



EN

Horizon 2020

Work Programme 2018-2020

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

IMPORTANT NOTICE ON THIS WORK PROGRAMME

This Work Programme covers 2018, 2019 and 2020. The parts of the Work Programme that relate to 2020 (topics, dates, budget) have, with this revised version, been updated. The changes relating to this revised part are explained on the Funding & Tenders Portal.

(European Commission Decision C(2020)6320 of 17 September 2020)



Table of contents

Introduction	7
Call - Sustainable Food Security	15
From functional ecosystems to healthy food.....	16
SFS-01-2018-2019-2020: Biodiversity in action: across farmland and the value chain.....	16
SFS-02-2020: Healthy terrestrial livestock microbial ecosystems for sustainable production	19
LC-SFS-03-2018: Microbiome applications for sustainable food systems	21
SFS-04-2019-2020: Integrated health approaches and alternatives to pesticide use	23
SFS-05-2018-2019-2020: New and emerging risks to plant health.....	25
SFS-06-2018-2020: Stepping up integrated pest management	27
SFS-07-2018: Making European beekeeping healthy and sustainable	29
SFS-08-2018-2019: Improving animal welfare	31
SFS-10-2020: Epidemiology of non-EU-regulated contagious animal diseases: from integrated data collection to prioritisation.....	32
SFS-11-2018-2019: Anti-microbials and animal production.....	34
SFS-12-2019: A vaccine against African swine fever	36
SFS-13-2020: Genome and epigenome enabled breeding in terrestrial livestock	38
DT-SFS-14-2018: Personalized Nutrition.....	39
LC-SFS-15-2018: Future proofing our plants	41
SFS-16-2018: Towards healthier and sustainable food.....	42
LC-SFS-17-2019: Alternative proteins for food and feed	44
Environment and climate-smart food production and consumption	45
LC-SFS-19-2018-2019: Climate-smart and resilient farming	46
LC-SFS-20-2019: European Joint Programme on agricultural soil management.....	47
SFS-21-2020: Emerging challenges for soil management	50
LC-SFS-22-2020: Forest soils Research and Innovation Action	52
SFS-23-2019: Integrated water management in small agricultural catchments.....	53
CE-SFS-24-2019: Innovative and citizen-driven food system approaches in cities	55
CE-SFS-25-2018: Integrated system innovation in valorising urban biowaste	56
Building capacities.....	58
DT-SFS-26-2019: Food Cloud demonstrators	58
SFS-27-2018: Monitoring food R&I investments and impacts	60
SFS-28-2018-2019-2020: Genetic resources and pre-breeding communities	61
SFS-29-2018: Innovations in plant variety testing.....	63
SFS-30-2018-2019-2020: Agri-Aqua Labs.....	65
SFS-31-2019: ERANETs in agri-food	68

Targeted international cooperation	72
SFS-32-2018: Supporting microbiome coordination and the International Bioeconomy Forum	73
EU-Africa Partnership on Food and Nutrition Security and Sustainable Agriculture (FNSSA).....	74
SFS-33-2018: Support to the implementation of the EU-Africa Research and Innovation Partnership on Food and Nutrition Security & Sustainable Agriculture (FNSSA).....	74
LC-SFS-34-2019: Food Systems Africa	75
SFS-35-2019-2020: Sustainable Intensification in Africa	77
CE-SFS-36-2020: Diversifying revenue in rural Africa through bio-based solutions.....	80
EU-China FAB Flagship initiative	82
SFS-37-2019: Integrated approaches to food safety controls across the food chain	82
SFS-38-2018: Highly efficient management of soil quality and land resources.....	83
CE-SFS-39-2019: High-quality organic fertilisers from biogas digestate	85
SFS-40-2020: Healthy soils for healthy food production	86
 Conditions for the Call - Sustainable Food Security.....	 87
 Call - Blue Growth	 93
BG-01-2018: Towards a Baltic and North Sea research and innovation programme.....	94
BG-02-2018: Blue Bioeconomy Public-Public Partnership.....	96
LC-BG-03-2018: Sustainable harvesting of marine biological resources	98
DT-BG-04-2018-2019: Sustainable European aquaculture 4.0: nutrition and breeding ...	100
BG-05-2019: Multi-use of the marine space, offshore and near-shore: pilot demonstrators	102
CE-BG-06-2019: Sustainable solutions for bio-based plastics on land and sea	104
BG-07-2019-2020: The Future of Seas and Oceans Flagship Initiative	106
BG-08-2018-2019: All Atlantic Ocean Research Alliance Flagship	111
LC-BG-09-2019: Coordination of marine and maritime research and innovation in the Black Sea.....	115
BG-10-2020: Fisheries in the full ecosystem context	117
BG-11-2020: Towards a productive, healthy, resilient, sustainable and highly-valued Black Sea	119
 Conditions for the Call - Blue Growth	 121
 Call - Rural Renaissance.....	 125
 From farm to society: understanding dynamics and modernising policies	 125
RUR-01-2018-2019: Building modern rural policies on long-term visions and societal engagement.....	126
RUR-02-2018: Socio-economic impacts of digitisation of agriculture and rural areas	130

RUR-03-2018: Contracts for effective and lasting delivery of agri-environmental public goods	131
RUR-04-2018-2019: Analytical tools and models to support policies related to agriculture and food.....	133
RUR-21-2020: Agricultural markets and international trade in the context of sustainability objectives.....	134
Organising sustainable food and non-food value chains under changing conditions	136
RUR-05-2020: Connecting consumers and producers in innovative agri-food supply chains	136
RUR-06-2020: Innovative agri-food value chains: boosting sustainability-oriented competitiveness	138
RUR-07-2020: Reducing food losses and waste along the agri-food value chain.....	140
CE-RUR-08-2018-2019-2020: Closing nutrient cycles	143
RUR-09-2018: Realising the potential of regional and local bio-based economies	146
CE-RUR-10-2019: Circular bio-based business models for rural communities.....	147
LC-RUR-11-2019-2020: Sustainable wood value chains	149
RUR-18-2019: Support to the BIOEAST initiative: boosting knowledge and innovation-based bioeconomies.....	151
Taking advantage of the digital revolution	153
DT-RUR-12-2018: ICT Innovation for agriculture – Digital Innovation Hubs for Agriculture	153
RUR-13-2018: Enabling the farm advisor community to prepare farmers for the digital age	155
RUR-20-2018: Digital solutions and e-tools to modernize the CAP	156
Boosting innovation and enhancing the human and social capital in rural areas.....	158
RUR-15-2018-2019-2020: Thematic networks compiling knowledge ready for practice.	158
RUR-16-2019: Fuelling the potential of advisors for innovation	160
RUR-17-2019: Reinforcing the EU agricultural knowledge base.....	161
Conditions for the Call - Rural Renaissance	163
Call - Food and Natural Resources.....	167
FNR-01-2020: Strengthening the European agro-ecological research and innovation ecosystem	167
FNR-02-2020: Developing long-term monitoring and evaluation frameworks for the Common Agricultural Policy	169
FNR-03-2020: A comprehensive vision for urban agriculture	171
FNR-04-2020: Towards a European research and innovation roadmap on soils and land management	172
FNR-05-2020: Husbandry for quality and sustainability	174

LC-FNR-06-2020: Defossilising agriculture – solutions and pathways for fossil-energy-free farming	176
CE-FNR-07-2020: FOOD 2030 - Empowering cities as agents of food system transformation	178
FNR-08-2020: Supporting the food safety systems of the future	180
CE-FNR-09-2020: Pilot action for the removal of marine plastics and litter	182
FNR-10-2020: Public engagement for the Bioeconomy	184
FNR-11-2020: Prospecting aquatic and terrestrial natural biological resources for biologically active compounds	185
FNR-12-2020: Industrial microbiomes – learning from nature	188
LC-FNR-13-2020: Bio-based industries leading the way in turning carbon dioxide emissions into chemicals	189
CE-FNR-14-2020: Innovative textiles – reinventing fashion	190
CE-FNR-15-2020: A network of European bioeconomy clusters to advance bio-based solutions in the primary production sector	192
FNR-16-2020: Enzymes for more environment-friendly consumer products	194
CE-FNR-17-2020: Pilot circular bio-based cities – sustainable production of bio-based products from urban biowaste and wastewater	196
FNR-18-2020: Sustainability of bio-based products – international governance aspects and market update	198
Conditions for the Call - Food and Natural Resources.....	200
Other Actions	203
1. Circular Bioeconomy Thematic Investment Platform (risk-sharing financial instrument)	203
2. Support to Research and Innovation Policy in the area of circular economy, bio-based products and services.	204
3. 5th Foresight exercise of the Standing Committee for Agricultural Research (SCAR)	205
4. External expertise	206
5. Bioeconomy Presidency Conference.....	206
6. Providing ad-hoc individual expertise to advise on EU research and innovation policy.....	207
7. Comparative study of the research and innovation investment level in food systems... ..	207
8. Dissemination and exploitation of results	208
9. Policy Support Facilities for Partnering for a sustainable Blue Economy	208
10. Policy Support Facilities for ensuring and promoting healthy, sustainable and productive Oceans, Seas, Coastal and Inland Waters	208
11. Commission Expert group to support the implementation of Bioeconomy Policy Support Facility	209
12. Promote education, training and skills across the bioeconomy	209
13. Bioeconomy Knowledge Centre	210
14. Presidency Event - Bioeconomy Stakeholders Conference under the Croatian Presidency	210

Horizon 2020 - Work Programme 2018-2020

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

15. Conference on Marine Resources under the Portuguese Presidency 211

16. Strategic analysis and support for enhanced research cooperation in agriculture and food systems 212

Budget..... 213

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 the 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. Investments for example 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.

Project proposers should consider and actively seek synergies with, and where appropriate possibilities for further funding from, other relevant EU, national or regional research and innovation programmes (including ERDF/ESF+ or the Instrument for Pre-accession Assistance [IPA II]), private funds or financial instruments (including EFSD).

Examples of synergies are actions that build the research and innovation capacities of actors; mutually supportive funding from different Union instruments to achieve greater impact and efficiency; national/regional authorities actions that capitalise on on-going or completed Horizon 2020 actions aimed at market up-take/commercialisation.

In order to explore options for synergies, project proposers could seek contact with national/regional managing authorities and the authorities who developed the Research and Innovation Smart Specialisation Strategies (RIS3)¹. For this purpose the 'Guide on Enabling synergies between ESIF, H2020 and other research and innovation related Union programmes'² may be useful. Horizon 2020 project proposals should outline the scope for synergies and/or additional funding, in particular where this makes the projects more ambitious or increases their impact and expected results. Please note, however, that while the increase in the impact may lead to a higher score in the evaluation of the proposal, the reference to such additional or follow-up funding will not influence it automatically.

¹ <http://s3platform.jrc.ec.europa.eu/map>

² http://ec.europa.eu/regional_policy/sources/docgener/guides/synergy/synergies_en.pdf

Policy context and strategy

Guided by the political drivers of the Commission, including 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 are highly vulnerable to climate change. At the same time forests – and harvested wood products–, soils and oceans are major carbon sequestration reservoirs. The R&I actions in this work programme will support meeting the ambitious climate targets while at the same time satisfying the needs for 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 that maintain and enhance the EU natural capital.
- **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, water and biodiversity as providers of terrestrial and aquatic ecosystem services. These services are key to sustainable primary production and 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 innovations 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 innovations 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 four calls: "Sustainable Food Security", "Blue Growth", "Rural Renaissance", "Food and Natural Resources" 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 and **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. 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 using the interactive innovation model. This approach is developed by the EIP-AGRI³ 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,

³ <https://ec.europa.eu/eip/agriculture/en/eip-agri-concept>

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. The terms EU or Europe include the EU outermost regions.

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 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 differences⁴.

⁴ For guidance on methods of sex / gender analysis, please refer to: http://ec.europa.eu/research/swafs/gendered-innovations/index_en.cfm

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.

One of the priorities of the Work Programme 2020 will be to support the implementation of some of the research aspects identified in the European Strategy for Plastics in a Circular Economy⁵, the Bioeconomy Strategy⁶, the Integrated Maritime Policy⁷, and the European Strategy for Marine and Maritime Research⁸. This priority will be implemented through several topics covered by different Societal Challenges and the Leadership in Enabling and Industrial Technologies (LEIT) pillar⁹.

These topics are complementary and promote a multi-disciplinary approach involving various research fields, such as environmental technology and sciences, ocean sciences, bio-medical sciences, materials science and nanotechnologies, exposure science, analytical chemistry, biotechnology, food sciences, business model and product design, systems thinking and behavioural sciences. They aim to enhance the understanding of the drivers and impact of plastic pollution, including pathways and fate of macro-, micro- and nanoplastics in the marine and terrestrial environments, to strengthen the means to reduce the plastic burden in the environment and to improve the design, production, use and reuse of materials and products. Taking a multi-faceted approach to address an issue crossing many regulatory boundaries and being of interest to the general public, this priority intends to strengthen the area of plastics research as a bridge to future activities.

Requirements for multi-actor projects:

Specific requirements for multi-actor projects:

Topics requesting proposals to follow the **multi-actor approach**¹⁰ should meet all of the following requirements. The multi-actor approach aims to make innovation more demand-

⁵ <https://eur-lex.europa.eu/legal-content/EN/TXT/?qid=1516265440535&uri=COM:2018:28:FIN>

⁶ <https://ec.europa.eu/research/bioeconomy/index.cfm?pg=policy&lib=strategy>

⁷ https://ec.europa.eu/maritimeaffairs/policy_en; and http://ec.europa.eu/environment/marine/good-environmental-status/index_en.htm

⁸ <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=LEGISSUM%3Ari0008>

⁹ RIA 4 - Micro- and nano-plastics in our environment: Understanding exposures and impacts on human health (Health, Demographic Change and Wellbeing, SC1); SFS-21-2020: Emerging challenges for soil management (Food Security, Sustainable Agriculture and Forestry, Marine and Maritime and Inland Water Research, and The Bioeconomy, SC2), BG-07-C: Technologies for ocean observations, observations for marine litter and microlitter (SC2); FNR-08-2020: Supporting the food safety systems of the future (SC2); CE-FNR-09-2020: Oceans Innovation Pilot for the Blue Economy (SC2); CE-SC5-24-2020: Improving the sorting, separation and recycling of composite and multi-layer materials (Climate Action, Environment, Resource Efficiency and Raw Materials, SC5); CE-SC5-25-2020: Understanding the transition to a circular economy and its implications on the environment, economy and society (SC 5); CE-SC5-28-2020: Develop and pilot circular systems in plastics, textiles and furniture sectors (SC 5); CE-SC5-29-2020: A common European framework to harmonise procedures for plastics monitoring and assessments (SC5); CE-SC5-30-2020: Plastics in the environment: understanding the sources, transport and distribution of plastics pollution (SC5); CE-BIOTEC-09-2020: Upcycling Bio Plastics for packaging food and drinks (LEIT NMBP)

¹⁰ For 2020, see topics SFS-01-2018-2019-2020, SFS-04-2019-2020, SFS-05-2018-2019-2020, SFS-06-2018-2020, SFS-13-2020, SFS-21-2020, SFS-40-2020, RUR-05-2020, RUR-06-2020, RUR-07-2020,

driven. This is more than just widely disseminating the results of a project, or listening to the views of a stakeholders' board. A multi-actor project should ensure genuine and sufficient involvement of various actors, and in particular end-users of project results such as farmers/farmers' groups, forest-related groups, fishers/fisher's groups, advisors, businesses, etc. This should be done all along the project: from the participation in the planning of the project and experiments, to implementation, the dissemination of results and a possible demonstration phase. Building blocks for innovation are expected to come from science as well as from practice and intermediaries, such as farmers, forest-related actors, 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. Therefore, a multi-actor project proposal shall demonstrate:

- how the project proposal's objectives and planning are targeting needs/problems and opportunities of end-users of project results;
- how the composition of the consortium and the description of the project concept reflects an balanced choice of key actors with complementary types of knowledge (scientific and practical), with a view to result in a broad implementation of the project results;
- how the project includes existing (sometimes tacit) knowledge into scientific work. This should be illustrated in the project proposal with sufficient quantity of high-quality knowledge exchange activities and indicating the precise and active role for the different non-scientific actors in the work. This should generate innovative solutions that are more likely to be applied thanks to the cross-fertilisation of competences and ideas between actors;
- the project's added value: how does the project complement existing research and best practices;
- how the project results in practical knowledge, made easily understandable and accessible, and how this feeds into the existing dissemination channels most consulted by end-users of the project results in the countries;
- for EU wide communication, this knowledge should also be assembled into a substantial number of 'practice abstracts' in the common EIP format¹¹ of the European Innovation Partnership (EIP) 'Agricultural Productivity and Sustainability'. For all other areas which would not be covered by the EIP-AGRI¹² - for instance projects on fisheries, aquaculture, marine and inland water issues - other similarly effective solutions for dissemination through main existing dissemination channels should be used;

CE-RUR-08-2018-2019-2020, RUR-15-2018-2019-2020, FNR-04-2020, FNR-05-2020 and LC-FNR-06-2020.

¹¹ The EIP common format for "practice abstracts" is available at: <https://ec.europa.eu/eip/agriculture/en/content/eip-agri-common-format>

¹² For the areas of innovative action of the EIP-AGRI: see EIP Commission Communication COM(2012) 79 final

- involvement of interactive innovation groups operating in the EIP context, such as EIP Operational Groups funded under Rural Development Programmes¹³, as much as possible. It is strongly recommended to facilitate discussions and mediate between the different types of actors.

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 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 'Connecting economic and environmental gains - the Circular Economy' (CE):
EUR 284.20 million

¹³ <http://ec.europa.eu/eip/agriculture/en/content/links-existing-operational-groups?stakeholder=3394>

Horizon 2020 - Work Programme 2018-2020

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

Focus Area 'Digitising and transforming European industry and services' (DT): EUR 82.00 million

Focus Area 'Building a low-carbon, climate resilient future' (LC): EUR 252.00 million

Call - Sustainable Food Security¹⁴

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 and emissions of air pollutants 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 farming¹⁵ 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".

The actions are expected to support Europe's endeavours to implement the Sustainable Development Goals (SDGs), in particular SDG 2 'Zero hunger', SDG 11 'Sustainable cities and communities', SDG 12 'Responsible consumption and production', SDG 13 'Climate action' and SDG 15 'Life on land'.

¹⁴ This call is expected to continue in 2020.

¹⁵ Depending on the topic "farming" will refer to terrestrial and/or aquatic primary production

From functional ecosystems to healthy food

Activities aim to tap into the potential of ecosystems services for crop and animal¹⁶ 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 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 chain

Specific Challenge: Agricultural biodiversity is understood to comprise all components of biological diversity that (i) are of relevance 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 (including climate) 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 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 commitments¹⁷. 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

¹⁶ Depending on the topic the term "animals" can refer to aquatic or terrestrial animals

¹⁷ 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

assessing the dynamics of biodiversity and its relationship with farming systems, the surrounding landscapes and throughout value chains.

A. [2018] Small organisms, big effects for plants¹⁸ - 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'¹⁹ 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 and 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'²⁰ engaging key stakeholders and experts and ensuring adequate involvement of the

¹⁸ 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

¹⁹ See definition of the 'multi-actor approach' in the introduction of this Work Programme part

²⁰ See definition of the 'multi-actor approach' in the introduction of this Work Programme part

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 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 party²¹ over the project duration.

C. [2020] From agrobiodiversity to dynamic value chains (RIA)

Activities shall release the value of so far underutilised and often genetically diverse crops²², (including landraces and varieties) and promote their broader use in breeding, farming and in food/non-food value chains. They will improve the performance of the selected crop(s) in relation to specific characteristics (e.g. agronomic such as adaptability to climate related abiotic stresses or quality related traits) and address the corresponding needs for farm and land management. Activities will feed into the development of value chains, which provide opportunities to diversify farm activities and income as well as meet consumer demands for diversified products and/or for products with a local/regional identity. This will include developing and testing marketing channels with enhanced producer-consumer links.

Proposed work should fall under the concept of 'multi-actor approach', thus allowing for adequate involvement of the farming sector and other relevant stakeholders. Consortia shall build on interdisciplinary expertise and a balanced partnership reflecting a range of geographic and socio-economic conditions.

All scopes (A), (B) and (C): The Commission considers that proposals requesting a contribution from the EU of up to EUR 7 million for A, 8 million for B and 6 million for C 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 and breeding practices.

In the short- to medium term work will

- expand the knowledge base on the links between biodiversity and agriculture and the use of agrobiodiversity in the context of sustainable farming and breeding practices;
- result in improved methods for assessing and evaluating different levels of diversity (genetic, species and ecosystem) as well as the linkages between agrobiodiversity and ecosystem services;

²¹ 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, since this is necessary to achieve the objectives of the action.

²² No definition is proposed. Applicants are expected to explain and justify the choice of crops (including tree and other perennial crops) in relation to the proposal's and topic's ambition.

- define operational biodiversity targets from the field to regional level (scopes A and B);
- deliver strategies and tools for biodiversity focused soil management (scope A);
- reduce the dependence on external inputs in crop management through effective plant-soil interactions and the use of soil organisms (scope A);
- develop private and public incentives to foster farmers' delivery of biodiversity as a public good (scope B);
- generate new sets of harmonised data on native biodiversity in farmland landscapes and contribute to foster a European biodiversity platform and network involving farmers (scope B);
- develop strategies for an increased and more effective use of genetic diversity in breeding and farming, in particular to introduce adaptive as well as quality and health related traits (scope C);
- create specific avenues for products, farm income and value chains from underutilised crops (scope C);
- strengthen producer – consumer links amongst others through new marketing modes (scope C).

In the longer term, funded activities will help to foster the synergies between agricultural production, biodiversity (including genetic diversity) and the delivery of ecosystem services of local, regional and global relevance. They will allow the farming sector to continue fulfilling its multiple functions under predicted, more challenging biotic and 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.

SFS-02-2020: Healthy terrestrial livestock microbial ecosystems for sustainable production²³

Specific Challenge: Research is increasingly paying attention to the importance of interactions between the animal host and microbiota and their effects on the production efficiency, and the health and welfare of animals. These interactions are highly dynamic and influenced not only by genetics, but also by external factors such as environment, nutrition/feeding and management. Recent developments in omics science and technologies have opened new avenues for understanding not only the biology and genetics of animals, but also the ecosystems in which they function and those which they harbour, i.e. microbiomes. This is

²³ This topic is part of a microbiome cluster. For complementary activities see also SC2 topics SFS-01-2018/19/20, SFS-03-2018 and BG-06-2018 on Marine Microbiomes as SC1 topic SC1-BHC-03-2018

particularly relevant for micro-organisms that are currently non-culturable. Research on the interplay between the animals and their microbial ecosystems is needed to contribute to the improvement of sustainable livestock production.

Scope: Activities shall address relevant microbial ecosystems of terrestrial livestock, and their effects on the production, health and welfare of animals. They should look in a balanced way at the characterisation of microbial ecosystems (including microbial communities and microbe-derived metabolites), assessing variability within and between breeds in relation to variability of production systems and diet; at microbial behaviour (e.g. interactions between microbiota, evolution with age of animals, transmission); at microbial functions and interactions with host, environment and management practices, including feeding where relevant; and at possible ways in which those ecosystems can be managed, including socio-economic aspects, in order to reduce environmental impact, improve production and its quality, and/or health in particular during challenging periods such as early life, weaning or after disturbances. Activities will include the incorporation of data on microbial ecosystems in the models used to analyse phenotypic variability and to perform genetic evaluations. The activities shall address either ruminants, or monogastrics. Gut microbiome of pigs or poultry can be addressed only in so far as the activities are complementary to those in related projects selected under LC-SFS-03-2018. Proposals may cover one or more species and one or more microbial ecosystem.

Research on anti-microbial resistance can be included as long as it is not the main objective of the project (see topic SFS-12-2018/2019). Research on single animal pathogens is not the focus of the topic. The projects are encouraged to interact as appropriate with relevant collaborative projects in Europe as appropriate and with international initiatives such as the rumen microbial genomics network of the Global Research Alliance on agricultural greenhouse gases²⁴.

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. Funding will allow support for at least one project relating to ruminants and one to monogastrics.

Expected Impact: Funded activities will contribute to deciphering the characteristics and functions of the livestock microbial ecosystems and understand the ways in which they influence production, health and/or welfare of animals. They will provide standardised methodologies for further application in livestock production to the greatest extent possible, including socio-economic aspects.

In the short- to medium term, the application of the knowledge and solutions developed will, as appropriate:

²⁴ <https://globalresearchalliance.org/research/livestock/networks/rumen-microbial-genomics-network/>

- enable inclusion of data on microbial ecosystems in the models used to analyse phenotypic variability and to perform genetic evaluations;
- improve resource use and environmental impact of terrestrial livestock production;
- improve robustness and health of terrestrial livestock, in relation to productive functions;
- reinforce collaborations with initiatives in related domains to promote coherence and applicability of research on microbial ecosystems.

In the longer term, the funded activities will contribute to more resilient production 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.

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 system²⁵ 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: Proposals²⁶ 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

²⁵ <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.

²⁶ 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

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 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 SWD²⁷, and the Blue Economy communication²⁸, 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

²⁷

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

²⁸

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

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

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

Specific Challenge: Plant protection and biocidal products (both covered under the term "pesticides") are used in agriculture to secure yield and ensure food and feed safety across agricultural production and the agri-food chain. At the same time, pesticides may have effects on the environment, non-target organisms, animal and human health. In the EU they are regulated²⁹ and 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 to the use of pesticides while at the same time safeguarding competitiveness.

Scope: **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 and 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 while considering other regulatory initiatives, in particular the Common Agricultural Policy, the protection of European biodiversity and 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 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

²⁹ Regulations (EC) No 1107/2009 and (EU) No 528/2012

development of a research agenda on plant protection in the context of a global health approach.

B. [2020] Alternative to contentious pesticides (IA)

Activities will foster the development and testing of tools, approaches, strategies and/or products to reduce the risks associated with the use of contentious plant protection products and/or biocidal products in conventional and/or organic farming systems and/or the agri-food chain. They will seek for more sustainable alternatives to contentious (or, as appropriate, active substances used in) plant protection product(s) for integrated pest, disease and/or weed management in agriculture and/or biocidal product(s) for preventing and controlling harmful organisms occurring in facilities related to agricultural production and the agri-food chain. Activities should address the development, testing and demonstration of novel, more durable and sustainable approaches, products, strategies and/or tools for their application within a systems approach and cultural practices.

The Commission considers that proposals requesting a contribution from the EU of up to EUR 15 million for scope A and EUR 5 million for scope B would allow this specific challenge to be addressed appropriately. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts.

All sub-topics (A), (B): Projects should fall under the concept of the 'multi-actor approach'³⁰ including a range of actors to ensure that knowledge and needs from various sectors such as research, farming, advisory services and industry including SMEs are brought together. 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, including the impact on labour, safety culture and risk management on farms and economic impact for farmers. 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, pest / disease / weed prevention and control strategies for EU agricultural production and / or the agri-food chain 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);

³⁰

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

Horizon 2020 - Work Programme 2018-2020
Food security, sustainable agriculture and forestry, marine, maritime and inland water research and the bioeconomy

- improve monitoring of pesticide uses and pressures on human and animal health and the environment, by developing appropriate tools and integrated approaches considering various pathways (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 on global health approaches (scope A);
- introduce alternative approaches, tools, strategies and/or products for prevention and control of pests/diseases/weeds with improved environmental performance (e.g. reduced effects on non-target organisms, natural resources and the environment) in the field of plant protection and/or use of biocides related to agricultural production and activities across the agri-food chain (scope B);
- assess the potential risks and benefits of the chosen alternatives in a coherent and consistent way in view of safety and sustainability (scope B);
- improve current agronomic, ecological and cultural practices to increase the resilience of agricultural production and/or the agri-food chain against biotic stresses (scope B);
- assess the economic, social and environmental impact of the alternative proposals for the farmers and/or consumers (scope B);
- support relevant EU plant health policies and/or European risk assessments in relation to EFSA and / or ECHA activities (scope B).

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.

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

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 because of intensification, climatic variations and changes in agricultural and forest management practices. They can have a significant impact on agricultural and forest productivity, environment and economics. Appropriate and rapid responses from decision-makers need to be based on scientific knowledge which addresses pest and disease management in a comprehensive manner.

Scope: Proposals will target one or more new or emerging plant pests (the term “pests” includes weeds) 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 European agriculture and/or forestry. The choice of target pest and/or disease will consider the potential threat in terms of development and spread, its potential exacerbation under climate change as well as the potential impact on agricultural production, forestry, trade and the wider environment. Proposals will increase knowledge of the biology, pathways of entry and spread of pest(s)/disease(s) and clarify the dependencies on abiotic factors. They will improve methods and strategies for early detection, prevention and control as well as enlarge the range of tools for integrated, sustainable and effective 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'³¹ 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 including the influence of climate change;
- the development of efficient tools for the prevention, detection and control of pests/diseases;
- the development of environmentally sound and long-lasting solutions for effective pest/disease management in farming and forestry in line with the principles of Integrated Pest Management within a systems approach;
- the reduction of economic, social and/or environmental losses for Europe;
- support for relevant EU plant health data management and 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.

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

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

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 (SUD³²). 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 often remains 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 European 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. The challenge is incorporating IPM into the entire farming system, and searching for synergies that result from taking a holistic approach in shaping farming systems.

Scope: 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-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'³³ including scientists, farmers, advisors and ICT specialists.

