ANNUAL WORK PLAN & BUDGET 2019

for the Bio-based Industries Joint Undertaking

BBI JU

Bio-Based Industries
Joint Undertaking

In accordance with the Statutes of the BBI JU annexed to Council Regulation (EU) No 560/2014 of 6 May 2014.
The annual work plan and budget will be made publicly available after its adoption by the Governing Board.

Please note that until the UK leaves the EU, EU law continues to apply to and within the UK, when it comes to rights and obligations; this includes the eligibility of UK legal entities to fully participate and receive funding in Horizon 2020 actions such as those called for in this work plan. Please be aware however that the eligibility criteria must be complied with for the entire duration of the grant. If the UK withdraws from the EU during the grant period without concluding an agreement with the EU ensuring in particular that British applicants continue to be eligible, they will no longer be eligible to receive EU funding and their participation may be terminated on the basis of Article 50 of the grant agreement.

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This document establishes the 2019 Annual Work Plan and Budget, outlining the scope and details of research and innovation activities prioritised for the Call for Proposals in 2019, as well as the governance and activities of the Bio-Based Industries Joint Undertaking (BBI JU) foreseen for 2019. 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 according to article 15 of the statutes of BBI JU Council Regulation (EU) No 560/2014 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 2019, call and project management rules, BBI JU's support to operations, governance and the internal control framework.
3. BBI JU's 2019 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 BBU 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 2019

2.1. Executive summary

The 2019 Annual Work Plan and Budget (AWP) is the sixth 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 2019 confirms the focus on better integrating 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 of members of the Bio-based Industries Consortium (BIC).

A priority paper 2019-2020 has been developed by BIC in collaboration with the EC considering the factual results from the 2014 – 2016 calls and the content of BBI JU AWP 2017 and 2018 versus the 2020 goals set out in the SIRA. As a result of this analysis, the scientific priorities for 2019 are the following, well aligned with the four strategic orientations of the SIRA:

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 2019 the call has an indicative budget of EUR 135 million for a total of 21 topics with 10 RIAs topics, 4 CSAs, 4 DEMOs and 3 FLAGs.

In 2019 the programme office will face a considerable increase in workload while consolidating and fine tuning the reporting landscape on financial contribution and leverage effect (as approved by the BBI JU GB in 2018). In order to keep BBI JU operation standards at the highest quality, the Staff Establishment Plan (SEP) may be proposed for adjustment within a neutral administrative budget impact over the programming period.

The interim evaluation report of BBI JU performed by the EC with the support of independent experts highlighted the positive 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 BBI JU programme office together with its founding partners EC and BIC developed a detailed action plan published in July 2018. The action plan addresses all recommendations from the experts including the promotion of the widening participation strategy, the further development of synergies and complementarities with other initiatives, the fine-tuning and monitoring of KPIs and socio-economic and environmental impact of the projects.

Another priority for 2019 will be to analyse and communicate the impact and the added value of the BBI JU iPPP and its project portfolio to a wide audience of stakeholders. To do so, the BBI JU will undertake more detailed analyses and studies about the socio-economic and environmental impact of BBI JU projects and demonstrate the added value of the initiative. Results and achievements of completed BBI JU's projects will be widely communicated with a specific focus on the scientific advancements and to the market uptake potential. This communication will be supported by specific tools and campaigns (including events) to communicate the added value of BBI initiative in the daily lives of EU citizens, as specifically requested by several EU institutions. And finally, in December 2019 BBI JU will organise the second BBI JU Stakeholder Forum keeping the successful format of 2017 with a specific focus on output, impact and benefits for the EU citizens.

2.2. Operations

2.2.1. Objectives and indicators of the AWP 2019

In 2019, BBI JU will continue to contribute to the overcoming of the main technological and innovation challenges described in the SIRA, via its funded portfolio. 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, in the Impact Assessment of the BBI JU, and in the SIRA. Tables 1 and 2 show how the planned actions in 2019 are expected to contribute to the specific targets[1].

[1] Please note that the numbers refer to the aggregated expected contribution of every AWP 20219 topic to each of the KPIs; this number is only tentative, as one topic may deliver more than one project selected for funding (therefore increasing its contribution) or none projects selected for funding (no contribution of this topic to the aggregated contribution).

Table 1: Specific research and innovation objectives of BBI JU and related Key Performance Indicators (KPIs): Expected contributions of successful 2019 actions.

Objectives & KPIs		TARGET 2024[2]	Addressed in AWP 2019			
			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	10	4	5
Objective	**New bio-based value chains**					
KPI 2	Number of new bio-based value chains created/realised with BBI JU projects	10	0	10	4	6
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	1	3
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	11	0	6
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	0	6	7
Objective	**BBI JU 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**					
KPI 7	Number of Flagship grant agreements signed between BBI JU and the project consortia	5	0	0	0	3-5[3]
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	10	0	0
Number of new and improved processing technologies validated with BBI projects. This KPI is complementary to KPIs 4, 5 and 6.						

[2] The target reflects the end of the JU activities in accordance with article 1 of the BBI JU Council Regulation
[3] All flagship topics are in the same budget line but have a different expected funding per action. Therefore, the number of flagships will be in this range, depending on which flagship topics deliver the proposals selected for funding.

Note: The description of the specific BBI JU objectives and KPIs is provided in the Impact Assessment of the BBI JU[4] 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).[5]

The monitoring of the above mentioned KPIs (Table 1) will be based on data collected from the yearly 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 ongoing projects report annually on their expected KPI results by 2020 or by the end of the project (the earliest). The verification of these results will take place as the projects finish. BBI JU will report on the progress against KPIs in its Annual Activity Report.

[4] http://eur-lex.europa.eu/resource.html?uri=cellar:7959e353-eaf4-11e2-a22e-01aa75ed71a1.0001.01/DOC_1&format=PDF
[5] 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 2019 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[6]	
Objective	**Private funding to be provided according to BBI JU Regulation**	**Target at the end of BBI JU programme**	**Addressed in AWP 2019**
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 135 million. Private funding: - EUR 60 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.
Objective	**Reach an appropriate balance between research, innovation and deployment**	**Target at the end of BBI JU programme**	**Addressed in AWP 2019**
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 34.8% (EUR 47 million); IA – Demonstration Actions 19.3% (EUR 26 million); IA – Flagship Actions 42.2% (EUR 57 million); CSA 3.7% (EUR 5 million)

[6] 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.

The indicators mentioned in Table 2 are part of a broader range of Horizon 2020 Performance Indicators[7] 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.

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.[8] 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 2019

The BBI JU conducted a risk assessment exercise within the scope of the objectives and priorities set out in the AWP 2019. 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 convergences and inter-dependencies between risks. This process is 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 2018 a total of 8 risks have been identified and described in the Risk Register with varying degrees of importance, convergence and inter-dependency.

The assessment confirmed the trend of previous years and some additional risks have been absorbed or reduced by an increased effectiveness of internal controls as well as experience gained in the core activities, such as the Horizon 2020 grant planning, processes and systems.

Certain other risks persist in the remit of the Programme Office and the mitigating actions envisaged in the past will continue to be applied in 2019. In these areas, the Programme Office demonstrates that it is operating to high quality operational standards. Efficiency ratios of operations and risks related to staff are continuously being tested in order to mitigate the threat of an expected increase

[7] Based on Annex II (PERFORMANCE INDICATORS) and Annex III (MONITORING) to Council Decision 2013/743/EU.
[8] This legal requirement is set out in Article 31 of the Regulation (EU) No 1291/2013 establishing Horizon 2020.

in workload for the period 2019-2021. This is also the case for those processes that are not yet fully implemented (such as the ex post controls on operational expenditure) and where a closer monitoring of preliminary data will support the relevant control measures already in force.

Some new risks have been identified or scaled up for closer monitoring by the Programme Office. These relate mainly to the external environment where proactive measures are currently limited (e.g. BREXIT) or they rely on the financial commitment of BIC (namely financial contributions to be made by the members other than the EU to the budget of BBI JU).

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

The scientific priorities and impacts for the year 2019 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 SIRA, which presents four main strategic orientations:

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.

A priority paper for 2019-2020 has been developed, considering the gap analysis performed on the factual results from the 2014 -2016 calls and the content of the AWPs 2017 and 2018, versus the 2020 goals set in the SIRA. As a result of this analysis, the scientific priorities for 2019-2020 are the following:

1. FOSTER SUPPLY OF SUSTAINABLE BIOMASS FEEDSTOCK TO FEED BOTH EXISTING AND NEW VALUE CHAINS

Strategies: expand and diversify the biomass feedstock portfolio through improved utilisation of existing and new sources, aligning logistical systems to meet the demand and including the primary sectors' actors as partners in the new bio-based value chains.

Sub-orientations and potential themes for this strategic orientation and their anticipated impacts are:

AGRI-BASED FEEDSTOCK

- Utilise valuable components in animal residues in bio-based operations: Pursue involvement of primary sector, livestock industry, food processing industry (including e.g. slaughterhouses)

  Expected impacts: Rural development; higher employment and income; lower environmental impact and contribution to KPI 1, 2, 3, 4, 5, 6.

- Set-up regional closed-loop systems in biorefinery clusters and hubs; including assessment of the potential impact on soil quality of discharging nutrient-rich process water from biorefineries onto fields

  Expected impacts: Rural development; higher employment and income; lower environmental impact and contribution to KPI 1, 2, 3, 4, 5, 6.

- Utilise new plant species or varieties to deliver specific targeted ingredients for further use

  Expected impacts: Rural development; valorisation of currently 'unexploited' lands (e.g. marginal lands); higher

- Identify biomass genotypes that can be grown for specific new value chains

  Expected impacts: Rural development; higher productivity in target molecules and/or lower input requirements for biomass cultivation.

- High-value ingredients and products from agro-food residues

  Expected impacts: Rural development, higher income for agro-food industry, less waste and residues routed to disposal, higher environmental sustainability of agro-food processing and contribution to KPI 1, 2, 3, 4, 5, 6.

- Expand the use of lignin as raw material to produce biomaterials

  Expected impacts: Higher incomes and market opportunities for forest-based industry; fostered replacement of fossil-based counterparts with lignin-based biomaterials; lower environmental impacts of the processes (compared to existing benchmarks) and contribution to: KPIs 1, 2, 5, 6.

AQUATIC/MARINE FEEDSTOCK

- Exploit marine-based feedstock for the bio-based industry through the use of innovative 'omics' tools, nano-technologies, reactor types, etc.

  Expected impacts: Coastal areas development; higher efficiency of marine biomass processing; lower biomass losses during processing stages and contribution to KPIs 1, 2, 4, 5, 8.

BIO-WASTE AND CO_2

- High-value products and nutrients from different bio-waste streams (e.g. livestock effluents, food processing side streams, organic fraction of MSW, wastewater, etc.)

  Expected impacts: Valorisation of streams currently being a burden for disposal; lower inputs of 'fresh' nutrients in agriculture; less bio-waste sent to landfill and/or incineration and contribution to KPIs 1, 2, 4, 5, 6.

- Collect, separate and pre-treat urban bio-waste streams (e.g. OFMSW, wastewater sludge) and apply adequate conversion steps towards added-value products for identified applications

  Expected impacts: Integration of local communities and municipalities into bio-based value chains with resultant related benefits; lower impact of seasonal variability on the overall efficiency of the processing stages; less urban wastes sent to landfill and/or incineration and contribution to: KPIs 1, 2, 4, 5, 6.

- Convert CO_2 into useable platform molecules. This could include atmospheric CO_2 as feedstock

  Expected impacts: Lower environmental footprint compared to identified benchmarks; higher income opportunities for business cases that produce significant amount of CO_2 and contribution to KPIs 1, 2, 4, 5, 6, 8.

2. OPTIMISE EFFICIENT PROCESSING FOR INTEGRATED BIOREFINERIES THROUGH RESEARCH, DEVELOPMENT AND INNOVATION

Strategies: expand the utilisation of new, breakthrough processes for the pre-treatment and conversion of a variety of biomass feedstock and in downstream processing for separation and purification of new bio-based products.

PRE-TREATMENT

- Efficient combination of physico-chemical and biotechnological processes to efficiently valorise valuable components in different starting biomass

  Expected impacts: Higher yields of target biomass-components; more efficient separation and further valorisation of all fractions of the target biomass; lower energy requirements and costs associated with biomass pre-treatment and contribution to KPIs 1, 2, 4, 5, 6.

- Apply and scale-up innovative technologies in existing primary processes to minimise residues and obtain higher value for side streams

  Expected impacts: Lower environmental impacts of the processes; less residual streams routed to disposal; improved overall efficiency and sustainability of target processes, and contribution to KPIs 1, 2, 4, 5, 8.

CONVERSION OF PRE-TREATED FEEDSTOCKS TO BIO-BASED CHEMICALS AND MATERIALS

- Use tailored (mixtures of) microorganisms and/or enzymes for co-digestion or co-fermentation of different feedstock; or to enable conversion of new (types of) feedstock. The scope can include the application of biotechnology to break-down ‘plastic waste’

  Expected impacts: Higher yields in fermentation processes; less impacts of feedstock variability (in terms of e.g. composition, characteristics, seasonality) on conversion yields and contributions to KPIs 1, 2, 4, 5, 6.

- Apply and/or upscale innovative 'omics' tools, synthetic and systems biology, nanotechnologies, electro-chemical, chemo-catalytic, thermo-chemical, biotechnological processes or a combination thereof to convert various types of biomass

  Expected impacts: Higher yields of the targeted products; lower environmental impacts of the processes; achieved bio-based conversion pathways that are currently impossible or too costly to implement and contribution to KPIs 1, 2, 4, 5, 8.

- Apply bio-based oleochemistry for production of high-value products

  Expected impacts: Milder processing conditions as compared to existing processes; higher yield of target products; lower environmental footprint of the target processes; introduction of sustainable (biotechnological) solutions into 'traditional chemical industry' and contribution to KPIs 1, 2, 4, 5, 6, 8.

DOWNSTREAM PROCESSING

- Apply downstream processing technologies to obtain high-purity products and to efficiently recover valuable by- and co-products, as well as water and unconverted biomass in an integrated biorefinery set-up

  Expected impacts: Higher yields in the targeted products compared to existing alternatives; higher recovery rate of unconverted biomass; lower water and/or energy requirements due to recycling and circular approach; lower environmental impacts and contributions to KPIs 1, 2, 4, 5, 8.

SYSTEM MODELLING

- Digitalisation of bio-based processes to increase competitiveness of bio-based value chains

  Expected: Improved monitoring of bio-based processes; shorter intervention time in process control operations; higher yields of bio-based processes. Set the basis for 'big-data' analysis to reveal trends and learnings for bi-based processes.

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.

DROP-IN BIO-BASED PRODUCTS

- Smart bio-based drop-in chemicals to improve bio-based industry's competitiveness

  Expected impacts: Lower environmental impacts of the processes compared to alternative pathways; lower energy requirements; less solvents or toxic chemicals required in the processes and contribution to KPIs 1, 2, 4, 5, 6.

BIO-BASED PRODUCTS THAT OUTPERFORM FOSSIL-BASED COUNTERPARTS

- New bio-based formulations for high-market products and applications

  Expected impacts: Safer and healthier formulation of mass consumption products; reduced environmental impacts associated to production processes; improved or at least comparable performances of bio-based products compared to existing alternatives and contribution KPIs 1, 2, 4, 5, 6.

- Bio-based nature-inspired performance materials

  Expected impacts: Improved performances compared to benchmark products and applications; shorter time-to-market of bio-based fibres and materials thanks to their high functionalities and contribution to KPIs 1, 2, 4, 5, 8.

- Smart packaging

  Expected impacts: Improved functionalities of packaging materials; lower costs of bio-based packaging materials compared to the current state-of-the-art and contributions to KPIs 1, 2, 4, 5, 6.

- Bio-control products and procedures for sustainable increase in agricultural productivity

  Expected impacts: Rural development; lower emissions (to air and water) associated to agricultural practices; lower requirements of 'fresh' chemical products in agriculture; higher income and contribution to KPIs 1, 2, 4, 5, 6.

- Bio-based plastics that are degradable, compostable or suitable for recycling

  Expected impacts: Reduced amount of plastics sent to landfill or incineration; reduced environmental impacts associated to end-of-life phase of plastic materials and contribution to KPIs 1, 2, 4, 5, 8.

'NEW' BREAKTHROUGH CHEMICALS AS THE FOUNDATION FOR TOMORROW'S MARKET

- (Co-)polymerisation processes based on new bio-based monomers

  Expected impacts: Lower energy requirements in the processes; lower environmental impacts of the target processes; the obtained polymers at least matching performances of benchmarks and contribution to KPIs 1, 2, 4, 5, 6.

PROTEINS AND ACTIVE INGREDIENTS FOR FEED/FOOD, PHARMA AND COSMETICS

- Bioactive compounds for different market sectors like pharmaceuticals, cosmetics, nutraceuticals, fragrances

  Expected impacts: Improved performances in the final applications; lower environmental impacts of the production processes and contribution to KPIs 1, 2, 4, 5, 6, 8.

- Innovative approaches to obtain proteins and other high-added products from 'unusual feedstock'

  Expected impacts: Higher extraction yields of the target compounds; lower environmental impacts of the developed processes compared to identified alternatives; high-purity products for high-value applications and market sectors and contributions to KPIs 1, 2, 4, 5, 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. Also, contribute to education to ensure adequate supply of needed skilled personnel for the current and future bio-based industry and research activities.

POLICY AND REGULATORY REQUIREMENTS

PUBLIC AWARENESS AND ACCEPTANCE

- Include society and end consumers in designing the bio-based sector in Europe

  Expected impacts: acceptance and support of bio-based applications in day-to-day life.

PUBLIC AND PRIVATE DEMAND

- Expand the bio-based industry across Europe.

EDUCATION

- Identify opportunities for careers, education and research activities in the European bio-based sector.
- Identify best practices of inclusive bio-based business models

  Expected impacts: Rural development; spread knowledge about opportunities linked to bio-based business cases; optimised solutions for efficient bio-based value chains.

2.2.4. Follow-up of the 2018 Calls for proposals

The 2018 Call was closed on 6 September 2018. A total of 142 eligible proposals were received. The proposals were evaluated by independent experts, first remotely as of 17 September and then centrally between 8 October and 9 November 2018 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 2018. 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 2019.

ACTIVITIES FOR 2019

Finalisation of the 2018 call management process (*)	
Finalisation of evaluations (information on outcome of the evaluation)	Q4 – 2018 / Q1 2019
Preparation and signature of the grant agreements for the selected proposals	Q1/Q2 - 2019
Pre-financing payments	Q2 – 2019
Follow-up of project implementation	Starting Q2 - 2019

(*) maximum 8 months from the final date for submission of completed proposals (6/09/2018), according to Horizon 2020 rules

2.2.5. The 2019 Call for proposals

INTRODUCTION

This annual work plan follows the structure of the strategic innovation and research agenda (SIRA)[9] of the Bio-based Industries Consortium (BIC). BIC and the EC developed the SIRA based on extensive consultation with public and private stakeholders. 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.

