



Brussels, 18.3.2019
C(2019) 1872 final

ANNEX 1

ANNEX

to the

COMMISSION IMPLEMENTING DECISION of XXX

on the adoption of multi-annual work programmes under Council Decision 2013/743/EU and Council Regulation (Euratom) No 2018/1563, to be carried out by the Joint Research Centre for the period 2019-2020, and amending Commission Implementing Decision C(2018) 1386

Key orientations for the Joint Research Centre's multi-annual work programme for 2019-2020

I. Introduction

The Commission's agenda for jobs, growth, fairness and democratic change focuses on 10 policy areas in which the European Union can make a real difference – if it establishes the right regulatory environment. The Commission's better regulation agenda¹ therefore relies on rigorously established, objective evidence to improve policy and law making so that policy objectives are achieved at minimum cost and with the least administrative burden.

The Joint Research Centre (JRC) is the Commission science and knowledge service. As part of its mission **to support EU policies with independent evidence throughout the policy cycle**, it contributes to the Commission's priorities and to better regulation. It provides data and analysis to help design new policy initiatives and legislative proposals and to monitor existing ones. As a 'boundary' organisation at the interface between science and policy, the JRC provides the cross-sectoral policy support that policymakers need to tackle increasingly complex economic, social, environmental and technical challenges.

The JRC will support **better regulation initiatives** with its expertise on modelling, data analysis, design of monitoring schemes, advice on scientific/technical aspects of desirability, feasibility and enforceability of limits/targets, as well as development and validation of testing methods and materials supporting effective implementation of regulation. Through the Competence Centre for Foresight and the EU Policy Lab, the JRC offers a 'safe' space to co-design policy initiatives and future-proof impact assessments with the engagement of experts, stakeholders, citizens and policy-makers. But a stronger evidence base for better regulation also requires a continuous quality support process accompanying impact assessments and evaluations from the start. Through its **Competence Centres** on Modelling and on Microeconomic Evaluation the JRC is cooperating closely with the Regulatory Scrutiny Board, the Secretariat General of the Commission and DG Budget on improving quantification, including data planning, in impact assessment and evaluation processes. The JRC will also support the Commission services in developing the monitoring and evaluation frameworks for the next MFF programmes, including indicators.

In support of the Commission's objective of improving the way it manages knowledge, the JRC will strengthen its **knowledge management** activities and contribute to the Data4Policy Group's work on better use of data. It will also contribute to better exploitation of data for policy making in accordance with the open access principles. It will further develop the Knowledge Centres for Disaster Risk Management, Bioeconomy, Food Fraud and Quality, Territorial Policies, and Migration and Demography. **Knowledge Centres** bring together expertise from inside and outside the Commission. They ensure that all the relevant data, knowledge and

¹ Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions of 19 May 2015 – Better regulation for better results - An EU agenda, COM(2015) 215 final.

intelligence in a specific policy area are accessible, and help to achieve a better coordination of policies. Together with relevant Commission departments, the JRC will launch a new Knowledge Centre for Global Food and Nutrition Security.

The JRC will continue strengthening its support for the **European Semester** process through country knowledge-sharing platforms which help ensuring that the Commission has the essential intelligence available for the Semester and more widely for all policies. It will provide scientific input to formulate country specific recommendations for reforms in various policy areas. The JRC will also step up support to Member States, in particular through the Structural Reform Support Programme.

Scientific excellence and relevant policy advice depend also on **partnerships and collaboration**. The JRC works with Member States, associated, candidate and neighbourhood countries, regional and local players, research institutes and international organisations. It also collaborates with the Scientific Advice Mechanism (SAM) and with the European Institute of Innovation and Technology and its Knowledge and Innovation Communities.

The JRC will extend open access to a number of its own world-class and sometimes unique **research infrastructures**, including e-infrastructures, giving European businesses and academic organisations access to facilities to address industrial and research requirements. A new ‘JRC Academy’ will provide science-to-policy courses, scientific and technical capacity building, and on-the-job **training**. Moreover, closer relations with higher education institutions in Europe will enable collaboration with students on topics with clear value added for policy implementation at EU, national and regional levels. With the Centre for Advanced Studies and Collaborative Doctoral Partnerships, the JRC is strengthening its relations with the best research institutions and universities to foster links between EU policies and science.

At the **local level**, the JRC is enhancing the monitoring and reporting of the urban dimension of EU policies, as a vehicle to implement the Sustainable Development Goals (SDGs) at local and regional levels. Extending the territorial approach to urban strategies and urban-sensitive policies, the Urban Data Platform and Urban observatory provide support on methodological guidance on integrated urban and territorial development, production of urban indicators, monitoring of global human settlements, policy learning by the dedicated Community of Practice, overview of urban trends in Europe and Africa, knowledge exchange and city-to-city cooperation, together with production of future scenarios of urban development.

There will be more engagement with **the candidates for EU accession and the European neighbourhood policy countries**, for example through the support for the development of smart specialisation strategies, building up capacity for technology transfer and innovation, as well as strengthening the translational capacities of research organisations and small and medium-sized enterprises (SMEs). The JRC will build on the successful results of its action for the Danube, which explores the conditions under which the smart specialisation model can be applied in the EU enlargement and neighbourhood countries. The feasibility of adapting the JRC’s model-based impact assessment currently used for assessing the impact of the European Fund for Strategic Investment (EFSI) to the External Investment Plan,

notably the European Fund for Sustainable Development Guarantee (EFSD), will be explored.

International cooperation will focus on the United States, Brazil, China, Japan, South Africa, India and Mexico, in accordance with the EU roadmaps for science, research and innovation. In this frame, the JRC actively contributes to initiatives led by various Commission services and by the European External Action Service (EEAS), such as the Joint Committee on Scientific and Technological Cooperation Committee (JSTCC), the Space Dialogues and the Cooperation Council.

At regional level, the JRC will strengthen its cooperation with the African Union, the African Regional Economic Communities, the Community of Latin American and Caribbean States (CELAC) and the Association of Southeast Asian Nations (ASEAN). Moreover, it will further develop scientific cooperation with think tanks and international organisations.

In the **nuclear field**, the JRC will provide technical and scientific support for developing, implementing and monitoring EU policies on nuclear safety, safeguards and radiation protection as well as related EU strategies (e.g. the energy security strategy). It will also support various European technology platforms, including the Sustainable Nuclear Energy Technology Platform, the Implementing Geological Disposal of Radioactive Waste Technology Platform and the European Nuclear Energy Forum. The JRC will continue the scientific collaboration with these platforms and other research institutions, from Member States, third countries or international organisations, looking for the highest impact and EU added value. The JRC supports EU policy (the Instrument for Nuclear Safety Cooperation) to reinforce nuclear and radiation safety globally. It cooperates with the International Atomic Energy Agency on nuclear safeguards and helps to increase global nuclear security through scientific and technical cooperation with the main international players. Through its cooperation on the implementation of the Chemical, Biological, Radiological, Nuclear and Explosive (CBRN-E) initiative, the JRC will provide support to the Instrument contributing to Security and Peace.

II. A work programme supporting the Commission's priorities

The JRC's work programme responds to the Commission's priorities. The Commission's priorities and actions are aligned with the SDGs, which are universally applicable and interlinked.

The JRC's work programme will ensure strong links and identify areas for added value between its own activities and the relevant focus areas under the **Horizon 2020 work programme 2018-2020**. In parallel, the strategic focus of its work is strengthened through the long-term orientation set out in the JRC strategy 2030.

The JRC's multi-annual work programme for 2019-2020 is:

- organised according to the ten areas set out in the agenda for jobs, growth, fairness and democratic change;
- in line with the overall objective set out in Horizon 2020 for the JRC's non-nuclear work (to provide customer-driven scientific and technical support to EU policies, while flexibly responding to new policy demands) and the general objectives of the Euratom research and training programme (to pursue nuclear research and training

activities with an emphasis on continuous improvement of nuclear safety, security and radiation protection);

- in synergy with the Horizon 2020 work programme for 2018-20, including the four focus areas: 'Building a low-carbon, climate resilient future'; 'Connecting economic and environmental gains – the Circular Economy'; 'Digitising and transforming European industry and services' and 'Boosting the effectiveness of the Security Union';
- funded either by institutional resources (i.e. operational funding for the JRC from Horizon 2020 and its complementary Euratom programme) or additional funding from Commission services and grant funding from Horizon 2020 and the Euratom programme. The JRC's participation in Horizon 2020 also provides valuable access to European and international research networks and helps to build up core competences.

The JRC's main contributions to the Commission's new initiatives for 2019 and 2020 and to the implementation of recent key initiatives are set out below.

A new boost for jobs, growth and investment

The new *Communication on the investment Plan for Europe: stock-taking and next steps* looks at how EU policies have impacted the business and investment environment. The JRC is providing input for the Communication by quantifying the macroeconomic impact of key EU policies. More specifically, the JRC is using a spatial computable general equilibrium model for EU regions and sectors – the RHOMOLO model – to assess the macroeconomic impact of the implementation of the regulatory reforms in the areas of the Single Market, the Digital Single Market, the Capital Markets Union, and Energy Efficiency.

