

EN

Annex 12

Horizon 2020

Work Programme 2018-2020

9. Food security, sustainable agriculture and forestry, marine, maritime and inland water research and the bioeconomy

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Introduction

With an investment of €1.3 billion, the Societal Challenge 2 (SC2) Work Programme for 2018-2020 responds to some of the key challenges our planet is facing for the years to come: adapting to and mitigating climate change; ensuring food security; safeguarding the natural resource base, promoting alternatives to fossil-based economies and sustainably using marine resources while protecting the oceans. Agriculture and food systems, forestry, the marine and the bio-based sectors are at the very heart of the challenges to be addressed.

SC2 Work Programme focuses on the sustainable management of land and waters to secure healthy food as well as on delivery of public goods such as biodiversity and clean water. Furthermore, it supports innovative food and marine industries, the bioeconomy and dynamic rural areas.

The solutions arising from SC2 activities are expected to deliver significant economic, environmental and social benefits. For example, investments will focus on the promotion of biodiversity rich agriculture and healthy and safe food, on increasing animal welfare, on the sustainable management of soils and on the development of microbiome applications, on the implementation of Food and Blue Clouds, supporting Food 2030 and pioneering a digital revolution and new value chains in rural economies. New ideas, products, technologies, policy recommendations and social innovations will work in tandem to provide a supportive framework for genuine improvements in the way we produce and consume. This is in line with societal expectations for impact-driven research.

Policy context and strategy

Guided by the political drivers of the Commission, for example the Jobs and Growth agenda, this Work programme is highly relevant to meeting commitments under the Sustainable Development Goals (SDGs) and the COP 21 Paris Climate Agreement. The activities will help implement important EU policies and initiatives such as the EU Common Agricultural Policy and European Innovation Partnership for Agricultural Productivity and Sustainability (EIP AGRI), the EU Bioeconomy Strategy, the Circular Economy Package, the EU Integrated Maritime Policy and the EU Common Fisheries Policy. The Work programme focuses on five priorities:

- **Addressing climate change and resilience on land and sea.** Climate change is one of the biggest challenges Europe and the world are facing. The primary sectors covered by SC2 are among the most important sources of CO₂ emissions and, at the same time forests, soils and oceans are major carbon sequestration reservoirs. The R&I actions in this work programme support meeting the ambitious climate targets while at the same time satisfying the need of food, feed, bio-based products and energy for a global population projected to reach 10 billion by 2030.
- **Making the transition towards a circular bioeconomy.** For a transition to a sustainable, low carbon and resource efficient bioeconomy, it is essential to implement

the European Commission's Circular Economy Package. R&I actions across all SC2 sectors will support resource-efficient production and distribution systems, value-chains based on new and more efficient use of wastes, residues and by-products, as well as new business models.

- **Fostering functional ecosystems, sustainable food systems, healthy lifestyles.** Ensuring long-term food and nutrition security and sustainability of food systems requires sustainable management of land, soil and water as providers of terrestrial and aquatic ecosystem services upon which rely primary production practises, which are at the basis of the whole food chain, nutrition, lifestyle and health. The investments in R&I in this Work programme will future-proof our food systems to make them more sustainable, resilient, responsible, diverse, competitive and inclusive.
- **Boosting major innovation on land and sea – new products, value chains and markets.** Innovation is at the core of EU policies. Testing, demonstrating and scaling up new technologies and business models that create breakthrough innovation are crucial for ensuring long-term competitiveness of the primary and secondary sectors covered by SC2. As scaling up of innovative new technologies represents a high commercial risk for private investors, public investment is essential in creating sustainable value chains, resulting in new jobs, products and services.
- **Developing smart, connected territories and value chains in rural and coastal areas.** Helping the rural and coastal areas to meet the wide range of economic, environmental and social challenges of the 21st century is one of the key challenges for Europe. This priority addresses the territorial dimension of R&I activities in primary production, the food and bio-based industries, most of which are located in rural and coastal areas. R&I activities aim at better capitalisation of territorial assets, taking account of long term drivers to open new sustainable avenues for business, services and value chains in support of rural and coastal communities, promoting new partnerships between producers, processors, retailers and society.

Implementation

The Work Programme is structured around three calls: "Sustainable Food Security", "Blue Growth and "Rural Renaissance" and a Thematic Investment Platform on Circular Bioeconomy. Within these calls a number of topics contribute to the Focus Areas "Low Carbon", "Circular Economy" and "Digitisation".

Many of the challenges addressed in this Work Programme are of global nature, requiring the development of global solutions **opening up the innovation process** to all active players in cooperation with third countries and relevant international organisations or initiatives. **Open science approaches and international cooperation** will be further encouraged, maximising the benefits of collaboration with regions outside the EU in particular in view of solving common problems and meeting international commitments. Particular priorities for international cooperation are:

- *Blue Growth*, which will launch a flagship initiative for the South Atlantic Ocean, paving the way towards an 'All Atlantic Ocean Research Alliance', as well as a flagship on the "Future of Seas and Oceans" in line with the G7 Initiative, and reinforce cooperation with partners in other regions such as the Baltic Sea and the North Sea, the Mediterranean and the Black Sea;
- *Sustainable Food Security*, which will continue supporting flagships initiatives with China and Africa on Food and Nutrition Security and Sustainable Agriculture

Innovation in the SC2 Work Programme will be supported following using the interactive innovation approach model. This approach is developed by the EIP-AGRI¹ and fosters the development of research into practical applications and the creation of new ideas thanks to interactions between actors ("cross-fertilisation") and the sharing of knowledge. The interactive innovation model is implemented in this Societal Challenge through the "multi-actor" approach".

A strategic coordinated approach for **marine and maritime research** across all challenges and priorities of Horizon 2020 will also support the implementation of relevant Union policies to help deliver key blue growth objectives across Europe. This will involve not only the Societal Challenge 2 calls, but also relevant topics from other Horizon 2020 calls, which will be interlinked through a blue-growth topics flagging system.

Public-Private Partnerships are an important element related to the overall implementation of Societal Challenge 2 objectives. As was the case for the SC2 2014-2017 Work Programme, the activities of this Work Programme are complemented by activities funded under the Joint Technology Initiative on Bio-based Industries (JTI BBI).

Public-Public Partnerships are also an important element of this Work Programme, in view of strengthening the European Research Area in the sectors covered by Societal Challenge 2. Increased cooperation between Member States will exploit synergies between Member States and European Commission by coordinating research priorities, reducing overlaps in activities, pooling resources and leveraging funds to increase impact of research investments in Europe

To promote **EU-wide participation**, this Work Programme includes a number of widening relevant actions. Synergies with regional research and innovation programmes through the European Structural and Investment Funds are encouraged, in particular in connection with smart specialisation strategies.

This SC2 Work Programme implements several overall recommendations expressed in the Horizon 2020 interim evaluation. SC2 thematic assessment of the interim evaluation of Horizon 2020 identified further specific areas for improvement:

- Better translate the high level challenges and objectives into specific call topics; and

- Find the right balance between project size, coverage of topics and research versus innovation;

The Commission implements specific measures to tackle overall and thematic specific issues in the last Work Programme for 2018-2020:

- Increased coherence between high level challenges and calls/topics while improving the degree of precision in the description of topics;
- Adopted a more balanced approach between fundamental research, applied research & innovation support; and
- Aims at achieving a greater outreach to civil society by involving all the stakeholders and citizens at large through public consultation activities, citizen involvement in projects co-creation and a continued use of the multi-actor approach.

Specific approaches and cross-cutting issues

Inputs from the **Social Sciences and Humanities** will be relevant to tackle the complex challenges addressed in the 2018-2020 Work Programme for Societal Challenge 2.

This work programme includes topics where it is relevant to look at the **gender dimension** in research content. Research and innovation activities should explore, analyse, and address possible sex and gender differences².

The concept of **Responsible Research and Innovation** (RRI) underpins this work programme, aiming to align research and innovation to the values, needs and expectations of society.

Topics requesting proposals to follow the **multi-actor approach**³ should meet all of the following requirements.

The **multi-actor approach** aims at to make innovation more demand-driven innovation through the genuine and sufficient involvement of various actors (end-users such as farmers/farmers' groups, foresters/foresters' groups, fishers/fisher's groups, advisors, enterprises/businesses, etc.) all along the project: from the participation in the planning of work and experiments, their execution/carrying them out, up until the dissemination of results and a possible/maybe organising a demonstration phase. A multi-actor project proposal needs to demonstrate:

² For guidance on methods of sex / gender analysis, please refer to: http://ec.europa.eu/research/swafs/gendered-innovations/index_en.cfm

³ See topics SFS-01-2018-2019-2020, SFS-04-2019-2020, SFS-05-2018-2019-2020, SFS-06-2018-2020, SFS-07-2018, SFS-08-2018-2019, SFS-11-2018-2019, SFS-12-2019, SFS-16-2018, LC-SFS-17-2019, LC-SFS-19-2018-2019, LC-SFS-22-2020, SFS-30-2018-2019-2020, SFS-33-2018, LC-SFS-34-2019, CE-SFS-36-2020, LC-BG-03-2018, RUR-01-2018-2019, RUR-02-2018, RUR-03-2018, CE-RUR-08-2018-2019-2020, CE-RUR-10-2019, DT-RUR-12-2018, RUR-14-2018, RUR-15-2018-2019-2020, RUR-16-2019, RUR-17-2020

- how the project proposal's objectives and planning are targetting to needs / problems and opportunities of end-users,
- how it complements and its complementarity with existing research and best practices.

Building blocks for innovation are expected to come from science as well as from practice and intermediaries, such as farmers, advisors, businesses, NGOs and others ("co-creation"). End-users and practitioners are to be involved, not as a study-object, but in view of using their entrepreneurial skills for developing solutions and creating "co-ownership" of results, which speeds up the acceptance and dissemination of new ideas. Thus, the composition of the consortium and the description of the project concept should reflect the adequate choice of key actors with complementary types of knowledge (scientific and practical) should be reflected in the consortium and in the description of the project concept, and result in a broad implementation of the project results. The multi-actor approach is more than just widely disseminating the results of a project, or listening to the views of a stakeholders' board. The multi-actor approach aims to include existing (sometimes tacit) knowledge into scientific work and this should be illustrated in the project proposal with sufficient quantity and quality of high-quality knowledge exchange activities and a clear role for the different actors in the work. This should generate innovative solutions that are more likely to be applied thanks to the cross-fertilisation of ideas between actors. The project should result in practical knowledge, that is made easily understandable and accessible, which and that feeds into the existing dissemination channels most consulted by end-users in countries. Furthermore, for EU wide communication, this knowledge should be translated assembled into a substantial significant number of 'practice abstracts' in the common EIP format for practitioners⁴ of the European Innovation Partnership (EIP) 'Agricultural Productivity and Sustainability'. For projects on fisheries, aquaculture, marine and inland water issues or other areas not covered by the EIP-AGRI⁵, other similarly effective solutions for dissemination should be exploredlooked into. It is strongly recommended to Ffacilitate discussion/mediateion between the different types of actors and involvement of relevant interactive innovation groups operating in the EIP context, such as EIP Operational Groups funded under Rural Development Programmes, are strongly recommended⁶.

Several topics include a suggestion for **coordination between projects** financed under the same or related topics. Such coordination allows organising clusters of projects working on similar issues, to avoid duplication of efforts and to enable cross-fertilisation and synergies.

The proposals are encouraged, when appropriate, to make use of **existing European research infrastructures** (including e-infrastructures), e.g. research infrastructures established as a European Research Infrastructure Consortium (ERIC) or identified on the roadmap of the European Strategy Forum on Research Infrastructures (ESFRI). Projects submitting a Data Management Plan are encouraged to identify the existing European research data

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infrastructures that may be used and how these may be mobilised, in particular for long-term data curation and preservation.

Proposers are encouraged to use **FIWARE** for some or all of their platform developments, when relevant. FIWARE enablers are available at www.fiware.org under open source licence for business use.

Proposers are advised to consult information on the **Copernicus programme** in general at <http://copernicus.eu>, the evolution topics identified there, as well as the availability of Copernicus Sentinel Data, access to Copernicus Contributing Mission data at the Commission's web http://ec.europa.eu/growth/sectors/space/research/index_en.htm.

To promote pan-European coherence and interoperability, integrate the results of the different activities and facilitate international co-operation, the activities related to earth observation data and other spatial data should at best comply with and build upon the existing Infrastructure for Spatial Information in the European Community (INSPIRE) (<http://inspire.ec.europa.eu/>).

Open research data

Grant beneficiaries under this work programme part will engage in research data sharing by default, as stipulated under Article 29.3 of the Horizon 2020 Model Grant Agreement (including the creation of a Data Management Plan). Participants may however opt out of these arrangements, both before and after the signature of the grant agreement. More information can be found under General Annex L of the work programme

Contribution to focus area(s)

Focus Area 'Building a low-carbon, climate resilient future' (LC): EUR 203.00 million

Focus Area 'Connecting economic and environmental gains - the Circular Economy' (CE): EUR 153.00 million

Focus Area 'Digitising and transforming European industry and services' (DT): EUR 92.00 million

Call - Sustainable Food Security⁷

H2020-SFS-2018-2020

The Sustainable Food Security call is Horizon 2020's main contribution to research and innovation in relation to Food and Nutrition Security in Europe and beyond. Its commitment to sustainability implies that particular attention is given to the interfaces between the economic, environmental and social dimensions of food production. The call advocates for food system approaches to tackle the inherent links between ecosystems, food production, the food chain and consumer health and wellbeing.

The SFS call aims to

- deliver diverse and healthy food from land and sea
- increase resource efficiency and environmental performance of food systems from primary production to consumers
- understand the impact of climate change on agriculture, resources, food quality and identify options to manage its effects
- reduce greenhouse gas emissions from land use and food production taking into account main drivers such as inputs and consumption patterns

Collectively, the results of funded activities will contribute to creating the conditions for dynamic and innovative farming⁸ and food sectors that manage to turn high quality products and high environmental standards into a competitive advantage. They will help to ensure food production under future, increasingly uncertain environmental conditions and move towards resource-smart, climate-smart and "eco-healthy" production and consumption.

Activities supported under the SFS call complement topics under the Blue Growth dealing with food and nutrition security from aquatic sources. They will contribute in particular to the Focus Area on "Building a low-carbon, climate resilient future" and to a minor extent to Focus Areas "Digitising and transforming European industry and services" and the "Circular Economy".

From functional ecosystems to healthy food

Activities aim to tap into the potential of ecosystems services for crop and animal⁹ production, notably in relation to pest and disease control, nutrient cycling, soil fertility and productivity. They emphasise the relationship between modes of food production, ecosystem functions, food quality and consumer health. The importance of diversity and diversification in increasing the resilience of food systems is an underlying theme. It includes promoting a

⁷ This call is expected to continue in 2020.

⁸ Depending on the topic "farming" will refer to terrestrial and/or aquatic primary production

⁹ Depending on the topic the term "animals" can refer to aquatic or terrestrial animals

better use of plant, animal genetic and microbial genetic resources. A cluster of targeted microbiome activities will help to better understand how existing biodiversity can support processes across soils, plants, animals, the marine environment and humans. These will be referenced and linked to microbiome research under other parts of Horizon 2020.

Proposals are invited against the following topic(s):

SFS-01-2018-2019-2020: Biodiversity in action: across farmland and the value chain¹⁰

Specific Challenge: Agricultural biodiversity is understood to comprises all components of biological diversity that (i) are of relevant ce for food and agriculture and all components of biological diversity that(ii) constitute agro-ecosystems. It is the result of highly dynamic interactions between the environment, genetic resources, agricultural practices and historical land management. The various dimensions of agricultural biodiversity play a significant role in conferring stability, resilience and adaptability to farming systems. Below ground biodiversity for example plays a major role in soil nutrient and water cycling, nutrient uptake by plants and in the control of plant diseases. Genetic diversity within species is at the origin of plant development, adaptation to different environments and a wide range of properties which cater for diverse needs. The native biodiversity on and around farms is associated with the provision of important ecosystem services that reach outgo beyond farm level.

The way farmers manage their land has immediate effects on domesticated and native biodiversity. Specialised, intensive agriculture has generally resulted in higher productivity at the expense of decreasing levels of biodiversity, partly due to a lack of incentives for farmers to safeguard biodiversity. Ambitions to make diversity a more integral part of farming are reflected in a number of European policies and global commitments¹¹. Translating these ambitions into practice will require the necessary know-how and a range of options for optimising the joint delivery of economic, environmental and social services by farming.

Scope: Activities will tackle biodiversity from various angles ranging from its supporting functions in agro-ecosystems (e.g. through activities of plant and soil biota), the integration of diversity into farming practices and incentives for wider biodiversity management including native biodiversity. Proposals will consider various temporal and spatial scales when assessing the dynamics of biodiversity and its relationship with farming systems, the surrounding landscapes and throughout value chains

Proposals should address only one of the following sub-topics:

¹⁰ It is expected that this topic will continue in 2020

¹¹ See e.g. Common Agricultural Policy, EU Biodiversity Strategy, Convention on Biological Diversity, Sustainable Development Goals and COP 21 Paris Agreement^[1] See e.g. Common Agricultural Policy, EU Biodiversity Strategy, Convention on Biological Diversity, Sustainable Development Goals and COP 21 Paris Agreement^[1] See e.g. Common Agricultural Policy, EU Biodiversity Strategy, Convention on Biological Diversity, Sustainable Development Goals and COP 21 Paris Agreement

A. [2018] Small organisms, big effects for plants¹² - Belowground biodiversity interaction with plants (RIA)

Proposals will lay the ground for better understanding and applying the benefits of soil organisms for resource uptake, plant growth, development and health. Activities will explore the processes and interactions between plants and the different plant and soil micro and macro biota. Work will expand knowledge of the impacts of land management on soil biological dynamics and its ecological importance, e.g. for nutrient cycling processes, plant defence mechanisms (i.e. disease prevention/pest control), plant development and growth. Findings on the beneficial effects of functional soil biodiversity for crop production will feed into the development of strategies and tools for sustainable plant/soil management. Proposals should fall under the concept of the 'multi-actor approach'¹³ to ensure that knowledge and needs from various sectors including farming are brought together.

B. [2019] Capitalising on native biodiversity in farmland landscape (RIA)

Proposals will enhance the understanding of the relationship between farm management and native biodiversity in the surrounding landscape, together with the associated ecosystem services. Activities will be developed at different scales and cover different habitats, as well as a diverse range of species (flora and fauna) from having beneficial to adverse effects on agriculture (i.e. from wild plants & wild pollinators to large carnivores). Work will consider both of the contrasting dynamics threatening farmland biodiversity (namely specialisation/intensification and marginalisation/abandonment).

Proposals will support the definition of biodiversity targets at the appropriate scale and design result-based incentives at policy and/or market level taking into account the current regulatory framework. Proposals will look at the synergies between increasing biodiversity awareness/acceptance by farmers and their involvement in the monitoring. They shall develop, test and scale-up existing and new biodiversity indicators taking into account the perspectives of stakeholders and provide integrated information platforms and improved methods.

Work shall build on existing initiatives, provide support for the setting-up of new networks that address biodiversity in farmland landscapes and liaise with relevant European Research Infrastructures such as ANAEE. Proposals should build on the system proposed for *in-situ* observatories ("Citizen Observatories") and the effective transfer of biodiversity knowledge to farming, research, policy and society. Proposals should fall under the concept of 'multi-actor approach'¹⁴ engaging key stakeholders and experts and ensuring adequate involvement of the farming sector in open source collaboration and data collection covering a wide range of agri-ecosystems. This will include enabling networking on similar issues across Europe. They should also seek contributions from social and economic sciences to cover the broader

¹² This sub-topic is part of a microbiome cluster. For complementary activities see also SC2 topics SFS-02-2019/20, SFS-03-2018, CE-BG-05-2018/2019 and BG-06-2018 on Marine Microbiomes as SC1 topic SC1-BHC-03-2018

¹³ See definition of the 'multi-actor approach' in the introduction of this Work Programme part

¹⁴ See definition of the 'multi-actor approach' in the introduction of this Work Programme part

economic, social, behavioural and environmental issues. Proposals may involve financial support to third parties, particularly for supporting regional/local networks. The proposal will define the process of selecting entities for which financial support will be granted up to EUR 100.000 per party¹⁵ over the project duration.

C. [2020] From agrobiodiversity to dynamic value chains

All scopes (A), (B): The Commission considers that proposals requesting a contribution from the EU of up to EUR 7 million for A and 8 million for B would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts. Proposals should include a task to cluster with other projects financed under the same sub-topic.

Expected Impact: Funded activities will showcase the benefits of agro-biodiversity at various levels and develop solutions and approaches to embed these benefits more effectively into farming practices and policy measures.

In the short to medium term work will

- expand the agro-ecological knowledge base on the links and dynamics between biodiversity and agricultural production
- deliver best practices based on production systems (both conventional and organic), , that combine support for biodiversity with value creation
- result in improved methods and tools to assess, evaluate and monitor different levels of diversity (genetic, species and ecosystem) as well as the linkages between agro-biodiversity and ecosystem services
- define operational biodiversity targets from the field to regional level
- deliver strategies and tools for biodiversity focused soil management (scope A)
- reduce the dependence on external inputs in plant management through effective plant-soil interactions and the use of soil organisms (scope A)
- develop private and public incentives to foster farmer's delivery of biodiversity as a public good (scope B)
- generate news sets of harmonised data on native biodiversity in farmland landscapes and contribute to foster a European biodiversity platform and network involving farmers (scope B)

In the longer term funded activities will help to foster the synergies between agricultural production, biodiversity and the delivery of ecosystem services of local, regional and global

¹⁵ In line with Article 23 (7) of the Rules for Participation the amount referred to in Article 137 of the Financial Regulation may be exceeded, and if this is the case proposals should explain why this is necessary to achieve the objectives of the action.

relevance. They will allow the farming sector to continue fulfilling its multiple functions under the more challenging biotic and abiotic conditions expected in the future.

Type of Action: Research and Innovation action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

LC-SFS-03-2018: Microbiome applications for sustainable food systems

Specific Challenge: The EU food system is an important part of the economy and society in Europe. Given the current context of societal, environmental and economic changes, there is need for constant improvement in terms of productivity, quality, safety, market orientation, adaptability, and international competitiveness. Knowledge of the potential of microbial systems, or microbiomes, throughout the food chains, is a promising means to this end. Microbiomes are known to regulate the productivity and health of major food sources such as plants and animals of both terrestrial and aquatic origin, therefore playing a major role in food and nutrition security. They also play a major role in food and feed processing and metabolism in different organisms throughout the evolutionary scale, ultimately influencing human health. A better understanding of the microbiomes associated with the food system¹⁶ would help address a number of key societal challenges including food and nutrition security, health and wellbeing, food waste management, climate change adaptation and mitigation.

Scope: Proposals¹⁷ shall focus on concrete microbiome applications which are of benefit to the food system. Building on knowledge already accrued from the isolation and characterization of microbiota associated to food production systems (plants, soils, animals, marine), proposals should look into ways to improve the quantity, quality and safety of the food we produce and consume in Europe. Microbiome applications in the treatment of food waste and alternative uses which promote sustainability and circularity are also included in the scope. Proposals are expected to develop holistic approaches across all stages of the food system from fork to farm including aquatic (marine and fresh water) resources. Activities shall also aim at increasing knowledge and applications derived from the marine microbiome for the development of new products, services or processes for food and health, while contributing to climate change mitigation. The inter-relations among microbiomes from different components across food chains - from soil to plants, animals, the marine and the

¹⁶ <http://www.un.org/es/issues/food/taskforce/pdf/All%20food%20systems%20are%20sustainable.pdf> A food system is defined as a system that embraces all the elements (environment, people, inputs, processes, infrastructure, institutions, markets and trade) and activities that relate to the production, processing, distribution and marketing, preparation and consumption of food and the outputs of these activities, including socio-economic and environmental outcomes. A sustainable food system is a food system that delivers food and nutrition security for all in such a way that the economic, social and environmental bases to generate food security and nutrition for future generations are not compromised.

¹⁷ Complementary topics presented in the Work Programme are: SC1-BHC-03-2018 Exploiting research results and potential of the human microbiome for personalised prediction and prevention of disease, SFS-01-A-2018: Small organisms, big effects for plants - Belowground biodiversity interaction with plants, SFS-02-2020 Healthy livestock gut ecosystem for sustainable production

human gut - and their impact on food and nutrition security and health shall also be considered. International co-operation, transdisciplinary research, and integration of SSH and RRI including gender aspects to ensure long-lasting implementation of the results are encouraged. Activities shall build on existing data and knowledge on the microbiomes associated to food production and processing systems, including results of EU funded projects in FP7 and Horizon 2020. Activities shall optimise the use of pre-existing databases and research infrastructures (including the distributed and virtual ones) and the opportunities granted by big data management tools, thus ensuring interoperability, standard methods and enhanced networking. The interdisciplinary and cross-sectorial nature of the project should also apply to training activities improving the professional skills and competencies and supporting the creation of new jobs in the food sector and the bioeconomy.

The Commission considers that proposals requesting a contribution from the EU of the order of EUR 10 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected Impact: In the framework of SDG no 2, 3, 9, 12, 13 and 15, the EU's Bioeconomy Strategy 2012, and the FOOD 2030 SWD¹⁸, and the Blue Economy communication¹⁹, proposals should explain how activities included are expected to:

- Raise awareness of the potential behind microbiomes from terrestrial and aquatic environments in transforming and future-proofing our food system;
- Bring to market new and cost-effective commercial applications to assist different stages and processes throughout the food chains, by 2025;
- Improve overall knowledge of microbiomes from land and seas towards the market needs in areas where applicability and readiness is not visible;
- Improve overall sustainability, including climate change mitigation, and innovation capacity of the food system through the use of microbiome applications and knowledge;
- Move available solutions from TRL 5/6 to TRL 7.

Type of Action: Innovation action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

¹⁸

http://ec.europa.eu/research/conferences/2016/food2030/pdf/food2030_conference_background.pdf#view=fit&pagemode=none

¹⁹

https://ec.europa.eu/maritimeaffairs/sites/maritimeaffairs/files/com-2017-183_en.pdf

SFS-04-2019-2020: Integrated health approaches and alternatives to pesticide use²⁰

Specific Challenge: Plant protection and biocidal products (both covered under the term "pesticides") are used in agriculture in order to secure yield and food safety in plant production and animal husbandry. At the same time, concerns are mounting over the effects of pesticides on the environment, non-target organisms, animal and human health. Active substances in pesticides are assessed for pre-market approval but tools and methods need to be further developed to better understand the overall risks and impacts associated with their individual and combined use and possible side effects. Member States and EU policies seek to reduce reliance on pesticides by designing and implementing more integrated approaches while at the same time safeguarding the competitiveness of EU's agriculture. Significant efforts are required to develop alternatives to critical active substances used in plant protection and/or biocidal products. It is also necessary to carry out an overall assessment in order to gauge the complexity and trade-offs inherent to the sustainable use of pesticides and related impacts at various scales, in line with a global health approach.

Scope: Proposals should address only one of the following sub-topics:

A. [2019]: Integration of plant protection in a global health approach (RIA)

Activities will test and deliver integrated approaches to advance in the assessment of the impacts of plant protection products and their metabolites (PPPs) on plant, human, animal and ecosystem health. Activities will build on existing data, validated models of PPPs fluxes/concentrations, models for economic analysis, integrated risk assessment tools, running projects and the European Food Safety Authority's (EFSA) activities. Activities will support new measurements and observations and further develop more comprehensive and reliable models. A synthesis of risks, cost & benefit analysis of PPPs' use at different spatial and temporal scales and their distribution between different stakeholders should be performed (including damages caused by pests, product quality and regulatory costs). Activities will build on representative case studies covering different agricultural products.

In terms of human health, both direct and indirect exposures to PPPs will be taken into account with a particular focus on direct exposure of farmers and the rural population and the exposure of consumers to PPP residues in food. Animal health risk assessment should take into account the exposure to residues of PPPs in feed (aggregating EU uses and residues in imported feed). Work on environmental risks and impacts should consider the diversity of European agricultural landscapes, as well as ecological and environmental variability. It should make it possible to gauge the spatial dimension of impacts and map risks at regional, national, European and global levels. Work should connect the risk assessment of PPPs with initiatives for the protection of European biodiversity, as well as initiatives under the Water Framework Directive.

Proposals will identify lock-ins, develop transition paths towards a sustainable use of PPPs, taking a transdisciplinary approach, and should consider the needs of risk managers for the

²⁰ It is expected that this topic will continue in 2020

authorisation/restriction of PPPs as well as of farmers for selecting more appropriate and sustainable products and their optimal use avoiding side effects. Activities will include the development of a research agenda on plant protection in the context of a global health approach.

The Commission considers that proposals requesting a contribution from the EU of up to EUR 15 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

B. [2020] Biocidal and plant protection products (IA)

All sub-topics (A), (B): Projects should fall under the concept of the ‘multi-actor approach’²¹ bringing together contributions from a wide range of stakeholders including research, farming, advisory services, industry as well as consumers and civil society. They should also seek contributions from social and economic sciences to cover the broader economic, social, behavioural and environmental issues associated with the adoption of novel management strategies. This will include looking at gender aspects, as appropriate.

Expected Impact: Activities will contribute to a better understanding of complex, interlinked issues and reduce the reliance on the use of pesticides by helping to:

- establish the impacts of the use or non-use of pesticides on the environment and human health (consumers, operators, farm workers and residents in agricultural areas);
- improve farmer, consumer and citizen awareness of and trust in global health approaches through clear and transparent and integrated assessments, plant health protection strategies and related communication;
- contribute to the ongoing collection of harmonised EU-wide datasets in open source collaboration and of indicators to assess and monitor trends over time and support risk management measures (scope A);
- improve monitoring of pesticide uses and pressures on human and animal health and the environment, by developing appropriate tools (scope A);
- foster lasting transdisciplinary cooperation in the fields of life sciences, human, plant and animal health and environmental sciences and strengthen the European scientific community (scope A);
- support relevant EU plant health policies and/or European risk assessments in relation to EFSA's activities.

In the longer-term results will strengthen an integrated health approach and foster the sustainable use of pesticides thereby reducing the exposure of human and animals, terrestrial and aquatic ecosystems, drinking water and the food chain to pesticides.

²¹ See definition of the 'multi-actor approach' in the introduction of this Work Programme part

Type of Action: Research and Innovation action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

SFS-05-2018-2019-2020: New and emerging risks to plant health²²

Specific Challenge: Trade and the movement of goods and people have facilitated the introduction, spread and establishment of plant pests and diseases. While new pests and diseases are likely to arise, existing ones might become more severe as a result of intensification, climatic variations and changes in agricultural and forest management practices. They can have a significant impact on agricultural and forest productivity. Appropriate and rapid responses from decision-makers need to be informed by scientific knowledge which addresses pest and disease management in a comprehensive manner.

Scope: Proposals will target one or more new or emerging plant pests and/or diseases (regulated or non-regulated, introduced or native) that are causing, or likely to cause, significant (socio-)economic and/or environmental losses to EU agriculture/forestry. The choice of target pest and/or disease will consider the potential threat in terms of development and spread as well as the potential impact on agricultural production, forestry, trade and the wider environment. Proposals will increase knowledge of the biology, development and spread of pests/diseases. They will improve methods and strategies for early detection, prevention and control as well as enlarge the range of tools for integrated and sustainable pest/disease management. International cooperation with countries affected or threatened by the same pest(s)/disease(s) is encouraged. Proposals should fall under the concept of the 'multi-actor approach'²³ including a range of actors to ensure that knowledge and needs from various sectors such as research, plant health services and the farming/forestry sector are brought together.

The Commission considers that proposals requesting a contribution from the EU of up to EUR 7 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected Impact: Activities will contribute to finding adequate responses to new and/or emerging plant pests/diseases. More specifically knowledge and solutions generated by these actions will contribute to:

- the understanding of drivers of plant pest/disease emergence;
- the development of efficient tools for the prevention, detection and control of pests/diseases;

²² It is expected that this topic will continue in 2020

²³ See definition of the 'multi-actor approach' in the introduction of this Work Programme part.

- the development of environmentally sound solutions for pest/disease management in farming and forestry in line with the principles of Integrated Pest Management;
- the reduction of economic, social and/or environmental losses by the farming/forestry sector and
- support for relevant EU plant health policies.

In the longer term, project outputs will help the agricultural/forestry sector to remain productive and contribute to sustainable agriculture and/or forest health.