The focus of a topic in the annual work plan (AWP) for 2019 determines its positioning in a particular SO and relevant sub-orientations. 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 in downstream processes (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, the aim being to optimise the value

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

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 the food chain and is not in competition with it, and does minimise any direct or indirect land use change (ILUC) or water and soil health imbalances.

Moreover, all proposals should describe the potential ecosystem service gain that could be achieved by the implementation of the project, as well as take into account biodiversity preservation in the targeted value chains.

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 (except for CSAs) should specifically demonstrate the **benefits versus existing state-of-the-art** technologies. This might include evidence of new processing solutions and/or new products obtained.

Proposals focusing on integrating biomass feedstock supply should offer solutions to the relevant technical and economic hurdles and bottlenecks affecting cultivation and harvesting of the biomass, 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 IA-demonstration and flagship projects.

In the context of the BBI JU 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 and in at least part of a work package, an **environmental assessment** using **life cycle assessment (LCA)** methodologies based on available standards, certification and accepted and validated approaches[10].

Life cycle thinking should also be a part of research and innovation action (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 proposal includes careful explanation and

[10] See 'Life cycle thinking and the use of LCA in policies around the world', 2017.

justification of how and why the critical issues were selected so that the expert evaluators can assess the proposal. Points to be addressed include:

- the impact criteria, such as water, biomass resource and energy use, and greenhouse gas emissions;
- LCA approach-related uncertainties, including the sensitivities of any modelling performed, limitations and data gaps;
- questions like: What is the function and added-value of this product? What is the anticipated targeted market? How will consumers use the product? 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 and how it will be further treated, if needed? Which are the (initial) bio-based specific considerations potentially relevant to this specific LCA (such as: (i) metrics; (ii) unknown eco-fate; (iii) lack of specific data of the chemical, bio-based material, product or process; (iv) the performance of the investigated product system; (v) system boundaries).

Innovation actions - demonstration actions should also assess the economic impact of the developed processes and/or products on the different stakeholders and actors involved in the value chain (for example members of the consortium, society, consumers). 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, in particular the potential for job retention and/or creation, the need for an adequately skilled workforce.

In innovation actions – flagship actions, the environmental, economic and social impacts of the developed products or processes should be fully assessed using life cycle sustainability assessment (LCSA) methodologies based on available standards, certification, accepted and validated approaches.

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 products[11]. If applicable, the social impacts of the developed products or processes should be analysed as well.

[11] 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;
- 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);

RIA proposals should include an economic viability performance check (value chain and market analysis) of the developed products and processes, including pricing risks of the targeted bio-based products in the assessments of the economic viability performance. Where applicable, an analysis of social impacts should also be included in RIA proposals.

Moreover, where relevant, proposals should include **process and product safety** (and thus also occupational and consumer safety) as elements for consideration in any value chain, especially when new products and materials are obtained. Any potential hazards associated with the developed processes and products should be analysed to check that the products are expected to comply with any relevant EU legislation on chemicals risk management, toxicity and safety requirements.

Proposals for both types of innovation actions should be based on a sound **business case and a business plan**, which should also seek an appropriate integration and remuneration of primary biomass producers.

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.

Proposals on topics that include activities on **biodegradability** of materials or products should assess it by applying the following criteria: ready and inherent biodegradability[12], bio-accumulative potential, origin, traceability, content of renewable ingredients.

- the Guide for Interpreting Life Cycle Assessment Result, (2016), developed by the European Commission Joint Research Centre, 2016 (https://ec.europa.eu/jrc/en/publication/guide-interpreting-life-cycle-assessment-result); and
- the European Platform on Life Cycle Assessment (http://ec.europa.eu/environment/ipp/lca.htm).

[12] Biodegradability is measured in accordance with the following tests:

- Council Regulation (EC) No 440/2008 of 30 May 2008 laying down test methods pursuant to Regulation (EC) No 1907/2006 of the European Parliament and of the Council on the Registration, Evaluation, Authorisation and Restriction of Chemicals (REACH), Part C.4, C.5, C.9 in conjunction with C.6 and C.42 of the Annex;
- OECD Guidelines for the Testing of Chemicals No. 301 – Ready Biodegradability; OECD 302 – Inherent Biodegradability; OECD 306 – Biodegradability in Seawater; OECD 310 – Ready Biodegradability – CO_2 in sealed vessels (Headspace test);
- or equivalent methods.

Moreover, and contributing substantially to the reduction and avoidance of marine and terrestrial litter, testing should build upon existing standards and test approaches:

- EN 13432 – Packaging – Requirements for packaging recoverable through composting and biodegradation – Test scheme and evaluation criteria for the final acceptance of packaging;
- EN 17033 – Plastics – Biodegradable mulch films for use in agriculture and horticulture;
- ISO 14851 and 14852 – Determination of the ultimate aerobic biodegradability of plastic materials in an aqueous medium;
- TG 306 – Biodegradability in Seawater;

The **technology readiness level**[13] (TRL) envisaged at the end of the project is always given in the topic description, and proposals should clearly state the starting and end TRLs of the key technology or technologies targeted in the project. It goes without saying that the 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%[14]') or not (like 'reduce residual streams'). In the latter case, proposals should indicate the level of improvement they will make and the impact it will have.

Also, even if not stated explicitly in a topic, proposals should always be **complementary and demonstrate synergies with other projects** funded under FP7 and Horizon 2020 and other funding schemes, both European and national, and both ongoing and concluded schemes. They should reflect awareness of the objectives of running projects in relevant fields to avoid overlap. Proposals of higher TRLs should build upon projects that ended at lower TRLs.

Proposals need to include a clear and convincing **dissemination and exploitation plan** to share the results with the bio-based industry, the public sector, R&I organisations, and consumers, and to exploit their results (in particular through transfer or licensing). Proposals, in particular on innovation action topics, should consider using bio-based materials for their dissemination activities and materials.

This AWP follows a **non-prescriptive approach** with open topics. Any examples given, such as for feedstock and market applications, have been given for orientation only. Other innovative approaches are also welcome.

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

Standard requirements for proposals for the different actions

Proposals for research and innovation actions, innovation action - demonstration actions or innovation action - flagship actions need to address a number of specific requirements that are standard for the respective action. Rather than repeating these standard requirements in each topic, the topic scope will refer to Table 3 below. The proposals need to address all items given for the specific action in this table.

- TG 305 – Bio-concentration: Flow-through Fish Test.

[13] 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.

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

Table 3: 'Standard requirements' for proposals for the different actions

	RIA	IA – demonstration action	IA – flagship action
Benefits versus the state of the art	Proposals should specifically demonstrate the benefits versus the state of the art (including fossil-based counterparts, if applicable) and existing technologies. This should be done by providing evidence of new [or more efficient] processing solutions and new products obtained.		
Issues about logistics	N/A	Proposals should seek to eliminate technical and economic hurdles and bottlenecks affecting logistics, transport modes and associated infrastructure in the targeted biomass feedstock supply systems. These include collection systems, intermediate storage and safety aspects.	
Relationship with other projects	Proposals should build on and seek complementarity with completed and ongoing projects funded under FP7, Horizon 2020 (including BBI JU programme) or nationally to avoid overlap. Proposals should promote synergies and advance beyond the state of the art.		
Business plan	N/A	Proposals should be based on a sound business case and business plan.	
Business models	N/A	Proposals should include specifications of an inclusive business model with all actors, from feedstock providers through market actors, as partners and beneficiaries of the new value chain. These inclusive business models are to realise all expected impacts as taken up in the IA topics.	
Standardisation aspects	If relevant, proposals should allow for pre- and co-normative research necessary for developing the needed product quality standards.		
Compliance with relevant EU legislations	Depending on the final applications of the targeted products, proposals should analyse any potential hazards associated with the developed processes and products and check that the products are expected to comply with any relevant EU legislation on chemicals risk management, toxicity and safety requirements.		
Biodiversity preservation	N/A	Proposals should guarantee biodiversity preservation in the targeted value chains.	

	RIA	IA – demonstration action	IA – flagship action
Sustainability assessment	Proposals should commit to assessing, as part of the project, the **environmental and economic impacts** of the developed products or processes, using LCA methodologies based on available standards, certification, accepted and validated approaches.		Proposals should commit to carrying out, as part of the project, a full assessment of the **environmental, economic and social impacts** of the developed products or processes, using life cycle sustainability assessment (LCSA) methodologies based on available standards, certification, accepted and validated approaches.
	If applicable, proposals should also analyse the **social impacts**.	Proposals should also analyse the **social impacts.**	
	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.	N/A	N/A
	Proposals should also include an **economic viability performance check** (value chain and market analysis) of the developed products and processes.	N/A	N/A

STRATEGIC ORIENTATION 1

FOSTER SUPPLY OF SUSTAINABLE BIOMASS FEEDSTOCK TO FEED BOTH EXISTING AND NEW VALUE CHAINS

Improve the utilisation of existing feedstock sources

BBI2019.SO1.D1 – SCALE UP CONVERSION OF LIGNIN INTO VALUABLE COMPOUNDS FOR APPLICATION IN SPECIFIC MARKET SECTORS

SPECIFIC CHALLENGE:

Expanding the use of lignin as a feedstock for conversion into chemicals and materials such as fibres, resins and composites, is being researched and developed through the use of several technologies. Some of these technologies are proving themselves at pilot level.

The applicability of lignin-based materials is enormous because of their high versatility and variety. Market actors in various sectors are demanding suitable quantities of lignin-based products at specified qualities to test application in their end products. Industry needs to scale up the developed technologies in an industrial setting and prove their technical and economic feasibility in dedicated value chains. While delivering higher quantities of the targeted products, industry also needs to achieve and validate the performance of the products intended to meet market demand. Achieving both quantity and quality as required by the market, will set the basis for an extensive uptake of lignin-based products.

The **specific challenge** is to demonstrate the efficient and sustainable conversion of lignin into compounds (intermediates and/or final products) that are applicable in a variety of market applications.

SCOPE:

Scale up proven technologies to convert lignin into compounds for added-value products at suitable quantities and quality for testing and validating their desired performance in specific market sectors.

This topic includes any lignin-rich feedstock, provided it can be sourced and converted in a way that is sustainable both from an environmental and an economic perspective. Proposals should apply the principle of the cascading use of biomass to ensure high efficiency of resource use.

Proposals should demonstrate that the developed technologies will achieve a conversion rate of at least 60%. The conversion rate is defined as the share of carbon contained in the input lignin that is converted into valuable products, thus excluding the potential share of biomass diverted to energy use (even though such energetic usage aims at increasing the overall sustainability of the process).

Proposals should address all requirements for IA - demonstration actions as shown in Table 3 in the Introduction.

The technology readiness level (TRL) at the end of the project should be 6-7. Proposals should clearly state the starting and end TRL of the key technology or technologies targeted in the project.

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 LINKED TO BBI JU KPIS:

- contribute to **KPI 1**: create at least one new cross-sector interconnection in the bio-based economy;
- contribute to **KPI 2**: create at least one new bio-based value chain;
- contribute to **KPI 6**: demonstrate at least one new 'consumer' product based on lignin-based compounds that meets market requirements.

ENVIRONMENTAL IMPACTS:

- replace fossil-based counterparts with lignin-based materials in targeted applications;
- increase the overall resource efficiency;
- when using lignin-rich residual streams as feedstock, reduce diversion of these streams to lower value uses such as energy production compared with the state of the art;
- reduce greenhouse gas emissions.

ECONOMIC IMPACTS:

- lay the basis for lower production costs of the targeted lignin-based products at commercial levels as compared with existing alternative production processes;

- increase income and business opportunities for stakeholders and actors (including primary producers) in the bio-based sectors.

SOCIAL IMPACTS:

- create new job opportunities in the bio-based sector, particularly the rural and/or urban areas.

TYPE OF ACTION: Innovation action – demonstration action.

BBI2019.SO1.D2 – PRODUCE COMPONENTS FOR VARIOUS MATERIALS, INCLUDING FOR FOOD AND FEED, FROM MICROALGAE

SPECIFIC CHALLENGE:

Due to their high productivity and their potential for avoiding competition with arable lands, microalgae are regarded as a valuable feedstock for biorefining operations. Microalgae are a potential source of molecules for a wide range of novel high-value products in different applications such as energy, fuel, food, feed, pharmaceutical and cosmetics. However, their current production scale and costs are holding back full-scale commercialisation steps. The main challenges regard: (i) efficiency of the cultivation method (in terms of growth rate and product synthesis rate); (ii) harvesting and separation of the microalgal biomass from the culture medium; (iii) pre-treatment of the algal biomass to release its components (mainly lipids, proteins, carbohydrates) for further conversion; and (iv) the further conversion steps themselves.

Growth rate and productivity of microalgae are affected by a number of factors such as availability of nutrients in the right amounts and compositions, presence of actinomycetes or other fungi, pH, light intensity and temperature. Open pond systems have relatively low capital costs and high scalability but may feature uneven mixing and nutrition conditions and are vulnerable to contamination and intrusion of alien species. Photobioreactor and closed-loop systems allow to better control growth conditions, but on the other hand require higher capital costs as well as higher maintenance costs.

Harvesting of microalgae is challenging and expensive due to small cell size and relatively low concentration. Several pre-treatment methods are employed, depending on the feedstock and desired products (chemical, enzymatic, physical, involving ionic liquids). The wide variability of microalgal feedstock composition and optimal growth conditions means that there is no one-fits-all solution; cultivation, harvesting and processing must be tailored to each species and targeted product.

The **specific challenge** is to scale up and lower the costs of microalgae cultivation combined with downstream processing towards commercial valorisation of marketable products.

SCOPE:

Demonstrate the efficient and sustainable cultivation, recovery and processing of microalgae and downstream production of high-value chemicals and/or materials including food and feed ingredients.

The scope of this topic excludes energy carriers (such as liquid fuels or hydrogen) as the main products.

Proposals should aim for large-scale continuous cultivation and recovery of microalgae, as well as separation and purification of the targeted products.

Proposals should also aim at reducing inputs for microalgae cultivation such as energy, water, nutrients and CO_2 (or other carbon sources in case heterotrophic microalgae are envisaged).

Proposals should valorise as many as possible of the valuable compounds contained in the microalgae through a cascading approach.

Proposals should demonstrate that the quality of the obtained products meets the requirements of specific market applications.

Proposals should address all requirements for IA - demonstration actions as shown in Table 3 in the Introduction.

The technology readiness level (TRL) at the end of the project should be 6-7. Proposals should clearly state the starting and end TRLs of the key technology or technologies targeted in the project.

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 LINKED TO BBI JU KPIS:

- contribute to **KPI 1** – create at least one new cross-sector interconnection in the bio-based economy;
- contribute to **KPI 2** – create at least one new bio-based value chain;
- contribute to **KPI 4** – demonstrate at least one new building block based on microalgae;
- contribute to **KPI 6** – demonstrate at least two new 'consumer' products based on bio-based chemicals and materials that meet market requirements.

ENVIRONMENTAL IMPACTS:

- increase the overall resource efficiency;

- reduce energy consumption and greenhouse gas emissions linked to microalgae cultivation, harvesting and downstream processing compared to the state of the art.

ECONOMIC IMPACTS:

- achieve at least a comparable, or lower, production cost (including extraction and purification cost) as compared with the state-of-the-art production route of the targeted product;
- increase income and business opportunities for stakeholders and actors (including primary producers) in the bio-based sectors, in particular in the microalgae cultivation and conversion value chains.

SOCIAL IMPACTS:

- create new job opportunities in the bio-based sector, particularly the coastal and/or inland areas.

TYPE OF ACTION: Innovation action – demonstration action.

Expand the exploitation of under-utilised or new feedstock for the bio-based industries

BBI2019.SO1.R1 – USE TREE SPECIES AND/OR VARIETIES TO CREATE NEW BIO-BASED VALUE CHAINS

SPECIFIC CHALLENGE:

The forest-based sector has the potential to mobilise new biomass feedstock for the bio-based industry by using as yet underutilised tree biomass from both coniferous and non-coniferous species. Leaving the traditional applications of wood intact, the envisaged tree species and varieties could lay the groundwork for cultivating and using new feedstock for the bio-based industry.

The **specific challenge** is to identify as yet underutilised tree species and/or varieties that may have the largest impact in expanding and diversifying the forest-based feedstock for the bio-based industry.

SCOPE:

Identify and screen tree species and/or varieties (both coniferous and non-coniferous) capable of growing as new wood-based feedstock for the bio-based industry without compromising existing forest-based value chains.

Proposals should describe the methods of selecting the appropriate tree species and/or varieties to fit their adaptability to the changing environment, availability, quality and logistics with targeted products and applications. The envisaged value chains based on the new feedstocks should be sustainable and lead to bio-based products that can compete with existing fossil-based alternatives.

The scope of this topic excludes energy carriers (such as liquid fuels or hydrogen) as the main products.

Proposals should specifically involve the primary sector actors so as to benefit from their knowledge and expertise, and to secure their support for the outcomes.

Proposals should aim to include currently underutilised land for growing the new feedstock for the bio-based sector or at growing new advantaged species/varieties on already utilised land and include the benefits of the new feedstock. In this framework, proposals should also include biodiversity and land use change impact studies aiming to assess whether (or not) land exploitation and management for such new feedstock does entail any impacts.

Proposals should address all requirements for RIA as shown in Table 3 in the Introduction.

The technology readiness level (TRL) at the end of the project should be 4-5 for the bio-based value chain in question. Proposals should clearly state the starting and end TRLs of the key technology or technologies targeted in the project.

Industry participation in the project would be considered as an added value because it can play a supportive role to demonstrate the potential for integrating the developed concepts and technologies into current industrial landscapes or existing plants so they can be deployed more quickly and scaled up to apply industry-wide.

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 LINKED TO BBI JU KPIs:

- contribute to **KPI 1** – create at least one new cross-sector interconnection in the 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.

ENVIRONMENTAL IMPACTS:

- diversify the forest-based biomass able to be exploit for bio-based value chains while avoiding ILUC issues;
- generate positive impacts on biodiversity and the eco-system.

ECONOMIC IMPACTS:

- increase income and business opportunities for stakeholders and actors (including primary producers) in the bio-based sectors, in particular in the forest-based sector.

SOCIAL IMPACTS:

- create new job opportunities in the bio-based sector, particularly in the forest-based sector.

TYPE OF ACTION: Research and innovation action.

BBI2019.SO1.F1 – VALORISE THE ORGANIC FRACTION OF MUNICIPAL SOLID WASTE THROUGH AN INTEGRATED BIOREFINERY AT COMMERCIAL LEVEL

SPECIFIC CHALLENGE:

The organic fraction of municipal solid waste (OFMSW) produced annually in the European Union is estimated at 88 million tonnes, rising to 96 million tonnes annually by 2020[15]. On a global basis, cities produced about 1.3 billion tonnes of solid waste in 2012, of which a significant percentage was organic. This figure is expected to rise to 2.2 billion tonnes per year by 2025[16].