The Commission will prepare a reflection paper *Towards a sustainable Europe by 2030* as a follow-up to the UN 2030 Agenda for Sustainable Development and to the Paris Agreement on Climate Change. The JRC will contribute to the reflection paper through a foresight study which will summarise the main factors of change with their potential impacts in terms of opportunities and risks to 2030. The JRC is also contributing to the work of the SDGs multi-stakeholders platform, to the definition of 2030 targets for the Eurostat SDGs indicator set, and will run an analysis of the inter-linkages between different goals. In cooperation with international partners (UN, World Bank, the International Institute for Applied Systems Analysis-IIASA), the JRC will work at the formulation of Science Technology and Innovation (STI) strategies to facilitate the achievement of the SDGs, in both developed and developing countries.

In support of the updated *Bioeconomy Strategy*, the Knowledge Centre for Bioeconomy will develop a comprehensive framework to monitor the progress of the bioeconomy in the EU. This will include a set of indicators which will provide concise information on the condition, performance and trajectory of the bioeconomy, regarding physical, environmental, social and economic dimensions. The bioeconomy monitoring framework will also highlight the potential synergies and trade-offs between the development of the EU bioeconomy and the achievements of the SDGs.

The Commission's initiatives on *Circular economy* have the potential to bring a huge benefit to Europe's economy, competitiveness and environment. The JRC, in support

of several Commission services, will contribute to the implementation of most key elements of the Circular Economy Action Plan, through work on quality of water for agricultural irrigation and ground water recharge, assessment and certification of alternative methods for microbiological monitoring and indicators on secondary raw materials to monitor the circular economy. It will provide support in relation to product policy, waste management, environmental management schemes and industrial emissions. The JRC will support the circular economy in the building sector with the development of an EU common framework of sustainability indicators for buildings. Specifically, in support of the *European Strategy for Plastics in a Circular Economy*, the JRC's work will include life cycle assessments for plastics, knowledge gathering on new plastics technology and processes, the development, harmonisation and standardisation of new or improved methods for the detection of micro- and nano-plastics, and the understanding of its effects on biological systems.

A connected digital single market

The digital transformation and the development of Artificial Intelligence (AI) are gathering speed, and in order to tackle these changes, the Commission has adopted a *Coordinated Plan on Artificial Intelligence*. Prepared with Member States, it aims at maximizing the impact of investments at EU and national level, preparing Europeans for the AI transformation and addressing ethical and legal considerations. The JRC will set up – in close collaboration with other Commission services – the AI Watch observatory which will analyse the European AI ecosystem, monitor the progress of AI technology and the uptake of AI applications across the economy, gather information on EU Member States' national initiatives on AI, provide an overview on the use of AI in public services, develop an AI index relevant for policy making and make relevant information available to the public. Together with other Commission services, the JRC will furthermore set up a new inter-regional smart specialisation platform on AI, and will analyse the impact of AI on policies dealing with education and the future of work.

The Commission and the EEAS presented a *Joint Action Plan to fight Disinformation*, focusing on strategic communication policy. The JRC supports the media monitoring activities of most of the European Institutions' services, including the Parliament, the Council, the Commission, the EEAS and many agencies and has therefore many years of expertise of relevant technologies, including Natural Language Processing and AI. Its tools allow monitoring not only of traditional media but also of Twitter and other social media.

The JRC is contributing to the *Commission Recommendation to establish a format for European Electronic Health Record Exchange* through expert support on interoperability and security aspects. It also addresses issues concerning the organisational and business impact of the recommended exchange format on the current healthcare digital infrastructures and exchange protocols. The JRC will also assist authorities across the EU to implement the secure exchange of genomic and other health data and address citizens' access to electronic health records.

Cyberattacks and new threats online put the success of the digital single market at risk. It is a priority for the Commission to protect European citizens from such threats. For this purpose the JRC will support the implementation of the *cybersecurity package*. It will identify and analyse security, intellectual property and privacy issues on the new and emerging technologies that are driving the digital single market. It will collaborate

with partners such as Europol for equipping Europe with the right tools to effectively investigate and prosecute cybercrime and cyber-enabled crime, and it will host the Europol decryption facility. The JRC will also participate in the future Cybersecurity Competence Centre.

A resilient European Energy Union with a forward-looking climate change policy

The new *Strategy for long-term EU greenhouse gas emissions reductions* aims at full decarbonisation of the economy, making optimal use of potentially disruptive technologies, innovative solutions and taking benefit of important global trends – such as digitalisation and automation – while at the same time increasing jobs and growth and ensuring the global competitiveness of the European industry. The JRC is supporting the strategy not only with the development and validation of accounting methodologies for greenhouse gas emissions, but also by contributing to the analysis of the different decarbonisation pathways. It provides scientific evidence for selected energy technologies and the different integration solutions by assessing the impact of digitalisation and sector-coupling on clean-energy transition as well as on jobs, growth, household expenditure and (energy) poverty and by assessing the innovation and infrastructure needs to support the decarbonisation goals. It will also continue its technical and scientific support to the transition towards smart, clean and sustainable transport through modelling, market surveillance, testing and analytical work.

The JRC will contribute to the 4th *State of the Energy Union Report* with analyses and indicators on Research & Innovation in clean energy technologies and on the Competitiveness of the European low carbon industry, as well as with knowledge for the monitoring of progress in all five dimensions of the Energy Union. It will also support the assessment of the integrated national energy and climate plans.

As a contribution to the Commission's *Strategic Action Plan on Batteries* the JRC will assess the quality, safety, competitiveness and innovation of energy storage technologies, including mapping of current and future availability of primary raw materials for batteries. In support of energy and resources efficiency standardisation, the JRC will work on eco-design for batteries, with a focus on battery performance related aspects and material sustainability aspects (material/resource efficiency). It will also facilitate the development of an "interregional partnership on batteries" through its expertise in Smart Specialisation.

A deeper and fairer Internal Market with a strengthened industrial base

A well-functioning single market enabling people, services, goods and capital to move freely is at the heart of the European project. On 22 November 2018, the Commission launched the communication on *The Single Market in a changing world. A unique asset in need of renewed political commitment*. The JRC is working in different areas that contribute to the assessment and the development of the Single Market. These areas include for example the assessment of the security of supply chains, in particular of raw materials, which would strengthen the resilience of the EU system and the Smart Specialisation which can drive growth, competitiveness and innovation, in particular for outermost and lagging regions. Moreover, the JRC has contributed to knowledge sharing within the EU, an example being the development of the Raw Materials Information System and of different monitoring indicators such as the Raw Materials Scoreboard and the Circular Economy monitoring indicator. The JRC will

share its knowledge to support the Commission's initiative on Single Market communication.

On 7 November 2018, the Commission adopted a *Communication on a comprehensive EU framework on endocrine disruptors*. A persistent gap is the lack of harmonised data on the prevalence of endocrine-mediated diseases at EU level and the question whether exposure to endocrine disruptors might or not be a contributing factor to the onset of these diseases. Indeed, there are often indications that certain endocrine-mediated diseases are increasing, with speculation that endocrine disruptors could play a role. The JRC has already contributed to the endocrine disruptor field through a screening methodology for identifying potential endocrine disruptors in the context of an EU impact assessment and supports the European Chemicals Agency (ECHA) and the European Food Safety Authority (EFSA) in the drafting of guidance on how to identify substances with endocrine disrupting properties in pesticides and biocides. The JRC will also contribute to the drafting of *in vitro* test guidelines relevant for endocrine disruptors and guidance documents within the Organisation for Economic Co-operation and Development (OECD). In addition the EU Reference Laboratory for alternatives to animal testing (ECVAM) will conduct validation studies on *in vitro* methodologies for specific endocrine disrupting pathways (e.g. androgen and thyroid pathways).

The JRC will support the renewed *EU Industrial Policy Strategy* by identifying and monitoring the main technological and industrial strategic areas where the EU can have strong competitive advantage potential. For example by analysing aspects of the security and sustainability of supply of raw materials and of their supply chains and by contributing to future assessments of the EU List of Critical Raw Materials, essential in defining EU policies and strategy on trade agreements with world partners. The JRC is analysing the effects of recent trade barriers imposed on global markets (such as aluminium or steel) on EU trade and raw materials supply chains. Special focus will be given to the supply chains of raw materials for batteries, in support of the Commission's involvement in the European Battery Alliance.

A major objective of the *Single Market Strategy* concerns the strengthening of market surveillance to ensure that only safe and compliant products circulate in the single market. JRC will support the new EU Product Compliance Network of market surveillance authorities and the Commission foreseen by the Goods Package proposal for a Regulation on Compliance and Enforcement. In the automotive sector the JRC will play an essential role in supporting the Commission's commitments for market surveillance (arising from the new legislation on vehicles type approval) and ensuring that declared car emissions are respected under real on-road conditions.