Type of Action: Research and Innovation action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

SFS-06-2018-2020: Stepping up integrated pest management²⁴

Specific Challenge: There is a need to develop and promote more cost-effective and sustainable Integrated Pest Management (IPM) options which are based on a holistic view of agro-ecosystems. IPM is part of EU legislation promoting the sustainable use of plant protection products (SUD). The various IPM solutions being developed across Europe all differ depending on the crops, the available climate monitoring systems, the underlying knowledge of pest populations, on pedo-climatic conditions and on the agro-ecological environment. IPM decision support systems and models developed as part of national or regional research projects usually only deal with limited aspects of crop production and are validated in regional circumstances. As a consequence, it remains often unclear what the value of such a model/system may be in other parts of Europe and what the impact of climate change could be on the validity of the model. Sharing IPM decision supporting tools at EU level therefore has great potential for synergies. Furthermore, on-farm demonstration of novel IPM tools would boost peer-to-peer learning across Europe and help farmers with daily management practices, as well as enable the integration of these tools into precision agriculture.

Scope: Proposals shall address only one of the following sub-topics:

A. [2018] Decision support systems (RIA)

Activities shall bring together the various individual IPM models and decision support systems into a platform to make them available for a wider range of geographic conditions. This user-friendly system shall be developed based on epidemiological parameters of existing decision support systems and made easily accessible to farmers and local advisers. Most processes (such as pest and disease development, crop growth, water balances, etc.) described in models/decision support systems, need detailed climate data and continuous improvement/updates. Therefore, proposals shall integrate the various local agro-

²⁴ It is expected that this topic will continue in 2020

meteorological networks across the EU to make it possible for all models/decision support systems offered on the platform to access and use these weather data. Activities should focus on pests and diseases for which IPM solutions are most urgently needed. The platform should enable country stakeholders such as research centres, producer organisations and advisors to select and adapt the relevant individual models/decision support systems to their specific country/region/crop context and make them available to the farmers concerned. Proposals must use an open-source approach and should fall under the concept of the 'multi-actor approach'²⁵ including scientists, farmers, advisors and ICT specialists.

The Commission considers that proposals requesting a contribution from the EU of up to EUR 5 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

B. [2020] EU wide demonstration farm network (CSA)

Expected Impact: Activities shall contribute to give farmers throughout the EU broader access to the existing knowledge on integrated pest management. They will also help them to incorporate IPM solutions in existing agricultural systems taking into account costs and benefits, by

- creating a European platform to share and further develop IPM decision support systems, covering the various bio-geographical areas;
- establishing partnerships between actors developing cost effective IPM decision support systems which are ready for practice;
- increasing awareness of the available IPM toolbox;
- increasing on-farm use of IPM techniques;
- supporting relevant plant health policies, in particular the implementation of the SUD.

In the long run, results will contribute to a sustainable agriculture by reducing exposure to pesticides of humans and animals, terrestrial and aquatic ecosystems, drinking water and the food chain.

Type of Action: Research and Innovation action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

SFS-07-2018: Making European beekeeping healthy and sustainable

Specific Challenge: The outputs of beekeeping can be private goods (e.g. honey production), public goods and services (e.g. pollination of wild flowers) or in-between (e.g. non-contracted

²⁵ See definition of the 'multi-actor approach' in the introduction of this Work Programme part

pollination of crops). Many initiatives aim to expand knowledge on honeybee colonies and their environment. However, the lack of a holistic approach makes it difficult to use this knowledge to best effect. Key factors for healthy and sustainable European beekeeping are determined by what happens in or around hives but also by wider socioeconomic and ecological conditions. However, much still needs to be learnt about the interactions of stressors affecting honeybees and their relative contribution to colony losses. The EFSA is developing an integrated risk assessment through the Multiple Stressors in Bees (MUST-B) project. As part of the project, the HEALTHY-B initiative provides a toolbox to assess honey bee colony health in a holistic way. This conceptual framework, the Health Status Index, needs further work to become operational. Little is known about how beekeepers assess and overcome the complexity of their business environment and what and how it influences their health management decisions (e.g. to treat against pathogens or not, to continue keeping bees or to quit, to replace lost colonies or not, to use local or introduced subspecies) and what makes them successful, including whether and how healthy colonies result in sustainable beekeeping and pollination. More information is needed on the role of actors other than beekeepers.

Scope: Proposals will develop ready-to-use tools for operationalising the 'Health Status Index' developed by EFSA²⁶ to enable data collection and return to beekeepers, while exploring the various socio-economic and ecological factors beyond bee health to provide comprehensive blueprints of successful business model(s) of European beekeeping. Proposals should also consider issues related to emerging risks or pathogens (e.g. the small hive beetle and the Asian hornet *Vespa velutina*). Proposals should aim to create an EU platform to collect and share knowledge of science and practice related to honeybees, their environment and agricultural and beekeeping practices, in order to develop and implement an action plan for a coordinated and harmonised approach to the collection of related data and information and to minimise the impact of biotic and abiotic stressors. The proposals should build on past or ongoing EU-funded research (e.g. Bee Health Workbench²⁷), and take into account other relevant EU initiatives (e.g. evaluation of the EU's apiculture measures²⁸, Member State bee monitoring projects), and entities (EFSA, EURL, JRC), as appropriate. Funded activities will include organising and coordinating data sets and standards relating to the environment and agricultural and beekeeping practices relevant to the monitoring of honeybee health and giving all relevant stakeholders access to such information. Work will serve to select the most promising and relevant indicators for bee health that could be developed and/or tested, and validate technologies for monitoring colonies and indicators in an automated or semi-automated way to facilitate standardised and accurate data collection and transfer. The selected project should carry out a pilot study in different representative European countries to test, standardise and validate methods for measuring and reporting selected indicators and factors affecting bee health, making it possible to give appropriate feedback to beekeepers both through dissemination and training and perform statistical analyses of the relative importance of relevant biological, chemical and environmental stressors affecting bee health

²⁶ see related scientific opinion (EFSA, 2016)

²⁷ <http://bees-dashboard.azurewebsites.net/BeesHome.html>

²⁸ http://ec.europa.eu/agriculture/evaluation/market-and-income-reports/apiculture-2013_en

and their pollination services. A multi-actor approach bringing together beekeepers, bee inspectors, other stakeholders (e.g. plant growers) and scientists (including social scientists) is required²⁹.

The Commission considers that proposals requesting a contribution from the EU of up to EUR 8 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected Impact: Funded activities will provide the critical knowledge necessary to understand bee colony health and identify important socio-economic components of sustainable beekeeping. The outputs of the project must contribute to:

- an EU platform on science and practice in relation to honeybees, their environment and agricultural and beekeeping practices;
- a pilot toolbox to improve monitoring of honeybee colonies and assessment of the multiple stressors that affect colony health;
- a better understanding of the management decisions made by beekeepers;
- potential and viable business models for EU beekeeping, with and without public interventions;
- support to scientists, risk assessors and policy makers in assessing and managing multiple stressors that affect the sustainability of the EU's apiculture.

More generally, the funded activities will help beekeepers better manage honeybees and contribute to the sustainability of EU beekeeping and related pollination services.

Type of Action: Research and Innovation action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

SFS-08-2018-2019: Improving animal welfare

Specific Challenge: EU animal welfare legislation has evolved on the basis of scientific knowledge, improving the quality of animals' lives taking into account citizens' expectations and market demands. Nevertheless, a number of problems remain unsolved and the sector faces challenges to cope with them. Research is needed to further improve the management of animal welfare³⁰, by looking into new opportunities offered by technological developments, development of appropriate business models and linking animal welfare with other production parameters, including animal health and environmental performance.

²⁹ See definition of the 'multi-actor approach' in the introduction of this Work Programme part.

³⁰ Farmed aquatic animals welfare is addressed under the Blue Growth call topic DT-BG-04-2018-2019: Sustainable EU aquaculture 2.0.

Scope: A. [2018] Organic and low-input farming (RIA)

The special needs for animal welfare in organic and low-input production systems should be explored. Proposals will investigate how to meet organic production standards and take into account ethical and positive welfare approaches, with a focus at least on alternatives to mutilation. Such comprehensive approach should at least address issues related to mutilations, solutions for the killing of male day-old chicks and supply of robust slow-growing poultry breeds/products fit for outdoor rearing

B. [2019] Precision livestock farming (IA)

Proposals should address various stages of the terrestrial livestock production system (e.g. breeding, rearing, fattening, transport and slaughter). Proposals should build on state of the art animal welfare approaches to develop innovative technologies. Work on indicators should be pursued, especially on those with potential for inclusion in efficient and impactful animal welfare management models. Innovative business models should be developed in order to make it easier for consumers to identify and choose enhanced welfare-friendly products. Projects may cover development of early warning systems; increased monitoring of behaviour, stress or other animal-based welfare indicators and effects on production efficiency; development of related intervention mechanisms.

Proposals for both sub-topics A and B should fall under the concept of the multi-actor approach³¹, ensuring that all the stakeholders, from farmers to consumers and regulators, will contribute to the building of new animal welfare approaches to further add value to EU foods of animal origin.

The Commission considers that proposals requesting a contribution from the EU of up to EUR 10 million (sub-topic A) and EUR 6 million (sub-topic B) would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude the submission and selection of proposals requesting other amounts.

Expected Impact: Provide the knowledge base for further improvements in animal welfare management and policy making. More specifically, activities will contribute to:

- a better understanding of animal welfare and associated animal behaviour;
- a broader range of animal welfare management strategies and tools;
- solving long-standing welfare related issues in organic farming, notably in poultry (sub-topic A);
- developing innovative approaches to measuring animal welfare at various stages of the production system (sub-topic B);
- increase the range of animal welfare management strategies and tools.

³¹ See definition of the 'multi-actor approach' in the introduction of this Work Programme part

In the long run, projects shall increase the sustainability of the livestock sector by better responding to consumer demands and/or increasing competitiveness of the sector.

Type of Action: Research and Innovation action, Innovation action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

SFS-11-2018-2019: Anti-microbials and animal production

Specific Challenge: Since their discovery, anti-microbials have played an essential role in the treatment of infectious diseases in humans and farmed animals, whether terrestrial or aquatic, and have enormously improved population health as well as food security and safety. However, with the widespread use of anti-microbials for human and animal health in recent decades, the world is increasingly confronted with the emergence and spread of microbes that resist anti-microbial treatment. Discoveries of new anti-microbials are not keeping up with pace anti-microbial resistance (AMR). AMR is responsible for an estimated 25,000 deaths yearly and over EUR 1.5 billion of healthcare costs and productivity losses in the EU alone. Addressing AMR is a cross-sectorial issue, requiring action by different policy areas, from health to agriculture, aquaculture and environment, from research to users, stakeholders and policy makers. A large proportion of anti-microbials is used in livestock production. Although links between this and resistance on human health are not fully established, agriculture is a main target for action. In line with the EU animal health strategy "prevention is better than cure" alternative strategies to anti-microbials need be developed. Alternatives to antimicrobials may be valuable, although evidence of efficacy in controlled trials is currently very limited.

In 2011, the European Commission came up with a five year action plan to fight against AMR and the new action plan³² is focussing on three pillars: making the EU a best practice region ; boosting research, development and innovation; shaping the global agenda. For the purpose of this topic, the words 'animals' and 'farmers' apply to both terrestrial and aquatic animals.

Scope: A. [2018] Rethinking management of health of farmed animals (RIA)

The activities should include socio-economic and behavioural science to analyse the practices, information and decision systems of farmers, veterinarians and other professionals involved in managing the health of farmed animals with (and without) reduced drug use practices, in order to: identify the reasons why farmers accept or reject health management recommendations (e.g. use vs. non-use of anti-microbials, use of vaccines as a preventive measure); identify levers/incentives for adherence to prudent use principles by veterinarians and farmers; create a basis for predicting the behaviour of stakeholders (breeding organizations; feeding and pharmaceutical industries, governments) involved in health management to estimate the effectiveness of intervention measures; create a basis for assessing resource allocation for health management (disease prevention, monitoring,

³² https://ec.europa.eu/health/amr/sites/amr/files/amr_action_plan_2017_en.pdf

therapeutic intervention, compensation of losses, etc.). The activities should also develop - and if possible validate - integrative strategies for animal health, to foster minimal use of anti-microbials; from breeding and feeding of farmed animals, to biosecurity, good husbandry practices, animal welfare and farm management. Proposals should address both conventional and organic farming. Proposals should fall under the concept of 'multi-actor approach'³³, involving representatives of farmers, extension services, veterinarians and other professionals as well other animal production stakeholders (e.g. feeding, breeding, pharmaceutical industries), and should involve training activities.

B. [2019] Alternatives to anti-microbials (RIA)

Activities shall focus on developing and testing new, efficient and targeted alternatives to anti-microbials in farmed animal production. This could be any type of alternative intervention measures (prophylaxis/prevention or treatment), other than vaccines - such as the modulation of host immunity and/or of microbial flora, feed additives or novel molecules. Basic research on gut microbiome should not be covered under this topic. Proposals should take into account the guidelines, standards and legislation in the field, to facilitate the marketing of the measures the project will identify. Proposals should fall under the concept of 'multi-actor approach'³⁴, involving at least representatives of practitioners (e.g. veterinarians), of the feed/feed additives and pharmaceutical industries.

The selected projects under sub-topics A and B should follow the policies and contribute to the objectives of the STAR-IDAZ international research consortium³⁵. International cooperation is recommended.

The proposals under sub-topic A and sub-topic B should liaise with other relevant EU projects and initiatives, in particular JPI AMR³⁶ and the project selected under topic SFS-36-2017. The projects should take into account the guidelines and standards of relevant EU and international statutory bodies, in particular the European Medicines Agency and the World Organisation for Animal Health.

The Commission considers that proposals requesting a contribution from the EU of up to EUR 6 million, for sub-topic A and for sub-topic B, would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected Impact: The funded activities will contribute to the fight against anti-microbial resistance arising from farmed animal production. More specifically they will help:

- develop options for reducing the use of anti-microbials in farming (scope A);

³³ See definition of the 'multi-actor approach' in the introduction of this Work Programme part

³⁴ See definition of the 'multi-actor approach' in the introduction of this Work Programme part

³⁵ <http://www.star-idaz.net/>

³⁶ <http://www.jpamr.eu/>

- develop alternative intervention measures from technology readiness levels (TRL) 5-6 to TRL 7 (scope B);

More generally, the funded activities will contribute to improved animal disease prevention and control, reduced production losses and improved resource-use (scopes A and B).

Type of Action: Research and Innovation action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

SFS-12-2019: A vaccine against African swine fever

Specific Challenge: African swine fever (ASF) is a devastating viral disease of swine which is endemic in Africa and has been present in Europe for several years, after its introduction from Trans-Caucasian countries. It is a transmissible disease that has the potential for very serious and rapid spread, irrespective of national borders. It has a serious socio-economic impact on farming sector and is of major importance in the international trade of animals and animal products. While in the EU, strict control measures including in particular biosecurity, culling of infected pigs, killing of wild-boars, have so far managed to contained the spread of the disease, restrictions on farming and trade remain. The threat is permanent (including incursion of exotic strains from endemic countries) and concerns are raised on the possibility to eradicate the disease without vaccination.

No vaccine is currently available and the development of effective and safe ASF vaccines is urgent as an additional tool to re-inforce control and eradication strategies currently in place. For details of potential strategies and possible research steps for vaccine development, see the blueprint and roadmap³⁷ produced by the EU Reference Laboratory for ASF.

Scope: The research proposals will address the necessary steps for developing safe vaccines against ASF for domestic pigs and wild boars. Proposals should build on past or ongoing EU funded research and on current knowledge of the characteristics of the viruses and research gaps, with the overall purpose of developing pilot vaccines and their companion DIVA test. Activities should address vaccination as part of a control strategy in different scenarios and should consider the potential impact on animal production and trade. Particular focus should be put on the European situation and the role of wild boars in the spread of the disease, so the proposals should address at least the ASF viruses circulating in Europe, and may also cover all or the most relevant exotic ones. Wild fauna other than wild boars, that are involved in the epidemiology and for which vaccination may help control the disease, may also be addressed. Participation by non-EU regions particularly affected by ASF is recommended.

³⁷ http://ec.europa.eu/food/animals/animal-diseases/control-measures/asf_en#bmrp

Proposals should fall under the concept of the 'multi-actor approach'³⁸ and be based on the active participation of stakeholders from research, animal health authorities and the farming and business sectors. Involvement of the pharmaceutical industry is highly recommended.

The Commission considers that proposals requesting a contribution from the EU of up to EUR 10 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude the submission and selection of proposals requesting other amounts.

Expected Impact:

- Pilot ASF vaccines and their companion DIVA tests for the possible prevention and/or eradication of the disease in domestic pigs and wild boars, with TRL 5 to 6.
- Contribution to international cooperation on animal health research, potentially reducing the threats from the introduction of exotic ASF virus strains in the EU and reducing the burden of ASF in countries outside the EU.

More generally, the selected project will contribute to a reduction of economic losses by the farming sectors and contribute to healthy livestock production. It will contribute to reduce the sanitary barriers to trade in swine and products therefrom.

Type of Action: Innovation action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

DT-SFS-14-2018: Personalized Nutrition

Specific Challenge: The World Health Organization estimates that about 80% of premature heart disease cases, strokes, type 2 diabetes and 40% of cancers could be avoided if the major risk factors for non-communicable diseases, such as unhealthy diets, were eliminated³⁹. Whereas a one-size-fits-all approach may fail, personalized nutrition can empower consumers to adhere to a long-lasting, healthy, pleasurable, nutritional and sustainable diet when tailored to individual parameters such as: the physical and psychological characteristics (health status, phenotype, genotype, microbiome configuration), the needs and preferences, behaviour, lifestyle, and budget; alongside to general economic factors (e.g. market prices) and socio-cultural aspects. Personalised nutrition can be used for different target groups from healthy people to patients such as malnourished people, vulnerable groups, people with allergies or non-communicable diseases, including cancer. Specific dietary and behavioural advice and/or support should be based on robust scientific evidence and knowledge from nutritional, medical, biological and social sciences and the humanities. Tackling this challenge requires a combined inter- and transdisciplinary approach engaging academics, policy makers, civil society, relevant industry and market actors.

³⁸ See definition of the 'multi-actor approach' in the introduction to this Work Programme part.

³⁹ http://www.who.int/features/factfiles/noncommunicable_diseases/facts/en/index9.html

Scope: Proposals shall deliver innovative solutions for personalized nutrition advice and/or support that will help consumers to achieve their optimal health and well-being and to adopt long-term healthy and sustainable diets. These concepts/tools/products/services shall focus on the consumer benefit and integrate all relevant factors such as health indicators, nutritional requirements, food composition, lifestyle, preferences, environment (i.e. cultural and socio-economic), etc. Moreover, proposals shall address all levels of personalization: from food choice in the shop, to customised production and delivery, to specific advice/warning systems (e.g. new, smart digital/ICT applications). Besides activities such as prototyping, testing, demonstrating, piloting and large-scale products validation in a near to operational environment, proposals may include limited research activities. Assessment and deepening the understanding of the drivers of food choice, the food environment, incentives and other relevant aspects influencing the motivation and behavioural change needed to sustain long term healthy and sustainable diets are essential. Proposals shall also develop and/or validate innovative approaches/methods/technologies for dietary assessment (e.g. measure dietary intake). Proposals shall build on existing knowledge and make use of relevant research infrastructures. To ensure the success of the developed actions, consumer engagement and acceptance, gender differences in patterns of nutrition and ethical issues, particularly on the use of personal data, should be taken into account. When applicable, proposals should address requirements from relevant EU regulatory frameworks, including pre-market approval.

The Commission considers that proposals requesting a contribution from the EU of the order of EUR 7 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected Impact: In the framework of SDG no 1, 2, 3, 9, 12 and 15, the EU's Bioeconomy Strategy 2012, and the FOOD 2030 Staff Working Document⁴⁰, proposals should explain how activities included contribute to:

- Empowered consumers able to make healthy and sustainable dietary choices;
- Personalized diets upon scientific-based dietary assessment and advice, by 2025;
- Increased consumer trust in personalized nutrition advice and/or support;
- Prevention of diet-related and non-communicable diseases;
- Increased/optimal health and well-being of individuals adopting long-lasting healthy and sustainable dietary behaviour;
- New market opportunities for novel concepts/tools/products, or services in personalized advice and/or support;

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European Research and Innovation for Food and Nutrition Security, SWD(2016)319.
<http://ec.europa.eu/transparency/regdoc/rep/10102/2016/EN/SWD-2016-319-F1-EN-MAIN.PDF>

- New market opportunities for novel approaches/methods/technologies for dietary assessment.
- Move available solutions from TRL 5 to TRL 6/7

Type of Action: Innovation action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

LC-SFS-15-2018: Future proofing our plants

Specific Challenge: It is well established that current food systems are under pressure due to the compounded effects of population growth, urbanisation, migration, resource scarcity, increasing demand for animal protein, land use change and climate change. Higher temperatures and CO₂ concentration are leading to enhanced plant growth but often lower quality, with subsequent impact on food value chains. Also, food production systems strongly rely on plant resources for food or feed but also often depend on chemical inputs that could have negative impacts on both the environment and on human and animal health, resulting in lower system resilience and increased societal concerns. A plausible way to tackle the challenges is future proofing those plants' qualities that could serve as a path to increased nutrition security and sustainable food systems. Now the time has come to capitalise on the results of decades of extensive plant research, while strategically moving towards a system approach to food chains.

Scope: Proposals shall map, assess and prioritise the technologies and methodologies for plant (both terrestrial and aquatic) improvement with a focus on enhancing plant nutrition efficiency and yield, enhancing nutrition and sensory quality, and ensuring environmental protection. Existing and new approaches and technologies should be assessed to best encompass future research and innovation aiming at plant improvement, while developing a holistic approach to exploit the potential of plant research. Following the RRI principles, proposals should ensure that societal actors (researchers, citizens/CSOs, policy makers, businesses, etc.) are brought together to align the forthcoming research programmes with the values, needs, and expectations of society.

The Commission considers that proposals requesting a contribution from the EU of the order of EUR 3 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected Impact: In the framework of SDG no 2, 12, 13 and 15, The EU's Bioeconomy Strategy 2012 and the Food 2030 Staff Working Document⁴¹, proposals should explain how the activities included will contribute to:

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European Research and Innovation for Food and Nutrition Security, SWD(2016)319.
<http://ec.europa.eu/transparency/regdoc/rep/10102/2016/EN/SWD-2016-319-F1-EN-MAIN.PDF>

- In the short term (by 2020), better equipped research toolboxes providing prerequisites for future plant research in Europe;
- Also in the short-term, assessment of the environmental, social and economic impact of existing and emerging technologies to provide complete information to all actors in the food system;
- In medium term (2025), intensified international collaboration through better communication and standardisation of strategic plant research areas.
- Also in the medium term, improved public awareness and trust ensuring a full understanding and uptake of novel technologies relative to plant improvement and nutrition security;
- In the medium to long term, successful implementation of new technological advancements or practises enhancing plant nutrition efficiency, yield and quality into today's conventional methods of agriculture.

Type of Action: Coordination and support action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

SFS-16-2018: Towards healthier and sustainable food

Specific Challenge: Increasingly, consumers are paying attention to healthier food diets, "healthy" food attributes (such as "freshness", "naturalness" and "nutritional value") and overall sustainability of production and processing methods. To meet these demands food production and processing need to further evolve in terms of better preservation of the raw material and natural food properties while ensuring healthy, tasty and sustainable food. In parallel it is necessary to improve the understanding of the influence of consumers' practices in maintaining the healthy food attributes from purchasing to consumption. Other important trends include a growing demand for regional and locally produced/supplied and less processed food. This has resulted in the emergence of new SME-led business models and an increasing number of farmers engaging in food processing (either on farm or by sharing processing facilities) and local food value chains. Developing effective and sustainable logistics systems for these types of products is essential to fully capitalise on new business opportunities in local/regional food systems and meet consumer expectations.

Scope: Activities will assess and develop food processing methods (e.g. minimal, mild, careful processing) with the potential to optimise the preservation of the naturally occurring nutritional, structural and functional food properties, even once the food is processed. They will focus on innovative small-scale processing technologies tailored to the needs of SMEs, while ensuring links between food processing and primary production. Work will include, as appropriate, testing of solutions and assessment of their impacts on product characteristics (food structure, composition and stability, safety, nutritional and sensory quality), traceability and authenticity, sustainability (environmental, social, economic) and public health. When

needed, proposals should address requirements from relevant EU regulatory frameworks including needs for pre-market approval. Activities will also look into the potential for the post-harvest preservation of naturally occurring nutritional food properties. Furthermore, work will explore appropriate business models adapted to proposed methods / technologies, taking into account organisation and distribution concepts, consumer behaviour / acceptance and/or the potential for consumer engagement. Proposed work shall benefit both the conventional and organic sectors. Activities will fall under the concept of the 'multi-actor approach'⁴² and allow for adequate involvement of food SMEs, farmers and consumers.

The Commission considers that proposals requesting a contribution from the EU of up to EUR 7 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected Impact: Activities will enhance market orientation and capacity of small and medium scale food processors and its suppliers to meet consumer demand for healthier food diets.

In the short- to medium term work will

- increase the availability of food with "healthy" attributes, resulting in positive impacts on sustainability and public health;
- develop food processing methods/technologies adapted to the needs of the SMEs and with the potential to optimise the preservation of the naturally occurring nutritional, structural and functional food properties;
- develop flexible and optimised food processing units adapted to the seasonal character of raw material production and processing in small(er) batches;
- ensure food authenticity and prevent/reduce food losses through efficient use of raw material and optimised processes between primary production and processing;
- stimulate creation of new business models supporting job creation and job retention in rural areas.

In the longer term funded activities will contribute to increased competitiveness, sustainability, circularity and diversity of regional and local food systems.

Type of Action: Research and Innovation action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

⁴² See definition of the 'multi-actor approach' in the introduction to this Work Programme part.

LC-SFS-17-2019: Alternative proteins for food and feed

Specific Challenge: While facing climate change and natural resource scarcity, ensuring sufficient, nutritious, safe and affordable food to a fast growing world population with changing dietary habits becomes increasingly challenging. The protein supply is in this respect most critical, both for human consumption and animal feed. Integration of a variety of new or alternative protein sources from both terrestrial and aquatic origin into new and/or existing processes or products needs to be explored, in order to develop and ensure more sustainable, resilient supply chains, featuring high consumer acceptability by a clean labelling approach and attractive market opportunities.

Scope: Proposals shall identify and assess new or alternative protein sources for food and/or feed and develop/validate efficient production and processing approaches to convert/integrate them into high quality, safe, healthy, and sustainable products or ingredients. Proposals shall focus on the characterisation of nutritional values, functional and sensory properties of new and alternative proteins, as well as on the deepening of the understanding of protein-protein interactions for knowledge-based (re)formulations of protein blends that partly or fully could substitute traditional sources. To ensure complementarity with the activities of other projects and initiatives at the EU level, proposals could include one or more of the following sources, for food: plant-based proteins, micro-organisms, terrestrial non-chordate phyla, algae and plankton or sources not deploying natural resources; and for terrestrial and aquatic animal feed: algae, insects and other terrestrial non-chordate phyla, micro-organisms, plankton and possibly other sources whose production is not in direct competition with food production. Synergies in applications for both food and feed are encouraged, in particular for aspects linked to logistical and safety aspects of production and processing, as well as value chains. Activities shall comprise testing, demonstrating and/or piloting in a (near to) operational environment, as well as experimental production, all with a view to paving the way for subsequent commercialization. When applicable, proposals should address requirements from relevant EU regulatory frameworks, including pre-market approval. Proposals may include limited research activities. Following the RRI principles, proposals will ensure that societal actors work together during the whole research and innovation process in order to better align both the process and its outcomes with the values, needs and expectations of society⁴³.

The Commission considers that proposals requesting a contribution from the EU of the order of EUR 8 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected Impact: In the framework of SDG no 2, 9, 12, 13 and 15, The EU's Bioeconomy Strategy 2012 and the Food 2030 SWD, proposals should explain how the activities included will contribute to:

In the short run,

⁴³ In case of proposals applying the 'multi-actor approach', see also its definition in the introduction to this Work Programme part.

- Far-reaching progress in providing, processing and production of high quality proteins for food and/or feed from terrestrial and/or aquatic origin, moving available solutions from TRL 5 to TRL 6;
- New market opportunities for novel products, exclusively or partly derived from non-traditional proteins;
- Future-proofed protein supply chains based on the principles of diversity, sustainability and resilience;
- Increased trust and consumer acceptability for alternative protein sources and processes.

In the longer run, a sustainable food sector that significantly reduced its footprint in terms of land use, greenhouse gas emissions, energy, water and other relevant indicators.

Type of Action: Innovation action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

Environment and climate-smart food production and consumption

Proposed activities open avenues to progress on low green house gas emission agriculture, fisheries and food industries. They will support the development of strategies and tools to better cope with more variable and extreme weather events, changing environmental conditions and new emerging threats. A number of topics target the mitigation capacity of the primary production sector and the synergies and trade-offs between adaptation and mitigation measures. Activities also tackle the stewardship and use of natural resources on land and sea and other inputs throughout food production. They aim at optimizing resource use and reducing environmental footprints throughout primary production, food industries, food distribution, food service and households.

Proposals are invited against the following topic(s):

LC-SFS-19-2018-2019: Climate-smart and resilient farming

Specific Challenge: Evidence on climate change is solid and reveals that it will affect the EU with European farming first in line through changes to rainfall regimes, rising temperatures, the variability and seasonality of the climate and the occurrence of more frequent extreme events (heatwaves, droughts, storms and floods). In addition to finding effective solutions for greenhouse gas (GHG) mitigation such as reducing GHG emissions and sequestering carbon below and above ground, farmers will need to adapt to climate change and develop farming systems resilient to fluctuating environmental and socio-economic conditions.

Scope: Proposals should address only one of the following sub-topics (A) or (B).

A. [2018] Microclimate management: from field to landscape (RIA)

Proposals shall improve the resilience of farming systems, including the livestock sector, to variable climatic conditions and more extreme weather events through risk management strategies and innovations in field and regional landscape design. Work will take into account the potential of traditional and innovative techniques and sensors and test their effectiveness in mitigating/buffering the effects of different weather events (such as drought, heat and cold waves, wind, heavy rain and flooding). Activities will maximise the time and space resolution of decision support systems to increase their effectiveness and reliability. Studies at landscape scale are required to understand leading ecological processes; therefore activities will include collaboration and coordination between farmers and between farmers and other stakeholders. Activities should look at the wider impacts of trade-offs and synergies between microclimate management and related policies (water framework directive, biodiversity action plans, common agricultural policy) on agri-ecosystems and their surroundings. Proposals will use transdisciplinary research methods and should fall under the concept of the 'multi-actor approach'⁴⁴. Proposals should establish a farm and landscape-level observatory and knowledge-exchange network on regional risks and microclimate management. They should build links with the European Innovation Partnership "Agricultural productivity and sustainability" and showcase good practices to be replicated.

B. [2019] Efficiency and resilience of mixed farming and agroforestry systems (RIA)

Activities will develop further mixed farming systems and show how the integration of crops, livestock and forestry activities can improve the resilience of agriculture in combination with the related climate change mitigation potential (e.g. carbon sequestration, nutrient recycling). Proposals should enable the participative design of mixed farming and agroforestry systems not only focusing on technical and agronomic aspects but also taking on board socio-economic aspects of mixed farming modes, the related value chains and necessary infrastructures as well as the environmental and climate potential. Proposals will contribute to increase synergies between crops and livestock by defining optimal combinations of production to increase income stability at farm level and sustainability of the relevant value chains. They shall develop models and tools adapted to real farm management to grasp the inherent complexity of mixed farming and agroforestry systems. Proposed work shall benefit both the conventional and organic sectors. Activities will use transdisciplinary research methods and proposals should fall under the concept of the 'multi-actor approach'⁴⁵.

All sub-topics- The proposals funded under this topic (sub-topics A and B) will contribute to the development of a conceptual framework on resilience at different levels (farm, community, region, national and EU) and its policy implications. Proposals should include a task to cluster with other projects financed under the same topic. The Commission considers that proposals requesting a contribution from the EU of up to EUR 7 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

⁴⁴ See definition of the 'multi-actor approach' in the introduction to this Work Programme part.

⁴⁵ See definition of the 'multi-actor approach' in the introduction to this Work Programme part.

Expected Impact: Funded activities will improve the climate and socio-economic resilience of the agricultural sector. In the short to medium term work will:

- Deliver effective solutions for ensuring the highest level of implementation on the farm and landscape scale regarding climate-smart and resilient systems and provide decision support systems adapted to mixed farming and agroforestry systems in heterogeneous landscapes;
- Unlock and improve viability and replicability of efficient and resilient farming systems and propose different transition scenarios leading to the development of modern land use systems, value chains and infrastructures;
- Reduce the environmental impact of farming and contribute towards mitigation and adaptation to climate change
- Provide ecosystem services through integrated and small-scale land management.

In the longer term funded activities will help to foster the synergies between agricultural production, climate change mitigation and adaptation. They will allow the farming sector to continue fulfilling its multiple functions under predicted, more challenging abiotic conditions.