Containing mainly carbohydrates, proteins and lipids, OFMSW presents an important feedstock for biorefining to convert it into valuable compounds for applications in a variety of market segments. However, this precious feedstock is often perceived as a challenge for urban agendas due to its potential pressure on the environment and human health. Together with other waste streams, OFMSW is often used for energy recovery or sent to landfill. These disposal steps of OFMSW pre-empt exploiting its potential for valuable products achievable in cascading operations. Aerobic (composting) and anaerobic digestion processes on the OFMSW have been able to reduce this fraction going to landfill. However, these processes mainly result in low-value products such as compost, biogas and digestate.

Building on earlier projects on OFMSW, industry is ready to scale up the total value chain to first-of-a-kind biorefinery at commercial level. Successful operation at this level will start to realise a better exploitation of the potential of the OFMSW in Europe.

The **specific challenge** is to sustainably scale up the conversion of OFMSW into added-value products to commercial levels.

SCOPE:

Produce large-scale added-value end products from the OFMSW for identified market applications from a successfully operating, first-of-its-kind biorefinery.

This topic excludes proposals having compost, digestate, biogas, methane or biofuels as the main products.

When dealing with unsorted MSW, proposals could address the efficient separation of the organic fraction.

[15] See: https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52010SC0577&from=EN
[16] See: http://www3.weforum.org/docs/WEF_Project_MainStream_Urban_Biocycles_2017.pdf (World Economic Forum in cooperation with the Ellen MacArthur Foundation).

The activities of this biorefinery must be included in a strategy for the valorisation of the OFMSW resources of the area where the biorefinery is operating. In particular, projects should realise a biorefinery that is integrated in the existing territorial waste management scheme and policies, involving all relevant stakeholders from the public and private sectors, and seek to improve and optimise current waste management schemes and practices in the subject territory.

Proposals should be fit for replicability in other territories.

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

Proposals may include any processing technology (excluding those leading primarily to compost, digestate, biogas, methane or biofuels) that has been demonstrated in an optimised value chain at TRL 6-7 and should encompass all processing stages leading to intermediate and end products.

Proposals should address all requirements for IA - flagship actions as shown in Table 3 in the Introduction.

The technology readiness level (TRL) at the end of the project should be 8. Proposals should clearly state the starting and end TRLs of the key technology or technologies targeted in the project.

INDICATIVE FUNDING:

It is considered that proposals requesting a maximum contribution of EUR 15 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 LINKED TO BBI JU KPIS:

- contribute to **KPI 1** – create at least one new cross-sector interconnection in the bio-based economy;
- contribute to **KPI 2** – create at least two new bio-based value chains;
- contribute to **KPI 4** – produce at least one new building block based on OFMSW;
- contribute to **KPI 5** – produce at least two new bio-based material based on OFMSW;
- contribute to **KPI 6** – Demonstrate at least two new ‘consumer’ products based on bio-based chemicals and materials that meet market requirements.

ENVIRONMENTAL IMPACTS:

- increase the overall resource efficiency;
- reduce quantities of OFMSW routed to landfill and incineration as compared with relevant business cases identified as benchmarks;
- reduce greenhouse gas emissions.

ECONOMIC IMPACTS:

- increased added-value to bio-based products resulting from underutilised feedstocks;
- increase income and business opportunities for stakeholders and actors in the bio-based sectors, in particular in the collecting, management and treatment of OFMSW.

SOCIAL IMPACTS:

- create new job opportunities in the bio-based sector, particularly the rural and/or urban areas;
- retain and/or develop new skills.

TYPE OF ACTION: Innovation action – flagship action.

STRATEGIC ORIENTATION 2

OPTIMISE EFFICIENT PROCESSING FOR INTEGRATED BIOREFINERIES THROUGH R&D&I

Pre-treatment

BBI2019.SO2.R2 – DEVELOP BREAKTHROUGH TECHNOLOGIES TO IMPROVE THE COST-EFFECTIVENESS AND SUSTAINABILITY OF PRE-TREATMENT STEPS WITHIN BIOREFINING OPERATIONS

SPECIFIC CHALLENGE:

The implementation of biorefining concepts at large scales is often affected by the need to achieve a balance between pre-treatment steps and the main conversion phase. The need to obtain high-purity fractions from the starting biomass to be fed into the following steps entails the use of harsh conditions in the pre-treatments. This entails high costs caused by: (i) energy, water and/or raw materials (e.g. chemicals, enzymes) requirements; (ii) complexity of operations and maintenance; (iii) an increase in waste and residues generation; and (iv) increased production of inhibitor compounds that may affect the overall yields of biorefining processes.

On the other hand, soft operating conditions in pre-treatments often result in a lower effectiveness in biomass fractionation, thus directly affecting the yields in the targeted products during conversion phases.

Several technologies based on chemical, biochemical, physical processes or a combination of these has shown the potential to provide valuable and sustainable solutions to substitute and/or efficiently integrate pre-treatment processes currently implemented.

The **specific challenge** is to reduce costs and improve sustainability associated with the pre-treatment steps of biomass feedstock while making it possible to achieve of sufficiently high yields in the targeted products in the subsequent conversion steps.

SCOPE:

Identify and develop cost-effective, efficient and sustainable technologies for biomass pre-treatments, paving the way for feeding the biomass fractions/components obtained after pre-treatments into the subsequent conversion steps. The solutions developed may be based on chemical, biochemical or physical processes, or a combination of these.

This topic may include any bio-based feedstock, provided it can be sourced in a way that is sustainable both from an environmental and an economic perspective.

Proposals should prove that the pre-treatment solution developed has the potential, when compared to state-of-the-art processes, to decrease costs, inhibitors and waste streams formation, and to make maintenance and process control easier.

Proposals should include testing activities on targeted bio-based feedstock to prove the potential for the subsequent upscaling of the developed process.

Proposals should address all requirements for RIA as shown in Table 3 in the Introduction.

The technology readiness level (TRL) at the end of the project should be 4-5 for the bio-based value chain in question. Proposals should clearly state the starting and end TRLs of the key technology or technologies targeted in the project.

Industry participation in the project would be considered as an added value because it can play a supportive role to demonstrate the potential for integrating the developed concepts and technologies into current industrial landscapes or existing plants so they can be deployed more quickly and scaled up to apply industry-wide.

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 LINKED TO BBI JU KPIS:

- contribute to **KPI 1** – create at least one new cross-sector interconnection in the 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.

ENVIRONMENTAL IMPACTS:

- improve the sustainability of pre-treatment steps for targeted biomass feedstock compared to the state of the art;
- decrease biomass losses and waste generation during pre-treatment steps;
- increase the overall resource efficiency;
- reduce greenhouse gas emissions.

ECONOMIC IMPACTS:

- improve the cost-effectiveness of pre-treatment steps for targeted biomass feedstock compared to the state of the art;
- pave the way to the effective implementation of breakthrough technologies in biorefining operations to broaden and strengthen the bio-based industry in Europe;
- enhance and simplify maintenance and process control operations associated with pre-treatment steps of targeted bio-based feedstock;
- increase income and business opportunities for stakeholders and actors in the bio-based industries.

SOCIAL IMPACTS:

- create new job opportunities in the bio-based sector, particularly the rural, coastal and/or urban areas.

TYPE OF ACTION: Research and innovation action.

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

BBI2019.SO2.R3 – APPLY MICROORGANISMS AND/OR ENZYMES TO RESOLVE END-OF-LIFE ISSUES OF PLASTICS

SPECIFIC CHALLENGE:

Microorganisms and/or enzymes can be applied to biodegrade/decompose plastic waste, one of the major threats to our ecosystem. This is a key focus area to apply the concept of the circular economy, besides changing human behaviour and production systems. The plastics industry is increasingly applying eco-design principles when producing plastics, ensuring an appropriate end of life by recycling, degrading or composting. Where these principles cannot be applied (any more), industry needs to establish different systems to close the circle of plastic material in the end-of-life phase. This will avoid plastic littering land and sea and reduce plastic waste diverted to landfill or incineration. Scientists have recently found that some microbes (bacteria and fungi) have evolved the ability to break down plastics[17]. Other scientists have discovered plastic-eating bacteria that can break down PET[18].

Applying microorganisms and/or enzymes in the end-of-life phase of plastics could result in new feedstock for the bio-based industry. They may even be applied to all sorts of residual streams without any preliminary separation or sorting operations.

The **specific challenge** is to exploit the potential of microorganisms and/or enzymes to resolve end-of-life issues with plastics.

SCOPE:

Select and apply the appropriate microorganisms and/or enzymes to address one or both of the following issues:

- convert waste streams containing non-biodegradable polymers;
- remove non-biodegradable polymers from the environment.

Proposals may include tailored microorganisms and/or enzymes for co-digestion or co-fermentation of different feedstock, provided that the developed solutions result in sufficient yields in terms of: (i) breaking down the feedstock; and/or (ii) conversion into valuable products.

[17] See: https://www.newscientist.com/article/2132650-newly-evolved-microbes-may-be-breaking-down-ocean-plastics/
[18] See: https://www.sciencealert.com/new-plastic-munching-bacteria-could-fuel-a-recycling-revolution; see also: See for example European Biotechnology – winter edition – vol. 16 2017, page 54.

Proposals should address all requirements for RIA as shown in Table 3 in the Introduction.

The technology readiness level (TRL) at the end of the project should be 4-5 for the bio-based value chain in question. Proposals should clearly state the starting and end TRLs of the key technology or technologies targeted in the project.

Industry participation in the project would be considered as an added value because it can play a supportive role to demonstrate the potential for integrating the developed concepts and technologies into current industrial landscapes or existing plants so they can be deployed more quickly and scaled up to apply industry-wide.

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 LINKED TO BBI JU KPIS:

- contribute to **KPI 1** – create at least one new cross-sector interconnection in the 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.

ENVIRONMENTAL IMPACTS:

- decrease the amount of non-biodegradable polymers sent to disposal or even discharged to the environment;
- in case the focus is on the removal of non-biodegradable polymers from the environment, contribute to 'close the loop' and thus reduce environmental impacts associated with non-biodegradable polymers discarded in the environment;
- enlarge the range of feedstock able to be effectively and sustainably processed through biocatalytic systems.

ECONOMIC IMPACTS:

- lay the basis to the further exploitation at higher scales of microorganisms and/or enzymes to convert currently challenging streams;
- increase income and business opportunities for stakeholders and actors (including primary producers) in the bio-based sectors, in particular in the waste management sector.

SOCIAL IMPACTS:

- create new job opportunities in the bio-based sector, particularly rural and/or urban areas.

TYPE OF ACTION: Research and innovation action.

BBI2019.SO2.R4 – DEVELOP SURFACE OR BULK TREATMENTS FOR IMPROVED WOOD-BASED MATERIALS

SPECIFIC CHALLENGE:

Wood-based materials find wide application in many market segments based on their macro-, micro- and nano-scale structures. Surface treatments, meaning altering the properties of the wood matrix at its skin or adding layers to it, are increasingly used to improve and expand the applicability of these materials. Equally important are treatments working on the whole volume of the material to improve bulk properties such as mechanical or thermal properties. The range of techniques used is huge.

Demand for treated wood-based material is increasing, stimulated by a widening of applications in practice. At the same time, market requirements are pushing towards improved performance, eco-design principles and reusability/recyclability at end-of-life phase.

The **specific challenge** is to develop new treatment methods for wood-based materials that improve the technological performance of the end product as well as the environmental impact at its end of life.

SCOPE:

Develop novel surface or bulk treatment methods for wood-based materials while improving reusability or recyclability at their end of life and test their applications in selected market segments.

The sustainable sourcing and conversion of starting wood material need to be ensured. Treatments can address the surface or the bulk volume of the wood-based material and can include physical, chemical, thermal and enzymatic processes or a combination thereof to achieve the desired quality of the surface and the functionalities of the material as a whole.

The overall resource efficiency of the process and products should also be increased by extending the durability of the targeted wood-based materials to foster the contribution of the harvested wood products to the carbon sink.

End-of-life phase should be addressed, with preference for reusing or recycling the material after its service life has ended. Otherwise, the biodegradability of the material should be assessed by applying the criteria given in the introduction.

Proposals should address all requirements for RIA as shown in Table 3 in the Introduction.

The technology readiness level (TRL) at the end of the project should be 4-5 for the bio-based value chain in question. Proposals should clearly state the starting and end TRLs of the key technology or technologies targeted in the project.

Industry participation in the project would be considered as an added value because it can play a supportive role to demonstrate the potential for integrating the developed concepts and technologies

into current industrial landscapes or existing plants so they can be deployed more quickly and scaled up to apply industry-wide.

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 LINKED TO BBI JU KPIS:

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

ENVIRONMENTAL IMPACTS:

- increase the overall resource efficiency;
- increase the contribution of the harvested wood products to the carbon storage by extending the durability of the treated woody biomass-based materials by at least 25% beyond the state of the art;
- reduce the amount of wood-based materials routed to landfill or incineration at end-of-life stage;
- replace fossil-based solutions in selected applications with wood-based solutions with a subsequent reduction of greenhouse gas emissions.

ECONOMIC IMPACTS:

- increase income and business opportunities for stakeholders and actors (including primary producers) in the bio-based sectors, in particular in the sectors where the developed new materials will be used.

SOCIAL IMPACTS:

- improve reusing and/or recycling solutions in targeted consumer products;
- create new job opportunities in the bio-based sector, particularly in the forest-based sector.

TYPE OF ACTION: Research and innovation action.

BBI2019.SO2.R5 – CONVERT PLANT OILS AND FATS INTO SAFE HIGH-ADDED-VALUE PRODUCTS FOR VARIOUS APPLICATIONS INCLUDING FOOD AND PERSONAL CARE

SPECIFIC CHALLENGE:

Plant oils and fats are a promising feedstock for high-value products with new functionalities and properties for applications in food, personal care, cosmetics and in the chemical industry, among others. However, current processing conditions for refining the feedstock can cause undesired or toxic impurities and possibly also potentially carcinogenic compounds[19]. Also, current refining processes have either a high energy demand or result in high oil losses, while the side streams bring in low value.

The **specific challenge** is to refine plant oils and fats at milder conditions, with high yields and delivering safe, high quality products.

SCOPE:

Validate applicable innovative technologies to refine plant oils and fats at milder conditions than current practices, resulting in high yields of the desired high-value products with new functions and properties, without the formation of genotoxic and potentially carcinogenic compounds.

This topic is about plant oils and fats originating from side streams of main processes, thus it excludes virgin plant oils and fats as feedstock. The scope also excludes fuels as the main product.

Proposals should also develop new or improved valorisation routes for side streams and co-products resulting from the plant oils extraction phase to achieve a maximally possible added value.

Proposals should address all requirements for RIA as shown in Table 3 in the Introduction.

[19] Such as 3-monochloropropane diol and its fatty acid esters, see EFSA CONTAM Panel (EFSA Panel on Contaminants in the Food Chain). Scientific Opinion on the update of the risk assessment on 3-monochloropropane diol and its fatty acid esters. EFSA Journal 2018;16(1):5083, 48 pp. https://doi.org/10.2903/j.efsa.2018.5083

The technology readiness level (TRL) at the end of the project should be 4-5 for the bio-based value chain in question. Proposals should clearly state the starting and end TRLs of the key technology or technologies targeted in the project.

Industry participation in the project would be considered as an added value because it can play a supportive role to demonstrate the potential for integrating the developed concepts and technologies into current industrial landscapes or existing plants so they can be deployed more quickly and scaled up to apply industry-wide.

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 LINKED TO BBI JU KPIS:

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

ENVIRONMENTAL IMPACTS:

- decrease the amount of plant oils and fats currently diverted to disposal;
- increase the use of biomass for bio-based products while decreasing the use of biomass for energy;
- increase the overall resource efficiency;
- reduce quantities of undesired or toxic residues as compared with the existing processes;
- reduce greenhouse gas emissions.

ECONOMIC IMPACTS:

- increase the added value of bio-based products with high oil and fat content;
- increase income and business opportunities for stakeholders and actors (including primary producers) in the bio-based sectors, in particular in the oleochemistry industries.

SOCIAL IMPACTS:

- create new job opportunities in the bio-based sector, particularly in the oleochemistry sector.

TYPE OF ACTION: Research and innovation action.

BBI2019.SO2.F2 – APPLY TECHNOLOGICAL COMBINATIONS TO VALORISE ALL COMPONENTS OF BIOMASS FEEDSTOCK

SPECIFIC CHALLENGE:

The chemical industry and other sectors apply combinations of technologies to improve operational effectiveness in relevant situations. These technologies include, for example, physico-chemical, electro-chemical, biochemical and thermo-chemical conversion technologies, combined in an innovative manner.

The concept of applying combined technologies, existing as well as newly emerging ones, may serve the bio-based industry sectors well in their pursuit to maximally valorise residual streams and unused or underutilised resources. This new way to convert biomass feedstock will result in the highest value and benefit for all concerned through partnership between the primary sectors and the emerging bio-based sector.

The **specific challenge** is to effectively apply new and innovative combinations of technologies in bio-based value chains to maximise valorisation of the feedstock.

SCOPE:

Apply effective, new and innovative combinations of technologies in a large-scale, first-of-its-kind integrated biorefinery converting sustainable biomass streams from existing agro-, food-, aquatic or forest-based operations into added-value products for identified applications.

The scope of this topic excludes energy carriers (such as liquid fuels or hydrogen) as the main products.

Proposals could also integrate technologies into existing large-scale biorefineries to increase the efficiency and value creation from the feedstock.

This biorefinery should fully integrate feedstock supply and processing technologies to deliver products with targeted functionalities to meet identified market demand at competitive prices. It should demonstrate effective and cost-efficient operation at a commercial level, applying where relevant the cascading use of biomass to maximise resource efficiency.

Proposals should include any processing technology that has been demonstrated in an optimised value chain at TRL 6-7 and should encompass all processing stages leading to intermediate and end products.

Proposals should address all requirements for IA - flagship actions as shown in Table 3 in the Introduction.

The technology readiness level (TRL) at the end of the project should be 8. Proposals should clearly state the starting and end TRLs of the key technology or technologies targeted in the project.

INDICATIVE FUNDING:

It is considered that proposals requesting a maximum contribution of EUR 20 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 LINKED TO BBI JU KPIS:

- contribute to **KPI 1** – create at least two new cross-sector interconnections in the bio-based economy;
- contribute to **KPI 2** – create at least two new bio-based value chain;
- contribute to **KPI 4** – produce at least two new building block based on sustainable bio-based feedstock;
- contribute to **KPI 5** – produce at least two new bio-based material based on sustainable bio-based feedstock;
- contribute to **KPI 6** – demonstrate at least two new 'consumer' product based on bio-based chemicals and materials that meet market requirements.