An area of security, justice and fundamental rights based on mutual trust

To become a reality, an area of justice, fundamental rights and mutual trust needs to rely on security and the rule of law. To this end, the Commission committed to step up efforts to disrupt organised crime and to tackle terrorism and corruption. The JRC will contribute to the delivery of the European Agenda on Security in several domains. It will provide scientific support to facilitate interoperability and increase the quality of data processed in order to enhance the EU law enforcement large scale IT systems, and to strengthen main investigation and prosecution functionalities such as localization and crime content determination. It will also contribute to the protection of public spaces and critical infrastructure against terrorist threats and against

chemical, biological, radiological and nuclear threats (CBRN-E), including through its work on detection of explosives precursors. In support of the Joint Framework for countering hybrid threats, the JRC will work on the development of a conceptual framework and on methods/tools for detection, countering and building resilience to those threats. Furthermore, it will contribute to enhance the security of external borders by supporting customs authorities in the domain of anti-fraud intelligence.

As the EU Internal Security Strategy also includes increasing resilience and providing timely responses to crises and natural and man-made disasters, the Commission proposed to set up a new Union Civil Protection Mechanism. The JRC will support the EU, its Member States and the Commission's Emergency Response Coordination Centre through the activities of the Disaster Risk Management Knowledge Centre, the development of a Multi-Disciplinary Framework and a pilot test on resilience.

A stronger global actor

The Asia-Europe Summit (ASEM) is a unique platform for dialogue and cooperation between Asia and Europe, allowing policymakers to exchange views on challenges in different fields. In support to the Commission's initiative on the *EU Strategy on connecting Europe and Asia*, the JRC will prepare a study presenting the analysis of international sustainable connectivity between countries in the ASEM framework. This analysis will be built upon the new "ASEM Sustainable Connectivity Portal"² that is being developed by the JRC. The portal is based on a framework of relevant indicators which can be combined into composite indicators and will help partner countries to identify cooperation areas to strengthen connectivity between them and in particular between Asia and Europe.

Finally, over the past 30 years, the JRC has been developing a multi-faceted cooperation with key African partners, such as the African Union and the Regional Economic Communities (RECs). This cooperation supports the implementation of projects and programmes for sustainable development and promotes collaboration with African researchers. Building on this experience, the JRC will contribute to the implementation of the *Communication on a new Africa-Europe alliance for sustainable investment and jobs* in the areas of Smart Specialisation strategies, migration and demography scenarios, and the development of entrepreneurship and professional competence frameworks. The JRC knowledge and expertise will be targeted to the African context to support the achievement of the priority objectives set in the new Communication, as well as the ones established by the broader renewed Africa-EU partnership Agenda, along three main cooperation strands: resilience building, resources sustainability and climate change, peace and security and governance, and migration and mobility.

² <https://composite-indicators.jrc.ec.europa.eu/asem-sustainable-connectivity/>

III. Key orientations supporting EU policies

The following sections present the JRC’s key orientations under the 10 political priorities and list some of the Commission objectives to which its work contributes.

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1. A new boost for jobs, growth and investment

1.1. Agriculture and rural development

With EU agriculture being one of the world's leading producers of food and EU's rural areas being home to a substantial number of its citizens, farming sector and rural areas remain a high priority in the European Union's agenda. Worldwide population growth, income disparities, the scarcity of natural resources, climate change and changing societal demands are the driving forces behind shifting production patterns and systems in EU agriculture.

The Communication on the "Future of Food and Farming"³ outlines the plans for the future Common Agricultural Policy (CAP), which should reflect a higher level of environmental and climate ambition (40% climate mainstreaming target) encourage the use of modern technologies and provide greater market transparency and certainty. A new delivery system should give increased responsibility to the Member States to decide on their measures based on common EU rules, thus answering the calls for a simpler more flexible CAP after the previous reform in 2013.

In preparation of the CAP post-2020, the optional monitoring approach for direct payments implemented in 2018 will be broadened and will need further developments to mature. As Member States will be setting their objectives and will be monitoring their performance towards the nine specific objectives of the future CAP, there is a need for indicators and 'benchmarks' ensuring that EU-wide climate and environmental targets are met.

Income disparities throughout the food chain have been a prominent issue over the last years. A legislative proposal on unfair trading practices has been adopted in 2018, but further improvement in the functioning of the food supply chain is requested.

Relevant Commission policy objectives:

- simplify and modernise the CAP to maximise its contribution to the Commission's 10 priorities and to the SDGs;
- promote sustainable food production, with a focus on farm income, agricultural productivity, price stability and job growth;
- promote the sustainable management of natural resources and climate initiatives, with a focus on Greenhouse Gas (GHG) emissions and removals, biodiversity, soil, raw materials and water;
- promote balanced territorial development, with a focus on rural employment, growth and poverty reduction in rural areas, including making use of the potential of the bioeconomy.

³ Communication from the Commission to the European Parliament, the Council, The European Economic and Social Committee and the Committee of the Regions of 29 November 2017 – The Future of Food and Farming, COM(2017) 713 final.

Key orientations for the JRC:

a) **CAP implementation** — develop efficient and innovative tools to implement agricultural legislation, considering the opportunities of big data, remote sensing and the free and open access to Copernicus satellite data; support the development of a technical framework for the monitoring approach introduced in 2018 and for the implementation in the pilot regions; support Member States in the design of their CAP Strategic Plans and provide support in assessing the relevance of the proposed measures to meet the nine specific objectives of the future CAP.

b) **Environmental assessment & management of natural resources in a changing climate** — develop knowledge and assessment tools on the impacts of the food and farming sector on soil, water, raw materials, forests, ecosystem services and air quality also considering the effects of climate change; develop data sets, baselines and sustainability indicators in order to improve the sustainable management of the agricultural sector including assessment of the application of common bio-physical criteria for delimiting Areas with Natural Constraints (ANC); measure the effectiveness of the agricultural sector's contribution to reaching the environmental and climate targets set by EU and UN policies. This includes the work of the knowledge hub on water and agriculture, behavioural economics analysis and is closely linked to the work on climate change mitigation and adaptation under key orientation 3.1.2.b and key orientation 9.2.3.a.

c) **Agricultural production, markets and trade** — analyse the competitiveness, performance and trade relations of the European agri-food sector including the food supply chain; provide model-based analysis of policy options for the CAP beyond 2020 throughout the legislative process, considering also the impact of increased subsidiarity, including model maintenance and improvement, increased model integration to allow coherent multi-dimensional analysis at different scales; forecast crop yields, production and demand and analyse the resilience of the market with respect to shocks caused by extreme events; increase market transparency and food security in Europe (related work on global food security is covered under key orientation 9.2.2).

1.2. Education, culture, youth and sport

At a meeting in Rome in March 2017, Europe's leaders committed to creating a Union where young people receive the best quality education. Equal access to high-quality education is the first principle of the European Pillar of Social Rights initiated by President Juncker and adopted by European leaders at the 2017 Gothenburg Social Summit. At the same Summit, the Commission proposed to work towards a European Education Area by 2025, including the European Universities, supported by the Erasmus programme and its successor.

The New European Agenda for Culture, adopted as a Commission Communication in May 2018, has three strategic objectives - social, economic and external. The New Agenda outlines that culture has the power to bring and keep people together. Under the economic dimension culture-based creativity in education and innovation, for jobs and growth is to be supported. This includes the promotion of the skills needed by cultural and creative sectors, including digital and entrepreneurial skills.

Relevant Commission policy objectives:

- tackling future skills mismatches and promoting excellence in skills development;
- transforming EU higher education systems through making them more inclusive and socially engaged, improving the quality of learning and teaching therein, and harnessing their full potential to contribute to innovation;
- supporting effective and efficient higher education systems through the Erasmus + programme and its successor, taking forward the European Education Area in the field of higher education via three key priorities that will boost mobility and student exchanges for all: 1) the European Universities, 2) the automatic mutual recognition of diplomas and 3) a European Student Card;
- supporting teachers and school leaders for excellent teaching and learning;
- improving governance of school education systems to make them more effective, equitable and efficient.

Key orientations for the JRC:

- a) **Education and training systems** — monitor trends under EU policy strategies (e.g. Europe 2020, ET2020 and the Knowledge Hub on Higher Education, the renewed EU agenda for higher education and the European Education Area) and provide evidence of the successful implementation and development of such policy frameworks.
- b) **Innovative education** — carry out research on policy-relevant themes such as efficiency and equity in education investment, the role of (higher) education for regional development and smart specialisation, education and societal wellbeing, the integration of vulnerable groups such as migrants, including refugees, and other minorities into the education system, and early childhood learning; study digitisation's impact on education and training practices and systems (AI, blockchains, platforms, etc.); foster innovation in digital learning in schools.
- c) **Cultural and creative sectors** — assess the impact of specific culture-oriented initiatives on economic and social development; develop further tools for measuring and monitoring cultural activities and creativity in cities (see also key orientation 10.1.c).