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

Activities shall fuel a European-wide network of IPM demonstration farms, which make a direct link between research and practical farm management, thereby facilitating IPM uptake and knowledge-sharing among advisors and farmers. The network should consist of normal farms where farmers can learn in a peer-to-peer mode from their colleagues. Practical

³² Directive 2009/128/EC on the sustainable use of pesticides

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

information on the farm techniques should be made readily available to all, using open source and open data management to enable wide and long-term sharing, possibly according to specific typologies and areas. Links with administrative databases (e.g. IACS-LPIS system in Member States) and other data sources (e.g. Copernicus earth observations) should be explored. The project should in particular incentivise the uptake of IPM practices by advisors who are using a holistic farm approach. Organic farming practices could also provide a possible source of inspiration, and forestry may be included. Besides making use of the developed decision support tools under scope A and other monitoring and warning systems, the proposals should also help promoting the variety of other existing IPM practices, comparing emerging new IPM techniques, and covering various diagnostic tools and efficient pest monitoring methods. Organic farming practices may provide a possible source of inspiration, and forestry may be included. Proposals will support the development and European-wide sharing of training modules for farmers and for advisors, including from various national/regional sources and demonstration farm programmes. These training modules should feed into the national Agricultural Knowledge and Innovation Systems (AKIS)³⁴. 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. Proposals may include other IPM issues covered under the SUD such as application equipment, risk communication to society, etc. All collected knowledge should feed into the existing dissemination channels most consulted by farmers. As many “practice abstracts” prepared in the common EIP-AGRI format should be delivered as possible, including audio-visual material wherever possible. It is strongly recommended to cover as many Member States and regions as possible and to seek synergies with similar activities financed through other sources, e.g. the Common Agricultural Policy. Forestry may also be included. Proposals should fall under the concept of the 'multi-actor approach'³⁵, with a consortium based on a balanced mix of actors with complementary knowledge, including participation and activation of farmers, farmers' groups and advisors to create co-ownership. In this way, in the long run, results will contribute to more sustainable agriculture by reducing exposure to pesticides of humans and animals, terrestrial and aquatic ecosystems, drinking water and the food chain.

The Commission considers that proposals requesting a contribution from the EU of up to EUR 5 million for scope A and EUR 6 million for scope 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 should create added value to existing projects by giving farmers throughout Europe a broader understanding of the existing knowledge on integrated pest management. This will support relevant plant health policies, more specifically the implementation of the SUD³⁶ by demonstrating that IPM strategies work in a "real world" application, and in particular by

³⁴ See Art 102 and 13 of the CAP proposal for the period 2021-2027

³⁵ See definition of the 'multi-actor approach' in the introduction to this Work Programme part.

³⁶ Directive 2009/128/EC on the sustainable use of pesticides

- helping farmers to incorporate IPM solutions in existing agricultural systems, with a focus on taking into account costs and benefits and interactions / with other aspects of agricultural management, thereby building resilience;
- supporting European platforms (such as the one created under scope A) for sharing and further developing IPM decision support systems, covering the various bio-geographical areas of Europe;
- broadening and adding value to the partnerships between actors, which are developing cost-effective IPM decision support systems ready for practice;
- creating an open European network of IPM demonstration farms in all EU Member States/Associated Countries and regions, sharing data and information with a long term effect available to all, where farmers can learn in a peer-to-peer mode from their colleagues on normal farms;
- increasing awareness of the available IPM toolbox and extending the range of applications, including by incentivising the take up of IPM techniques and related advisory tools by holistic oriented advisors in their daily services;
- increasing on-farm use of IPM techniques
- developing European-wide IPM training for farmers and advisors, with modules adaptable to the regional/national contexts , the various farmers' profiles and advisory services.

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-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 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 EFSA³⁷ 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 Workbench³⁸), and take into account other relevant EU initiatives (e.g. evaluation of the EU's apiculture measures³⁹, 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 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 required⁴⁰.

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:

³⁷ see related scientific opinion (EFSA, 2016)

³⁸ <http://bees-dashboard.azurewebsites.net/BeesHome.html>

³⁹ http://ec.europa.eu/agriculture/evaluation/market-and-income-reports/apiculture-2013_en

⁴⁰ See definition of the 'multi-actor approach' in the introduction of this Work Programme part.

- 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 welfare⁴¹, 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.

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, while also considering the

⁴¹ Farmed aquatic animals welfare is addressed under the Blue Growth call topic DT-BG-04-2018-2019: Sustainable EU aquaculture 2.0.

needs to reduce emissions of air pollutants from agriculture. 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 approach⁴², 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.

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-10-2020: Epidemiology of non-EU-regulated contagious animal diseases: from integrated data collection to prioritisation

Specific Challenge: The increasing demand for animal derived food and the mounting pressure on land and oceans is expected to push further intensification and expansion of

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

animal production in certain regions of the world. Contagious livestock diseases impede the efficiency of animal production and lead to economic costs, poor animal welfare, and in the case of certain diseases, have an impact on trade, consumer confidence and public health. While the impact of epizootic diseases and some other regulated contagious diseases is relatively well known due to the regulatory framework, the situation with non-regulated contagious diseases is poorly known, even less for diseases with multiple pathogens (disease complexes). It is up to the private sector to deal with them. There is a need to determine the prevalence of production related diseases, the burden of these diseases and to set up a framework to facilitate monitoring of the situation and enable improvements in risk assessments and prioritisation of disease control measures throughout the animal production chain, for the producers and their organisations, the private stakeholders in the livestock sector (e.g. veterinarians, animal health industry, animal breeding industry, food industry) and the public stakeholders (e.g. risk managers, funders).

Scope: Activities will aim to harvest the knowledge inherently carried in existing data streams on contagious, non-EU-regulated, animal diseases, including diseases with multiple pathogens (disease complexes) and AMR. The proposals should address at least terrestrial livestock, while including marine and freshwater aquaculture whenever relevant, and should investigate the feasibility of addressing relevant wildlife. Data from different production systems should be included. Activities will look for ways to validate, integrate and process these data, including modelling, possibly generating additional useful information inferred from existing data and identifying new data that could be integrated in data streams. They will focus on identifying and characterising relevant data on diseases (including animals, pathogen and environment, including genomic and metagenomic data), context and consequences (e.g. performance), the various components of data streams and will assess opportunities and barriers to utilising or sharing information across countries and stakeholders throughout Europe. This should improve risk identification and determination of the burden and cost of non-regulated contagious diseases and effectiveness and efficiency of control measures. Relevant geospatial information and data on animal welfare and genetics, in so far as they can be connected to animal diseases, can be included in the planned activities.

Work shall explore the potential of precision farming and “big” data, cloud-based integrated data collection for the detection of hitherto undetected relations between symptoms, diagnoses, treatments, risk factors, control measures and spread of diseases as well as their associated burden and economic costs. They should test the feasibility and potential benefits of an integrated approach to knowledge extraction and decision support based on a specific risk scenario for a disease. Decision-makers involved at different levels in the management of diseases should be considered (e.g. producers, private stakeholders supporting diseases control plans at a collective level, public sector). Possible integration with farm management and information systems and (automated) decision support systems, should be explored. Development or refinement of existing risk-based approaches and early warning systems should be explored. The project will provide a coherent blueprint and a framework for the necessary changes to allow improved data utilisation to protect animal health and welfare, human health and the food chain in Europe. Proposals should fall under the concept of 'multi-

actor approach'⁴³, involving representatives of producers, veterinarians and other professionals from animal production and the food chain, as appropriate, and decision-makers.

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: Strategic utilisation of existing and development of new data streams will:

- allow a clear view on occurrence and cost of disease and relation to welfare;
- enable timely and evidence-based decision-making by stakeholders in public and private sectors, and potentially by producers. It will enable a more focused targeting of resources for controlling diseases;
- provide a basis for potential rapid and early detection coupled with prediction of consequent losses,
- facilitate educational strategies for animal disease and animal welfare management; identify gaps in human capital knowledge.

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-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

⁴³ See definition of the 'multi-actor approach' in the introduction of this Work Programme part

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 plan⁴⁴ 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, 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'⁴⁵, 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 (IA)

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'⁴⁶, involving at least representatives of practitioners (e.g. veterinarians), of the feed/feed additives and pharmaceutical industries.

⁴⁴ https://ec.europa.eu/health/amr/sites/amr/files/amr_action_plan_2017_en.pdf

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

⁴⁶ See definition of the 'multi-actor approach' in the introduction of this Work Programme part

The selected projects under sub-topics A and B should follow the policies and contribute to the objectives of the STAR-IDAZ international research consortium⁴⁷. 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 AMR⁴⁸ 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);
- 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, 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 contain 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.

⁴⁷ <http://www.star-idaz.net/>

⁴⁸ <http://www.jpiamr.eu/>

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 roadmap⁴⁹ 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.

The selected project should take into consideration the EU animal health regulatory framework, and follow the policies and contribute to the objectives of the STAR-IDAZ international research consortium⁵⁰.

Proposals should fall under the concept of the 'multi-actor approach'⁵¹ 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, at target TRL 5-6;
- 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

⁴⁹ http://ec.europa.eu/food/animals/animal-diseases/control-measures/asf_en#bmrp

⁵⁰ <http://www.star-idaz.net/>

⁵¹ See definition of the 'multi-actor approach' in the introduction to this Work Programme part.

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

SFS-13-2020: Genome and epigenome enabled breeding in terrestrial livestock

Specific Challenge: Genetics is currently one of the important levers for efficient livestock production, not only to increase performance and productivity, but also to ensure resilience and to reduce resource use and environmental impact, to ensure health and welfare of the animals, while maintaining or improving longevity of animals and product quality. Understanding of the biological mechanisms underpinning traits, including epigenetic responses to the environment and non-genetic inheritance, remains relatively limited and underexploited, notably when several complex traits need to be targeted simultaneously, while avoiding or reducing trade-offs. In addition, improving livestock breeding programmes in both cosmopolitan and local breeds requires an optimal level of genetic diversity that needs to be measured and exploited. There is a need also for new knowledge and tools to open up new prospects for the measurement, conservation and exploitation of genetic diversity in farm animal species, for optimal genetic diversity in farm animal breeding programmes in both cosmopolitan and local breeds and to inform and develop strategies to provide for cost-effective in vivo conservation of endangered genetic resources.

Scope: The selected projects will assist in the exploitation of existing knowledge on the genome sequence and its regulation and expression. They will do so by providing (i) analysis of the genome and the epigenome in relation to combinations of traits (including intermediate and/or indicators) important for efficient terrestrial livestock production and (ii) tools to improve breeding schemes, both for cosmopolitan and local breeds of terrestrial livestock, striving to ensure optimal genetic and epigenetic diversity, at least within breeds. The projects will encompass development of methods, tools and models to assist both industry and policy makers as well as to respond to social challenges. Proposals should fall under the concept of 'multi-actor approach'⁵², involving representatives of breeders, biodiversity conservation and other relevant professionals from animal production, the food chain and decision-makers, as appropriate.

The activities may address:

- Study of the genetic relationship between animal performance traits to tackle some potential trade-offs between different phenotypes of interest that may alter long-term selection strategies to improve lifetime efficiency.
- Assessment of the relevance of (i) epigenetic mechanisms as a potential source of phenotypic variance unaccounted by genomic selection, and (ii) improving genomic prediction models with better integration of environmental and non-genetic inheritance factors.

⁵² See definition of the 'multi-actor approach' in the introduction to this Work Programme part.

- Development of (i) appropriate deep phenotype indicators and their genomic and epigenomic determination that reflect different ways of improving resource-use efficiency, health, welfare, quality and resilience of terrestrial livestock and (ii) multi-trait genomic and epigenomic prediction models that can efficiently utilize these indicators.
- Assessment of the potential, including benefits and risks, of both (i) genome editing for cross-species and/or inter-breed transmission of specific traits without affecting other selected characteristics or specificities and (ii) targeted epigenome editing for improved animal welfare and/or product quality.
- Study of the opportunity and feasibility of integration of genome editing in genomic selection (specifics and comparison with introgression: theoretical and practical applications).
- Development of refined genomic and epigenomic strategies for management of biodiversity.

The projects are encouraged to interact as appropriate with relevant Horizon 2020 projects.

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:

- Methods for biology-driven selection of livestock with more balanced performances for production, robustness, and/or quality, taking into account environmental variability.
- Set of phenotypes as well as the molecular tools available to farmers and farm advisers to assess and simultaneously drive animal traits related to efficiency, for a long-time evaluation of breeding strategies.
- Set of options for conservation of genetic diversity among and within breeds.
- More generally, the projects will contribute to the diversity and sustainability of livestock production.

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-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 eliminated⁵³. 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.

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.

⁵³

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

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 Document⁵⁴, 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;
- 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, climate change. Under certain circumstances, 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

⁵⁴ 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>

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. Gender aspects should also be considered.

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 Document⁵⁵, proposals should explain how the activities included will contribute to:

- 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

⁵⁵ 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>

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'⁵⁶ 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;

⁵⁶ See definition of the 'multi-actor approach' in the introduction to this Work Programme part.

- 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.

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 commercialisation. 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 society⁵⁷.

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,

- 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 greenhouse 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 optimising resource use and reducing environmental footprints throughout primary production, food industries, food distribution, food service and households.

⁵⁷ In case of proposals applying the 'multi-actor approach', see also its definition in the introduction to this Work Programme part.

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, EU Adaptation Strategy) on agri-ecosystems and their surroundings. Proposals will use transdisciplinary research methods and should fall under the concept of the 'multi-actor approach'⁵⁸. 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 mitigation and adaptation potential. Proposals will contribute to increase synergies between crops and livestock by defining

⁵⁸ See definition of the 'multi-actor approach' in the introduction to this Work Programme part.

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'⁵⁹.

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 and mitigation 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.

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 management⁶⁰ contributes to food security, climate change mitigation/adaptation and ecosystem services. Preserving and increasing fertility of

⁵⁹ See definition of the 'multi-actor approach' in the introduction to this Work Programme part.

⁶⁰ Soil management includes: soil conservation, soil fertility and soil biodiversity.

soils, not least through their organic content and water retaining capacity, increases agricultural production. Soils and their carbon, nitrogen and phosphorus 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 functions including 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 management and its 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 management⁶¹. The activities should look at how management of agricultural soils can reduce degradation of land and soils (in particular soil erosion and loss of organic matter), 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 contribute to improving inventories, measurements, reporting and accounting activities at different scales. 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. Farmers, landowners and other stakeholders should be included in research activities as appropriate in the spirit with the multi-actor approach⁶².

State-of-art technologies for mapping and soil sampling and analysis (physical, chemical and biological parameters) should be explored for wider and simple use at various levels. 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 LUCAS⁶³ –European Soil Database as well support EU contribution to global soil mapping activities.

⁶¹ Agro-forestry is included in the topic.

⁶² See definition of the 'multi-actor approach' in the introduction of this Work Programme part.

⁶³ **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

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 areas, such as agriculture, climate and environment, and when feasible and appropriate knowledge exchange between science and practice for better agricultural soil management by farmers should be envisaged.

The activities will need to be coordinated as appropriate with other international soil related activities under the United Nations umbrella among them the Global Soil Partnership and more particularly with European Soil Partnership node; with the Global Research Alliance on agricultural greenhouse gases; Horizon 2020 project CIRCASA⁶⁴; 4% Initiative: soils for food security and climate; Joint Programming Initiatives (FACCE, CLIMATE); the Belmont Forum and soil activities coordinated by the European Commission Joint Research Centre⁶⁵ when relevant and appropriate. The work of the EJP will also support a number of policies: the Common Agricultural Policy, Climate Change related policy and relevant environmental policies, in particular the implementation of the EU Soil Thematic Strategy⁶⁶.

Financial support provided by the participants to third parties is one of the aims of this action and, in order to achieve the objectives of the action, the 60 000 EUR threshold provided for in Article 137(1)(c) of the Financial Regulation N°966/2012 and Article 210(a) of the Rules of Application Regulation N°1268/2012 can be exceeded.

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 and implementation of soil-related 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 capacities and cooperation across Europe including training of young soil scientists;

⁶⁴ Project selected under SFS-50-2017 topic

⁶⁵ European Soil Data Centre; EIONET - European Environment Information and Observation Network – soil network

⁶⁶ COM(2006)231

- Supporting harmonised European soil information, including for international reporting;
- fostering the uptake of soil management practices which are conducive to climate change adaptation and mitigation;
- developing region-specific fertilisation practices considering the local soil, water and pedo-climatic conditions;

In the long term, the programme will strengthen the role of the farming sector as a steward of land and soil resources. It will increase its capacity to adapt to climate change and contribute to mitigation and carbon sequestration.

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.

SFS-21-2020: Emerging challenges for soil management

Specific Challenge: Sustainable soil management is paramount to keep soils in a good status for both agriculture and environmental needs. Over the past years, our understanding of the various threats to soil functions has increased. The recent, more in depth analysis of the importance of soil biodiversity for delivering important ecosystem services has identified major knowledge gaps on its role for the degradation of waste materials and for agricultural productivity. The extensive use of plastics, products containing plastic and other emerging contaminants in daily life has not only impacts on oceans but also on soils. The understanding of the impact and fate of micro- and nano-plastics and other stressors on soils is very limited and needs assessing. Following recent assessments of land degradation by IPBES and IPCC, there is also a need to evaluate the economic, social and environmental costs of soil and land degradation.

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

A. [2020]: Emerging challenges for soil management: Soil biodiversity assessment (RIA)

Proposals shall cover soil biodiversity analysis, including relevant microbes and invertebrates for soil-mediated ecosystem services. Proposals shall address soil management, exploring the links between soil biodiversity, its functions and land degradation to increase economic, environmental and social wellbeing of biogeographical regions of Europe. Proposals shall cover ecosystem stressors on soil and more particularly on soil biodiversity and its potential impact on ecosystem functions.

Work shall build on the existing initiatives⁶⁷ and provide support to relevant Member State commitments under the Global Soil Partnership. If relevant cooperation and

⁶⁷ European Soil Biodiversity Atlas prepared by the European Commission's Joint Research Centre and the Global Soil Biodiversity Atlas prepared by the European Commission's Joint Research Centre and Global Soil Biodiversity Initiative.

complementarities could also be sought with projects funded by other Societal Challenges⁶⁸. International cooperation is encouraged.

B. [2020]: Emerging challenges for soil management: use of plastic in agriculture (RIA)

Proposals shall cover analysis of the use of plastic in agricultural production and its impact on soil. The particular focus of the proposals should be on the micro-plastic after harvest and its fate in the environment. The potential future impact of micro-plastic on soil biodiversity and its potential transfer to other parts of the environment and beyond should be analysed.

Activities shall also analyse the impact of micro- and nano-plastics on soil properties and its ecosystem services function. In addition the focus of this analysis should be concentrated on the use of plastic during agricultural production at the field level but also at the farm level. Proposals should fall under the concept of the 'multi-actor approach'⁶⁹

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:

- Understand the current status, challenges and potential of soil biodiversity (sub-scope A);
- Understand the impact of micro- and nano-plastics on soil biodiversity and ecosystem services (sub-scope B);
- Understand the impact of micro- and nano-plastics and other stressors in soil on agricultural productivity and ecosystem services (sub-scope B);
- Understand and assess the chemical changes and disaggregation of micro- and nano-plastics in soils, their impacts and further behaviour in soils (including soil physics) (sub-scope B);
- Quantify the economic, environmental and social consequences of unsustainable soil management in different biogeographical regions (sub-scopes A and B);
- Contribute towards understanding, management and conservation of soil biodiversity for the global soil assessment (sub-scope A);

In the long term, funded activities will contribute to European and international soil biodiversity assessments such as initiatives under the Food and Agricultural Organization of the United Nations.

⁶⁸ Societal Challenge 1 (Health, Demographic Change and Wellbeing), Societal Challenge 5 (Climate Action, Environment, Resource Efficiency and Raw Materials)

⁶⁹ See definition of the 'multi-actor approach' in the introduction to 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.

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

Specific Challenge: Soil continually undergoes development through physical, chemical and biological processes, which include both formation and degradation. Ultimately, it sustains primary production, which is directly related to land management practices and associated soil types. There are several challenges associated with forest soils, such as water availability and erosion, depositions of air pollutants and nitrogen, natural disturbances such as storms, pathogens and wildfires, and impacts of forest practices intensification on compacting, biodiversity and fertility of soils. Forest soils also have a key climate change mitigation dimension, as they contain more carbon than the atmosphere, and improving forest management could decrease emissions, leading to an accumulation of soil carbon stocks. However, they are also subject to the general limitations associated with the LULUCF (land use, land use-change and forestry) sector, such as non-permanence and saturation of carbon stock and the challenges associated with emissions and removals of greenhouse gases (nitrous oxide, methane and CO₂). Several sustainable land management practices conducive to enhanced carbon sinks in forest soils are often put forward, such as avoidance of bare soil (including reduced deforestation), close-to-nature forestry including shelterwood cutting, promotion of nitrogen-fixing and mycorrhizal plants/symbionts, etc. However, the full range and limitation of soil-related climate change mitigation avenues are still to be fully understood, let alone put into practice.

Scope: Proposals shall aim at strengthening the knowledge base of forest soil typology and (micro)biological properties including methodologies for soil analysis. They shall address soil functions in relation to their climate change mitigation capacity given by organic carbon stocks and associated fluxes - representative for the variety of forest ecosystems and production systems in Europe. Specific emphasis in the proposal shall be put on several of the following research areas:

Improved, integrated and harmonised methods for estimation of carbon, nitrogen and base cation stocks and fluxes in soils, in relation to forest management systems/practices, land-use history and their impact on greenhouse gas inventories and the corresponding monitoring framework;

Effects of natural disturbances and associated relief measures on carbon and nitrogen stocks/fluxes, including the vulnerability and the upper ecological limit of the soil organic carbon pool (i.e. saturation);

Effects of forest management practices on soil properties, including microbial diversity and activity, nutrient availability (e.g. C, N, P, K, Mg, Ca), organic matter quality, acidity, etc.;

Effects of drainage, rewetting and other management practices in forest-like wetlands on carbon, nitrogen and base cation stocks and fluxes;

Trade-offs and synergies between microbial activity in the soil organic and mineral layers and other ecosystem services, including functional biodiversity⁷⁰ water cycles, etc.

National research institutes and other entities looking into forest soils research and mapping, as well as LULUCF sector of greenhouse gas inventories, are specifically encouraged to take part in the Consortia submitting proposals to this competitive call.

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 3, 13 and 15, the EU's Bioeconomy Strategy 2012/2018, the EU's Forest Strategy 2013, Paris Agreement 2015, LULUCF Regulation 2018, proposals are expected to assess how they will contribute to:

In the short to medium term, improved and harmonised methodologies for estimation of greenhouse gas emissions and removals in the LULUCF sector Europe-wide;

In the medium to long term, strengthened knowledge base and capacity for forest managers to adopt silvicultural techniques and forest management practices conducive to enhanced contribution of the sector to the global climate change mitigation objectives whilst enhancing forest biodiversity, resilience and overall ecosystem service delivery;

In the medium to long term, more sustainable forest management and contribution of the forest-based sector to increasing and diversifying societal demands upon forest-based products and service.

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-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 retention⁷¹ can be properly tackled at the smaller scale of an agricultural catchment. Equally, the local impact of climate change or/and

⁷⁰ See also the topic LC-CLA-06-2019 for inter-relations between climate change and biodiversity

⁷¹ 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.

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-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 should fall under the 'multi-actor approach'⁷² 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.

⁷² See definition of the 'multi-actor approach' in the introduction to this Work Programme part.

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 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 7.5 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 framework of SDG no 2, 3, 9, 11 and 12, the EU's Bioeconomy Strategy 2012, and the FOOD 2030 Staff Working Document⁷³, proposals should explain how activities included are expected to contribute to:

⁷³ 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>

- 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 chain⁷⁴ such as research, (small scale) food production, city municipalities, education centres, consumers and citizens in the medium to long term;
- 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

⁷⁴ 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."

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 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-05-2016⁷⁵, H2020 CIRC-02-2016-A⁷⁶ and the topic BBI 2016.D6⁷⁷.

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 Document⁷⁸, 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;

⁷⁵ http://ec.europa.eu/research/participants/data/ref/h2020/wp/2016_2017/main/h2020-wp1617-focus_en.pdf

⁷⁶ <http://ec.europa.eu/research/participants/portal/desktop/en/opportunities/h2020/topics/circ-02-2016-A.html>

⁷⁷ http://ec.europa.eu/research/participants/data/ref/h2020/other/wp/jtis/h2020-wp16-bbi_en.pdf

⁷⁸ 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>

- Reduced amount of urban biowaste that would otherwise be incinerated or landfilled, and hence reduced environmental impact (including emissions of GHG and of air pollutants and their precursors) 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.

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 2030⁷⁹ 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-ROSA⁸⁰, EOSCPilot⁸¹, ENPADASI⁸², RICHFIELDS⁸³), integrate existing communities, and make use of relevant learnings from parallel thematic initiatives being developed under Horizon 2020 (e.g. Blue Cloud⁸⁴). 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

⁷⁹ 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>

⁸⁰ http://cordis.europa.eu/project/rcn/206339_en.html

⁸¹ http://cordis.europa.eu/project/rcn/207500_en.html

⁸² European Nutritional Phenotype Assessment and Data Sharing Initiative by JPI HDHL (<http://www.enpadasi.eu>)

⁸³ http://cordis.europa.eu/project/rcn/200239_en.html

⁸⁴ Topic BG-08-[A]-2019-The Future of Seas and Oceans Flagship Initiative - Blue Cloud Services

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 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 communities

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, evaluate 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, evaluation and 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.

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 improve 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 in breeding, farming, forestry and by consumers. Work will enable the development and testing 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 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)

Activities will accelerate the mobilization of GenRes from in-situ and/or ex-situ collections to benefit plant breeding and the delivery of new varieties which are better adapted to variable environments and consumer demands. They will tackle the GenRes-user interface, i.e. propose improvements to the information available to users with regard to characteristics of accessions and also to the visualisation of this information. Major resources shall be devoted to pre-breeding activities implemented in close cooperation between public, private and non-for profit sectors. The involvement of SMEs is crucial and will be fostered through targeted calls and financial support to third parties⁸⁵. Due attention shall be given to pre-breeding activities undertaken across Europe and covering different pedo-climatic regions

The Commission considers that proposals requesting a contribution from the EU of up to EUR 3 million for sub-topic A, EUR 7 million for sub-topic B and EUR 7 million for sub-topic 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: 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);

⁸⁵ In line with Article 23(7) of the Rules for participation the amount referred to in the last paragraph of Article 204 of the Financial Regulation may be exceeded, where achieving the objectives of the action would otherwise be impossible or overly difficult.

- 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).
- improve tools to display user-friendly information on accessions and their characteristics (scope C)
- speed up the introduction of useful characteristics from GenRes into breeding (scope C)
- promote the delivery of new varieties which are fit for purpose as regards changing environmental / climatic conditions and consumer demands (scope C)

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: Coordination and support 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-29-2018: Innovations in plant variety testing

Specific Challenge: Agriculture (including horticulture and other forms of primary production) is increasingly being urged to reduce its dependency on external inputs, lower its environmental footprint and cope with more variable climatic conditions. In this context, plant breeding needs to further evolve and 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 test the performance of new plant varieties under conditions associated with sustainable and more variable farming practices⁸⁶. Innovations in breeding can be further promoted by increasing the robustness and efficacy of variety testing methods for obtaining marketing authorization and Plant Variety Rights⁸⁷.

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

⁸⁶ For the purpose of this topic performance testing - including testing for value for cultivation and use (VCU) - is not limited to important agricultural species. In relation to agricultural species mentioned in the Seed Directives this implies that the term "performance testing" should be understood as equal to testing the VCU.

⁸⁷ 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).

and tools to integrate sustainability criteria into performance testing (VCU testing and other performance trials) 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, performance testing networks (including VCU testing), plant variety DUS examination offices to farming (conventional and organic) - to bring together the necessary, multidisciplinary know-how. The work proposed shall address performance (including VCU) and DUS 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 (e.g. mitigating the impacts of climate change. 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:

- gain a better understanding of crop-specific characteristics underpinning resource efficiency as well as resilience to more challenging environments;
- develop experimental designs, methods and tools to improve performance testing (including VCU) 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 Labs

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 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. Food and other plant-based products are the result of plants' capacity to harvest light and convert it into chemical energy to build energy rich organic compounds and ultimately biomass. Energy efficiency is central to plant yield and robustness. The various components of the complex plant energy system as well as their interactions (in spatial and temporal terms) need to be better understood as a basis for crop improvement, crop management and adaptability of crops to changing environments.

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

For the purpose of sub-topic A, the terms '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 FAANG⁸⁸ 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-EBI⁸⁹). 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 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 order to better predict 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 (RIA)

Proposals will advance our understanding of the plant energy system in terms of elucidating specific mechanisms as well as the complex processes and interactions that determine overall energy efficiency in plants.

More specifically work will allow to better understand and determine

⁸⁸ <http://www.faang.org/index>
⁸⁹ <http://data.faang.org>

Horizon 2020 - Work Programme 2018-2020
Food security, sustainable agriculture and forestry, marine, maritime and inland water research and the bioeconomy

- (some of) the various components, processes and interactions of plants' energy system and their regulation - from energy capture to its conversion, transport, photoassimilate partitioning and use
- the metabolic reactions underlying particular functions of plants' energy system
- responses of the energy system to abiotic changes (e.g. CO₂ concentration, light, temperature, water, salinity)
- the basis of naturally occurring variation of selected components of the energy system
- the overall energy efficiency in plants at various levels: cell – whole plant – canopy (including leaf anatomy and canopy structure)
- trade-offs between the efficiency of the energy system and the plant's susceptibility to or tolerance to biotic stresses

The above listed elements provide a framework for action from which proposals can choose a particular scope and approach in line with the broader objectives of the call.