ENVIRONMENTAL IMPACTS:

- decrease biomass losses by at least 30%[20];
- increase the overall resource efficiency;
- in case residual streams are envisaged, reduce quantities of residues routed to low-value uses such as combustion by at least 30%[2020] as compared with the relevant benchmark;
- reduce energy requirements in the processing units (including upstream, conversion and downstream steps) by at least 20%[20] as compared with the requirements at the outset of the project;
- reduce greenhouse gas emissions.

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

ECONOMIC IMPACTS:

- reduce production costs of the targeted products by at least 10%[20] as compared with the state of the art;
- increase the economic value of the targeted feedstock;
- increase income and business opportunities for stakeholders and actors (including primary producers) in the bio-based sectors.

SOCIAL IMPACTS:

- create new job opportunities in the bio-based sector, particularly the rural, coastal and/or urban areas;
- retain and/or develop new skills.

NUMBER OF PROJECTS: a maximum of one project will be funded under this topic.

TYPE OF ACTION: Innovation action – flagship action.

Downstream processing

BBI2019.SO2.R6 – IMPROVE BIOREFINERY OPERATIONS THROUGH PROCESS INTENSIFICATION AND NEW END PRODUCTS

SPECIFIC CHALLENGE:

Biorefinery operations, processing specific types of biomass feedstock, yield a wide variety of products and fractions for further valorisation to applications such as food, feed and materials. However, existing pre-treatment steps often result in relatively high concentrations of impurities and inhibitors, impeding high yields of the desired products. In the case of fermentation processes, for example, downstream processing steps for separation and purification could easily amount to about 80% of the total fermentation costs.

Ongoing developments towards process intensification of the total plant operation in other industrial sectors offer interesting opportunities for the bio-based industry. For example, in the petrochemical, pharmaceutical and food processing industries, process intensification has led to re-sizing, higher efficiencies and safer operations with significant cost reductions[21]. Similarly, process intensification could lower the costs of bio-based operations, including conversion and downstream processing.

The **specific challenge** is to improve biorefinery operations by applying process intensification concepts to lower operational costs, increase operational safety and achieve high yields of the desired products.

SCOPE:

Develop and evaluate process intensification steps and schemes for an integrated lignocellulosic biorefinery to lower capital and operational costs for safely achieving high yields of desired products.

When addressing the in situ recovery of targeted products, proposals should focus on technologies that will also enable the removal of highly reactive products and should consider a range of products including liquid and gaseous products.

Proposals should address all requirements for RIA as shown in Table 3 in the Introduction.

The technology readiness level (TRL) at the end of the project should be 4-5 for the bio-based value chain in question. Proposals should clearly state the starting and end TRLs of the key technology or technologies targeted in the project.

Industry participation in the project would be considered as an added value because it can play a supportive role to demonstrate the potential for integrating the developed concepts and technologies

[21] See for example: D. Reay, C. Ramshaw, A. Harvey. Process Intensification: Engineering for Efficiency, Sustainability and Flexibility. Butterworth-Heinemann (2013).

into current industrial landscapes or existing plants so they can be deployed more quickly and scaled up to apply industry-wide.

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 LINKED TO BBI JU KPIS:

- contribute to **KPI 1** – create at least one new cross-sector interconnection in the 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.

ENVIRONMENTAL IMPACTS:

- decrease biomass losses by at least 10%[22];
- increase the overall resource efficiency;
- reduce the amount of energy required for separation and purification of the targeted products;
- reduce greenhouse gas emissions associated with downstream process steps within the biorefinery operations.

ECONOMIC IMPACTS:

- decrease overall costs associated with biorefinery processes by at least 10%[22] compared with current processing solutions identified as benchmarks;
- when addressing fermentation processes, reduce production costs associated with the targeted products by at least 20%[22] as compared with the state of the art;
- increase income and business opportunities for stakeholders and actors (including primary producers) in the bio-based sectors.

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

SOCIAL IMPACTS:

- improve the operational safety aspects linked to biorefinery operations;
- create new job opportunities in the bio-based sector, particularly the rural, coastal and/or urban areas.

TYPE OF ACTION: Research and innovation action.

System modelling

BBI2019.SO2.R7 – MODEL THE COMPOSITION OF BIO-BASED RESIDUAL STREAMS AND ITS EVOLUTION TO OPTIMISE ITS MANAGEMENT AND PROCESSING

SPECIFIC CHALLENGE:

Variations in composition of bio-based residual streams are a major drawback for their effective management and processing. Better insight into their nature, composition and transformation reactions affecting their composition and energetic content is crucial for putting the right valorisation steps in place.

Modelling systems to track and chart impacts of relevant variables in managing and processing organic residual streams can provide the desired insight and help simulate value chains for valorisation.

The **specific challenge** is to increase insight into the changing quality of bulk organic residues with the aid of modelling systems.

SCOPE:

Develop and test adequate analytical tools and innovative algorithms to model the composition of different organic residual streams.

Proposals should deliver adequate tools to monitor and analyse the evolving composition of organic residual streams. Proposals should enable and facilitate the testing of parameters such as availability, seasonality, territorial features and the origin of the targeted residual streams.

The developed models should focus on the physico-chemical characteristics of the different residual streams, paving the way to a better valorisation of such feedstock into a wide range of products.

Proposals should address all requirements for RIA as shown in Table 3 in the Introduction.

The technology readiness level (TRL) at the end of the project should be 4-5 for the bio-based value chain in question. Proposals should clearly state the starting and end TRLs of the key technology or technologies targeted in the project.

Participation of industry and territorial waste managing authorities in the project would be considered as an added value because they can play a supportive role to demonstrate the potential for integrating the developed concepts into current waste management schemes, industrial landscapes or existing plants so that they can be deployed more quickly and scaled up.

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 LINKED TO BBI JU KPIS:

- contribute to **KPI 1** – create at least one new cross-sector interconnection in the 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.

ENVIRONMENTAL IMPACTS:

- decrease quantities of bio-waste routed to landfill or incineration;
- improve the yields of bio-waste valorisation processes;
- reduce the environmental impacts associated with bio-waste treatment processes as compared with existing alternatives.

ECONOMIC IMPACTS:

- reduce logistical costs of bio-wastes valorisation processes;
- increase income and business opportunities for stakeholders and actors (including primary producers) in the bio-based sectors, in particular in the waste management sector.

SOCIAL IMPACTS:

- create new job opportunities in the bio-based sector, particularly the rural, coastal and/or urban areas.

TYPE OF ACTION: Research and innovation action.

STRATEGIC ORIENTATION 3

DEVELOP INNOVATIVE BIO-BASED PRODUCTS FOR IDENTIFIED MARKET APPLICATIONS

Bio-based products that outperform fossil-based counterparts

BBI2019.SO3.R8 – DEVELOP SUSTAINABLE BIO-BASED MATERIALS FOR HIGH-VOLUME CONSUMER PRODUCTS

SPECIFIC CHALLENGE:

Bio-based materials are promising alternatives to fossil-based plastic counterparts in several high-volume consumer applications: for example, they can be used for transparent films, in packaging and hygiene products, non-woven products, superabsorbent polymers and reinforced bio-composites. These bio-based materials can be made biocompostable, and/or biodegradable or recyclable if not degradable, lowering the environmental burden versus fossil-based alternatives.

The **specific challenge** is to provide bio-based materials for high-volume consumer products with a lower environmental footprint at end of life than their fossil-based plastic counterparts.

SCOPE:

Develop bio-based materials with functional properties for high-volume consumer products, making them perform better than fossil-based plastics in comparable applications.

Proposals should test the properties of the new bio-based materials against those of fossil-based counterparts, and prove that the end products meet market requirements and have a higher performance on relevant aspects as compared with fossil-based counterparts.

Proposals should include sustainable solutions for the end-of-life phase of the resultant new bio-based products, increasing their competitive advantage as compared with their fossil-based counterparts. To that end, proposals should measure their environmental footprint at end of life and compare this with the fossil-based plastic counterparts.

Proposals may cover physical, chemical or biotechnological routes (or combinations thereof).

This topic includes any bio-based feedstock, provided it can be sourced in a way that is sustainable both from an environmental and an economic perspective.

Proposals should address all requirements for RIA as shown in Table 3 in the Introduction.

The technology readiness level (TRL) at the end of the project should be 4-5 for the bio-based value chain in question. Proposals should clearly state the starting and end TRLs of the key technology or technologies targeted in the project.

Industry participation in the project would be considered as an added value because it can play a supportive role to demonstrate the potential for integrating the developed concepts and technologies into current industrial landscapes or existing plants so they can be deployed more quickly and scaled up to apply industry-wide.

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 LINKED TO BBI JU KPIS:

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

ENVIRONMENTAL IMPACTS:

- increase the environmental sustainability associated with the end of life of materials for high-volume consumer products;
- increase the share of sustainable and efficient bio-based materials in the field of high-volume consumer products;
- increase the overall resource efficiency;
- reduce greenhouse gas emissions.

ECONOMIC IMPACTS:

- foster the future market uptake of the developed bio-based materials for high-volume consumer products;
- increase income and business opportunities for stakeholders and actors (including primary producers) in the bio-based sectors.

SOCIAL IMPACTS:

- create new job opportunities in the bio-based sector, particularly the rural, coastal and/or urban areas.

TYPE OF ACTION: Research and innovation action.

BBI2019.SO3.R9 – DEVELOP BIO-BASED FIBRES AND/OR FUNCTIONAL MOLECULES TO IMPROVE THE PERFORMANCE OF TEXTILE PRODUCTS

SPECIFIC CHALLENGE:

The global consumption of textile fibres is increasing rapidly. This market has been growing with an annual rate of approximately 4%, reaching around 103 Mt in 2017[23]. Synthetic and traditional natural bio-based fibres like cotton cannot meet the increasing demand in a context of limited resources. The production capacity of cotton, for example, is limited by sustainability constraints linked to resources consumption (land, water, fertilisers, pesticides, etc.).

Concurrently, consumers are increasingly demanding sustainable high-quality textiles: from renewable feedstock, sustainably produced, and with clear end-of-life qualities to support a circular economy. Innovative bio-based yarns and textiles can enter and compete in the established textile markets by meeting all of consumers' evolving sustainability requirements, combined with performance levels that exceed the state of the art.

In the same context, also bio-based additives for textiles have the potential to guarantee environmental sustainability while providing specific technical properties to meet consumers' demand. Moreover, bio-based functional molecules can represent valuable, non-hazardous alternatives for fossil-based additives currently used in textile applications.

The new bio-based fibres, as well as improved or tailor-made bio-based additives, can, for example, provide better mechanical or physical properties than the existing fibres in specific applications.

[23] The Fiber Year GmbH. The Fiber Year 2018 - World Survey on Textiles & Nonwovens. Issue 18, May 2018 (Table of Content and Executive Summary available at: https://www.thefiberyear.com/fileadmin/pdf/TFY2018TOC.pdf).

The **specific challenge** is to meet market requirements for new textile products outperforming the state of the art in terms of technical properties and sustainability aspects.

SCOPE:

Develop innovative bio-based fibres and/or bio-based additives for textile applications that outperform conventional (synthetic or natural) counterparts in terms of both technical and sustainability performance.

Proposals may address either bio-based fibres or bio-based additives, or both.

This topic excludes the use 'as such' of fibres and materials that already have a significant use in Europe. If proposals aim at these high-volume fibres and materials, the focus must be on innovative components (such as new bio-based additives) or treatments to improve their properties.

Proposals should target the fibre composition and its performance in specific applications, and/or functional molecules to improve the properties of specific textile products in identified applications. These functional bio-based molecules/additives can include colourants, flame retardants, water or gas proofing agents, UV and heat stability agents, fillers, photo- or thermo-reacting molecules, hydrophobic or hydrophilic agents, biocides, etc.

This topic includes any bio-based feedstock, provided it can be sourced in a way that is sustainable both from an environmental and an economic perspective.

Proposals should target mild operating conditions and resource-efficient processes to add sustainable processing steps to a value chain.

Proposals that focus on yarns should deliver new yarns that are compatible with conventional textile machinery.

Proposals should include an experimental validation of the proposed concept via direct comparison with existing comparable options.

Proposals should involve consumers, designers, trend influencers and/or specific end-user organisations to identify requested and feasible performance requirements in for example clothing, technical textiles and geotextiles.

Proposals should address all requirements for RIA as shown in Table 3 in the Introduction.

The technology readiness level (TRL) at the end of the project should be 4-5 for the bio-based value chain in question. Proposals should clearly state the starting and end TRLs of the key technology or technologies targeted in the project.

Industry participation in the project would be considered as an added value because it can play a supportive role to demonstrate the potential for integrating the developed concepts and technologies

into current industrial landscapes or existing plants so they can be deployed more quickly and scaled up to apply industry-wide.

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 LINKED TO BBI JU KPIS:

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

ENVIRONMENTAL IMPACTS:

- reduce the environmental impacts associated with the developed textile products as compared with the state of the art;
- increase the overall resource efficiency;
- reduce greenhouse gas emissions.

ECONOMIC IMPACTS:

- develop textile products, either entirely bio-based or containing bio-based additives, with improved properties and performances as compared with the state of the art for the targeted applications, thus enhancing their market deployment;
- increase the competitiveness of bio-based industry in the textile sector;
- increase income and business opportunities for stakeholders and actors (including primary producers) in the bio-based sectors, in particular in the textile sector.

SOCIAL IMPACTS:

- create new job opportunities in the bio-based sector, particularly the rural, coastal and/or urban areas.

TYPE OF ACTION: Research and innovation action.

BBI2019.SO3.R10 – DEVELOP BIO-BASED HIGH-PERFORMANCE MATERIALS FOR VARIOUS AND DEMANDING APPLICATIONS

SPECIFIC CHALLENGE:

High-performance applications often demand stable materials that, for example, can withstand temperature variations or are resistant to salt or to degradation by enzymes. Moreover, society increasingly demands products and applications that are sustainable and that can improve the environment in their entire life cycle (during their use and at their end of life).

The demand for high-performing, safe and sustainable bio-based materials exists today in market sectors as diverse as cosmetics, personal care, home care, packaging, coatings, resins and paints, additives, fibres, insulation, automotive, construction and others. The requirements for their functional capabilities and end of life may, however, differ.

The **specific challenge** is to identify and make available high-performance bio-based products for market applications that demand specific performance in use and in the end-of-life phase.

SCOPE:

Develop bio-based products with high functional qualities for specific market applications that cannot be met by currently available fossil-based products and can improve the environment in their entire life cycle (in their use and in their end-of-life phase).

Proposals should include successful testing of the developed products to efficiently prove that they offer the required performance in the targeted application(s). To that end, the developed products' end-users should be involved to accurately define the required performance and properties and the approaches to forced ageing tests.

While the functional (technical) requirements of the bio-based products are dictated by the end products, their required end-of-life qualities depend on the use of the end products and their potential risk of environmental burden.

Depending on the targeted application(s) and use, proposals should: (i) determine the functional requirements of the developed products; (ii) prove that the products meet those requirements; and (iii) show that the products do not burden the environment in their entire life cycle including their end-of-life phase.

This topic includes any bio-based feedstock, provided it can be sourced in a way that is sustainable both from an environmental and an economic perspective.

Proposals should address all requirements for RIA as shown in Table 3 in the Introduction.

The technology readiness level (TRL) at the end of the project should be 4-5 for the bio-based value chain in question. Proposals should clearly state the starting and end TRLs of the key technology or technologies targeted in the project.

Industry participation in the project would be considered as an added value because it can play a supportive role to demonstrate the potential for integrating the developed concepts and technologies into current industrial landscapes or existing plants so they can be deployed more quickly and scaled up to apply industry-wide.

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 LINKED TO BBI JU KPIS:

- contribute to **KPI 1** – create at least one new cross-sector interconnection in the bio-based economy;
- contribute to **KPI 2** – set the basis for at least one new bio-based value chain;
- contribute to **KPI 5** – validate at least two new bio-based materials with high performances for selected application(s);
- contribute to **KPI 8** – validate at least one new and improved processing technology reflecting the 'TRL gain' since the start of the project.

ENVIRONMENTAL IMPACTS:

- increase performance (from a technical, environmental and/or economic perspective) of the obtained products or materials as compared with existing benchmarks;
- increase the overall resource efficiency;
- reduce greenhouse gas emissions.

ECONOMIC IMPACTS:

- increase income and business opportunities for stakeholders and actors (including primary producers) in the bio-based sectors.

SOCIAL IMPACTS:

- create new job opportunities in the associated industrial sectors.

TYPE OF ACTION: Research and innovation action.

BBI2019.SO3.D3 – PRODUCE BIO-BASED FUNCTIONAL INGREDIENTS AND ADDITIVES FOR HIGH-END MARKETS

SPECIFIC CHALLENGE:

Several market sectors utilise functional ingredients and additives to achieve the desired functionality and performance of their consumer products. Specialty, functional molecules are required to meet market requirements in sectors as diverse as cosmetics, flavours and fragrances, nutraceuticals, pharmaceuticals, medicine, beverages, food and feed.

In consumer products, especially those related to personal and home care, food and beverages, consumers are demanding functional natural products and ingredients. In industrial products, bio-based formulations open interesting opportunities for better performance and higher sustainability. In addition, bio-based value chains based on regionally sourced biomass feedstock offer interesting opportunities to meet requirements from consumers and industry in different market sectors and realise maximum benefits for the local society.

The **specific challenge** is to create integrated value chains with the appropriate business models to produce functional ingredients and additives.

SCOPE:

Demonstrate the efficient production of functional ingredients and additives from sustainably sourced biomass feedstock streams through new value chains and business models that provide maximal benefits to the society.

The scope includes useable biomass feedstock from any sustainable source, thus including residual streams from food production and processing, production of beverages, biowaste, etc.

Proposals should include any relevant and applicable technology to obtain the desired ingredients and additives.

The integrated value chain should be based on a business model that includes the conversion of the biomass feedstock into different intermediates, applying a cascading approach where appropriate to maximise the revenues and societal benefits. Production of low-value by-products should be kept to a minimum.

Proposals should demonstrate a guaranteed supply of sufficient biomass feedstock (considering regionality, seasonality, sustainability and legal constraints if needed) to meet demand for resulting products in a way that is sustainable from both an environmental and an economic perspective.

Proposals should address all requirements for IA - demonstration actions as shown in Table 3 in the Introduction.

The technology readiness level (TRL) at the end of the project should be 6-7. Proposals should clearly state the starting and end TRLs of the key technology or technologies targeted in the project.

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 LINKED TO BBI JU KPIS:

- contribute to **KPI 1** – create at least one new cross-sector interconnection in the bio-based economy at local level;
- contribute to **KPI 2** – create at least one new bio-based value chain involving local stakeholders including farmers, food transformers and SMEs;
- contribute to **KPI 6** – demonstrate at least two new 'consumer' products based on bio-based chemicals, ingredients and materials that meet market requirements.

ENVIRONMENTAL IMPACTS:

- increase the overall resource efficiency through the smart use of biomass feedstock.