1.3. Environment

EU environment policy until 2020 is guided by the Commission's 10 political priorities, the SDGs for 2030 and the 7th Environment Action Programme (7th EAP) (2014-2020) 'Living well, within the limits of our planet'. The three thematic pillars of the 7th EAP are:

- protecting, conserving and enhancing the Union's natural capital;

- transforming the Union into a resource-efficient, green and competitive low-carbon economy;
- safeguarding the Union's citizens from environment-related pressures and risks to health and wellbeing.

To create maximum synergies between the Commission's political priorities and the 7th EAP, the work on environment policy focus on three strategic areas: generating green growth, connecting with citizens and making it happen. Therefore, the main environment policy orientations include a renewed focus on implementing and reviewing existing legislation and generating opportunities to innovate and create jobs. Integrating environmental considerations into other policies and providing better information by improving the knowledge base are considered key enablers.

The follow-up to the circular economy package aims to 'close the loop' of product (and services) lifecycles, ensuring that resources - including natural resources - are used in a more sustainable, responsible and secure way. The follow-up to the 2016 EU Action for Sustainability should ensure implementation of the United Nations SDGs, several of which address the environment and the management of natural resources. On the latter, due consideration will be given to the authoritative reports of the International Resource Panel. The fact that many environmental challenges are of a global dimension means that the EU has a strong interest in cooperating with international partners, notably on the follow-up to the Rio+20 summit.

Relevant Commission policy objectives:

- enable EU citizens to live well, within the planet's ecological limits, in an innovative, circular economy where biodiversity is protected, valued and restored, where environment-related health risks are minimised in ways that make society more resilient, and where growth has been decoupled from the use of resources. This is to be achieved, in particular, by better implementing EU environment legislation (e.g. through the EC Environmental Compliance Assurance Action Plan⁴) and the EU Bioeconomy Strategy, in order to ensure greater environmental integration and policy coherence, and to increase the knowledge and evidence base for EU environment policy.

Key orientations for the JRC:

1.3.1. Protecting and enhancing our natural capital

- Freshwater and marine environment** — using the ecosystem services accounts develop freshwater accounts on water purification and build ecosystem services accounts for the provision of fish; assess water resources and water-use efficiency, floods and droughts (linked to key orientation 9.1.1.a); provide hydro-economic modelling and assessment of implementation scenarios for the Water Framework Directive and related directives (Urban Waste Water Treatment Directive, Bathing Water Directive and the revised Drinking Water Directive); provide integrated

⁴ http://ec.europa.eu/environment/legal/compliance_en.htm

analyses of water allocation across economic sectors for Europe and other regions of the world (water-energy-food-ecosystems nexus – also contributing to its global dimension, linked to key orientation 9.2.3.b); develop methods to monitor and assess chemical, microbiological, biological and ecological water quality, and assess acceptable alternatives; develop standards and reference materials for pollutants (including plastics) for fresh and marine waters; set consistent and comparable nutrient boundaries across Europe; develop minimum quality requirements for water reuse (also contributing to the circular economy — linked to key orientation 1.3.2.a); develop the knowledge base, including the integrated modelling framework for freshwater and marine environment, targeting in particular the Water Framework Directive, the Marine Strategy Framework Directive (linked to key orientations in 1.4), the Birds and Habitat Directives and related directives; continue the research work on mapping and assessing ecosystem services delivered by freshwater and marine ecosystems that can be of interest for the EU biodiversity strategy; help develop a comprehensive approach to assessing and managing the risks from the simultaneous presence of multiple chemicals (mixtures) in the aquatic environment, in particular gathering, assessing and developing the scientific and technical knowledge on effect-based tools and on identifying problematic substances in mixtures.

b) Biodiversity, ecosystem services, forests and soils — support the implementation and final evaluation of the EU biodiversity strategy (also contributing to its global dimension, linked to key orientation 9.2.3.b), notably by assessing ecosystem conditions, ecosystem services and supporting natural capital accounting (INCA) in the context of the environmental knowledge community; support the implementation of the EU Green Infrastructure Strategy, the EU Pollinators Initiative, the invasive alien species regulation and its information system; contribute to global biodiversity monitoring and the sustainable supply and demand of biomass for all uses; analyse and model forest resources and develop information systems on forests and forest fires in support of the EU forest strategy; support the EU soil thematic strategy and further soil policy developments by improving knowledge, modelling and developing indicators of soil functions and soil and land degradation processes (also as SDG indicators), including desertification; maintain JRC soil expertise and European Soil Data Centre as well as monitor land and soil conditions through land use/cover area frame statistical survey and other data sources, in close coordination with the European Environment Agency and ESTAT; perform activities to assess soil 'point' contamination and to close data and knowledge gaps in particular on soil biodiversity and soil diffuse pollution; support growing ecosystem services, soil and land related activities at international level in particular on SDGs, Food and Agriculture Organization (FAO) and the Global and European Soil Partnerships, UN Convention to Combat Desertification (UNCCD) Land Degradation Neutrality, UN System of Environmental-Economic Accounting (UN-SEEA), the Intergovernmental Panel on Climate Change (IPCC) and the Intergovernmental science-policy Platform on Biodiversity and Ecosystem Services (IPBES) as well as similar networks and the European Soil Bureau Network.

1.3.2. A circular, green and competitive low-carbon economy

a) Sustainable consumption and production and the circular economy — elaborate criteria and measures for implementing sustainable product policies (EU Ecolabel Regulation, Green Public Procurement Communication, Ecodesign requirements for Energy-related Products Directive, Energy Label Regulation) and for facilitating the

exchange of information on best practices; determine the best available techniques and develop indicators for waste management; determine and assess the efficiency of sorting and recycling operations for key waste streams, as well as how to treat waste oils and other hazardous waste; evaluate how to optimise energy recovery from waste in line with the EU waste hierarchy; assess the product-waste interface (i.e. reparability, durability, and recyclability); develop lifecycle methodologies, data and analyses for sustainable consumption and production (linked to key orientation 4.1.f); develop other actions related to circular economy policy, such as EU raw materials knowledge base (linked to key orientation 4.1.d) and plastics strategy, which includes: addressing the challenge of recycling plastic waste in higher value applications (e.g. food contact materials), developing methods and tools for lifecycle assessments of plastics, assessing the environmental footprint of products and organisations, assessing the environmental benefits of higher recycling levels, developing methods and reference materials to detect, characterize and quantify microplastics and nanoplastics in food, water and the environment; develop and deploy a set of indicators for the sustainability assessment of buildings; gather knowledge and data on the technical and economic viability and the environmental impacts of innovative recycling technologies and processes, assessing environmental and industrial policies (linked to key orientation 4.1.a).

b) **Environmental knowledge and indicators** — develop environmental indicators and lifecycle-based methods and data for the roadmap to a resource-efficient Europe, for SDGs (linked to key orientation 9.2.1.a) and for incorporating environmental considerations into other policies, e.g. via the better regulation toolbox; contribute to the environmental knowledge community, including through its knowledge innovation projects in order to generate, plan and share environmental knowledge in a more efficient way; develop indicators on natural capital accounting (INCA), circular economy, raw materials, food waste and SDGs indicators; contribute to regular data production of the indicators in the Commission monitoring framework on the circular economy, in particular the indicator on patents; improve spatial data management at the Commission, building on the experience in implementing INSPIRE (the infrastructure for spatial information in Europe); develop innovative tools and products for spatial data harvesting and management as contribution to the follow up on the environmental reporting fitness check.

1.3.3. Protection from environment-related risks to human health and wellbeing

a) **Chemicals and nanomaterials** — help to design and implement legislation on chemicals, including nanomaterials, and support policy development in cross-cutting areas; set up a knowledge base and further develop and maintain the Information Platform for Chemical Monitoring (IPChem), especially to support the European Human Biomonitoring Initiative (HBM4EU); support mutual acceptance of chemicals and nanomaterial data at international level (e.g. OECD); develop and promote alternatives to animal testing; develop methodologies, standards, reference materials and representative test materials for nanomaterials, including the nanomaterials repository (see also key orientations in 4.1).

b) **Air quality, pollutant emissions and industrial accident prevention** — monitor and model ambient air quality and emissions (for the reduction of transport specific emissions, see key orientations 3.1.1.c and 4.1.a); carry out integrated impact assessments of air quality and climate policies, support the mainstreaming air quality

in other policy areas (energy, transport, climate, agriculture, human health) and provide tools to make it easier to manage air quality at national, regional and local level; support the implementation of EU air quality policies through harmonisation and standardisation programmes, providing training to Member States, and by improving and validating innovative methods and air quality modelling (through the FAIRMODE network); support the implementation of the Industrial Emissions Directive by determining best available techniques for reducing industrial emissions to air, water and soil; develop information systems on, and carry out analyses of, industrial accidents.