Type of Action: Research and Innovation action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

LC-SFS-20-2019: European Joint Programme on agricultural soil management

Specific Challenge: Good agriculture soil management contributes to food security, climate change mitigation/adaptation and ecosystem services. Preserving and increasing fertility of soils, not least through their organic content and water retaining capacity, increases agricultural production. Soils and their carbon content are also important for climate change mitigation. A number of good soil management practices have been developed to deal with some of the challenges; however serious knowledge gaps exist, e.g. on the characteristics of soils in various regions of Europe, the factors influencing their fertility or their capacity to store carbon, depending on different climate and environment conditions. The European Union is committed to addressing climate change with ambitious targets. An integrated framework for soil research in Europe is required to overcome current fragmentation and unleash the potential of agricultural soils to contribute to climate change mitigation/adaptation, while preserving or increasing agricultural functions.

Scope: The European Joint Programme will boost soil research with main emphasis on agricultural soil contribution to climate change mitigation and adaptation. The aim is to construct a sustainable framework for an integrated community of research groups working on related aspects of agricultural soil management⁴⁶. The activities should look at how

⁴⁶ Agro-forestry is included in the topic.

management of agricultural soils can reduce degradation of land and soils (in particular soil erosion), preserve and increase fertility of soils and how the processes related to organic content and water retaining capacity can support mitigation and adaptation to climate change. The EJP will evaluate and foster implementation of novel technologies for soil management and carbon sequestration. The aim of the EJP is also to look for synergies between different approaches used in Europe for farm level accounting of emissions and removals from agricultural activities and particularly of carbon storage. In doing so, activities will look into inventories, measurements, reporting and accounting activities. Sustainable agricultural productivity and environmental aspects will also be targeted in connection with climate change mitigation and adaptation, so that optimisation of land management is ensured.

The European Joint Programme will include joint programming and execution of research and other joint integrative activities such as education and training (e.g. short-term missions, workshops), knowledge management, access to experimental facilities and databases, including also harmonisation, standardisation.

State-of-art technologies for mapping and soil sampling (physical, chemical and biological parameters) should be explored for wider and simple use from national level to farm level. In return, by e.g. developing new ICT tools, this could help farmers to protect and manage soils in line with current scientific understanding of processes. The EJP should also facilitate sampling and further development of LUCAS⁴⁷ –European Soil Database as well support EU contribution to global soil mapping activities.

Participating legal entities must have research funding and/or management responsibilities in the field of agriculture soil management.

The proposal should include a five-year roadmap describing the key priorities and governance processes as well as the first annual work plan.

The acquired knowledge should support policy-making in the domain of agricultural soil management and related policies, such as agriculture, climate and environment, and when feasible and appropriate transfer of science to practice for better agricultural soil management by farmers should be envisaged.

The activities will need to be coordinated as appropriate with the Global Soil Partnership and more particularly with European Soil Partnership node, with the Global Research Alliance on agricultural greenhouse gases, [the project selected under SFS-50-2017], 4/1000, GACSA, JPI FACCE, JPI CLIMATE, Belmont Forum, and soil activities coordinated by the JRC⁴⁸ when relevant and appropriate. The work of the EJP will also support number of policies: Common Agricultural Policy, Climate Change related policy and relevant environmental policies.

⁴⁷ **Land use/cover area frame statistical survey**, abbreviated as **LUCAS**, is a European field survey program funded and executed by [Eurostat](http://ec.europa.eu/eurostat/statistics-explained/index.php/Glossary:Land_use/cover_area_frame_survey_%28LUCAS%29) http://ec.europa.eu/eurostat/statistics-explained/index.php/Glossary:Land_use/cover_area_frame_survey_%28LUCAS%29

⁴⁸ European Soil Data Centre; EIONET - European Environment Information and Observation Network – soil network

Considering the budget available, the scope covered and the potential entities for the EJP, the Commission considers that an EU contribution to a maximum 50% of the total eligible costs of the action or up to 40 million EUR would allow this specific challenge to be addressed appropriately.

Expected Impact: The project will lead to significant long term alignment of research strategies and activities at national and EU level by:

- fostering understanding of soil management and its influence on climate mitigation and adaptation, sustainable agricultural production and environment;
- understanding how soil carbon sequestration can contribute to climate change mitigation at regional level including accounting for carbon;
- strengthening scientific cooperation at European level including training of young scientists;
- development of agreed knowledge base and database for European contribution towards international reporting;
- contributing to the European Soil Data Centre with harmonized European soil information for international reporting.

Type of Action: COFUND (European Joint Programme)

The conditions related to this topic are provided at the end of this call and in the General Annexes.

LC-SFS-22-2020 - Forest soils Research and Innovation Action

SFS-23-2019: Integrated water management in small agricultural catchments

Specific Challenge: Tackling both quantity and quality of water in small agricultural catchments provides a number of advantages. The number of hydrological processes and interactions can be analysed in detail which is not the case for large scale hydrological analyses. Usually issues of natural/small water retention⁴⁹ can be properly tackled at the smaller scale of an agricultural catchment. Equally, the local impact of climate change or/and changes in local micro-climate can also be analysed in an integrated way with other challenges of small scale catchments. At the level of the small agricultural catchment, water management supports not only sustainable agricultural production but also local ecosystems. A sufficient supply of water for sustainable crop production might become more important in the coming years. At the same time a number of underutilised techniques of water management (natural/small water retention, nutrients recovery from streams, etc.) could be re-

⁴⁹ Natural/small water retention aims to protect water resources and address water-related challenges by restoring or maintaining ecosystems as well as natural features and characteristics of water bodies using natural means and processes. The use of 'small' or 'natural' water retention depends on Member States definitions which can include management of small water reservoirs.

introduced into agricultural management for the benefit of farmers, local communities and the environment.

Scope: Activities shall assess the use of small water retention approaches for managing excess and shortage of water and nutrient recovery from water streams. The link between agricultural land management and soil-water management for increased nutrient uptake and water retention should be assessed. Work should focus on affordable and easy-to-implement at the farm-level solutions including an economic analysis of proposed measures as well as maintenance of the infrastructure. The analysis of proposed techniques for water management should consider the need for adaptation to climate change and its impact on ecosystem services. Work should allow assessing long term benefits for the farm and the local ecosystem from the implementation of the natural/small water retention measures. Proposals for this call fall under the 'multi-actor approach'⁵⁰ ensuring cooperation between farmers and farmers associations, local water management organization, technology providers, research centres and public administration. Preference will be given to proposals focusing on Continental, Pannonia and Boreal biogeographical regions of Europe as defined by the European Environment Agency.

The Commission considers that proposals requesting a contribution from the EU of up to EUR 7 million would allow this specific challenge to be addressed properly. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected Impact: In the short to medium term:

- Improved understanding of how small water retention within different climatic zones can contribute to water-use efficiency at the farm level;
- Identification of tools and techniques for stream nutrients recovery and re-use of water at the scale of the agricultural catchment;
- Identification of economically sustainable technologies for dry and wet spell water management at the farm and catchment levels.

Type of Action: Research and Innovation action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

CE-SFS-24-2019: Innovative and citizen-driven food system approaches in cities

Specific Challenge: The challenge of providing the inhabitants of European cities with affordable, safe, and nutritious food is both urgent and complex. Moreover, the health and wellbeing of EU citizens and consumers are directly affected by the way cities and regions themselves are shaping a sustainable food environment. Research and (open) innovation co-created with citizens are part of broader city-region food system approaches. Such initiatives

⁵⁰ See definition of the 'multi-actor approach' in the introduction to this Work Programme part.

stimulate the development of cities as innovative food hubs. Nevertheless, there are barriers to the application and demonstration of systemic food-related innovative approaches due to the diversity of European cities and regions that are not well understood, leading to market failure in the uptake of promising research results and innovation in cities. Demonstration and first application in the market of innovative solutions, co-created with citizen and cities with the involvement of public authorities, economic actors and non-profit organisations, could be one way to support sustainable food security in cities.

Scope: The proposals shall identify several food-related innovative approaches based on citizen science and engagement, to be practised in cities to foster sustainability of the food system. Proposals shall explore and share the application of these approaches in a wider range of European cities and shall be built on results of existing research, best practices and existing platforms and programmes. Proposals could comprise activities such as prototyping testing, demonstrating and piloting in a (near to) operational environment, as well as experimental production, all with a view to subsequent replication and application in other cities. Proposals shall include the development of a classification and assessment of the benefits (economic, environmental and societal) of existing approaches for dissemination purposes, accessible online. Proposals may include limited R&D activities and a clear focus on validating the benefits of pilot activities for citizens with a view of increasing engagement and replication. The action shall cover cities in rural and coastal areas and urban agglomerations. Proposals shall also include co-creation between social innovation and technological innovation. Following the RRI principles, proposals will ensure that societal actors work together during the whole research and innovation process in order to better align both the process and its outcomes with the values, needs and expectations of society. Active participation of municipalities and SMEs is strongly encouraged.

The Commission considers that proposals requesting a contribution from the EU of the order of EUR 6 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected Impact: In the framework of SDG no 2, 3, 9, 11 and 12, the EU's Bioeconomy Strategy 2012, and the FOOD 2030 Staff Working Document⁵¹, proposals should explain how activities included are expected to contribute to:

- Job creation in EU cities in which good practices for sustainable food security are applied in the short term (up to 3 years), fostering thriving urban, rural and coastal economies and communities;
- Intensified interactions between all actors in the food chain⁵² such as research, (small scale) food production, city municipalities, education centres, consumers and citizens in the medium to long term;

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European Research and Innovation for Food and Nutrition Security, SWD(2016)319.
<http://ec.europa.eu/transparency/regdoc/rep/10102/2016/EN/SWD-2016-319-F1-EN-MAIN.PDF>

- Empowered local communities by using their potential to contribute to ensuring food and nutrition security at city level, which in turn supports the relevant SDGs;
- Increased participatory and citizen science initiatives in the area of food and nutrition security in cities;
- Easy and increased knowledge-sharing;
- In the long term, positive economic, social and environmental links between urban, peri-urban and rural areas, meeting the needs, values and expectations of society in a responsible and ethical way.

Type of Action: Innovation action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

CE-SFS-25-2018: Integrated system innovation in valorising urban biowaste

Specific Challenge: Most of the biowaste produced in cities (such as garden and park waste, food and kitchen waste from households, restaurants, caterers and retail premises), as well as sewage sludge from urban wastewater treatment plants are processed into compost and biogas used for energy recovery or even landfilled without fully exploiting in a smart and innovative cascading fashion its potential as feedstock for valuable and precious compounds. New and emerging processing technologies can enable the recycling and valorisation of urban biowaste into higher-value biobased products (e.g. biobased chemicals and plastics, nutrients, human food or animal feed ingredients and proteins), thereby generating significant economic, social and environmental benefits. The successful implementation of urban biowaste recycling and valorisation technologies will require an integrated system innovation approach in a city context. Besides the technological challenges, there will be a need for public authorities to adopt new policies; changing citizens' behaviour will require social innovation initiatives, and new, profitable business models along the entire urban biowaste value chain will have to be developed.

Scope: Proposals shall focus on an integrated system innovation approach in urban biowaste recycling and valorisation for the production of high-value biobased products, including proteins for food and feed. Proposals shall ensure the full integration of the upgraded urban biowaste value chain into the existing local waste/wastewater management schemes. Proposals shall guarantee the active participation of local and regional authorities, waste/wastewater management utilities, (biobased) industries, the scientific community, local communities and citizens. Particular attention shall also be given to: Life Cycle Assessment (LCA) of the entire urban biowaste value chain; improving logistic models taking into account changing the behaviour and participation of citizens and local communities in relation

⁵² OECD/WTO (2013), developing on FAO (2005) on agrifood value chain: "A 'value chain' in agriculture identifies the set of actors and activities that bring a basic agricultural product from the field to final consumption and add value at each stage of the production process."

to the collection and use of this particular feedstock; increasing consumer awareness and acceptance of urban biowaste-derived products; adapting/developing business models for successful market uptake; food and feed safety aspects; regulatory aspects; and facilitating the exchange of good practices and experiences between all stakeholders.

The proposal should seek the complementarity to the projects funded under H2020 topics CIRC-05-2016⁵³, H2020 CIRC-02-2016-A⁵⁴ and the topic BBI 2016.D6⁵⁵.

The Commission considers that proposals requesting a contribution from the EU of the order of EUR 10 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected Impact: In the framework of SDG no 3, 6, 9, 11, 12 and 13, the EU's Bioeconomy Strategy 2012, the EU's Circular Economy Package 2015, and the FOOD 2030 Staff Working Document⁵⁶, proposals shall assess their contribution to:

- Validated technical and economic viability of the proposed approaches at target TRL 7;
- New business and organisational models on cities ensuring the full integration of the upgraded urban biowaste value chain into the existing local waste/wastewater management schemes;
- Improved perception of citizens on urban biowaste as a local resource and their enhanced active participation in its separate collection through social innovation initiatives;
- Improved consumer acceptance of urban biowaste-derived products, including food and feed ingredients;
- A more sustainable and resilient protein supply chain;
- Safety assessment of biobased processes and products from urban biowaste;
- Reduced amount of urban biowaste that would otherwise be incinerated or landfilled, and hence reduced environmental impact (including GHG emissions) of municipal and food waste;
- Detailed assessments of specific technical, regulatory, financial, market and logistical barriers hampering the full exploitation of the urban biowaste value chain;
- Evidence-based support for EU policies/targets in the biobased and circular economy, climate mitigation, sustainable growth and re-industrialisation.

⁵³ http://ec.europa.eu/research/participants/data/ref/h2020/wp/2016_2017/main/h2020-wp1617-focus_en.pdf

⁵⁴ <http://ec.europa.eu/research/participants/portal/desktop/en/opportunities/h2020/topics/circ-02-2016-A.html>

⁵⁵ http://ec.europa.eu/research/participants/data/ref/h2020/other/wp/jtis/h2020-wp16-bbi_en.pdf

⁵⁶ European Research and Innovation for Food and Nutrition Security, SWD(2016)319.
<http://ec.europa.eu/transparency/regdoc/rep/10102/2016/EN/SWD-2016-319-F1-EN-MAIN.PDF>

Type of Action: Innovation action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

Building capacities

A defined set of activities addresses more fundamental research needs as well as the harmonisation and rationalisation of data, methods or infrastructures. Activities will help to test new approaches and develop new models for business creation and societal engagement. The delivery of knowledge and resources will support downstream translational research and innovations.

Proposals are invited against the following topic(s):

DT-SFS-26-2019: Food Cloud demonstrators

Specific Challenge: The European Open Science Cloud (EOSC) will federate existing and emerging research data infrastructures, and provide researchers with services for Open Research Data (ORD) storage, management, analysis and re-use across disciplines. The move towards a thematic EOSC section for food and nutrition security (FNS) - or Food Cloud - would accelerate and support the ongoing transition to a more Open Science and Open Innovation model for food and nutrition systems, stimulate intra- and interdisciplinary research, and increase the impact and efficiency of research investments and infrastructures. It would address the increased complexity of data sharing and analysis as well as reproducibility within and across scientific disciplines, as well as the sharp growth in data volumes. Although the components needed to create a first generation Food Cloud are largely there, they are fragmented, spread over EU Member States and across different scientific communities, and lack interoperability. There is a lack of widespread awareness of the value of open research data and of incentives and possibilities for data sharing. There is no dedicated and mandated effort or instrument to co-ordinate EOSC-type activities within the area of FNS research.

Scope: Proposals shall advance the EOSC in different scientific areas that relate to FNS (e.g. agri-food sciences and engineering, nutrition sciences) by building and implementing Food Cloud demonstrators, and by ensuring their long term sustainability. Proposals shall address the federation, networking and co-ordination of research infrastructures and scientific clouds for the purpose of increasing data findability, accessibility interoperability, and reusability improving the services provided to research communities and facilitating re-use of data by a wider user community. Particular attention shall be paid to reducing fragmentation of existing governance models, through model integration and involvement of research user communities, training, monitoring and measuring awareness, interest, uptake and added value. Proposals shall stimulate collaboration between researchers in the food and nutrition domain and ICT/data specialists. Proposals shall support a food systems approach to research and innovation for FNS, focus on use cases that can significantly contribute to the priorities

defined in the European Commission Staff Working Document FOOD 2030⁵⁷ and that address researchers' needs especially in data intensive fields such as microbiome research. The Food Cloud demonstrators will build on progress of relevant projects (e.g. e-ROSA⁵⁸, EOSCPilot⁵⁹, ENPADASI⁶⁰, RICHFIELDS⁶¹), integrate existing communities, and make use of relevant learnings from parallel thematic initiatives being developed under Horizon 2020 (e.g. Blue Cloud⁶²). Proposals shall also rely on effective global standards, and build on best practices regarding governance and financing.

The Commission considers that proposals requesting a contribution from the EU of the order of EUR 10 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected Impact: In the framework of SDG1, 2, 9, the EU's Bioeconomy Strategy, and FOOD 2030 SWD, proposals should assess their impact on:

- In the short term (by 2025), improved data management tools, practices and skills in selected scientific areas that relate to FNS based on better understanding between e-infrastructure providers/ operators and scientific domain specialists/users;
- Also in the short term (by 2025), a proven governance and business model for the Food Cloud based on best practices, on broadly supported policy choices, and on effective global standards;
- In medium term (by 2030), improved data management skills, and increased awareness of the benefits of open research data among FNS researchers;
- In the short to long term, increased data sharing and re-use among FNS researchers.
- Move available solutions from TRL 4-5 to TRL 6-7

Type of Action: Innovation action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

SFS-27-2018: Monitoring food R&I investments and impacts

Specific Challenge: Research plays a significant role in helping the agriculture, fisheries, aquaculture and food sectors to cope with the various challenges these sectors face among which ensuring sustainable use of natural resources, and mitigating and adapting to climate

⁵⁷ European Research and Innovation for Food and Nutrition Security, SWD(2016)319. <http://ec.europa.eu/transparency/regdoc/rep/10102/2016/EN/SWD-2016-319-F1-EN-MAIN.PDF>

⁵⁸ http://cordis.europa.eu/project/rcn/206339_en.html

⁵⁹ http://cordis.europa.eu/project/rcn/207500_en.html

⁶⁰ European Nutritional Phenotype Assessment and Data Sharing Initiative by JPI HDHL (<http://www.enpadasi.eu>)

⁶¹ http://cordis.europa.eu/project/rcn/200239_en.html

⁶² Topic BG-08-[A]-2019-The Future of Seas and Oceans Flagship Initiative - Blue Cloud Services

change. Yet little information exists on the levels of investments in public and private research and innovation at European and other levels of governance. Without monitoring, in particular at national and EU levels, it is not possible to gain a comprehensive overview and a good understanding of the dynamics behind and the impact of investments in research and innovation. Furthermore, it is necessary to improve methodologies and tools for measuring the impact of research, including in relation to the UN Sustainable Development Goals (SDGs).

Scope: Taking into account the main results of recent research projects as well as of ongoing policy initiatives, establish strategies, methodologies and tools to improve the monitoring of public and private investments in agriculture, fisheries, aquaculture and food research in Europe, at different levels of governance, thereby allowing monitoring of these investments over time and for major research areas. The network will also look into the measurement – quantitative and qualitative - of the impact of research, at micro and macro levels, applying different methodologies (quantitative, impact pathways, etc.) and taking into account EU policy objectives such as those related to the SDGs. It will monitor research and innovation policies, foster policy discussions and debates and provide recommendations for research and innovation policies and investment strategies, including as result of a foresight exercise. Proposals will take account of initiatives related to research and innovation, for instance the IFPRI's initiative ASTI or the OECD monitoring of innovation in food and agriculture.

The Commission considers that proposals requesting a contribution from the EU of up to EUR 7 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected Impact:

- In the short to medium term: increased transparency of investments in research and innovation in Europe at different governance levels; improved management of agricultural, fisheries, aquaculture and food research and innovation ensuring better coordination and synergies between the actors involved; improved impact measurement of research and innovation activities allowing for better policy developments;
- In the long term: better investments in research and innovation for improved solutions to societal needs.

Type of Action: Research and Innovation action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

SFS-28-2018-2019-2020: Genetic resources and pre-breeding communities⁶³

Specific Challenge: Genetic resources (GenRes) play a crucial role in agricultural activities and sustainable forest management in Europe. They hold the key to the adaptation of plants and animals to a changing and more variable climate, yet their diversity remains largely underused in current breeding, farming and forest management. Conservation efforts (in-situ, ex-situ) aim to capture, preserve and make available a substantial share of these global assets. However, access to resources is often limited by the quality of the material and the information provided by the various conservation sites. With increasing concerns over biodiversity loss and genetic erosion, there is a need to step up collaborative efforts to expand and improve the preservation as well as the use of plant and animal GenRes in farming and forestry.

Scope: A range of activities implemented by a wide range of stakeholders will seek to enhance management and use of GenRes and implement global commitments in this area. While the focus of activities is on Europe, international resources and activities shall be taken into account.

Proposals should address only one of the following sub-topics:

A. [2018]: Joining forces for GenRes and biodiversity management (CSA)

Activities will provide a framework in which the existing mosaic of European, national/regional structures can join forces to develop and implement ambitious approaches and strategies for the management of crop, forest and animal GenRes. In addition to advancing individual roadmaps, inventories and information tools for crop, forest and animal GenRes, cooperation between the different communities shall foster GenRes conservation within a wider (agro) biodiversity context. Particular care shall be taken to building and widening capacities across Europe and neighbouring countries (including Mediterranean countries), exchanging best practices, harmonising standards as well as sharing resources and data.

B. [2019]: Adding value to plant GenRes (RIA)

Activities will address processes, tools and know-how associated with a dynamic management and documentation of GenRes collections (both ex-situ and in-situ, as appropriate). They will add value to the preserved germplasm to promote its use, e.g. in breeding, farming, forestry and by consumers. Work will enable the development and testing of a range of solutions to enhance quality and efficiency of operations and services across collections. Major efforts should go into capturing and characterising the genetic diversity in germplasm and revealing novel information to users. This will include acquiring comprehensive and more precise genotypic and phenotypic information on GenRes material, understanding the connections between the two, how they vary in different environmental contexts and having in place appropriate (bioinformatic) tools for data processing, exchange and visualisation. Due account shall be given to disclosing the potential of less adapted

⁶³ It is expected that this topic will continue in 2020

material from genebanks/in-situ conservation sites in relation to valuable traits associated with resilience, adaptability and quality of crops.

Proposals should foresee a task for joint activities with other projects financed under this topic.

C. [2020]: The GenRes-user interface and pre-breeding activities (IA)

The Commission considers that proposals requesting a contribution from the EU of up to EUR 3 million for sub-topic A and EUR 7 million for sub-topic B would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected Impact: Activities will enhance the status of genetic resources and increase effectiveness of conservation efforts, in particular in Europe.

In the short to medium term work will

- result in the development and/or implementation of integrated strategies for conservation and use of crop, forest and animal GenRes as well as for wider biodiversity (sub-topic A)
- enhance user oriented services provided by networks involved in plant (agriculture and forestry), and animal GenRes management (sub-topic A)
- help establishing high quality, harmonised standards for the management and description of GenRes across Europe (and beyond) (sub-topics A and B)
- increase the quantity and quality of data in established information systems for crop, forest and animal GenRes (sub-topics A and B)
- promote innovative ways of sharing resources and services between genebanks/in-situ conservation sites in Europe and beyond (sub-topics A and B)
- develop methods and tools for greater insight into the characteristics and the value of collections (sub-topic B),
- create novel services for users within and outside the conservation communities (sub-topic B)

In the long term activities will allow tapping into the vast potential of GenRes more effectively in order to meet current and future needs of food security, the delivery of non-food products from primary production and support the different functions of forestry.

Type of Action: Research and Innovation action, Coordination and support action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

SFS-29-2018: Innovations in plant variety testing

Specific Challenge: Agriculture is increasingly being urged to reduce its dependency on external inputs, lower its environmental footprint and cope with more variable climatic conditions. Plant breeding needs to take into account more systematically those characteristics that contribute to crop resilience vis-a-vis biotic and abiotic stresses. This implies that criteria and methods are in place to assess the value of cultivation and use (VCU) of new varieties for food and feed under conditions associated with sustainable and more variable farming practices. For the purpose of this topic VCU testing is not limited to important agricultural species. Innovations in breeding can be further promoted by increasing the robustness and efficacy of variety testing methods for marketing and for obtaining Plant Variety Rights (DUS testing)⁶⁴.

Scope: Proposed work will help identify crop characteristics and "sustainability criteria" associated with the capacity of new varieties to maintain yield under more variable conditions and under more sustainable crop management practices (e.g. with regard to the use of fertiliser, water or plant protection products). Work shall result in the development of methods and tools to integrate sustainability criteria into VCU testing under a range of agro-ecological environments, soil types and on-farm conditions. In addition, activities will improve precision and speed of methods for DUS testing based on European/international requirements for the marketing and granting of rights for new varieties. Proposals must clearly address the specificities of VCU and DUS testing while exploiting synergies between the two in particular when advancing field-based phenotyping methods, molecular tools and when setting up databases and reference collections. Consortia are required to tap into the expertise of various sectors – ranging from research, breeding, plant variety VCU experimentation, plant variety DUS examination offices and farming both conventional and organic - to bring together the necessary, multidisciplinary know-how. The work proposed shall address DUS and VCU testing in a balanced way and maximise synergies between related activities.

The Commission considers that proposals requesting a contribution from the EU of up to EUR 8 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected Impact: Activities will support the introduction of new varieties that are “fit for purpose”, i.e. that provide stable and high(er) yields while having an increased capacity for adaptation to varying biotic and abiotic conditions. This will help introduce plant traits that respond to new challenges and demands in the conventional and organic sectors, while also taking into account the economic return of growers. More specifically, activities will help:

⁶⁴ Distinctiveness, Uniformity and Stability (DUS) are legal requirements for authorisation of marketing of new varieties of agricultural, fruit and vegetable species in the EU. They are also applied for granting Plant Variety Rights to breeders to protect their innovations. Varieties belonging to important agricultural species (for food and feed) can be marketed on the Common market only if – in addition to the DUS requirements - they exhibit a significant value of cultural use (VCU).

- gain a better understanding crop-specific characteristics underpinning resource efficiency as well as resilience to more challenging environments;
- develop experimental designs, methods and tools to improve VCU testing of new varieties for their sustainability profile;
- evaluate protocols and increase the range of tools available to European plant variety offices for DUS testing;
- support activities of the network of European and national plant variety examination offices;
- provide breeders and bodies entrusted with variety testing with more robust selection/testing criteria and tools to predict the performance of genotypes in different pedo-climatic and agronomic conditions
- improve information and recommendations on variety performance available to growers.

Potentially, molecular tools developed under proposed activities will benefit other uses such as the detection of new breeding methods.

In the longer term improved testing methods will promote the marketing and use of more adaptable and sustainable varieties by European farmers.

Type of Action: Research and Innovation action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

SFS-30-2018-2019-2020: Agri-Aqua Labs⁶⁵

Specific Challenge: Agriculture and aquaculture are increasingly knowledge-intensive sectors that need to be supported by advances in basic science domains in tandem with translational research. This nexus between basic and applied research requires specific openings for testing ideas and their potential application in plant and animal production, both terrestrial and aquatic.

Recent developments in genomic selection have revolutionised **animal breeding** and resulted in significant gains in production efficiency of animals. However, our understanding of the biological mechanisms underpinning traits remains limited. Most phenotypes, in particular for traits related to health, biological efficiency and robustness, are complex and a major goal of biological research is to use genome information to predict such complex outcomes.

In the area of **crop production** there is a fundamental interest in deciphering the dynamic responses of plants as they (pre)adapt to local conditions or adjust their growth and development to changes in the environment within their plasticity range. These adaptive traits

⁶⁵ It is expected that this topic will continue in 2020

are all the more important as plants are sessile and therefore require effective strategies to deal with uncertainty and to tolerate rather than avoid stress. Understanding the different adaptation strategies, and the circumstances that favour one strategy over another, is vital for understanding how annual or perennial crops perform in a given environment or under changing conditions. It will also help to assess how plants may respond to future environmental changes.

Scope: Proposals should address only one of the following sub-topics:

A. [2018]: Understanding the genome of farmed animals, its expression and translation into traits (RIA)

For the purpose of sub-topic A, the words 'animal' and 'farm' apply to both terrestrial and aquatic animals. Research activities should generate experimental data to map out what part of farmed animal genomes are active (whether coding or regulatory), and under which circumstances, characterise the resulting phenotypes and assess how phenotypes are affected by genetic and epigenetic changes. Bioinformatic analyses should support identification of these functional and structural elements in genomes, and enable the development of tools for genotype to phenotype prediction. Work should also help to develop or extend terminologies (ontologies) to describe, represent and standardize annotation. Proposed projects should target one or more farmed animal species with high-quality genome assemblies (in particular cows, chicken, pigs, sheep, salmon and other relevant species), focussing on specific tissue panels, and address correlations between normal and abnormal situations. They may target different physiological and developmental stages and different breeds within the same species, where this brings added value to the understanding of the genotype to phenotype relationship. As regards genome annotation, the proposed projects should use FAANG⁶⁶ metadata standards and core assays and coordinate with other projects in order to minimise overlaps. The data should be submitted to relevant European biological data archives in accordance with these standards to ensure they are available to the whole community (EMBL-EBI⁶⁷). The proposed projects should develop and test, where appropriate, innovative tools to measure related phenotypes, including intermediate phenotypes. Activities may include biomarkers and their proxies, as well as sensors, together with ways to record related phenotypes at population level (whether reference populations or not). Proposals should include a task to cluster with other projects financed under this topic.

B. [2019]: Looking behind plant adaptation (RIA)

Proposals shall advance our understanding of the ability of plants to (pre)adapt to specific – often extreme - conditions or to react to sudden changes in their environment.

They will look into the specific mechanisms (genetic, epigenetic, physiological, morphological, metabolic...) and dynamics that underlie adaptive processes of crops and how these responses are modulated by the type and severity of conditions/stresses. In studying

⁶⁶ <http://www.faaang.org/index>

⁶⁷ <http://data.faaang.org>

adaptation of crops to single or multiple abiotic conditions, work shall also establish potential fitness trade-offs. Proposals are expected to improve capacities for modelling plant adaptation responses in view of predicting changes in plant performance and inform crop improvement and crop management strategies. While taking advantage of findings from (semi) model crops, work shall focus on crop plants and relevant agronomic conditions.

Proposals should foresee a task for joint activities with other projects financed under this topic.

C. [2020]: Plant energy biology

The Commission considers that proposals requesting a contribution from the EU of up to EUR 6 million for sub-topic A and EUR 5 million for sub-topic B would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected Impact: Results of funded activities will help to create knowledge hubs in their respective domains and develop specific pathways to feed biological insight into agricultural (husbandry, crops) and aquaculture practices.

In the short to medium term work will

- deliver comprehensive genome annotation maps of high quality in the targeted farmed animal species/tissues (sub-topic A)
- progress in understanding genotype per environment interactions and deciphering the mechanisms by which some effects induced by environment/stressors can be transmitted across generations (sub-topic A)
- pave the way for subsequent use of annotated genomes to improve precision breeding in farmed animal production, by linking genome to phenotype and improving means to measure/record phenotypes (sub-topic A)
- contribute to international cooperation on genome annotation (sub-topic A)
- provide insight into the range of mechanisms that underpin plant responses (from single cell to whole plant) to specific and/or multiple environmental change (sub-topic B)
- deliver more accurate models for the prediction of crop adaptation in response to environmental stresses (sub-topic B)
- translate knowledge on the adaptive plasticity of plants and complex genotype by phenotype interactions into crop improvement and management strategies sub-topic (sub-topic B)

In the long term activities will enhance the sustainability of farmed animal production (sub-scope A). They will allow making more solid assertions on how crops will respond and can possibly better adapt to the effects of climate change (sub-scope B).

Type of Action: Research and Innovation action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

SFS-31-2019: ERANETs in agri-food

Specific Challenge: The agri-food sector⁶⁸ is subject to multiple external pressures, such as rising demand for food, competition for land and other natural resources with other biomass uses, globalisation, threats from animal or plant diseases, environmental changes and public health considerations. This implies the need to become more efficient and sustainable; improve its impact on consumer health; take advantage of new technological developments; and become more transparent and responsive to consumer demands, within a food-system approach.

Scope: Proposals should address one or more of the following sub-topics (A) to (C) and should clearly indicate to which one they refer.