ECONOMIC IMPACTS:

- reduce import of biomass feedstock, ingredients and additives;
- increase income and business opportunities for stakeholders and actors (including primary producers) in the bio-based sectors, in particular in the forestry, agriculture, arboriculture, horticulture, fisheries, aquaculture and the food and drink sectors;
- improve (regional) competitiveness of stakeholders and actors involved in the new developed bio-based value chains.

SOCIAL IMPACTS:

- contribute to creating high-value regional industries associated with regional biomass production systems;
- create new job opportunities in the bio-based sector, particularly the rural, coastal and/or urban areas.

TYPE OF ACTION: Innovation action – demonstration action.

BI2019.SO3.D4 – DEMONSTRATE BIO-BASED PESTICIDES AND/OR BIOSTIMULANT AGENTS FOR SUSTAINABLE INCREASE IN AGRICULTURAL PRODUCTIVITY

SPECIFIC CHALLENGE:

Use of synthetic, fossil-based pesticides in the agriculture sector is under pressure. Consumer and environmental considerations have resulted in an increasing number of regulations limiting their applications. Moreover, increasing resistance to pesticides by various pests and diseases limits their commercial life-span. As a result, availability of efficient chemical solutions to certain agricultural pests is dwindling. These developments are threatening current and future agricultural production levels.

Bio-based solutions such as bio-based pesticides have the potential to decrease inputs of synthetic pesticides in the agricultural sector, while providing high yields in terms of pests' control. However, having a higher selectivity than currently used pesticides, they would require the combination of different solutions in integrated pest management approaches to obtain the total desired results. Also, extensive testing needs to prove they meet all requirements regarding risks, toxicity and pathogenicity. These factors have been holding back a wide use so far.

On the other hand, one of the biggest challenges of agriculture is to guarantee high crop yields and productivity, while matching increasingly stringent environmental regulations dealing with the agricultural sector. Moreover, the increasing world population and the related increased demand for sustainable food production systems are boosting the expansion of agricultural practices also in currently un- or under-exploited lands. Thus, the optimal use of such new arable lands calls for environmentally friendly products for plant health enhancement, such as biostimulants able to foster plant growth without 'overloading' the environment with potentially harmful chemical inputs.

The **specific challenge** is to apply sustainable solutions for effective pest control and/or biostimulation enabling a sustainable increase of agricultural productivity.

SCOPE:

Demonstrate effective production and application of bio-based pesticides and/or biostimulant agents to maintain and increase agricultural productivity.

Proposals may address both bio-based pesticides and biostimulants and in so doing can show complementarity and synergy between the two in an integrated approach.

In case proposals address only biostimulants, proposals should target products based on bioactives extracted/derived from bio-based feedstock.

This topic includes any bio-based feedstock, provided it can be sourced in a way that is sustainable both from an environmental and an economic perspective.

Proposals that target actives/molecules from bio-based feedstock should include: (i) the sourcing and chemical characterisation of the base feedstock; (ii) the separation and purification of the desired compounds; and (iii) the optimal and safe production of the standardised final products.

Proposals should include an experimental validation stage, assessing the effect of the developed products or microorganisms on the targeted crop(s). Proposals should also compare the effects of the developed products when applied to the same crop and to the relevant soil types and growing conditions. In this test work, the performance of the products or microorganisms developed should be demonstrated, in terms of, for example, their tolerance to abiotic stress, their water uptake, nutrient assimilation and overall crop quality of the crop (in the case of biostimulants), and/or resistance to pests and diseases (in the case of bio-based pesticides).

Proposals should provide evidence of the test results.

Proposals should address all requirements for IA - demonstration actions as shown in Table 3 in the Introduction.

The technology readiness level (TRL) at the end of the project should be 6-7. Proposals should clearly state the starting and end TRLs of the key technology or technologies targeted in the project.

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 LINKED TO BBI JU KPIS:

- contribute to **KPI 1** – create at least one new cross-sector interconnection in the bio-based economy;
- contribute to **KPI 2** – create at least one new bio-based value chain;
- contribute to **KPI 6** – Demonstrate at least one [new 'consumer' products / bio-based applications] based on bio-based chemicals and materials that meet market requirements.

ENVIRONMENTAL IMPACTS:

- reduce the environmental footprint associated with agricultural activities as compared with existing alternative approaches;
- increase the overall resource efficiency.

ECONOMIC IMPACTS:

- increase crop yield by at least 10% as compared with existing cultivation cases based on chemical inputs;
- reduce costs of crop nutrition and control by 15% as compared with benchmark chemical approaches;
- increase income and business opportunities for stakeholders and actors in the bio-based sectors, in particular in the primary sectors.

SOCIAL IMPACTS:

- create new job opportunities in the bio-based sector, particularly the rural areas.

TYPE OF ACTION: Innovation action – demonstration action.

BBI2019.SO3.F3 – PRODUCE HIGH-PERFORMANCE BIO-BASED ALTERNATIVES TO HARMFUL PRODUCTS OR PROCESSES TO PROTECT AND ENHANCE HUMAN HEALTH AND THE ENVIRONMENT

SPECIFIC CHALLENGE:

Industry and society in general are increasingly looking for bio-based, high-performance, non-toxic and fully biodegradable alternatives to conventional compounds, production processes or products that may be harmful to human health and/or the environment. Applications under scrutiny are, among others, related to the working environment in industrial settings and households, or operations close to freshwater reservoirs and marine environments.

The **specific challenge** is to increase the protection of human health and the environment in different application sectors with novel bio-based product alternatives.

SCOPE:

Produce high-performance bio-based alternatives to potentially harmful products and/or production processes in a successfully operating, commercially viable, first-of-its-kind plant dedicated to this purpose.

Proposals should focus on replacing chemicals, materials or processes that have a known direct negative impact on human health and the environment. Human health is to be interpreted in the broad

sense as 'a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity'[24].

The scope excludes proposals that only result in indirect positive impact such as lowering carbon footprint.

This topic includes any biomass feedstock and any application that may affect human health and the environment.

Proposals should provide evidence of the targeted chemical's or material's risks to human health and its environmental burden, and clearly show how the proposed replacement would increase protection of human health and the environment in the intended application.

Proposals should build on optimised processing technologies to deliver products with targeted functionalities to meet identified market demand at competitive prices. Proposals should demonstrate effective and cost-efficient operation at a commercial level, applying where relevant the cascading use of biomass to maximise resource efficiency and sustainability.

Proposals may include any processing technology or combination of technologies in the value chain. Proposals may include any applicable processing technology that has been demonstrated in an optimised value chain at TRL 6-7 and should encompass all processing stages leading to intermediate and end products.

Proposals should address all requirements for IA - flagship actions as shown in Table 3 in the Introduction.

The technology readiness level (TRL) at the end of the project should be 8. Proposals should clearly state the starting and end TRLs of the key technology or technologies targeted in the project.

INDICATIVE FUNDING:

It is considered that proposals requesting a maximum contribution of EUR 10 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 LINKED TO BBI JU KPIS:

- contribute to **KPI 1** – create at least two new cross-sector interconnection in the bio-based economy;
- contribute to **KPI 2** – create at least two new bio-based value chains;

[24] World Health Organization (WHO); see: https://www.ncbi.nlm.nih.gov/books/NBK99584/

- contribute to **KPI 5** – produce at least two new bio-based materials able to generate a direct benefit on human health and/or the environment;
- contribute to **KPI 6** – demonstrate at least three new bio-based applications that meet market requirements

ENVIRONMENTAL IMPACTS:

- increase the overall resource efficiency;
- increase the environmental performance of the obtained products or materials as compared with existing benchmarks;
- reduce quantities of fossil-based products used in specific market sectors;
- reduce risks for the environment linked to specific product categories.

ECONOMIC IMPACTS:

- increase the economic performance of the obtained products or materials as compared with existing benchmarks;
- increase income and business opportunities for stakeholders and actors (including primary producers) in the bio-based sectors.

SOCIAL IMPACTS:

- reduce risks for human health linked to specific product categories;
- increase the health-related performance of the obtained products or materials as compared with existing benchmarks;
- create new job opportunities in the targeted sectors, particularly the rural, coastal and/or urban areas;
- retain and/or develop new skills.

STRATEGIC ORIENTATION 4

CREATE AND ACCELERATE THE MARKET-UPTAKE OF BIO-BASED PRODUCTS AND APPLICATIONS

BBI2019.SO4.S1 – ASSIST BRAND OWNERS TO 'SWITCH TO BIO-BASED'

SPECIFIC CHALLENGE:

Brand owners are key stakeholders for implementing and accelerating the bio-based economy. As with any industrial investor, brand owners need harmonised legislation and stable policies to change business models and make investments.

Brand owners often perceive current market and regulatory situations as uncertain and are therefore reluctant to invest in a (new) bio-based product. These uncertainties relate to regulatory issues, feedstock quality and availability, results of life cycle assessments, bio-based product eco-design, functionalities and performance, standards, lack of knowledge, shortage of relevant skills, etc., and exist against the backdrop of consumers' increasing sustainability expectations about products and applications. Local and regional success stories may help change this perception and instil confidence in brand owners so that they make the switch to bio-based products.

The **specific challenge** is to: (i) respond appropriately to brand owners' perceptions of the potential risks of the 'switching to bio-based'; (ii) identify advantages, incentives, motivations and best practices that may drive brand owners to switch; and (iii) provide frameworks able to incentivise, motivate and drive brand owners to 'switch to bio-based'.

SCOPE:

Map and analyse major issues that brand owners qualify as high potential risks and cause their reluctance to invest in a 'switch to bio-based', and present efficient solutions to mitigate the potential risks.

Proposals should also identify and analyse incentives, motivations and best practices that may drive brand owners to ´switch to bio-based´. These incentives may include legislative frameworks, cost considerations, enhanced product performance or functionalities, public perceptions and consumer behaviour on 'bio-based' alternatives and megatrends, and impact on occupational health.

Proposals should focus on successful innovation ecosystems, as well as large brand owners' companies that are already investing in bio-based alternatives, that could serve as examples or as value chain components for brand owners to switch to bio-based products and applications.

Proposals should include a variety of feedstock types and value chains and involve industry actors from relevant bio-based sectors. Proposals should deliver an effective 'Switch-to-bio-based toolbox'.

Proposals should demonstrate and validate the added value of the developed 'Switch-to-bio-based toolbox' by at least one actual case of a switch from a fossil-based to a bio-based market application. This validation should include an assessment of the economic, social and environmental impacts.

Proposals may focus on specific value chains and relevant brand owners for successful consumer acceptance and applications of associated bio-based products. However, the proposed solution should be able to assist brand owners in any bio-based value chain.

Proposals need to include a clear and convincing communication, dissemination and exploitation plan to share the results with the bio-based industry at large, but also with the industry that has not yet made the 'switch to bio-based' and give effective advice.

The participation of organisations that could act as a link between the private sector (including brand owners) and the public sector (for example policy makers) is particularly encouraged.

The Bio-based Industries Consortium (BIC) will set up an industry and market expert group from among its members to provide expertise on the implementation and follow-up of the different tasks and help organise meetings. This expert group is not to be a part of the proposal, but will be offered to the project consortium to assist as needed. This expert group therefore should have an advisory role in the project but would not be 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 two years 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:

- raise brand owners' interest in 'switching to bio-based';
- increase brand owners' involvement with and commitment to the bio-based industry;
- increase marketability of 'bio-based' alternatives by fostering consumer awareness of the added value of bio-based products compared to fossil-based counterparts.

NUMBER OF PROJECTS: a maximum of one project will be funded under this topic.

TYPE OF ACTION: Coordination and support action.

BBI2019.SO4.S2 – ESTABLISH METHODS AND COMMUNICATION FOR APPLYING MASS BALANCE PRINCIPLES TO ATTRIBUTE BIOMASS CO-FEEDSTOCK TO PRODUCTS

SPECIFIC CHALLENGE:

The long-term objectives of the BBI JU Initiative include: (i) increasing production of bio-based chemicals and materials to 25% of the total in Europe by 2030; and (ii) contributing to the European target of a 20% reduction in greenhouse gas emissions by 2020[25].

A sustainable chemical industry plays a key role in achieving these long-term objectives. A roadmap to pursue the 25% chemicals and materials objective is being developed by a running BBI JU project[26]. To stay competitive, operators seek to cover the higher costs of processing biomass feedstock through a premium on the products they put on the market.

The chemical industry can convert pure biomass feedstock in dedicated processes into specific products, which can be characterised by a direct relationship between the amount of biomass feedstock and the 'bio-based content' of the products. This is a cumbersome undertaking with specific R&D needs and requiring potential investments to convert a chemical value chain into a dedicated bio-based operation.

The chemical industry can also use existing infrastructures to co-feed biomass feedstock with fossil-based feedstock and convert the mixed feedstock into various products that all contain some bio-based components. To set the basis for products' premia along this path, the industry needs to attribute the contribution of the verified biomass feedstock to each specific product. The chemical operators seek to do this by applying the principle of conservation of mass in analysing the conversion systems from input to output (mass balance). This approach can only be deployed and maintained if it is properly and transparently communicated and accepted by the customers.

The **specific challenge** is to arrive at a thorough understanding of the applicability of mass-balance systems to attribute biomass feedstock to products.

SCOPE:

Analyse existing methods for measuring, tracking and attributing biomass feedstock share in mixed biomass-fossil feedstock systems to specific products, and analyse their usability as a common method for the sustainable chemical industry and for communication with customers.

Proposals should lead to understanding the pros and cons of existing different systems for mass allocation. The analysis should seek to yield one common system for use throughout the chemical and

[25] See SIRA May 2017, chapter 2, long-term objectives 8 and 12.
[26] CSA project RoadToBio: http://www.roadtobio.eu/

related downstream industries to benefit all. Proposals should also analyse the potential of misusing the mass-balancing system.

Proposals should also devise specific key messages for communication with relevant audiences. The messages should enable audiences to clearly distinguish between mass-balanced products from mixed feedstock systems and bio-based products from pure biomass feedstocks. Proposals should include at least one consumer communication pilot.

The scope of this topic excludes analysing the production, definition and benefit claims of bio-based products. CEN, Cenelec and ETSI have already developed definitions of 'bio-based products'[27] and guidelines for determining the bio-based carbon content of blends[28].

Proposals should: (i) estimate the potential of using the proposed methodology to progress towards the SIRA long-term objectives; and (ii) estimate the associated benefits for the environment (based on LCA studies for selected exemplary cases).

Proposals should utilise results of projects on standards and communication regarding bio-based products and the bio-based economy, if applicable and available.

The participation of organisations that could act as a link between the private sector (including brand owners) and the public sector (for example policy makers) is particularly encouraged.

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

INDICATIVE FUNDING:

It is considered that proposals requesting a maximum of EUR 500 000 and a planned duration of not more than two years 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:

- increase awareness in the private (chemical industry and brand owners among others) and public sector (customers, public bodies and institutions among others) of products partially or fully derived from biomass, and of related sustainability aspects;

[27] See European standard EN16575 and other related products at ftp://ftp.cen.eu/CEN/Sectors/List/bio_basedproducts/DefinitionsEN16575.pdf.
[28] See mandate M/492 to CEN, CENELEC and ETSI for the development of horizontal European standards and other standardization deliverables for bio-based products: http://ec.europa.eu/growth/tools-databases/mandates/index.cfm?fuseaction=search.detail&id=477.

- boost an effective and sustainable use of biomass by the chemical industry through improved communication approaches;
- enlarge business opportunities for the chemical industry associated with an efficient exploitation of biomass and mixed feedstock.

NUMBER OF PROJECTS: a maximum of one project will be funded under this topic.

EXPECTED DURATION: up to two years.

TYPE OF ACTION: Coordination and support action.

BBI2019.SO4.S3 – SHAPING THE BIO-BASED ECONOMY THROUGH A PARTICIPATORY APPROACH

SPECIFIC CHALLENGE:

Since citizens are the end-consumers of bio-based products and services, they should have the opportunity to provide direct input into the design and implementation of the bio-based economy. This engagement should in particular play a role in the current period of change which may eventually result in people moving out of their comfort zone. Moving away from traditional and familiar products and services to different or new products and services that are bio-based or contain bio-based components may not be easy. The bio-based industry faces the challenge to fit the results of its value chains to the needs of civil society. The most efficient way to achieve this is to involve the public and provide them with opportunities to give input into the bio-based agenda. This opportunity expands the 'triple helix' of university, industry and government organisations to also include civil society organisations, and is a significant part of 'open science'.

Digitalisation offers these opportunities. Developments in information and communications technology (ICT) make it possible to share information and data that can be of significant value when designing the bio-based agenda and implementing it in society. Many citizens are already using their mobile phones to record and transmit events in their daily lives and surroundings[29,30,31] , connecting actors in these networks. Increasingly, people are willing and motivated to participate in programmes that can improve their lives, those of others and the quality of the world they live in. Similarly, citizens may want to participate in providing input and monitoring implementation of the bio-based economy.

The **specific challenge** is to design the appropriate tools and system to empower citizens to participate in the bio-based economy.

[29] Citizen-science project 'CurieuzeNeuzen Vlaanderen' https://curieuzeneuzen.be
[30] Food Cloud: https://food.cloud/how-foodcloud-works/
[31] Rebuilding Ireland: https://vacanthomes.ie

SCOPE:

Identify possible systems to enable citizens to provide input into the agendas of the bio-based industry. The information could range from suggestions on designing and making bio-based products and applications for specific services to reporting the actual market performance of these products. The information could also be about situations that citizens believe are bad for humans or the environment and could be improved by bio-based products or applications. This will enable citizens to help shape the bio-based economy from the 'bottom-up'.

Proposals should seek to identify or design user-friendly and useable systems in a wide array of daily life activities, in surroundings ranging from the home, leisure and work, to travel, vacation, etc.

Proposals should also pursue possibilities offered by gamification in the bio-based economy.

Proposals should investigate possibilities to create a 'citizen bio-based economy observatory' that could collect the information and relay it to the bio-based industry and to policy makers. Proposals should also link up with the Bioeconomy Knowledge Centre Activities operated by the European Commission Joint Research Centre.

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

INDICATIVE FUNDING:

It is considered that proposals requesting a maximum of EUR 2 million and a planned duration of not more than three years 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:

- foster the direct involvement of the public in the development of bio-based products and aspects of the bio-based agenda in general;
- increase consumer knowledge and awareness of the potential benefits of bio-based solutions and of current bottlenecks still hampering the development of the bio-based economy.

NUMBER OF PROJECTS: a maximum of one project will be funded under this topic.

TYPE OF ACTION: Coordination and support action.

BBI2019.SO4.S4 – EMPOWER SME CLUSTERS TO BRING SMES 'ACROSS THE VALLEY OF DEATH'

SPECIFIC CHALLENGE:

The Bio-based Industries Consortium (BIC) sees as one of its major task as helping its members in obtaining investments for excellent projects. See for example BIC's report to increase awareness about the European financial instruments to support the development and growth of the bio-based economy and demonstrate how to use them[32].