1.4. Maritime affairs, fisheries and the Blue Economy

European policies on maritime affairs and fisheries aim to ensure that marine resources are used in a responsible way while at the same time contributing to further develop the potential of Europe's maritime economy. Sustainable and competitive fisheries, food supply, sustainable aquaculture and thriving coastal communities are the objectives of the Common Fisheries Policy (CFP) and the Integrated Maritime Policy (IMP).

In 2013, the CFP was reformed taking forward the concept of Maximum Sustainable Yield, which should be reached at the latest by 2020. It also aimed at gradually eliminating the wasteful practice of discarding through the introduction of the landing obligation. The IMP provides a coherent approach to all other maritime issues through increased coordination between different policy areas, such as blue growth, integrated maritime surveillance, the marine environment, and sea-basin strategies supporting the development of cross-sectoral tools (Maritime Spatial Planning, the Common Information Sharing Environment, etc.).

To foster the growth of the Blue Economy a first edition of an Annual Economic Report on the Blue Economy has been launched in 2018. Measuring the trends, performance and progress of the EU blue economy should serve as guidance for both policy-makers and potential investors.

In 2017, the EU has also further positioned itself as a global champion of sustainably managed oceans by hosting the 4th Our Ocean Conference. The EU remains committed to this process as a means to implement the Joint Communication on International Ocean Governance.

Relevant Commission policy objectives:

- ensuring that the ocean resources are used sustainably and that coastal communities and the fishing sector have a prosperous future;
- stimulating a sustainable Blue Economy;
- promoting Ocean Governance at international level.

Key orientations for the JRC:

a) **Implementation of the Common Fisheries Policy** — develop and apply biological, economic, social, spatial and genetic/genomic approaches to sustainable and competitive aquaculture and fisheries, in the EU and worldwide.

b) **Assessment of the Blue Economy** — support the Blue Growth Strategy through the analysis of value and opportunities of the Blue Economy (also contributing to its global dimension - linked to key orientation 9.2.3.b).

c) **Maritime Security** — improve EU maritime surveillance systems, enhance their interoperability and provide support to implement selected actions under the EU maritime security strategy (other work on security is covered under key orientations in 7.2).

1.5. Health and food safety

1.5.1. Health

Promotion of health and prevention of disease safeguards not only the personal wellbeing and quality of life of EU citizens at large but also the sustainability of our healthcare systems and the competitiveness of our economy. The health sector offers great potential to promote growth, create new jobs, ensure fairness and trigger productivity gains. As documented in the *Health at a Glance: Europe 2018*⁵, life expectancy across EU Member States has increased by at least 2 to 3 years over the decade 2001 to 2011 in all EU countries, but inequalities persist both between and within them. This is largely due to different levels of exposure to risk factors, but also to unequal access to healthcare. Dietary risks as well as smoking, alcohol use and physical inactivity are major societal problems in Europe and globally, with a great impact on people's wellbeing: unhealthy diets are the 1st risk factor in the EU for mortality, causing over 1 million deaths in the EU (in 2016)⁶.

To appreciate the health-related opportunities for jobs, growth and investments, it is critical to look beyond Europe: emerging markets already today represent two thirds of the world's elderly. According to UN forecasts, the global share of people aged 65 and over will rise to nearly 80 % by 2050 in those markets. By 2035 China will become a 'hyper-aged' society (defined by the UN as those in which seniors make up more than 21% of the population). South Korea, Singapore and Thailand present a similar picture. This development could boost growth in the EU medical technology sector.

Health can be promoted through general *preventive* measures (e.g. healthier lifestyle to prevent cardiovascular disease, cancer or obesity and subsequent disease burden, better understanding of causative factors for diseases/conditions, reduction of tobacco and alcohol consumption, physical activity and balanced diets), and *curative* measures (e.g. use of medicines and medical technology).

Relevant Commission policy objectives:

⁵ https://read.oecd-ilibrary.org/social-issues-migration-health/health-at-a-glance-europe-2018_health_glance_eur-2018-en#page14

⁶ <https://ec.europa.eu/jrc/en/health-knowledge-gateway/societal-impacts/burden>

- improve and protect human health, reduce health inequalities, support the reform of health systems and fight discrimination; enable the digital transformation of health and care;
- support the development of innovative and sustainable healthcare systems and new technologies in the EU;
- prevent non-communicable diseases (particularly cardiovascular diseases, obesity, diabetes, and cancer) and promote good health and nutrition in an ageing Europe using appropriate measures;
- support Commission policies and proposals related to consumer safety, health and the environment with scientific advice and risk assessments;
- protect Europeans from a range of cross-border health threats and ensure a fully coordinated response in the event of a crisis;
- assure the availability and promote the application of harmonised measurement methods and classifications;
- evaluate the action plan against the rising threat from antimicrobial resistance.

Key orientations for the JRC:

a) Healthcare, health information, and promotion of a healthier society — in the field of harmonisation and improvement of healthcare and health information in the EU: provide expert support (for example technical, legal and organisational) to professional associations and patient associations for the development of European disease registries (including for rare diseases and for the European Reference Networks); provide high quality health data to relevant processes at EU level, such as the State of Health; launch of an innovative and comprehensive quality-assured cancer healthcare pathway (starting with breast cancer, followed by colorectal cancer, etc.); monitor cross-border health threats and reference systems including certified reference materials for health measurements. In the framework of health promotion and prevention of non-communicable diseases (NCDs): support of policies for fighting cardiovascular disease, cancer and diabetes, both childhood and adult obesity, in line with the Tartu call for healthy lifestyle. To help member states to reach the sustainable development goals on health: support of policy anticipation and implementation efforts in health promotion and NCDs prevention; selection, evaluation and dissemination of interventions for implementation in Member States through support to the Steering Group on Health Promotion, Disease Prevention and Management of Non-Communicable Diseases⁷.

b) Support policies related to Health Technology Assessment (HTA), chemicals and nanomaterials — support the further development of evidence-based approaches and of reliable data to facilitate cooperation on HTA; monitor chemical data; harmonise the methodology for endocrine disruptors related chemical assessment; disseminate novel toxicity approaches. For nanomaterials, focus will be on

⁷ https://ec.europa.eu/health/non_communicable_diseases/steeringgroup_promotionprevention_en

harmonisation of assessment methodologies, safe innovation and new advanced materials.

1.5.2. Food safety, food quality and food fraud

Food safety policies aim to ensure a high level of protection of human health while providing for a proper functioning of the internal market. In 2017, 3 832 original notifications of non-compliance with EU food legislation were sent through the EU's rapid alert system for food and feed. Many of the recent food crises, such as the recent incident with fipronil, were related to food fraud and to a lesser extent to food safety. The protection of public and animal health is also key regarding emerging food and feedstuffs, such as insects, as new source of animal protein. International collaboration on food safety inspection is well established, but further efforts are needed to detect and prevent food fraud.

The objective of EU animal health policy is to raise the health status and improve the conditions of animals in the EU, in particular food-producing animals. But the purpose is also to permit trade and imports of animals and animal products between Member States in accordance with appropriate health standards and international obligations. EU rules on plant health aim to protect crops, fruit, vegetables, ornamentals and forests from harmful pests and diseases by preventing them from entering or spreading in the EU.

Relevant Commission policy objectives:

- ensure a high level of safety in the food and feed chain through science-based risk management;
- ensure evaluation and follow-up of food legislation;
- carry out a REFIT evaluation of Regulation (EC) No 1924/2006 of the European Parliament and of the Council⁸;
- carry out a REFIT evaluation of Regulation (EC) N°1935/2004 on Food Contact Materials
- amend Regulation (EC) No 1829/2003 of the European Parliament and of the Council⁹ as regards the possibility for the Member States to restrict or prohibit the use of genetically modified food and feed on their territory;
- ensure implementation of the Regulation (EU) 2017/625 of the European Parliament and of the Council¹⁰ (the Official Controls Regulation);

⁸ Regulation (EC) No 1924/2006 of the European Parliament and of the Council of 20 December 2006 on nutrition and health claims made on foods (OJ L 404, 30.12.2006, p.9).

⁹ Regulation (EC) No 1829/2003 of the European Parliament and of the Council of 22 September 2003 on genetically modified food and feed (OJ L 268, 18.10.2003, p.1).

¹⁰ Regulation (EU) 2017/625 of the European Parliament and of the Council of 15 March 2017 on official controls and other official activities performed to ensure the application of food and feed law, rules on animal health and welfare, plant health and plant protection products, amending Regulations (EC) No 999/2001, (EC) No 396/2005, (EC) No 1069/2009, (EC) No 1107/2009, (EU) No 1151/2012, (EU) No 652/2014, (EU) 2016/429 and (EU) 2016/2031 of the European Parliament and of the Council,

- ensure implementation of Regulation (EU) 2015/2283 of the European Parliament and of the Council¹¹ (the new Novel Food Regulation);

- introduce a new animal and plant health law.