A. [2019] ICT-enabled agri-food systems

Today, despite increased information demand from consumers and food chain players alike, Europe's food businesses and farmers are slow at adopting digital technologies. This is due in part to the inherent complexities of relevant products and processes, and in part to the dynamically changing open network organisation of the food sector with its multitude of SMEs, its cultural diversity, its differences in expectations and in the ability to serve transparency needs. The agri-food sector needs to take more advantage of the potential of digital technologies. Relevant technologies may include Internet of Things, Artificial Intelligence, Big Data technologies, remote and localised sensing. This sub-topic will engage the agri-food community in supporting the development of solutions to remove the barriers to adoption of digital technologies, taking a multi-actor approach across different supply chains (conventional and organic) from farm to fork. These solutions will be targeted to supporting third party development of a variety of digital technologies which can take advantage of, integrate with, and complement the standardisation efforts and platform developments in other Horizon 2020 and nationally-funded projects. In addition, this sub-topic will support the development of new data-driven ICT platforms and solutions which derive value for multiple actors from the data collected throughout the food chain, thereby enabling new business models which will increase the affordability and adoption of such solutions, reduce the environmental footprint, increase system resilience, and empower consumers. International cooperation will be encouraged and complementarity with other ERA-NETs will be ensured throughout the project development stages by means of active collaboration and communication

B. [2019] Climate change and food systems

⁶⁸ OECD/WTO (2013), developing on FAO (2005) on agrifood value chain: "A 'value chain' in agriculture identifies the set of actors and activities that bring a basic agricultural product from the field to final consumption and add value at each stage of the production process."

Proposals under this sub-topic will aim at developing climate-resilient and sustainable value chains for food systems. In particular they will assess risks and vulnerabilities of food systems faced with climate change, thereby offering low carbon footprint solutions (technological and/or non-technological) to increase resilience and sustainability. Specific focus will be put on the socio-economic impacts of climate change on different food chains, price volatility and the territorial dimension on access to accessible and nutritious foodstuffs. Complementarity with SusFood ERA-NETs will be ensured throughout the project development stages.

C. [2019] International veterinary vaccinology

Vaccination is one of the most cost-effective prevention strategies for controlling and eliminating infectious diseases of animals. Despite recent successes there are still diseases for which there are either no vaccines or where current vaccines lack optimal efficacy. New and improved vaccines have been identified as an important component in strategies to reduce reliance on antimicrobials. In most cases the lack of vaccines is because classical methods of generating vaccines have failed or the current market situation does not justify the cost of their development. While the induction of immunological memory is fundamental to vaccines we still do not have a clear understanding of how best to design vaccines that drive long-lasting and protective memory responses. It is also possible that technological advances would make the development of vaccines more economically viable. Addressing current challenges will require international collaboration, not least for infectious diseases that do not respect country borders and are threats to EU animal production and trade, and in a number of cases, to public health. The ERA-NET will pool resources and expertise to increase knowledge on immunology and to develop novel tools and generic technology platforms for producing novel and/or improved vaccines that are applicable to specific livestock sectors and/or diseases. Areas of particular interest include vaccine delivery systems and thermo-stabilisation. Vaccines for regulated diseases, in particular an efficient and safe vaccine against highly pathogenic avian influenza viruses and its companion DIVA test, will be part of the activities developed. Industry engagement in projects selected under the ERA-Net is encouraged. The projects selected should follow the policies and contribute to the objectives of the STAR-IDAZ international research consortium⁶⁹.

The Commission considers that proposals requesting a contribution from the EU of EUR 6 million for sub-topic A) and 5 million for sub-topics B) and C), respectively, would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected Impact:

- Improve coordination between national and EU funding and ensure better use of resources in the priority research areas above [A, B, C];
- Reduce the environmental footprint of the sector by reducing inputs and waste [A, B].

⁶⁹ <http://www.star-idaz.net/>

- Realise the potential of ICT and digital technologies to share data throughout the food value chain, thereby driving greater sustainability, offering new business models and helping to empower consumers to make smarter, more sustainable, healthier and more personal food and dietary choices, taking into account data regarding environmental impact, origin, nutrition, safety, integrity, etc., underpinned by the concept of transparency [A];
- Integrate effectively with major digital platforms from food actors, ICT solution providers and consumers [A];
- Develop innovative solutions to cope with the multiple risks and challenges to the food systems posed by global environmental changes [B];
- Provide new generic tools and systems to design and develop new or improved vaccines, including better preparedness to react to emerging diseases [C];
- Improve control of specific infectious diseases, including highly pathogenic avian influenza viruses, by translating key knowledge on host and pathogen interaction into pathways for new/improved vaccines [C];
- Improve collaboration with international initiatives to promote coherence and the applicability of research to preventive tools in order to control animal diseases [C].

Type of Action: ERA-NET Cofund

The conditions related to this topic are provided at the end of this call and in the General Annexes.

Targeted international cooperation

Activities promoted address global challenges and allow for significant international cooperation, exchanges and sharing of resources. In addition to general openings for international cooperation, targeted activities are foreseen to support the implementation of the EU-Africa Partnership on Food and Nutrition Security and Sustainable Agriculture (FNSSA) and implement the EU-China FAB Flagship initiative.

FNSSA Africa:

In 2016 the EU-Africa High Level Policy Dialogue on science, technology and innovation (HLPD) has adopted the roadmap⁷⁰ for the EU-Africa Research and Innovation Partnership on Food and Nutrition Security & Sustainable Agriculture (FNSSA). In support of the implementation of the R&I Partnership on FNSSA and in line with the ‘Joint communication to the European Parliament and the Council for a renewed impetus to the Africa-EU Partnership’⁷¹, a number of actions are proposed. The actions include: for the overall support

⁷⁰ [Roadmap towards a jointly funded EU-Africa Research & Innovation Partnership on Food and Nutrition Security and Sustainable Agriculture](#). Addis Ababa, 4-5 April 2016.

⁷¹ JOIN (2017) 17

to the implementation of the EU-Africa R&I Partnership on a Cooperation and Support Action (SFS-32); for pillar I of the roadmap (Sustainable intensification) a portfolio of projects (SFS-34 and SFS-35); for pillar II (Agriculture and food systems for nutrition) a research and innovation action (SFS-33). Pillar IV of the partnership should be considered as appropriate in each proposal.

Proposals are expected to establish relevant links with other projects funded in support of the EU-Africa R&I Partnership on FNSSA, including those funded by previous Horizon 2020 work programmes and those funded by the EU's development budget.

For FAB China:

The European Commission and the Chinese Academy of Agricultural Sciences signed a letter of intent on research and innovation cooperation in food, agriculture and biotechnology (FAB) in November 2013. They agreed to work towards an ambitious strategic long-term partnership and launched the FAB 'flagship initiative'. Building on this agreement, the EU-China Task Force on FAB has developed specific common priorities that will promote substantial, coordinated and balanced research and innovation cooperation between the EU and China. These priorities are reflected in topics SFS-36 to SFS-39.

Proposals are invited against the following topic(s):

SFS-32-2018: Supporting microbiome coordination and the International Bioeconomy Forum

Specific Challenge: Knowledge of the potential of microbial systems, or microbiomes, throughout the food chains, is seen as a promising means to ensuring the sustainability of our food system. Although a number of relevant European programmes and initiatives are currently running or are being launched, they are largely fragmented, implying a stringent need for coordinated action. This need for joint action at the European level can also be regarded in the broader picture of microbiome-related actions at the international level. A forum for regular, strategic international cooperation at multi-partner level could focus on building policy coherence and exploiting synergies between countries and regions. To this end, the European Commission launched in October 2016 the International Bioeconomy Forum (IBF), a flexible multilateral platform whereby European and global R&I partners would gather to discuss and act on common challenges in the bioeconomy, such as the microbiome. The bioeconomy has been incorporated in the strategic activities of a large number of countries in Europe and worldwide. Accordingly the IBF will be used as a platform to share ideas and experiences on bioeconomy policies, strategies and actions, fostering collaboration and joint activities that will promote innovation in key sectors.

Scope: Proposals should aim at a platform for collaboration and coordination across various microbiome-related research and innovation programmes, in Europe and worldwide, throughout the food systems and beyond, including both terrestrial and aquatic environments (e.g. linkages among microbiome related work in plants, animals, soils, marine and human

health)⁷²]. They should map the state of play in the different Member States, associated countries and third countries participating in the IBF, and propose strategic research agendas for future Microbiome activities addressing emerging technologies and political priorities. In line with the objectives of the EU strategy for international cooperation in research and innovation⁷³, proposals should also aim at supporting similar activities within other IBF working groups. Participation of relevant partners from third countries and international organisations is strongly encouraged.

The Commission considers that proposals requesting a contribution from the EU in the range of EUR 3 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected Impact: In line with the EU Bioeconomy Strategy, in the short/medium term proposals will:

- Improve coherence and reduce the overlap between national and EU funding in microbiome research; reinforce collaborations and knowledge exchange with international networks to promote coherence and applicability of microbiomes; help establish an internationally agreed microbiome definition, best practices and standards, consistent protocols and pipelines.
- Improve the international cooperation framework of bioeconomy research programmes, thus creating the basis for the development of joint international research programmes and facilitate the alignment of international research agendas.
- Exchange knowledge across the scientific and political community and ensure an efficient use of the available resources, while raising awareness of the bioeconomy at an international level.

In the long-term, proposals will impact on global challenges relevant to the bioeconomy world-wide through multilateral co-operation and broader international efforts towards the achievement of some ambitious Sustainable Development Goals (SDGs).

Type of Action: Coordination and support action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

⁷² Relevant topics presented in the Work Programme are: SC1-BHC-03-2018 Exploiting research results and potential of the human microbiome for personalised prediction and prevention of disease, LC-SFS-03-2018 Microbiome applications for sustainable food systems, SFS-11-2018-2019 Anti-microbials and livestock production, [....

⁷³ <http://ec.europa.eu/research/iscp/index.cfm?pg=strategy>

EU-Africa Partnership on Food and Nutrition Security and Sustainable Agriculture (FNSSA)

SFS-33-2018: Support to the implementation of the EU-Africa Research and Innovation Partnership on Food and Nutrition Security & Sustainable Agriculture (FNSSA)

Specific Challenge: Following adoption of the FNSSA roadmap in 2016 there is a need to create a platform for exchanging information between different projects and to look for synergies between different funding mechanisms implementing the R&I Partnership on FNSSA. The partnership is a ten-year flexible research and innovation programme for which a long-term governance mechanism needs to be created.

Scope: The coordination and implementation of the EU-Africa Research and Innovation Partnership on Food and Nutrition Security & Sustainable Agriculture (FNSSA) will be supported by a dedicated structure. Activities will provide support to a) building a knowledge base and b) overseeing projects funded under Horizon 2020 and previous EU research programmes and relevant programmes funded from other sources. It will also encourage strong links to projects funded by the EU's development programmes or bilateral projects funded by the EU Member States and African partners. This structure will give full support to the Bureau of the EU-Africa High Level Policy Dialogue (HLPD) on science and technology and innovation, which is the final responsible organ. It will support the HLPD in monitoring and evaluating the outputs of the R&I Partnership and its cluster of H2020 projects (the HLPD Bureau will define the exact request each year). Activities will help analyse the impact of relevant EU-Africa research and innovation projects funded by the EU in FNSSA domain. The proposals will contribute to human and institutional capacity building and provide the basis for turning the EU-Africa R&I Partnership on FNSSA into a long-term platform for collaboration.

The Commission considers that proposals requesting a contribution from the EU of up to EUR 5 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected Impact: In the short to medium term the work will result in

- the creation of a true cluster of projects in support of a coherent implementation of the EU-Africa R&I Partnership to optimise research and innovation programmes relevant to FNSSA;
- support to EU-Africa HLPD Bureau as a part of the implementation of the R&I Partnership on FNSSA.

In the long term activities will strengthen networking and collaboration and provide the basis for turning the EU-Africa R&I Partnership on FNSSA into a long-term platform for collaboration.

Type of Action: Coordination and support action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

LC-SFS-34-2019: Food Systems Africa

Specific Challenge: Nutritional imbalances in both Europe and Africa are increasing, characterised by growing diet-related, non-communicable diseases and persistent under-nutrition. The UN projects that the global population will increase from 7 billion to more than 9 billion by 2050⁷⁴, of which the majority is expected to occur in Africa. To anticipate such population growth and challenges associated with enhanced climate change, agricultural systems need to become more sustainable and better linked to nutrition performance by strengthening the agro-biodiversity of resilient cropping systems, thereby increasing the range of food products for a balanced, healthy diet. Furthermore, resource-efficient, resilient food value chains need to be developed to deliver sufficient, safe, affordable and nutritious food to local consumers and for high value global markets. Africa has a wealth of local varieties, food intelligence and healthy African diets including plant based proteins, which are currently largely untapped and not reaching the market, neither in African cities nor in Europe.

Scope: Proposals shall assess and deliver better nutrition performance of African farming systems, strengthening the agro-biodiversity (including integrated aquaculture systems) and food diversity. They shall address innovative approaches in local food systems while covering technological, food safety, social and gender issues⁷⁵, and address sustainable postharvest technologies, including bio-based packaging, to reduce food waste along the post-harvest/consumer chain and plastic littering. Empowerment of small farmers and processors benefitting rural areas leading to diversity of diets and improving food identity is essential. Food supply chains (conventional and organic) for both local urban markets and high value global markets shall be targeted. Proposals need to ensure the commitment and participation of a variety of partners established in the EU and in Africa, and shall establish relevant links with other projects involved in the EU-Africa Research and Innovation Partnership on Food and Nutrition Security & Sustainable Agriculture (FNSSA). Proposals should include a task to cluster with other projects involved in the EU-Africa R&I Partnership on FNSSA and with the cooperation platform established under SFS-32-2017.

The Commission considers that proposals following a multi-actor approach including civil society organisations requesting a contribution from the EU of the order of EUR 7 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

⁷⁴ <http://www.un.org/en/development/desa/news/population/2015-report.html>

⁷⁵ Applicants may be interested in a separate but connected call topic on " Implementation research for maternal and child health" under Societal Challenge 1.

Expected Impact: In the framework of SDG no 1, 2, 3, 8, 10, 12, 13, 15 and 17, the EU-Africa R&I Partnership on FNSSA⁷⁶, the EU's Bioeconomy Strategy 2012, and the FOOD 2030 SWD⁷⁷, proposals shall describe how projects can contribute to:

- Improved food systems resulting in sustainable, healthy African diets (comparable to the Mediterranean diet) that on the short term are to become mainstream in 10 African cities;
- Empowerment of small farmers combined with sustainable growth of food chain operators (SMEs) in rural areas in Africa, both for internal markets and export;
- New market opportunities for novel food products, tools and processes applicable in Africa that are taking into account food safety issues across the entire food value chain (e.g. improved food storage under mycotoxins free conditions) and reduce food waste;
- Significant reduction of malnutrition in Africa and particularly in relation to children, including those within the first 1,000 days of life, by implementing nutritional recommendations (proportion/figures to be specified in the proposals as well as reflections on specific food strategies for crisis and civil war situations);
- Major progress towards the establishment of the EU-Africa Research and Innovation Partnership on FNSSA and impact at local level;
- Development and implementation of pilot innovation actions for the benefit of African and European consumers at TRL 4-5.

Type of Action: Research and Innovation action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

SFS-35-2019-2020: Sustainable Intensification in Africa⁷⁸

Specific Challenge: African and European agriculture share the common challenge of moving towards more sustainable ways of agricultural production. Both regions aim to ensure food production and reduce the environmental impact of agricultural activities in the face of climate change, more unpredictable water supply and increased degradation of (land) resources. Systems approaches are needed to optimise agricultural productivity as well as the delivery of ecosystem services.

Scope:

A. [2019]: African Farming Systems, sustainable intensification pathways (RIA)

⁷⁶ Joint communication to the EP and Council for a renewed impetus to the Africa-EU Partnership', JOIN (2017) 17

⁷⁷ European Research and Innovation for Food and Nutrition Security, SWD(2016)319. <http://ec.europa.eu/transparency/regdoc/rep/10102/2016/EN/SWD-2016-319-F1-EN-MAIN.PDF>

⁷⁸ It is expected that this topic will continue in 2020

Activities shall seek to implement and test systems approaches for the sustainable intensification of primary production in Africa, taking into account its long term economic support to local communities. The proposed research should address the improvement of agricultural practices by tackling land and water management (including land degradation where appropriate) and soil management (including its quality and nutrients uptake) for sustainable intensification. The importance of traditional agricultural practices like grazing methods, livestock, crops and legumes should be duly reflected. Emphasis should be given to farming systems that support restoration of land, increase land productivity and/or bring land back into production. Proper attention should be given to the importance of gender in African agricultural production.

For proper analysis, a range of different systems should be included (e.g. organic farming, agroecology, agroforestry). While presenting results the importance of scale of the analysis and its applicability should be taken into account. The analysed systems should include socio-economic aspects, farm income and where pertinent also cultural aspects of farming. Preference will be given to proposals focusing on specific regions of Africa.

Proposals fall under the concept of the 'multi-actor approach'⁷⁹. Proposals should include a task to cluster with other projects financed under the topic and with the cooperation platform established under SFS-32-2017.

B.[2019]: Soil system for Africa (RIA)

For the implementation of the EU-Africa R&I Partnership on FNSSA a comparable and open database on agricultural soils information is needed. It is expected that a minimum of 20 000 sampling points will be sufficient to create a database with standard soil properties (a similar procedure to the one used for LUCAS⁸⁰ database of Europe should be developed).

The soil samples will only be taken from the agricultural land and analysed by one laboratory for the: physical and chemical parameters. As a minimum the following parameters should be analysed: particle size (clay, silt and sand content), pH (acidity and alkalinity), organic carbon, carbonate content, phosphorus content, total nitrogen content and extractable potassium content. In addition an analysis of heavy metal content in selected sub-samples might be proposed. Based on the analysed samples a set of indicators for monitoring of state of land soil, water and ecosystem should be proposed. Other physical, chemical and biological parameters for soil test might be proposed along with the specific indicators for which they will be used. The indicators should be developed as a part of the long-term implementation of FNSSA and its contribution to the SDGs discussion. Presentation of data should be provided in an open data and map viewer and should include four aspect pictures of where the soil sample was taken and should link with open earth data from e.g. the Copernicus programme and the project funded under H2020 topic SFS-43-2017⁸¹. It is expected that the open

⁷⁹ See definition of the 'multi-actor approach' in the introduction to this Work Programme part.

⁸⁰ Number of publications related to LUCAS soil component can be found under the following link: <http://esdac.jrc.ec.europa.eu/resource-type/documents>

⁸¹ https://ec.europa.eu/research/participants/data/ref/h2020/wp/2016_2017/main/h2020-wp1617-food_en.pdf

database will contain at least a minimum of 20 000 soil sample analysed by one laboratory. The final methodology should be developed in cooperation with and validated by the Joint Research Centre and the Global Soil Partnership – IPTS African members.

Proposals should include a task to cluster with other projects financed under the topic and with the cooperation platform established under SFS-32-2017.

The Commission considers that proposals requesting a contribution from the EU of up to EUR 7.5 million for sub-topic A and EUR 5 million for sub-topic B would allow this specific challenge to be addressed properly. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected Impact: In the short to medium term:

- Boost the impact of Africa-EU joint research at local level by addressing the entire value-chain, strengthening capacity-building and focusing on demonstration projects and pilot actions to bring research and innovation results to the users (sub-topic A);
- Provide simple tools and solutions for preserving and increasing natural resources of specific agro-system (sub-topic A);
- Identification of methods and tools for improving soil condition for water retention, increase in nutrient and organic matter (sub-topic A);
- Proposed methods and solutions for different farming systems should include potential of transferability and scale at which solution can be implemented (sub-topic A).
- Solutions and tools for increasing farm income within sustainability of long term farming (sub-topic A);
- Based on the soil sample analysis, provide a set of key indicators for soil assessment in Africa (sub-topic B).

In the long term: for sub-topic A - improve agricultural production potential and income of farmers and for sub-topic B- provide an open soil dataset with a set of key indicators with methodology for which soil samples and the time line of indicators can be independently repeated in support of monitoring of soil and land degradation. The set of indicators should as much as possible support the relevant SDGs implementation discussion.

Type of Action: Research and Innovation action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

CE-SFS-36-2020 - Diversifying farmers' income through small bio-based concepts

EU-China FAB Flagship initiative

SFS-37-2019: Integrated approaches to food safety controls across the agri-food chain

Specific Challenge: Food safety in the food chain is a basis for effective functioning of national and international markets with trust and transparency. Food safety risks occur along the food chain from a number of biological and chemical contaminants. In addition, malpractices or fraudulent practices could also lead to increased food safety risks. Improving risk assessment and monitoring, including the use of big data, is of major importance. Developing integrated approaches along the entire food chain for detecting, assessing, and mitigating relevant pathogens and contaminant hazards is essential. It implies efficient food safety control systems, supported by reliable authentication and traceability approaches, being implemented across the entire food chain, focusing on the combination of hazard monitoring and control options in the specific stages of the food chain where the impact would be greater, or combinations of these at multiple stages. This is in particular challenging for SMEs which is a predominant entrepreneurial model across the agri-food sector, both in the EU and China.

Scope: Proposals should look at the development of an integrated approach for detecting, assessing and mitigating food safety risks from biological and chemical hazards (whether emerging or not) through the entire food chain/s (from primary production to consumers). They should tackle specific sector/s while taking into account the diversity of the supply chains within sector(s). The research activities should gather relevant data to assess risks and deliver practical solutions (technology and management related) in order to control those hazards and their combinations at specific stages of the food chain where interventions can deliver the most efficient and greatest possible impact on public health. Activities will develop detection and monitoring tools that will allow for the data collection, integration, validation and analysis. Proposals will establish and validate non-targeted and targeted rapid detection methods for the screening and identification of biological and chemical hazards. Special attention will be given to developing and/or improving systems ensuring process efficacy and validation for hazard control. Proposed activities will encompass work within the food safety risk analysis framework while at the same time developing simple and practical decision support tools tailored towards the needs of agri-food sector (SMEs in particular) and scientific stakeholders. Proposals will fall under the concept of the 'multi-actor approach'⁸² and allow for the adequate involvement of SMEs and food safety control authorities. Proposals should include a task to cluster with other project/s financed under this topic and ensure complementarity with activities of EU-China-Safe project funded in response to the topic "SFS-45-2016: Increase overall transparency of processed agri-food products". Proposals shall promote balanced research and innovation cooperation between the EU and China. China-based entities that will participate in joint projects with European partners under Horizon 2020 have also the possibility to apply for funding under the Chinese co-funding mechanism (see topic conditions).

⁸² See definition of the 'multi-actor approach' in the introduction to this Work Programme part.

The Commission considers that proposals requesting a contribution from the EU of up to EUR 4 million would allow this specific challenge to be addressed properly. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts. Contributions for Chinese participants will come in addition and will be made available by China.

Expected Impact: Overall, activities will improve food safety control systems (implementations, inspection and controls) along the food chain.

In the short to medium term work will:

- Ensure and enhance the transparency and reliability of food safety along the entire food chain (including the e-commerce mean) with regard to international trade and internal EU and Chinese markets;
- Enhance capacity of food SMEs and operators along the chain to detect, assess and mitigate food safety risks stemming from relevant pathogens, contaminant hazards and counterfeit food;
- Improve the effectiveness and efficiency of the controls performed by the food safety authorities along the food chain;
- Contribute to standard-setting and regulatory cooperation in the EU and China.

In the longer term funded activities will increase food safety along the food chains in the EU and China.

Type of Action: Research and Innovation action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

SFS-38-2018: Highly efficient management of soil quality and land resources

Specific Challenge: Production, protection and remediation are the three major components for securing global food supply on limited land resources for the growing global population. As competition between urban, industrial/transportation and agricultural land uses increases, food production needs to be maintained on decreasing land areas. To achieve a new balance on a higher output level, with possibly less input is the ultimate goal of resource use efficiency, sustainable management and competitiveness of agriculture. Land suitability-based management with prioritization of targets (outputs) has to be in place and life cycle assessment of nutrient flows need to be included. Harmonization between environmental and social targets has to be made on the basis of common/harmonized data and parameters of soil and land. Research should focus more on priority areas in the optimization of land use and environmental protection taking into consideration the specific ecological and socio-economic conditions in China and Europe.

Scope: Harmonising land information is crucial for building common understanding of the resource base, with special regard to prime land. Harmonisation should be based on the Eurasian coverage of the new global soil map, incorporating local soil information. Indicators for sustainable intensification and delineation of both prime agricultural land and problem lands should be defined. Options for a trade-off between ecology and productivity should be demonstrated for both productive and less productive land. Influence of climate change and impact of land use change should be incorporated to the models, especially targeting the loss of prime land. The achievement of a new balance should also consider the socio-economic context. In order to achieve the suitability-based highly-efficient land resources management, focus has to be on soil properties (carbon in particular), nutrient input to soil (N, P, K) and N fixation. Proposals shall promote balanced research and innovation cooperation between the EU and China. China-based entities that will participate in joint projects with European partners under Horizon 2020 have also the possibility to apply for funding under the Chinese co-funding mechanism (see topic conditions).

The Commission considers that proposals requesting a contribution from the EU of up to EUR 5 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts. Contributions for Chinese participants will come in addition and will be made available by China.

Expected Impact: in the short to medium term:

- Introduce a new harmonized land information base for Europe and China;
- Propose indicators and management solutions for a new balance of soil resource utilisation;
- Raise public awareness about land as a crucial global resource;
- Improvement of common understanding of prime land and problem land in the global context.

In long term enhance EU-China cooperation in land use optimization for global food and environmental security.

Type of Action: Research and Innovation action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

CE-SFS-39-2019: High-quality organic fertilisers from biogas digestate

Specific Challenge: Public policies in China and in several EU Member States have promoted the use of anaerobic digestion to treat organic wastes and to generate renewable energy. This has resulted in the production of considerable volumes of digestate as by-product, which could raise an environmental concern, prove costly and represent an inefficient use of

biomass. The most straight-forward option for placing a value on digestate is to use it as an organic fertiliser and soil amender. However digestate is not highly appreciated by farmers as a soil treatment due to its significant shortcomings. These may include, amongst other things and depending on the feedstock source, potential risks of water pollution through leaching, soil contamination, or a threat to human health by food contamination. Furthermore, digestate is difficult to manage due to its fertilising properties, format and high water content.

Scope: Projects shall develop treatment technologies to convert digestate into a suitable fertiliser or soil amender. They could focus on a specific digestate type or develop a flexible process covering a variety of digestates. These treatments shall (i) reduce risks linked to biological and chemical hazards (including AMR) to acceptable levels, (ii) improve fertilising properties and (iii) address issues related to format, formulation and handling. Proper solutions must be sought for the liquid phase to avoid pollution.

The fertiliser developed must be suitable for direct use, or for mixed formulation with other fertilisers. Field tests must be implemented over an appropriate period of time to assess its agronomic properties, as well as its effect on the environment (including greenhouse gas emissions), and on food safety. Projects shall focus on technologies that could be deployed in a decentralised manner, at a relatively small scale. Such technologies shall achieve a technology readiness level (TRL) 6-7 by the end of your project. A comprehensive impact assessment (economic, environmental and social) of the business model shall be carried out, and policy recommendations shall be provided to boost its deployment.

Proposals shall ensure solid collaboration between agro-food actors, technology providers, research centres, end-users (farmers and farmers associations), and public administration. Projects shall perform a thorough analysis of the state of the art, and demonstrate that your proposed activities go beyond this state and do not overlap with past or ongoing research.

Proposals shall include a task to cluster with other projects financed under topic RUR CE-08-2018/2019/2020 and — if possible — with other relevant projects in the field funded by Horizon 2020, including under the Bio-based Industries Joint Undertaking (BBI JU). Proposals shall promote balanced research and innovation cooperation between the EU and China. China-based entities that will participate in joint projects with European partners under Horizon 2020 have also the possibility to apply for funding under the Chinese co-funding mechanism (see topic conditions).

The Commission considers that proposals requesting a contribution from the EU of up to EUR 5 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude the submission and selection of proposals requesting other amounts. Contributions for Chinese participants will come in addition and will be made available by China.

Expected Impact: Projects are expected to provide the technologies needed to develop commercial fertilisers based on biogas digestate. This will help to:

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- replace conventional, non-renewable mineral fertilisers, hence reducing external dependence and risks related to depletion;
- reduce the environmental impacts linked to the inadequate management of biogas digestate, and to the production of fossil-based fertilisers;
- develop new business models in rural areas, that are synergised with existing ones, creating value from digestate.

In the long term, this shall contribute to a more circular, resource-efficient and sustainable agro-food sector, and create wealth and quality jobs in rural areas.

Projects shall also contribute to increasing the innovation capacities of participating organisations, and to strengthening scientific and industrial collaboration between the EU and China.

Type of Action: Innovation action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

Conditions for the Call - Sustainable Food Security

Opening date(s), deadline(s), indicative budget(s):⁸³

Topics (Type of Action)	Budgets (EUR million)			Deadlines
	2018	2019	2020	
Opening: 27 Oct 2017				
LC-SFS-19-2018-2019 (RIA)	7.00			13 Feb 2018 (First Stage)
SFS-01-2018-2019-2020 (RIA)	14.00			11 Sep 2018 (Second Stage)
SFS-05-2018-2019-2020 (RIA)	7.00			
SFS-06-2018-2020 (RIA)	5.00			
SFS-07-2018 (RIA)	8.00			

⁸³ The Director-General responsible for the call may decide to open the call up to one month prior to or after the envisaged date(s) of opening.

The Director-General responsible may delay the deadline(s) by up to two months.

All deadlines are at 17.00.00 Brussels local time.

The deadline(s) in 2019 and 2020 are indicative and subject to separate financing decisions for 2019 and 2020.

The budget amounts for the 2018 budget are subject to the availability of the appropriations provided for in the draft budget for 2018 after the adoption of the budget 2018 by the budgetary authority or, if the budget is not adopted, as provided for in the system of provisional twelfths.

The budget amounts for the 2019 and 2020 budget are indicative and will be subject to separate financing decisions to cover the amounts to be allocated for 2019 and for 2020.

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SFS-08-2018-2019 (RIA)	10.00			13 Feb 2018	
SFS-11-2018-2019 (RIA)	12.00				
SFS-16-2018 (RIA)	14.00				
SFS-27-2018 (RIA)	7.00				
SFS-29-2018 (RIA)	8.00				
SFS-30-2018-2019-2020 (RIA)	18.00				
SFS-38-2018 (RIA)	5.00				
CE-SFS-25-2018 (IA)	20.00				
DT-SFS-14-2018 (IA)	28.00				
LC-SFS-03-2018 (IA)	42.00				
LC-SFS-15-2018 (CSA)	3.00			Opening: 25 Oct 2018	
SFS-28-2018-2019-2020 (CSA)	3.00				
SFS-32-2018 (CSA)	2.75				
SFS-33-2018 (CSA)	5.00				
CE-SFS-24-2019 (IA)		12.00			23 Jan 2019
CE-SFS-39-2019 (IA)		5.00			
DT-SFS-14-2018 (IA)		10.00			
DT-SFS-26-2019 (IA)		10.00			
LC-SFS-17-2019 (IA)		32.00			
LC-SFS-20-2019 (COFUND-EJP)		40.00			
SFS-08-2018-2019 (IA)		6.00			
SFS-12-2019 (IA)		10.00			
SFS-31-2019 (ERA-NET-Cofund)		21.00			
LC-SFS-19-2018-2019 (RIA)		14.00		23 Jan 2019 (First Stage) 04 Sep 2019 (Second Stage)	
LC-SFS-34-2019 (RIA)		21.00			
SFS-01-2018-2019-2020 (RIA)		16.00			

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SFS-04-2019-2020 (RIA)		15.00		
SFS-05-2018-2019-2020 (RIA)		7.00		
SFS-11-2018-2019 (RIA)		6.00		
SFS-23-2019 (RIA)		14.00		
SFS-28-2018-2019-2020 (RIA)		14.00		
SFS-30-2018-2019-2020 (RIA)		10.00		
SFS-35-2019-2020 (RIA)		35.00		
SFS-37-2019 (RIA)		8.00		
Opening: To be defined				
Focus area topic(s) for 2020			24.00	To be defined
Overall indicative budget	218.75	306.00	24.00	

Indicative timetable for evaluation and grant agreement signature:

For single stage procedure:

- Information on the outcome of the evaluation: Maximum 5 months from the final date for submission; and
- Indicative date for the signing of grant agreements: Maximum 8 months from the final date for submission.

For two stage procedure:

- Information on the outcome of the evaluation: Maximum 3 months from the final date for submission for the first stage and maximum 5 months from the final date for submission for the second stage; and
- Indicative date for the signing of grant agreements: Maximum 8 months from the final date for submission of the second stage.