In addition to project scalability and investment readiness, seeking investment from any source also involves preparing and presenting the project and its potential benefits for society and investors in an effective way. BIC is therefore seeking opportunities to train industry actors, in particular SMEs, to be successful in securing investment for excellent projects. The opportunity BIC would like to pursue is through empowering interested SME clusters at regional level (BIC members as well as non BIC members) to train their SME members and to reward them for excellent performance through a competition, with the regional winners moving on to a European final. SME clusters therefore need to be empowered to train their SME members and to adequately run the competition.

The **specific challenge** is to design the appropriate tools and system to build the capacity of SME clusters so that they can train SMEs to devise excellent projects that are scalable, investment ready and which convey these qualities to potential investors.

SCOPE:

Identify possible systems for enabling SME clusters to set up a platform where SME entrepreneurs in the bio-based industry and investors can exchange expertise and business opportunities that could lead to successful cooperation.

The scope includes the necessary steps to 'train the trainers' as well as practical steps SMEs can use when preparing and presenting projects with a high level of investment readiness.

The scope also includes building the capacity of SME clusters to build links with investors.

Proposals should consider: (i) the disparity across Europe of the investment activities; and (ii) the required skills for the trainers, so as to best assist the SME clusters and the different types of investors. The clusters should aim at becoming self-supporting in this respect after the project runtime with a clear plan to achieve this.

[32] A 2017 report 'Access to EU financial instruments suitable for the implementation of large Bio-based industry investments' on BIC website: https://biconsortium.eu/library/bic-documents

Proposals should devise a framework that can be used to select the best projects through a competition in which investors evaluate and select winning SME proposals at regional level. If the winner's reward is a cash prize, its value is not an eligible cost in the framework of the grant agreement.

Proposals should also set the basis for a European final of regional winners, and hence, proposers should link up with relevant and interested regional authorities.

Proposals could build on the experience of the European Bio-Economy Venture Forum held on 6-7 June in Viborg, Denmark[33].

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

INDICATIVE FUNDING:

It is considered that proposals requesting a maximum of EUR 1.5 million and a planned duration of not more than three years 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:

- foster an increase of private investments into the bio-based sector through an effective cooperation between SMEs and potential investors;
- improve the involvement and the role of SME clusters as a reference point for SMEs to cooperate, exchange expertise and meet potential business opportunities to implement successful bio-based projects.

NUMBER OF PROJECTS: a maximum of one project will be funded under this topic.

TYPE OF ACTION: Coordination and support action.

[33] See description on BIC website: https://biconsortium.eu/events/european-bio-economy-venture-forum

TOPICS GLOSSARY

ADDED-VALUE PRODUCT = product presenting a significantly increased value from a technical, economic and/or environmental perspective as compared with the starting material or feedstock from which the product is obtained.

(BIO)ACTIVE OR FUNCTIONAL INGREDIENT = any compound having a proved effect on a living organism, tissue or cell. Such compounds may include different types of molecules, such as: polyphenols, carotenoids, fatty acids, flavonoids, glycolipids, specialty carbohydrates, peptides and proteins, etc. (see topic BBI2019.SO3.D3).

BENCHMARK = a standard product/process/service representative of a specific technological field or market application, used as reference with which features of the developed product/process/service are compared.

BIO-BASED PESTICIDES (OR BIOPESTICIDES) = according to US EPA definition, these are 'certain types of pesticides derived from such natural materials as animals, plants, bacteria, and certain minerals'. They include naturally occurring substances that control pests by non-toxic mechanisms (biochemical pesticides), microorganisms that acts to control pests (microbial pesticides), and pesticidal substances that plants produce from genetic material that has been added to the plant (plant-incorporated-protectants, or PIPs)[34].

(PLANT) BIOSTIMULANT = 'material which contains substance(s) and/or microorganism(s), whose function when applied to plants or the rhizosphere is to stimulate natural processes to enhance/benefit nutrient uptake, nutrient efficiency tolerance to abiotic stress and/or crop quality, independent of its nutrient content' (European Biostimulant Industry Council — EBIC - 2016).

BIOMASS = 'material of biological origin excluding material embedded in geological formations and/or fossilised[35]'.

BIO-BASED = 'derived from biomass[36]'.

BIO-BASED DROP-IN CHEMICALS = bio-based versions of existing petrochemicals which have established markets. They are chemically identical to existing fossil-based chemicals (BIO-TIC 2014)[37].

BIO-BASED SMART DROP-IN CHEMICALS = a special sub-group of drop-in chemicals. They are also chemically identical to existing chemicals based on fossil hydrocarbons, but their bio-based pathways provide advantages compared to the conventional pathways (RoadtoBio project[38]).

[34] https://www.epa.gov/ingredients-used-pesticide-products/what-are-biopesticides.
[35] ftp://ftp.cen.eu/CEN/Sectors/List/bio_basedproducts/DefinitionsEN16575.pdf.
[36] ftp://ftp.cen.eu/CEN/Sectors/List/bio_basedproducts/DefinitionsEN16575.pdf.
[37] https://www.roadtobio.eu/uploads/news/2017_October/RoadToBio_Drop-in_paper.pdf.
[38] https://www.roadtobio.eu/uploads/news/2017_October/RoadToBio_Drop-in_paper.pdf.

BIO-BASED PRODUCT = 'a product wholly or partly bio-based[39]'. Bio-based products can include chemicals, materials or energy carriers.

BUILDING BLOCK = 'a molecule which can be converted to various secondary chemicals and intermediates, and, in turn, into a broad range of different downstream uses. The largest markets for bio-based chemical building blocks are in the production of bio-based polymers, lubricants and solvents[40]'.

CO-NORMATIVE RESEARCH = the research that is necessary to quantify the repeatability, reproducibility and uncertainty of the procedures that are incorporated in the standard.

COMPOUND = in chemistry, a substance formed by two or more elements chemically bonded together. In the context of topic BBI 2019.SO1.D1, the term 'compounds' refers both to 'intermediates' (i.e. substances to be further converted into the final targeted products) and to **'products'.**

CONSUMER PRODUCTS = 'items intended for consumers or likely to be used by consumers, even if not intended for them[41]'. Such products are ordinarily used and bought by individuals or households for private purposes.

DEDICATED BIO-BASED CHEMICALS = chemicals which are produced via a dedicated pathway and which do not have an identical fossil-based counterpart. As such, they 'can be used to produce products that cannot be obtained through traditional chemical reactions and products that may offer unique and superior properties that are unattainable with fossil-based alternatives' (BIO-TIC 2014[42]).

As suggested by RoadToBio project, drop-in chemicals are considered 'smart drop-ins' if at least two of the following criteria apply:

- The Biomass Utilization Efficiency (BUE, see Iffland et al. 2015) from feedstock to product is significantly higher compared to other drop-ins.
- Their production requires significantly less energy compared to other production alternatives.
- Time-to-product is shorter due to shorter and less complex production pathways compared to the fossil-based counterpart or other drop-ins.
- Less toxic or harsh chemicals are used or occur as by-products during their production process compared to the fossil-based counterpart or other drop-ins.

[39] ftp://ftp.cen.eu/CEN/Sectors/List/bio_basedproducts/DefinitionsEN16575.pdf.
[40] http://www.industrialbiotech-europe.eu/new/wp-content/uploads/2014/08/Summary-of-the-findings-related-to-chemical-building-blocks.pdf.
[41] https://www.cen.eu/work/areas/consumerproducts/Pages/default.aspx.
The European Standards developed by various Technical Committees of CEN in the area of consumer products can be classified into five distinct categories:

- child safety
- household goods, sports and leather
- cosmetics
- textile products
- safety of other consumer products

[42] https://www.roadtobio.eu/uploads/news/2017_October/RoadToBio_Drop-in_paper.pdf.

ECOSYSTEM SERVICES = 'the benefits that people obtain from ecosystems. These include provisioning services such as food and water; regulating services such as flood and disease control; cultural services such as spiritual, recreational, and cultural benefits; and supporting services, such as nutrient cycling, that maintain the conditions for life on Earth' (Millenium Ecosystem Assessment[43]).

ILUC (INDIRECT LAND USE CHANGE) = displacement of agricultural production into non-croplands (e.g. grasslands and forests) due to the destination of croplands previously used for food agricultural production having been shifted to the production of non-food bio-based products (e.g. biofuels). Indirect land use change risks causing an increase in greenhouse gas emissions because non-croplands such as grasslands and forests typically absorb high levels of CO_2. By converting these land types to cropland, negative environmental effects may occur, including increase of atmospheric CO_2 levels[44], and biodiversity loss[45].

INTERMEDIATE PRODUCT = a substance requiring further processing or conversion steps to obtain the final product.

LIFE CYCLE ASSESSMENT (LCA) = assessment of the environmental impacts of a product, process or service throughout the entire life cycle. The main references for LCA methodologies are the international standards ISO 14040 and ISO 14044. **Environmental LCA** is complemented by **life cycle costing** (LCC), which aims to assess the economic impacts of a product/process/service, and by **social life cycle assessment** (S-LCA), which aims to evaluate social implications of a product/process/service.

In the context of AWP 2019, depending on the type of impacts to be assessed, 'LCA methodologies' can refer to:

- life cycle assessment (LCA) to evaluate environmental impacts;
- life cycle costing (LCC) to evaluate economic impacts;
- social life cycle assessment (S-LCA) to evaluate social impacts.

LIFE CYCLE SUSTAINABILITY ASSESSMENT (LCSA) = assessment of the environmental, economic and social impacts of a product, process or service throughout the entire life cycle (see IA - flagship actions).

NEW = in the context of AWP 2019, 'new' refers to a product or a process that entails clearly described innovative and/or advanced properties or enhancements compared to existing benchmarks (for example a 'new material' does not mean that such type of material currently does not exist on the market, but it refers to the fact that such material entails performances /properties that are unmatched by existing benchmark products available on the market).

[43] https://www.millenniumassessment.org/documents/document.300.aspx.pdf.
[44] https://ec.europa.eu/energy/en/topics/renewable-energy/biofuels/land-use-change.
[45] http://ec.europa.eu/environment/nature/conservation/species/pollinators/index_en.htm.

PEST = any living organism that negatively affects the growth and qualities of cultivated crops or plants. Pests include: weeds, fungi, bacteria, insects, mites, nematodes, gastropods, viruses and phytoplasms.

PRECURSOR = a substance that is converted into another compound through a chemical reaction, thus preceding the latter within a synthetic or biological pathway.

PRE-NORMATIVE RESEARCH = the research carried out to establish the validity and reliability of the subject matter to be standardised.

PROCESS INTENSIFICATION = 'a chemical and process design approach that leads to substantially smaller, cleaner, safer and more energy-efficient process technology. It improves process flexibility, product quality, speed to market and inherent safety, with a reduced environmental footprint[46]'.

STATE OF THE ART = the most updated developments of a product/process/service entailing the newest achievements and improvements in the related (application or technological) field.

SUSTAINABLE = in the context of the 2019 AWP, this refers to a product/process/value chain that enhances and create benefits for the environment, economy and society.

[46] Reay, D., Ramshaw, C., Harvey, A. Process Intensification - Engineering for Efficiency, Sustainability and Flexibility (2nd Edition), Butterworth-Heinemann, 2013.

2.2.6. Conditions of the 2019 Call

Call identifier: H2020-BBI-JTI-2019

Publication date: 4 April 2019[47]

Indicative deadline: 4 September 2019[48] 17:00:00 (Brussels local time) - (single stage call).

Indicative budget: EUR 135 million[49,50,51]

Estimated value of the in-kind contributions by the members other than the Union or their constituent entities (BIC): Minimum EUR 60 million.

Indicative budgets by type of actions

Topic	Indicative budget (million EUR)
Research and innovation actions	
BBI2019.SO1.R1 – Use tree species and/or varieties to create new bio-based value chains	47
BBI2019.SO2.R2 – Develop breakthrough technologies to improve the cost-effectiveness and sustainability of pre-treatment steps within biorefining operations	
BBI2019.SO2.R3 – Apply microorganisms and/or enzymes to resolve end-of-life issues of plastics	
BBI2019.SO2.R4 – Develop surface or bulk treatments for improved wood-based materials	
BBI2019.SO2.R5 – Convert plant oils and fats into safe high-added-value products for various applications including food and personal care	
BBI2019.SO2.R6 – Improve biorefinery operations through process intensification and new end products	
BBI2019.SO2.R7 – Model the composition of bio-based residual streams and its evolution to optimise its management and processing	
BBI2019.SO3.R8 – Develop sustainable bio-based materials for high-volume consumer products	

[47] The BBI JU Executive Director may decide to open the call up to one month prior to or after the envisaged date of opening.
[48] The BBI JU Executive Director may delay this deadline by up to two months.
[49] 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.
[50] The final total funding for projects includes EFTA contributions.
[51] 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.

BBI2019.SO3.R9 – Develop bio-based fibres and/or functional molecules to improve the performance of textile products	
BBI2019.SO3.R10 – Develop bio-based high-performance materials for various and demanding applications	
Innovations actions – demonstration actions	
BBI2019.SO1.D1 – Scale up conversion of lignin into valuable compounds for application in specific market sectors	26
BBI2019.SO1.D2 – Produce components for various materials, including for food and feed, from microalgae	
BBI2019.SO3.D3 – Produce bio-based functional ingredients and additives for high-end markets	
BBI2019.SO3.D4 – Demonstrate bio-based pesticides and/or biostimulant agents for sustainable increase in agricultural productivity	
Innovation actions – flagship actions	
BBI2019.SO1.F1 – Valorise the organic fraction of municipal solid waste through an integrated biorefinery at commercial level	57
BBI2019.SO2.F2 – Apply technological combinations to valorise all components of biomass feedstock	
BBI2019.SO3.F3 – Produce high-performance bio-based alternatives to harmful products and processes to protect and enhance human health and the environment	
Coordination and support actions	
BBI2019.SO4.S1 – Assist brand owners to 'switch to bio-based'	5
BBI2019.SO4.S2 – Establish methods and communication for applying mass balance principles to attribute biomass co-feedstock to products	
BBI2019.SO4.S3 – Shaping the bio-based economy through a participatory approach	
BBI2019.SO4.S4 – Empower SME clusters to bring SMEs 'across the valley of death'	
Total	135

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.

2.3.1. List of countries eligible for funding

Part A of the General Annexes[52] to the Horizon 2020 Work Programme 2018-2020 shall apply *mutatis mutandis* to the actions covered by this Work Plan with the following derogation:[53]

Coordination and Support actions (CSA) and Research and Innovation Actions (RIA)	By way of derogation from Article 10(1) of Regulation (EU) No 1290/2013, with regard to the 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: (a) small and medium-sized enterprises; (b) secondary and higher education establishments; (c) non-profit legal entities, including those carrying out research or technological development as one of their main objectives; (d) the Joint Research Centre; (e) international European interest organisations.

[52] http://ec.europa.eu/research/participants/data/ref/h2020/other/wp/2018-2020/annexes/h2020-wp1820-annex-ga_en.pdf
[53] OJ L 174, 13.6.2014, p. 12.

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.

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)[54] 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

[54] 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

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

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)	Clarity and pertinence of the objectives; Soundness of the concept and, credibility of the proposed methodology; Quality of the proposed coordination and/or support measures.	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; Quality of the proposed measures to: ▪ 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	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; Appropriateness of the allocation of tasks, ensuring that all participants have a valid role and adequate resources in the project to fulfil that role. Complementarity of the participants and extent to which the consortium as whole brings together the necessary expertise (if relevant); Appropriateness of the management structures and procedures, including risk and innovation management.
Research and Innovation Actions (RIA)	Clarity and pertinence of the objectives; Soundness of the concept and, credibility of the proposed methodology; Extent that the proposed work is beyond the state of the art, and demonstrates innovation potential (e.g. ground-breaking objectives, novel concepts and approaches, new products, services or business and organisational models) Appropriate consideration of interdisciplinary approaches and, where relevant, use of stakeholder knowledge.	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; 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; Quality of the proposed measures to:	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; Appropriateness of the management structures and procedures, including risk and innovation management Complementarity of the participants and extent to which the consortium as whole brings together the necessary expertise (if relevant); Appropriateness of the allocation of tasks, ensuring that all participants have a

Type of action	Excellence	Impact	Quality and efficiency of the implementation
		▪ 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 Extent to which the proposed consortium own contribution will help maximising the impact of the action.	valid role and adequate resources in the project to fulfil that role.
Innovation Actions (IA)	Clarity and pertinence of the objectives; Soundness of the concept and, credibility of the proposed methodology; Coverage of the value chain (raw materials, equipment and technology suppliers and end-users); Extent that the proposed work is beyond the state of the art, and demonstrates innovation potential (e.g. ground-breaking objectives, novel concepts and approaches, new products, services or business and organisational models) Appropriate consideration of interdisciplinary approaches and, where relevant, use of stakeholder knowledge.	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; 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; Quality of the proposed measures to: ▪ 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	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; Appropriateness of the management structures and procedures, including risk and innovation management Appropriateness of the allocation of tasks, ensuring that all participants have a valid role and adequate resources in the project to fulfil that role. Complementarity of the participants and extent to which the consortium as whole brings together the necessary expertise (if relevant); Soundness of the business case and business plan; Readiness of the technology for the implementation of the pilot phase, demonstration or flagship[56].

[56] 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).

Type of action	Excellence	Impact	Quality and efficiency of the implementation
		Extent to which the proposed consortium own contribution, including additional investments[55], will help maximising the impact of the action	

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.

[55] 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.

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 main areas:

- SME participation
- Widening participation
- Synergies with other relevant funding programmes
- Business Intelligence and impact monitoring.

The related action plans are discussed with the two advisory bodies SC and SRG. For 2019 and beyond they are also based on the recommendations of the BBI JU interim evaluation report[57] published on 9 October 2017, as well as on the action plan developed in response to the recommendations of the BBI JU interim evaluation, which was published on its website on 14 May 2018[58].

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 JU 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, engagement of the primary sector and regional potential. In addition, BBI JU will continue to analyse the innovation potential and outputs of its portfolio, reporting on progress through consolidated and/or ad-hoc reports as needed. This will be achieved based on internal analyses and/or with the support of external resources via experts or low value procured studies.

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.

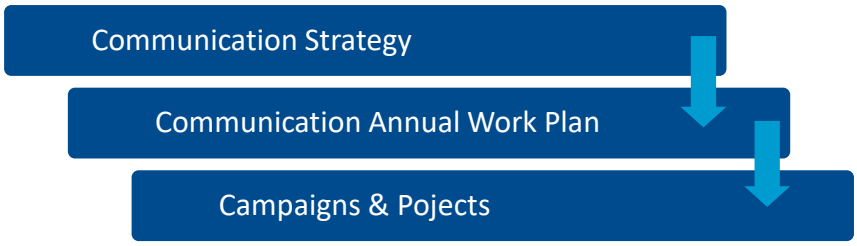
These activities are closely monitored by the BBI JU advisory bodies and Governing Board, to which regular progress updates will be reported.