Key orientations for the JRC:

a) **Food and feed safety** — manage three EU reference laboratories, which includes developing harmonised/validated methods, organising laboratory proficiency tests and providing new analytical tools for food and feed safety control, food contact materials and the pre-marketing authorisation of genetically modified organisms and feed additives; support official control in EU Member States related to food products and the integrity of the food chain by providing quality assurance tools (analytical methods, proficiency tests and reference materials) and training for monitoring substances of concern; support the implementation and enforcement of the food legislation provisions relating to engineered nanomaterials.

b) **Food and feed quality and fraud** — manage the Knowledge Centre on Food Fraud and Quality (see also key orientation 7.1.a); assist in the fight against food fraud in emerging cases; operate two European reference centres (authenticity of wine, water in poultry); produce certified reference materials for food and feed analysis; coordinate an EU wide testing campaign to tackle the alleged differences in quality of food products.

c) **Plant health** — protect plant health through early detection and plant health monitoring initiatives.

1.6. Regional policy

Cohesion policy investments in Member States, regions and cities are increasingly important for achieving the objectives of the Europe 2020 strategy and the priorities of the Investment Plan for Europe and its successor, the InvestEU Programme. The policy is an integral part of EU economic governance and contributes to the European Semester process. Cohesion policy aims at economic, social and territorial cohesion and is funded through the European structural and investment funds.

Relevant Commission policy objectives:

Council Regulations (EC) No 1/2005 and (EC) No 1099/2009 and Council Directives 98/58/EC, 1999/74/EC, 2007/43/EC, 2008/119/EC and 2008/120/EC, and repealing Regulations (EC) No 854/2004 and (EC) No 882/2004 of the European Parliament and of the Council, Council Directives 89/608/EEC, 89/662/EEC, 90/425/EEC, 91/496/EEC, 96/23/EC, 96/93/EC and 97/78/EC and Council Decision 92/438/EEC (Official Controls Regulation) (OJ L 095 7.4.2017, p. 1).

¹¹ Regulation (EU) 2015/2283 of the European Parliament and of the Council of 25 November 2015 on novel foods, amending Regulation (EU) No 1169/2011 of the European Parliament and of the Council and repealing Regulation (EC) No 258/97 of the European Parliament and of the Council and Commission Regulation (EC) No 1852/2001 (OJ L 327, 11.12.2015, p. 1).

- achieve economic, social and territorial cohesion by reducing disparities between the levels of development of regions and countries of the EU;
- ensure synergies, strengthen performance and simplify the use of EU investments and place-based policy development;
- develop strengthened cooperation with non-EU countries through macro-regional strategies;
- coordinate urban policies and maximise their contribution to the urban dimension of the sustainable development goals and the new urban agenda.

Key orientations for the JRC:

- a) **Territorial modelling for impact assessment of policies and investments** — manage a Knowledge Centre for Territorial Policies and carry out integrated modelling to better assess the impact of investments and policies in cities, regions and macro-regions, including demographic trends, climate change impacts, employment and productivity, accessibility and connectivity and territorial resilience.
- b) **Economic, social and environmental cohesion and development** — develop indices, customize satellite-based data and perform quantitative analyses at urban, regional, cross-border and macro-regional levels, including on drivers of population dynamics and air quality control.
- c) **Support for territorial and local macro-regional and smart specialisation strategies** — develop integrated processes and qualitative methods to support the development, implementation and monitoring of smart specialisation strategies and other territorial and local strategies; support the transition to smart grids and capacity building at national, regional, urban, cross-border and macro-regional levels.

1.7. Research, science and innovation

The European research, science and innovation strategy targets a world that is open, digital and global. It focuses on shaping research and innovation systems by bringing together the digital and physical worlds enabling socio-economic prosperity and environmental sustainability. It seeks to secure research results that can reach the market, keep European scientific output at a world-class level and strengthen Europe's global role in science.

Relevant Commission policy objectives:

The way that science works is fundamentally changing and an equally important transformation is taking place in how companies and societies innovate. The advent of digital technologies is making science and innovation more open, collaborative and global. In this light, three goals are set for EU research and innovation policy: open innovation, open science and open to the world.

The Renewed European Agenda for Research and Innovation adopted in May 2018 presents a set of concrete actions to deepen Europe's innovation capability and provide lasting prosperity.

For the final work programme under Horizon 2020¹², the Commission has set out five major priorities which are based on overall EU policy priorities and show how research and innovation contribute across the Commission's political priorities:

- increasing investment in sustainable development and climate related research and investment (R&I);
- integrating digitisation in all industrial technologies and societal challenges;
- strengthening international R&I cooperation;
- societal resilience, including research on security threats and migration;
- market creating innovation.

Key orientations for the JRC:

a) **Research and innovation policies** — model, monitor and analyse the drivers of and barriers to research and innovation, including the effectiveness of policy instruments related to research and innovation at EU, national, regional and (cross-) sectoral levels; support R&I funding agencies by developing a semantic similarity tool to help avoiding double funding of research; develop indicators, scoreboards, information systems and web platforms for monitoring and analysing the implementation of EU research and innovation policies; provide support through foresight and horizon scanning to identify research and innovation priorities; provide open access to research infrastructures; manage a Competence Centre for Technology Transfer for policy support and capacity building.

b) **Fuel cells and hydrogen technologies** — support the Fuel Cells and Hydrogen Joint Undertaking by monitoring and assessing the technologies and the multi-annual programme. This JRC work is closely linked with workstreams described in Sections 1.8 (transport — namely, on alternative fuels) and 3.2 (energy).

c) **Low-carbon energy observatory** — provide data, analysis and assessment of the state of the art of different energy technologies, their industrial development, market barriers and global competition; estimate the potential contribution of the technologies in the future energy mix; carry out an inventory of scientific developments and new and emerging technologies. The relevant JRC work is closely interconnected with work described in Section 3.2 (energy).

d) **Bioeconomy** — manage a Knowledge Centre for Bioeconomy serving the following purposes: collect, structure and make accessible data and information on the bioeconomy from different sources; develop methods and data for assessing the

¹² http://ec.europa.eu/research/participants/data/ref/h2020/wp/2018-2020/main/h2020-wp1820-intro_en.pdf

environmental performance of bio-based products based e.g. on the Product Environmental Footprint; bring together the knowledge and expertise needed to assess the status, progress, and impact of the bioeconomy; develop and make available forward-looking tools and results of foresight exercises; provide a basis for coherent cross-sectoral policy-making on the bioeconomy, including across relevant agriculture, food, environment, climate, energy and industry policies; provide data and analysis on sustainable biomass supply and demand at EU level and worldwide, covering all types and uses of biomass; provide a basis for coherent policies on the bioeconomy, including relevant agriculture, food, environment, climate, energy and industry policies. The JRC's work on the bioeconomy will be closely interconnected with work described in Sections 1.1 (agriculture and rural development), 1.3 (environment), 1.4 (blue economy), 1.6 (regional), 1.5 (health and food safety), 1.9 (employment), 3.1 (climate action) and 3.2 (energy) and 4.1 (industrial base).

e) **R&I in Cities** — Collect, structure and make accessible data and information on Urban Research and Innovation from different sources; bring together the knowledge and expertise needed to assess the impact of urban research and innovation projects and activities; develop and make available forward-looking tools and results of foresight exercises; moderate the development of a Multi-level Thirdspace for Systemic Urban Research and Innovation (EU Policy Lab with DG RTD); expand the Community of Practice on Cities. This work will be closely linked with work of the Knowledge Centre for Territorial Policies and with the Urban Data platform. It also has links with work described in Sections 1.2 (education, culture, youth and sport), 1.3 (environment), 1.5 (health and food safety), 1.6 (regional policy), 1.8 (transport), 1.9 (employment, social affairs, skills and labour mobility), 3.1 (climate action), 3.2 (energy), 4.1 (industrial base), 8.1 (migration), 9.2 (international) and 10.2.

1.8. Transport

The transport sector is both an essential parameter to the citizens' freedom of movement and a very important economic sector, significantly contributing to employment and growth (5.2 % of total employment and 5 % of European gross added value), while it is linked with the energy and climate policy and objectives. Currently it is highly dependent on oil and oil products (94 %) and responsible for 24 % of GHG emissions (excluding international maritime) and it is the main cause of reduced air quality and of noise in cities, which poses a serious threat to public health. The objectives of EU transport policy are described in the 2011 White Paper, with initiatives to increase the efficiency of the transport system and its competitiveness and to remove major barriers in key areas, while drastically reducing dependence on imported oil and cutting carbon emissions in transport by 60 % by 2050. The low-emission mobility strategy, adopted in 2016 and further detailed with the three mobility packages in 2017 and 2018, aims to increase the efficiency of the transport system, speed up the deployment of low-emission alternatives for transport and move towards zero-emission vehicles. The strategy also aims for safer road transport, smart mobility and smooth deployment of intelligent transport systems and connected and automated vehicles.