While capitalising on knowledge resulting from work in model species, proposals should also work in crop species taking into account relevant agronomic conditions.

The Commission considers that proposals requesting a contribution from the EU of up to EUR 6 million for sub-topic A, EUR 5 million for sub-topic B and EUR 5 million for sub-topic 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: 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 changes (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 B).
- allow to better understand the key mechanisms, interactions and control of the various components of plants' energy biology system as well as their inherent trade-offs at the subcellular and whole plant level (sub-topic C)
- help to better assess plant responses to abiotic changes (sub-topic C)
- elucidate energy related traits to feed into breeding and crop management strategies at the level of individual plants and the canopy (sub-topic C)
- advance knowledge on the relationship between photoassimilate partitioning, plant growth and agronomic yield (sub-topic C)

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 changing environments, also by means of enhancing plant energy efficiency to optimise productivity of plants.

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 sector⁹⁰ 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 and climatic changes and public health considerations. Climate change will further impact the agri-food sector both directly through its effect on production at EU level, but also indirectly through its supply chain. 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

⁹⁰ 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."

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, European Structural and Investment Funds (ESIF) and regionally/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. Interregional and 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. When relevant, projects should consider synergies with the Thematic Smart Specialisation Platform on Agri-food (TSSP-AF)⁹¹ and related interregional partnerships under the Research and Innovation Strategies for Smart Specialisation (RIS3).

B. [2019] Climate change and food systems

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, including expected effects on supply chains, 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 coordination of research on infectious animal diseases

Animal health is a key element to guarantee food safety and security, by means of competitive and sustainable livestock systems. Partnerships and collaborations at the European and International levels are important for fighting infectious animal diseases, including those which are a significant threat to human health and international trade.

⁹¹ <http://s3platform.jrc.ec.europa.eu/agri-food>

The ERA-Net will cover the major groups of infectious diseases of animals, including infections by viral, bacterial, protozoal, fungal pathogens, prions, parasites, and multifactorial diseases. An important focus will be put on at least African swine fever (ASF) and animal influenza.

The ERA-NET will pool and share resources and expertise between countries to further the fundamental understanding of hosts, pathogens and their interactions. Also, focus on understanding wider animal infectious disease issues e.g. systems-based studies that integrate host/pathogen studies with the epidemiology, and population dynamics of disease, pathogenesis, ecology, evolution, and transmission, resulting eventually in better prevention of disease. An important focus will be put on the role of wildlife in the emergence and transmission of infectious diseases to livestock, and on related disease surveillance and control, in order to also contribute to animal health risk assessment activities, in particular by EFSA or OIE.

In addition, consideration needs to be given to data sharing, integration and analysis to develop new tools to accelerate identification of outbreaks, enabling a rapid response and thus reducing the spreading of diseases. This should be done in coordination with existing data sharing systems (e.g. WAHIS⁹² and ADNS⁹³ systems).

Another focus will also be on development of safe and effective vaccines, generic technology platforms for producing novel and/or improved vaccines, and rapid, accurate and easy to use in-field diagnostics technology. Vaccination strategies, including the tools to distinguish vaccinated animals from non- vaccinated ones (DIVA vaccines) should also be addressed. New and improved vaccines have been identified as an important component in strategies to reduce reliance on antimicrobials (OIE *ad hoc* Group on prioritisation of diseases for which vaccines could reduce antimicrobial use in animals, 2015). There is a need to investigate new methods of generating vaccines and to understand of how best to design vaccines that drive long-lasting and protective memory responses.

Projects should be complementary to other H2020 projects in the same area.

International cooperation and industry engagement in projects selected under the ERA-Net are encouraged. The projects selected should take into consideration the EU animal health regulatory framework, and follow the policies and contribute to the objectives of the STAR-IDAZ international research consortium⁹⁴. Participation of legal entities from third countries, and/or regions including those not automatically eligible for funding in accordance with General Annex A, is encouraged in the joint call as well as in other joint activities including additional joint calls without EU co-funding. Participants from countries not listed in General Annex A are eligible for EU funding under this topic and may request a Union contribution (on the basis of the ERA-NET unit cost) only for the coordination costs of additional activities.

⁹² <http://www.oie.int/en/animal-health-in-the-world/wahis-portal-animal-health-data/>

⁹³ https://ec.europa.eu/food/animals/animal-diseases/not-system_en

⁹⁴ <http://www.star-idaz.net/>

The Commission considers that proposals requesting a contribution from the EU of EUR 5 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].
- 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];
- Enhance understanding and awareness about the effects of climate change on global food value chains [B];
- Develop innovative solutions to cope with the multiple risks and challenges to the food systems posed by global environmental changes [B];
- Improve control of specific infectious animal diseases, in particular those where the role of wildlife is prominent, by further understanding of the epidemiology and means of surveillance and control [C].
- Provide new generic tools, systems for better prevention and improved preparedness to react to infectious animal disease outbreaks, in particular by designing and developing new or improved vaccines, diagnostic tools and vaccination strategies [C];
- Improved translation of key knowledge on host and pathogen interaction into pathways for means of prevention, detection and control of animal infectious diseases [C];
- Improve collaboration with international initiatives to promote coherence and the applicability of research to preventive tools in order to control infectious animal diseases [C];
- Contribute to the reduction of antimicrobial use in livestock, minimising antimicrobial resistance [C].
- Contribute to animal welfare by a better prevention of diseases [C].

- More broadly, contribute to food security and sustainable production, by reducing the burden of disease and reducing impact on international animal trade [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-AU⁹⁵

High Level Policy Dialogue on science, technology and innovation (HLPD) has adopted the roadmap⁹⁶ 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’⁹⁷, a number of actions are proposed. The actions include: for the overall support to the implementation of the EU-Africa R&I Partnership on a Cooperation and Support Action (SFS-33-2018); for pillar I of the roadmap (Sustainable intensification) a portfolio of projects (SFS-35-2019-2020 and CE-SFS-36-2020); for pillar II (Agriculture and food systems for nutrition) a research and innovation action (LC-SFS-34-2019). 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

⁹⁵ In October 2017 the EU-Africa High Level Policy Dialogue was renamed to EU-AU High Level Policy Dialogue. Following this change the text is amended when appropriate.

⁹⁶ [Roadmap towards a jointly funded EU-Africa Research & Innovation Partnership on Food and Nutrition Security and Sustainable Agriculture](#). Addis Ababa, 4-5 April 2016.

⁹⁷ JOIN (2017) 17

substantial, coordinated and balanced research and innovation cooperation between the EU and China. These priorities are reflected in topics SFS-37-2019 to CE-SFS-39-2019.

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)⁹⁸. 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 innovation⁹⁹, 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.

⁹⁸ 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, [...]

⁹⁹ <http://ec.europa.eu/research/iscp/index.cfm?pg=strategy>

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.

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 funded proposal will create a support structure for the implementation of the EU-Africa Research and Innovation Partnership on Food and Nutrition Security & Sustainable Agriculture (FNSSA). Activities will provide support to build a knowledge base on developments and current status of projects funded under Horizon 2020 and previous EU research programmes and relevant programmes to FNSSA funded from other sources. It will also encourage creating 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-AU 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. Activities 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. They are expected to run for at least four years.

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-AU 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 2050¹⁰⁰, 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.

¹⁰⁰ <http://www.un.org/en/development/desa/news/population/2015-report.html>

Scope: Proposals shall assess and deliver better nutrition performance of African farming systems, strengthening the agro-biodiversity (and integrated aquaculture systems) and food diversity. They shall address innovative approaches in local food systems while covering technological, food safety, social and gender issues¹⁰¹, 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 (including aquafarmers) 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-33-2018.

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.

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 FNSSA¹⁰², the EU's Bioeconomy Strategy 2012, and the FOOD 2030 SWD¹⁰³, 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 (including aquafarmers) 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);

¹⁰¹ Applicants may be interested in a separate but connected call topic on " Implementation research for maternal and child health" under Societal Challenge 1.

¹⁰² Joint communication to the EP and Council for a renewed impetus to the Africa-EU Partnership', JOIN (2017) 17

¹⁰³ 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>

- 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 Africa

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.

Environmental modifications such as climate change and globalisation are increasing the risk of infectious animal diseases emerging in new locations with greater frequency, and this is particularly relevant with vector borne diseases. These diseases have a major impact not only on livestock production and related economy but also on global food security and trade. Some of these emerging diseases also threaten human health (zoonoses). The African continent suffers from a number of vector-borne diseases, sometimes with heavy burden, although it is not always fully ascertained. A number of these diseases occur or do present a risk of introduction and spread also in Europe. The complex transmission cycles can make it difficult to assess risk and organise control. We need to get further knowledge on these diseases, not least on their vectors, in order to improve their control, and assess their potential spread all over Europe.

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

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) plant protection and pest control (including integrated pest management) and sustainable 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, analyse its resilience to climate change, 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'¹⁰⁴. Proposals should include a task to cluster with other projects financed under the topic and with the cooperation platform established under SFS-33-2018.

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 LUCAS¹⁰⁵ - European database - 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 and other chemical residues in selected sub-samples might be proposed in order to assess the risk of soil contamination. 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-43-2017¹⁰⁶. It is expected that the open 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 – ITPS African members.

Proposals should include a task to cluster with other projects financed under the topic and with the cooperation platform established under SFS-33-2018.

C.[2020]: Vector-borne diseases in Africa (RIA)

¹⁰⁴ See definition of the 'multi-actor approach' in the introduction to this Work Programme part.

¹⁰⁵ Number of publications related to LUCAS soil component can be found under the following link: <http://esdac.jrc.ec.europa.eu/resource-type/documents>

¹⁰⁶ https://ec.europa.eu/research/participants/data/ref/h2020/wp/2016_2017/main/h2020-wp1617-food_en.pdf

The proposals should aim to develop knowledge on selected vector-borne diseases affecting terrestrial livestock, whether they also affect humans or not. The proposals may address one or more diseases. Priority should be given to diseases with either a serious impact in Africa, or a risk of spread to Europe with significant consequences, or both. Activities should cover the ecology of the pathogens and vectors, and epidemiological features, including the risk of short and long distance transmission and the capacity for the disease to establish in and spread to new areas, with potentially features different from the original area. The burden of disease in animals (and humans if relevant), and the socio-economic impact should be further assessed as appropriate. Systems and/or networks to improve epidemiological surveillance strategies in domestic and wild species should be developed/strengthened. Activities should also address detection and control tools, including prevention, monitoring, diagnostics and:

- Vector competence studies including exploration of vector-pathogen interactions simulating field conditions.
- Map, explore and predict vector densities and spread and the role of the vector in spreading the disease.
- Study the relationship between immunity and pathogen spread including the role of pre-existing immunity and the role of vaccinations.
- Exploration of livestock species, both African and European breed, for susceptibility to the diseases.
- New diagnostic methods for pathogen or specific antibody detection.

Projects should include capacity-building and training activities. The projects should build on results and experiences from related EU projects and existing networks in this field.

Proposals should include a task to cluster with other projects financed under this scope and with the cooperation platform established under SFS-33-2018¹⁰⁷.

The Commission considers that proposals requesting a contribution from the EU of up to EUR 7.5 million for sub-topic A, EUR 5 million for sub-topic B and up to EUR 6 million for sub-topic C 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);

¹⁰⁷ The awarded project acronym is LEAP4FNSSA

- 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).
- Funded activities will contribute to better prevention and minimisation and mitigation of selected vector-borne diseases of livestock (sub-topic C). More specifically they will:
 - o enable strengthened surveillance systems/networks and allow an improved view on occurrence and burden of selected disease(s);
 - o improve assessment of the risks of introduction and spread among livestock and humans of the selected disease(s) in new areas;
 - o provide improved tools for rapid detection of selected pathogens, preferably on-site;
 - o improve prevention and control of the selected disease(s);
 - o enable a more focused targeting of resources for controlling the selected disease(s);

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 revenue in rural Africa through bio-based solutions

Specific Challenge: In many African regions, agriculture is predominantly subsistence-oriented, hence most farmers lack the means to invest on improving the productivity of their exploitation activities, or to undertake basic transformation of their produce. Low productivity and lack of economic diversification makes farmers vulnerable to food insecurity, and contribute to a continuous migration towards urban areas, especially among the younger generations.

In many locations, unsustainable practices generate serious impacts on the environment, such as deforestation for energy or for new agricultural land, or soil degradation, which further aggravate the vulnerability of rural populations.

Scope: Proposals shall screen existing bio-based technologies that can be adapted and successfully transferred to rural African contexts. The focus should be on simple, robust technologies that can be operated and maintained locally, and suitable for operation at farm, village or rural community level (including mobile systems). A variety of end-products can be considered¹⁰⁸, and the business models developed should be sustainable and highly circular. Although bio-fuels or bio-energy can be part of the end-products, projects focussing mainly on these outputs are not eligible.

The selected technologies shall be integrated into one existing agri-food system¹⁰⁹ without compromising food production, and without fundamentally changing established agricultural practices, provided that these are sustainable. The integrated value chain should be widely replicable, based on agricultural by-products or dedicated crops that can be incorporated through multi-cropping or intercropping practices, including agro-forestry. It shall be tested and adapted in real productive conditions, in an appropriate number of testing sites. A thorough assessment shall be performed on the agronomic, environmental, social and economic sustainability of the whole model, including gender issues and an assessment of potential risks. The project shall deliver practice guides and policy recommendations for deployment in new areas.

Projects should ensure solid collaboration between farmers, farmers associations, local industry, technology providers, research centres, extension services and policy makers. Development partners and relevant international organisations should be involved as appropriate. Proposals should include a task to cluster with other relevant projects involved in the EU-Africa R&I Partnership on FNSSA and with the cooperation platform established under SFS-33-2018¹¹⁰. Activities should also be foreseen to cluster with the other projects financed under this topic.

The Commission considers that proposals requesting a contribution from the EU of up to EUR 9 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: Proposed activities will deliver new and sustainable bio-based value chains that can be plugged into African agri-food systems. This will help rural communities to:

- Increase and diversify agricultural income and foster savings and investment.
- Enhance sustainability and reduce the environmental impact of domestic and economic activities, through e.g. reduced logging or nutrient recycling.

¹⁰⁸ Examples include fertilisers or soil improvers, feed, energy or fuels, soap, building or packaging materials, etc.

¹⁰⁹ Agro-food system shall be understood here as a characteristic combination of farming activities and (possibly) first-level transformation or conditioning of the farming outputs.

¹¹⁰ The awarded project acronym is LEAP4FNSSA

- Develop new economic activities and sectors, thus creating new jobs and opportunities.

In the longer term results will contribute improving livelihoods, enhancing food security, increasing community resilience, and reducing rural migration.

Projects should also contribute increasing the innovation capacities of participating organisations, and reinforcing the scientific collaboration between the EU and Africa.

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.

EU-China FAB Flagship initiative

SFS-37-2019: Integrated approaches to food safety controls across the 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) and include common risks such as environmental contamination, process contamination, contamination through packaging and misuse or adulteration. 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'¹¹¹ 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.

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 (implementation, 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 the 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.

¹¹¹ See definition of the 'multi-actor approach' in the introduction to this Work Programme part.

Horizon 2020 - Work Programme 2018-2020
Food security, sustainable agriculture and forestry, marine, maritime and inland water research and the bioeconomy

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 prioritisation of targets (outputs) has to be in place and life cycle assessment of nutrient flows need to be included. Harmonisation between environmental and social targets has to be made on the basis of common/harmonised data and parameters of soil and land. Research should focus more on priority areas in the optimisation 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.

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 harmonised 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 the long term enhance EU-China cooperation in land use optimisation 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.

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:

- 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.

SFS-40-2020: Healthy soils for healthy food production

Specific Challenge: The EU and China are facing similar challenges of increasing soils health and producing more high quality food for increasing population. At the same time soils are facing a lot of pressures from use of fertilizers (manure and mineral), historical management of soils and increasing land degradation. To achieve certain quality of food production management of soils at the farm level needs to incorporate techniques for soil remediation/soil quality restoration and balanced fertilizer application. For the long-term increase of soil quality land management techniques should adopt and enhance quality of soils.

Scope: The proposals shall analyse soil remediation strategies and assess sustainable use of fertilizers for agricultural production including social-economic and environmental aspects. The evaluation of tools and methods for increasing the quality of soils and of food produced is included in the scope. Proposals shall also address land degradation aspects and prevention of further degradation. They shall cover the evaluation of agricultural systems (e.g. organic farming, agro-ecology, agroforestry) and their suitability to achieve a good status of soils for sustainable food production. The proposals shall build on the past projects financed under the

EU-China cooperation on soil. The proposals will fall under the concept of ‘multi-actor approach’¹¹². 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.

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:

- Identification of tools and methods, mainly at the farm level for soil remediation and balanced fertilizers application;
- Identification of agricultural system approach that can enhance quality of soils for food production;
- To raise public awareness about soil as a crucial global resource;
- Enhance EU-China long-term 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.

Conditions for the Call - Sustainable Food Security

Opening date(s), deadline(s), indicative budget(s):¹¹³

Topics (Type of Action)	Budgets (EUR million)			Deadlines
	2018	2019	2020	
Opening: 31 Oct 2017				
CE-SFS-25-2018 (IA)	20.00			13 Feb 2018

¹¹² See definition of the 'multi-actor approach' in the introduction to this Work Programme part.

¹¹³ 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 budget amounts for the 2020 budget are subject to the availability of the appropriations provided for in the draft budget for 2020 after the adoption of the budget 2020 by the budgetary authority or, if the budget is not adopted, as provided for in the system of provisional twelfths.

Horizon 2020 - Work Programme 2018-2020
Food security, sustainable agriculture and forestry, marine, maritime and inland water research and the bioeconomy

DT-SFS-14-2018 (IA)	28.00				
LC-SFS-03-2018 (IA)	42.00				
LC-SFS-15-2018 (CSA)	3.00				
SFS-28-2018-2019-2020 (CSA)	3.00				
SFS-32-2018 (CSA)	2.75				
SFS-33-2018 (CSA)	5.00				
LC-SFS-19-2018-2019 (RIA)	7.00			13 Feb 2018 (First Stage) 11 Sep 2018 (Second Stage)	
SFS-01-2018-2019-2020 (RIA)	14.00				
SFS-05-2018-2019-2020 (RIA)	7.00				
SFS-06-2018-2020 (RIA)	5.00				
SFS-07-2018 (RIA)	8.00				
SFS-08-2018-2019 (RIA)	10.00				
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				
Opening: 16 Oct 2018					
CE-SFS-24-2019 (IA)		15.00			23 Jan 2019
CE-SFS-39-2019 (IA)		5.00			
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-11-2018-2019 (IA)		6.00			
SFS-12-2019 (IA)		10.00			

Horizon 2020 - Work Programme 2018-2020
Food security, sustainable agriculture and forestry, marine, maritime and inland water research and the bioeconomy

SFS-31-2019 (ERA-NET-Cofund)		15.00		
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		
SFS-04-2019-2020 (RIA)		15.10		
SFS-05-2018-2019-2020 (RIA)		7.00		
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: 15 Oct 2019				
SFS-04-2019-2020 (IA)			20.00	23 Jan 2020
SFS-06-2018-2020 (CSA)			6.00	
SFS-28-2018-2019-2020 (IA)			14.00	
CE-SFS-36-2020 (RIA)			18.00	23 Jan 2020 (First Stage) 08 Sep 2020 (Second Stage)
LC-SFS-22-2020 (RIA)			10.00	
SFS-01-2018-2019-2020 (RIA)			18.00	
SFS-02-2020 (RIA)			20.00	
SFS-05-2018-2019-2020 (RIA)			7.00	
SFS-10-2020 (RIA)			10.00	
SFS-13-2020 (RIA)			14.00	
SFS-21-2020 (RIA)			14.00	
SFS-30-2018-2019-2020 (RIA)			5.00	
SFS-35-2019-2020 (RIA)			12.00	
SFS-40-2020 (RIA)			5.00	
Overall indicative budget	218.75	293.10	173.00	

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	<p>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.</p> <p>In order to achieve the objectives of the call topic, the project should have a minimum duration of four years.</p>
LC-SFS-34-2019	<p>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 four participants from a specific region of Africa (as defined by African Union) and a minimum of five participants from Africa.</p>
SFS-35-2019-2020	<p>Sub-topic A: 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 five participants from specific region of Africa (as defined by the 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</p>

Horizon 2020 - Work Programme 2018-2020
Food security, sustainable agriculture and forestry, marine, maritime and inland water research and the bioeconomy

	<p>sample analysis should be located on the African continent.</p> <p>Grants will be awarded to proposals according to the ranking list. However, in order to ensure a balanced portfolio of supported actions, at least the highest-ranked proposal per sub-topic will be funded provided that it attains all thresholds.</p> <p>Sub-topic C: 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 five participants from Africa.</p>
CE-SFS-36-2020	<p>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 four participants from a specific region of Africa (as defined by African Union) and in total a minimum of five participants from Africa.</p>
SFS-21-2020	<p>Grants will be awarded to proposals according to the ranking list. However, in order to ensure a balanced portfolio of supported actions, at least the highest-ranked proposal per sub-topic will be funded provided that it attains all thresholds.</p>

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 Funding & Tenders Portal.

Grant Conditions:

SFS-01-2018-2019-2020, SFS-28-2018-2019-2020	<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>
--	--

Consortium agreement:

CE-SFS-24-2019, CE-SFS-25-2018, CE-SFS-	<p>Members of consortium are required to conclude a consortium agreement, in principle prior to the signature of the grant</p>
---	--

Horizon 2020 - Work Programme 2018-2020
Food security, sustainable agriculture and forestry, marine, maritime and inland water research and the bioeconomy

<p>36-2020, CE-SFS-39-2019, DT-SFS-14-2018, DT-SFS-26-2019, LC-SFS-03-2018, LC-SFS-15-2018, LC-SFS-17-2019, LC-SFS-19-2018-2019, LC-SFS-20-2019, LC-SFS-22-2020, LC-SFS-34-2019, SFS-01-2018-2019-2020, SFS-02-2020, SFS-04-2019-2020, SFS-05-2018-2019-2020, SFS-06-2018-2020, SFS-07-2018, SFS-08-2018-2019, SFS-10-2020, SFS-11-2018-2019, SFS-12-2019, SFS-13-2020, SFS-16-2018, SFS-21-2020, SFS-23-2019, SFS-27-2018, SFS-28-2018-2019-2020, SFS-29-2018, SFS-30-2018-2019-2020, SFS-31-2019, SFS-32-2018, SFS-33-2018, SFS-35-2019-2020, SFS-37-2019, SFS-38-2018, SFS-40-2020</p>	<p>agreement.</p>
---	-------------------

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 aquaculture¹¹⁴, 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'¹¹⁵, 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

¹¹⁴ 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).

¹¹⁵ 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.

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.

The Blue Growth Call is intended to deliver on a series of EU policies¹¹⁶ 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'.

The actions are expected to support Europe's endeavours to implement the Sustainable Development Goals (SDGs), in particular in particular SDG 2 'Zero hunger', SDG 13 'Climate action' and SDG 14 'Life below water'.

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

¹¹⁶ 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.

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 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"¹¹⁷, the COFASP Strategic Research Agenda¹¹⁸, and the Marine Biotech Strategic Research and Innovation Roadmap¹¹⁹. 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 Initiative¹²⁰ and the EUSAIR, as well as the priorities defined in the European Commission Staff Working Document FOOD 2030¹²¹ 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.

¹¹⁷ Joint Programming Initiative "Healthy and Productive Seas and Oceans", <http://www.jpi-oceans.eu/>

¹¹⁸ COFASP Strategic Research Agenda, <http://www.cofasp.eu/node/6674>

¹¹⁹ <http://www.marinebiotech.eu/launch-marine-biotechnology-research-and-innovation-roadmap>

¹²⁰ Initiative for the sustainable development of the blue economy in the Western Mediterranean

¹²¹ 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>

Horizon 2020 - Work Programme 2018-2020
Food security, sustainable agriculture and forestry, marine, maritime and inland water research and the bioeconomy

- 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:

- 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. This zone is known to play a significant role in the global carbon cycle, where the concentration of atmospheric carbon dioxide would be ~50% higher without its activities. 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 this globally important marine ecosystem and an understanding of the mechanisms controlling its biomass and its significant role in the global carbon cycle through the reduction of atmospheric CO₂. 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 data, information and 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'¹²² 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 Common Fisheries Policy, 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 2030¹²³ process for food and nutrition security, activities shall:

In the short term:

- Increase the knowledge of mesopelagic zone ecosystems.
- 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.

¹²² See definition of the 'multi-actor approach' in the introduction of this Work Programme part.

¹²³ 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>

Horizon 2020 - Work Programme 2018-2020
Food security, sustainable agriculture and forestry, marine, maritime and inland water research and the bioeconomy

- Foster innovation for food and nutrition security and other bio-based value chains, biodiversity preservation and climate resilience.

In the medium term:

- Contribute to enhance the conservation and sustainable use of oceans and their resources (UN SDG 14).
- 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).
- 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 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 aquaculture¹²⁴ provides 1.25 million tonnes of seafood annually¹²⁵, 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

¹²⁴ 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).

¹²⁵ http://www.europarl.europa.eu/atyourservice/en/displayFtu.html?ftuId=FTU_5.3.7.html

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 (contributing to disease resistance) and welfare, different production systems, feeding efficiency, resilience and climate change mitigation - when applicable, including related traits and possible links between them (synergies, trade-offs) -, zero waste, by-products valorisation following circularity principles and organoleptic and nutritional values of seafood optimisation. Efforts to close the reproduction cycle of economically important species should be considered. In addition, activities shall explore the potential of the microbiome on health and productivity of farmed species.¹²⁶ Activities shall consider sound cost-effective production methods and profitability, testing, demonstrating and upscaling of the production processes to pre-commercial product. Regulatory authority and consumers should also be consulted, addressing their concerns and demands. 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 2030¹²⁷, 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.

¹²⁶ 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).

¹²⁷ 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>

Horizon 2020 - Work Programme 2018-2020

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

- 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).
- 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 and support the Plastics Strategy¹²⁸. They shall include innovative product design and business models facilitating efficient reuse and recycling strategies and solutions, including ensuring the safety of recycled materials when used for toys or packaging food stuffs. 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 or other contaminants shall also be addressed. Additionally, activities shall contribute to building a biodegradable plastics¹²⁹ 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

¹²⁸ 16.1.2018 COM(2018) 28 final

¹²⁹ 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.

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 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 Initiative

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 Ministers¹³⁰). It will also support the Collaborative Research Action on Oceans of the Belmont Forum¹³¹ and the International Ocean Governance Communication¹³². 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 forecasting¹³³, 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 SeaDataCloud¹³⁴. The interdisciplinary and cross-sectorial nature of the proposal

¹³⁰ <http://www8.cao.go.jp/cstp/english/others/20160517communiqué.pdf>

¹³¹ Belmont Forum <https://www.belmontforum.org/>
¹³² (JOIN(2016) 49)

¹³³ All proposals under B) must include an observation part.
http://goosocean.org/index.php?option=com_content&view=article&id=14&Itemid=114
http://www.japan.go.jp/g7/_userdata/common/data/20160517communiqué.pdf

¹³⁴ 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. See topic DT-SFS-27-2019 under this Work Programme's SC2 Sustainable Food Security Call. 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>

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 Variables¹³⁵, notably the biological variables, including plankton biomass and diversity. They shall build on ongoing efforts (data, tools, EOSC, including its Pilot Blue Cloud, Data and Information Access Services (DIAS) of COPERNICUS, etc) and take account of the parallel EOSC thematic initiatives being developed – such as the Food Cloud Demonstrator.¹³⁶ 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 innovations¹³⁷. 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 SeaDataCloud¹³⁸, BlueBridge, the EOSC Pilot and other relevant projects funded under Horizon 2020, including those under Information and Communication Technologies¹³⁹. 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 Communiqué¹⁴⁰. It will support activities in the different EU sea basins and the Atlantic

¹³⁵ All proposals under B) must include an observation part.
http://goosocean.org/index.php?option=com_content&view=article&id=14&Itemid=114
http://www.japan.go.jp/g7/_userdata/common/data/20160517communiqué.pdf

¹³⁶ 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. See topic DT-SFS-27-2019 under this Work Programme's SC2 Sustainable Food Security Call. 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>

¹³⁷ 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> <https://www.belmontforum.org/collaborative-research-actions>

¹³⁸ 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. Recommendations 1, 3 and 4 on ocean observations and data sharing

¹³⁹ <https://ec.europa.eu/digital-single-market/en/information-communication-technologies-horizon-2020>
Initiative for the sustainable development of the blue economy in the Western Mediterranean

¹⁴⁰ All proposals under B) must include an observation part.
http://goosocean.org/index.php?option=com_content&view=article&id=14&Itemid=114
http://www.japan.go.jp/g7/_userdata/common/data/20160517communiqué.pdf

Horizon 2020 - Work Programme 2018-2020
Food security, sustainable agriculture and forestry, marine, maritime and inland water research and the bioeconomy

Ocean, including the deep sea (below 2000 m), also supporting the needs of food security and safety as outlined in Food 2030¹⁴¹. It will also support the future Collaborative Research Action on Oceans of the Belmont Forum¹⁴². 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 Initiative¹⁴³, 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 Initiative¹⁴⁴ and the EUSAIR¹⁴⁵, and actions addressing other European regional 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)¹⁴⁶ 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)¹⁴⁷. 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.