2.4. Support to Operations

2.4.1. Communication activities

The BBI JU communication activities are developed and executed in line with its communication strategy as presented to the BBI JU Governing Board in September 2018. Similarly to the previous year, all relevant actions will follow the roadmap developed in cooperation with the EC and BIC while taking into careful consideration BBI JU's resources in order to ensure efficiency and to obtain a maximum return for the BBI JU initiative.

[57] http://ec.europa.eu/research/evaluations/pdf/bbi.pdf
[58] https://www.bbi-europe.eu/sites/default/files/action_plan_in_response_to_the_recommendations_of_the_interim_evaluation_of_the_bbiju.pdf



The 2018 communication action plan focused on consolidating the transition of BBI JU from "recognition" to "reputation" via the following actions:

a. Promote the BBI JU calls with a particular emphasis on underrepresented countries or macro-regions in synergy with other EC and BIC initiatives;

b. Organise communication events and campaign to communicate the impact of the BBI JU initiative as a key instrument for the development of a sustainable bio-based industry in the EU;

c. Implement a Stakeholder management action plan to widen the understanding and recognition of BBI JU towards a wider group of prioritized key stakeholders, relevant federations, NGOs, etc.;

d. Extend the communication action plan to third countries where win-win strategies have been identified.

As described also under section 2.5.2, the 2019 work plan will build on the results obtained, and elaborate further on the dissemination of the achievements and impact of completed BBI JU's projects with a specific focus on the scientific advancements and their market uptake potential. The vision of the current initiative and of the Joint Undertaking itself will be communicated via campaigns that will concentrate on its concrete added value in the daily lives of the EU citizens, as specifically requested by several EU institutions.

The selective and strategic use of the right tools is critical for achieving BBI JU's long-term communication goals also with regards to its wide array of stakeholders. The 2019 action plan will continue the development of relations with targeted stakeholders to further consolidate its recognition in an impactful way. More specifically, BBI JU will continue engaging with these stakeholders that have been mapped and identified according to their priority for achieving BBI JU's mission. The stakeholder action plan will be focussed on tailored and strategic messages and all available tools and communication channels will be used to that purpose.

Concluding, it needs to be noted that the actions to implement the communication action plan for 2019 will continue to place a strong emphasis on ensuring a coordinated and collaborative approach, taking advantage of complementarities and avoiding duplication with other initiatives.

Communication channels

Communication channel	Description	Action
Press and media	Media and press relations, communication materials	Engage with the wider public and key individuals, storytelling, disseminate key messages and achievements
Communication events	Refer to the "*Indicative list of events involving BBI JU participation in 2019*" below for more details	Highlight impact and achievements of the programme, maximise impact of the BBI JU's outreach, promote the BBI JU Call
Digital platforms and social media	Website redesigning, partnering platform, social media, e-newsletter	Improve project dissemination, favour networking, keep up the growing presence/influence on social media, raise visibility, storytelling
Public relations and advocacy	Bilateral meetings, presentations, networking	Widen stakeholder engagement and support, improve the visibility and recognition of the programme with a particular focus to key individuals

Horizontal activities in support of the implementation of the programme

In addition to the main activities outlined above, the BBI JU communication team will provide support to the horizontal actions related to the implementation of the programme as described under section 2.3.11. It is worth mentioning that as from 2019 activities linked with the areas of widening participation strategy, SMEs participation strategy, actions to identify synergies with other programmes as well as business intelligence, as well as the action plan that has been based on the recommendations of the BBI JU interim evaluation report, will be developed and streamlined.

Communication Action Plan for 2019

The Communication Action Plan for 2019 (mainly, but not exclusively) will entail the following:

- Development and implementation of press & media relations, to include the public procurement of **media and press agency services and of media monitoring services**.
- BBI JU will continue the development of **short promotional videos** to tell the success stories about the programme through the BBI JU projects and via political figures with a close link to the sector.
- BBI JU will conduct a user review and implement improvements through the BBI JU **partnering platform.** This includes the management of BBI JU's partnering platform during its annual Info Day brokerage event to help potential participants to network around the annual Call for proposals. In addition to the above, the platform will remain active throughout the year for interested parties to

network with its help. Like in the previous years, BBI JU will organise a dedicated on-line networking meeting.

- **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.
- **Organisation and sponsorship of targeted events**, including advertising, sponsorship of awards and marketing activities which build BBI JU's corporate reputation in line with its mission and objectives.
  - The **Info Day** and brokerage event to support the annual Call for proposals. The event will be held in the EC premises (Charlemagne building) and relevant supporting communication materials will be developed for the actual day of the event but also for events following that, i.e. national info days, webinars, etc.
  - BBI JU will hold its second **Stakeholder Forum in** December 2019. The 2 days event will take place in an external venue and all material (physical and electronic) necessary for its successful development will be acquired via existing FWC or public procurement.
  - In the context of BBI JU's stakeholder management plan priorities for 2019, BBI JU will also participate in the **sponsorship** of awards, prizes and events with a strong link on the bio-based sector, bioeconomy and the wider R&I policy. To that end, BBI JU will sponsor the EUCYS 2019 bioeconomy prize, World Bio Markets 2019 and other events of similar scope and focus.
  - As on-going policy developments closely impacting BBI JU's current and future activities, the target will remain the EU institutions through the **participation in events** like European Week of Cities and Regions and others of similar nature and focus.

BBI JU indicative list of events in 2019:

Event	Date(s)	Place	BBI JU role
World Bio Markets	1-3 April	Amsterdam, NL	Sponsor and speaker
Info Day & Brokerage event	12 April	Brussels, BE	Organiser
Global Bioeconomy Summit	TBC	Berlin, DE	Speaker
Member States Info Days	Various	Various	Speaker
Food 2030	TBC		Speaker
Bio World Congress 2019	9 – 19 July	Iowa, USA	Speaker
EUCYS	TBC	TBC	Sponsor of one of the Bioeconomy awards
Ecomondo 2019	TBC	Rimini, IT	Speaker
Stakeholder Forum 2019	December	Brussels, BE	Organiser
IFIB 2019	TBC	TBC	Speaker
Scaling Up 2019	TBC	TBC	Speaker
BIOKET	TBC	TBC	Speaker

Overview of the 2019 activities and indicative budget

The table below provides an overview of the activities outlined above. The timeline and the relevant allocated budget are indicative[59].

Activity	Timeline	Budget	Expected procurement procedure
Media monitoring	Q3+Q4	EUR 15 000	Public procurement
Media campaigns and media publications	Q1-Q4	EUR 40 000	Public procurement
Public relations	Q1-Q4	EUR 60 000	Public procurement
Communication materials: publications, leaflets, posters, banners, etc.	Q1-Q4	EUR 50 000	FWC/SLA and public procurement
Promotional videos	By Q2	EUR 40 000	FWC /SLA and public procurement
Partnering Platform	Q2	EUR 15 000	Existing contract
Public website	Q3	EUR 35 000	SLA with DIGIT for webhosting and FWC for website redesigning
Info Day	Q2	EUR 40 000	Public procurement and FWC
Stakeholder Forum	Q4	EUR 350 000	FWC

2.4.2. Procurement and contracts

For the year 2019 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 rules[60]. 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.

[59] With regards to the budget please note it may be subject to modifications in the EU General Budget for 2019, if any, and would thus be updated accordingly.
[60] https://www.bbi-europe.eu/sites/default/files/bbi_ju-financial_rules.pdf

The table below provides a summary of tenders planned for 2019 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
BBI JU Stakeholder Forum 2019	Up to EUR 350 000	Specific contracts within a FWC	Q1 2019
Communications Materials	Up to EUR 50 000	Various low value procedures and one mid value.	Q1-Q4
Communication tools	Up to EUR 65 000	Mid value negotiation procedure	Q1-Q2
Public relations including media support	Up to EUR 40 000	Mid value negotiation procedure	Q1-Q2
Media monitoring service	Up to EUR 25 000	Mid value negotiation procedure	Q1-Q2
Impact study on the participation of the agricultural sector in BBI JU: business models, challenges and recommendations to enhance the impact on rural development	Up to EUR 100 000	Mid value negotiation procedure	Q1-Q2

2.4.3. IT and logistics

Cloud/Office 365/Intranet

The BBI JU is gradually rolling out internal cloud-based services. In 2019, more applications will be available for the BBI JU staff to improve efficiency and collaboration in their everyday work, including easy-to-use project management and task management tools.

The BBI JU's Intranet is also going to be upgraded taking into account the feedback gathered during the initial period of operation.

Unified Communications

Related to the previous point, a cloud-based unified communications solution (Microsoft Teams) will be put in place to improve collaboration and teamwork while keeping a high level of security. This tool will be integrated with the Intranet, providing a flexible platform to share and discuss work-related documents.

BBI JU staff members will also have the possibility to benefit from the Bring Your Own Device concept that will provide them access to the corporate IT resources on their own devices (PC, tablet, smartphone), in a secure manner.

Reporting website

The BBI JU is looking into potential use cases where a cooperation with the IMI 2 JU and access to their reporting tool (QlikSense) would provide benefit in terms of automating certain tasks/steps of creating reports like the Annual Activity Report, Governing Board monthly reports, etc.

ICT Operations and Support Services Contract

During the course of 2018, the Joint Undertakings launched and finalised a public procurement procedure to cover their needs in this domain.

Because of the nature of the resulting framework contract, in 2019 the JUs will have to monitor closely its implementation with an emphasis on the quality of service provided by the supplier, and apply corrective measures, if necessary.

Document management

Following the migration to Ares in 2018, BBI JU will focus on the elaboration and fine-tuning of internal procedures using this document management tool. The objective is to reach more efficient and effective procedures with reduced use of paper.

2.4.4. JU Executive Team – HR matters

MANAGEMENT OF THE PROGRAMME OFFICE

The Programme Office will continue implementing 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

In 2019, the BBI JU will reach its objective in terms of Staff Establishment Plan, with 23 staff members. Therefore, no additional recruitment of statutory staff is foreseen. However, since staff turnover and inter agency mobility are expected to increase, recruitment needs will be closely monitored by the HR function.

BBI JU will be entering in the core phase of its mandate and the workload will significantly increase while the total number of staff will remain the same. In order to cope with these peak periods of work, BBI JU might recruit interim staff to provide occasional additional support and guarantee business continuity for critical periods.

Given the increased success of its traineeship programme, 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.

In 2019, the HR function will also perform an analysis on how the Programme Office should evolve in the near future in terms of staff allocation ensuring that the organisation achieve its objectives.

In addition, the HR function will develop a new IT recruitment tool for the publication of its external vacancies.

LEGAL MATTERS AND HR MANAGEMENT

In 2019, BBI JU will continue to develop its internal guidelines and strengthen its legal framework, paying particular attention to how EC staff implementing rules apply to the JU particularities. The programme office will also organise an annual appraisal and reclassification exercise.

New staff implementing rules are expected to be adopted by the GB in 2019 in consultation with DG HR and the Standing Working Party[61].

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. Training is an integral part of BBI JU human resources policy and serves the

[61] 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.

interests of both the individual and the organisation. Therefore, in 2019 HR will continue to develop a learning and development policy focusing on the following priorities:

- **Collaborative working and knowledge-sharing** in order to favour effective teamwork across the whole organisation;
- Improve the capacity of staff members to **communicate** effectively among themselves and with external stakeholders;
- **Vision, leadership** and effective **management** of people, projects and processes in an increasingly complex world, with increasing pressure on staff.

The HR function 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, several common learning events will be organised in house in order to build common working methods and to further foster the cohesion in the team.

The HR function will also continue to improve the BBI JU Intranet to improve the communication within the team and facilitate the access to key documents for staff.

INTER JU/AGENCY NETWORK COOPERATION

In 2019, BBI JU will continue to collaborate with the other JUs, the agency network and the EC HR support services. In this context, BBI JU will have access to EC IT tool SYPER2 ensuring alignment with the EC rules and procedures on HR matters. This new tool will facilitate the daily management of the HR activities and ensure a better alignment with the needs of BBI JU staff and BBI JU stakeholders.

In 2019, the common JU network of confidential counsellors will be in place and 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 its Data Protection Officer (DPO), continues to ensure and apply the data protection legal framework within the Joint Undertaking, taking into account the entry into force of the new Regulation (EU) 2018/1725, which replaced on 11 December 2018 Regulation (EC) No 45/2001.

With the entry into force of the new regulation there is a shift from mere compliance to a risk based approach in the management of data protection. In addition, the new regulation introduces the obligation for controllers and processors to maintain documentation of the processing operations

under their responsibility, instead of a prior notification to the EDPS as it was required by Article 25 of Regulation (EC) No 45/2001.

Once all the necessary changes have been introduced in 2018 to comply with the new legal framework the key objective of BBI JU DPO for 2019 is to raise awareness among BBI JU staff of the changes introduced by Regulation (EU) 2018/1725.

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 JU and shall supervise the implementation of its activities in accordance with Article 7 of the Statutes[62].

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 2019 are listed below:

Key activities in 2019 – Timetable	
Adopt the Annual Activity Report 2018 and its assessment by the GB	Q2
Adopt an opinion on the final accounts 2018	Q2
Approve the list of proposals selected for funding after the evaluation of Call 2019	Q4
Adopt the AWP and Budget 2020	Q4
Approve the Additional Activities Plan 2020	Q4

[62] Annex to the Council Regulation (EU) No 560/2014 of 6 May 2014 establishing the Bio-based Industries Joint Undertaking ("BBI JU 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 June 2018 the Executive Director presented to the Governing Board the BBI JU priorities for the year 2019. 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 – February 2019.

For the year 2018 the priorities were to:

- Reinforce the PPP highlighting the impact of the initiative, the EU added value, the Industry commitment and the strategic alignment of its founding members.
- Consolidate the BBI JU projects portfolio in line with the up-dated SIRA and BBI JU Council Regulation objectives.
- Continue running BBI JU operations ensuring the highest standards in terms of quality and efficiency.
- Successfully implement suitable solutions addressing for In Kind Additional Activities (IKAA) and In Kind Operational Activities (IKOP) reporting and financial contribution at project level.
- Implement the communication and stakeholder management action plan towards a wider group of stakeholders; shifting from BBI JU "recognition" to "reputation".

For 2019, the executive Director and the management team presented on 13th June 2018 to the BBI JU GB the priorities for 2019, they were adjusted after the GB feedback, and those below are the final ones:

1. **Keep BBI JU operational standards at the highest quality and ensure efficiency to absorb the increase of workload.** The programme office will consolidate and fine tune the reporting landscape on financial contribution and leverage effect as approved by the BBI JU GB. BBI JU will propose the adjustment of the Staff Establishment Plan (SEP) to absorb the increase of workload with a neutral administrative budget impact over the programming period. BBI JU will optimise the JU's specific audit efforts based on the analysis of the first ex-post audits and of the specificities of BBI JU beneficiaries. The new Internal Control framework will be implemented by building on achieved compliance and effectiveness, while fostering efficiency.

2. **Analyse and communicate the impact and the added value of the BBI JU iPPP and its project portfolio to a wide audience of stakeholders.** To do so the BBI JU will undertake more detailed analyses and studies of the socio-economic and environmental impact of BBI JU projects and demonstrate the added value and additionality of the initiative. Results and achievements of completed BBI JU's projects will be widely communicated with a specific focus on the scientific

advancements and to the market uptake potential. Those communication campaigns, will be supported by specific tools and campaigns (including events) to communicate the added value of BBI initiative in the daily lives of EU citizens, as specifically requested by several EU institutions. And finally, in December 2019 BBI JU will organise the second BBI JU Stakeholder Forum keeping the successful format of 2017 with a specific focus on output, impact and benefits for the EU citizens.

3. **Implement the adjustments to the project portfolio following the recommendations of the BBI JU interim evaluation, while maintaining all its recognised key strengths.** The programme office will continue to consolidate the effective BBI JU project management, focusing on assessment and payments of final reports. The implementation of the dedicated RIA topics in the final two Calls will be improved based on the lessons learned from call 2018. The implementation of the agreed methodology for the monitoring, validation and communication format of the project outcome KPIs will be developed and implemented. The mobilisation in Eastern, Baltic and Southern Europe MS will stay a priority expecting to obtain and report concrete effects of the widening participation strategy. The programme office will undertake a study on the BBI JU added value for / by SMEs in bio-based industries. And finally it is expected to increase the mobilisation of a prioritised set of third countries in a win-win way.

4. **Contribute to the discussions on Horizon Europe in terms of Missions and Objectives and in terms of operational functioning of the BBI JU as implementing body, by building on the lessons learnt from the implementation of Horizon 2020.** To do so, the programme office will act at four levels:

- Prepare and propose a set of solutions to fully integrate the BBI JU industries into the whole bioeconomy value chains addressing the issues of biodiversity, competition with food and feed, and water and soil management practices;
- Undertake an analysis of the BBI JU project portfolio to prepare proposals on how to better address the mobilisation of the primary sectors, scarcely covered geographic areas and feedstocks not enough mobilised;
- Identify and propose a set of opportunities in terms of operational practice and implementing rules to improve the implementation of Horizon Europe vis-à-vis Horizon 2020;
- Prepare a plan to cover the transition between Horizon 2020 and Horizon Europe taking into consideration the plausible scenarios regarding the type of instrument to be selected for implementing the missions of “Bio-based innovative systems” and other related areas of the bioeconomy.

The AWP 2019 has been built around those priorities and its related objectives.

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 fourteen 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 2019 AWP in two stages:

- provision of input to the first draft of the AWP 2019, including topic texts
- provision of recommendations to the pre-final version of the AWP2019, including topic texts and budget.

During the year 2019, 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 2019 – Timetable	
10th 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 JU will provide information on the main achievements in the implementation of the 2018 annual work plan, participation in the call for proposals and evaluation results of the Call 2018, on-going projects, etc. ▪ Provide advice on the scientific priorities to be addressed in the annual work plan 2020. 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). ▪ Provide SC position on Horizon Europe and BBI JU related topics	Q2
11th Meeting of the SC. The SC would: ▪ Provide advice on the draft of the Annual Work Plan 2020 ▪ Provide advice on the BBI JU programme progress and achievement of targets and other strategic issues. The BBI JU will provide information on the 2019 annual work plan implementation, participation in the call for proposals 2019, 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 JU 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 2019 Annual Work Plan in two stages: (i) first draft of AWP with the list of topics in May 2018, (ii) pre-final full version to the draft of the 2019 AWP in October 2018.