Relevant Commission policy objectives:

- ensure that GHG emission reductions and climate resilience in the transport sector help to achieve EU targets;
- ensure that air pollutant emission reductions in the transport sector help to achieve EU ambient air quality standards, and that air quality co-benefits of CO₂ reduction policies are realised;
- promote the efficient and safe functioning of Europe's infrastructure to help develop the internal market;
- support optimal connectivity across different transport modes to make travel easier;
- develop harmonised standards for safety and security.

Key orientations for the JRC:

- a) **Transport innovation** — support the strategic transport innovation agenda (STRIA) on cooperative, connected and automated transport, transport electrification, vehicle design and manufacturing, low-emission alternative energy for transport, network and traffic management systems, smart mobility and services and transport infrastructure; develop the transport innovation and monitoring information system (TRIMIS); assess the status of new transport technologies and their possible future implementation. This key orientation is linked to key orientations 4.1.f and 3.1.1.d.
- b) **Alternative fuels** — monitor the deployment and uptake of alternative fuels (electricity, hydrogen, natural gas, LPG and biofuels) in the transport sector by maintaining and expanding the knowledge and data base on alternative fuel production capacity in Europe; perform studies on alternative fuels demand scenario reflecting the evolving EU regulatory framework; carry out pre-normative testing and help to develop standards for implementing the alternative fuels infrastructure under the Alternative Fuels Infrastructures Directive; support the follow-up of the action plan for alternative fuels infrastructure with the broadest use of alternative fuels and related provisions in Directive 2014/94/EU on the deployment of alternative fuels infrastructure; perform modelling of electromobility including the best placement for charging infrastructure and support for electromobility standardisation through pre-normative research. This key orientation is linked to key orientation 3.1.1.d.
- c) **Transport policy analysis** and tools for citizen's awareness and education — perform socioeconomic analyses of the transport sector, using transport models, quantitative methodologies, data, scenarios and technology watch; develop congestion indicators; contribute to harmonisation of transport data with spatial and environmental information.
- d) **Intelligent transport systems and electronic tools** — provide technical support to implement the 'smart tachograph', in particular to prepare new technical specifications; support the development of cooperative intelligent transport systems and connected and automated vehicles and contribute to anticipate their implications for transport, economy, and society.

e) **Safety and security** — develop tools and databases on EU-wide multimodal accidents and incidents (including a specific database for alternative fuels incidents) and data visualisation and exploration tools for transport safety analysis, including for aviation safety and transport infrastructure; carry out performance testing and analysis of aviation security technologies.

1.9. Employment, social affairs, skills and labour mobility

The number of people in employment in the European Union has reached new record levels and the last year confirmed the ongoing positive labour market trends as well as an improving social situation, in part thanks to EU-level actions. The European Fund for Strategic Investments (EFSI), a strengthened Youth Employment Initiative and Youth Guarantee and the European Structural and Investment Funds were launched together with the European Investment Advisory Hub. Still, the need to create jobs in the medium term, particularly for vulnerable groups, such as young people, the long-term unemployed, and refugees, remains a pressing policy issue.

In 2016, the Commission introduced the new skills agenda for Europe to support the supply side of labour markets. The agenda calls for action to develop skills, such as using pathways at national level to upskill the low-skilled, making a better use of basic and digital skills and anticipating what skills will be needed in future.

The Commission also established a ‘European pillar of social rights’. The aim is to support fair and well-functioning labour markets and welfare systems in the face of the global challenges posed by disruptive technologies and adverse demographics. The pillar sets out 20 key principles that build on and complement existing EU social legislation to guide policies in a number of fields that are essential for well-functioning and fair labour markets and welfare systems and reflect the realities of the 21st century.

Relevant Commission policy objectives:

- promote dynamic, inclusive and resilient labour markets in Member States and tackle youth unemployment;
- step up the coordination and monitoring of employment policies at EU level in line with EU economic governance and improve cross-sectoral cooperation;
- contribute to the growth and investment package and funding initiatives that support access to the labour market, in particular by promoting vocational training and lifelong learning to strengthen skills;
- work to reduce inequality and poverty;
- implement the European pillar of social rights.

Key orientations for the JRC:

a) **Monitoring and evaluation of employment and social policy** — provide high-quality monitoring, benchmarking, impact assessment and evaluation support for

employment and social-policy-related measures, notably through three Competence Centres referred to in Section 10.1.

b) **Fairness and inequality** — produce and share, in a multi-annual research project and community of practice, insights and analysis on what makes a society fair, thus building a wider evidence base that can enhance EU policy in this priority area (the importance of the fairness agenda being reflected by the adoption of the European Pillar of Social Rights, see also key orientation 5.1.a); measure and analyse poverty.

c) **Future of skills and work** — analyse how skills are distributed and evolve and their links with employment potential, the changing nature of work and welfare systems and new forms of employment, social innovation and the collaborative economy (see also key orientation 4.2.a).

2. A connected digital single market

2.1. Digital economy and society

Continuously evolving internet and digital technologies are increasingly permeating every aspect of our economy and society, offering numerous opportunities, but also bringing about new challenges. In the first three and a half years of its office, the Commission proposed around 60 initiatives to create an efficient, fair and safe European Digital Single Market taking due account of dynamic developments, such as the conclusions of the Mid-Term Review of the Digital Single Market Strategy and the commitments made by European Heads of State at the Tallinn Digital Summit at the end of 2017. Taking account of the Tallinn conclusions, the Commission is focusing on addressing the challenges and reaping the opportunities triggered by technologies such as Artificial Intelligence & Distributed Ledger Technologies while keeping the emphasis on building a strong cyber-security in Europe, supporting the development of High Performance Computing, securing the necessary technical and international conditions for the development of 5G and ensuring the development of digital skills.

Relevant Commission policy objectives:

- boost e-commerce in the EU by tackling geoblocking, and making cross-border parcel delivery more affordable and efficient;
- modernise EU copyright rules and make them fit for the digital age;
- update EU audiovisual rules and work with platforms to create a fairer environment for everyone, promote European films, protect children and tackle hate speech;
- scale up Europe's response to cyber-attacks by strengthening ENISA, the EU cybersecurity agency, and create an effective EU cyber deterrence and criminal law response to better protect Europe's citizens, businesses and public institutions;
- unlock the potential of a European data economy with a framework for the free flow of non-personal data in the EU;

- ensure everyone in the EU has the best possible internet connection, so they can fully engage in the digital economy, i.e. ‘connectivity for a European gigabit society’;
- adapt ePrivacy rules to the new digital environment;
- help large and small companies, researchers, individuals and public authorities to make the most of new technologies by ensuring that everyone has the necessary digital skills, and by funding EU research in health and high performance computing;
- ensure a fair, trusted and innovation-driven ecosystem in the online platform economy that contributes to the Digital Single Market in terms of innovation, competitiveness, jobs and growth.

Key orientations for the JRC:

a) **Impact of digital technology and transformation on society** — provide evidence on the development of Digital Transformation and AI in the European economy and society; observe current developments and explore future developments and their impacts, including the development of an AI index, in order to inform and guide future EU policies; assess related economic models on growth, jobs and consumer welfare in the EU; measure the economic impact of policy initiatives in the European Data Economy; investigate digitally-enabled innovation and entrepreneurship; analyse the deployment of digital transformations in human societies and its impact on governance, public services, resilience of social structures and human-machine interactions; support the pan-European network of digital innovation hubs; develop a methodology to monitor EU data flows and their value creation for the EU economy based on an econometric model factoring in social and innovation dimensions; assist in developing a policy framework for data sharing in business-to-business and business-to-government situations, including economic analysis of data as an economy resource and competition element of the data economy.

b) **Modern telecommunications** — develop IT tools and methodologies to analyse the radio spectrum inventory and support spectrum management; perform technical tests and analyses of the integration of 5G technologies and 5G vertical markets; investigate the potential of quantum cryptographic keys for 5G and satellite telecommunications; study the impact of quantum technologies on wireless protocols like 5G.

c) **Cybersecurity, privacy and trust** — help to build EU resilience to cyber-attacks; provide technical support for the deployment of the EU cybersecurity strategy including on-field research of issues related to the cybersecurity of hyperconnected systems; help to create an adequate security and trust framework for the internet of things (IoT) by supporting the establishment of standards and trust assessment of IoT systems; analyse communication protocols, data protection and privacy issues of the new telecommunication paradigms and online services; support to the certification of security related IT systems and their components such as cloud computing; assess the vulnerability and standardisation of crypto-currencies and distributed ledgers; develop data analysis tools and techniques for dimensioning the connectivity of urban-wide sensor networks; support the creation and management of the first European Atlas on Cyber-Security Research and Development; support the establishment of the European

Cybersecurity Industrial, Technology and Research Competence Centre, its objectives and overall organizational set up.

d) Optimising the use of digital technologies in the public and private sector — provide technical support for the interoperability of e-infrastructures (helping to modernise the digital public services) and open access (supporting open science); offer competences and expertise in data science including AI and machine learning and serve the demand for intelligent data exploration and analysis; assess the interoperability of energy services in support of digitisation of the energy system (linked to key orientation 3.2.c); analyse the impact of interoperability and standardisation on intellectual property rights; provide expert support on interoperability and security aspects for the European Electronic Health Record Exchange; provide support to Member States for delivering cross-border access to genomic information; provide support to the digital transformation of built environment.