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 Forum¹⁴⁸ on Ocean sustainability shall also be considered.

¹⁴¹ 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. See topic DT-SFS-27-2019 under this Work Programme's SC2 Sustainable Food Security Call. 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>

¹⁴² 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> <https://www.belmontforum.org/collaborative-research-actions>

¹⁴³ 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. Recommendations 1, 3 and 4 on ocean observations and data sharing

¹⁴⁴ <https://ec.europa.eu/digital-single-market/en/information-communication-technologies-horizon-2020> Initiative for the sustainable development of the blue economy in the Western Mediterranean

¹⁴⁵ <http://www.adriatic-ionician.eu/>

¹⁴⁶ http://goosocean.org/index.php?option=com_content&view=article&id=14&Itemid=114

¹⁴⁷ The development of such laboratories is not part of this call.

¹⁴⁸ <https://www.belmontforum.org/>

[C] 2020 - Technologies for observations

Proposals shall address i) the demonstration of new and innovative technologies to measure the Essential Ocean Variables (EOV) at all depths, and ii) sensors to measure variables for aquaculture, fisheries, micro and nanoplastics, and marine litter and micro-litter, iii) the demonstration of novel approaches to observe the ocean with multiple underwater, surface, and air vehicles (surface and air vehicles are optional, but underwater must always be included) with a view to realizing the digital ocean. Optional air vehicles could potentially, among others, contribute to the development of fully documented fisheries.

Sensors should measure in-situ biogeochemical and biological EOVs and may include new or emerging EOVs (possibly defined at OceanObs19¹⁴⁹ or those needed for MSFD Descriptors) as well as technologies needed for “augmented” observatories (i.e. genome-enabled multidisciplinary observatories) to allow deeper investigation of marine biology and ecology and as sites to test the new technology. Demonstrations to advance deep sea oceanography, notably biological oceanography, by combinations of fleets of gliders, fixed stations, research vessels, etc. should reach TRL 6 or higher. Proposals may also cover the standards, protocols and communications needed for the observations, for open access to data, standards for data management and communication. Activities to transfer technologies from other sectors (for example combinations with data from satellites) will also be considered. The proposals shall also address issues such as low-power, miniaturisation, modularity, interoperability and low-cost. The proposals shall take agreed standards (for example Open Geospatial Consortium standards) into account. The development of new vehicles or other platforms are excluded from this call. Data collected (except data for testing) must be prepared in line with commonly agreed standards and be made available in a form suitable for EMODnet and clouds.

This topic is in support of the European Strategy for Plastics in a Circular Economy. Selected projects under this topic as well as projects selected under other topics in H2020 supporting the Plastics Strategy are strongly encouraged to participate in joint activities as appropriate. These joint activities could take the form of clustering of projects, participation in workshops, common exploitation and dissemination etc. The projects should describe how they will be complementary with already existing relevant national activities or other multilateral activities funded by the EU or funded jointly by several Member States. The proposals are expected to demonstrate support to common coordination and dissemination activities. Therefore, the proposals should foresee a dedicated work package for this purpose and earmark appropriate resources. Further details of these coordination activities will be defined during the grant preparation phase with the Commission.

Please note that this topic is part of the lump sum funding pilot scheme. Funding for grants awarded under this topic will take the form of lump sums as defined in [Commission Decision C\(2017\)7151 of 27 October 2017](#). Details of the lump sum funding pilot scheme are published on the [Funding and Tender Portal](#) together with the specific [Model Grant Agreement for Lump Sums](#) applicable.

¹⁴⁹ <https://www.oceanobs19.net/>

The Commission considers that proposals requesting a contribution from the EU in the range of EUR 6 million for sub-topic [A], EUR 12 million for sub-topic [B] and EUR 9 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.

Expected Impact: Contributing to the ongoing implementation of the Galway and Belém Statements and of EU policies such as the EU Bioeconomy Strategy, the Circular Economy Strategy, the European Open Science Cloud Initiative, the Blue Growth Strategy, the Common Fisheries Policy, the EU Maritime Spatial Planning Directive, the Marine Strategy Framework Directive, the International Ocean Governance Communication and the UN Sustainable Development Goals, activities will:

In the short-term:

- Support the implementation of the G7 Future of the Seas and Oceans initiative, the Paris Climate Agreement, the UN Decade of Ocean Science for Sustainable Development, and the needs of the Marine Strategy Framework Directive.
- 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 and C).
- 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 selected stressors to take timely preventive measures, notably to protect aquaculture resources (sub-topic B and C).
- 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).

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 changes, 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.
- Contribute to determining the distribution and fate of marine litter and microplastics (sub-topic C).

Type of Action: Innovation action, Innovation action Lump Sum

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 Ocean¹⁵⁰ 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 Africa¹⁵¹.

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 Plan¹⁵² 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

¹⁵⁰ EU-Canada-US Galway Statement on Atlantic Ocean Cooperation, May 2013

¹⁵¹ EU-Brazil-South Africa Belém Statement on Atlantic Research and Innovation Cooperation, July 2017

¹⁵² South-South Framework for Scientific and Technical Cooperation in the South and Tropical Atlantic and Southern 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. PIRATA¹⁵³, SAMOC¹⁵⁴, SA MAR-ECO¹⁵⁵, GEOTRACES¹⁵⁶, SOLAS¹⁵⁷, OTN¹⁵⁸, ICEMASA¹⁵⁹, BCLME¹⁶⁰, 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. In agreement with the Commission services, projects should ensure appropriate flexibility so as to respond in real time to potentially fast-changing policy scenarios.

[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

¹⁵³ Prediction and Research Moored Array in the Atlantic

¹⁵⁴ South Atlantic Meridional Overturning Circulation.

¹⁵⁵ South Atlantic Patterns and Processes of the Ecosystems of the southern Mid-Atlantic Ridge.

¹⁵⁶ An international Study of the Marine Biogeochemical Cycles of Trace Element and their Isotopes.

¹⁵⁷ Surface Ocean Lower Atmosphere Study.

¹⁵⁸ Ocean Tracking Network.

¹⁵⁹ International Centre for Education, Marine and Atmospheric Sciences over Africa.

¹⁶⁰ Benguela Current Large Marine Ecosystem.

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 aquaculture¹⁶¹ 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 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.

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

¹⁶¹ 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).

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

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 Forum¹⁶² 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 2030¹⁶³ 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)¹⁶⁴.
- 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).
- 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).

¹⁶² <https://www.belmontforum.org/>

¹⁶³ 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>

¹⁶⁴ EU-Brazil-South Africa Belém Statement on Atlantic Research and Innovation Cooperation, July 2017

Horizon 2020 - Work Programme 2018-2020
Food security, sustainable agriculture and forestry, marine, maritime and inland water research and the bioeconomy

- 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: 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.

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, water and air 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.

BG-10-2020: Fisheries in the full ecosystem context

Specific Challenge: Fisheries, an important part of the blue economy, provides food, generates gross profit of around EUR 1,342 billion and accounts for more than 150,000¹⁶⁵ jobs, and contributes to coastal social cohesion and resilience. The Common Fisheries Policy (CFP) regulates access to and use of the marine living resources. The CFP seeks to apply the ecosystem-based approach to fisheries management, with fishing in line with the Maximum Sustainable Yield concept and minimizing the effect of fishing on the ecosystem¹⁶⁶. The Marine Strategy Framework Directive (MSFD) requires that fish and shellfish stocks are in good environmental status¹⁶⁷. The Maritime Spatial Planning Directive¹⁶⁸ aims to regulate uses of the marine environment. The design of such policies can be better served with a holistic, integrated approach. For successful policy implementation an improvement of our predictive capacity of environmental impacts on marine biogeochemistry and productivity, food webs and ecosystem structure and functioning, is required. Considerable effort to scientifically and technically support these policy objectives goes hand in hand with filling

¹⁶⁵ Facts and figures on the CFP Basic statistical data 2016 Edition ISSN 1977-3609 EU publication office
¹⁶⁶ Regulation (EU) No 1380/2013 of the European Parliament and of the Council of 11 December 2013 on the Common Fisheries Policy, amending Council Regulations (EC) No 1954/2003 And (EC) No 1224/2009 and repealing Council Regulations (EC) No 2371/2002 and (EC) No 639/2004 and Council Decision 2004/585/EC

¹⁶⁷ Directive 2008/56/EC of the European Parliament and of the Council of 17 June 2008 establishing a framework for community action in the field of marine environmental policy

¹⁶⁸ Directive 2014/89/EU of the European Parliament and of the Council of 23 July 2014 establishing a framework for maritime spatial planning

considerable gaps in basic knowledge and providing predictive tools available for integrated management.

Scope: Building on related work done in previous research and innovation framework programmes and in other EU-funded programmes, research activities shall fill in knowledge gaps which hinder an efficient, ecosystem-based approach to the management of fisheries (e.g. biological characteristics and assessment of marine habitats; links of environmental factors and abundance, health, growth, reproduction etc. of fish stocks and human health and consumption etc., taking into account sex and gender differences if and where relevant; relations of different trophic levels in the food chain; efficiency of management measures protecting the ecosystem, interactions with and impacts from/on other uses of the sea). The proposals shall integrate existing and new knowledge in modelling or other applied tools/methods which can be used by scientific advisory bodies in sustainable fisheries management.

Following the principles of *responsible research and innovation*, proposals will ensure that societal players work together during the whole research and innovation process. Proposals should also test the efficiency of the proposed solutions across Europe.

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

Expected Impact: In the framework of UN SDGs (1, 2, 7, 8, 12, 13, 14), the Common Fisheries Policy, the Food 2030 policy blueprint for food and nutrition security, the BLUEMED strategic research and innovation agenda and the Atlantic research and innovation cooperation, proposals will:

- Improve integrated understanding of environmental impacts on marine ecosystem and food web structure and reduce uncertainties in future projections;
- Improve fisheries management assisting EU Member States to comply in a meaningful way with the requirements of European and international marine related legislation;
- Contribute to conserve and restore fish stocks, and to regulate harvesting of fishing and end overfishing including illegal, unreported and unregulated fishing and destructive fishing practices, and to contribute to the conservation of coastal and marine ecosystems;
- Provide improved tools for ecosystem-based fisheries management which are tested, effective, discussed with scientific bodies in charge of advising on stock, fisheries and ecosystem dynamics and that are fit for the 21st century;
- Ensure that the ecosystem-based approach to the sustainable use of seas can be applied by different public bodies and in the framework of different public policies;
- Provide improved alignment of research and innovation processes and their outcomes with the values, needs and expectations of society;

- Contribute to a thriving fishing sector and to a thriving European blue economy, including improved professional skills and competences;

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: Research and Innovation action

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

BG-11-2020: Towards a productive, healthy, resilient, sustainable and highly-valued Black Sea

Specific Challenge: The Black Sea contains the largest body of oxygen-free hydrogen sulphide-rich marine waters on Earth. Any new local, national or transboundary policy measures should consider its special ecosystem characteristics, its biodiversity and its submerged cultural heritage sites.

The European Commission has been supporting the work of researchers from all the Black Sea countries to advance a shared vision for a productive, healthy, resilient, sustainable and highly-valued Black Sea by 2030. The first step was a gap analysis and a [Vision Paper: A Blue Growth Initiative for Research and Innovation in the Black Sea](#) (May 2018), leading to the drafting of a Strategic Research and Innovation Agenda (SRIA) for the Black Sea basin.

The Vision Paper identifies a series of challenges for the Black Sea basin, which are driven by a range of human-induced and natural drivers, such as pollution, maritime transport, eutrophication, climate change, and coastal hazards. The abundance of gas hydrates is a particular asset of the Black Sea that represents both opportunities and risks. Fish stocks and species diversity are under severe stress, common surveys and monitoring can provide a base for better assessment, management and prevention. The area's marine heritage and its ecosystem services are also at risk. Black Sea societies can be more deeply connected through a bridge of knowledge, technologies, services and innovations. The EU is committed to supporting the development of solutions to solve these issues. This work will support several policies and international agreements such as the EU Integrated Maritime Policy (IMP), the EU Marine Strategy Framework Directive (MSFD), the EU Common Fisheries Policy (CFP), the EU Neighbourhood Policy, and the Bucharest Convention¹⁶⁹.

Scope: Proposals shall provide solutions for accurate predictive tools and capabilities to tackle the increasingly complex array of multi-stressors and their poorly understood interactions, including their connection with rivers flowing into the Black Sea.

¹⁶⁹ The Horizon 2020 work programme for 2019 includes a Coordination and Support Action: *Coordination of marine and maritime research and innovation in the Black Sea.*

Horizon 2020 - Work Programme 2018-2020
Food security, sustainable agriculture and forestry, marine, maritime and inland water research and the bioeconomy

Proposals shall address the fundamental Black Sea research challenges, that have been identified so far and others that may be defined as the priority-setting work proceeds, taking into account policy documents such as the MSFD reports of Romania and Bulgaria and the Strategic Action Plan of the Bucharest Convention. Proposals shall:

- Develop innovative multi-disciplinary research, building on past and on-going regional, international, as well national and EU projects/initiatives, including research infrastructures, data sharing mechanisms that will generate the knowledge needed to increase ecosystem resilience (e.g. SEAS-Era ERA-NET, PERSEUS, COCONET, SENTINEL, Marine Copernicus Monitoring Environment Service, European research infrastructures such as EMBRC, Euro-Argo ERIC, ICOS ERIC and EMSO ERIC, Black Sea Economic Cooperation, DANUBIS-RI etc.);
- Provide new knowledge to assess and mitigate the impacts of global climate change and the multiple natural and human-induced stressors in the Black Sea from land-sea interface to the deep basin.

Furthermore, proposals should provide scientific support to very early development of emerging start-ups in the region.

All data collected must be handled in line with commonly agreed standards and be compatible with EMODnet and clouds.

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: Activities will support the implementation of the MSFD and the Bucharest Convention, marine and maritime research and innovation to create synergies, increase economic benefits, and reduce hazards for prosperous, resilient and empowered communities deriving interest from the Black Sea basin.

In the short term, activities will develop:

- sustainable smart observation and monitoring systems, and assessment frameworks promoting governance for a sustainable ecosystem, mitigation of climate change impact and other stressors, and accurate forecasting for adaptive management;
- a harmonised set of working methods, standards and procedures on all aspects of coastal and marine research. This would provide compatible data, information and knowledge at the sea-basin level;
- facilities for promoting start-ups oriented towards the circular and blue economies in the region and

Horizon 2020 - Work Programme 2018-2020
Food security, sustainable agriculture and forestry, marine, maritime and inland water research and the bioeconomy

- new marine-based technologies by harnessing the Industry 4.0 for the Black Sea to promote safe and sustainable economic growth of the marine and maritime sectors, the conservation and valorisation of marine cultural heritage.

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.

Activities will promote education and capacity building:

- training and utilisation and transfer of technologies and knowledge for established and new marine and maritime-related jobs;
- educational and vocational youth mobility related to the blue economy among the countries in the region;
- enhanced science-policy dialogue in formulating coastal and marine policies and programmes;
- ocean-engaged citizens and policy-makers by providing high-level scientific output, contributing to a clean, plastic-free, healthy and productive Black Sea.

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.

Conditions for the Call - Blue Growth

Opening date(s), deadline(s), indicative budget(s):¹⁷⁰

Topics (Type of Action)	Budgets (EUR million)			Deadlines
	2018	2019	2020	
Opening: 31 Oct 2017				
BG-08-2018-2019 (RIA)	33.00			13 Feb 2018 (First Stage)
LC-BG-03-2018 (RIA)	12.00			11 Sep 2018 (Second Stage)

¹⁷⁰ 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 budget amounts for the 2020 budget are subject to the availability of the appropriations provided for in the draft budget for 2020 after the adoption of the budget 2020 by the budgetary authority or, if the budget is not adopted, as provided for in the system of provisional twelfths.

Horizon 2020 - Work Programme 2018-2020
Food security, sustainable agriculture and forestry, marine, maritime and inland water research and the bioeconomy

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			
Opening: 16 Oct 2018				
BG-08-2018-2019 (RIA)		27.00		23 Jan 2019 (First Stage) 04 Sep 2019 (Second Stage)
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		
Opening: 15 Oct 2019				
BG-07-2019-2020 (IA-LS)			18.00	23 Jan 2020
BG-10-2020 (RIA)			16.00	23 Jan 2020 (First Stage) 08 Sep 2020 (Second Stage)
BG-11-2020 (RIA)			18.00	
Overall indicative budget	77.50	89.00	52.00	

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.

Horizon 2020 - Work Programme 2018-2020
Food security, sustainable agriculture and forestry, marine, maritime and inland water research and the bioeconomy

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.
BG-07-2019-2020	Under this topic, legal entities established in Brazil are eligible for funding from the Union.

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-07-2019-2020, BG-08-2018-2019	Grants will be awarded to proposals according to the ranking list. However, in order to ensure a balanced portfolio of supported actions, at least the highest-ranked proposal per sub-topic will be funded provided that it attains all thresholds
-------------------------------------	---

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

Grant Conditions:

BG-07-2019-2020	For grants awarded under this topic for sub-topic C (2020), funding will take the form of lump sums as defined in Commission Decision C(2017)7151 of 27 October 2017. Details of the lump sum funding pilot scheme are published on the Funding and Tender Portal together with the specific Model Grant Agreement for Lump Sums applicable.
-----------------	--

Consortium agreement:

BG-01-2018, BG-02-2018, BG-05-2019, BG-07-2019-2020, BG-08-2018-2019, BG-10-2020, BG-11-2020, CE-BG-06-2019, DT-BG-04-2018-2019, LC-BG-03-2018, LC-	Members of consortium are required to conclude a consortium agreement, in principle prior to the signature of the grant agreement.
---	--

Horizon 2020 - Work Programme 2018-2020
Food security, sustainable agriculture and forestry, marine, maritime and inland water research and the bioeconomy

BG-09-2019	
------------	--

Call - Rural Renaissance¹⁷¹

H2020-RUR-2018-2020

The Rural Renaissance call will enhance the natural, social, cultural and economic potential of rural areas¹⁷² 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-food¹⁷³ 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".

The actions are expected to support Europe's endeavours to implement the Sustainable Development Goals (SDGs), in particular SDG 9 'Industry, innovation and infrastructure', SDG 11 'Sustainable cities and communities', SDG 12 'Responsible consumption and production', SDG 13 'Climate action' and SDG 15 'Life on land'.

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-

¹⁷¹ This call is expected to continue in 2020.

¹⁷² 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.

¹⁷³ Non-food chains include wood.

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):

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. The move towards greater flexibility for Member States to design their rural policy interventions within a performance-based framework after 2020 further increases the need for context-relevant knowledge, indicators and analytical tools.¹⁷⁴ 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, highly-skilled former urban dwellers and retired people. 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)

¹⁷⁴ CAP strategic plans – Proposal for a regulation COM(2018) 392

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 areas¹⁷⁵, 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 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.

D. [2019] Rural society-science-policy hub (CSA)

Actions shall set up a knowledge and policy hub that engages policy makers, scientists, stakeholders and rural dwellers locally with the objectives to: i) take stock of past and on-going rural research; ii) translate outcomes into attractive and easily understandable tools for policy makers and citizens (serving in particular strategic thinking around post-2020 EU policies); iii) conduct public engagement activities contributing to future rural policy and research policy design; and iv) explore avenues for longer-term science-society-policy interfaces. Activities shall synthesize and capitalise on the outputs and results of relevant past and on-going rural research projects, including at least those funded under EU framework programmes for research and innovation in the last fifteen years, and consider integrating toolboxes and datasets used within these projects. Communication products and tools valorising useful rural knowledge shall bring real adding-value content to the different society and policy 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 by a wide range of projects

¹⁷⁵ as defined in EU regulation 1305/2013 art. 32.2

and on outcomes of foresight activities under other actions funded through this topic or other programmes, 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 with relevant networks and platforms and with all the relevant on-going projects will be needed throughout the project. The duration of the project and the planning of its activities shall take into account the need for participatory activities contributing to the preparation of the implementation of future EU policies impacting rural areas.

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 approach¹⁷⁶, 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-topics A, D), 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, D);
- ensure a wide outreach and engagement in most EU Member States through a balanced and representative coverage of activities (sub-topics A, B, C, D);
- improve the uptake of available knowledge by policy makers at European, national and regional levels and open avenues for long-lasting mechanisms improving interfaces between society, science and policy makers on rural development (sub-topics A, D);
- 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);
- 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).

¹⁷⁶ See definition of the 'multi-actor approach' in the introduction to this Work Programme part.

In the long term proposed actions shall contribute to improving quality of life, socio-economic prospects, resilience to climate change, 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 approach¹⁷⁷, engaging representatives of farmers, rural businesses or citizens groups and digital technology providers. Early 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.

¹⁷⁷ See definition of the 'multi-actor approach' in the introduction of this Work Programme part

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, as well as on climate change adaptation and mitigation. 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'¹⁷⁸ 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-environment-climate public goods and guaranteeing their longevity over time. In the short to medium term work will:

- Lead to the development of innovative agri-environment-climate contractual models based on the review of existing initiatives and the design of new ones;
- Unlock and improve economic viability of agri-environment-climate initiatives through a renovated and coherent agri-environment-climate 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;
- Strengthen transdisciplinary research and integrated scientific support for consistent approaches between agricultural and environment-climate priorities and identify, when relevant, data management needs for the implementation of these approaches.

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

¹⁷⁸ See definition of the 'multi-actor approach' in the introduction of this Work Programme part

of environmental public goods and services, including climate adaptation and mitigation benefits.

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 and climatic impacts 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.

RUR-21-2020: Agricultural markets and international trade in the context of sustainability objectives

Specific Challenge: The EU remains a staunch supporter of the multilateral trading system. In spite of its successes, the World Trade Organisation (WTO) is now facing new challenges in light of a rapidly changing world. The WTO can be further modernised, by making its trade agenda closer to citizens and ensuring that trade contributes to the pursuit of broader objectives set by the global community, in particular with regard to sustainability¹⁷⁹. There are strong, complex and crucial links between trade, financial, economic and social policies, and these also reflect in agriculture. As one of the sectors with the lowest income worldwide,

¹⁷⁹ http://trade.ec.europa.eu/doclib/docs/2018/september/tradoc_157331.pdf

average farm income in the EU28 is only around 40% of average overall income¹⁸⁰. In Africa, rural areas remain much poorer, although the urban-rural gap has narrowed¹⁸¹. The profile of the global poor shows they are predominantly rural, young, poorly educated, and mostly employed in agriculture¹⁸². Competition on world markets is considered by some to be the cause of poverty as it drives prices down on some sensitive commodity markets. The United Nations (UN) Sustainable Development Goals (SDG) agreed in the framework of Agenda 2030 in 2015 set out a detailed set of actions to be pursued, many of them with strong links to trade. Of particular relevance to agriculture are SDG1 "No poverty" and the closely related SDG2 "Zero Hunger" and SDG3 "Good Health and Well-being". Aspects linked to agricultural practices and standards are also included in several environmental-related SDGs: "Life on Land" (SDG 15), "Clean Water" (SDG 6) and "Climate Action" (SDG 13). Global commitments should prompt the adoption of measures attentive to the social and environmental impact of trade in agriculture. In a globalised food system¹⁸³, the impact of these measures in one part of the world may be offset by slower progress in other parts, which would benefit from lower costs and increased competitiveness in the meantime. Consequently, a detailed analysis of the SDG targets related to the agriculture sector, and the corresponding environmental issues, should be undertaken and options through which trade policy can contribute to achieving the SDGs should be identified.

Scope: Proposals will analyse and further develop robust methods and related indicators to assess the impacts (positive and negative) of agricultural international trade on the environment and society. It will include analysis of options through which trade policies can contribute to achieving the SDGs and implementing climate and biodiversity agreements while securing the achievement of EU objectives regarding a fair standard of living for farmers and poverty eradication, which remains the primary objective of development policy under the new European Consensus¹⁸⁴. Work will look in particular to relevant supply chains in the agriculture sector involved both in import and export for the European Union in relation to its major agricultural trading partners. In addition, a contrasting analysis from the African continent perspective - the world's poorest continent (Sub-Saharan Africa was hosting more than half the world's poor in 2013) – could be proposed¹⁸⁵. Environmental impacts as carbon leakage¹⁸⁶ and other concepts will be analysed regarding agricultural trade. Activities will build upon previous studies¹⁸⁷ including the work done on the impact of EU consumption on

¹⁸⁰ Facts and figures on EU agriculture and the CAP, [Statistical annex: Agricultural and farm income](#)

¹⁸¹

<https://www.un.org/africarenewal/sites/www.un.org.africarenewal/files/Poverty%20in%20a%20Rising%20Africa%20Overview.pdf>

¹⁸²

Poverty and shared prosperity 2016 – Taking on inequality – World Bank Group
<https://openknowledge.worldbank.org/bitstream/handle/10986/25078/9781464809583.pdf>

¹⁸³

Nearly one third of global arable land use is connected to international trade
https://wad.jrc.ec.europa.eu/sites/default/files/atlas_pdf/2_WAD_GlobalPatternsOfHumanDomination.pdf

¹⁸⁴

https://ec.europa.eu/europeaid/policies/european-development-policy/european-consensus-development_en

¹⁸⁵

In relation to the Task Force Rural Africa – strengthening our partnership in food and farming

¹⁸⁶

Carbon leakage refers to the situation that may occur if, for reasons of costs related to climate policies, businesses were to transfer production to other countries with laxer emission constraints. This could lead to an increase in their total emissions.

¹⁸⁷

https://ec.europa.eu/agriculture/trade-analysis/impact-assessment_en

deforestation¹⁸⁸ and related to the target 6 of the EU Biodiversity Strategy (action 17b)¹⁸⁹ regarding the enhanced contribution of trade policy to conserving biodiversity, ecosystems and ecosystem services. Projects will design transition paths in order to develop trade relations in sustainable and fair ways and as “equals” (SOTEU2018) while considering the role that labour plays in overall production cost and the impact of the internalisation of environmental costs on the competitiveness of agricultural productions.

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

Expected Impact:

- More evidence-based policies and improved civil society dialogue building on improved data, analysis, and methods;
- Improved coherence between EU policies (Agriculture, Environment, Trade, Climate, Food security, Development...);
- Best practices and policies for multilateral trade contributing to the Sustainable Development Goals and global agreements on environmental and climate challenges.

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):

RUR-05-2020: Connecting consumers and producers in innovative agri-food supply chains

Specific Challenge: In the context of a greater market-orientation of the Common Agricultural Policy (CAP), one of the specific post 2020 CAP objectives is to rebalance the farmers' position in the food chain¹⁹⁰. The food supply chain is vulnerable to unfocused and even unfair trading due to strong imbalances between small and large operators: often farmers and

¹⁸⁸ <http://ec.europa.eu/environment/forests/pdf/3.%20eport%20policies%20proposal.pdf>

¹⁸⁹ <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52011DC0244&from=EN>

¹⁹⁰ https://ec.europa.eu/info/food-farming-fisheries/key-policies/common-agricultural-policy/future-cap_en

small operators in the food supply chain have hardly any information or connection with the consumer to improve their offer and adapt it to the demand. A knowledge-based approach will strengthen the sector's market orientation and enhance its competitiveness, incentivising organisational innovation along the supply chain, triggered by new emerging technologies and evolving consumer demand¹⁹¹. Zooming in on the connections between producers and consumers therefore has the potential to improve farmers' position in the value chain, as it will strengthen capacity-building. Innovative supply chains and novel food systems may tackle the downward pressure on farm gate prices and at the same time make them more sustainable, e.g. by reducing CO2 emissions. Focus on costs and margins is needed: even in innovative chains, improvement of primary producers' incomes should not be taken for granted: cases illustrate that costs attributed to the intermediaries in short supply chains may rise from 20 up until 50%. Although smaller tenders fit for small-scale producers are vital to local and fresher food in public offices, schools and hospitals, the experience needed to enable adequate public procurement approaches is generally lacking¹⁹². Proposals have ample opportunity to build on sharing of good practices developed to overcome all these barriers.