Eligibility and admissibility conditions: The conditions are described in General Annexes B and C of the work programme.. The following exceptions apply:

SFS-33-2018	Due to the specific challenge of this topic, in addition to the minimum number of participants set out in the General Annexes, proposals shall include at least eight participants from Africa.
SFS-35-2019-2020	Sub-topic A: Due to the specific challenge of this topic, in

	<p>addition to the minimum number of participants set out in the General Annexes, proposals shall include at least five participants from specific region of Africa (as defined by African Union) and a minimum of eight participants from Africa.</p> <p>Sub-topic B: Due to the specific challenge of this topic, in addition to the minimum number of participants set out in the General Annexes, proposals shall include at least eight participants from Africa. Due to logistics the laboratory for soil sample analysis should be located on the African continent.</p>
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Evaluation criteria, scoring and threshold: The criteria, scoring and threshold are described in General Annex H of the work programme.

Evaluation Procedure: The procedure for setting a priority order for proposals with the same score is given in General Annex H of the work programme.

The full evaluation procedure is described in the relevant [guide](#) published on the Participant Portal.

Grant Conditions:

SFS-01-2018-2019-2020	<p>For grants awarded under sub-topic B <i>action</i> beneficiaries may provide support to third parties as described in part K of the General Annexes of the Work Programme. The support to third parties can only be provided in the form of grants. The respective options of Article 15.1 and Article 15.3 of the Model Grant Agreement will be applied.</p>
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Call - Blue Growth

H2020-BG-2018-2020

The Blue Growth Call aims at sustainably harvesting the potential of resources from seas, oceans and inland waters for different uses and across the range of marine and maritime industries, while protecting biodiversity and enhancing climate resilience. It supports sustainable growth in the marine and maritime sectors through a responsible management of marine resources for healthy, productive, safe, secure and resilient seas and oceans, which are essential for thriving ecosystems, climate regulation, global food security, human health, livelihoods and economies.

This call will boost the blue economy by: i) Improving our integrated knowledge about the reciprocal impact of climate change on marine ecosystems and biological resources in order to effectively manage their response, mitigation and resilience capacities; ii) Preserving and sustainably exploiting marine and coastal ecosystems, and biological resources to deliver improved nutrition and health; iii) De-risking major investments and boosting blue innovations on land and at sea to develop new bio-based marine value chains and open up new markets; iv) Developing smart and connected territories between land and sea; and v) Strengthening the international research and innovation cooperation around seas and oceans, to promote a globally sustainable blue economy.

Activities shall improve ocean observations - in support of the *G7 Future of the Seas and Oceans Initiative* - to better predict and mitigate the impact of stressors and changes (including sea-level rise), and the exploration of marine resources, including enhancing the access and management of data and services ("blue cloud"). They will tap into the potential of marine resources, including plankton and microbiomes, and aquatic production systems, from fisheries to aquaculture⁸⁴, for better food and nutrition security, health and bio-based products as well as climate change mitigation. Major international cooperation activities will also be launched, focusing on the South Atlantic Ocean and paving the way towards an 'All Atlantic Ocean Research Alliance'⁸⁵, and reinforcing cooperation with partners in other regions such as the Baltic Sea and the North Sea, the Mediterranean and the Black Sea. All Blue Growth actions shall also contribute to improving science education and ocean literacy through dissemination, outreach and training activities.

A strategic coordinated approach for marine and maritime research across all parts of Horizon 2020 will support the implementation of relevant EU policies to help deliver key Blue Growth objectives across Europe, including the EU Outermost Regions. This will also involve relevant topics from other parts of Horizon 2020 in addition to Societal Challenge 2, which will be interlinked through a Blue Growth topics flagging system.

⁸⁴ In this context, 'aquaculture' comprises the farming of aquatic organisms (including fish, shellfish, algae and aquatic plants) in all types of controlled or natural water environments (freshwater, brackish and seawater).

⁸⁵ Belém Statement on Atlantic Research and Innovation Cooperation, Commission Decision C(2017)3551/F1, full reference to be introduced upon Council approval in mid July 2017.

The Blue Growth Call is intended to deliver on a series of EU policies⁸⁶ and international commitments such as the UN Sustainable Development Goals, and it also contributes to the following Focus Areas: 'Building a low-carbon, climate resilient future', 'Digitising and transforming European industry and services' and 'Connecting economic and environmental gains – the Circular Economy'.

Proposals are invited against the following topic(s):

BG-01-2018: Towards a Baltic and North Sea research and innovation programme

Specific Challenge: The northern seas of Europe - the Baltic Sea and the North Sea - are at the forefront of the global surge to enhance and realise marine and maritime potential. This enormous economy is directly and critically dependent on the quality and extent of the ecosystem services provided by the two regional seas and their coasts. In order to foster understanding of these coastal seas and the sustainable use of their goods and services (within the context of the EU Blue Growth Strategy, related policies and environmental legislation) challenges need to be addressed such as: fragmentation among nations and sectors, gaps in interdisciplinary knowledge, inadequate information on potential synergies and trade-offs between different sectors and the environment (including climate change issues), insufficient exchange of knowledge among scientists, industries and policy makers, and a need to increase attention to the societal inclusiveness and human well-being. To address these challenges, it is recognised that a significant and well-coordinated research effort between these two regional seas is necessary. BONUS, the Joint Baltic Sea Research and Development Programme, implemented under Article 185 of the TFEU, has already progressed towards consolidating such efforts among the Baltic Sea Member States. There is now an expressed interest and willingness to prepare conditions for launching a broader European North Sea and Baltic Sea Research and Innovation Programme.

Scope: Activities shall focus on creating the necessary conditions for coordinated research and innovation efforts in the North Sea and Baltic Sea region in cooperation with BONUS by bringing together the main national funding agencies (programme owners and/or managers). They shall map and engage with relevant stakeholders in the region and especially further strengthen a possible new/successor programme with a sound North Sea component. Taking into account of existing commitments in relevant fora the activity shall focus on the preparation and delivery of a Joint Baltic-North Sea Strategic Research and Innovation Agenda, the creation of conditions (governance, management, financial, legal aspects and administration) and the development of an effective mechanism for its implementation, showing a strong commitment to achieve a sound level of integration (scientific, management and financial). Furthermore, they shall ensure visibility and broad involvement of the scientific community, public authorities, decision makers, and other stakeholders (including industry) in the region. The action shall facilitate consultation, awareness and commitment by

⁸⁶ Including the EU Bioeconomy Strategy, 2030 Climate and Energy Framework, Circular Economy Package, Common Fisheries Policy, Integrated Maritime Policy, Marine Strategy Framework Directive, Maritime Spatial Planning Directive, Blue Growth Strategy, and the International Ocean Governance: an agenda for the future of our oceans.

all parties involved. The action shall also prepare and launch a long-term partnership ensuring appropriate funding from all the relevant participating states and a high leveraging effect. Finally, the action shall demonstrate the rationale of the initiative, EU added value, clearly identifying the problems that it proposes to tackle, likely impacts (scientific and technological, economic, social, environmental including climate-change, administrative, impacts on SMEs and on competitiveness and innovation) and main drivers. Synergies and harmonisation should be sought with other relevant ongoing national, regional, EU and international initiatives and institutions such as the Joint Programming Initiative 'Healthy and Productive Seas and Oceans', the International Council for the Exploration of the Seas (ICES), the Convention for the Protection of the Marine Environment of the North-East Atlantic (OSPAR Convention), the Baltic Marine Environment Protection Commission (HELCOM), etc. In agreement with the Commission services, projects should ensure appropriate flexibility so as to respond in real time to potentially fast-changing policy scenarios.

The Commission considers that proposals requesting a contribution from the EU in the range of EUR 2.5 million would allow this specific challenge to be adequately addressed. Nonetheless, this does not preclude the submission and selection of proposals requesting other amounts.

Expected Impact: In order to contribute to the implementation of the EU Integrated Maritime Policy, the EU Blue Growth Strategy, the EU Marine Strategy Framework Directive, the EU Maritime Spatial Planning Directive, the EU International Ocean Governance Communication, the EU Communication for a Sustainable European Future and other EU initiatives such as the Blue Growth Agenda for the Baltic Sea Region, Blue Growth and North Sea related activities, the EU Strategy for the Baltic Sea Region (EUSBSR) and the UN SDGs, activities shall contribute to the following:

In the short term:

- Overcome fragmentation in research and innovation by developing a joint Baltic-North Sea Marine and Maritime Strategic Research and Innovation Agenda by the Baltic Sea and the North Sea countries.
- Create lasting marine and maritime stakeholder platforms and integration mechanisms in the area, and establishing appropriate stakeholder collaboration mechanisms between the North Sea and Baltic Sea regions.

In the medium term:

- Create a framework and deliver the necessary mechanisms, based on experience gained by the current BONUS and other equivalent initiatives, for developing a European Baltic-North Sea Research and Innovation Programme.
- Contribute to improve the professional skills and competences of those working and being trained to work within the blue economy.

- Contribute to policymaking in research, innovation and technology.

Type of Action: Coordination and support action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

BG-02-2018: Blue Bioeconomy Public-Public Partnership

Specific Challenge: Aquatic biomass from the seas and oceans, rivers and lakes has a large potential to ensure future food and nutrition security and to supply raw materials for other high added value chains and products, such as bioenergy, pharmaceuticals and cosmetics while factoring in environment and climate change risks. These so-called provisioning ecosystem services could ensure private and public benefits, while demonstrating synergies or trade-offs with a broader range of ecosystem services. However, this potential is currently underutilised due to a lack of synergies between sectors and of adequate investments. Consequently, EU intervention is needed to create the conditions to mobilise investments by aligning national and regional innovation research agendas across different blue bioeconomy sectors.

Scope: Activities shall pool the necessary financial resources from the participating national and/or regional research programmes with a view to implementing a joint call for proposals with EU co-funding resulting in grants to third parties. Proposers are requested to implement other joint activities, including additional joint calls without EU co-funding. Activities shall address innovative, sustainable and climate-friendly possibilities to produce, harvest and exploit aquatic biomass from different trophic levels for use in food and other value chains. The technical and economic feasibility of these possibilities should be clearly demonstrated by including in the projects industry partners that contribute a concrete and feasible business perspective. The ERA-NET Cofund shall address research and innovation gaps such as achieving zero waste by optimising the use of underutilised and waste material from fisheries and aquaculture and apply biotechnology and ICT in the blue bioeconomy to develop smart, efficient, traceable food systems and other biomaterials and create synergies between aquaculture and fisheries (e.g. through genetic assessment); to unlock the potential of microbiomes in aquaculture, fisheries, food processing and biotechnology; to create predictive tools to improve the identification, targeting and conservation of biodiversity “hot-spots” in the oceans (e.g. through omics-based technologies); explore synergies with land-based production in areas such as food and feed processing, biorefining, bioenergy, biomaterials, chemicals and nutrients, and include waste streams from aquatic to terrestrial value chains; to improve aquaculture and fisheries by using a combination of methods, processes and technologies such as biotechnology to create innovative feeds, improve brood stock, introduce new species, improve biosecurity, define stock baselines, and assess stocks. Activities shall also build on developments derived from relevant Framework Programme projects. Activities shall also aim to implement other joint activities without EU co-funding, on issues related to fisheries, aquaculture, seafood processing and aquatic biotechnology in line with the Strategic Research and Innovation Agenda of the Joint Programming Initiative "Healthy and Productive

Seas and Oceans"⁸⁷, the COFASP Strategic Research Agenda⁸⁸, and the Marine Biotech Strategic Research and Innovation Roadmap⁸⁹. Inclusion of societal actors and stakeholders at large during the whole research and innovation process shall allow to better align both the process and its outcomes with the values, needs and expectations of society while facilitating the creation of new value chains in the market. The interdisciplinary and cross-sectorial nature of the project should also apply to training activities improving the professional skills and competencies and supporting the creation of new jobs in the blue economy. Proposers have to demonstrate that the topic for the cofunded call excludes duplication with calls launched or planned under Horizon 2020.

Participation of legal entities from international partner countries will be encouraged in the joint call as well as in other joint activities including additional joint calls without EU co-funding. Participants from countries which are not automatically eligible for funding may request a EU contribution (on the basis of the ERA-NET unit cost) for the coordination costs of additional activities.

The Commission considers that proposals requesting a contribution from the EU in the range of EUR 8 million would allow this specific challenge to be adequately addressed. Nonetheless, this does not preclude the submission and selection of proposals requesting other amounts.

Expected Impact: Contributing to ongoing implementation at EU and national level of EU policies such as the Bioeconomy Strategy, the Circular Economy Strategy, the Blue Growth Strategy, the Common Fisheries Policy, the Marine Strategy Framework Directive, the Maritime Spatial Planning Directive, the BLUEMED Initiative and notably common priorities with the WestMED Initiative⁹⁰ and the EUSAIR, as well as the priorities defined in the European Commission Staff Working Document FOOD 2030⁹¹ and international initiatives such as the Atlantic Ocean Research Alliance, this ERA-NET Cofund shall:

In the short term:

- Create, test, upscale and bring to the market new knowledge-intensive products and services derived from aquatic biomass, fostering job creation and economic growth in Europe.
- Provide consumers with the knowledge needed to make informed decisions about safe, healthy and sustainable food and policy makers with robust scientific advice.

In the medium term:

⁸⁷ Joint Programming Initiative "Healthy and Productive Seas and Oceans", <http://www.jpi-oceans.eu/>

⁸⁸ COFASP Strategic Research Agenda, <http://www.cofasp.eu/node/6674>

⁸⁹ <http://www.marinebiotech.eu/launch-marine-biotechnology-research-and-innovation-roadmap>

⁹⁰ Initiative for the sustainable development of the blue economy in the Western Mediterranean

⁹¹ European Research and Innovation for Food and Nutrition Security, SWD(2016)319. <http://ec.europa.eu/transparency/regdoc/rep/10102/2016/EN/SWD-2016-319-F1-EN-MAIN.PDF>

- Increase the efficient and sustainable use of by-products generated from blue bioeconomy sectors.
- Contribute to the UN SDG 2 target to ensure sustainable food production systems and the UN SDG 14 target to effectively regulate harvesting and end overfishing.
- Contribute to improve the professional skills and competences of those working and being trained to work within the blue economy.
- Contribute to policymaking in research, innovation and technology.

Type of Action: ERA-NET Cofund

The conditions related to this topic are provided at the end of this call and in the General Annexes.

LC-BG-03-2018: Sustainable harvesting of marine biological resources

Specific Challenge: In the search for new biological resources, a large unexploited biomass has been identified in the mesopelagic zone (water column between 200 and 1000 m). This largely unknown zone includes micro-organisms, copepods, krill and plankton feeding fish that are lower in the food chain, as well as squids and other higher trophic level fish. If exploited at sustainable levels, without impacting upon biodiversity and compromising the oceans' role in climate regulation, this biomass could be used to produce more high quality ingredients (proteins with high nutritional value and polyunsaturated fatty acids) for human food chain (which includes farmed animals), to decrease the fishing pressure on overexploited species of higher trophic levels and potentially discover and to develop new bio-based products, including pharmaceuticals and nutraceuticals. This requires a holistic assessment of the marine ecosystem and an understanding of the mechanisms controlling its biomass and their influence on climate. It also requires development of new monitoring and management tools able to weight the costs and benefits of the exploitation of these marine biological resources.

Scope: Activities shall provide fundamental knowledge on the potential role of mesopelagic micro- and macro-organisms for human food chain and other bio-based products and processes, while preserving biodiversity and enhancing resilience to climate change and mitigation. They shall address issues such as food safety (with regards to risks linked to emerging marine toxins), fisheries management, fishing techniques, processing (on-board and on-shore) and consumer acceptance and marketing. Impacts of fishing and climate change on the mesopelagic populations and the wider ecosystem, including biodiversity, natural food webs and greenhouse gas sequestration shall be assessed. They shall also address the potential of mesopelagic resources including micro-organisms for marine biotechnological applications. An ecosystem-based approach to exploitation for food and other bio-based products and processes, as well as cost-effective and environmentally sustainable resource management tools shall be developed. Inclusion of societal actors and stakeholders during the whole research and innovation process shall allow for better alignment of both the process

and its outcomes with the values, needs and expectations of society. Activities undertaken as part of this interdisciplinary and cross-sectorial project shall build on previous knowledge produced in EU Framework Programme projects and contribute to creating jobs, reinforcing capacity building and improving the professional skills and competences of those working within relevant blue economy sectors. The interdisciplinary and cross-sectorial nature of the project shall also apply to training activities contributing to improving the professional skills and competencies supporting the creation of new jobs in the blue economy. Proposals shall fall under the concept of the 'multi-actor approach'⁹² and allow for adequate involvement of SMEs.

The Commission considers that proposals requesting a contribution from the EU in the range of EUR 6 million would allow this specific challenge to be adequately addressed. Nonetheless, this does not preclude the submission and selection of proposals requesting other amounts.

Expected Impact: In line with the EU Blue Growth Strategy, the EU Marine Strategy Framework Directive, the EU International Ocean Governance Communication, the EU Communication for a Sustainable European Future, the EU Bioeconomy Strategy, the EU Biodiversity Strategy and the EU Food 2030⁹³ process for food and nutrition security, activities shall:

In the short term:

- Increase the knowledge of mesopelagic zone ecosystems and foster innovation for food and nutrition security and other bio-based value chains, biodiversity preservation and climate resilience.
- Contribute to the UN SDG 14 targets to effectively regulate marine harvesting and to sustainably manage and protect marine ecosystems, including by strengthening their resilience, and to take action for their restoration in order to achieve healthy and productive oceans by 2020; further strengthen the knowledge base to support the implementation of the Paris Agreement of 2015, COP22 and UN SDG 13.
- Contribute to preserve the ecological functioning of the mesopelagic zone in line with the EU targets of halting the loss of biodiversity and ecosystem services by 2020 and restoring at least 15% of degraded ecosystems.
- Contribute to the preservation of processes regulating climate and to the mitigation of impacts of climate change.

In the medium term:

⁹² See definition of the 'multi-actor approach' in the introduction of this Work Programme part.

⁹³ European Research and Innovation for Food and Nutrition Security, SWD(2016)319. <http://ec.europa.eu/transparency/regdoc/rep/10102/2016/EN/SWD-2016-319-F1-EN-MAIN.PDF>

- Create management tools to ensure that nutritious seafood is available, accessible and affordable for all while conserving natural resources and contributing to climate change mitigation (UN SDG 2).
- Contribute to achieve the sustainable management and efficient use of natural resources, by 2030 (UN SDG 12) ensuring that fishing has no significant adverse impacts on species and ecosystems (EU Biodiversity Strategy).
- Contribute to enhance the conservation and sustainable use of oceans and their resources (UN SDG 14).
- Contribute to improve the professional skills and competences of those working and being trained to work within the blue economy.
- Contribute to the creation of jobs and growth in the fishing and processing sector as well as in the marine biotech sector particularly in coastal areas.
- Contribute to policymaking in research, innovation and technology.

Type of Action: Research and Innovation action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

DT-BG-04-2018-2019: Sustainable European aquaculture 4.0: nutrition and breeding

Specific Challenge: European aquaculture⁹⁴ provides 1.25 million tonnes of seafood annually⁹⁵, valued at over 4 billion euro. However, Europe heavily depends on external markets to ensure consumer demands for seafood (including from fresh water) is met. EU aquaculture needs to increase the competitiveness of its food products and to respond to consumer demands for high-quality and safe food, in a challenging context of climate change, greater competition for natural resources, and conflicting interests for space and markets. To ensure food and nutrition security by 2030, European aquaculture has to sustainably expand in terms of space, production and new value chains, exploring and enhancing innovation opportunities offered by sustainable and resilient aquaculture production systems, implementing the circular economy principles and increasing social acceptance of the corresponding activities and products. European aquaculture has now a unique opportunity to address not only today's challenges of climate change and food and nutrition security, but also to implement the international commitments encompassed in the UN SDGs, while fostering economic growth and social prosperity.

Scope: Activities shall develop smart breeding programmes and/or tailor feeding formulas and technologies for conventional and organic aquaculture – for marine and/or freshwater - targeting animal health and welfare, different production systems, feeding efficiency,

⁹⁴ In this context, 'Aquaculture' comprises the farming of aquatic organisms (including fish, shellfish, algae and aquatic plants) in all types of controlled or natural water environments (fresh, brackish and seawater).

⁹⁵ http://www.europarl.europa.eu/atyourservice/en/displayFtu.html?ftuId=FTU_5.3.7.html

resilience and climate change mitigation, zero waste, by-products valorisation following circularity principles and organoleptic and nutritional values of seafood optimisation. In addition, activities shall explore the potential of the microbiome on health and productivity of farmed species.⁹⁶ Activities shall consider sound cost-effective production methods and profitability, testing, demonstrating and upscaling of the production processes to pre-commercial product. Regulatory authority concerns and consumer demands should also be addressed. The use of Internet of Things (IoT) and Artificial Intelligence (AI) should be considered. The participation of deep-tech start-ups is encouraged. Activities shall develop a set of indicators to monitor and measure progress towards the expected impacts as listed in the call text and in particular the improvement of the production systems that increases productivity, resilience and sustainability. The interdisciplinary and cross-sectorial nature of the project should also apply to training activities improving the professional skills and competencies and supporting the creation of new jobs in the blue economy.

The Commission considers that proposals requesting a contribution from the EU in the range of EUR 6 million would allow this specific challenge to be adequately addressed. Nonetheless, this does not preclude the submission and selection of proposals requesting other amounts.

Expected Impact: Contributing to the ongoing implementation of EU policies such as the Bioeconomy Strategy, the Circular Economy Strategy, the Blue Growth Strategy, the Common Fisheries Policy, the Marine Strategy Framework Directive, the priorities defined in the European Commission Staff Working Document FOOD 2030⁹⁷, as well as international policies and initiatives such as the UN SDGs, the EU Biodiversity Strategy, the BLUEMED Initiative, the Atlantic Ocean Research Alliance and the BIOEAST Initiative, activities shall:

In the short term:

- Demonstrate that investment in sustainable aquaculture research and innovation leads to the creation of new value chains, markets, growth and jobs in coastal, offshore and landlocked areas.
- Improve consumers' awareness, perceptions and acceptability of the European aquaculture products and methods.
- Contribute to the creation of improved sustainable aquaculture systems and implement productive and resilient aquaculture practices that maintain healthy aquatic ecosystems and strengthen capacity for adaptation to climate change, by 2020 (UN SDG 2).

⁹⁶ Two other topics under the SC2 Sustainable Food Security Call will address related issues on terrestrial animal welfare and the influence of microbiomes on terrestrial livestock health (SFS-02-2020: Healthy livestock gut ecosystem for sustainable production; and SFS-09-2018-2019: Increasing animal welfare).

⁹⁷ European Research and Innovation for Food and Nutrition Security, SWD(2016)319. <http://ec.europa.eu/transparency/regdoc/rep/10102/2016/EN/SWD-2016-319-F1-EN-MAIN.PDF>

- Contribute to ensure the genetic diversity of farmed algae (micro and macro) and farmed aquatic species (fish, molluscs and crustaceans) and their related wild species, and promote access to the utilisation of genetic resources by 2020 (UN SDG 2).

In the medium term

- Contribute to increasing available, accessible, affordable and nutritious food and feed, while conserving natural resources and contributing to climate change mitigation (UN SDG 2).
- Improve the professional skills and competences of those working and being trained to work within the blue economy.
- Contribute to policymaking in research, innovation and technology.

Type of Action: Innovation action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

BG-05-2019: Multi-use of the marine space, offshore and near-shore: pilot demonstrators

Specific Challenge: Combining several activities such as renewable energy, aquaculture, marine bio-resources and biotechnologies, maritime transport and related services, in the same marine space, including in multi-use platforms, can serve to divide and reduce the costs of offshore operations and the demand on the space needed for different activities. Research on multi-use platforms funded under the FP7 call ‘The Oceans of Tomorrow’ has provided promising designs, technological proposals and models for combining activities in terms of economic potential and environmental impact. Horizon 2020 funded projects have helped to identify and tackle regulatory and technological barriers and develop business models to reduce the risk for operators and investors. Before reaching a stage enabling large scale installations, it is necessary to develop pilots for demonstration in a real environment of multi-use platforms or co-location of activities in a marine space with their logistic support, including service vehicles and port facilities.

Scope: Activities shall develop pilots by involving industrial actors and by integrating the available knowledge, technologies and facilities, in particular capitalising on the results of EU and national projects for the development of multi-use platforms or co-location of different activities in a marine space, and relevant support offshore vessels and autonomous vehicles. Pilots could include the reconversion/reuse of decommissioned platforms. The pilots shall aim to demonstrate in a real environment the viability (economic, social and environmental) of the multi-uses of a marine space for the output of at least two economic activities (such as renewable energy, aquaculture, marine bio-resources and biotechnologies, maritime activities and related services or tourism). The aim is to demonstrate the economic, social and environmental added-value of the multi-use of a marine space around coastal or deep sea environments and should include a business plan and a commercial economic feasibility

assessment (informed by the Pilot's results), addressing possible trade-offs and costs for other sectors, for the combined activities to generate revenue. The pilots should also address health and safety issues, including for the logistics, ancillary infrastructure and maintenance services. Societal acceptance should also be integrated, especially by involving local communities. The interdisciplinary and cross-sectorial nature of the project should also apply to training activities improving the professional skills and competencies and supporting the creation of new jobs in the blue economy.

The Commission considers that proposals requesting a contribution from the EU in the range of EUR 9 million would allow this specific challenge to be adequately addressed. Nonetheless, this does not preclude the submission and selection of proposals requesting other amounts.

Expected Impact: In order to contribute to the implementation of the EU Integrated Maritime Policy and its environmental pillar, the EU Blue Growth Strategy, the EU Marine Strategy Framework Directive, the EU Maritime Spatial Planning Directive, the EU International Ocean Governance Communication, the EU Communication for a Sustainable European Future, the EU Bioeconomy Strategy, the EU Integrated Maritime Policy and in order to reinforce European competitiveness in the blue economy, activities shall:

In the short term:

- Starting from technology readiness level (TRL) 5, bring selected designs of multi-purpose and multi-use facilities to TRL 7, ensuring validation in the real environment.
- Improve health and safety in multi-use platforms or co-location of activities.
- Reduce costs of implementation and increase economic viability of multi-use of marine space for the European maritime industry.
- Raise societal awareness, involve local communities and secure acceptance of these new developments by society-at-large.

In the medium term:

- Improve the professional skills and competences of those working and being trained to work within the blue economy.
- Contribute to policymaking in research, innovation and technology.

Type of Action: Innovation action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

CE-BG-06-2019: Sustainable solutions for bio-based plastics on land and sea

Specific Challenge: Decoupling of plastics production from fossil feedstock is necessary. In addition to the recycled plastics waste, alternative feedstock such as biomass is part of a more resource-efficient, greenhouse gas emission (GHG) neutral solution. The shift towards biomass-sourced plastics will only make sense in the framework of a circular plastics economy where plastics reuse and recycling are maximised. Reuse and recycling of plastics, particularly for some applications such as packaging, remain very low. It has been estimated that globally, about 12 million tonnes of plastics waste per year leak out of the waste management systems and end up in the environment, in particular in the oceans, where it interferes with ecosystem processes and eventually enter the food-feed chain. As regards marine litter, while land-based sources are predominant as a result of land-sea interaction, sea-based sources such as shipping, fishing or aquaculture are also significant. As part of the mitigation efforts, biodegradable or compostable plastics for specific applications such as fishing gear could be a positive development if a clear sustainability framework for biodegradability conditions is provided.

Scope: Activities shall focus on sustainability strategies and solutions for bio-based products. They shall include innovative product design and business models facilitating efficient reuse and recycling strategies and solutions. They shall address the technical and economic barriers to bio-based plastics recycling as regards established and/or alternative recycling options. The risk, impact and solutions to cross-contamination with conventional plastics waste streams shall also be addressed. Additionally, activities shall contribute to building a biodegradable plastics⁹⁸ sustainability framework by mapping and focusing on the applications where biodegradable and compostable solutions could support public policies. Work on the biodegradable sustainability framework could include pre-normative research including field tests on land and at sea. Lastly, in line with the requirements of responsible research and innovation, activities shall support the development of international fora and platforms that would facilitate systemic innovation and uptake of results by enabling different actors of the value chains, from industry to civil society and public authorities, to cooperate towards more circularity in the bio-plastics economy. Activities shall build on the results and ongoing developments of EU projects funded under Framework Programmes FP7 and Horizon 2020 as well as on available and on-going standardisation results and activities including work within CEN TC 411 or under ISO. The interdisciplinary and cross-sectorial nature of the proposal should also apply to training activities improving the professional skills and competencies and supporting the creation of new jobs in the blue economy and in the bioeconomy.

The Commission considers that proposals requesting a contribution from the EU in the range of EUR 9 million would allow this specific challenge to be addressed properly. Nonetheless, this does not preclude the submission and selection of proposals requesting other amounts.

Expected Impact: Contributing to the implementation of the EU Bioeconomy Strategy, the EU Plastic Strategy, the EU Circular Economy action plan, the EU Marine Strategy Framework

⁹⁸ Oxo-degradable plastic fragments over time into small particles which remain in the environment and may increase pollution. They are not considered biodegradable plastics in the framework of this topic.

Directive, the EU Maritime Spatial Planning Directive, the Energy Union's vision for a low carbon, energy-efficient economy, the EU Blue Growth Strategy and the UN SDGs, activities shall:

- In the short term:
- Deliver solutions with work starting at technology readiness level (TRL) 5 and achieving TRL 6 or higher, where technological innovation is involved.
- Deliver results in a form that allows for efficient feedback into policymaking in research, innovation and technology, in particular in the EU Plastic Strategy.
- Prevent and significantly reduce marine pollution of all kinds, in particular from land-based activities, including marine debris and nutrient pollution by 2025 (UN SDG 14).
- Raise awareness and create a better framework for systemic innovation and uptake of results through broad stakeholder engagement.

In the medium term:

- Demonstrate solutions and develop strategies for circular innovation of the whole bio-plastics system, building on a shared vision and enhancing cooperation between all stakeholders on land and at sea.
- Contribute to the development of EU-harmonised criteria for biodegradability (in open-air and in oceanic conditions) and a sustainability framework that increase market transparency and improves waste management practices on land and sea.
- Contribute to the assessment of the impact of plastics on terrestrial and aquatic flora and fauna and on human health.
- Improve the professional skills and competences of those working and being trained to work within the blue economy and the bioeconomy.
- Improve framework conditions and foster innovations that enable the plastics value chains to become more circular, resource-efficient and reduce their carbon and GHG footprint, in line with climate, energy and sustainable development goals (e.g. UN SDG 14).
- Contribute to policymaking in research, innovation and technology.

Type of Action: Innovation action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

BG-07-2019-2020: The Future of Seas and Oceans Flagship Initiative⁹⁹

Specific Challenge: Our future is intimately linked to the future of the seas, oceans and coasts. The seas, oceans and coasts provide multiple ecosystem services and a wealth of resources, influence climate and provide many economic opportunities. To fully profit from the seas and oceans also in the future, we have to preserve those valuable resources and ensure that their exploitation is sustainable. Furthermore, without appropriate ocean observations for forecasting and for the protection of property and human activities, the global economy would lose hundreds of billions of euros annually. For this, we need to have the technologies for observations, integrated ocean observing systems, data management systems, and appropriate models and services. This action will contribute to make ocean observations and data management in European seas and the Atlantic Ocean fit for the future, in line with the G7 Future of the Oceans Initiative (Tsukuba Communiqué of the G7 Science Ministers¹⁰⁰). It will also support the Collaborative Research Action on Oceans of the Belmont Forum¹⁰¹ and the International Ocean Governance Communication¹⁰². Similarly, ocean observation data must be available to effectively address local, national and global challenges such as the forecasting of ocean conditions and climate change, to take stock of biomass and biodiversity, to mitigate the impact of climate change and ocean acidification, to ensure food security and food safety (also in fresh water), and to contribute to the UN 2030 Sustainable Development Agenda, notably UN SDGs 2, 13, 14 and 15, and monitoring their targets for 2020 and 2025.

Scope: Proposals shall address one of the following sub-topics: blue cloud services, or ocean observations and forecasting¹⁰³, or technologies for observations (in 2020). Actions shall demonstrate integration, capacity and (scientific, economic etc) potential. They shall complement and build on existing observation tools and systems such as EuroGOOS/EOOS, IOOS, GEO/GEOSS, COPERNICUS Marine Service or EMODnet, European research infrastructures such as Euro-Argo ERIC and EMSO ERIC as well as funded H2020 projects such as SeaDataCloud¹⁰⁴. The interdisciplinary and cross-sectorial nature of the proposal should also apply to training activities improving the professional skills and competencies of workers and supporting the creation of new jobs in the blue economy.

[A] 2019 - Blue Cloud services

Activities shall develop cloud services for applications that are specific for oceans, seas and fresh water bodies and are necessary for marine ecosystems research, conservation, forecasting and innovation in the Blue Economy, building and implementing also Blue Cloud demonstrators as needed. Blue Cloud demonstrators should integrate the Essential Ocean Variables¹⁰⁵, notably the biological variables, including plankton biomass and diversity. They

⁹⁹ This topic is expected to continue in 2020.

