title	Heading	Budget 2018 CA (in €)	Budget 2018 PA (in €)	Amended Budget 2017 CA (in €)	Amended Budget 2017 PA (in €)	Amended Budget 2016 executed CA (in €)	% comparing 2018 CA vs 2016	Amended Budget 2016 executed PA (in €)	% comparing 2018 PA vs 2016
2 6	External communication, information, publicity	587,810	587,810	635,423	676,866	366,388	60.4%	232,312	153.0%
2 7	Service contracts	100,000	100,000	187,360	194,000	34,140	192.9%		
Title chapter	Heading	Budget 2018 CA (in €)	Budget 2018 PA (in €)	Amended Budget 2017 CA (in €)	Amended Budget 2017 PA (in €)	Amended Budget 2016 executed CA (in €)	% comparing 2018 CA vs 2016	Amended Budget 2016 executed PA (in €)	% comparing 2018 PA vs 2016
2 8	Experts contracts and evaluations ⁸⁶	1,000,000	1,000,000	1,315,723	1,315,723	508,763	96.6%	508,763	8.1%
2 9	Expert reviewers	230,000	230,000	103,394	83,900	0		0	
3	Operational expenditure EC	114,832,447	112,439,102	85,764,866	84,297,519	185,602,866	-39.2%	61,792,021	81.2%
30	Previous years' calls		112,439,102		84,297,519			61,792,021	
31	Current year's call (s)	114,832,447		85,764,866		185,602,866			
	TOTAL EXPENDITURE	120,233,525	117,840,180	93,267,308	92,028,686	188,858,780	-37.4%	64,849,389	81.0%

⁸⁶ For year 2018: This amount of 1,000,000€ (in commitment and payment appropriations) is an indicative amount (including any third countries/EFTA appropriations this amount may contain) that the BBI JU may need the EU to transfer, on its behalf, to the REA for the contracting and payment of its experts-evaluators 2018 (excepted the part of this amount that may be already remaining – if any – at the level of the REA from the contracting and payment BBI JU experts-evaluators in previous years). However, the BBI JU will not request the EU to transfer these appropriations in its Accrual Based Accounting system (as these will be implemented by the REA), except if the accounting officers of the EU and of the BBI JU would decide otherwise during the course of 2018. Besides, it shall be noted that this is an indicative amount and there therefore may be either reflows from the REA of unused appropriations (which shall then be transferred back to the BBI JU Accrual. This amount is composed indicatively by €550,000 budgeted as a revenue for 2018 and by €450,000 as a reactivation of unused appropriations from the 2017 budget.

SUMMARY SCHEDULE OF PAYMENTS

Multiannual payment schedule on the operational budget (amounts highlighted in green are estimations according to the best available information)

Year	2014	2015	2016	2017	2018	2019
Total awarded grants	Grant amount € 49,653,707	Grant amount € 179,036,974	Grant amount € 185,070,932	Maximum Grant amount € 85,764,866	Maximum Grant amount € 114,832,447	
Pre-financing		€ 17,713,972	€ 61,790,836	€ 62,487,741	€ 34,305,946	€45,132,979
Interim payments				€ 21.323.120	€ 77,361.128	€92,625,160
Final payments					€ 772,028	€8,441,215
					€ 112,439,102 ⁸⁷	€ 146,999,354 ⁸⁸

Call 2014	2014	2015	2016	2017	2018	
Total awarded grants	€ 49,653,707					
Pre-financing		€ 17,713,972				
Interim payments				€ 21,323,120	€ 6,527,290	
Final payments					€ 772,028	€4,627,729

Call 2015.1	2014	2015	2016	2017	2018	
Total awarded grants		€ 73,741,234				
Pre-financing			€ 27,609,092			
Interim payments					€ 19,886,049	€15,281.516
Final payments						€2.743.361

Call 2015.2	2014	2015	2016	2017	2018	
Total awarded grants		€ 105.295.739				
Pre-financing			€ 34,181,744			
Interim payments					€ 49,379,602	
Final payments						

Call 2016	2014	2015	2016	2017	2018	
Total awarded grants			€ 185,070,932			
Pre-financing				€ 62,487,741		
Interim payments					€ 568,187	€77,343,664
Final payments						€1,070,125

Call 2017	2014	2015	2016	2017	2018	
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⁸⁷ This amount includes €500,000 BIC contribution and 486,657 of reactivations from 2017.

⁸⁸ Periodic reports' payments show higher claims in the first reporting period, thus the estimations have been updated accordingly.

Total awarded grants				€ 85,764,866		
Pre-financing					€ 34,305,946	
						to be determined on the basis of project start date

Call 2018	2014	2015	2016	2017	2018	
Total awarded grants					114,832,447	
Pre-financing						€ 45,932,979

3.2 Staff Establishment Plan

Grade	Establishment Plan 2017			Year 2018								
				Posts evolution				Organisational evolution		Establishment Plan 2018		
				Promotion / Career advancement		Turn-over (departures/arrivals)		New posts (per grade)		Requested (Budget)		
	PERM	TA	TOTAL	PERM	TA	Officials	TA	PERM	TA	PERM	TA	TOTAL
AD16												
AD15												
AD14		1	1								1	1
AD13		1	1								1	1
AD12												
AD11		2	2								2	2
AD10		2	2								2	2
AD9												
AD8		2	2								2	2
AD7		2	2								2	2
AD6												
AD5												
Total AD		10	10								10	10
AST11												
AST10												
AST9												
AST8												
AST7		3	3								2	2

AST6												
AST5												
AST4												
AST3												
AST2		0	0								1	1
AST1												
Total AST		3	3								3	3
SC6												
SC5												
SC4												
SC3												
SC2												
SC1												
Total SC												
Overall Total		13	13								13	13

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

*Includes the new GF III post

4. LIST OF ACRONYMS

AAR	Annual Activity Report
AWP	Annual Work Plan
BBI JU	Bio-based Industries Joint Undertaking
BIC	Bio-based Industries Consortium
CA	Commitment Appropriations
CAS	Common Audit Service
CEN	European Committee for standardization
CSA	Coordination and Support Action
CSC	Common Support Centre
DEMO	Demonstration Action
EC	European Commission
ECA	European Court of Auditors
EFTA	European Free Trade Association (Iceland, Liechtenstein, Norway, and Switzerland)
EDPS	European Data Protection Supervisor
FP7	European Framework Programme 7 (2007-2013)
FLAG	Flagship Action
GB	Governing Board
H2020	Horizon 2020-2020 (European Framework Programme 2014-2020)
HR	Human Resources
IA	Innovation Action
IAS	Internal Audit Service
ICF	Internal Control Framework
ICS	Internal Control Standards

IKAA	In Kind Additional Activities
IKOP	In Kind Operational Activities
KPI	Key Performance Indicator
LCA	Life-Cycle Assessment
LCSA	Life-Cycle Sustainability Assessment
NCPs	National Contact Points
MEP	Member of the European Parliament
MSW	Municipal Solid Waste
PA	Payment Appropriation
PPP	Public-Private Partnership
RIA	Research and Innovation Action
SC	Scientific Committee
SIRA	Strategic Innovation and Research Agenda
SLA	Service Level Agreement
SO	Strategic Orientation
SRG	States Representatives Group
SMEs	Small and medium-sized enterprises
TA	Temporary Agent
TRL	Technology Readiness Level
TTG	Time To Grant
TTI	Time To Inform
TTP	Time To Pay