Scope: Activities should look into concrete ways for producers to collaborate on opportunities which are both consumer driven and conducive to improving farmers' incomes (e.g. economies of scale, smarter distribution, reduction of environmental footprints, territorial approaches etc.), building on a set of good examples of efficient and applicable approaches to do so. Proposals shall collect and develop good practices for mutually beneficial cooperation, integrating the needs of primary producers and consumers in a hands-on approach. Proposals shall pay particular attention to the calculation of costs and margins for each link in the supply chain. Activities may cover infrastructure and logistics for efficient access to consumers such as smart joint logistics of producers' groups, outsourcing of transport to entrepreneurs sharing the values of the producers, optimising sales order picking and transport routes, regaining consumers' trust by shortening chains, direct sales and collaboration, etc. This should lead to a collection of good examples showing efficient access to markets, with a view to reducing costs for intermediaries as much as possible. Proposals should help to develop identity of primary producers and market position e.g. through unique selling points. They may touch upon incentives from grassroots' initiatives like local food communities, agri-food clusters or food policy councils, the role of communities of practice and of knowledge hubs and even deal with legal constraints in so far as they support the envisaged impacts of this topic. Simultaneously, educational aspects may also be covered, such as connecting producers with consumers via open days, producer events, culinary events with local producers, food education in school curricula, celebrating local food heroes, promotion of local food labels, etc., leading to a set of concrete examples of education and awareness raising activities. Moreover, activities should support development of new public procurement approaches for offices, schools, hospitals, etc. interactively building smaller tenders to enable provision of local and seasonal food. Activities should make contracting authorities share experiences,

¹⁹¹ https://ec.europa.eu/info/sites/info/files/food-farming-fisheries/farming/documents/amtf-report-improving-markets-outcomes_en.pdf

¹⁹² See EIP-AGRI Workshop Cities and Food – Connecting Consumers and Producers <https://ec.europa.eu/eip/agriculture/event/eip-agri-workshop-cities-and-food---connecting>

create a dialogue with suppliers to attune supply and demand, and develop support mechanisms for smaller suppliers to meet tender requirements. Proposals shall fall under the concept of the 'multi-actor approach'¹⁹³ with a consortium based on a balanced mix of actors with complementary knowledge clearly including farmers/foresters, farmers' groups, advisors, contracting authorities and policy makers. The project's strategy, as well as related projects RUR-06-2020 and RUR-07-2020 should be coordinated with the SCAR AKIS Strategic Working Group (SWG) with a view to cross-fertilise between projects under this topic, in order to help sharing conclusions of the project with the competent policy makers and national or regional authorities. Projects should deliver a substantial number of "practice abstracts" in the common EIP-AGRI format, including audio-visual material as much as possible.

The Commission considers that proposals requesting a contribution from the EU of up to 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:

- Developing tailor-made and practical support to set up innovative supply chains creating win-wins for producers and consumers, including through a collection of examples of good practices, illustrating mutually beneficial cooperation and a fair share for primary producers;
- Integrating the needs of primary producers and consumers in a hands-on approach in particular by minimising margins taken by intermediaries;
- Improved sharing of experience between contracting authorities on tendering healthy and fresh food, with a view to connecting consumers with producers in a mutually beneficial way for the longer term.

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-06-2020: Innovative agri-food value chains: boosting sustainability-oriented competitiveness

Specific Challenge: Food systems face many interlinked challenges, which jeopardise their sustainability, such as changing climate conditions, deteriorating natural resources, increasing power imbalances in the agri-food value chain, changing demographics and dietary habits. Although the stages of the agri-food value chain are strongly interconnected, the design processes of solutions to improve their sustainability are still mostly managed separately. Such an approach is often ineffective, as it can lock in the system, blocking much needed

¹⁹³ See definition of the 'multi-actor approach' in the introduction to this Work Programme part.

radical innovations, and/or generate unintended consequences elsewhere. Therefore, the complexity and persistence of the sustainability challenges underline an urgent need for innovative systemic approaches to redesign agri-food value chains, with a view to unlock their full potential to deliver economic, environmental and social benefits while also addressing power imbalances between farmers and other operators. This implies that different actors across the agri-food value chains need to cooperate with each other on innovative integrated approaches to produce and distribute enough affordable nutritious food for all in a sustainable way. Such co-created innovative designs of agri-food value chains are emerging. Not all innovative strategies are, however, equally sustainable. There is a need to identify such innovative integrated approaches, assess them against sustainability criteria, elicit those with the highest potential to address sustainability challenges across a variety of agri-food sectors and demonstrate their benefits to serve as examples of best practice. There is also a need to understand the structure and behavioural incentives inherent in agri-food value chains, how these affect sustainability and innovation in practice, and what kind of adjustments would be desirable to facilitate good practice at a systemic level, in order to contextualise and understand the replicability of the best practices identified.

Scope: Building on the state of the art, the proposals shall map and assess existing innovations, and (re)design and pilot innovative systemic approaches to agri-food value chains that unlock their full potential to achieve economic, social and environmental sustainability and foster cooperation, notably involving farmers. The innovative approaches to agri-food value chains should combine diverse forms of innovation, for instance, technological, social, organisational, managerial and institutional, etc.

Activities shall assess and validate the benefits of pilot activities for actors involved with a view to promote them as examples of best practice. Proposals shall apply comprehensive methods, quantitative and qualitative, to assess and benchmark economic, environmental and social performance of the innovative approaches along entire agri-food value chains. Particular attention should be paid to the potential of the innovative agri-food value chains to reduce trade-offs and to boost synergies between the economic, social and environmental dimensions of sustainability as well as to the fair distribution of costs, benefits and risks among all actors involved in the agri-food value chains. Activities should scrutinize factors enabling and hindering innovative approaches. Recommendations, best practice guidelines and toolkits for promising innovative approaches to agri-food value chains shall be developed and disseminated to reach broad audiences likely to take up and adapt the identified innovative approaches to agri-food value chains.

Proposals shall fall under the concept of the 'multi-actor approach'¹⁹⁴, engaging relevant actors (including those traditionally less involved in research and innovation), such as farmers and farmers' organizations, input and food industry, in particular SMEs, traders and distributors, food related services, consumers, environmental and social non-governmental organisations as well as public authorities, in collaboration on redesigning the agri-food value chains towards common sustainability objectives.

¹⁹⁴ See definition of the 'multi-actor approach' in the introduction to this Work Programme part

To maximize impact across Europe and to ensure wide dissemination of the project results, proposals should foresee a dedicated work package for cooperation with other selected projects under topic RUR-06-2020 and earmark appropriate resources. Cooperation with other selected projects under topic RUR-07-2020 is encouraged.

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: The innovation action will result in:

- long-term, win-win economic relationships between actors from agri-food chains which effectively collaborate towards common sustainability objectives;
- better understanding and fairer distribution of costs, benefits and risks amongst the actors involved in the innovative agri-food chains which are piloted, tested and demonstrated;
- a portfolio of innovative sustainable business models well-functioning in operational environment;
- strengthened farmers' position in agri-food value chains through innovative approaches that enhance transparency, information flow and management capacity;
- enhanced positive socio-economic and environmental impacts of agri-food value chains.

In the long term, the innovations action will contribute to more competitive, efficient, resilient, sustainable and better performing agri-food value chains.

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-07-2020: Reducing food losses and waste along the agri-food value chain

Specific Challenge: Annually in the EU around 88 million tonnes of food are lost or wasted all along the agri-food value chain, from primary production to final consumption, with consequent high environmental, social and economic impacts¹⁹⁵. The problem is particularly worrying for perishable foods. Reducing food losses and waste, primarily through prevention, has enormous potential for ensuring sustainable food and nutrition security, reducing greenhouse gas emissions and lessening environmental impacts by improved resource use efficiency. Nonetheless, reducing food losses and waste all along the agri-food value chain is

¹⁹⁵ Figure based on 2012 [data](#). The reference for the figure of 88 million tonnes of food waste quoted by the Commission corresponds to the latest estimates of food waste generated in the EU-28 published in 2016 by FP7 project Fusions '[Estimates of European food waste levels](#)'. This figure is not broken down on what is produced in the EU and what is imported.

not straightforward, as the problem is a result of manifold and highly interlinked causes. Much is known about the causes and many innovative solutions are already available. There is, however, an urgent need for their demonstration and market replication. To avoid shifting the burden of food losses and waste from one stage of the agri-food value chain to another, it is important to coordinate the innovative actions to tackle food losses and waste along all stages of the agri-food value chain.

Scope: Building on the state of the art, proposals shall identify, validate and demonstrate innovative, effective ways to reduce food losses and waste, with a focus on preventing avoidable losses and waste of perishable products, all along the agri-food value chain from primary production down to final household consumption and disposal. Proposals should consider diverse forms of innovation, e.g., technological, social, organizational, managerial and institutional, etc. that allow actors to better organize and coordinate their activities, to monitor conditions, to eliminate the many intricate direct and indirect causes of inefficiency, and, hence, to discard as little food as possible all along the agri-food value chains without compromising on food quality, including safety, and sustainability. When applicable, proposals should address requirements from relevant EU regulatory frameworks, including pre-market approval.

In order to test and demonstrate efficacy of the introduced innovative approaches and to further improve understanding of the root causes behind the current situation, proposals shall include a task to measure and monitor food losses and waste (and associated economic and environmental costs) along the agri-food value chains. Any methods used for this purpose should be compatible with the EU legislation on measurement and reporting data on food losses and waste (to be adopted by the 31 of March 2019)¹⁹⁶, but may be complemented with measurement of materials not covered by the legislation (e.g., farm losses). Activities should scrutinize factors enabling and hindering innovative approaches. Recommendations, best practice guidelines and toolkits for promising innovative approaches to the reduction of food losses and waste shall be developed, taking into consideration the underlying socio-cultural factors and gender aspects, when relevant.

Proposals should foresee activities to inform diverse actors along the agri-food chain, including consumers and policymakers, about the innovative solutions to food losses and waste, influencing their behaviour in relation to this issue, and supporting policy development and implementation. Proposals should seek complementarities¹⁹⁷ with selected projects under topic RUR-07-2020 and other relevant EU projects, as well as contribute to relevant initiatives at EU level^{198, 199}. To maximize impact across Europe and to ensure wide dissemination of the project results, proposals should foresee a dedicated work package for cooperation with selected projects under topic RUR-07-2020 and earmark appropriate

¹⁹⁶ For further details see - https://ec.europa.eu/food/safety/food_waste/eu_actions/food-waste-measurement_en

¹⁹⁷ Articles 2 and 41.4 of the MGA

¹⁹⁸ https://ec.europa.eu/food/safety/food_waste_en;

¹⁹⁹ http://ec.europa.eu/environment/circular-economy/index_en.htm

resources. Cooperation with other selected projects under topic RUR-06-2020 is also encouraged.

Proposals shall fall under the concept of the 'multi-actor approach'²⁰⁰, ensuring solid collaboration between relevant actors, such as farmers or farmers associations, agri-food industry (including small businesses), wholesalers and retailers, food related services, consumers and policymakers.

The Commission considers that proposals requesting a contribution from the EU of up to 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 short and medium term, proposed innovative activities will lead to a significant reduction of food losses and waste along the entire agri-food chain, and:

- increase the capacity and engagement of actors along the agri-food chain to collaborate with each other towards the common objective to reduce food losses and waste;
- raise awareness on the value of food and increase shared responsibility for food losses and waste prevention among all actors of the agri-food chain;
- expand the portfolio of innovative technologies, added-value products, business models and modes of cooperation between actors across the agri-food chain with large potential for market replication and reduction of food losses and waste; the TRL of the innovative solutions can vary at the start of the project, but should achieve at least TRL 6-7;
- contribute to and/or improve understanding of the root causes behind the current situation and measurement of food losses and waste to be taken by Member States as laid down in the recently amended Waste Framework Directive²⁰¹.

In the long-term the innovation action will:

- identify adequate measures to promote the reduction of food losses and waste;
- increase resource use efficiency and reduce adverse environmental impacts, including emissions of greenhouse gases;
- reduce economic costs associated with food loss and waste, create jobs and increase competitiveness of the agri-food chain.

Type of Action: Innovation action

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

²⁰⁰ See definition of the 'multi-actor approach' in the introduction to this Work Programme part
²⁰¹ <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:02008L0098-20180705>

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

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, water and air pollution. Agri-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 and waste streams, 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 agri-food or forestry sectors, or from waste water and sewage sludge, and conversion into novel fertilisers.

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 resources²⁰². 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 chain²⁰³, 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)

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

²⁰² This shall include both products with low organic matter (comparable to current mineral fertilisers) and products with high organic matter content (advanced organic fertilisers)

²⁰³ Including the production, transport and use phases.

overlaps. Technologies that are currently under development shall be further improved, and possibly integrated, to produce high quality end-products²⁰⁴. Proposals shall address end-product marketability, safety, sustainability including emissions of greenhouse gasses and pollutants, and compliance with relevant EU regulations²⁰⁵. 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'²⁰⁶ including relevant actors such as agri-food industries, technology providers, research centres, end-users (farmers and farmer associations), or public administration.

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

Projects shall demonstrate processes for recovery of mineral nutrients and production of novel fertilisers from by-products of the agri-food, fisheries, aquaculture or forestry sectors, excluding animal manure, water and sewage sludge (covered in scopes B and D). Proposals should demonstrate that the activities proposed go beyond past or ongoing research, without overlaps. Technologies that are currently under development should be further improved, and possibly integrated, to produce high quality end-products²⁰⁷. Proposals shall address end product marketability, safety, sustainability including emissions of greenhouse gasses and pollutants, and compliance with relevant EU regulations. Their suitability and acceptability under the organic farming regulatory framework should 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'²⁰⁸, including relevant actors such as agri-food industries, technology providers, research centres, end-users (farmers and farmer associations), or public administration.

D.[2020] Bio-based fertilisers from waste water and sewage sludge (RIA)

Projects shall develop techniques for nutrients recovery from waste water streams such as urban and industrial waste water, sewage sludge from waste water treatment plants, brine from water desalination or demineralisation plants²⁰⁹. Building on related work under previous research framework programmes and other EU-funded programmes, projects should design and test techniques for nutrients recovery and subsequent mechanical, chemical or biological processes to upgrade recovered nutrients. The monitoring and removal or

²⁰⁴ These can be mineral-type (i.e. with low organic matter content), or advanced organic fertilisers (e.g. through improved composting processes).

²⁰⁵ This includes notably regulations relative to fertilisers, animal by-products, or nitrates.

²⁰⁶ See definition of the 'multi-actor approach' in the introduction to this Work Programme part.

²⁰⁷ These can be mineral-type (i.e. with low organic matter content), or advanced organic fertilisers (e.g. through improved composting processes).

²⁰⁸ See definition of the 'multi-actor approach' in the introduction to this Work Programme part.

²⁰⁹ Water desalination or demineralisation plants may include, for example, plants treating wastewater in food or pulp & paper industries.

mitigation of contaminants affecting food safety, human and ecosystem health (e.g. pharmaceuticals in sewage sludge) in recovered nutrients should be key in the process design. A life-cycle assessment should be carried out in order to evaluate the environmental impacts of processes along the whole value chain, including waste/residues, and products' environmental performances. Regulation issues should be part of the investigation. Involvement of governments at different levels as regards regulation issues, regional/local strategies and territorial development plans is an asset.

The Commission considers that proposals requesting a contribution from the EU in the range of EUR 6 million for sub-topic A and D and EUR 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. Proposals for sub-topics A, B and C 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). For sub-topics B and C, participation of partners from CELAC countries²¹⁰ 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 non-renewable mineral fertilisers, hence reducing external dependence and risks related to depletion (sub-topics A, B, C and D);
- 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, to the emissions of greenhouse gases, or to the production of fossil-based fertilisers (sub-topics A, B, C and D);
- develop new business models creating value from agri-food, fisheries, aquaculture or forestry by-products (sub-topics B and C) and from water sector and the industrial sector subject to waste water treatment, including desalination or demineralisation plants (sub-topic D).

In the long term, this should 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

²¹⁰ Community of Latin American and Caribbean States

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 untapped²¹¹.

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 regions²¹². 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 roadmaps²¹³ through participative approaches, adapted to the local conditions and biomass sources²¹⁴. 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 available²¹⁵ and establishing synergies with relevant policies and

²¹¹ 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.

²¹² Including the establishment of links with relevant initiatives, such as e.g. BIOEAST or the Bio-based Industries Joint Undertaking (BBI JU).

²¹³ 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.

²¹⁴ Originating in sectors such as e.g. agriculture, forestry, fisheries and aquaculture, industry, waste management, etc.

²¹⁵ Notably by creating synergies among the European Structural and Investment Funds (ESIF), Horizon 2020, private funds, etc.

programmes, notably those related to rural and regional development, and related Smart Specialisation Strategy implementing bodies.

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, 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 system²¹⁶, 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 security²¹⁷. 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 areas²¹⁸ 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 plan²¹⁹, and a set of policy options and recommendations.

Proposals shall fall under the concept of the 'multi-actor approach'²²⁰, 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 CE-SFS-36-2020 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 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 and outermost regions;

²¹⁶ '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.

²¹⁷ E.g. by focusing on agricultural waste and/or dedicated crops on marginal/abandoned lands or through multi-cropping strategies.

²¹⁸ E.g. forestry or paludiculture (cultivation of marshlands).

²¹⁹ The business plan should take into account, among other things, the marketability of the end-products

²²⁰ See definition of the 'multi-actor approach' in the introduction to this part of the work programme.

- 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 chains

Specific Challenge: Forests play a vital role in Europe's economy, society and environment²²¹. 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 non-renewable resources through the sustainable use of 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. Climate change is at the same time increasing forests' vulnerability. Several research projects²²² and COST Actions²²³ launched in FP7 looked into the development of innovative, resource efficient wood-based products. While ensuring the sustainability of forest production systems under changing climate conditions remains a long-term objective for the sector, a key challenge now is to further develop and deploy the technological advancements of environmental and micro/macrocclimate-friendly wood-based value chains on the ground.

Scope: A. [2019] Building with wood (IA)

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. product definitions, standards and construction codes), performance standards, public policies and

²²¹ 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.

²²² e.g., BEST, BOOSTEFF, CUTEWALL, HIFIVENT, OSIRYS, PERFORMWOOD, REACTAFIRE, SUSTAINCOMP, WOOD-FLARETCOAT

²²³ e.g. FP 1004, 1006, 1101, 1105

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 (RIA)

Proposals shall aim at enhancing the adaptation of forest ecosystems (both primary and secondary) and forest production systems to the growing societal demands for forest products (i.e. wood and non-wood) and ecosystem services, considering trade-offs, climate change and vulnerability to natural disturbances (e.g. storms, droughts, pathogens, wild fires). Restoration of degraded ecosystems and natural expansion of forests, considering the long-term rural development, climate change mitigation objectives and biodiversity enhancement are also in the scope. Proposals shall encompass a varied range of forest and site types and tailored forest management systems representative of Europe's biogeographic regions. Proposals shall cover multiple parts of the production cycle and related operations, from regeneration/planting to harvesting, shall consider jointly supply (i.e. primary production) and demand (i.e. socio-economic) factors, and are expected to be interdisciplinary²²⁴ in nature.

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 Forest Strategy 2013, the Circular Economy Package 2015, the Paris Agreement 2015, the EU's Bioeconomy Strategy 2018, and the EU Action Plan for Nature, People and the Economy, 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 (emissions of GHG and air pollutants 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 and competitive, forest-based bioeconomy, by 2025 [sub-topic A];

224

Increased long-term resilience of forest production systems and associated value chains to climate/environmental change and societal demand [sub-topic B];

Protection and restoration of biodiversity of primary and secondary forest [sub-topic B];

Enhanced contribution of the forest-based sector to long-term climate change mitigation, adaptation 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 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, Research and Innovation action

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

RUR-18-2019: Support to the BIOEAST initiative: boosting knowledge and innovation-based bioeconomies

Specific Challenge: Many European macro-regions have very high potential to develop functioning circular bioeconomies, exploiting their land, aquatic or waste based resources, but they often suffer the drawbacks of less developed knowledge and innovation systems. Neither traditional nor innovative value-chains are fully exploited and the opportunities for creating value added processes are not recognised or not well understood. A systemic and integrated approach for sustainable production and consumption is often missing and rural communities fail to exploit the potential of an evidence-based, sustainable circular bioeconomy.

These challenges are deeply inter-connected and mutually reinforce each other. Within this frame, coordinated and integrated actions need to be carried out to create synergies and complementarities between sectors and countries. This is to provide added value to regional, national and EU investments, remove barriers, avoid duplication and reduce fragmentation, as it was put forward in the Vision Paper of the “Central and Eastern European Initiative for Knowledge-based Agriculture, Aquaculture and Forestry in the Bioeconomy”, the BIOEAST Initiative²²⁵.

Scope: This action is expected to contribute to the implementation of 'The BIOEAST Initiative' vision paper with its related action plan. This calls for the further alignment and convergence of national research, knowledge and innovation activities and other relevant initiatives and investments with the different actors and across different sectors, *in primis* between the European countries from the CEE macro-region and the whole EU. Proposals should support the BIOEAST Initiative to steer the development of strategies and evidence-based policies, to identify common challenges and validate common research areas, to map

²²⁵ <http://bioeast.eu/vision>

and establish data-driven support for the design and implementation of policies, the improvement of skills and the development of synergies between European and national funds. Proposals should therefore also improve Agricultural Knowledge and Innovation Systems (AKISs) in the CEE macro-region, make them more interconnected and structured and embed them within the European Research Area (ERA) and the European Innovation Partnership (EIP-AGRI). The activities should strengthen rural communities looking also at local small-scale value chains with strong rural development features.

The Commission considers that proposals requesting a contribution from the EU in the range of 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.

Proposals shall include a task to cluster with other projects financed under RUR-09-2018. In agreement with the Commission services, projects should ensure appropriate flexibility to respond in real time to potentially fast-changing policy scenarios.

Expected Impact: In the framework of United Nations Sustainable Development Goals 8, 12, 13, 15 and in order to contribute to the implementation of the EU Bioeconomy Strategy, the Common Agricultural Policy and EU Forest Strategy, activities shall

In the short term:

- Contribute to the implementation of the BIOEAST Initiative Vision and its related action plan
- Develop national bioeconomy strategies to tackle specific environmental and climatic challenges identified in the BIOEAST Initiative Vision Paper.
- Facilitate evidence-based policy making by developing bioeconomy-relevant statistical and administrative data.
- Promote co-creation of innovation and the multi-actor approach, improve knowledge flows and connection between actors within national and regional AKISs, and better link these with the ERA and the EIP-AGRI.

In the medium term:

- Increase sustainable biomass production while maintaining or improving biodiversity and biosecurity.
- Facilitate the creation of new value-chains and value-added jobs and competences to sustain viable rural society.
- Boost knowledge and innovation in rural communities, ensuring that they participate in the knowledge economy and maximise opportunities arising from advances in the research and innovation system as well as incentivising bottom-up innovative ideas.
- Support stability and socio-economic development.

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.

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 Strategy²²⁶ 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.²²⁷ 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, and connecting them with actors that can provide access to finance, advanced training skills, knowledge and needs of the farming community.

²²⁶ <https://ec.europa.eu/digital-single-market/en/digitising-european-industry>

²²⁷ <http://ec.europa.eu/futurium/en/content/digitising-european-industry-catalogue-initiatives>

Hence, the following is 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 party²²⁸;
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 Europe²²⁹.

Proposals should fall under the concept of the multi-actor approach²³⁰.

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 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:

²²⁸ 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, since this is necessary to achieve the objectives of the action.

²²⁹ 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"

²³⁰ See definition of the 'multi-actor approach' in the introduction to this Work Programme part.

- 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), 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. In order to achieve the objectives of the call, projects should have a minimum duration of four years and should fall under the concept of the multi-actor approach²³¹.

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-20-2018: Digital solutions and e-tools to modernize the CAP

Specific Challenge: The EU eGovernment Action Plan 2016-2020²³² calls on the modernisation of public administrations in Europe and improving the interaction with citizens and businesses. This 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. Another key domain of application is the Common Agricultural Policy (CAP).

²³¹ See definition of the 'multi-actor approach' in the introduction to this Work Programme part.

²³² EU eGovernment Action Plan 2016–2020 Accelerating the digital transformation of government.pdf

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 use of these data currently limited to agriculture, and the potential broader uses (e.g. for monitoring environmental and climate policies) in combination with new technologies, ancillary space data and other data sources such as agri-environment-climate 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 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 through a Large-Scale Pilot.

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 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") must be used.

To demonstrate the robustness and the socio-economic benefit of the pilot, the project must test and validate the newly developed technologies and tools for at least 12 months in real conditions across different use cases. 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. Projects are expected to fall under the concept of the multi-actor approach²³³.

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.

²³³ See definition of the 'multi-actor approach' in the introduction to this Work Programme part.

Expected Impact: Achieve a further integration and digitisation 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-environment-climate 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 practice

Specific Challenge: Despite the continued funding of scientific projects, innovative ideas and methods from practice are not captured and spread, while also often research findings are not integrated into agricultural and forestry practice. It is essential to act at EU level to remedy this because national and sectoral agricultural knowledge and innovation systems (AKISs) are insufficiently connected and organised to fully facilitate the necessary intensifying of thematic cooperation between researchers, advisors and farmers/foresters. This exchange of knowledge will foster economically viable and sustainable agriculture and forestry.

Scope: The themes must focus on the most urgent needs which farmers and foresters experience. The activities of thematic networks are summarising, sharing and presenting, - in a language that is easy to understand and is targeted to farmers and foresters - existing best

practices and research findings that are close to being put into practice, but not sufficiently known or used by practitioners. The specific themes of the networks can be chosen in a 'bottom-up' way. First and foremost, they must tackle the most urgent needs experienced by farmers and foresters. If it is appropriate to solve these needs, the themes can cover sectoral or cross-sectoral issues, organisational or management solutions. The activities should pay attention to the cost/benefit aspects of the specific practices collected and summarised. A comprehensive description of the state of current farming practices relative to the chosen theme should explain the added value of the proposal and the relevance of the theme for the farmer. The proposal should also explain how it avoids duplication with ongoing or completed projects and networks. 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 useful, applicable and appealing end-user material for farmers and foresters. This information should be easy to access and understand, and feed into the existing dissemination channels most consulted by farmers and foresters at national or regional level. It should also be provided to the European Innovation Partnership (EIP) 'Agricultural Productivity and Sustainability' in the common "practice abstract" format. Proposals should fall under the concept of the 'multi-actor approach'²³⁴, with preferably a project duration of three years and a consortium based on a balanced mix of actors with complementary knowledge clearly activating farmers/foresters, farmers' groups and advisors. Wherever possible, details on the synergies with relevant EIP Operational Groups and interactive innovation groups operating in the context of the EIP-AGRI are expected, 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. Nonetheless, this does not preclude the submission and selection of proposals requesting other amounts.

Expected Impact: Activities must

- contribute to the collection and distribution of easily accessible practice-oriented knowledge on the thematic area chosen, including delivering as many “practice abstracts” in the common EIP-AGRI format as possible and as much audio-visual material as possible.
- conserve the practical knowledge for the long term - beyond the project period – in particular by using the main trusted dissemination channels which farmers/foresters consult most often, and also serve education and training purposes;

²³⁴ See definition of the 'multi-actor approach' in the introduction to this Work Programme part.

- 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 innovation²³⁵ 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 the context of linear knowledge 'transfer', advisors should now also develop the skills to be able to take on 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 advisors for learning and exchanging interactive innovation techniques that support the transition to a more productive, sustainable and climate-smart agriculture and a higher level of development in rural areas. Projects shall identify and showcase best practices from a broad series of practical cases of advisory services across the EU, with a view to support 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 help advisors to acquire the skills for managing and participating in interactive innovation projects and how to intermediate in farmer-to-farmer learning processes. Proposals must expand and update the inventory of advisors in the EU by the PRO-AKIS project, with a particular focus on including all private and public advisors and ensuring an 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

²³⁵ For the interactive innovation model, see the introduction to this Work Programme.

networks, research organisations etc. and seek synergies with 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. Special attention should be given to the CEE countries where knowledge sharing attitudes and interconnectivity within the AKISs are still limited.

In order to achieve the objectives of the call, projects should have a minimum duration of four years and shall fall under the concept of the multi-actor approach²³⁶. To network all public and private advisors across the EU, consortia shall include as many key actors – private and public – with practical advisory experience as possible within the EU. 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 advisors 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 advisors, 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 research and practical implementation for more productive and sustainable agricultural practices and rural development;
- 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.

RUR-17-2019: Reinforcing the EU agricultural knowledge base

Specific Challenge: Since 2014, the EU has invested in a large number of agricultural research, innovation, coordination and support actions to improve knowledge flows in the

²³⁶ See definition of the 'multi-actor approach' in the introduction to this Work Programme part.

Agricultural Knowledge and Innovation Systems (AKISs) – the systems of people and organisations in countries/regions that generate, share and use agriculture-related knowledge and innovation²³⁷. These projects, in particular those applying the multi-actor approach, have compiled innovative solutions for farming and forestry practice, and their outputs include end-user material in many forms such as knowledge databases, IT applications, decision-making tools, videos etc. made available through the websites of the projects, using a variety of standards and IT systems. However, the long-term longevity of knowledge and end-user material produced or collected by these individual actions is not necessarily ensured. The challenge now is to favour their longer-term and wider use with a view to enable updating, consolidating and connecting to regional and national AKISs.

Scope: Proposals shall review activities and outputs, and the communication and information channels for dissemination used by Horizon 2020 multi-actor projects²³⁸. Consortia shall organise participatory activities with partners from multi-actor projects. Activities shall analyse and compare the approaches taken on their performance and impact for farmers/foresters as well as effectivity of the communication and information channels used for dissemination in countries and regions. Proposals shall explore the feasibility and added-value of developing joint tools, joint platform(s) and/or (e-) infrastructure integrating some or all of the outputs of projects into an EU wide open source system(s) and propose options for the future. Moreover, these options should connect efficiently to existing communication and dissemination channels within the national and regional AKISs.

Proposals shall fall under the concept of the 'multi-actor approach'²³⁹ with a project duration of up to two years. Consortia shall engage with the variety of actors involved in the multi-actor projects as well as with key players in the national and regional AKISs, therefore coordinating activities with the Member States and experts in the SCAR-AKIS Strategic Working Group²⁴⁰.

The Commission considers that proposals requesting a contribution from the EU of up to EUR 2.5 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: This action aims at improving knowledge flows in the long-term by proposing ways to structure and connect agricultural knowledge created through EU-funded and other projects, with a view to maximise their impact beyond the end of the projects themselves.