¹⁰⁰ <http://www8.cao.go.jp/cstp/english/others/20160517communique.pdf>

¹⁰¹ Belmont Forum <https://www.belmontforum.org/>

¹⁰² (JOIN(2016) 49)

¹⁰³ All proposals under B) must include an observation part.

¹⁰⁴ This will also include mutual feedback processes with the Copernicus Programme and other relevant actions such as those undertaken by IOC/IODE or the Marine Environment Monitoring Service.

¹⁰⁵ http://goosocean.org/index.php?option=com_content&view=article&id=14&Itemid=114

shall build on ongoing efforts (data, tools, EOSC, including its Pilot Blue Cloud, Data and Information Access Services (DIAS) of COPENICUS, etc) and take account of the parallel EOSC thematic initiatives being developed – such as the Food Cloud Demonstrator.¹⁰⁶ The action shall contribute to unlocking the innovation potential of the Blue Cloud, and demonstrate its potential in promoting the blue economy shortening the time span between research and innovation in frontier fields, such as micro-organisms and genomics-enabled innovations¹⁰⁷. Activities shall build on existing research infrastructures, take advantage of existing data sharing activities (for example EMODnet), and build on relevant results of past and on-going global, national and EU projects such as SeaDataCloud¹⁰⁸, BlueBridge, the EOSC Pilot and other relevant projects funded under Horizon 2020, including those under Information and Communication Technologies¹⁰⁹. Proposals should include a task to cluster with other projects financed under this topic and – if possible – with other relevant projects in the field funded by Horizon 2020.

[B] 2019 - Observations and forecasting

The action shall contribute to the development and demonstration of the feasibility of the European component of a future Global Ocean Observing System in line with the G7 Tsukuba Communiqué¹¹⁰. It will support activities in the different EU sea basins and the Atlantic Ocean, including the deep sea (below 2000 m), also supporting the needs of food security and safety as outlined in Food 2030¹¹¹. It will also support the future Collaborative Research Action on Oceans of the Belmont Forum¹¹². It will underpin forecasting of the state of the ocean, climate change impact and weather. Activities shall include the demonstration of methods and technologies and their integration in existing systems to collect information on the state and variability of European seas and the Atlantic Ocean, including the impact of stressors and marine litter, and underpin sustainable management of the marine environment and its resources (e.g. the effect of networks of protected areas and other spatial protection measures). They shall take account of the needs deriving from the G7 Future of the Seas and Oceans Initiative¹¹³, from actions such as the Atlantic Ocean Research Alliance and its related South Atlantic Flagship, the BLUEMED Initiative, and notably common priorities with the WestMED Initiative¹¹⁴ and the EUSAIR¹¹⁵, and actions addressing other European regional

¹⁰⁶ See topic DT-SFS-27-2019 under this Work Programme's SC2 Sustainable Food Security Call.

¹⁰⁷ Following up on the Communication "European Cloud Initiative – Building a competitive data and knowledge economy in Europe", the European Open Science Cloud (EOSC) will soon become an important tool for scientists, citizens and policy makers <https://ec.europa.eu/digital-single-market/en/news/communication-european-cloud-initiative-building-competitive-data-and-knowledge-economy-europe>

¹⁰⁸ This will also include mutual feedback process with the Copernicus Programme and other relevant actions such as those undertaken by IOC/IODE or the Marine Environment Monitoring Service.

¹⁰⁹ <https://ec.europa.eu/digital-single-market/en/information-communication-technologies-horizon-2020>

¹¹⁰ http://www.japan.go.jp/g7/_userdata/common/data/20160517communiqué.pdf

¹¹¹ European Research and Innovation for Food and Nutrition Security, SWD(2016)319. <http://ec.europa.eu/transparency/regdoc/rep/10102/2016/EN/SWD-2016-319-F1-EN-MAIN.PDF>

¹¹² <https://www.belmontforum.org/collaborative-research-actions>

¹¹³ Recommendations 1, 3 and 4 on ocean observations and data sharing

¹¹⁴ Initiative for the sustainable development of the blue economy in the Western Mediterranean

¹¹⁵ <http://www.adriatic-ionian.eu/>

seas. The inclusion of forecasting tools (for example to protect aquaculture installations or to inform fisheries decision making) shall be an advantage. Similarly, the sustainability of the approach selected, the integration of innovative observations solutions and existing systems, the smooth storage of data in open access data centres and the improvement of the predictive capability shall be demonstrated. Observations and data handling may also include pilots for Essential Ocean Variables (EOVs)¹¹⁶ under consideration (for example, nutrients, carbonate, sound and microbes/omics) and variables that are of importance in European regional seas as well as the integration of “augmented” observatories (i.e. genomic-enabled multidisciplinary observatories)¹¹⁷. Flow of information across variables and disciplines shall be included. Data collected shall be in line with agreed standards, be openly available via portals (including EMODnet) and feed into the Pilot Blue Cloud (part of the European Open Science Cloud). International cooperation with Third Country partners is encouraged.

The Commission considers that proposals requesting a contribution from the EU in the range of EUR 6 million for sub-topic [A] and EUR 12 million for sub-topic [B] would allow this specific challenge to be adequately addressed. Nonetheless, this does not preclude the submission and selection of proposals requesting other amounts.

Proposals shall include a task to cluster with other projects financed under this topic and – if possible – with other relevant projects in the field funded by Horizon 2020. Possible links with related research and innovation activities supported by the Belmont Forum¹¹⁸ on Ocean sustainability shall also be considered.

[C] 2020 - Technologies for observations

Expected Impact: Contributing to the ongoing implementation of EU Policies such as the Bioeconomy Strategy, the Circular Economy Strategy, the European Open Science Cloud Initiative, the Blue Growth Strategy, the Common Fisheries Policy, the Maritime Spatial Planning Directive, the Marine Strategy Framework Directive, the International Ocean Governance Communication and the UN SDGs, activities shall:

In the short term:

- Support the implementation of the Future of the Oceans Initiative of the G7 Science Ministers.
- Deliver cloud services with work starting at technology readiness level (TRL) between 4 and 5 and achieving TRL between 6 and 7 or higher (sub-topic A).
- Achieve at least TRL 6 for ocean observations' systems and tools (sub-topic B).
- Contribute to regularly measure 50% of biological and biogeochemical EOVS, including in the sea below 2000 m, and predict negative impacts of ocean acidification and other

¹¹⁶ http://goosocean.org/index.php?option=com_content&view=article&id=14&Itemid=114

¹¹⁷ The development of such laboratories is not part of this call.

¹¹⁸ <https://www.belmontforum.org/>

selected stressors to take timely prevention, notably to protect aquaculture resources by 2020 (sub-topic B).

- Lay the foundations for and contribute to the sustainable management and protection of marine and coastal ecosystems to avoid significant adverse impacts (UN SDG 14) (sub-topic).

In the medium term:

- Increase scientific knowledge, develop research capacity and transfer marine technology, taking into account the Intergovernmental Oceanographic Commission Criteria and Guidelines on the Transfer of Marine Technology, in order to improve ocean health (UN SDG 14).
- Improve forecasting of climate change, weather and ocean conditions to protect human activities in support of UN SDG 14 and other relevant goals, and of the objectives of related Conventions (for example, on biodiversity).
- Shorten the time span between research and innovation and foster economic value in the blue economy.
- Improve the professional skills and competences of those working and being trained to work within the blue economy and in the context of open data sharing.
- Contribute to policymaking in research, innovation and technology.
- Increase data sharing and increase integration of data.

Type of Action: Innovation action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

BG-08-2018-2019: All Atlantic Ocean Research Alliance Flagship

Specific Challenge: The Atlantic Ocean is an invaluable shared resource. The societal value of its blue economy is enormous for countries located on its shores. There are however, still considerable gaps in our knowledge and understanding of processes related to this ocean especially with regard to its chemistry, ecology, biodiversity, impacts of climate and the potential for the sustainable exploitation of its natural resources including aquaculture. The Atlantic Ocean is subject to a range of pressures, such as impacts related to climate change, pollution, fishing above sustainable levels, mining and coastal eutrophication. Both remote and local forces play a role in these changes and it is necessary to consider local, regional and basin-wide drivers and factors to understand, predict and adapt to change. Furthermore, the potential of seafood to reduce food and nutrition insecurity calls for collaboration at international level. Having already demonstrated how successful research cooperation can be

in the North Atlantic Ocean¹¹⁹ in tackling some of these issues, the objective now is to take a systemic approach to tackle the scientific and socio-economic challenges and to move towards a basin-wide cooperation from Antarctica to the Arctic, through enhanced cooperation with countries bordering the South Atlantic, notably Brazil and South Africa¹²⁰.

Scope: The actions shall aim at understanding and sustainably managing the Atlantic Ocean as a whole, through a large-scale basin effort involving both the northern and the southern parts of this ocean and its interlinks with the adjacent areas. In order to achieve this, it is necessary to bring together and systematically connect scientists, stakeholders, data, knowledge, expertise, capacities, and resources. This is only feasible through the synergistic cooperation among the bordering countries. With the development of a South Atlantic Ocean Science Plan¹²¹ focusing on the challenges and research needs of the South Atlantic Ocean, which are also interconnected with the challenges and research needs of the North Atlantic Ocean, this cooperation can converge towards the implementation of a systemic approach by linking and jointly tackling the climate-food-ocean challenges. Overall, activities shall contribute to upscale cooperation along and across the Atlantic Ocean and the creation of long-term partnerships building on on-going initiatives such as the All Atlantic Ocean Research Alliance. In order to realise this, proposals shall address one of the following sub-topics:

[A] 2018 - Coordination of marine and maritime research and innovation activities in the Atlantic Ocean. Activities shall launch a multi-stakeholder platform to reinforce international cooperation between Europe and tropical and South Atlantic countries and to connect with the challenges and research needs of the North Atlantic Ocean, as outlined above. The platform shall address the key following points: enhance business opportunities and the up-take of innovations e.g. aquaculture production systems, marine and maritime technologies; develop common standards e.g. for deep ocean and shelf observing systems, seafloor mapping, ecosystem approaches in utilizing marine living resources; reinforce capacity building by aligning European training programmes, including through industrial apprenticeship opportunities and networking with Atlantic partners; promote citizen awareness and literacy on ocean issues; align and converge international research and innovation cooperation activities and other relevant initiatives and investments between the northern and southern Atlantic countries. It will upscale cooperation with countries bordering the South Atlantic Ocean, in particular Brazil and South Africa, by reinforcing the mutual benefits of science diplomacy, addressing the grand challenges and opportunities of the Atlantic Ocean as a system, exploiting the benefits it holds for our citizens and entering a new era of *Blue Enlightenment* which spans from Antarctica to the Arctic.

This action should build on past and ongoing regional, national initiatives and programmes e.g. PIRATA¹²², SAMOC¹²³, SA MAR-ECO¹²⁴, GEOTRACES¹²⁵, SOLAS¹²⁶, OTN¹²⁷,

¹¹⁹ EU-Canada-US Galway Statement on Atlantic Ocean Cooperation, May 2013

¹²⁰ EU-Brazil-South Africa Belém Statement on Atlantic Research and Innovation Cooperation, July 2017

¹²¹ South-South Framework for Scientific and Technical Cooperation in the South and Tropical Atlantic and Southern Ocean

¹²² Prediction and Research Moored Array in the Atlantic

ICEMASA¹²⁸, BCLME¹²⁹, and EU projects e.g. MAREFRAME, BIOMORE, ATLANTOS, AORAC-SA, EU POLAR Net, INMARE, PREFACE etc. as well as national initiatives across and alongside the Atlantic Ocean. It should also involve (or liaise with) relevant European research infrastructures such as Euro-Argo ERIC and EMSO ERIC.

[B] 2018-2019- Assessing the status of Atlantic marine ecosystems. Activities shall enhance the knowledge on the status and dynamics of Atlantic marine ecosystems, quantifying main drivers of short and long-term change, examine the interactions between different stressors, including climate change, and the role of cumulative impacts on ecosystem functioning and associated ecosystem services. They shall also contribute to improve the sustainability of the exploitation of the marine resources, through extending climate based predictions as well as testing for so-called tipping points, regimes shifts or more advanced assessments of ecosystem stability. Activities may entail 3D-mapping of the water column and high resolution seafloor mapping of selected large areas (including relevant marine ecosystems), considering the feasibility/safety and sustainability of these maritime operations. Mapping shall include variables of a different nature, such as physical, biological, chemical, habitats, seafloor characteristics and integrity (including in relation to climate change) and may require the development of new technologies. Furthermore, demonstration of cost-effective approaches to management and processing of the large quantities of data, better coordinated data sharing and operability, as well as the development of improved forecasting capabilities of stressors, tipping points, recovery and changes in ecosystem state will be important. The participation of industrial and regional stakeholders is encouraged to help define ecosystem-requirements. All data collected by the projects (including in international waters) shall be made open access by the end of the project. The choices of the selected areas need to be justified. Actions shall include capacity building and training with/in countries bordering the South and Tropical Atlantic Ocean. Links with ongoing initiatives such as EMODNet should be considered. The activities will be carried out in close co-operation with relevant Commission services (Directorate-General for Research and Innovation), ensuring coherence with related policy initiatives.

[C] 2018-2019- New value chains for aquaculture¹³⁰ production. Activities shall explore new species, products and/or processes for aquaculture production (including algae). They shall consider existing, emerging and potential markets, take into consideration sound cost-effective production methods, sustainability and profitability. Consideration shall be given to the design of Internet of Things (IoT) approaches in the development of innovative production technologies, including new/improved biosensors, the circularity of the processes with the

¹²³ South Atlantic Meridional Overturning Circulation.

¹²⁴ South Atlantic Patterns and Processes of the Ecosystems of the southern Mid-Atlantic Ridge.

¹²⁵ An international Study of the Marine Biogeochemical Cycles of Trace Element and their Isotopes.

¹²⁶ Surface Ocean Lower Atmosphere Study.

¹²⁷ Ocean Tracking Network.

¹²⁸ International Centre for Education, Marine and Atmospheric Sciences over Africa.

¹²⁹ Benguela Current Large Marine Ecosystem.

¹³⁰ In this context, 'Aquaculture' comprises the farming of aquatic organisms (including fish, shellfish, algae and aquatic plants) in all types of controlled or natural water environments (fresh, brackish and seawater).

objective of zero waste and consider consumers' concerns and demands. The development of monitoring programmes for risk assessment including emerging pollutants and climate change resilience and mitigation will be essential. Activities shall contribute to reduce risks to human health. They will also foster higher levels of economic productivity through diversification, technological upgrading and innovation, including through a focus on high-value added and labour-intensive sectors. Finally, it will be important to reinforce capacity building by aligning training programmes, including through industrial apprenticeship opportunities and networking along and across the Atlantic Ocean, in particular, but not exclusively, with South Africa and Brazil and other Atlantic Ocean coastal states. Reinforcing links between industrial partners is also crucial to exchange best practices and to facilitate the creation of business opportunities, therefore the SME participation in this topic is encouraged.

Consortia submitting proposals to this Flagship are encouraged to include participants from countries bordering the Atlantic Ocean as their active participation is key to the success of the proposals.

The Commission considers that proposals requesting a contribution from the EU respectively in the range of EUR 4 million for sub-topic [A], EUR 9 million for sub-topic [B] and EUR 8 million for sub-topic [C] would allow this specific challenge to be adequately addressed. Nonetheless, this does not preclude the submission and selection of proposals requesting other amounts.

Proposals shall include a task to cluster with other projects financed under this topic and – if possible – with other relevant projects in the field funded by Horizon 2020. Possible links with related research and innovation activities supported by the Belmont Forum¹³¹ on Ocean sustainability shall also be considered.

Expected Impact: In order to contribute to the implementation of the EU Integrated Maritime Policy and its related Atlantic Strategy and Action Plan, the EU Blue Growth Strategy, the EU Marine Strategy Framework Directive, the EU Maritime Spatial Planning Directive, the EU International Ocean Governance Communication, the EU Communication for a Sustainable European Future, the UN SDGs, the EU Food 2030¹³² process for food and nutrition security, as well as the Atlantic Ocean Research Alliance, activities shall:

In the short term:

- Contribute to the implementation of the EU-Brazil-South Africa Belém Statement on Atlantic Ocean Research and Innovation cooperation (sub-topics A, B & C)¹³³.
- Improve the coordination and alignment of programmes/initiatives and projects between South and North Atlantic regions and with the EU and its Member States (sub-topic A).

¹³¹ <https://www.belmontforum.org/>

¹³² European Research and Innovation for Food and Nutrition Security, SWD(2016)319. <http://ec.europa.eu/transparency/regdoc/rep/10102/2016/EN/SWD-2016-319-F1-EN-MAIN.PDF>

¹³³ EU-Brazil-South Africa Belém Statement on Atlantic Research and Innovation Cooperation, July 2017

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- Contribute to create the right conditions for the development of better and accurate monitoring, modelling, planning, management and prediction capacities in the whole Atlantic (sub-topics A & B).
- Develop ecosystem assessments and forecasts as well as a deeper understanding of vulnerabilities and risk including those relating to the global climate system and the impacts of climate change (sub-topic B).
- Increase the competitiveness of the EU's blue economy by developing new technologies to service societal needs and new value chains (sub-topics A, B & C).
- Create a lasting partnership on sustainable aquaculture business opportunities for industrial partnerships between Europe and countries bordering the South Atlantic (sub-topic C).
- Contribute to creating sustainable food production systems and implementing resilient aquaculture practices that increase productivity and production, help maintain healthy and productive aquatic ecosystems and strengthen capacity for adaptation to climate change (UN SDG 2) (sub-topic C).
- Contribute to the sustainable management and protection of marine and coastal ecosystems to avoid significant adverse impacts, including by strengthening their resilience, and take action for their restoration in order to achieve healthy and productive oceans (UN SDG 14) (sub-topics A & B).

In the medium term:

- Contribute to the development of ecosystem services to ensure the long-term sustainable management of marine resources (UN SDG 14) (sub-topic B).
- Ensure that nutritious and safe food is available, accessible and affordable for all while conserving natural resources and contributing to climate change mitigation (UN SDG 2 and SDG 13) (sub-topic C).
- Contribute to achieving a zero waste European aquaculture system by strengthening the sustainability, resilience and robustness of industry, by 2030 (sub-topic C).
- Increase EU leadership in ocean technology developments (sub-topics A, B & C).
- Increase consumers' trust and confidence in seafood products (sub-topic C).
- Create a well trained workforce able to tackle the multi-sectoral, multi-disciplinary challenges and opportunities of the Atlantic Ocean (sub-topics A & C).
- Consolidate education and training networks including more ocean-engaged citizens and communities (sub-topic A).

- Improve the professional skills and competences of those working and being trained to work within the blue economy.
- Contribute to policymaking in research, innovation and technology (sub-topics A, B & C).

Type of Action: Coordination and support action, Research and Innovation action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

LC-BG-09-2019: Coordination of marine and maritime research and innovation in the Black Sea

Specific Challenge: The Black Sea is going through rapid changes in response to closely interlinked natural and anthropogenic pressures. Climate change is influencing the physical dynamics and hydrological structure of the Black Sea, while nutrient and pollutant loads are flowing from growing urban areas, inland and coastal activities. Increasing maritime traffic is also leading to safety concerns, potential pollution and the introduction of invasive alien species. Fishing activities in the Black Sea are unsustainable. The area's marine heritage and its ecosystem services are also at risk. The geo-political complexity of the area further complicates the establishment of favourable framework conditions to support the growth of the blue economy (e.g. in trans-border cooperation on sea-related activities, including maritime spatial planning). Coordinated and integrated actions need to be carried out by countries bordering the Black Sea individually and together in order to create synergies and complementarities between sectors and countries. A common marine and maritime R&I strategy needs to be developed in order to achieve knowledge-based, sustainable and long-lasting Blue Growth in the region.

Scope: Proposals shall develop a Strategic Research and Innovation Agenda and Implementation Plan and contribute to the further alignment and convergence of national research and innovation activities and other relevant initiatives and investments by and with the different actors and across different sectors *in primis* between the countries bordering the Black Sea coasts and the whole EU. Activities shall establish and consolidate an operational network of marine and maritime research funders and other key players. Activities shall support the design and implementation of new transnational joint activities. This action shall build on past and on-going regional, international as well national and EU projects/initiatives (e.g. SEAS-Era ERA-NET, PERSEUS, COCONET, European research infrastructures such as EMBRC, Euro-Argo ERIC, ICOS ERIC and EMSO ERIC, Black Sea Economic Cooperation, DANUBIS-RI etc.). It must integrate research, policy, industry (including aquaculture) and society (including the preservation of local coastal cultures). It shall also contribute to pooling different funding streams at national and EU level, and combine them in an effective way. In agreement with the Commission services, projects should ensure appropriate flexibility so as to respond in real time to potentially fast-changing policy scenarios.

The Commission considers that proposals requesting a contribution from the EU in the range of EUR 2 million would allow this specific challenge to be adequately addressed. Nonetheless, this does not preclude the submission and selection of proposals requesting other amounts.

Expected Impact: Contributing to the implementation of the EU Bioeconomy Strategy, the EU Integrated Maritime Policy and its environmental pillar, the EU Marine Strategy Framework Directive, the EU Maritime Spatial Planning Directive, the EU Common Fisheries Policy and the EU Blue Growth Strategy, activities shall

In the short term:

- Deliver a Strategic and Innovation Research Agenda, structuring and consolidating research and innovation around the Black Sea and in cooperation with the rest of the EU.
- Boost the knowledge base and contribute to creating the right conditions for the development of new technologies and services and to improve human capacity and infrastructure in the Black Sea region.

In the medium term:

- Boost the blue economy and contribute to creating more jobs in the Black Sea region by coordinating and aligning EU, national and regional marine and maritime research programmes.
- Increase the competitiveness of EU researchers, industry and SMEs within the marine and maritime sectors.
- Maximise the impact of science diplomacy through enhanced marine cooperation in the Black Sea region.
- Improve the professional skills and competences of those working and being trained to work within the blue economy.
- Contribute to making the Black Sea healthier, more productive, resilient, better known and valued.
- Contribute to policymaking in research, innovation and technology.

Type of Action: Coordination and support action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

Conditions for the Call - Blue Growth

Opening date(s), deadline(s), indicative budget(s):¹³⁴

Topics (Type of Action)	Budgets (EUR million)		Deadlines
	2018	2019	
Opening: 27 Oct 2017			
BG-01-2018 (CSA)	2.50		13 Feb 2018
BG-02-2018 (ERA-NET-Cofund)	8.00		
BG-08-2018-2019 (CSA)	4.00		
DT-BG-04-2018-2019 (IA)	18.00		
BG-08-2018-2019 (RIA)	33.00		13 Feb 2018 (First Stage)
LC-BG-03-2018 (RIA)	12.00		11 Sep 2018 (Second Stage)
Opening: 25 Oct 2018			
BG-05-2019 (IA)		18.00	23 Jan 2019
BG-07-2019-2020 (IA)		18.00	
CE-BG-06-2019 (IA)		18.00	
DT-BG-04-2018-2019 (IA)		6.00	
LC-BG-09-2019 (CSA)		2.00	
BG-08-2018-2019 (RIA)		27.00	23 Jan 2019 (First Stage)
			04 Sep 2019 (Second Stage)
Overall indicative budget	77.50	89.00	

Indicative timetable for evaluation and grant agreement signature:

¹³⁴ The Director-General responsible for the call may decide to open the call up to one month prior to or after the envisaged date(s) of opening.

The Director-General responsible may delay the deadline(s) by up to two months.

All deadlines are at 17.00.00 Brussels local time.

The deadline(s) in 2019 are indicative and subject to a separate financing decision for 2019.

The budget amounts for the 2018 budget are subject to the availability of the appropriations provided for in the draft budget for 2018 after the adoption of the budget 2018 by the budgetary authority or, if the budget is not adopted, as provided for in the system of provisional twelfths.

The budget amounts for the 2019 budget are indicative and will be subject to a separate financing decision to cover the amounts to be allocated for 2019.

For single stage procedure:

- Information on the outcome of the evaluation: Maximum 5 months from the final date for submission; and
- Indicative date for the signing of grant agreements: Maximum 8 months from the final date for submission.

For two stage procedure:

- Information on the outcome of the evaluation: Maximum 3 months from the final date for submission for the first stage and maximum 5 months from the final date for submission for the second stage; and
- Indicative date for the signing of grant agreements: Maximum 8 months from the final date for submission of the second stage.

Eligibility and admissibility conditions: The conditions are described in General Annexes B and C of the work programme.. The following exceptions apply:

BG-08-2018-2019	Due to the specific challenge of this topic, in addition to the minimum number of participants set out in the General Annexes, proposals shall include participants from South Africa and Brazil. Under this topic, legal entities established in Brazil are eligible for funding from the Union.
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Evaluation criteria, scoring and threshold: The criteria, scoring and threshold are described in General Annex H of the work programme.

Evaluation Procedure: The procedure for setting a priority order for proposals with the same score is given in General Annex H of the work programme. The following exceptions apply:

BG-08-2018-2019, BG-07-2019-2020	At least one project (above the evaluation threshold) per sub-topic will be funded
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The full evaluation procedure is described in the relevant [guide](#) published on the Participant Portal.

Call - Rural Renaissance¹³⁵

H2020-RUR-2018-2020

The Rural Renaissance call will enhance the natural, social, cultural and economic potential of rural areas¹³⁶ and support policy coherence. It will boost economic development, ecosystem services and entrepreneurial innovation. This will be achieved by building on diversification and modernisation strategies, improving governance models, supporting innovative food and non-food¹³⁷ value chains, and capitalising on local assets, including human natural and cultural capital.

The call will renew relevant policies dealing with rural areas and their analytical support tools. It will develop synergies between the main economic sectors of rural areas, strengthen the sustainable development of food and non-food chains making use of territorial assets, support the development of the circular economy in rural areas, develop a comprehensive approach towards digitisation as an enabler of rural economies, improve the agricultural knowledge and innovation systems (AKIS) in Europe so as to boost innovation and the delivery of the European Innovation Partnership "Agricultural Productivity and Sustainability (so-called EIP-AGRI).

Activities under the RUR call will be instrumental in implementing the Focus Areas "Digitising and transforming European industry and services" and "Connecting economic and environmental gains – the Circular Economy". Also, to a lesser extent, they will contribute to the Focus Area "Building a low-carbon, climate resilient future".

Societal Challenge 2 will co-finance with LEIT-ICT the topic DT-ICT-08-2019 "Agricultural digital integration platforms" with €15 million. In addition, Societal Challenge 2 will co-finance with LEIT-ICT the topic DT-ICT-09-2020 "Digital service platforms for rural economies.

From farm to society: understanding dynamics and modernising policies

The objective is to better understand the assets and long-term drivers of rural territories and land use and establish how they are impacted by current policies. The design of innovative policy instruments/approaches and governance models through which to improve socio-economic and environmental conditions will be addressed. This includes activities on policies impacting the delivery of ecosystem services and public goods.

Proposals are invited against the following topic(s):

¹³⁵ This call is expected to continue in 2020.

¹³⁶ For the purpose of this call, the term "rural" is understood in a wide sense and also includes peri-urban, remote, mountain and coastal areas, unless otherwise specified in the topic description.

¹³⁷ Non-food chains include wood.

RUR-01-2018-2019: Building modern rural policies on long-term visions and societal engagement

Specific Challenge: The design of modern rural policies requires capturing and anticipating the long-term trends affecting European rural areas. The EU has already invested in rural research on a variety of issues, although the impact on policies has been insufficient due to the diversity of rural areas, the complexity of the problems at stake and the multiplicity of policy makers involved. The interfaces between science, society and policy makers need to be improved to enhance the use of new and existing knowledge, provide policy makers with the evidence they need and empower rural citizens to take part in policy-making, including designing future research priorities. In addition, there are still knowledge gaps regarding big challenges facing rural areas and how they will impact people and territories. One of the most important is demographic change. Current trends combine rural exodus, selective out-migration of women and young people and the arrival of newcomers, including migrants and highly-skilled former urban dwellers. The challenge is particularly acute in the farming sector. With 6 % of farmers under the age of 35, as opposed to 55 % who are above 55, the ageing of farmers is one of the biggest threats to food security, farming systems diversity, biomass provision and rural vitality in the coming decades. The situation is similar for small forest owners. A new generation needs to be empowered to take over. Beyond young farmers, who are supported by the common agricultural policy (CAP), a broader group of people referred to as "new entrants into farming" could contribute to generation renewal while bringing new approaches to farming and rural areas. This could happen provided they can overcome the many obstacles they face, such as access to land. Finally, long-term trends and changes are likely to increase disparities between rural areas faced with various constraints. Mountainous areas, which represent 15% of EU utilised agricultural area and are particularly supported under the CAP, are likely to be more strongly impacted by climate change, as well as by increased economic competition, due to geophysical conditions which limit productivity, production choices and adaptability. A deeper understanding of how rural communities, territories and businesses will evolve is needed to design new policies that would protect rural areas from the existing threat of decline and help them seize opportunities.

Scope: Proposed actions shall address one of the following sub-topics:

A. [2018] Rural society-science-policy hub (CSA)

Actions shall setup a knowledge and policy hub that engages policy makers, scientists, stakeholders and rural dwellers locally with the objectives to: take stock of past and on-going rural research; translate outcomes into attractive and easily understandable tools for policy-makers and citizens; conduct public engagement activities contributing to future rural policy and research policy design; and explore avenues for longer-term science-society-policy interfaces. Activities shall at least build upon relevant past and on-going research projects funded under EU framework programmes in the last fifteen years, including those under this topic, and consider integrating toolboxes and datasets used within these projects. Communication products and tools shall bring real adding-value content to the different target groups in various countries and languages. The use of multimedia is encouraged. Public

engagement activities shall involve rural dwellers, policy-makers and other business, social innovation or community actors at various geographic levels in a representative and balanced set of geographical and socio-economic situations across the EU, including coastal areas. Building on knowledge made accessible and on outcomes of foresight activities under this topic, public engagement activities shall result in concrete proposals to renew policy instruments that impact rural areas at various levels, as well as an agenda for future research activities matching rural citizens' needs. Close cooperation and networking activities will be needed, throughout the project, with relevant networks and platforms and with all the relevant on-going projects. The duration of the project shall take into consideration the need to implement participatory approaches.

B. [2018] Renewing rural generations, jobs and farms (RIA)

Actions shall carry out foresight analyses of the evolution of European rural populations and jobs, in time and space, in the coming decades, describing the drivers and root causes explaining the expected changes. They shall cover all economic sectors with particular attention to farming (including farm structures and forest and farm land ownership) and all socio-economic and age categories, with special attention to women, young people and migrants (from inside and outside the EU). Beyond basic demographic indicators, activities shall extend to skills profiles and other relevant social capital dimensions. A significant part of activities shall be dedicated to rural newcomers and new entrants into farming, improving the understanding of their human, social and professional characteristics and of their role in generation renewal, in innovation and in rural development in general. The issue of access to land, including the impact of such aspects as legal and policy arrangements and land market trends, shall be analysed. An EU-wide quantitative analysis shall be combined with more focused qualitative analyses. The qualitative analyses shall include significant public engagement activities and cover a representative and balanced set of geographical and socio-economic situations across the EU to yield generalizable policy conclusions. Actions shall undertake an ambitious policy design exercise aimed at assessing the performance of current policies and public or private strategies which impact rural and farming attractiveness to different types of people, and at proposing a set of renewed policy options, backed by a prior assessment of their possible impacts, and accompanied by practical tools allowing i) policy makers at EU and other governance levels to easily exploit project outcomes for forward-looking policy design (e.g. typologies, maps, policy analysis, benchmarking); and ii) new rural generations to find inspiration in winning strategies developed by their peers.

C. [2019] Building resilient mountain value chains delivering private and public goods (RIA)

Actions shall carry out foresight analyses of the development of primary production and related value chains and ecosystems in mountainous areas¹³⁸, in the coming decades, looking in particular at the positive and negative effects of climate change, of changes in policies influencing these areas and of broader socio-economic drivers. The analysis shall benchmark production and land-use systems with regards to their capacity to sustainably improve

¹³⁸ as defined in EU regulation 1305/2013 art. 32.2

performance and resilience under changing climate and broader conditions while securing public goods provision for uplands and lowlands, taking into account interactions across scales (field, territories and ecosystems) and sectors. Particular attention shall be paid to new or emerging products or practices which could develop sustainably under more favourable climatic conditions. Activities shall cover a variety of situations representing the diversity of environmental and socio-economic conditions in European mountains as well as the diversity of mountain crop, livestock and forest-based products and value chains. Public engagement of stakeholders in the activities will be key to securing relevant results. Activities shall assess whether current policy approaches are fit for the future and shall deliver a set of renewed policy options, backed by a prior assessment of their possible impacts and accompanied by practical tools and recommendations to i) modernise relevant policy instruments available at EU and other governance levels (with a particular focus on CAP, quality policy, regional policy, climate and environment policies and innovation policy tools), ii) adapt value chain development strategies, and iii) secure long-term public good provision.