The SRG also provides information to, and acts as an interface within, the BBI JU 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 2019, 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 2019 – Timetable	
10th Meeting of the SRG. The SRG would: ▪ Provide recommendations on the BBI JU programme progress and achievement of targets and other strategic issues. The BBI JU 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 2018, on-going projects, communication activities, synergies with other initiatives, etc. ▪ 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 Joint JRC-BBI JU-IEA Bioeconomy survey on national activities. ▪ 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. ▪ Provide SRG position on Horizon Europe and BBI JU related topics	Q2
11th Meeting of the SRG. The SRG would: ▪ Provide advice on the draft of the Annual Work Plan 2020 ▪ Issue recommendations on the BBI JU programme progress and achievement of targets and other strategic issues. The BBI JU will provide information on the 2019 annual work plan implementation, participation in the 2019 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 2019 BBI JU will continue to run its operations by improving the quality level of programme implementation while integrating the corrective actions that were identified in the past.

The main activities that will be performed include the following:

- Implement a new Internal Control framework in line with the most recent practice of the EU bodies by building on achieved compliance and effectiveness while fostering efficiency;
- 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 and of the external auditor of BBI JU accounts;
- 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 optimise the JU's specific audit efforts based on the analysis of the first ex-post audits and of the specificities of BBI JU beneficiaries;

2.6.1. Financial procedures

In 2019 BBI JU will continue to consolidate and improve its financial procedures in both the administrative and grant management areas, in line with its Manual of Financial Procedures as well as the general EU financial regulatory framework and IT tools used for financial transactions performed by the BBI JU.

On the grants side the majority of transactions will continue to be dealt with via the Horizon 2020 corporate tools - COMPASS/SYGMA, with certain grants-related transactions being performed directly in the EC accounting system ABAC, or completed in ABAC following initiation in other tools (e.g. COMPASS/SYGMA or EMI). Staff (existing as well as newly-recruited where relevant) will continue to be trained adequately to ensure maximum competence in the use of the IT tools as well as the various different transactions which can arise (e.g. grant amendments, the participant guarantee fund mechanism, recoveries).

On the administrative side, the improved business procedures already in force in 2018 should ensure high-quality processing, optimal budgetary implementation and accurate accounts. There will be continued monitoring of these procedures to evaluate their efficiency and fine-tune or update them where necessary.

In 2019 the volume of financial transactions will increase significantly compared to prior years, particularly on the grants side. The administration and finance unit and the programme unit will continue to collaborate in order to ensure coherent understanding and implementation of the financial rules of Horizon 2020 grants, in line with the practices of DG RTD. This will also ensure the speedy and efficient verification and validation of all transactions, both complex and straightforward.

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 2019 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 BBI 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 2019 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 of operational expenditure will continue to be implemented in line with the Horizon 2020 Audit Strategy. The Horizon 2020 Common Support Centre (CSC) of the European Commission developed this audit strategy in cooperation with all its clients (i.e. the entities that implement the Horizon 2020 budget: Services of the European Commission, Executive Agencies and Joint Undertakings).

The main objective of the Audit Strategy is to provide the individual Authorizing Officers with the necessary elements of assurance in a timely manner, thus allowing them to report on the budget expenditure for which they are responsible. Ex-post controls on operational expenditure contribute in particular to:

- assessing the legality and regularity of expenditure on a multi-annual basis;
- providing an indication of the effectiveness of the related ex-ante controls;
- providing the basis for corrective and recovery mechanisms, if necessary.

The Common Audit Service (CAS) of the European Commission is the part of the CSC serving all Horizon 2020 stakeholders in the implementation of the audit strategy. Its mission is to deliver a corporate approach for the audit cycle: audit selection, planning, application of rules, relations with beneficiaries and management information on the audit process.

BBI JU is effectively integrated in this control chain: it participates in the audit process definition and in the monitoring of its implementation in continuous collaboration with CAS and its clients. The main objectives of the cooperation are to align operations and exploit synergies on the common audit effort. The efficiency gains should reduce the audit costs and the administrative burden on auditees, always in line with the specific objectives for ex-post controls explained above.

In 2019, BBI JU will continue to implement the results of the ex post audits on BBI JU beneficiaries and will provide adequate reporting through the budget discharge process.

2.6.3. Audits

The audit environment is an 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.

In 2019, BBI JU will continue to ensure the coordination and support to the audits carried out by the Internal Audit Service (IAS), and the Court of Auditors (ECA) and by the external auditor of BBI JU accounts. BBI JU will also continue to 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 for the years 2017-2019 that was defined in 2016. According to this plan, the remaining audit topic to be covered in the current plan is an audit on the performance management of the BBI JU activities. In 2019, The IAS will also provide a new Strategic Plan for the years 2020-2021.

3. BUDGET 2019

3.1. Budget information

Please note that the BBI JU 2019 budget may be subject to modifications in the EU General Budget for 2019, if any, and would thus be updated accordingly. The draft budget is in line with the preliminary budget presented in the Fiche Financière as well as the draft budget sent to GB members on 12/11/2018 except for an adjustment of the EFTA contribution % from 2.33% to 2.38% (final EFTA rate for 2018)

Please see also the notes below each of the statements.

I STATEMENT OF REVENUE[63]

Heading	Budget 2019 CA (in €)	Budget 2019 PA (in €)	Amended Budget 2018 CA (in €)	Amended Budget 2018 PA (in €)	Amended Budget 2017 CA (in €)	Amended Budget 2017 PA (in €)
EU contribution (excl. third countries contribution/EFTA)	**133,608,895**	**163,833,500**	**112,487,038**	**111,138,458**	**80,951,465**	**83,648,693**
of which Administrative	1,184,579	1,184,579	2,223,726	2,223,726	2,062,155	2,062,155
of which Operational	132,424,316	162,648,921	110,263,312	108,914,732	78,889,310	81,586,538
Third countries contribution (including EFTA)	**3,479,892**	**4,199,237**	**2,820,948**	**2,789,526**	**2,203,657**	**1,910,819**

[63] For the year 2019: an indicative amount of 900,000€ (including any EFTA/R0 appropriations this amount may contain; and also including any reactivated unused budget appropriations from previous years this amount may contain) in commitment and payment appropriations is included in the JU's Budget (included in the Revenue for 2019 and included in Expenditure chapter 28) for the contracting and payment of the BBI JU experts-evaluators 2019 by the REA on the BBI JU behalf. For this purpose, part of this amount (except the reactivated appropriations counted in 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) may need to be transferred by the EU, on the BBI JU behalf, in commitment and payment appropriations, to the REA. However, the BBI JU will not request the EU to transfer in its Accrual Based Accounting system the corresponding appropriations to this amount's part, 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 2019.

Heading	Budget 2019 CA (in €)	Budget 2019 PA (in €)	Amended Budget 2018 CA (in €)	Amended Budget 2018 PA (in €)	Amended Budget 2017 CA (in €)	Amended Budget 2017 PA (in €)
of which Administrative EFTA[64]	28,193	28,193	51,813	51,813	55,758	55,758
Of which administrative third countries excluding EFTA[65, 66, 67]	300,000	300,000	200,000	200,000	223,000	223,000
of which Operational EFTA	3,151,699	3,871,044	2,569,135	2,537,713	1,924,899	1,632,061
Industry (financial) contribution	**1,512,772**	**3,512,772**	**4,475,539**	**2,975,539**	**3,115,280**	**3,365,280**
of which Administrative[68]	1,512,772	1,512,772	2,475,539	2,475,539	2,615,280	2,615,280
of which Operational	0	2,000,00069	2,000,000	500,00070	500,000	750,000
SUB-TOTAL revenues	**138,601,559**	**171,545,509**	**119,783,525**	**116,903,523**	**86,270,402**	**88,924,792**
C2 reactivation of unused appropriations from administrative expenditure	**2,695,766**	**2,695,766**	**622,497**	**728,744**	**2,546,249**	**2,774,974**
of which from 2015	0	0	0	0	989,945	431,673

[64] For the year 2019: EFTA contribution computed on the EU contribution (excl. third countries/EFTA) to the BBI JU administrative expenditure 2019. EFTA rate for 2019 is 2.38 %.
[65] For the year 2019: Third countries contribution to be transferred by the EC to the REA on behalf of BBI JU for the contracting and management of its expert evaluators 2019. This amount is indicative only; however any change in this amount along the year 2019 would not impact the total EU contribution (incl. 3rd countries/EFTA contribution) to BBI JU administrative expenditure 2019 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 2019.
[66] For the year 2017: from 08.025001.6-R0-RTD 847 F0 (BBI) to 08.025001.6-R0-REA.
[67] For the year 2018: from 08.025001.6-R0-RTD 847 F0 (BBI) to 08.025001.6-R0-REA.
[68] For the year 2019: BIC's 50% contribution to BBI JU 2019 administrative expenditure (matching total EU contribution including third countries/EFTA).
[69] For the year 2019: BIC financial contribution to BBI JU appropriations for operational expenditure 2019: the payment appropriations relate to the 2018 call contribution.
[70] 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 2019 CA (in €)	Budget 2019 PA (in €)	Amended Budget 2018 CA (in €)	Amended Budget 2018 PA (in €)	Amended Budget 2017 CA (in €)	Amended Budget 2017 PA (in €)
of which from 2016	0	0	0	0	1,556,304	2,343,301
of which from 2017[71]	2,395,766	2,395,766	622,497	728,744	0	0
of which from 2018[72]	300,000	300,000				
C2 reactivation of unused appropriations from operational expenditure	**0**	**25,000,000**	**825,798**	**486,657**	**4,450,657**	**328,920**
of which from 2015	0	0	0	0	1,353,523	328,920
of which from 2016	0	0	825,798	0	3,097,134	0
of which from 2017	0	0	0	486,657[73]	0	0
of which from 2018	0	25,000,000[74]	0	0	0	0
SUB-TOTAL reactivations	**2,695,766**	**27,695,766**	**1,448,295**	**1,215,401**	**6,996,906**	**3,103,894**
TOTAL REVENUES	**141,297,325**	**199,241,275**	**121,231,820**	**118,118,924**	**93,267,308**	**92,028,686**

[71] For the year 2019: Prudent estimate of part of the 2017 year-end surplus of administrative budget to be reactivated in 2019 as C2 appropriations. The total estimated administrative surplus from 2017 is €3,100,000 in CA and €4,000,000 in PA. Of these amounts, €2,395,766 in CA and PA are reactivated (reabsorbed) in 2019 to cover part of BBI administrative needs for 2019. This reabsorption enables a respective reduction of €1,000,000 in both the EC and BIC contributions to the BBI administrative expenditure 2019 compared to what was initially foreseen in the financial programming for BBI JU. This reduction (€ 2,000,000 in total) is already reflected (deducted) in the EC and BIC contributions to BBI admin expenditure 2019 presented in this table. The remaining balance on the administrative surplus from 2017, net of this reactivation in 2019, will be reactivated in 2019 via a budgetary amendment.

[72] Unused administrative appropriations to be reactivated in 2019 on the Communications budget line (which would for instance be used to top up the budget for the planned Stakeholder Forum event) as well as the service contracts budget line (to fund a study to be launched by BBI, in agreement with the Commission and BIC (see details in public procurement table above)).

[73] For the year 2018: Actual amount of year-end surplus of operational payment appropriations 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).

[74] Unused operational payment appropriations, relating to periodic reports of projects for which the payment due by the end of 2018 was either less than anticipated (according to the historical data) or was delayed until early 2019.

II STATEMENT OF EXPENDITURE

Title / Chapter	Heading	Budget 2019 CA (in €)	Budget 2019 PA (in €)	Amended Budget 2018 CA (in €)	Amended Budget 2018 2017 PA (in €)	Amended Budget 2017 executed CA (in €)	% ratio 2017 CA to 2019	Amended Budget 2017 executed PA (in €)	% ratio 2017 PA to 2019
1	**Staff Expenditure**	**2,979,871**	**2,979,871**	**2,826,854**	**2,831,306**	**4,448,150**	**149.27%**	**4,458,785**	**149.63%**
1 1	Staff in active employment	2,605,200	2,605,200	2,424,068	2,464,308	3,946,044	**151.47%**	3,986,217	**153.01%**
1 2	Staff recruitment / Miscellaneous expenditure	92,471	92,471	67,322	66,400	96,169	**104.00%**	61,754	**66.78%**
1 3	Mission and duty travels	60,000	60,000	80,000	80,738	159,349	**265.58%**	184,412	**307.35%**
1 4	Other staff costs (socio-medical structure)	212,200	212,200	245,417	209,860	223,366	**105.26%**	216,300	**101.93%**
1 5	Entertainment and representation expenses	10,000	10,000	10,048	10,000	23,222	**232.22%**	10,102	**101.02%**
2	**Other administrative expenditure**	**2,741,439**	**2,741,439**	**2,746,721**	**2,848,516**	**3,054,292**	**125.10%**	**3,272,382**	**119.37%**
2 0	Rental of buildings and associated costs	316,184	316,184	325,516	290,000	310,220	**98.11%**	348,887	**110.34%**

Title Chapter	Heading	Budget 2019 CA (in €)	Budget 2019 PA (in €)	Amended Budget 2018 CA (in €)	Amended Budget 2018 2017 PA (in €)	Amended Budget 2017 executed CA (in €)	% ratio 2017 CA to 2019	Amended Budget 2017 executed PA (in €)	% ratio 2017 PA to 2019
2 1	Administrative information technology	236,000	236,000	279,047	252,100	259,847	**110.10%**	306,546	**129.89%**
2 2	Movable property and associated costs	5,000	5,000	5,000	5,000	25,082	**501.64%**	90,863	**1817.26%**
2 3	Current administrative expenditure	20,000	20,000	29,792	29,000	50,661	**253.31%**	55,400	**277.00%**
2 4	Telecommunications and postal charges	14,800	14,800	16,836	13,600	13,550	**91.55%**	22,926	**154.91%**
2 5	Expenditure on formal meetings	113,000	113,000	113,000	113,000	153,032	**135.43%**	177,271	**156.88%**
2 6	External communication, information, publicity[75]	690,000	690,000	602,477	788,555	635,423	**92.09%**	676,866	**98.10%**
2 7	Service contracts[76]	155,000	155,000	100,000	100,000	187,360	**340.65%**	194,000	**125.16%**
2 8	Experts contracts and evaluations[77]	900,000	900,000	1,027,260	1,027,260	1,315,723	**146.19%**	1,315,723	**146.19%**

[75] For the year 2019: the amount of 690,000€ in commitment and payment appropriations includes 200,000€ of unused administrative budget appropriations from 2018, reactivated in this budget line to for instance top up the budget for the planned Stakeholder Forum event

[76] For the year 2019: the amount of 155,000€ in commitment and payment appropriations includes 100,000€ of unused administrative budget appropriations from 2018, reactivated in this budget.

[77] For the year 2019: an indicative amount of 900,000€ (including any EFTA/R0 appropriations this amount may contain; and also including any reactivated unused budget appropriations from previous years this amount may contain) in commitment and payment appropriations is included in the JU's Budget (included in the Revenue for 2019 and included in Expenditure chapter 28) for the contracting

Title / Chapter	Heading	Budget 2019 CA (in €)	Budget 2019 PA (in €)	Amended Budget 2018 CA (in €)	Amended Budget 2018 2017 PA (in €)	Amended Budget 2017 executed CA (in €)	% ratio 2017 CA to 2019	Amended Budget 2017 executed PA (in €)	% ratio 2017 PA to 2019
2 9	Expert reviewers	291,455	291,455	247,794	230,000	103,394	**35.48%**	83,900	**28.79%**
3	**Operational expenditure,**	**135,576,015**	**193,519,965**	**115,658,245**	**112,439,102**	**85,764,866**	**63.26%**	**84,297,519**	**43.56%**
30	Previous years' calls	0	193,519,965	0	112,439,102	0	0	84,297,519	43.56%
31	Current year's call (s)	135,576,015	0	115,658,245	0	85,764,866	0	0	0
	TOTAL EXPENDITURE	**141,297,325**	**199,241,275**	**121,231,820**	**118,118,924**	**93,267,308**	**66.15%**	**92,028,686**	**46.19%**

and payment of the BBI JU experts-evaluators 2019 by the REA on the BBI JU behalf. For this purpose, part of this amount (except the reactivated appropriations counted in 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) may need to be transferred by the EU, on the BBI JU behalf, in commitment and payment appropriations, to the REA. However, the BBI JU will not request the EU to transfer in its Accrual Based Accounting system the corresponding appropriations to this amount's part, 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 2019. 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 Based Accounting system, for implementation by the BBI JU then), or additional appropriations to be transferred by the EU to the REA on behalf of the BBI JU (for implementation by the REA then). This would not result in any change of the total BBI JU budget and compensation would be made through other parts of the BBI JU budget.

Summary schedule of payments

Multiannual estimated 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	2020
Total awarded grants	**Grant amount 49,653,707**	**Grant amount 179,036,974**	**Grant amount 185,070,932**	**Grant amount 85,161,992**	**Maximum Grant amount 114,832,447**	**Maximum Grant amount 135,576,015**	**Maximum Grant amount 200,203,476**
Pre-financing		17,713,972	61,790,836	62,487,741	34,305,946	52,032,089	54,230,406
Interim payments				21.323.120	51,028,593	131,809,069	105,128,879
Final payments					772,028	9,678,807	16,315,133
					85,865,418	193,519,965[78]	175,674,418

Call 2014	2014	2015	2016	2017	2018	2019	2020
Total awarded grants	49,653,707						
Pre-financing		17,713,972					
Interim payments				21,323,120	5,576,858		
Final payments					772,028	4,267,729	

Call 2015.1	2014	2015	2016	2017	2018	2019	2020
Total awarded grants		73,741,234					
Pre-financing			27,609,092				
Interim payments					12,206,499	27,205,333	12,497,557
Final payments						2,743,361	

Call 2015.2	2014	2015	2016	2017	2018	2019	2020
Total awarded grants		105.295.739					
Pre-financing			34,181,744				
Interim payments					31,498,688		25,309,481
Final payments							9,483,557

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

Call 2016	2014	2015	2016	2017	2018	2019	2020
Total awarded grants			185,070,932				
Pre-financing				62,487,741			
Interim payments					1,746,548	104,128,893	27,544,682
Final payments						2,667,718	5,702,273

Call 2017	2014	2015	2016	2017	2018	2019	2020
Total awarded grants				85,764,866			
Pre-financing					34,305,946		
Interim payments						474,843	39,777,159
Final payments							1,129,302

Call 2018	2014	2015	2016	2017	2018	2019	2020
Total awarded grants					114,832,447		
Pre-financing						52,032,089	
							to be determined on the basis of project start date

3.2. Staff Establishment Plan

Grade	Establishment Plan 2019			Year 2019								
				Posts evolution				Organisational evolution		Establishment Plan 2019		
				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												
AD12		1	1								1	1
AD11		1	1								1	1
AD10												
AD9												
AD8		3	3								3	3
AD7		4	4								4	4
AD6												
AD5												
Total AD		10	10								10	10
AST11												
AST10												
AST9												
AST8												
AST7												

AST6												
AST5		1	1								1	1
AST4		1	1								1	1
AST3												
AST2		1	1								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.

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
FWC	Framework Contract
GB	Governing Board
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
iPPP	Institutional Public-Private Partnership

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

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