By driving future knowledge sharing systems towards the most efficient solutions, the action will, in the short term:

²³⁷ https://scar-europe.org/images/AKIS/Documents/AKIS_towards_2020.pdf

²³⁸ The list of multi-actor projects for each H2020 call is in the footnote linked to the definition of the 'multi-actor approach' in the introduction of the H2020 Workprogrammes

²³⁹ See definition of the 'multi-actor approach' in the introduction to this Work Programme part.

²⁴⁰ https://scar-europe.org/images/AKIS/Documents/AKIS_foresight_paper.pdf

Horizon 2020 - Work Programme 2018-2020
Food security, sustainable agriculture and forestry, marine, maritime and inland water research and the bioeconomy

- increase sharing of multi-actor project know-how and spreading of practical information between as many geographical areas and agricultural sectors in Europe as possible, drastically improving dissemination to end-users; and
- produce recommendations and technical specifications which favour greater interoperability and integration of EU and Members States' knowledge bases for practitioners in the future; and
- improve long-term access to practical knowledge produced by the Horizon 2020 multi-actor projects.

In the longer term, greater circulation of innovative knowledge around Europe will contribute to increased competitiveness and sustainability for European farmers and foresters.

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):²⁴¹

Topics (Type of Action)	Budgets (EUR million)			Deadlines
	2018	2019	2020	
Opening: 31 Oct 2017				
CE-RUR-08-2018-2019-2020 (RIA)	6.00			13 Feb 2018 (First Stage)
RUR-01-2018-2019 (RIA)	12.00			11 Sep 2018 (Second Stage)
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			

²⁴¹ 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 budget amounts for the 2020 budget are subject to the availability of the appropriations provided for in the draft budget for 2020 after the adoption of the budget 2020 by the budgetary authority or, if the budget is not adopted, as provided for in the system of provisional twelfths.

Horizon 2020 - Work Programme 2018-2020
Food security, sustainable agriculture and forestry, marine, maritime and inland water research and the bioeconomy

RUR-13-2018 (CSA)	7.00			
RUR-15-2018-2019-2020 (CSA)	12.29			
Opening: 26 Jul 2018				
RUR-20-2018 (IA)	10.00 <small>242</small>			11 Sep 2018
Opening: 16 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-01-2018-2019 (CSA)		5.00		
RUR-15-2018-2019-2020 (CSA)		10.00		
RUR-16-2019 (CSA)		5.00		
RUR-17-2019 (CSA)		2.50		
RUR-18-2019 (CSA)		3.00		
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: 15 Oct 2019				
CE-RUR-08-2018-2019-2020 (IA)			16.00	23 Jan 2020
RUR-05-2020 (CSA)			9.00	
RUR-06-2020 (IA)			21.00	
RUR-07-2020 (IA)			12.00	
RUR-15-2018-2019-2020 (CSA)			10.00	
CE-RUR-08-2018-2019-2020 (RIA)			6.00	23 Jan 2020 (First Stage)
LC-RUR-11-2019-2020 (RIA)			10.00	08 Sep 2020 (Second Stage)
RUR-21-2020 (RIA)			4.00	
Overall indicative budget	107.29	84.50	88.00	

²⁴² of which EUR 5.00 million from the 'Europe in a changing world – Inclusive, innovative and reflective societies' WP part.

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-20-2018	The large-scale pilot shall include a minimum of six relevant national administrations (or legal entities designated to act on their behalf) in at least six different EU Member States.
RUR-13-2018, RUR-16-2019	In order to achieve the objectives of the call the project should have a minimum duration of four years.
RUR-17-2019	In order to achieve the objectives of the call, the duration of the project shall not exceed two years.

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:

CE-RUR-08-2018-2019-2020	Grants will be awarded to proposals according to the ranking list. However, in order to ensure a balanced portfolio of supported actions, at least the highest-ranked proposal per sub-topic will be funded provided that it attains all thresholds.
--------------------------	--

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

Grant Conditions:

Horizon 2020 - Work Programme 2018-2020
Food security, sustainable agriculture and forestry, marine, maritime and inland water research and the bioeconomy

DT-RUR-12-2018, RUR-20-2018	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.
--------------------------------	---

Consortium agreement:

CE-RUR-08-2018-2019-2020, CE-RUR-10-2019, DT-RUR-12-2018, LC-RUR-11-2019-2020, RUR-01-2018-2019, RUR-02-2018, RUR-03-2018, RUR-04-2018-2019, RUR-05-2020, RUR-06-2020, RUR-07-2020, RUR-09-2018, RUR-13-2018, RUR-15-2018-2019-2020, RUR-16-2019, RUR-17-2019, RUR-18-2019, RUR-20-2018, RUR-21-2020	Members of consortium are required to conclude a consortium agreement, in principle prior to the signature of the grant agreement.
--	--

Call - Food and Natural Resources

H2020-FNR-2020

The Food and Natural Resources call bridges towards the next European Framework Programme for Research and Innovation. As the challenges related to food and natural resources are complex, interlinked and global in nature, activities will follow a systemic approach. The call fosters participatory approaches to research and innovation, including the multi-actor approach and develop knowledge and innovation systems at local, regional, national and European levels. Social innovation with citizens' engagement and trust in innovation will be crucial to encourage new governance, production and consumption patterns.

The FNR call aims to

- sustainably manage and use natural resources from land and sea;
- ensure food and nutrition security, providing safe, healthy and nutritious diets;
- accelerate the transition from a fossil-based linear economy to a low emission, low-carbon circular economy and sustainable bio-based economy

Activities supported under the FNR call complement topics under the Sustainable Food Security, Blue Growth and Rural Renaissance calls and contribute towards implementation of the updated EU Bioeconomy strategy and its action plan. They will also contribute 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".

The actions are expected to support Europe's endeavours to implement the Sustainable Development Goals (SDGs), in particular SDG 2 – Zero Hunger; SDG 6 – Clean Water and Sanitation; SDG 8 – Inclusive and sustainable economic growth; SDG 9 – Sustainable Industrialisation; SDG 11 – Sustainable Cities and Communities; SDG 12 - Responsible Consumption and Production; SDG 13 – Climate Action; SDG 14 – Life Below Water; SDG 15 - Life on Land.

Proposals are invited against the following topic(s):

FNR-01-2020: Strengthening the European agro-ecological research and innovation ecosystem

Specific Challenge: To meet increasing societal requirements as well as food insecurity challenges, agriculture must address the environmental and climate change issues relating to primary production. By using ecosystem services, agroecology – defined as the study of ecological processes applied to agricultural production systems – can strengthen the sustainability and resilience of farming and land use systems, including through agricultural

practices that contribute to climate change mitigation. Agro-ecological production practices are site-specific, complex and long to setup. They must be implemented on a significant proportion of farms to have a tangible impact on the environment. In addition to the spatial and temporal scales, the human and social factors also need to be taken into consideration to develop a coherent and integrated approach. Speeding-up the agro-ecological transition requires a strengthening of research infrastructures and open innovation initiatives, such as living labs, with the potential to trigger large-scale change. There is a need for mechanisms that can help sustain research infrastructures and approaches that deliver site-specific knowledge and solutions in the long term and at the relevant landscape level. Individual European research projects can contribute to launching facilities or networks but can neither sustain them in the long-run nor integrate them in bottom-up grassroots initiatives in specific territories. A successful transition to agro-ecology, as a climate friendly production system, requires the development of an ambitious and longer-term joint action at European level involving European, national and regional funders.

Scope: Proposals shall develop the framework for a European network of agro-ecological living labs (LL) and research infrastructures (RI). Such a framework should make it possible to grasp long-term agro-ecological processes at landscape level and would accelerate the transition to sustainable farming practices by promoting place-based innovation in a co-creative environment. Proposals shall map existing European RI, LL and similar research or open innovation activities that contribute to knowledge creation and further deployment in practice of agro-ecological production processes. They should build on the work of past and ongoing RI and LL initiatives, in and outside of the agricultural domain, and analyse how to develop relevant approaches for agro-ecological production systems. Proposals should take into account the results of national and regional projects, networks or LL launched under Horizon 2020 and previous European research and innovation framework programmes and RI related to agro-ecosystems. They should describe in detail the functioning of these initiatives and their existing capacities. They should analyse the potential to create new initiatives as well as the various methods and approaches followed, and identify potential synergies and trade-offs between RI and LL in order to propose a common set of activities to connect them. Proposals should also analyse how various stakeholders (such as farmers, up- and downstream businesses, consumers and citizens) are engaged in these initiatives and make recommendations regarding their engagement in future initiatives. Knowledge and data management issues will be taken into consideration in particular to enable comparison and exchanges at European level.

Proposals should analyse how existing funding sources (including Horizon 2020, rural and regional development funds) are mobilised to support agro-ecological research and innovation initiatives approaches.

They should explore the interest of regional and national funders in supporting such activities in the long run and provide recommendations on the funding sources that could be combined and under which conditions (e.g. application requirements, monitoring and evaluation), looking for synergies and coherence. Proposals shall identify needs for training on LL/RI

methods. They should prepare a training package matching the needs of various actors and pilot training activities for potential actors to be involved in future activities.

Involvement of Member States' authorities is encouraged in order to ensure a strategic and long-term approach, along with a broad coverage of Europe. Transdisciplinary and integration of SSH and RRI are also encouraged. The Commission considers that proposals requesting a contribution from the EU up to EUR 2 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: This topic aims at mapping, analysing and providing recommendations to strengthen the European agro-ecological research and innovation ecosystem. In the short term, the project should:

- provide a structured framework for the development of an initiative that develops synergies in this area at European level;
- increase connections in the agro-ecological community and, if mature, prepare the community for the implementation of this initiative;
- prepare the funders and raise their capacity to mobilise complementary funding sources;
- improve the human and social capital as well as skills and methods for the development of living labs and research infrastructures in the field of agro-ecology;
- improve capacity to tailor policy interventions to specific situations based on stronger evidence.

In the medium/long term, the project should provide for research and innovation projects and initiatives to benefit from the work of the network in terms of engagement of the relevant actors as well as availability of long-term-series and landscape level data regarding agro-ecological processes.

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.

FNR-02-2020: Developing long-term monitoring and evaluation frameworks for the Common Agricultural Policy

Specific Challenge: The proposed Common Agricultural Policy (CAP) for the period post-2020 assigns a prominent role to the use of indicators for the preparation of the CAP plans and for the monitoring of the policy. While the decision-making process on the legislative proposals for the Multiannual Financial Framework and related preparatory work are ongoing, Research and Innovation Actions should pave the way for longer-term modernisation of monitoring and evaluation.

Scope: The project will support the long-term development of monitoring and evaluation frameworks for agricultural policy. Insofar as it is possible these frameworks will be based on context, results and impact indicators and reflect the need for modernisation, simplification and accuracy. The project will establish an inventory of indicators, proxies and data needs which would allow for a better targeting of agricultural policy, in social, environmental and economic terms. The consortium will rely on the input of the relevant scientific disciplines and administrations.

The project should explore how the identified data needs can be met. A strong scientific basis, combined with technical knowledge and support from the ICT and other relevant sectors should allow the exploration of advanced and innovative data capturing methods. These methods will: (a) rely on a combination of different sources, for example combining satellite data with on the ground sensors or data captured by drones; (b) where possible be automated and/or rely on platforms, sensors or other systems already in place, while anticipating future needs; (c) respect other economic or social needs such as a good cost-benefit ratio and respect for privacy.

The project will identify the most promising pathways for managing future data flows between the private sector, Member States and the EU (a) aiming at a mutualisation of resources and (b) allowing for a better use of the data and information beyond policy monitoring and evaluation. Needs at farm level should also be covered, for instance enhanced possibilities for e-declarations, one-stop data entries, integration of field and administrative data, or on-the-fly automatic information retrieval from clouds.

The project will take into account existing relevant initiatives and methods and consider what is developed by the following projects: Recap, BEACON, CAPSELLA, SENSAGRI, Sen4Cap, as well as the projects selected under RUR-03-2018: Contracts for effective and lasting delivery of agri-environmental goods, RUR-20-2018: Digital solutions and e-tools to modernise the CAP and DT-ICT-08-2019: Agricultural digital integration platforms.

The Commission considers that proposals requesting a contribution from the EU of up to EUR 2 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: Support the development monitoring and evaluation frameworks of the CAP but also of other EU and national policies (e.g. environmental policies):

- in order to achieve a better targeting of policy measures;
- establish an inventory of data needs and potential solutions to fill in these needs;
- develop a roadmap and explore a potential initiative with Member States on research and innovation in the domain
- further harmonise Member States monitoring and evaluation frameworks, including indicators, the underpinning data flows and measuring methods.

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.

FNR-03-2020: A comprehensive vision for urban agriculture

Specific Challenge: Urban agriculture²⁴³, in its many different forms, can provide responses to a wide array of challenges related to life in cities. In developed countries, these relate mainly to social and environmental concerns, climate change adaptation, sustainable urban development, food quality and sustainability, or to the search for new economic avenues and business models. In developing countries, urban agriculture has also proved to be a non-negligible source of food and income for the urban poor, and a valuable buffer in cases of food shortage. Consequently, interest in urban farming has significantly increased in the last years. Initiatives, projects, networks and studies have proliferated worldwide. However, these studies generally focus on just one or a few of its dimensions. There is a need to address urban agriculture from a holistic perspective, to develop a comprehensive vision about its future role and to see how European policies, including research and innovation, can support its development.

Scope: The proposals should build on knowledge and data created through recent studies and former projects and address the exchange of knowledge and experience in urban farming. In line with the principles of Responsible Research and Innovation, the proposals shall bring together actors (academia, municipal and regional authorities, urban farmers, businesses, citizen associations, etc.) representing various approaches to urban agriculture across a representative set of urban locations and countries (including least developed countries). Proposals should consider the variety of contexts and motivations that exist, and encompass all the dimensions of urban agriculture, such as:

- Role in urban development and landscapes, and potential synergies and conflicts with other land uses and economic activities, including notably urban sprawl;
- Environmental benefits (biodiversity, green infrastructure, climate, etc.);
- Social benefits, including income generation, development of social capital within cities, effects on gender balance, or improved urban-rural connections;
- New business models based on urban agriculture;
- Improvements on food security, accessibility, safety and quality as well as food literacy and diets.

²⁴³ In the context of this topic, 'urban agriculture' shall be understood as encompassing agricultural activities performed within the limits of urbanised areas, and agriculture occurring on the fringes of cities (or peri-urban agriculture). All modes of agricultural production, including food gardening, are considered.

The formulation of guidance and recommendations to stakeholders and policy makers, including on means to engage European citizens in urban agriculture, are included in the scope.

Cooperation with relevant projects in this domain under Horizon 2020²⁴⁴ (including notably the project funded under FNR-07-2020) or other programmes is essential. Where relevant, the consortium should establish links with actors and networks around the world that are active in this domain.

The Commission considers that proposals requesting a contribution from the EU of up to EUR 2 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 should contribute creating a community of stakeholders, fostering a structured dialogue and developing a holistic and balanced vision of urban agriculture. In the short term, this will help to:

- Develop and deploy urban agriculture initiatives by urban stakeholders adapted to a variety of contexts;
- Inform the development of policies supporting the development of urban agriculture and facilitate harmonisation and coordination between decision-making levels.
- Develop suitable R&I programmes to deliver the knowledge, technologies and practices needed to achieve the objectives set out in the vision.

In the longer term, this should contribute exploiting the full potential of urban agriculture to improve the quality of life, wealth, health, diets and food security and safety of urban dwellers.

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.

FNR-04-2020: Towards a European research and innovation roadmap on soils and land management

Specific Challenge: Land and soils perform a number of vital functions including the production of food and the provision of ecosystem services such as water purification, nutrient cycling, carbon storage and the support to biodiversity. Pressures on land and soils continue growing as a consequence of competing demands for the delivery of food, energy and biomaterials or the development of industries, infrastructures and urbanisation. Finally, soils are also at the center of climate mitigation efforts.

²⁴⁴ Such as SiEUGreen, proGInet or EdiCitNet.

A new level of ambition is needed to tackle Research and Innovation (R&I), thereby generating the necessary knowledge, solutions to enhance the delivery of soil functions and develop capacities for a more sustainable land management across Europe and beyond.

Scope: Activities will create an effective framework for action which will allow pooling resources, coordinating efforts and developing a coherent portfolio of R&I activities (programme) in the wider area of soils and land management. This will include

- mapping and assessing existing soil/land related European and international R&I activities and promoting their coordination
- analysing the needs for R&I on soils/land management as expressed through stakeholder/citizen consultation and on-going research projects
- identifying gaps, priority areas and types of action for intervention
- proposing methodologies to monitor and review a portfolio of soil related R&I activities

The details of coordination activities will be defined during the grant preparation phase with the Commission.

Proposals fall under the concept of the "multi-actor approach"²⁴⁵, thus bring together main players such as from research, research funding, policy and land management and land. Transdisciplinary and integration of SSH and RRI are also encouraged. Activities will be implemented in close cooperation with EU Commission services. The Commission considers that proposals requesting a contribution from the EU up to EUR 1 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 increase European capacities (technical, organisational) for implementing a major R&I programme on soil/land management. This will result in

- a roadmap for R&I on soils/land management developed following the concept of "co-creation" with a wide range of stakeholders
- improved coordination with existing activities in Europe and globally, thereby raising visibility and effectiveness of R&I funding
- identification of potential "flagships" for testing and demonstrating solutions on key strategic domains such as boosting organic carbon content of soils in agriculture and forestry

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.

²⁴⁵ See definition of the 'multi-actor approach' in the introduction to this Work Programme part.

FNR-05-2020: Husbandry for quality and sustainability

Specific Challenge: Animal products constitute an important source of good quality, digestible proteins, minerals and vitamins in human consumption patterns and are part of a healthy and balanced diet. Due to the increasing demand at global level for animal derived food and the mounting pressure over land use, further intensification and expansion of animal production is expected. Development of the livestock sector at EU and global levels is challenging as it contributes significantly to greenhouse gas emissions, can put pressure on the environment and natural resources, may increase the risks to the health and welfare of animals within the systems and to human health. At the same time, livestock farming systems generate valuable products for human consumption including some from resources that cannot otherwise be converted into food (e.g. grass-based systems). They support the development of rural communities, but livestock farmers often thrive to reach economic sustainability. Extensive livestock systems can contribute to the management and maintenance of ecosystems and may increase biodiversity. Climate change is an additional pressure to the sustainability (e.g. productivity, health) of livestock systems. Means to improve sustainability of terrestrial livestock production and consumption systems need to be sought. Farming systems and the agri-food chain need to be (re)designed in a holistic manner to best reconcile the various demands concerning productivity, sustainability, quality and other societal values, for now and the future.

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

A. (2020) Husbandry for sustainability (RIA)

Proposals should undertake a comprehensive assessment of the sustainability and potential delivery of ecosystem services, social services, resilience, competitiveness and possible trade-offs of diverse EU livestock production systems²⁴⁶, covering all the EU's major types of production systems and most important species.

The assessment should be holistic, encompassing the main facets of the concerned systems, and their role in a circular economy. These facets will notably include: environmental impacts (incl. impact of feed production, climate change, (indirect) land use); economics and supply chain dynamics (incl. international trade, demand, market power and farm income); territorial dynamics (incl. socio-geographic and demographic changes of the concerned farming community, areas with little alternatives to livestock production); animal welfare; as well as food and nutrition security (extended to the place of animal products in the society and diets in the future).

Activities will build on existing Life Cycle Assessment data and perform new measurements where necessary. Work on emission factors should be included and the development of new comprehensive models should be supported.

The assessment should form the basis for a coordination of further action in response to the major challenges of the respective production and consumption systems, in the domains of

²⁴⁶ Livestock production systems for human food.

research, innovation, policy-making and business development. A wide range of alternative development scenarios will be used to identify the most appropriate coping strategies and future development scenarios within planetary and nutritional boundaries and may propose policy options. The analyses will include (indirect) effects on related production systems.

Proposals should fall under the concept of 'multi-actor approach'²⁴⁷, representing a broad and diverse range of public and private interests and actors. This will provide insights on how sustainable livestock management can be translated into practice and propose holistic solutions and policies to tackle the multiple societal requirements related to livestock production.

B. (2020) Husbandry for quality (RIA)

Proposals should undertake an assessment of the intrinsic quality of livestock products stemming from different production systems. They should study the relation between intrinsic quality and husbandry (e.g. breeding, feeding, management), taking into account the processing methods and means to ensure authenticity along the food chain. Where considered appropriate, proposals will dedicate resources to the assessment of claims on the relation between intrinsic quality of products and extrinsic factors (e.g. sustainable production systems, traditional production systems). Proposals may work on one or more species but shall, within the same species, assess at least differences between extensive and intensive production systems. Proposals should fall under the concept of 'multi-actor approach', representing in particular farmers, the food industry and consumers.

The intrinsic qualities covered will at least encompass: (i) food safety (ii) nutritional value, (iii) organoleptic quality and sensorial features of animal products.

The Commission considers that proposals requesting a contribution from the EU of up to EUR 9 million for scope A and EUR 6 million for Scope 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: Proposals should contribute in achieving the following impacts:

- Incorporation of societal demands in livestock production
- Increasing the added value of livestock products, via higher quality and/or more sustainable production processes
- (Scope A) Development of pathways for action in research, innovation, policy and business development, in support of a sustainable development of the EU livestock sector
- (Scope B) Understanding of the relation between intrinsic quality and husbandry

Type of Action: Research and Innovation action

²⁴⁷ See definition of the 'multi-actor approach' in the introduction to this Work Programme part.

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

LC-FNR-06-2020: Defossilising agriculture – solutions and pathways for fossil-energy-free farming

Specific Challenge: The bioeconomy is expected to contribute to the replacement of fossil-based products, materials and energy, thereby helping decarbonize the economy. However European agriculture, the starting point of numerous bioeconomy value chains, still relies heavily on direct fossil energy inputs in farm operations and buildings, but also on indirect fossil energy embedded in agricultural inputs, materials and the related transport. Such products therefore embed greenhouse gas emissions, and need to be addressed through technology and policy. Energy consumption by agriculture made up 2.8% of final energy consumption in the EU-28 in 2014, of which 53% was fossil-based. The potential for the use of renewable energy produced by the agricultural sector to be consumed at the level of farms or group of farms is still mostly untapped. The challenge is to reduce the technical complexity and develop cost-effective solutions for fossil-energy-free farming, and to design the pathways for a de-fossilised agriculture as a keystone of new agricultural agendas and energy systems.

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

A. [2020] Pathways for a fossil-energy-free agriculture (CSA)

This coordination and support action (CSA) shall provide a framework in which policy makers, scientists and other stakeholders can join forces to conceive and implement ambitious approaches and strategies towards a fossil-energy-free agriculture. The action shall setup a knowledge and policy hub to take stock of past and on-going research, to inventory and benchmark policies and technologies at the interface of agriculture and energy, and to identify good practices.

The outcomes should be translated into attractive and easily understandable materials for policymakers, farmers and rural communities. Such materials should include roadmaps for particularly energy-intensive farming systems (e.g. greenhouses), practices (e.g. ploughing or irrigation) or inputs (e.g. fertilisers or plastics). In this exercise, proposals should consider both direct and indirect fossil energy uses, as well as the possibility of integration with the upper scales of the energy systems (groups of farms / rural communities / rural-urban). The sustainability of proposed approaches shall be assessed from the economic, social and environmental perspectives, including land use considerations.

The consortium shall develop a vision on the de-fossilisation of agriculture, identify enablers, bottlenecks and lock-ins in this transition, and provide a set of policy recommendations and a research roadmap. Interlinkages and synergies with the forestry sector should be considered where common approaches are possible.

B. [2020] Close-to-market solutions for fossil-energy-free farming (IA)

Horizon 2020 - Work Programme 2018-2020
Food security, sustainable agriculture and forestry, marine, maritime and inland water research and the bioeconomy

Proposals shall test cost-effective technical solutions for reducing the dependence on fossil energy sources in agriculture, and demonstrate whether renewable energy produced on-farm can be a reliable source to cover the needs of agricultural operations. Proposals shall tackle both renewable energy production on farm(s) and the adaptation of machinery and buildings to these new energy sources, and consider fuel, heat and electricity production and storage as appropriate.

Proposals shall focus on a specific on-farm practice, provided that it is common in Europe and highly dependent on fossil energy consumption. The sustainability of the solutions developed shall be assessed from social, economic and environmental perspectives. Such assessment should consider indirect fossil fuel consumptions and impacts on agricultural land use. At the end of the project, the TRL will range between 6 and 7 (see part G of the General Annexes). Proposers will indicate the estimated levels of TRL at the beginning and at the end of the project.

All sub-topics: The proposals funded under this topic (sub-topics A and B) should include a task to cluster with other projects financed under the same topic and potentially other running projects dealing with energy systems (e.g. LC-SC3-ES-3-2018-2020 Integrated local energy systems) and climate change mitigation. This cluster will in particular identify the lock-ins, barriers and path dependencies regarding the fossil-energy uses (including fiscal policies) in order to map out the transition pathways for a fossil-fuel-free agriculture in the CSA (scope A). Proposals should fall under the concept of the 'multi-actor approach'²⁴⁸, with a consortium based on a balanced mix of actors with complementary knowledge clearly activating farmers, technology providers, researchers and advisors.

The Commission considers that proposals requesting a contribution from the EU of EUR 2 million for scope A and 5 million for scope 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: Proposed activities will provide policy and technology solutions paving the way towards a fossil-energy-free agriculture. In the short term, this will help to:

- Develop appropriate, coherent policies and strategies at EU and national level.
- Reduce farm costs, increase competitiveness and improve farm resilience.
- Reduce greenhouse gas emissions related to agricultural activities.
- Raise awareness and help increase the outreach and impacts of European R&I outcomes and initiatives.

In the longer term, this should contribute to the EU commitments on climate change mitigation and the objectives of the EU Energy Union.

Type of Action: Coordination and support action, Innovation action

²⁴⁸ See definition of the 'multi-actor approach' in the introduction to this Work Programme part.

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

CE-FNR-07-2020: FOOD 2030 - Empowering cities as agents of food system transformation

Specific Challenge: Our current food systems are unsustainable and threatened by global pressures. Environmental challenges (e.g. climate change, loss of biodiversity, scarcity and degradation of natural resources), combined with increasing social inequalities amplified by poverty, hunger and malnutrition, and urbanisation, are putting serious pressure on cities and their peri-urban interfaces.

It is estimated that by 2050, not only will food demand increase, but also over 70% of people will be living in cities. Therefore, future proofing our food systems will require a rethinking of the role of cities as agents of positive change. Cities have the potential to become ecosystems of innovation facilitating experimentation and multi-stakeholder engagement, to establish long-term evidence-based strategies that will ultimately ensure safe, healthy, sustainable and nutritious food to their inhabitants and surrounding communities.

Local authorities have a key role to play in convening, connecting and supporting food system actors and citizens across their City Region Food System (CRFS)²⁴⁹ to build and deliver transformative solutions with real societal impact based on sound science, research and innovation. However, the degree of embedding of systemic thinking into urban food policies varies greatly among cities and many of the existing fragmented initiatives focus on the production and/or the consumption side only.

The specific challenge of this topic, therefore, is to support cities to overcome existing barriers to food system transformation and develop integrated, sustainable and safe urban food system policies/strategies in line with the FOOD 2030 policy priorities (i.e. Nutrition for sustainable and healthy diets; Climate-smart and environmentally sustainable food systems; Circularity and resource efficient food systems; and Innovation and empowerment of communities).

Scope: Proposals shall support cities and their peri-urban interface to develop and implement urban food systems policies delivering on the four FOOD 2030 priorities accompanied by the deployment of concrete actions. Innovation shall be fostered via the establishment of FOOD 2030 living labs as open innovation ecosystems.

The proposals shall draw key learnings from existing good practices in cities that have already engaged themselves in food policies and practices (e.g. the signatories of the MUFPP). Proposals shall include a wide diversity of cities (e.g. in terms of size and geography) that also ensure a good pan-European coverage. Furthermore, proposals shall include cities that have a 'good track record' in food systems transformation, as well as less experienced cities which aspire to put food systems transformation at the heart of their policy agenda.

²⁴⁹ In this context, CRFS refers to hybridity of the food system of any city, which could include urban, peri-urban and nearby rural farms in the complexity of urban-rural linkages.

In line with the principles of Responsible Research and Innovation (RRI), proposals shall support urban participatory policy processes that convene a wide variety of public and private stakeholders throughout the whole food system from farm to fork to gut and back. These shall include, for instance: food producers, processors, retailers, procurers, food service industry, nutritionists, universities, SMEs and local/regional business, educators, behavioural and social scientists, museums/science centres, professional associations, innovative ICT companies, banks, venture capitalists and other sources of investment, NGOs, media and citizens and taken into account gender aspects. The set-up of a living lab in each city is required²⁵⁰. In particular, proposals shall collaborate with local authorities with a view of creating political commitment and institutionalising the expected food policy for a long-term deployment.

Proposals shall also deploy a compelling communication and dissemination strategy to share best practices throughout a broader network in order to inspire, share learnings and mobilise other cities, regions and national governments. Finally, proposals shall dedicate resources to attract additional financial investments and opportunities to ensure the long-term sustainability of the planned actions. Proposals shall require a strong centralized professional coordination to ensure cities are assisted in implementing a harmonised approach, to allow comparability assessment and to develop an aligned overarching communication strategy.

Proposals shall also foresee the inclusion of a specific and budgeted work-package in view to cooperating closely with other projects funded under this topic and with the European Commission, in particular to align with the FOOD 2030 framing, for consistent communication and dissemination, monitoring and comparability of outcomes. Furthermore, proposals shall foresee cooperation with relevant projects in this domain under Horizon 2020 (e.g. with the projects funded under CE-SFS-24-2019) and other programmes.