All sub-topics – Proposals should include a task to cluster with other projects financed under this topic, under RUR-02-2018 and – if relevant – with other relevant projects in the field funded by Horizon 2020. They shall fall under the concept of multi-actor approach¹³⁹, bringing in the complementary expertise of private sector and civil society representatives of relevance to the scope. The Commission considers that proposals requesting a contribution from the EU of up to EUR 5 million (sub-topic A), 6 million (sub-topics B, C) would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected Impact: This topic aims to foster the design of future-proof rural policies. In the short to medium term, proposals are expected to:

- translate visions of future trends and dynamics and understanding of the associated drivers into strategic options for policy design, delivery and monitoring and maximise their uptake by the relevant policy levels (sub-topics A,B,C);
- ensure a wide outreach and engagement in most EU Member States through a balanced and representative coverage of activities (sub-topics A,B,C);
- improve the uptake of available knowledge by policy makers and open avenues for long-lasting mechanisms improving interfaces between society, science and policy makers (sub-topic A);
- help diversifying rural economic activities, improve the skills base and social capital by identifying and promoting policy options which enhance the attractiveness and sustainable development of rural areas and favour generation renewal (sub-topics B, C);

¹³⁹ See definition of the 'multi-actor approach' in the introduction to this Work Programme part.

- increase the number and success rate of new entrants into farming; ease their access to farmland and forested land by promoting the most efficient instruments and strategies implemented in the Member States when it comes to accessing land (sub-topic B).
- maintain and enhance sustainable primary production, income generated by value chains and ecosystem service delivery in mountain areas through adequate policies and integrated strategies (sub-topic C).

In the long-term proposed actions shall contribute to improving quality of life, socio-economic prospects, job diversity and the attractiveness of rural areas.

Type of Action: Research and Innovation action, Coordination and support action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

RUR-02-2018: Socio-economic impacts of digitisation of agriculture and rural areas

Specific Challenge: The deployment of information and communication technologies induces changes that impact individuals, societies and the environment in profound and pervasive ways. Agriculture and rural areas will be changing significantly with the multiplication of devices, their increased "intelligence", autonomous behaviour and connectivity. Aside from the benefits of digital innovations, there are also challenges, and sometimes threats, that need to be addressed to ensure that technological innovations go hand in hand with societal needs and expectations. To cope with the digital revolution research needs to clarify its dynamics and its net impact on socio-economic challenges that agriculture and rural areas are confronted now and in the future.

Scope: Proposals shall analyse the social and economic impacts of digitisation on agriculture and rural areas, looking into costs, benefits and possible trade-offs. Analyses shall distinguish the diversity of agricultural sub-sectors or farming systems and other activities in rural areas, including forest operations. They must cover a representative set of different rural contexts that exist across the EU, analysing the impact of the various policy settings. They shall fill knowledge gaps on the impacts of digitisation on agriculture and rural areas regarding at least: employment and quality of life, functioning of markets and value chains, competitiveness and scalable opportunities for agricultural and rural businesses and (re)deployment of public services. Beyond the impacts of past and ongoing developments, the action shall explore future scenarios for digitisation in the coming decades, characterising drivers and barriers which are likely to accelerate or hamper their respective development, as well as their respective impacts.

Proposals shall include activities to work in cluster with projects selected under RUR-01-2018. They shall fall under the concept of multi-actor approach¹⁴⁰, engaging representatives of farmers, rural businesses or citizens groups and digital technology providers. Early

¹⁴⁰ See definition of the 'multi-actor approach' in the introduction of this Work Programme part

engagement of public authorities shall help guarantee the relevance of the analysis and the uptake of project outcomes.

The Commission considers that proposals requesting a contribution from the EU of up to EUR 5 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude the submission and selection of proposals requesting other amounts.

Expected Impact: Anticipating and adjusting policy and strategies to take advantage of digitisation opportunities and mitigate associated risks. For agriculture and rural areas, the project will in the short term:

- fill the socio-economic knowledge gaps on digitisation of agriculture and rural areas, including impacts on existing and future challenges;
- develop the most plausible future scenarios for the development of digitisation;
- raise awareness among key stakeholders about digital game changers, allowing for the development of appropriate coping strategies, in particular at policy level; and
- improve the uptake of societal concerns in ICT-related policy and innovation, by liaising with on-going projects on the digitisation of agriculture and rural areas.

In the longer term, the project will contribute to EU agricultural and rural economies and communities becoming more inclusive and competitive, due to adapted strategies.

Type of Action: Research and Innovation action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

RUR-03-2018: Contracts for effective and lasting delivery of agri-environmental public goods

Specific Challenge: The links between the richness of the natural environment and farming practices are complex. Many valuable habitats in Europe are maintained by extensive farming and forestry, but inappropriate agricultural practices and land uses have also had an adverse impact on natural resources, such as soil, water and air pollution, fragmentation of habitats and loss of native biodiversity in farmland landscapes. Beyond providing food, fibre or biomass, farmers can provide environmental public goods through the land management activities necessary to grow crops and rear animals. Farmers often face trade-offs between sustainability and short term profitability. Providing environmental public goods, in domains such as biodiversity, water, carbon sequestration and recreation can require collective actions for the necessary scale and scope of the action and its existence over time.

Scope: Proposals will look into effective ways of coupling public and/or private incentives to the delivery of one or more environmental goods at land and value chain levels. Proposals will review and investigate existing and new initiatives addressing the delivery by farmers of

environmental public goods and services and their longevity. They will explore existing and design new approaches to improve cooperation between farmers as well as between farmers and other stakeholders (e.g. land owners, forestry sector, food industry, retailers, consumer associations, environmental NGOs, public bodies, water management authorities, protected areas, tourism services...).

Activities will cover the three following issues in a combined or stand-alone way in each of the analysed approaches: (1) how land tenure systems can strengthen the longevity of both agricultural activities and environmental protection; (2) how result-based approaches, as compared to practice-based approaches, can be implemented effectively (considering the use of the most appropriate indicators); (3) how collective implementation of practices can be managed to enhance the delivery of ecosystem services at different scales. Proposals will take into account the diversity of European situations, e.g. with regard to legal and historical contexts or different categories of land ownership.

Proposals will analyse how duties and responsibilities are shared in arrangements between two or more parties, including as relevant, the distribution of the added value and the financial and/or production risks inherent to the agricultural sector and its complex links with the natural environment. Proposals will analyse the strengths and weaknesses of different approaches regarding their transaction costs, their relationship with market trends and their impacts on the ecosystem services over time. Proposals will fall under the concept of the 'multi-actor approach'¹⁴¹ and ensure appropriate involvement of the farming sector. They should also seek contributions from social and economic sciences to cover the broader economic, social, behavioural and environmental issues associated with the adoption of novel agri-environmental contracts.

The Commission considers that proposals requesting a contribution from the EU of up to EUR 5 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected Impact: Funded activities will showcase cooperation models enabling the delivery of agri-environmental public goods and guaranteeing their longevity over time. In the short-to medium term work will:

- Lead to the development of innovative agri-environmental contractual models based on the review of existing initiatives and the design of new ones;
- Unlock and improve economic viability of agri-environmental initiatives through a renovated and coherent agri-environmental contractual framework;
- Provide support to policy makers and stakeholders (set of incentives/legal/economic instruments) by sharing the good practices at national and regional level;

¹⁴¹ See definition of the 'multi-actor approach' in the introduction of this Work Programme part

- Strengthen transdisciplinary research and integrated scientific support for consistent approaches between agricultural and environmental priorities.

In the longer term funded activities will help to foster the necessary socio-economic contractual framework to enable farmers to reconcile agricultural production with the delivery of environmental public goods and services.

Type of Action: Research and Innovation action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

RUR-04-2018-2019: Analytical tools and models to support policies related to agriculture and food

Specific Challenge: Society assigns an increasing number of objectives to the policies influencing the agricultural sector and rural areas that it expects to see fulfilled. Therefore, justifications for policies extend well beyond mere food production. Evidence-based policy making implies the development and maintenance of appropriate instruments for use in the design of these policies and for the monitoring of their effects, taking advantage of new socio-economic approaches and increased possibilities opened up by progress in the ICT area.

Scope: A. [2018] Developing new models supporting policies related to agriculture (RIA)

Modelling policies dealing with agriculture and the related management of renewable resources at various geographic scales implies the development of a new architecture taking advantage of progress in modelling approaches and ICT. Given the focus on local effects of global events and EU policies, new approaches should take into account the individual decision making unit (e.g. agent-based or machine learning-based approaches). Modelling will include such aspects as the environmental impact of farming, delivery of ecosystem services modelling of aspects ranging from product / sector to farming systems, structural change including the transfer of production factors such as land, the integration of agriculture in rural society and will allow the establishment of links with biophysical models and geo-referenced datasets. Proposals will develop modelling at various geographic scales – from regional to global. They will build a highly modular and customisable suite of tools which will allow flexible use and further improvements as needs arise.

B. [2019] Modelling international trade in agri-food products (RIA)

Trade modelling has a long-standing tradition but some issues are notoriously difficult to assess and include in the existing simulation models. Proposals will develop appropriate methodologies to include some of these issues in existing trade models. These issues include (non-exhaustive):

- Non-tariff measures (NTM): The project will work on a methodology to assess the welfare effects of NTM (both positive and negative) and to include them in trade

simulation models. This should go further than the standard gravity model approach which has strong downsides as discussed in the literature;

- Geographical Indications (GIs): The project will work on a methodology to assess the welfare effect of GIs and the resulting trade impacts of different schemes under trade negotiations;
- Zero trade flows: Current trade models have problems creating trade flows that did not exist before due to tariff or NTM reasons. This project will work on a methodology to overcome this bias;
- Quality differentiation: current trade models typically assume homogeneous goods. However, agri-food trade is becoming increasingly heterogeneous. The project should aim to broaden the commodity scope by including horizontal and vertical product differentiation trade models.

Proposals for both sub-topics should ensure that the approach proposed will be compatible with and improve the tools used at the European Commission. Proposals should include a task to cluster with other projects financed under the topic and with the modelling platform SUPREMA established under SFS-49-2017.

The Commission considers that proposals requesting a contribution from the EU of up to EUR 4 million for A and 5 million for B would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected Impact:

- In the short term: improvement of the capacity to model policies dealing with agriculture and related natural resources, food and international trade;
- In the medium to long term: improvement of policy design, impact assessments and monitoring.

Type of Action: Research and Innovation action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

Organising sustainable food and non-food value chains under changing conditions

The objective is to boost the development of innovative and sustainable food and non-food chains and services to support the diverse needs of communities and businesses, in a responsible and ethical way, hence fostering sustainable growth and jobs in rural areas and connecting territories (e.g. coastal-inland, rural-urban). This part will include activities related to the Focus Area "Connecting economic and environmental gains – the Circular Economy".

Proposals are invited against the following topic(s):

CE-RUR-08-2018-2019-2020: Closing nutrient cycles¹⁴²

Specific Challenge: The EU depends strongly on external sources for the supply of key fertilisers used in agriculture. Resource depletion and an increasing global demand for mineral fertilisers may, in the long term, lead to price tensions with an impact on food security. Mineral-based fertilisation also poses significant environmental problems, linked e.g. to the amounts of fossil energy needed to produce and transport these fertilisers. At the same time, large amounts of minerals are being dispersed in the environment through a large variety of organic waste streams, resulting in soil and water pollution. Agro-food specialisation has led to regional imbalances: whilst in some regions a nutrient overabundance is causing severe environmental impacts (e.g. nitrate pollution), other are experiencing nutrient deficits. These contrasting effects may also be observed between locations within the same region.

Several technologies are being developed to recover and re-use nutrients from organic by-products, but many are insufficiently mature and the characteristics of end-products do not always match end-user preferences. It is expected that the EU ‘circular economy package’ will boost the emergence and commercialisation of such new fertilisers, hence it is important to understand their agronomic and environmental performance in order to establish adequate policies, guidelines and application rules.

Scope: Proposals shall address inter-regional and intra-regional imbalances through effective nutrient recovery from by-products of the agro-food or the forestry sectors, and conversion into novel fertilisers. Proposals should include a task to cluster with other projects financed under this topic, under topic SFS-39-2019 and – if possible – with other relevant projects in the field funded by Horizon 2020 (including under the BBI JU).

Proposals should address only one of the following sub-topics:

A.[2018] Understanding properties and impacts of bio-based fertilisers (RIA)

The project shall generate a knowledge basis that could support policy decisions related to novel fertilisers based on organic resources¹⁴³. On the basis of products that are currently available or under development, a comprehensive set of potential environmental impacts shall be identified and assessed across the fertiliser value chain¹⁴⁴, along with criteria related to their agronomic performance, safety and quality. Parameters and reference values shall be proposed as a basis for future policies related to new organic-based fertilisers. The project shall also propose reliable analytical measurement and testing methods for future compliance checks. An analysis of nutrient imbalances between regions in the EU shall be carried out, and the viability and sustainability of nutrient flows between regions through new organic-based fertilisers (including the understanding of logistic costs) shall be assessed.

B.[2019] Bio-based fertilisers from animal manure (IA)

¹⁴² It is expected that this topic will continue in 2020

¹⁴³ This shall include both products with low organic matter (comparable to current mineral fertilisers) and products with high organic matter content (advanced organic fertilisers)

¹⁴⁴ Including the production, transport and use phases.

Projects shall demonstrate processes for recovery of mineral nutrients and production of novel fertilisers from animal manure. Proposals shall perform a thorough analysis of the state of the art, and demonstrate that the activities proposed go beyond past or ongoing research, without overlaps. Technologies that are currently under development shall be further improved, and possibly integrated, to produce high quality end-products¹⁴⁵. Proposals shall address end-product marketability, safety, sustainability including greenhouse gas emissions, and compliance with relevant EU regulations¹⁴⁶. Their suitability and acceptability under the organic farming regulatory framework shall also be analysed. An integrated assessment of the business model (economic, agronomic, social and environmental) shall be performed. The whole value chain shall be demonstrated to a near-commercial scale (TRL 6-7). Proposals shall fall under the concept of the 'multi-actor approach'¹⁴⁷ including relevant actors such as agro-food industries, technology providers, research centres, end-users (farmers and farmer associations), or public administration.

C.[2020] Bio-based fertilisers from other by-products of the agro-food, fisheries, aquaculture or forestry sectors (IA)

The Commission considers that proposals requesting a contribution from the EU of up to EUR 6 million for sub-topic A and 8 million for sub-topics B and C would allow this specific challenge to be addressed appropriately. Nonetheless this does not preclude the submission and selection of proposals requesting other amounts. For sub-topics B and C, participation of partners from CELAC countries¹⁴⁸ is encouraged.

Expected Impact: Proposals are expected to provide the technologies needed to develop a new generation of commercial, sustainable and safe fertilisers based on organic by-products, and the scientific knowledge needed to frame their use. This will help to:

- set up a coherent policy framework for the sustainable production and use of organic-based fertilisers (sub-topic A).
- replace conventional, non-renewable mineral fertilisers, hence reducing external dependence and risks related to depletion (sub-topics A, B and C).
- balance nutrient concentrations between or within regions, thus increasing resource efficiency (sub-topics A, B and C).
- reduce the environmental impacts linked to the dispersion of nutrients present in waste flows, or to the production of fossil-based fertilisers (sub-topics A, B and C).
- develop new business models creating value from agro-food, fisheries, aquaculture or forestry by-products (sub-topics B and C).

¹⁴⁵ These can be mineral-type (i.e. with low organic matter content), or advanced organic fertilisers (e.g. through improved composting processes).

¹⁴⁶ This includes notably regulations relative to fertilisers, animal by-products, or nitrates.

¹⁴⁷ See definition of the 'multi-actor approach' in the introduction to this Work Programme part.

¹⁴⁸ Community of Latin American and Caribbean States

In the long term, this shall contribute to a thriving, sustainable and circular bio-economy, the development of new business models that are synergic with other economic sectors, and therefore to the creation of wealth and quality jobs in rural areas.

Type of Action: Research and Innovation action, Innovation action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

RUR-09-2018: Realising the potential of regional and local bio-based economies

Specific Challenge: Bioeconomy is a major opportunity for regional and local communities. Despite broad political agreement, the potential of many European regions to develop a thriving circular bio-based economy using their own resources remains largely untapped¹⁴⁹.

Many factors contribute to this situation, including lack of awareness and practical knowledge among regional/local authorities and stakeholders, low degree of cooperation and networking at all levels, insufficient involvement of local/regional stakeholders in drawing up bioeconomy strategies, or inadequate technology transfer and exploitation of innovation.

New, sustainable technology options or business models suitable for local deployment are needed, as current integrated biorefinery models are predominantly based on complex technologies and are difficult to finance, so remain inaccessible to many players.

Scope: Proposals shall foster cooperation and networking between relevant actors at all levels, so that regional bio-based economies can take off, promote open innovation approaches, and ensure adequate knowledge exchange within and among regions¹⁵⁰. Emphasis shall be put on increasing the capacities of regional/local authorities and stakeholders, especially in regions with high potential (e.g. underused biomass streams, human capacities), but that have a low number of established biorefineries. Proposals shall ensure proper support and guidance in developing regional strategies and roadmaps¹⁵¹ through participative approaches, adapted to

¹⁴⁹ This is particularly the case in 'moderate/modest innovator' countries according to the European Innovation Scoreboard (http://ec.europa.eu/growth/industry/innovation/facts-figures/scoreboards_en). Regions in central and eastern EU Member States are a clear example, as shown by the conclusions of the Bratislava Bioeconomy Conference under the Slovak Presidency of the Council of EU (2016), the Lodz Declaration of Bioregions (2016), the outcome of the meeting of the ministers of agriculture of the Visegrad Group extended by Bulgaria, Romania and Slovenia (GV4 + 3) of 26 October 2016, and the findings of the recent study "Mapping of EU Member States' / regions' research & innovation plans & strategies for smart specialisation (RIS3) on bioeconomy", and the Danubionet Bioeconomy capacity building survey under the FP7 Danube-INCO.net project.

¹⁵⁰ Including the establishment of links with relevant initiatives, such as e.g. BIOEAST or the Bio-based Industries Joint Undertaking (BBI JU).

¹⁵¹ These should go beyond basic approaches and consider concepts such as circularity, the sustainability of the biomass supply, the optimisation of value creation (cascade use of biomass), the integration of biorefineries into existing or new agricultural and industrial value chains, or demand-side developments. Use of existing tools, such as the [Self-Assessment Tool](#) developed by the [European Sustainable Chemical Support Services](#), is encouraged.

the local conditions and biomass sources¹⁵². These shall also include avenues to address the education and information gap on key issues related to sustainability, to increase R&I capacities and to improve the generation of innovation, making best use of the various funding streams available¹⁵³ and establishing synergies with relevant policies and programmes, notably those related to rural development.

Proposals shall address the different bio-based business models available for stakeholders and policy-makers, with a specific attention paid to models that could be deployed at a smaller scale in rural areas. Their economic (growth and jobs), social and environmental potential, as well as their advantages and disadvantages compared to larger and more complex models, shall be established.

The Commission considers that proposals requesting a contribution from the EU of up to EUR 3 million would allow this specific scope to be addressed appropriately. Nonetheless, this does not preclude the submission and selection of proposals requesting other amounts.

Expected Impact: In the framework of the EU Bioeconomy Strategy, the impact of the proposals will be assessed on the basis of:

- Increased capacity of regional/local policy makers and stakeholders to structure their bioeconomy and to support the emergence of a thriving bio-based sector. Adequate knowledge and best practice exchange and networking within and among regions, across the EU.
- Improved capacity of policy makers and stakeholders to make informed decisions, based on a thorough knowledge of the different business models, their respective advantages and disadvantages, and the best approaches to promote them.
- Ambitious regional strategies and roadmaps leading to regional bio-based sectors that are sustainable, inclusive and adapted to local assets and conditions.
- Enhanced research and innovation capacities, and appropriate transfer of research results to regional/local stakeholders.

Type of Action: Coordination and support action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

CE-RUR-10-2019: Circular bio-based business models for rural communities

Specific Challenge: To boost the development of a bio-based economy in Europe, there is a need for business models that can be replicated easily in a variety of locations and contexts,

¹⁵² Originating in sectors such as e.g. agriculture, forestry, fisheries and aquaculture, industry, waste management, etc.

¹⁵³ Notably by creating synergies among the European Structural and Investment Funds (ESIF), Horizon 2020, private funds, etc.

with relatively low levels of investment, risk and technical sophistication. A wider range of rural entrepreneurs needs to get involved in the emerging bio-based business sector, including farmers, forest owners, their associations, and small rural business. This will help to diversify and revitalise the economy and create quality jobs in rural areas. Local and regional authorities need to do more to support the bio-economy in their respective territories. They should therefore have a range of options to choose from and be able to select the approach that best suits local needs and assets. As a key part of a circular economy, the bioeconomy needs to close loops to make the most efficient possible use of biomass under market and logistical constraints, and to ensure the sustainability of business models.

Scope: Based on an established agro-food system¹⁵⁴, proposals shall consider a variety of additional bio-based processes and end products that could be integrated into the system, and that are viable on a small scale (farm to rural community level). The TRL of the technologies considered can vary at the start. The project shall test and demonstrate the combination of these in a circular configuration. The integrated system shall achieve a TRL 6-7.

Proposals can target any combination of non-food bio-based outputs, but projects focussing mainly on bio-fuels or bio-energy are not eligible. The choice of feedstock sources shall avoid negative effects on food security¹⁵⁵. Proposals shall focus on a single agro-food system that should be common in Europe and offer high replication potential, and can be combined with sustainable management of natural areas¹⁵⁶ and/or use of marginal lands. A complete assessment (economic, environmental and social) of the integrated system shall be carried out. The project shall include a business plan¹⁵⁷, and a set of policy options and recommendations.

Proposals shall fall under the concept of the 'multi-actor approach'¹⁵⁸, ensuring solid collaboration between relevant actors such as farmers or farmers associations, agro-food industry (including small businesses), technology providers, research centres or public authorities. Proposals should include a task to cluster with other projects financed under this topic, under topic SFS-35-2020 and – if possible – with other relevant projects in the field that are funded by Horizon 2020 (including under the BBI JU).

The Commission considers that proposals requesting a contribution from the EU of up to EUR 10 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected Impact: Proposed activities will expand the range of business models available to entrepreneurs and local authorities by developing circular and sustainable business models

¹⁵⁴ 'Agro-food system' shall be understood here as a characteristic combination of farming activities and first transformation or conditioning of the farming outputs. In coastal areas, this may include fisheries, aquaculture and first processing of their products.

¹⁵⁵ E.g. by focusing on agricultural waste and/or dedicated crops on marginal/abandoned lands or through multi-cropping strategies.

¹⁵⁶ E.g. forestry or paludiculture (cultivation of marshlands).

¹⁵⁷ The business plan should take into account, among other things, the marketability of the end-products

¹⁵⁸ See definition of the 'multi-actor approach' in the introduction to this part of the work programme.

with large potential for replication in areas with unexploited resources, at a relatively low cost, risk and with low levels of technical complexity. This will help to:

- expand and diversify the sector by mobilising a wider range of players in the bio-based economy, including small businesses, farmers, forest owners and their associations;
- develop regional and local bio-based models adapted to the wide variety of contexts found in the EU, including rural and remote areas.
- ensure adequate recovery of nutrients and organic matter, and their reuse in agriculture.

In the longer term results consolidate a diversified, circular and climate-friendly bio-based sector that harnesses regional assets, provides quality jobs and opportunities in rural areas and revitalises rural economies.

Type of Action: Innovation action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

LC-RUR-11-2019-2020: Sustainable wood value chains¹⁵⁹

Specific Challenge: Forests play a vital role in Europe's economy, society and environment¹⁶⁰. Scenarios likely to keep the global warming below 2°C (Paris Agreement goal) would entail a substantial reduction of anthropogenic GHG emissions, through far-reaching changes to energy systems, land use and associated value chains. The second consumer-driven factor of GHG emissions is the construction sector (ca. 15%), implying a significant role for forest-based products. The forest-based sector can contribute to climate change mitigation through increasing sinks in and reducing emissions from living biomass, soils and wood products, and the substitution of fossil fuels through the material and energy use of wood-based materials. The combined sink and substitution effects of wood value chains can provide a key mitigation option, provided that changes in fossil and biogenic carbon are taken into account in a comprehensive and balanced manner. Several research projects¹⁶¹ and COST Actions¹⁶² launched in FP7 looked into the development of innovative, resource efficient wood-based products. While ensuring the sustainability of forest production systems under changing environment conditions remains a long-term objective for the sector, a key challenge now is to further develop and deploy the technological advancements of micro/macrocimate-friendly wood-based value chains on the ground.

¹⁵⁹ It is expected that this topic will continue in 2020

¹⁶⁰ Forests cover more 40 % of the EU's landmass, represent 70 % of Europe's freshwater repository, remove the equivalent of 9 % of GHG emitted by other parts of the economy, and provide for a wide range of other social, economic and ecological services. The forest-based sector provides income for 16 million forest owners and 3-4 million workers in rural areas, and represents some 8% of the EU's total manufacturing value.

¹⁶¹ e.g., BEST, BOOSTEFF, CUTEWALL, HIFIVENT, OSIRYS, PERFORMWOOD, REACTAFIRE, SUSTAINCOMP, WOOD-FLARETCOAT

¹⁶² .g. FP 1004, 1006, 1101, 1105

Scope: A. [2019] Building with wood: Proposals shall develop and test new technologies and environmental friendly solutions for the use of wood-based materials in the (re)construction and/or retrofitting of buildings. Proposals should also explore options for building with wood in combination with composite/hybrid materials, linkages with other nature-based solutions, make use of ICT, and consider LCA and carbon accounting, 'environmental documentation' (i.e. standards and construction codes), performance standards, public policies and regulations, consumer perception and engagement/co-creation. Activities could include limited research and shall produce plans and arrangements or designs for new, altered or improved products, processes or services. For this purpose they may include prototyping, testing, demonstrating, piloting, large-scale product validation and market replication. Proposals shall ensure that relevant actors (researchers, citizens, policy makers from urban/rural areas, businesses, architects, site-managers, etc.) work together during the whole research and innovation process in order to better align the process and its outcomes with the societal values, needs and expectations.

B. [2020] Resilient forest systems

Both sub-topics (A and B) are suitable for INCO and SMEs participation, and are expected to integrate technology with SSH and RRI aspects.

The Commission considers that proposals requesting a contribution from the EU of the order of EUR 10 million for sub-topic A and 5 million for sub-topic B would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected Impact: In the framework of SDG 9, 11, 13 and 15, the EU's Bioeconomy Strategy 2012, the EU's Forest Strategy 2013, the Circular Economy Package 2015 and Paris Agreement 2015, proposals are expected to assess how they will contribute to:

- Increased resource and/or energy efficiency and added value and minimising pollution and the environmental footprint (GHG emissions included) in the construction sector in the cities, by specific amounts/proportions to be specified in the proposals, by 2030 [sub-topic A];
- Enhanced connectivity of rural-urban areas and their overall contribution to a resilient, circular, forest-based bioeconomy, by 2025 [sub-topic A];
- Increased long-term resilience of forest production systems and associated value chains to enhanced climate/environmental change and societal demand [sub-topic B];
- Enhanced contribution of forest-based sector to long-term climate change mitigation and rural development objectives [sub-topics A & B];
- Also in the long-term, prompt a sizeable positive change to European landscapes and economies, by keeping the countryside green and serving to make the cities greener, and increasing the share of both decent and green jobs [sub-topics A & B].

- Advance available solutions from TRL 4-5 to TRL 6-7 for sub-topic A and from TRL 3-4 to TRL 5 sub-topic B

Type of Action: Innovation action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

Taking advantage of the digital revolution

ICT tools can play a key role in rural growth through a variety of impacts such as increased efficiency and competitiveness, social inclusion, new business models and opportunities, modernisation of services, renewal of governance models through, for example, improved participation of society. This call section will explore the conditions under which benefits of ICT applications can be maximized. This part will include activities related to the Focus Area "Digitising and transforming European industry and services".

Proposals are invited against the following topic(s):

DT-RUR-12-2018: ICT Innovation for agriculture – Digital Innovation Hubs for Agriculture

Specific Challenge: European agriculture could gain a decisive competitive advantage if the ICT sector and the farming community could work together to generate a wave of bottom-up ICT innovations across Europe designed to create more productive and sustainable agricultural systems. The topic will facilitate the adoption and widespread transfer of ICT-based solutions for agriculture.

The Digitising European Industry Strategy¹⁶³ aims to ensure that every business in Europe has access to a Digital Innovation Hub at 'a working distance'. A Digital Innovation Hub (DIH) helps companies become more competitive by improving their business/production processes, products and services through the use of digital technologies. DIHs offer services to test and experiment with advanced technologies and produce innovative products/solutions. They should also act as a broker between user companies and technology suppliers.

Many components of Digital Innovation Hubs already exist at European, national and regional level.¹⁶⁴ Through this topic, the European Commission is adding value to these existing investments by supporting highly innovative experimentation on a pan-European scale.

Scope: The topic calls for promoting Digital Innovation Hubs in agriculture. It should address the adoption of ICT-based solutions for more productive and sustainable agriculture systems. The focus is on innovative technologies that need to be customized, integrated, tested and validated not only by technology developers but also the farming community before they are placed on the market. Special emphasis is on the strengthening of European start-ups and SMEs by adopting new concepts linked to innovative agri-business and/or service models,

¹⁶³ <https://ec.europa.eu/digital-single-market/en/digitising-european-industry>

¹⁶⁴ <http://ec.europa.eu/futurium/en/content/digitising-european-industry-catalogue-initiatives>

and connecting them with actors that can provide access to finance, advanced training skills, knowledge and needs of the farming community.

Hence, the following are requested for this topic:

1. Organisations participating in the call should demonstrate that they are deeply rooted in a digital innovation hub that offers digital transformation services to companies in its proximity. They should provide a clear analysis of how the proposed project will add value to the existing service offer, and how it is aligned with the national or regional digitisation initiative. Every project should support a critical mass of dedicated pan-European innovation experiments that bring together technology suppliers and the farming sector. At least 50% of the budget should directly benefit SMEs. The action may involve financial support to third parties. The proposal will define the process of selecting entities for which financial support will be granted, typically in the order of 40.000 – 100.000 per party¹⁶⁵.
2. Activities proposed should be sustainable in the long term and must include a business plan for the Digital Innovation Hubs, a plan to attract investors, to address needs of the farming sector and dissemination activities. The use of established networks for SMEs such as the Enterprise Europe network is encouraged.
3. The project should create a network and help achieve a broad coverage in terms of technological aspects, application, innovation and geography.. It should also link up with regional/national innovation initiatives and other DIHs. This shall include maintaining a single innovation portal, sharing of best practice, dissemination, brokerage between ICT suppliers and farming users, leveraging investment and training.
4. Selected projects are expected to collaborate on building a network of Digital Innovation Hubs, covering most regions in Europe¹⁶⁶.

Proposals should fall under the concept of the multi-actor approach¹⁶⁷.

The Commission considers that proposals requesting a contribution from the EU up to EUR 10 mill would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected Impact: Proposals must promote the creation of a self-sustaining innovation ecosystem of competence centres, farming users and suppliers supported by services available through a marketplace, covering a large number of regions. Through the creation of a sustainable network of Digital Innovation Hubs, proposals will provide European added value

¹⁶⁵ In line with Article 23 (7) of the Rules for Participation the amount referred to in Article 137 of the Financial Regulation may be exceeded, and if this is the case proposals should explain why this is necessary to achieve the objectives of the action.

¹⁶⁶ Please refer to topic DT-ICT-06-2018, Call "Digitising and transforming European industry and services" H2020-DT-2018-2020 published under Annex 6 of the WP 2018-2020 " Information and Communication Technologies"

¹⁶⁷ See definition of the 'multi-actor approach' in the introduction to this Work Programme part.

to investments made at national and regional level in DIH. It should have a high leveraging effect on other sources of funding, in particular regional and national funding.

In the short to medium term work will:

- Attract a significant number of new users of ICT in the agricultural sector.
- Attract a significant number of innovative and competitive technology suppliers (start-ups and SMEs) able to supply the farming community with new solutions for improving farming operations.
- Create a critical mass of pan-European experiments that explore new application areas for ICT in agriculture in general.
- Increase deployment of technologies in the agriculture sector

In the longer term funded activities will create sustainable production systems and increase the competitiveness of the farming sector.