The Commission considers that proposals requesting a contribution from the EU in the range of EUR 12 million would allow this specific challenge to address at least 10 cities. Nonetheless, this does not preclude submission and selection of proposals requesting other amounts and number of cities.

Expected Impact: In the framework of the objectives of FOOD 2030, as well as of the New Urban Agenda and the UN Sustainable Development Goals, in particular SDG 11 on “Sustainable Cities and Communities”, this topic is expected to support the development of sustainable, healthy and inclusive food systems policies in city-regions, where system thinking, institutional innovation and participatory planning are at the core.

In particular, the expected impact includes the following:

- the creation of new and sound evidence for policy makers in relation to urban food systems in support of policy development;

²⁵⁰ Living labs are referred to as open innovation ecosystems based on a systematic user co-creation approach integrating research and innovation processes in real life communities and settings.

- the building up of political commitment and capacity for multi-objective coordinated strategies, roadmaps and actions between different government departments, jurisdictions and stakeholders that aim at delivering co-benefits relevant to FOOD 2030 priorities;
- the creation of a wide network of pilot European cities of different sizes and geographical settings that will develop and implement food system policies and actions including living labs, act as demonstrators of good practice, and become ambassadors for the transferability of the food system model all over Europe and beyond;
- the reconnection of citizens with food fostering behavioural change towards healthy sustainable diets and nutrition, responsible production and consumption;
- increased food and nutrition security for urban and rural dwellers;
- improved social inclusion and equity of all actors of the food systems;
- the creation of innovation opportunities, jobs and growth relevant to city region livelihoods and economic development for all actors of the food systems.

Type of Action: Innovation action

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

FNR-08-2020: Supporting the food safety systems of the future

Specific Challenge: The EU evidence-based food safety framework is based on the General Food Law, which, among others, introduced the risk analysis principle to underpin food safety policy making and established the European Food Safety Authority. Recent consumer concerns on the transparency of the process of safety assessment of our foods as well as technological developments and innovations have shown that there is a need to reflect on the EU food safety system of the future. The challenge requires fostering coordination and integration among different food safety stakeholders in order to ensure that the science and infrastructures needed to support evidence-based policies of the future will be timely available.

Scope: Proposals shall aim at developing a research and innovation platform for collaboration and coordination across food safety stakeholders in Europe. Actions shall engage key stakeholders such as National Food Safety Authorities, relevant EU Agencies, Commission Services, policy makers, scientists and civil society with the objectives to: i) map the state of play in food safety research and innovation in the different Member States and Associated Countries; ii) strengthen research and innovation capacity to ensure that Europe continues to be the global leader on food safety standards; iii) exchange of knowledge and data across the scientific community and policy actors including relevant EU Agencies; iv) improve coherence and reduce the overlap between national and EU funding in Food safety research. v) develop innovative approaches to communicate both on food safety research and

innovation as well as on risk assessment procedures in the area of food safety in a manner that citizens are properly informed and engaged in taking into account gender aspects, thus contributing to boosting consumers' confidence on the evidence-base for food safety systems and vi) explore avenues for long-term science- policy-society interfaces.

In agreement with the Commission services, proposals 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 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 principles, requirements and procedures of the General Food Law, in the short/medium term proposals will:

- Deliver a platform for European cooperation at multi-partner level on food safety that builds on research and innovation (R&I) and policy coherence, exploits synergies and capabilities between countries and regions and enhances public confidence.
- Develop innovative models for collaborations and knowledge exchange across food safety actors and develop networks to promote coherence and harmonisation across the food safety stakeholders throughout the Member States.
- Identify integrated and reliable resources (e.g. data repositories, accredited laboratories, individual roadmaps, inventories) accessible for the food safety stakeholders.
- Deliver the basis for the development of joint trans-national research programmes and alignment of national research agendas.
- Develop a coherent Food Safety Strategic Research and Innovation Agenda (SRIA) which shall also address consumers' expectations, emerging technologies and policy priorities.
- Deliver models to inform civil society of the science-based risk assessment process providing clear guidance on dissemination models.
- Deliver logistic and technical support for permanent structure in the future ensuring that research and innovation will support food safety policies.

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-FNR-09-2020: Pilot action for the removal of marine plastics and litter

Specific Challenge: Marine litter is high on the scientific and political agendas and of major concern for European citizens. More than 80 percent of marine litter is plastic. It is estimated that by 2050, more plastic could be in the ocean than fish. It can be found on beaches (mostly produced locally), on the ocean surface, in animals and on the seafloor. Microplastics can get into the food chain, together with the integrated and adsorbed toxins. It is estimated that each year 5 to 13 million tonnes plastics reach the seas and oceans (worldwide), becoming eventually the main source of microplastics. In addition to possible health risks, the damage to marine ecosystems and the blue economy (tourism and other maritime sectors) due to plastic litter are enormous.

Therefore, urgent action is needed both for the prevention and for the removal of existing marine litter, notably plastics and microplastics. For this topic, a demonstration of the removal of marine litter and research is being proposed, highlighting how the environment is impacted by the removal, and the corresponding impacts in terms of ecosystem and economic recovery.

Scope: The overall goal of this topic is the demonstration of approaches or technologies to improve marine spatial planning and conservation (or even restoration) of coastal ecosystems. More specifically, this topic is for the demonstration of technologies to clean the seafloor and the surface of nearshore waters, and possibly the water column, from historically accumulated plastics and micro-plastics as well as from other accumulated marine litter and the assessment of effectiveness and impact. Accompanying research will have to address impacts on coastal ecosystems' food chains, biodiversity and functioning, fisheries, aquaculture, Marine Protected Areas, wild life and local economies (all of these) 6, 12, 18 and 24 months after the (start of the) cleaning. At the end of the project, the consortium is expected to identify a way forward and lay the foundations for upscaling with a view to a future potentially automated removal of historically accumulated marine litter (legacy), in particular at hot-spots of accumulated marine litter.

The inclusion of actions to reduce other pollutants and effects of stressors is an advantage.

Projects shall demonstrate the effectiveness of an (or several) automatic or remotely controlled wireless device(s) capable of collecting plastics and other marine litter of reasonable size (larger micro-litter and macro-litter up to a meter or so). The proposed solution must be able to work at the sea surface and on the seafloor/beach. The demonstration has to be for longer periods of time (several months on one site; several sites at the same time are acceptable). The marine litter must be sorted and reused (project must include demonstration of feeding of litter into reuse/recycling chains) in line with the circular economy and the plastics strategy²⁵¹.

The environmental impact, notably on biota, has to be minimized and assessed.

The project must include demonstrations in different sites, including beaches, harbours and shallow seafloor.

²⁵¹ http://ec.europa.eu/environment/circular-economy/index_en.htm

This topic is in support of the European Strategy for Plastics in a Circular Economy. Selected projects under this topic as well as projects selected under other topics in H2020 supporting the Plastics Strategy are strongly encouraged to participate in joint activities as appropriate. These joint activities could take the form of clustering of projects, participation in workshops, common exploitation and dissemination etc. The projects should describe how they will be complementary with already existing relevant national activities or other multilateral activities funded by the EU or funded jointly by several Member States. The proposals are expected to demonstrate support to common coordination and dissemination activities. Therefore, the proposals should foresee a dedicated work package for this purpose and earmark appropriate resources. Further details of these coordination activities will be defined during the grant preparation phase with the Commission.

The Commission considers that proposals requesting a contribution from the EU in the range of EUR 6 million would allow this challenge to be addressed appropriately. 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 EU Bioeconomy Strategy, the Circular Economy Strategy, the European Strategy for Plastics in a Circular Economy, the European Integrated Maritime Policy, the Marine Strategy Framework Directive and the UN Sustainable Development Goals, activities will:

In the short-term:

- Support the implementation of the UN Nations Decade of Ocean Science for Sustainable Development, and the needs of the Marine Strategy Framework Directive.
- Achieve at least TRL 6.
- Achieve a removal of 90% of macro-plastic litter and a substantial fraction of micro-litter in the demonstration areas reducing the clean-up cost to the local blue economy.
- Increase availability of efficient and environmentally sustainable technologies to remove existing marine litter.
- Contribute to awareness rising of citizens about the importance of prevention to avoid environmental damage and high costs (for the community and the tax payer instead of the polluter).
- Contribute to the sustainable management and protection of marine and coastal ecosystems to avoid significant adverse impacts (UN SDG 14).

In the medium-term:

- Obtain no more damage from marine litter to the local blue-economy and marine ecosystems services.
- Achieve 80% reduction of micro-plastics in shellfish in treated areas (or other locally important small marine animals).

Horizon 2020 - Work Programme 2018-2020
Food security, sustainable agriculture and forestry, marine, maritime and inland water research and the bioeconomy

- 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).
- Ensure that collected marine plastics are reused or reconverted in a way that is in line with the European Strategy for Plastics in a Circular Economy.
- 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.
- Increase data sharing and increase integration of data.
- Contribute to determining the distribution and fate of marine litter and microplastics.

In the long-term:

- Achieve 80% reduction of micro-plastics and plastics in non-migratory birds species in the areas where cleaning technologies are being used.
- Achieve substantial reduction of micro-plastics originating from macro-plastics locally.

Type of Action: Innovation action

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

FNR-10-2020: Public engagement for the Bioeconomy

Specific Challenge: The bioeconomy includes sectors and systems that use, produce, process or are driven by biological resources. The successful transition towards the bioeconomy requires a profound transformation on both the supply and the demand sides of the economy and involve different multipliers (consumers, retailers, etc.). It is therefore important to raise public awareness and knowledge about the environmental and socio-economic impacts of activities on all bioeconomy areas among a wide range of stakeholders.

Scope: Proposals will build upon sectoral communication activities at national, regional and local level through awareness raising about the bioeconomy at large for European citizens. The actions shall promote the environmental and socio-economic benefits of bioeconomy areas through awareness-raising and education on sustainable production, consumption and lifestyles.

The Commission considers that proposals requesting a contribution from the EU in the range of EUR 1 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 the UN SDGs, this action will contribute to the implementation of the updated 2018 EU Bioeconomy Strategy²⁵². It will also contribute to the overall awareness by European citizens about the bioeconomy.

In particular, this action will help European citizens (including young people) to:

- Be aware of the bioeconomy and all its areas;
- Be knowledgeable on sustainability and environmental protection;
- Raise awareness on sustainable production, consumption and lifestyles;
- Make more informed choices in the future when buying and consuming products;
- Encourage the deployment of Bioeconomy Strategies at local level;
- Contribute to the European Bioeconomy Network.

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.

FNR-11-2020: Prospecting aquatic and terrestrial natural biological resources for biologically active compounds

Specific Challenge: Global biodiversity remains a largely untapped source of natural bioactive molecules and compounds. Such molecules offer unmatched chemical diversity and structural complexity, together with biological potency and selectivity. While some of the natural chemodiversity has been studied, resulting in open access and proprietary compound libraries, the potential for developing commercial products is far from exhausted. There is still significant potential for application in various industries, such as high-value agro-chemicals (e.g. natural plant protection products), food and feed ingredients (such as nutraceuticals), pharmaceutically active ingredients, cosmetics, flavourings etc. On conservative estimates, these compounds represent a global market of EUR 150 billion²⁵³ and global industrial revenues of EUR 19 billion²⁵⁴.

The main challenges tackled in the topic are, depending on the source:

- technological readiness for the sustainable exploitation of natural resources, linked with;

²⁵² Action 2.4. “Promote education, training and skills across the Bioeconomy”.

²⁵³ “The role of biomass and bioenergy in a future bioeconomy: policies and facts” (2015) *World Markets 2012* European Commission, Joint Research Centre (JRC).

²⁵⁴ Frost and Sullivan revenues by end-user industry (2010 world) Fraunhofer White Biotechnology, N8E3-39 (June 2011).

- scarcity of the source natural biological material (e.g. in case of protected / rare species);
- low concentrations of the target compounds, leading to the difficulties in obtaining sufficient amounts of the pure molecules.

The challenge is to match their sustainable sourcing and processing with efficient and cost-effective use. This calls for close cooperation between industrial and academic partners, with due consideration for health and environmental legislation, and informed public engagement.

Scope: Proposals should cover the entire development pipeline with a focus on:

- biodiscovery (prospecting natural biological resources from land and sea), i.e.:
 - o identifying suitable molecules;
 - o verifying their claimed benefits;
 - o optimising technological exploitation, including cultivation strategies for selected production systems and metabolic engineering to ensure high productivity and purity;
 - o assessing safety, and
 - o developing products (final formulation) and their commercialisation, in Europe.

Proposals should focus on small molecules²⁵⁵, with novel bioactivities, qualities and applications, in particular from unusual or underutilised sources, and on our understanding of their relevant chemical, genetic, physiological and environmental make-up. Special attention should be devoted to ensuring sustainable sourcing from the raw feedstock, to avoid overexploitation, taking into account recent technical advances in molecular biology (e.g. metabolomics, new gene mining and optimisation techniques, development of suitable host production platforms). Proposals could explore in vivo or in vitro approaches to study the interactions between various biological entities (e.g. through symbiotic or defence relationships) as a source of interesting bioactive properties. They should:

- prove the techno-economic feasibility and effectiveness of a chosen production route²⁵⁶;
- commit to assessing, as part of the project, the environmental and health impacts of the developed products or processes, using life-cycle assessment (LCA) methodologies based on available standards, certification, and accepted and validated approaches, and
- guarantee biodiversity preservation and comply with relevant international rules on access to biological resources, their sustainable use and the fair and equitable sharing of

²⁵⁵ Defined as chemical compounds or substances that are produced naturally by living organisms, such as bioactive secondary metabolites (e.g. alkaloids, terpenoids, flavonoids, glycosides, polyketides and peptides), and/or their derivatives. Large macromolecules such as proteins/enzymes are excluded.

²⁵⁶ Including, if appropriate, an outline of continuation of the end-product development beyond the project timeline and its resources.

benefits from their utilisation, with the national regulations in the source countries and with the Convention on Biological Diversity and its Nagoya Protocol.

In line with the EU's policy on responsible research and innovation, dissemination and public engagement via modern communication and dissemination tools will be an essential element of the projects that are funded. Projects should involve an analysis of the state of the art to avoid duplications and overlaps with past or ongoing research. Cooperation with other selected proposals under this topic is encouraged.

Proposals should address one of the following sub-topics:

A: Prospecting terrestrial natural biological resources for biologically active compounds

Actions must focus on land-based biological natural resources.

B: Prospecting aquatic natural biological resources for biologically active compounds

Actions must focus on marine and fresh-water biological natural resources.

The Commission considers that proposals requesting an EU contribution of around EUR 7.5 million would allow this specific challenge to be addressed appropriately. This does not preclude the submission and selection of proposals requesting other amounts.

Expected Impact: Activities will support the sustainable biodiscovery and use of natural biological resources from diverse environments and ecosystems, allowing better assessment of the selected bioactivity potential. This will increase capacity in the European biotechnology sector and other industries to respond to society's needs. Specifically, activities will contribute to:

Short/medium term:

- developing novel natural, sustainable and 'eco-friendly' products with significant bioactive properties, especially as relevant for the pharmaceutical, cosmetic, agrochemical or marine sectors and applications. These will deliver clear-cut benefits for consumers by being more effective and/or eco-friendly, cheaper, and more readily accessible than existing alternatives;
- developing sustainable exploitation, cultivation and processing methods based on promising species/organisms, and chosen production routes;
- increasing public-private cooperation in European biotechnology, while integrating its sectors e.g. 'green' (plant), 'blue' (marine), and 'white' (industrial); and;
- increasing public knowledge of biodiversity potential and, if relevant, ecosystem interactions, and their impact on bioactive response;

Long term:

- reducing the pressure on the harvesting of wild populations; and;

- ensuring the environmental and economic sustainability of the entire process, inter alia by reducing and extracting waste via the efficient use of biomass (cascade approach).

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.

FNR-12-2020: Industrial microbiomes – learning from nature

Specific Challenge: Microorganisms are used in the bio-based industry to produce a wide range of products. To date, most bulk and speciality bio-based products from biorefineries are based on microbial monocultures. Monocultures are optimised for simple processes, so their efficiency is limited in complex situations, e.g. in integrated biorefineries generating several added-value chemicals and ideally using a wide variety of feedstock. In nature, microorganisms do not live and function in isolation: they form complex communities associated with specific habitats (microbiomes). Compared with monocultures, microbial communities possess many appealing and powerful features such as stability, functional robustness and the ability to perform complex tasks. These have inspired rapidly growing interest in industrial microbiomes.

The challenge is to use industrial microbiome approaches to optimise existing industrial processes and/or to develop wholly new microbiome-based industrial processes.

Scope: Proposals should focus on concrete bio-based processes and/or products. They should embrace an understanding of natural consortia mechanisms and their transposition to industrial environments, and involve the engineering of synthetic microbial consortia inspired by the metabolic interaction found in nature. Proposals should employ the use of -omics tools to understand, monitor and exploit microbial communities in the industrial environment. Activities should focus on the optimisation of existing industrial processes or on the design and development of wholly new ones, in order to improve process and product quality and safety.

Activities should optimise the use of pre-existing databases and research infrastructures (including distributed and virtual ones) and the opportunities offered by big-data management tools, thus ensuring interoperability, standard methods and enhanced networking. Multidisciplinary and cross-sectoral experts should cooperate, share standards across borders and disciplines and integrate resources. The interdisciplinary, cross-sectorial approach should also apply to training activities to improve professional skills and competencies, and support job creation in the bio-based and bioeconomy sectors. Cooperation with other selected proposals under this topic is encouraged.

The Commission considers that proposals requesting an EU contribution of around EUR 6 million would allow this specific challenge to be addressed appropriately. This does not preclude the submission and selection of proposals requesting other amounts.

Expected Impact: In the framework of the renewed 2018 EU Bioeconomy Strategy, proposals are expected to:

- raise awareness of microbiomes' potential to transform and future-proof the bio-based economy;
- improve overall knowledge of the industrial microbiome with a view to responding to market needs;
- improve the bio-based sector's overall sustainability (including climate change mitigation) and innovation capacity by using microbiome applications and knowledge;
- strengthen the market position and increase the market share of bio-based solutions;
- deliver results in a form that allows for efficient feedback into policymaking in research, innovation and technology;
- demonstrate solutions and develop strategies for innovation based on the microbiome approach, building on enhanced cooperation between all stakeholders and exploiting the opportunities offered by big data; and
- raise awareness and create a better framework for systemic innovation and uptake of results through broad stakeholder engagement.

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-FNR-13-2020: Bio-based industries leading the way in turning carbon dioxide emissions into chemicals

Specific Challenge: The use of industrially emitted or atmospheric CO₂ as a raw material offers a number of opportunities for European industry. It is not only a key means of fighting climate change, but also supports the circular economy (by converting waste CO₂ into products) and opens new ways of coupling environmental protection and economic growth.

The industrial conversion of CO₂ faces technical challenges that call for scientific progress and research support. One of the main technological bottlenecks is the low energy content of CO₂, which results in highly energy-intensive conversion processes. While substantial R&D effort has been devoted to the use of CO₂ as a feedstock for fuels, research organisations and their industrial counterparts are now turning the attention to the pathway to (longer-life) added-value chemicals. This is particularly the case in bio-based industries, for two main reasons:

- integrating CO₂ use technologies in industrial operations using biomass could make it offer the possible to achieve zero or negative greenhouse gas emissions; and

- biotechnological processes are a promising route for the use of CO₂.

Scope: Proposals should address one of the following mutually compatible concepts:

- innovative technologies for converting CO₂ from industrial plants processing biomass into bio-based products, as direct feedstock for the production of added-value chemicals and their integration into the plants' flowchart; and

- biotechnological processes for the conversion of CO₂ into added-value chemicals.

Proposals should include a life cycle assessment of the environmental performance of the concept. This should go beyond impacts in terms of climate change. Proposals should address business models, operations and logistics, considering also the possibility of industrial symbiosis if relevant. They should also explore the socio economic and regulatory measures required to support the use of CO₂ as a raw material for the production of chemicals. In order to avoid duplication of previously EU-funded projects, the development of algae-based concepts is excluded. The technology readiness levels (TRLs) covered by the projects should range from 3 to 5. Cooperation with other selected proposals under this topic is encouraged.

The Commission considers that proposals requesting an EU contribution of around EUR 7 million would allow this specific challenge to be addressed appropriately. This does not preclude the submission and selection of proposals requesting other amounts.

Expected Impact:

Short/medium term

- development of breakthrough technologies for the conversion of CO₂ into high added-value chemicals;
- design of an integrated process with zero or negative greenhouse gas emissions;
- new business models and value chains in the CO₂ utilisation sector;
- definition of targets of the conversion process including energy requirements, production costs and product yields; and

long term

- diversification of the economic base of bio-based industries.

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-FNR-14-2020: Innovative textiles – reinventing fashion

Specific Challenge: The main market driver in the textile sector is the fast-growing demand for products and the need to respond to it without a negative environmental impact. The

proportion of bio-based textile fibres has been falling steadily for decades, mainly because of the environmental limits of cotton production and the progress made (e.g. in terms of reduced costs) in the field of synthetic fibres. However, over a third of textile fibres are still bio-based.

A shift in the market from petrochemical to bio-based fibres will require new processing technologies and huge market uptake of sustainable bio-based materials other than cotton, wool and silk. Of all natural fibres, cellulose has seen the fastest increase in all textile substrates in recent years. Other all-natural fibres²⁵⁷ are under development or have been introduced in niche markets. In addition, small proportion of new bio-based polymer fibres²⁵⁸ can already be found in specific applications.

The challenge is to develop processing technologies and create an innovative and sustainable bio-based textile economy based on circular economy principles, thus making efficient use of resources, radically improving recycling, phasing out plastic microfibre release²⁵⁹ and accelerating the development and adoption of sustainable circular business models.

Scope: Activities should address:

- the development of innovative, techno-economically feasible materials and processes for the production of resource-efficient, sustainable and functionally performing bio-based textiles;
- the technical, environmental and economic aspects of bio-based textile recycling, focusing on quality, i.e. targeting up-cycling, or at least, recycling into the same or similar quality applications; and;
- the use of new bio-based materials and the design of textiles that are either biodegradable or do not shed microfibers and have the properties needed for performance applications.

Work on the sustainability and safety of end products should embrace the use of resources as a whole and incorporate the established standards for products with a small environmental footprint, from life-cycle assessment to eco-labelling. In addition, activities should investigate the elements needed for the development of innovative circular business models for bio-based textiles.

In line with responsible research and innovation principles, activities should support the development of international fora and platforms that facilitate systemic innovation and uptake by enabling actors in the value chains, from industry to civil society and public authorities, to cooperate to improve circularity in the bio-based textiles economy. The interdisciplinary,

²⁵⁷ e.g. alginate fibres, chitin and chitosan fibres, soybean protein fibres, non-food milk casein fibres, spider silk, sisal, hemp and kenaf.

²⁵⁸ e.g. PLA, PDO or castor oil-based polyamides.

²⁵⁹ When washed, some synthetic garments release plastic microfibres, of which around half a million tonnes every year contribute to ocean pollution – 16 times more than plastic microbeads from cosmetics.

cross-sectoral approach should also apply to training activities to improve professional skills and competencies, and to support the job creation in the bioeconomy.

Proposal should deliver solutions with work starting at technology readiness level (TRL) 5 and reaching TRL 6 or higher, where technological innovation is involved.

Cooperation with other selected proposals under this topic is encouraged.

The Commission considers that proposals requesting an EU contribution of around EUR 7 million would allow this challenge to be addressed appropriately. This does not preclude the submission and selection of proposals requesting other amounts.

Expected Impact:

- foster innovations that enable bio-based textile value chains to become more resource efficient, circular, and reduce their carbon, greenhouse gas and water footprint, in line with climate, energy and sustainable development goals (e.g. UN SDG 14);
- prevent and significantly reduce plastic microfibre pollution;
- improve the efficiency and technological performance of bio-based textile recycling;
- strengthen the market position and increase the market share of bio-based textiles;
- deliver results in a form that allows for efficient feedback into policymaking in research, innovation and technology, in particular in the EU circular economy;
- demonstrate solutions and develop strategies for the circular innovation of the whole innovative bio-based textile system, building on a shared vision and enhancing cooperation between all stakeholders; and;
- raise awareness and create a better framework for systemic innovation and uptake of results through broad stakeholder engagement.

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-FNR-15-2020: A network of European bioeconomy clusters to advance bio-based solutions in the primary production sector

Specific Challenge: Inclusive and sustainable bio-based business models (e.g. cooperatives, producer associations and higher-level structures such as clusters) offer a major opportunity for communities to combine the local creation of value, societal engagement and environmental protection.

This may lead to:

- reduction of the negative environmental impacts of unsustainable production and consumption patterns;
- greater circularity of local resources;
- better use of eco-system services and goods originating in primary sectors (e.g. high biodiversity and measures to meet climate targets).

However, the adoption of such models is often hampered by factors at the level of stakeholders such as insufficient awareness, cooperation and innovation exploitation. The challenge entails developing strategies that deliver the above-mentioned principles, while mobilising stakeholders to adopt sustainable and inclusive business models, based on technologies and under-valorised or under-utilised resources, suitable for use on a small scale and easy to replicate and adapt to local conditions.

Scope: The action will stimulate adoption of the business models by the relevant stakeholders (especially primary producers), with a clear emphasis on agriculture and forestry. It will achieve a sound geographical balance²⁶⁰, and may cover all primary biomass sectors. Proposals should establish a pilot network of national/regional ‘bioeconomy clusters’ gathering relevant actors in the bioeconomy (e.g. EU, national/regional policy and funding bodies, industry, academia, farmer associations and cooperatives, industry, researchers, civil society and NGOs)²⁶¹. These clusters should develop appropriate strategies for the deployment of bio-based solutions involving the primary production sector, tailored to regional conditions and assets, and exploiting synergies between policy instruments, such as the common agricultural policy, regional funds and relevant national programmes.

At a minimum, the action should help address:

- lack of awareness and practical knowledge among stakeholders (especially primary biomass producers) as to the potential of sustainable business models in the bio-based sector to create economic, environmental and societal value through the production and/or use of hitherto unexploited bio-based resources;
- low degree of cooperation and networking at all levels; and;
- inadequate transfer of technology and exploitation of innovation, which too often impede uptake of these business models.

To avoid overlaps, this action will build on the state of the art including past and ongoing EU-funded projects²⁶².

²⁶⁰ In terms of covering diverse agricultural areas in Europe.

²⁶¹ Proposers should be aware of the self-assessment tool for EU regions to assess their investment readiness, see <https://ec.europa.eu/growth/tools-databases/escss> & <http://ecrn.net/six-model-regions-show-the-way-to-a-sustainable-eu-chemical-industry/>.

²⁶² e.g. topics RUR-09-2018 (“Realising the potential of regional and local bioeconomies”), and RUR-10-2019 (“Circular bio-based business models for rural communities”).

The Commission considers that proposals requesting an EU contribution of around EUR 2 million would allow this challenge to be addressed appropriately. This does not preclude the submission and selection of proposals requesting other amounts.

Expected Impact: The action will implement the 2018 EU bioeconomy strategy²⁶³.

More specifically, it will:

Short/medium term:

- contribute to the establishment of fully integrated and diversified business models and value chains in ‘bio-based sectors’ by mobilising a wider and more inclusive set of primary biomass actors;
- develop and disseminate practical recommendations based on concrete success stories from agriculturally diverse areas of Europe;
- raise awareness among the stakeholders in the bio-based sector (including primary producers) of sustainable, inclusive and circular bioeconomy objectives including the underpinning EU policy objectives on climate targets and biodiversity protection, of opportunities linked to the sector;

Long term:

- contribute to the creation of skilled jobs in rural economies, and increase and diversify income for primary biomass producers, thus raising awareness among policymakers and in society at large of the opportunities in the bio-based sector;
- stimulate local value creation, circularity and environmental and socio-economic sustainability for easy replication in rural areas; and
- establish a dynamic enabling framework for the deployment of bioeconomies, combining the sectoral and territorial dimensions.

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.

FNR-16-2020: Enzymes for more environment-friendly consumer products

Specific Challenge: It has been demonstrated that the unique selectivity and catalytic activity of enzymes gives them significant potential to support sustainability, reduce environmental pollution, lower processing costs and enhance product performance and functionalities. Growing environmental concerns have contributed to the rapid growth in the market for enzymes and their use in various industrial and speciality applications. Enzymes find

²⁶³ Action 3.1.1. (“Mobilise public and private stakeholders, in research, demonstration and deployment of sustainable, inclusive and circular bio-based solutions”).

application in the processing phase and in the formulation of consumer products such as washing agents, textiles, personal care, cosmetics or nutraceuticals.

The specific challenge is to expand the use of enzymes to respond to the steadily growing demand for greener consumer products, combining economic competitiveness and greater sustainability.

Scope: Proposals should address the development of novel or improved enzyme(s) for the processing and/or the formulation of one or more of the following consumer products: washing agents, textiles, personal care products, cosmetics and nutraceuticals. The approach could involve bioprospecting or the exploitation of existing databases. Activities should include assessment of the environmental impact of the developed approach. They should aim at a strong improvement of environmental performance, against the state of the art, linked to enzyme functionality. In line with the principles of Responsible Research and Innovation, close research collaboration with all relevant stakeholders is needed to ensure future industrial implementation and market uptake.

Proposals should:

- involve the development of an efficient production system of the enzyme(s) in question, together with downstream processes and methods for enzyme formulation and inclusion in the consumer product(s);
- (where they concern the development of enzyme-containing consumer products) cover the management of safety aspects, including appropriate risk assessment;
- combine the development of the targeted enzyme(s) with the development of generic platform technologies with a view to faster transition from lab to market. This should be based on an interdisciplinary approach and could involve: novel technologies and methods such as the screening, design, creation or optimisation of novel high-performance enzymes as well as computational methods and tools for effective big-data analysis.

Cooperation with other selected proposals under this topic is encouraged.

The Commission considers that proposals requesting an EU contribution of around EUR 6 million would allow this specific challenge to be addressed appropriately. This does not preclude the submission and selection of proposals requesting other amounts.

Expected Impact:

short/medium term

- broaden the range of enzymes used in the production or formulation of consumer products;
- reduce the environmental impact of those consumer products;

Horizon 2020 - Work Programme 2018-2020
Food security, sustainable agriculture and forestry, marine, maritime and inland water research and the bioeconomy

- improve the overall sustainability and innovation capacity of the bio-based sector through the use of innovative enzymes;
- develop strategies to speed up the transition from lab to market for the development of enzyme-based innovation, on the basis of closer and interdisciplinary cooperation;
- deliver results in a form that allows for efficient feedback into policymaking in research, innovation and technology, in particular in the 2018 EU bioeconomy strategy;
- raise awareness and create a better framework for systemic innovation and uptake through broad stakeholder engagement; and

medium/long term

- enhance the competitiveness and sustainability of European industry, including the biotechnology and consumer products sectors.

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-FNR-17-2020: Pilot circular bio-based cities – sustainable production of bio-based products from urban biowaste and wastewater

Specific Challenge: The 2018 EU Bioeconomy Strategy sees cities becoming major circular bioeconomy hubs. Urban biowaste²⁶⁴ and wastewater are circular feedstocks that can be used to produce innovative bio-based products such as bio-based chemicals, plastics and fertilisers. Moreover, the new EU waste legislation may lead to more quality biowaste becoming available for use in biorefineries. Nevertheless, very few European cities have developed circular bio-based economy strategies and projects for the production of innovative bio-based products. The challenge is to foster investments and to implement projects to valorise urban biowaste and wastewater through the production of innovative bio-based products within the framework of targeted circular bio-based economy strategies in urban areas. The EU added value can be obtained where projects introduce innovation to the market regarding financing solutions minimising transaction costs as well as where they demonstrably remove legal, administrative and other market barriers for mainstreaming circular bio-based investment schemes in European cities.

Scope: Proposals shall provide Project Development Assistance (PDA) to a pilot group made up of at least 5 European cities (and/or clusters of cities) to build their technical, economic and legal expertise needed for leading to concrete investments in projects to valorise urban biowaste and wastewater through the production of safe and sustainable bio-based products, including the innovative ones. The valorisation of urban biowaste and wastewater solely in the form of compost, biogas and biofuels is not part of the focus of this topic. PDA shall

²⁶⁴ i.e. biodegradable garden and park waste, food and kitchen waste from households, offices, restaurants, wholesale, canteens, caterers and retail premises.

support each city of the pilot group to bridge the gap between their plan/strategy to valorise urban biowaste and wastewater and the concrete investments for the launch and implementation of the respective projects. PDA should include feasibility studies, stakeholder and community mobilisation, financial engineering, business plans, technical specifications, procurement procedures, etc. Proposals shall justify the budget for the PDA provided to each city (and/or cluster of cities) based on the expected amount of investments to be triggered and the respective leverage factor to be achieved²⁶⁵, where these expected investments and leverage factors shall also be justified. Projects and related investments shall be embedded in urban circular bio-based economy strategies embracing a wider sustainable and circular approach of the entire urban metabolism, where urban waste and wastewater are prevented, reduced and their recycling improved. Each city (and/or cluster of cities) shall include an agglomeration of a population equivalent generating a critical amount of urban biowaste and/or wastewater as feedstock for biorefining. The composition of the pilot group of cities (and/or clusters of cities) shall reflect a geographical spread within Europe and represent cities of different sizes and socio-economic structures to the largest extent possible. The involvement and proof of formal commitment of local and/or regional authorities at proposal stage is a precondition for the success of the project. An already existing practice of the separate collection of urban biowaste is an asset. The pilot circular bio-based economy cities should act as demonstrators with a view to transferring urban circular bio-based economy models all over throughout Europe and beyond. Proposals should support the creation of a European network to facilitate the exchange of good practices and lessons learned among circular bio-based cities. Cooperation with selected proposals under topic CE-SFS-25-2018 "Integrated systems innovation in valorising urban biowaste" is encouraged.

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

Expected Impact: This action will contribute to the implementation of the 2018 EU Bioeconomy Strategy (Action 2.2. Pilot actions to support local bioeconomy development (urban) via Commission instruments and programmes) and the 2018 EU Circular Economy Package. Proposals are expected to demonstrate the following impacts using quantified indicators and targets when possible:

- delivery sustainable circular bio-based economy investments and support the launch of the related projects embedded in urban circular bio-based economy strategies to valorise urban biowaste and wastewater through the production of bio-based products, including the innovative ones;
- creation of a European network to facilitate the exchange of good practices and lessons learned among circular bio-based cities;

²⁶⁵ i.e. amount of investments in the production of bio-based products from urban biowaste and wastewater triggered per each EUR of Horizon 2020 support.

- contribute to increased recycling of urban biowaste and wastewater, avoid landfilling and cut the respective associated greenhouse gas emissions; and
- contribute to the creation of jobs in local 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.

FNR-18-2020: Sustainability of bio-based products – international governance aspects and market update

Specific Challenge: The UN sustainable development goals are at the top of the international science, technology and innovation (STI) policy agenda. Among the key objectives of policies to improve sustainability is the development of renewable, innovative bioproducts beyond biofuels and traditional products²⁶⁶ that:

- have a small (low-carbon) environmental footprint;
- contribute to more circularity and resource efficiency; and
- support the shift from non-renewable fossil resources, while taking account of the international context²⁶⁷.

The challenge involves comprehensive analysis of:

- diverse sustainability-related aspects of bio-based industrial products²⁶⁸;
- local vs. global value chains, and their carbon and environmental footprint;
- global value chain traceability; and
- use of specific certification and labelling schemes.

Better understanding in this regard could lead to more sustainable value chains, greater trust and acceptance by consumers and end-users, and awareness among decision-makers. In the long term, better understanding of sustainability standards can lead to a closer alignment of growth and circularity and ultimately increase the market share of the resulting novel bio-based products.

²⁶⁶ See a related topic RUR-21-2020 (“Agricultural international trade in the context of the sustainability objectives”) in the Rural Renaissance call.

²⁶⁷ e.g. ongoing work in international organisations such as the OECD (Working Party on Bio-, Nano-, and Converging Technologies) and the FAO, European national and international efforts (e.g. Global Bioeconomy Summit, International Bioeconomy Forum) and other initiatives (e.g. Ellen McArthur Foundation CE100.CO. Project on renewable materials).

²⁶⁸ Taking account of the principle of cascade use, existing criteria for bioenergy product sustainability and existing approaches to indirect land-use change (ILUC) for bioenergy for the development of ILUC factors for bio-based products.

Scope: Building on the state of the art, including past and ongoing EU-funded projects, this action will bring together global sustainability experts in bio-based innovation (focus on bio-based products) to strengthen the common understanding of sustainability goals and green innovation, and to provide reliable and easy-to-use data for policymakers, consumers and end-users. Cooperation with key European and non-European bioeconomy leaders and international organisations, and the bio-based industry is strongly encouraged.

The action will:

- address the main issues concerning the sustainable bioeconomy and its practical implementation in global value-chains;
- promote the sharing of best practice as regards corporate responsibility; and
- deliver specific recommendations taking account of existing standards and the life cycle assessment (LCA) approach, enriched by specific challenges and the potential of renewable, innovative and safe bioproducts²⁶⁹

The Commission considers that proposals requesting an EU contribution of up to EUR 1.5 million would allow this specific challenge to be addressed appropriately. This does not preclude the submission and selection of proposals requesting other amounts.

Expected Impact: In the framework of the renewed 2018 European bioeconomy strategy²⁷⁰ related to voluntary guidance on bio-based innovations, proposals are expected to:

Short/medium term:

- contribute to the global discussion on efficient, implementable and fit-for-purpose sustainability schemes, criteria and indicators;
- feed into ongoing international efforts in this regard (e.g. OECD);
- support dialogue between regulators and the bio-based industry;

²⁶⁹ e.g. see recommendations developed by European Committee for Standardisation Technical Committee 411 (CEN/TC411) on bio-based products: (https://standards.cen.eu/dyn/www/f?p=204:32:0:::FSP_ORG_ID,FSP_LANG_ID:874780,25&cs=1D63BAA7EABE56EB230DDAA05D6F2CE70), and those published on the European Platform on Life Cycle Assessment (<http://ec.europa.eu/environment/ipp/lca.htm>): EN 16751:2016 (Bio-based products – Sustainability criteria), EN 16760:2015 (Bio-based products – Life cycle assessment), CEN/TR 16957:2016 (Bio-based products – Guidelines for Life Cycle Inventory (LCI) for the End-of-life phase); Commission Recommendation 2013/179/EU on the use of common methods to measure and communicate the life cycle environmental performance of products and organisations (<http://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32013H0179&from=EN>); International reference life cycle data system (ILCD) Handbook developed by the European Commission Joint Research Centre (http://eplca.jrc.ec.europa.eu/?page_id=86); Guide for interpreting life cycle assessment result (2016), developed by the European Commission Joint Research Centre, 2016 (<https://ec.europa.eu/jrc/en/publication/guide-interpreting-life-cycle-assessment-result>).

²⁷⁰ Action no. 3, point 3.1.3 “Study and analysis of enablers and bottlenecks and provide voluntary guidance to the deployment of bio-based innovations”.

Horizon 2020 - Work Programme 2018-2020
Food security, sustainable agriculture and forestry, marine, maritime and inland water research and the bioeconomy

- improve understanding of the international dimension of the guidance and identification of bottlenecks, enablers and gaps that influence synergies and the deployment of bio-based innovations;
- strengthen corporate responsibility and awareness as regards bio-based innovations, circularity and sustainability, building trust between stakeholders;
- widen the use of bio-based standards and certification schemes and increase the role of bio-based products in sustainability schemes, e.g. (eco)labelling; and

Long term:

- support the creation of a market pull for European and global bio-based products.

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 - Food and Natural Resources

Opening date(s), deadline(s), indicative budget(s):²⁷¹

Topics (Type of Action)	Budgets (EUR million)	Deadlines
	2020	
Opening: 15 Oct 2019		
CE-FNR-07-2020 (IA)	38.00	23 Jan 2020
CE-FNR-09-2020 (IA)	13.20	
CE-FNR-14-2020 (IA)	21.00	
CE-FNR-15-2020 (CSA)	2.00	
CE-FNR-17-2020 (IA)	8.00	
FNR-01-2020 (CSA)	2.00	
FNR-02-2020 (CSA)	2.00	
FNR-03-2020 (CSA)	2.00	
FNR-04-2020 (CSA)	1.00	

²⁷¹ 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.

Horizon 2020 - Work Programme 2018-2020
Food security, sustainable agriculture and forestry, marine, maritime and inland water research and the bioeconomy

FNR-08-2020 (CSA)	3.00	
FNR-10-2020 (CSA)	1.00	
FNR-18-2020 (CSA)	1.50	
LC-FNR-06-2020 (CSA)	12.00	
LC-FNR-06-2020 (IA)		
FNR-05-2020 (RIA)	21.00	23 Jan 2020 (First Stage) 08 Sep 2020 (Second Stage)
FNR-11-2020 (RIA)	30.00	
FNR-12-2020 (RIA)	12.00	
FNR-16-2020 (RIA)	18.00	
LC-FNR-13-2020 (RIA)	21.00	
Overall indicative budget	208.70	

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.

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:

Horizon 2020 - Work Programme 2018-2020
Food security, sustainable agriculture and forestry, marine, maritime and inland water research and the bioeconomy

FNR-05-2020, FNR-11-2020, LC-FNR-06-2020	Grants will be awarded to proposals according to the ranking list. However, in order to ensure a balanced portfolio of supported actions, at least the highest-ranked proposal per sub-topic will be funded provided that it attains all thresholds.
--	--

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

Consortium agreement:

CE-FNR-07-2020, CE-FNR-09-2020, CE-FNR-14-2020, CE-FNR-15-2020, CE-FNR-17-2020, FNR-01-2020, FNR-02-2020, FNR-03-2020, FNR-04-2020, FNR-05-2020, FNR-08-2020, FNR-10-2020, FNR-11-2020, FNR-12-2020, FNR-16-2020, FNR-18-2020, LC-FNR-06-2020, LC-FNR-13-2020	Members of consortium are required to conclude a consortium agreement, in principle prior to the signature of the grant agreement.
---	--

Other Actions²⁷²

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 study²⁷³ has identified funding gaps in two key areas of the bioeconomy – the bio-based industries and the blue economy²⁷⁴ –, 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 minimised²⁷⁵. 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 bioeconomy²⁷⁶ projects and focusses in priority, but not exclusively, on innovative circular bioeconomy projects.

²⁷² The budget amounts for the 2020 budget are subject to the availability of the appropriations provided for in the draft budget for 2020 after the adoption of the budget 2020 by the budgetary authority or, if the budget is not adopted, as provided for in the system of provisional twelfths.

²⁷³ InnovFin Advisory "Study on Access-to-Finance Conditions for Investments in Bio-Based Industries and the Blue Economy", June 2017.

²⁷⁴ 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.

²⁷⁵ 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)

²⁷⁶ 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)

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 funds²⁷⁷ 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 circular economy, 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

and bioenergy

(Innovating for Sustainable Growth: A Bioeconomy for Europe. COM(2012)60 (Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions)).

²⁷⁷

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.

initiatives and legislative and programme proposals in the area of Circular Economy, Bio-based products and services. The importance of these areas has been emphasized in the 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, support to stakeholders and studies.

In concrete, in 2020 the action to be launched will aim at setting-up the coordination and support service for the implementation of the Circular Cities and Regions Initiative (CCRI). This action will be implemented via a framework contract with a duration of 4 years and an estimated budget of 5 million euro. This action will be complemented by Other Action 7 “Support circular economy solutions at local and regional scale” under the H2020 Work Programme Part 20 “cross-cutting activities” (Annex 23 to the Horizon 2020 Work Programme 2018-2020).

Type of Action: Public Procurement - One framework contract and several specific contracts signed under that framework contract.

Indicative timetable: Third quarter of 2018 and fourth quarter of 2020

Indicative budget: EUR 1.50 million from the 2018 budget and EUR 2.60 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 timetable: 4th quarter 2018

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 timetable: 2018-2019

Indicative budget: EUR 0.32 million from the 2018 budget and EUR 0.79 million from the 2019 budget and EUR 0.97 million from the 2020 budget

5. Bioeconomy Presidency Conference²⁷⁸

In support of the implementation of the Strategy "Innovating for Sustainable Growth: a Bioeconomy for Europe", a Bioeconomy Stakeholders' Conference should provide opportunities for public awareness raising and for an informed dialogue on the progress of the bioeconomy, involving researchers, stakeholders, policy makers and the civil society at large across the whole bioeconomy value chain. The Conference should address in particular the importance of aligning all stakeholders around the creation of new markets and boosting investments in the bioeconomy, to deliver jobs and inclusive, sustainable economic growth. The organisation of such a Conference should build on efforts undertaken in this direction by the European Commission and the Finnish Presidency of the Council of the EU.

Legal entities:

Tapio Oy, Maistraatinportti 4 A 00240 Helsinki

Type of Action: Grant to identified beneficiary - Coordination and support actions

Indicative timetable: Second half 2019

Indicative budget: EUR 0.10 million from the 2019 budget

²⁷⁸

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

6. Providing ad-hoc individual expertise to advise on EU research and innovation policy

This action will support the use of independent experts to capitalise on results and outcomes of SC2 funded projects as well as and marine/maritime projects funded in other parts of H2020. This will help strengthen the analysis and dissemination of policy impact of EU research and innovation activities on key EU policy areas relevant for SC2, as well as to communicate the impact and added value of the EU funding following evidence based analysis.

This will be provided to individual experts, who are selected on the basis of their knowledge and experience in different areas under SC2. In order to be flexible and to build on the results from other activities, it is anticipated to call in the experts on an individual and ad-hoc basis, with the possibility to work both remotely and in meetings and workshops to present, discuss and further develop the findings.

This action shall be provided by up to 10 individual experts covered by specific expert contracts. A special allowance of EUR 450/day will be paid to the experts appointed in their personal capacity who act independently and in the public interest.

Type of Action: Expert Contracts

Indicative budget: EUR 0.15 million from the 2019 budget

7. Comparative study of the research and innovation investment level in food systems

The objective is to provide external expertise to ensure objectivity and a high-level technical service to support the design and preparation of proposals for the agenda planning related to Food 2030. The required service relates to the area of economic analysis and technical assistance and will be delivered in the form of a study, building on the work of the European Commission Staff Working Document "European Research and Innovation for Food and Nutrition Security" [SWD(2016)319] and the FOOD 2030 Expert Group.

The tasks will involve measuring the public and private Research & Innovation investment levels and Venture Capital-related investments across the multiple sectors making up the "food system" (farm-to-fork and back), to provide a baseline upon which future Food and Nutrition-related policies can be monitored and evaluated. In addition, the tasks will involve assessing national and regional differences in the EU, differences across components of the food system (production, processing, logistics, packing, retail, Horeca, consumption, nutrition, etc.) and between different subsectors (dairy, meat, insects, etc.) and stakeholders, and will assess why actual R&I investment in these sectors in Europe is less than in other leading economies (USA, Japan, etc.).

The appropriate investment level will be determined in function of expected future needs and trends, and based on international benchmarks. A key point of the tasks will be to identify the relevant targets for sustainable food system transformation related to the SDG, while proposing the amount of investment needed for reaching them in the EU.

Type of Action: Public Procurement - One new direct service contract

Indicative timetable: 1st quarter 2019

Indicative budget: EUR 0.20 million from the 2019 budget

8. Dissemination and exploitation of results

The challenge is to exploit the knowledge from projects in the sectors covered by the Specific Programme of Horizon 2020 Societal Challenge 2, funded under FP7 and Horizon 2020, as well as as well as and marine/maritime projects funded in other parts of H2020. Projects that are at a short distance from market application may need assistance amongst other in defining their strategy towards exploitation (including for feedback to policy), developing their business plan, identifying the risks and opportunities, and finding investors and other exploitation partners. For this, the Commission will offer a targeted service linked to the TRL level of the project, through procurement contracts.

Type of Action: Public Procurement - One or several specific contract(s) – Use of an existing framework contract

Indicative budget: EUR 0.35 million from the 2019 budget

9. Policy Support Facilities for Partnering for a sustainable Blue Economy

Activities supporting, promoting and analysing the feasibility, options and opportunities of research and innovation actions across all European Seas, are proposed to be funded under this action.

Type of Action: Public Procurement - Service Contracts under existing Framework Contracts and up to 5 low or very low value contracts

Indicative timetable: 2020

Indicative budget: EUR 0.80 million from the 2020 budget

10. Policy Support Facilities for ensuring and promoting healthy, sustainable and productive Oceans, Seas, Coastal and Inland Waters

Activities supporting, analysing and promoting healthy, sustainable and productive Oceans, Seas, Coastal and Inland Waters across all European Seas and beyond are proposed to be funded under this action.

Type of Action: Public Procurement - Service Contracts under existing Framework Contracts and up to 7 low or very low value contracts

Indicative timetable: 1st quarter 2020

Indicative budget: EUR 1.80 million from the 2020 budget

11. Commission Expert group to support the implementation of Bioeconomy Policy Support Facility

The objective of this action is to provide high quality external expertise through an expert group to support the design, preparation and implementation of Union policy initiatives that support bioeconomy local deployment at national and regional level, in line with the updated EU Bioeconomy strategy 2018 (policy support facility). The action will provide support to develop and implement bioeconomy strategies across Europe with particular focus on Member States in the Central Eastern Europe (CEE), and will facilitate networking, knowledge exchange, mutual learning, interaction and cooperation. The Expert Group will support the implementation of Mutual Learning Exercise adapted to the needs of the CEE countries as well as the Member States with a Bioeconomy Strategy. The tasks of the expert group will also be developed in cooperation with the involved countries.

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 expert group will be composed of experts appointed in a personal capacity (i.e. "Type A" members) and of Member States (i.e. "Type D" members).

"Type A" experts will be highly qualified, specialised, independent experts 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 €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 the related preparatory work.

Type of Action: Expert Contracts

Indicative timetable: First quarter 2020

Indicative budget: EUR 0.30 million from the 2020 budget

12. Promote education, training and skills across the bioeconomy

The promotion of training, education and skills across the bioeconomy is one of the action points in the updated Bioeconomy Strategy.

Building on complementing and consolidating existing knowledge, the objective is to map and assess current University and higher education curricula, vocational and entrepreneurship training, educational methods and tools, occupational profiles, skill sets in all bioeconomy sectors, as well as to identify future gaps, needs and opportunities for 2030 and 2050. The action will also facilitate networking, the development and exchange of knowledge, mutual learning, interaction and cooperation. The required services will be implemented through workshops, communication and studies.

Type of Action: Public Procurement - Direct Contract

Indicative timetable: 1st quarter 2020

Indicative budget: EUR 0.60 million from the 2020 budget

13. Bioeconomy Knowledge Centre

The improvement of the current system of strategic intelligence is needed to analyse the knowledge on, and monitor the progress of, the EU Bioeconomy.

The Bioeconomy Knowledge Centre will present both the state of advancement and the results of a systematic policy-watch, market-watch and science and technology-watch. Special attention will be paid to present and analyse market developments, National Bioeconomy strategies, Regional Smart specialisation strategies, skills availability and future requirements, infrastructures, services, etc. Research activities performed in the framework of the action might include the identification of indicators to monitor the economic, social and environmental development of the EU Bioeconomy. Other activities might relate to the dissemination of the above-mentioned knowledge and monitoring outputs.

Type of Action: Provision of technical/scientific services by the Joint Research Centre

Indicative timetable: Second half 2020

Indicative budget: EUR 1.50 million from the 2020 budget

14. Presidency Event - Bioeconomy Stakeholders Conference under the Croatian Presidency²⁷⁹

In support of the implementation of the updated Bioeconomy Strategy "A sustainable Bioeconomy for Europe: strengthening the connection between economy, society and the environment", a Bioeconomy Stakeholders' Conference should provide opportunities for public awareness raising and for an informed dialogue on the progress of the bioeconomy, involving researchers, stakeholders, policy makers and the civil society at large across the whole bioeconomy value chains. The Conference should address in particular the importance of aligning all stakeholders around the creation of new markets and boosting investments in the bioeconomy, to deliver jobs and inclusive, sustainable economic growth. The organisation of such a Conference should build on efforts undertaken in this direction by the European Commission and the Croatian Presidency of the Council of the EU.

Legal entities:

Croatian Republic Ministry of Agriculture, Ul. grada Vukovara 78, P.P. 1034, 10000 Zagreb

²⁷⁹ This grant will be awarded without call for proposals in line with Article 195(e) of the Financial Regulation, Regulation (EU, Euratom) No 1046/2018 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

Type of Action: Grant to identified beneficiary - Coordination and support actions

Indicative timetable: First half 2020

Indicative budget: EUR 0.10 million from the 2020 budget

15. Conference on Marine Resources under the Portuguese Presidency²⁸⁰

Events of major strategic nature, well focused and with the participation of a broad spectrum of stakeholders are of outmost importance for assessing past activities, identifying policy options and priorities, and planning future actions.

The European Commission will support the organisation of the event (conference) Marine Resources' in the first half of 2021, in cooperation with the Portuguese government, holding the EU Presidency of the European Union in the first semester of 2021.

Participation of non-EU actors is possible. Outreach activities may be included, such as a press programme or events dedicated to the wider public or schools. To avoid limiting the impact of this kind of event, the subject should not overlap with that of other Presidency events already undertaken or foreseen during the same period.

The commitment of the national authorities to support the event both from a political point of view and with resources is a pre-requisite to submit a proposal. Proposals should be supported by the competent Minister, evidenced in a letter included in the proposal. In order to ensure high political and strategic relevance, the active involvement of the competent national authority/authorities will be positively reflected in the evaluation.

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 event is expected to result in: improved visibility, in particular in Portugal, of the areas covered by Horizon 2020 and the future Horizon Europe Cluster 5 of the Commission proposal; identification of policy options and priorities via review and assessment of developments, and sharing of information and comparison of points of views; and efficient networking of various stakeholders and support to their activities, e.g. natural scientists, social scientists, businesses, investors, local authorities, environmental organisations, museums and schools.

Legal entities:

Fundação para a Ciência e a Tecnologia, Av. D. Carlos I, 126, 1249-074 Lisboa, Portugal

Fundo Regional para a Ciência e Tecnologia, Rua do Mercado, N°21, 9500-326 Ponta Delgada, Açores

²⁸⁰ This grant will be awarded without call for proposals in line with Article 195(e) of the Financial Regulation, Regulation (EU, Euratom) No 1046/2018 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

Type of Action: Grant to identified beneficiary - Coordination and support actions

Indicative timetable: First Semester 2021

Indicative budget: EUR 0.10 million from the 2020 budget

16. Strategic analysis and support for enhanced research cooperation in agriculture and food systems

A public procurement (tender procedure) analysing the feasibility, options and opportunities of research and innovation cooperation for European agriculture and food systems is proposed to be funded under this topic. The action will support networking, the exchange of knowledge, mutual learning, interaction and cooperation through facilitated working groups and workshops. The required service is in the areas of policy analysis, portfolio analysis and knowledge sharing through the support for strategic and collaborative working groups of member states as well as experts and stakeholders groups. It will be delivered in the form of a framework contract with a duration of 4 (2+2) years and an estimated budget of EUR 2 million.

Type of Action: Public Procurement - Framework contract and several specific contracts signed under that framework contract

Indicative timetable: Fourth quarter 2020

Indicative budget: EUR 1.02 million from the 2020 budget

Horizon 2020 - Work Programme 2018-2020
Food security, sustainable agriculture and forestry, marine, maritime and inland water research and the bioeconomy

Budget²⁸¹

	Budget line(s)	2018 Budget (EUR million)	2019 Budget (EUR million)	2020 Budget (EUR million)
Calls				
H2020-SFS-2018-2020		218.75	293.10	173.00
	<i>from 05.090301</i>	<i>111.00</i>	<i>215.10</i>	<i>168.00</i>
	<i>from 08.020302</i>	<i>107.75</i>	<i>78.00</i>	<i>5.00</i>
H2020-BG-2018-2020		77.50	89.00	52.00
	<i>from 08.020302</i>	<i>77.50</i>	<i>89.00</i>	<i>52.00</i>
H2020-RUR-2018-2020		102.29 ²⁸²	84.50	88.00
	<i>from 05.090301</i>	<i>101.29</i>	<i>62.00</i>	<i>72.00</i>
	<i>from 08.020302</i>	<i>1.00</i>	<i>22.50</i>	<i>16.00</i>
H2020-FNR-2020				208.70
	<i>from 05.090301</i>			<i>40.00</i>
	<i>from 08.020302</i>			<i>168.70</i>
Contribution from this part to call H2020-DT-2018-2020 under Part 5.i of the work programme			15.00	15.00
	<i>from 05.090301</i>		<i>15.00</i>	<i>15.00</i>
Contribution from this part				86.00

²⁸¹ The budget figures given in this table are rounded to two decimal places.

The budget amounts for the 2020 budget are subject to the availability of the appropriations provided for in the draft budget for 2020 after the adoption of the budget 2020 by the budgetary authority or, if the budget is not adopted, as provided for in the system of provisional twelfths.

²⁸² 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 107.29 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

to call H2020-LC-GD-2020 under Part 20 of the work programme	<i>from</i> 05.090301			24.30
	<i>from</i> 08.020302			61.70
Contribution from this part to call H2020-EIC-FTI-2018-2020 under Part 17 of the work programme		8.90	8.90	8.90
	<i>from</i> 05.090301	3.78	3.78	3.78
	<i>from</i> 08.020302	5.12	5.12	5.12
Other actions				
Financial Instrument		50.00		
	<i>from</i> 05.090301	20.00		
	<i>from</i> 08.020302	30.00		
Public Procurement		1.50	0.55	6.82
	<i>from</i> 08.020302	1.50	0.55	6.32
	<i>from</i> 05.090301			0.50
Expert Contracts		0.52	0.94	1.27
	<i>from</i> 08.020302	0.34	0.54	0.66
	<i>from</i> 05.090301	0.18	0.40	0.61
Grant to Identified beneficiary			0.10	0.20
	<i>from</i> 08.020302		0.10	0.20
Provision of technical/scientific services by the Joint Research Centre				1.50
	<i>from</i> 08.020302			1.50

Horizon 2020 - Work Programme 2018-2020
Food security, sustainable agriculture and forestry, marine, maritime and inland water research and the bioeconomy

Contribution from this part to Public Procurement under Part 20 of the work programme				2.40
	<i>from 08.020302</i>			<i>2.40</i>
Contribution from this part to Expert Contracts under Part 20 of the work programme				0.30
	<i>from 08.020302</i>			<i>0.30</i>
Estimated total budget		459.46	492.09	644.09