Type of Action: Innovation action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

RUR-13-2018: Enabling the farm advisor community to prepare farmers for the digital age

Specific Challenge: Digitisation represents a huge opportunity to leverage the information and day-to-day knowledge generation on farms. While the more technology savvy farmers may be able to benefit from their data immediately, the majority of the EU's 12 million farmers will need support from intermediaries such as farm advisors to take up technologies and to make decisions on ICT use adapted to their specific farm context. The best way to motivate independent advisors to embrace the upcoming digital revolution is to build on tools that are already familiar to farmers and advisors. Rethinking the use of data within regional and national agricultural knowledge and innovation systems should be a top priority for existing advisory bodies, but awareness is often lacking. Many existing and new data flows could fulfil multiple uses and be brought to a higher level by improved ICT applications if supported by independent advisors. The challenge is to connect advisors in order to share ICT tools and create spill-overs across different regions on digital transformation processes. The future role of farm advisory services should include facilitating and supporting farmers in orienting themselves in the digital landscape.

Scope: Proposals should aim to collect best practice ICT applications and share them in a network of independent advisors. Proposals should be based on existing ICT advisory tools on biological, physical and economic processes that provide added value to current advisory techniques. Projects are furthermore expected to develop advisors' ability to support farmers on novel on-farm technologies (e.g. robots, internet of things (IoT) technologies, artificial

intelligence, etc.), including the related costs and benefits and the role and position of farmers in a digital environment. Activities should ensure sufficient coverage of various cropping and livestock systems and farm sizes across all EU Member States. Activities should follow up on the key trends in digitisation of agriculture and make sure these are reflected in work on ICT advisory tools and the facilitation of farm-level uptake. Projects shall seek synergies with the national or regional EIP networks and EIP Operational Groups, and provide input to and coordinate their strategy with the SCAR-AKIS Strategic Working Group. Dedicated attention should be given to Member States where knowledge sharing attitudes and interconnectivity within the AKISs are still limited. Liaison should be made with concurring EU projects on agricultural digitisation.

Consortia should bring together public and private advisors that have day-to-day on-farm advisory experience, and may further include other relevant players such as farmers, farmers' organisations, etc. Projects are expected to run for at least 5 years and should fall under the concept of the multi-actor approach¹⁶⁸.

The Commission considers that proposals requesting a contribution from the EU up to EUR 7 million would allow the areas to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected Impact: A farm advisor community ready to actively use the possibilities of digital technologies and help farmers orient themselves in the new digital landscape. Projects will contribute to:

- networking farm advisors across the EU serving a systematic delivery of knowledge and resources to support digital innovation and making advisors able and eager to spread application of digital advisory tools;
- spill-over effects of digital tool infrastructures between agricultural advisors across Member States;
- developing new types of advisory activities with a focus on making farmers better able to handle involvement and investments in digital technologies.

Type of Action: Coordination and support action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

RUR-14-2018: Digital solutions and e-tools to modernise the CAP

Specific Challenge:

The EU eGovernment Action Plan 2016-202¹⁶⁹ calls on the modernisation of public administrations in Europe and improving the interaction with citizens and businesses. This

¹⁶⁸ See definition of the 'multi-actor approach' in the introduction to this Work Programme part.

¹⁶⁹

modernisation aims to reduce administrative burden on stakeholders, including farmers, based on the reuse of common services. A set of cross border services in key policy areas such as health, procurement, justice and identification have been successfully developed in the past through Large Scale Pilots. A key domain of application is the Common Agricultural Policy (CAP).

The EU's CAP delivers on a wide variety of social, environmental and economic goods. Due to its multiple dimensions, broad range of stakeholders involved and the large geographic area covered, the current governance system is complex. This results in high socio-economic costs for those involved and society at large. The current infrastructure governing the CAP direct payments (the Integrated Administration and Control Systems, IACS) which includes different realisations across Member States, contains important amounts of detailed and valuable data. However, to reduce the important gap between the current use of these data currently limited to agriculture, and the potential broader uses in combination with new technologies, ancillary space data and other data sources such as agri-environmental data while reducing socio-economic and administrative burden will require new forms of data interoperability and accessibility beyond the CAP. It is expected that the development of new cross-border services will have a spill over effects for other fields of application.

Scope: The proposal should support the further development of the IACS, promoting extensive data and information flows between Member States, the European Commission and various other stakeholders.

The proposal should ensure that appropriate and relevant data collected at the source become a reliable additional input for subsequent processes of payment and performance monitoring. The cross-border dimension of this pilot is essential to define a pan-EU standardised IACS. The pilot should demonstrate how cross-border information could contribute to simplifying and rationalising the administrative process by reusing (open) data and contribute to increasing the overall social, economic and environmental performance of the CAP measures for all actors, including the farmers. The project will also identify the drivers, barriers, potential vulnerabilities and legal issues associated with implementing the new system in the EU that can be generalised to other fields of application.

The project will enable the interaction and co-creation based on the existing national systems, and will re-use if relevant existing cross-border services, in particular services operated by the Connecting Europe Facility (CEF) telecom programme. The action may involve financial support to third parties. The proposal will define the process of selecting entities for which financial support will be granted, typically in the order of EUR 40 000 – 300 000 per party¹⁷⁰. The free access to the foreground must be guaranteed to enable access by any Member State to the results specifications. In addition open source (EUPL "European Union Public Licence") should be used.

EU eGovernment Action Plan 2016–2020 Accelerating the digital transformation of government.pdf

¹⁷⁰ In line with Article 23 (7) of the Rules for Participation the amount referred to in Article 137 of the Financial Regulation may be exceeded, and if this is the case proposals should explain why this is necessary to achieve the objectives of the action.

To demonstrate the robustness and the economic benefit, the project must pilot the system for at least 12 months in real conditions. The large-scale pilot shall include a minimum of six relevant national administrations (or legal entities designated to act on their behalf) from at least six different EU Member States.

The Commission considers that proposals requesting a contribution from the EU up to EUR 10 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

Expected Impact: Achieve a further integration and digitization of the EU CAP's governance infrastructure. The project shall:

- evaluate the reduction of the socio-economic costs and – barriers for a wide range of stakeholders involved in the implementation of the CAP;
- improve the potential of IACS to be used for monitoring, analyses and control, by incentivising administrations to share part of their national LPIS information with EU bodies, academia and research institutions;
- achieve a higher level of system interoperability and (meta-)data standardisation, allowing innovative ways to use and combine agri-environmental data;
- achieve user acceptance validation addressing privacy, security, vulnerability, liability, identification of user needs.

In the long term this pilot will contribute to a more inclusive, efficient and sustainable EU CAP.

Type of Action: Innovation action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

Boosting innovation and enhancing the human and social capital in rural areas

The objective is to support sustainable growth by encouraging innovation. This involves two main strands of activities: 1) strengthening the skills, human and social capital of farmers, foresters and rural dwellers by improving cooperation, knowledge transfer and networking; 2) investing into the knowledge and innovation systems to improve their delivery. In particular, support to the implementation of the EIP-AGRI "interactive innovation approach" will be provided.

Proposals are invited against the following topic(s):

RUR-15-2018-2019-2020: Thematic networks compiling knowledge ready for practice¹⁷¹

Specific Challenge: Despite the continued funding of scientific projects, innovative ideas and methods from practice are not captured and spread, while also research results findings are often insufficiently not exploited and taken up/integrated into agricultural and forestry practice. It is essential to close the research and innovation divide and to act at EU level. National and sectoral agricultural knowledge and innovation systems (AKISs) are insufficiently connected to fully meet this challenge. More intense cooperation is needed between researchers, advisors and farmers/foresters to stimulate the exchange of knowledge exchange in view of fostering economically viable and sustainable agriculture and forestry.

Scope: The activities of thematic networks shall include summarising, sharing and presenting, - in a language that is easily understandable and is targeted to farmers and foresters -, existing best practices and research results findings that are near close to being put into practice, but not sufficiently known or used by practitioners. The specific themes of the networks may can be chosen in a 'bottom-up' way and must focus on the most urgent needs of farmers and foresters. If, where appropriate, they can covering important or promising cross-sectoral issues. They should pay attention to the cost/benefit aspects of the new practices. A comprehensive description of the state of the art on the chosen theme should explain the added value of the proposal, the relevance of the theme and how it avoids duplication with of existing ongoing or completed projects and networks. If duly substantiated, proposals may focus on the widening of an existing thematic network. 'Widening' could apply to, be it content wise and/or related to geographic coverage (e.g. by through twinning or cross-border exchange visits). In order to better reach and capture knowledge from the targeted farmers/foresters, the networks may organise 'cross-fertilisation' through sub-networks, covering, for example, a region, a language or a production system.

The result of the project should be an extensive range of appealing resulting end-user material .should be quite substantial in number, This should be easily to access/understand and aiming to feed into the existing dissemination channels most consulted by end-users in countries. Itible and should also be provided/delivered to the European Innovation Partnership (EIP) 'Agricultural Productivity and Sustainability'. Proposals should fall under the concept of the 'multi-actor approach'¹⁷², with a consortium based on a balanced mix of actors with complementary knowledge involving farmers/foresters, farmers' groups and advisors. Wherever possible related and relevant to the chosen theme, synergies and complementarity with EIP Operational Groups and interactive innovation groups operating in the context of the EIP-AGRI are encouraged, and, if useful, with other European Structural and Investment Fund projects. In the exceptional event that minor testing of specific solutions would be needed, a maximum of 20% of the project budget may be used for this purpose.

The Commission considers that proposals requesting a contribution from the EU of up to EUR 2 million per project would allow this specific challenge to be addressed appropriately.

¹⁷¹ It is expected that this topic will continue in 2020

¹⁷² See definition of the 'multi-actor approach' in the introduction to this Work Programme part.

Nonetheless, this does not preclude the submission and selection of proposals requesting other amounts.

Expected Impact: Activities shall contribute to the collection and distribution of easily accessible practice-oriented knowledge on the thematic area chosen, including delivering as many as possible “practice abstracts” in the common EIP-AGRI format and as much audio-visual material as possible. The aim is to

- conserve the practical knowledge for the long term - beyond the project period - using the main trusted dissemination channels which farmers/foresters consult most often, and also for education and training purposes;
- increase the flow of practical information between farmers/foresters in Europe in a geographically balanced way, creating spill-overs and taking account of the differences between territories;
- achieve greater user acceptance of collected solutions and a more intensive dissemination of existing knowledge.

Type of Action: Coordination and support action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

RUR-16-2019: Fuelling the potential of advisors for innovation

Specific Challenge: Despite the continued generation of scientific knowledge, its impact and application in practical farming and forestry is disappointing and its innovative impact poor. Although there are some good examples, the EIP-AGRI evaluation study recommends that more advisors need to be involved in interactive innovation¹⁷³ projects to fuel cross-fertilisation and implementation of results. Advisors indeed have clear impact on farmers' and foresters' decisions and should play a key role in linking science and practice. Whereas the term ‘advice’ until recently merely referred to a given recommendation in a the context of linear knowledge ‘transfer’, advisors should now also develop the skills to be able to take upon a more interactive role in projects. These new forms of interaction and 'knowledge exchange' among advisors, farmers, private forest owners, scientists and other actors are unfamiliar to most. There is a need to network advisors to promote this approach and to boost advisors' innovation potential in order to ultimately improve knowledge flows in national and regional agricultural knowledge and innovation systems (AKISs).

Scope: Activities shall aim at networking advisory services to for learning and exchanging interactive innovation techniques which that support the transition to a more productive, sustainable and climate-smart agriculture and more a higher level of developedment in rural areas. Projects shall identify and showcase best practices from a broad series of practical cases of advisory services across the EU, Proposals shall develop methods towith a view to support

¹⁷³ For the interactive innovation model, see the introduction to this Work Programme.

advisors on how to capture grass-roots innovative ideas from farmers and foresters and further develop them into innovation projects. The activities shall create peer-to-peer learning for active and future advisors as well as training opportunities, e.g. through exchanges and cross-visits abroad. They shall teach advisors the skills for managing and participating in interactive innovation projects and how to intermediate in farmer-to-farmer learning processes. Projects shall identify best practices from a broad series of practical cases of advisory services across the EU. Proposals must expand and update the inventory of advisors in the EU prepared by the PRO-AKIS project, with a particular focus to on including all private and public advisors and ensuring EU wide coverage. Based on this, projects shall collect best practices for well-organised, well-connected and effective advisory services supporting innovation and facilitating complementary partners to work together in innovative projects. Proposers are encouraged to establish links between their activities and existing activities, services and networks, such as those related to the farm demonstration networks, research organisations etc. and seek synergies with the national or regional EIP networks and EIP Operational Groups. Projects should provide input to and coordinate their strategy with the SCAR-AKIS Strategic Working Group. Dedicated Special attention should be given to the CEE countries where knowledge sharing attitudes and interconnectivity within the AKISs are still limited.

Projects are expected to run five years and shall fall under the concept of the multi-actor approach¹⁷⁴. To network all public and private advisors across the EU, consortia shall include as many key actors – private and public – in the EU with practical advisory experience as possible. – private and public – They should be engaged in a broad range of technical advisory subjects for a more sustainable and competitive agriculture and forestry.

The Commission considers that proposals requesting a contribution from the EU of up to EUR 5 million would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude the submission and selection of proposals requesting other amounts.

Expected Impact: Activities shall contribute to better interconnected advisory services with a focus on innovation at national/regional level, able to support EIP-AGRI Operational Groups and Horizon 2020 multi-actor projects, by:

- improving networking and peer-to-peer learning of advisors, stimulating the interactive role of advisors to boost innovation and providing a set of best practices for advisory services, thereby building an advisory network covering the EU in a balanced and comprehensive way;
- enhancing the impact of advisors on the strengthening of knowledge flows between scientific research and practical implementation for more productive and sustainable agricultural practices and rural development ;

¹⁷⁴ See definition of the 'multi-actor approach' in the introduction to this Work Programme part.

- improving education by developing efficient material and dedicated training systems for advisors that help to preserve practical knowledge in the long-term, and by delivering a substantial number of “practice abstracts” in the common EIP-AGRI format, including audio-visual material.

Type of Action: Coordination and support action

The conditions related to this topic are provided at the end of this call and in the General Annexes.

Conditions for the Call - Rural Renaissance

Opening date(s), deadline(s), indicative budget(s):¹⁷⁵

Topics (Type of Action)	Budgets (EUR million)			Deadlines
	2018	2019	2020	
Opening: 27 Oct 2017				
CE-RUR-08-2018-2019-2020 (RIA)	6.00			13 Feb 2018 (First Stage) 11 Sep 2018 (Second Stage)
RUR-01-2018-2019 (RIA)	12.00			
RUR-02-2018 (RIA)	5.00			
RUR-03-2018 (RIA)	15.00			
RUR-04-2018-2019 (RIA)	12.00			
DT-RUR-12-2018 (IA)	20.00			13 Feb 2018
RUR-01-2018-2019 (CSA)	5.00			
RUR-09-2018 (CSA)	3.00			
RUR-13-2018 (CSA)	7.00			
RUR-14-2018 (IA)	10.00 176			

¹⁷⁵ The Director-General responsible for the call may decide to open the call up to one month prior to or after the envisaged date(s) of opening.

The Director-General responsible may delay the deadline(s) by up to two months.

All deadlines are at 17.00.00 Brussels local time.

The deadline(s) in 2019 and 2020 are indicative and subject to separate financing decisions for 2019 and 2020.

The budget amounts for the 2018 budget are subject to the availability of the appropriations provided for in the draft budget for 2018 after the adoption of the budget 2018 by the budgetary authority or, if the budget is not adopted, as provided for in the system of provisional twelfths.

The budget amounts for the 2019 and 2020 budget are indicative and will be subject to separate financing decisions to cover the amounts to be allocated for 2019 and for 2020.

Horizon 2020 - Work Programme 2018-2020
Food security, sustainable agriculture and forestry, marine, maritime and inland water research and the bioeconomy

RUR-15-2018-2019-2020 (CSA)	12.43			
Opening: 25 Oct 2018				
CE-RUR-08-2018-2019-2020 (IA)		8.00		23 Jan 2019
CE-RUR-10-2019 (IA)		20.00		
LC-RUR-11-2019-2020 (IA)		20.00		
RUR-15-2018-2019-2020 (CSA)		10.00		
RUR-16-2019 (CSA)		5.00		
RUR-01-2018-2019 (RIA)		6.00		23 Jan 2019 (First Stage)
RUR-04-2018-2019 (RIA)		5.00		04 Sep 2019 (Second Stage)
Opening: To be defined				
Focus area topic(s) for 2020			41.00	To be defined
Overall indicative budget	107.43	74.00	41.00	

Indicative timetable for evaluation and grant agreement signature:

For single stage procedure:

- Information on the outcome of the evaluation: Maximum 5 months from the final date for submission; and
- Indicative date for the signing of grant agreements: Maximum 8 months from the final date for submission.

For two stage procedure:

- Information on the outcome of the evaluation: Maximum 3 months from the final date for submission for the first stage and maximum 5 months from the final date for submission for the second stage; and
- Indicative date for the signing of grant agreements: Maximum 8 months from the final date for submission of the second stage.

Eligibility and admissibility conditions: The conditions are described in General Annexes B and C of the work programme.. The following exceptions apply:

RUR-14-2018	The large-scale pilot shall include a minimum of six relevant
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¹⁷⁶ of which EUR 5.00 million from the 'Europe in a changing world – Inclusive, innovative and reflective societies' WP part.

	national administrations (or legal entities designated to act on their behalf) in at least six different EU Member States.
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Evaluation criteria, scoring and threshold: The criteria, scoring and threshold are described in General Annex H of the work programme.

Evaluation Procedure: The procedure for setting a priority order for proposals with the same score is given in General Annex H of the work programme.

The full evaluation procedure is described in the relevant [guide](#) published on the Participant Portal.

Grant Conditions:

DT-RUR-12-2018, RUR-14-2018	For grants awarded under this topic beneficiaries may provide support to third parties as described in part K of the General Annexes of the Work Programme . The support to third parties can only be provided in the form of grants. The respective options of Article 15.1 and Article 15.3 of the Model Grant Agreement will be applied.
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Other Actions

1. Circular Bioeconomy Thematic Investment Platform (risk-sharing financial instrument)

Specific Challenge: The bioeconomy could significantly contribute to meeting the EU priorities on growth and climate as well as some of the UN Sustainable Development Goals (SDGs), if innovative technologies, processes and business models in this domain are developed and deployed. One of the key success factors behind such development and deployment is access to finance.

An InnovFin Advisory study¹⁷⁷ has identified funding gaps in two key areas of the bioeconomy – the bio-based industries and the blue economy¹⁷⁸ –, when projects are about to enter the demonstration or commercial phases. These funding gaps stem from the innovative nature of projects in these sectors, which causes a high level of risks (such as technology risks, market risks, regulatory risks), as well as a high level of required capital expenditure for those projects reaching the higher development and deployment stages. The study recommends, amongst other, tackling these funding gaps by establishing a dedicated EU Thematic Investment Platform (a risk-sharing financial instrument). Other areas of the bioeconomy, such as the agriculture and food sectors, would also benefit from such instrument.

This instrument should not only fill the existing funding gaps in the bioeconomy sectors both on land and sea, but also contribute to the EU agenda for a circular economy. In a circular economy the value of products, materials and resources is maintained for as long as possible, and the generation of waste minimised¹⁷⁹. The circular bioeconomy is about the application of this concept to biological resources, products and materials.

Scope: The Circular Bioeconomy Thematic Investment Platform aims at providing access to finance, in particular in the form of debt or quasi-equity, to innovative bioeconomy¹⁸⁰ projects and focusses in priority, but not exclusively, on innovative circular bioeconomy projects.

¹⁷⁷ InnovFin Advisory "Study on Access-to-Finance Conditions for Investments in Bio-Based Industries and the Blue Economy", June 2017.

¹⁷⁸ Sectors within bio-based industries and blue economy covered by the InnovFin Advisory "Study on Access-to-Finance Conditions for Investments in Bio-Based Industries and the Blue Economy" are detailed in this study.

¹⁷⁹ Closing the loop – An EU action plan for the Circular Economy. COM(2015)614 (Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions)

¹⁸⁰ The bioeconomy encompasses the production of renewable biological resources [terrestrial or aquatic] and the conversion of these resources and waste streams into value added products, such as food, feed, bio-based products (where bio-based products are products that are wholly or partly derived from materials of biological origin, excluding materials embedded in geological formations and/or fossilised) and bioenergy (Innovating for Sustainable Growth: A Bioeconomy for Europe. COM(2012)60 (Communication from the

The Platform may include, amongst others, projects that use terrestrial or aquatic biomass (including waste, residues, discards and by-products from the agricultural, agro-food, forestry and aquatic sectors) for innovative bio-based products or processes, or to valorise it for other innovative purposes (amongst which food, feed, fertilisers or soil improvers).

Projects focussing exclusively or mainly on renewable energy generation (fuels, heat or power) are not in the scope of the action.

This Thematic Investment Platform will be set-up under the InnovFin Holding fund. The EU funds¹⁸¹ for this Platform will be entrusted to a manager to be selected by the EC.

Expected impact: Expected impact: The InnovFin Circular Bioeconomy Thematic Investment Platform will help in:

- reducing perceived investment risks by investors of the projects financed under this financial instrument, and thereby crowding-in private capital that could help filling the funding gaps;
- de-risking innovative technologies, processes or business models (amongst others) by validating them from a technological or commercial viewpoint, thereby encouraging later investments in their further development or deployment;
- fostering industrial, rural, coastal and offshore development, and opening new avenues for the primary sector, hence creating jobs and growth in the EU;
- contributing to the EU priorities on climate as well as on some of the UN SDGs by supporting projects related to the transition to a circular bioeconomy;
- promoting highly circular paradigms in bioeconomy.

Type of Action: Financial Instrument

Indicative timetable: Second half 2018

Indicative budget: EUR 50.00 million from the 2018 budget

2. Support to Research and Innovation Policy in the area of bio-based products and services

The objective is to provide highly qualified external expertise to support with objectivity the contracting authority in the design, preparation and proper implementation of Union policy initiatives and legislative and programme proposals in the area of Bio-based products and services Research and Innovation. The importance of this area has been emphasized in the

Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions)).

¹⁸¹ EUR 50.00 million from the Societal Challenge 2 budget 2018 (of which EUR 30.00 from SC2-RTD and EUR 20.00 from SC2-AGRI), complementing budget of EUR 50.00 million from Access to risk finance, which makes a total of EU contribution of EUR 100.00 million to this risk-sharing financial instrument.

European Commission policy initiatives on the Bioeconomy, the Circular Economy and Industrial Renaissance. The required services are in the areas of policy analysis and implementation and will be delivered in the form of technical assistance and/or studies.

Type of Action: Public Procurement - Two direct contracts

Indicative timetable: Third quarter of 2018 and first quarter of 2020

Indicative budget: EUR 1.50 million from the 2018 budget and EUR 1.20 million from the 2020 budget

3. 5th Foresight exercise of the Standing Committee for Agricultural Research (SCAR)

A group of experts should be established to provide a better understanding of drivers and new and emerging factors which are of importance for the development of policies at the European level and by Member States and Associated Countries related to the Bioeconomy in its broadest meaning. In this respect, in the framework of the Monitoring and Signalling Mechanism (MSM) established in support of the SCAR foresight process, an ad hoc foresight expert group formed by high-level independent experts should be contracted by the Commission, with the task to build on the 4 previous SCAR foresight rounds as well as other recent studies and analyses and deliver new insight about possible changes of importance for the development of the European Bioeconomy and related strategies. The study should be conducted in close cooperation with relevant activities within on-going initiatives and possible future foresights.

The activities carried out by the group will be essential to the development and monitoring of the Union policy on Research, technological development and demonstration. The experts will be highly qualified and specialised. They will be appointed in their personal capacity, acting independently and expressing their own personal views and will be selected on the basis of objective criteria, following a call for applications published in accordance with Article 10 of Decision C(2016)3301.

They will be paid a special allowance of EUR 450/day for each full working day spent assisting the Commission, in terms of Article 21 of Decision C(2016)3301. This amount is considered to be proportionate to the specific tasks to be assigned to the experts, including the number of meetings to be attended and possible preparatory work.

Type of Action: Expert Contracts

Indicative budget: EUR 0.20 million from the 2018 budget

4. External expertise

This action will support the use of appointed independent experts for the monitoring of actions (grant agreement, grant decision, procurements, financial instruments) and, where appropriate, include ethics checks.

Type of Action: Expert Contracts

Indicative budget: EUR 0.18 million from the 2018 budget and EUR 0.22 million from the 2019 budget

5. Fostering transnational cooperation between National Contact Points (NCP) in the area of Food security, sustainable agriculture and forestry, marine and maritime and inland water research and the bioeconomy : follow-up project¹⁸²

The action will facilitate transnational cooperation between Horizon 2020 NCPs in the area of Food security, sustainable agriculture and forestry, marine and maritime and inland water research and the bioeconomy, with a view to identifying and sharing good practices and raising the general standard of support to programme applicants, taking into account the diversity of actors that make up the constituency of the Food security, sustainable agriculture and forestry, marine and maritime and inland water research and the bioeconomy sector. It will involve one consortium of NCPs focussing on transnational cooperation on issues specific to the Food security, sustainable agriculture and forestry, marine and maritime and inland water research and the bioeconomy sector, within the context of Horizon 2020 calls for proposals.

All activities must be tailored according to the nature of this sector.

The proposal should show that the activities put forward will deliver tangible benefits to potential applicants. Activities should capitalise on relevant work of the previous NCP network project in this sector, and of the 'NCP Academy' (www.ncpacademy.eu). Various mechanisms may be included, such as benchmarking, joint workshops, enhanced cross-border brokerage events, and specific training linked to the Food security, sustainable agriculture and forestry, marine and maritime and inland water research and the bioeconomy sector.

Where relevant, activities should make use of commonly available tools (e.g. for brokerage and partner search, benchmarking tools, guidebooks, promotional tools etc).

To help close the innovation divide, a substantial component of the proposed activities must be devoted to activities aimed at helping NCPs in those countries that have been participating at low levels in the programme up to now. These activities should help these NCPs rapidly acquire the know-how on NCP operations accumulated in other countries including, for example, training, mentoring, and twinning. They may also include awareness raising actions aimed at increasing visibility of well-qualified potential applicant organisations in the above mentioned countries.

The legal entities listed below are the host organisations of NCPs from EU Member States and Associated Countries who have been officially appointed by the relevant national authorities, and who have expressed a willingness to participate in this proposal. NCPs not opting to be a beneficiary are nevertheless invited and encouraged to participate in the project

¹⁸² This grant will be awarded without call for proposals in line with Article 190(1)(e) of the Rules of applications of Regulation (EU, Euratom) 966/2012, Regulation No 1268/2012 and Article 11(2) of the Rules for participation and dissemination in "Horizon 2020 - the Framework Programme for Research and Innovation (2014-2020)", Regulation (EU) No 1290/2013.

activities (e.g. workshops), and costs for such participation (e.g. travel costs paid by the consortium) may be included in the estimated budget and be eligible for funding by the Commission.

[In line with Articles 2, 31.6 and 41.4 of the Model Grant agreement, the project arising from this grant will complement other NCP network projects. This means that the beneficiaries and those of the complementary grants must cooperate and provide access to their results. They must conclude a written collaboration agreement regarding the coordination of the complementary grants and the work of the action.]

The project must end by August 2020.

Expected impact:

- An improved, more consistent and professionalised NCP service across Europe, thereby helping simplify access to Horizon 2020 calls, and lowering the entry barriers for newcomers,
- An increase in the quality of proposals submitted, including those from countries where success rates are currently lower than average

Legal entities:

The names of all beneficiaries will be available and listed here by 01 September 2017

Type of Action: Grant to Identified beneficiary

Indicative budget: EUR 0.25 million from the 2019 budget

Calls and Other Actions for 2020

Call - Sustainable Food Security

H2020-SFS-2018-2020-continued

Indicative budget for 2020:

[of the call for proposals] : EUR 199 million

Topics:

From functional ecosystems to healthy food:

- SFS-01-2018-2019-2020-continued - Biodiversity in action: across farmland and the value chain
- SFS-02-2020 - Healthy livestock gut ecosystem for sustainable production
- SFS-04-2019-2020-continued - Integrated health approaches and alternatives towards pesticide use
- SFS-05-2018-2019-2020-continued - New and emerging risks in plant health
- SFS-06-2019-2020-continued - Stepping up IPM
- SFS-09-2020 - Husbandry for quality
- SFS-10-2020 - Epidemiology of contagious animal diseases
- SFS-13-2020 - Genome enabled breeding
- SFS-18-2020 - Food systems pilot action

Environment and climate-smart food production and consumption

- SFS-21-2020 - Soils going global

Building capacities

- SFS-28-2018-2019-2020-continued - GenRes and (Pre) breeding communities
- SFS-30-2018-2019-2020-continued - Agri-Aqua Labs

Targeted International Cooperation

EU-Africa Partnership on Food and Nutrition Security and Sustainable Agriculture (FNSSA)

- SFS-35-2019-2020-continued - Sustainable intensification in Africa

EU-China FAB Flagship initiative

- SFS-40-2020 - Healthy soils for healthy food production

Call - Blue Growth

H2020-BG-2018-2020-continued

Indicative budget for 2020:

[of the call for proposals] : EUR 72 million

Topics:

- BG-10-2020 - Fisheries in full ecosystem context
- BG-07-2019-2020-continued - The Future of the Oceans Flagship Initiative
- BG-11-2020 - Oceans Innovation Pilot
- BG-12-2020 - Black Sea Research and Innovation Action

Call - Rural Renaissance

H2020-RUR-2018-2020-continued

Indicative budget for 2020:

[of the call for proposals] : EUR 55 million

Topics:

Organising sustainable food and non-food value chains under changing conditions

- RUR-05-2020 - Connecting consumers and producers in innovative supply chains
- RUR-06-2020 - Innovative agri-food chains
- RUR-07-2020 - Reducing food losses along the value chain

Boosting innovation and enhancing the human and social capital in rural areas

- RUR-15-2018-2019-2020-continued - Thematic networks compiling knowledge ready for practice
- RUR-17-2020 - Networking European farms to boost thematic knowledge exchanges and close the innovation gap

Horizon 2020 - Work Programme 2018-2020
Food security, sustainable agriculture and forestry, marine, maritime and inland water research and the bioeconomy

Budget¹⁸³

	Budget line(s)	2018 Budget (EUR million)	2019 Budget (EUR million)	2020 Budget (EUR million)
Calls				
H2020-SFS-2018-2020		218.75	306.00	24.00
	<i>from 05.090301</i>	<i>111.00</i>	<i>215.00</i>	<i>19.00</i>
	<i>from 08.020302</i>	<i>107.75</i>	<i>91.00</i>	<i>5.00</i>
H2020-BG-2018-2020		77.50	89.00	
	<i>from 08.020302</i>	<i>77.50</i>	<i>89.00</i>	
H2020-RUR-2018-2020		102.43 ¹⁸⁴	74.00	41.00
	<i>from 05.090301</i>	<i>101.43</i>	<i>54.00</i>	<i>31.00</i>
	<i>from 08.020302</i>	<i>1.00</i>	<i>20.00</i>	<i>10.00</i>
H2020-SFS-2018-2020-continued				189.00
	<i>from 08.020302</i>			<i>40.00</i>
	<i>from 05.090301</i>			<i>149.00</i>
H2020-BG-2018-2020-continued				72.00
	<i>from</i>			<i>72.00</i>

¹⁸³ The budget figures given in this table are rounded to two decimal places.

The budget amounts for the 2018 budget are subject to the availability of the appropriations provided for in the draft budget for 2018 after the adoption of the budget 2018 by the budgetary authority or, if the budget is not adopted, as provided for in the system of provisional twelfths.

The budget amounts for the 2019 and 2020 budget are indicative and will be subject to separate financing decisions to cover the amounts to be allocated for 2019 and for 2020.

¹⁸⁴ To which EUR 5.00 million from the 'Europe in a changing world – Inclusive, innovative and reflective societies' WP part will be added making a total of EUR 107.43 million for this call.

Horizon 2020 - Work Programme 2018-2020
Food security, sustainable agriculture and forestry, marine, maritime and inland water research and the bioeconomy

	08.020302			
H2020-RUR-2018-2020-continued				55.00
	from 05.090301			55.00
Contribution from this part to call H2020-EIC-FTI-2018-2020 under Part 17 of the work programme		8.90	8.90	8.90
	from 05.090301	3.78	3.78	3.78
	from 08.020302	5.12	5.12	5.12
Contribution from this part to call H2020-DT-2018-2020 under Part 5.i of the work programme			15.00	
	from 05.090301		15.00	
Other actions				
Financial Instrument		50.00		
	from 08.020302	30.00		
	from 05.090301	20.00		
Public Procurement		1.50		1.20
	from 08.020302	1.50		1.20
Expert Contracts		0.38	0.22	
	from 08.020302	0.34	0.14	
	from 05.090301	0.04	0.08	
Grant to Identified beneficiary			0.25	
	from 08.020302		0.25	
Estimated total budget		459.46	493.37	391.10