3. A resilient Energy Union with a forward-looking climate change policy

3.1. Climate action

Domestically, EU climate policy aims at encouraging the transition towards a low-carbon and climate-resilient economy in the EU to help slow down global warming and support the recovery of the ozone layer. It also aims at ensuring that climate policy is taken into account in other EU policies and programmes. Since the Paris Agreement on climate change came into force in November 2016, the EU has been driving the process forward to secure ambitious coordinated climate action with its international partners.

The European Council's agreement in October 2014 on the '2030 climate and energy policy framework'¹³ set specific targets and confirmed the core structure of EU climate and energy policy up to 2030. The framework is now an integral building block of the Energy Union strategy¹⁴ adopted by the Commission in February 2015.

The first legislative deliverable under the Energy Union to implement the 2030 targets was the revised ETS directive¹⁵ which regulates GHG emissions from large point sources (mainly power sector and industry) and aviation. The annual ETS cap reduction was increased with a view of achieving 43% reductions by 2030 compared to 2005. A second set of legislation regulates emissions and absorptions of the sectors outside the EU ETS in the 2030 climate and energy framework: The Effort Sharing

¹³ EUCO 169/14, European Council Conclusions of 24 October 2014.

¹⁴ Communication from the Commission to the European Parliament, the Council, the European and Social Committee, the Committee of the Regions and the European Investment Bank of 25 February 2015 – A Framework Strategy for a Resilient Energy Union with a Forward-Looking Climate Change Policy, COM(2015) 080 final.

¹⁵ Directive (EU) 2018/410 of the European Parliament and of the Council of 14 March 2018 amending Directive 2003/87/EC to enhance cost-effective emission reductions and low-carbon investments, and Decision (EU) 2015/1814, and Consolidated version of Directive 2003/87/EC of the European Parliament and of the Council establishing a scheme for greenhouse gas emission allowance trading within the Community and amending Council Directive 96/61/EC

Regulation¹⁶ and Regulation on the inclusion of greenhouse gas emissions and removals from land use, land use change and forestry (LULUCF)¹⁷.

The 2013 EU **strategy on adaptation to climate change**¹⁸ contributes to a more climate-resilient Europe by ensuring that authorities at local, regional, national and EU level are better prepared and have a greater capacity to respond to the impact of climate change, developing a coherent and coordinated approach. The strategy has been evaluated and the Commission adopted the resulting Report¹⁹ on 12 November 2018.

In 2018 the Commission also came forward with a Communication on a 'European long-term strategic vision for a prosperous, modern, competitive and climate neutral economy'²⁰. It aims to open a thorough debate involving European decision-makers and citizens at large as to how Europe should prepare itself towards a 2050 horizon and the subsequent submission of the European long-term Strategy to the UN Framework Convention on Climate Change by 2020.

Relevant Commission policy objectives:

- further develop and achieve a well-functioning EU carbon market;
- create and maintain a fair and operational framework for the reduction of GHG emissions in non-emissions trading system (non-ETS) sectors (agriculture, forestry, land use, buildings, transport, waste);
- further decarbonise the transport sector;
- increase the resilience of EU society and partner countries against the effects of climate change;
- optimise and efficiently manage financial incentives to support the innovation-based transition to a low-carbon and climate-resilient economy in the EU;

¹⁶ Regulation (EU) 2018/842 - Binding annual greenhouse gas emission reductions by Member States from 2021 to 2030 contributing to climate action to meet commitments under the Paris Agreement and amending Regulation (EU) No 525/2013

¹⁷ Regulation (EU) 2018/841 - Inclusion of greenhouse gas emissions and removals from land use, land use change and forestry in the 2030 climate and energy framework, and amending Regulation (EU) No 525/2013 and Decision No 529/2013/EU

¹⁸ Communication from the Commission to the European Parliament, the Council, the European and Social Committee, and the Committee of the Regions of 16 April 2013 – An EU Strategy on adaptation to climate change, COM(2013) 216 final.

¹⁹ Report from the Commission to the European Parliament and the Council of 12 November 2018 on the Evaluation of the EU Strategy on adaptation to climate change (with accompanying documents), COM(2018) 738 final

²⁰ Communication from the Commission to the European Parliament, the European Council, the Council, the European Economic and Social Committee, the Committee of the Regions and the European Investment Bank of 28 November 2018 - A Clean Planet for all A European strategic long-term vision for a prosperous, modern, competitive and climate neutral economy, COM(2018) 773 final

- contribute to effective international negotiations (The United Nations Framework Convention on Climate Change, Kyoto, Paris, International Civil Aviation Organization, International Maritime Organisation, Montreal).

Key orientations for the JRC:

3.1.1. Mitigation

a) **Economic and climate modelling/assessments** — design and implement domestic and international climate policies and strategies to keep global warming well below 2 °C and pursue efforts to limit it to 1.5°C; maintain and further develop integrated sets of models that cover relevant sectors and greenhouse gases in the EU and other relevant world regions for applications such as (i) socio-economic analysis of scenarios consistent with climate policy goals; (ii) development of in-house energy models; (iii) assessment of contributions of related sectors; (iv) analysis of GHG emissions trends and drivers and emissions projections of non-ETS sectors per Member State.

b) **GHG and air pollutants emissions modelling** — monitor, report and verify (using independent in-situ, air- or space-borne atmospheric measurements) anthropogenic GHG emissions, and more specifically energy-related, agricultural and forestry (Land Use, Land-Use Change and Forestry - LULUCF and Reduction of Emissions from Deforestation and Degradation - REDD+) emissions to meet legal obligations at EU and international level; model and analyse how to integrate the assessment of these emissions into EU and international legislation; assess GHG emissions and mitigation options in agriculture; compile global emissions inventories which include short lived climate pollutants (black carbon and methane). This key orientation is linked to key orientation 1.3.3.b.

c) **Vehicle emissions** — provide technical support to the implementation of the mobility packages for decarbonising the transport sector; specifically, support the further development and implementation of the CO₂ emission legislation and associated tools for light- and heavy-duty vehicles, including effective market surveillance mechanisms such as in-service conformity testing; perform collection and analysis, by means of testing and modelling, of real-world fuel consumption and CO₂ emissions data of light- and heavy-duty vehicles; support the development of consumer information systems in relation to CO₂ and fuel consumption (also exploring feasibility to include air pollutant emissions); assess eco-innovation CO₂ savings; assess innovation scenarios for smart mobility technology. This key orientation is linked to key orientations 4.1.f and 1.8.a.

d) **Alternative fuels for transport** — assess the environmental sustainability, technological development and costs of bioenergy and biofuels, energy efficiency and associated savings on GHG and pollutant emissions, including ‘well-to-wheels’ analyses; assess competing demands for biomass from other sectors; provide support for alternative fuels and fuel quality legislation; support the Commission's work on alternative fuels for aviation, including international negotiations and commitments at the United Nations International Civil Aviation Organization (UN-ICAO).

3.1.2. *Adaptation*

a) **Support the review and update of the EU adaptation strategy and the objectives of the Sendai framework for disaster risk reduction²¹ and the sustainable development goals** — assess the economic and non-economic impact of climate change, vulnerability, resilience, and options for adapting in the EU and globally; in collaboration with the Knowledge Centres on Disaster Risk Management, on Migration and Demography, and on Territorial Policies, assess the impact of weather extremes, study the links between climate change and displacement/migration and urban resilience (including support for the adaptation activities under the Covenant of Mayors for Climate and Energy²², further covered under key orientation 3.2.d).

b) **Assess the climate change impacts, mitigation and adaptation options** in agriculture and in the terrestrial, aquatic and marine ecosystem, within a European and global perspective (this includes the evaluation of the opportunities in the agriculture and ecosystems that climate change can bring if appropriate measures are taken).

3.1.3. *Climate science, research and observations*

a) **Climate monitoring and observation** — advance the understanding of how climate change will affect the Earth's system (see also key orientation 4.1.b); study the occurrence and dynamics of extreme events and the vulnerability of the Arctic region to climate change (including support to international initiative to inform policy makers to sustain Arctic observation investments in the long term) and translate the findings into specific strategies for mitigation, adaptation and sustainable development.

3.2. **Energy**

The EU's energy policy aims to promote the energy transition to a competitive low-carbon and resilient economy and to ensure affordable, secure and sustainable energy for businesses and households. In June 2018, the Commission, the Parliament and the Council reached a political agreement which includes a binding renewable energy target for the EU for 2030 of 32 % and an energy efficiency target of 32,5 %, both clauses to be revised by 2023. These targets, together with the COP21 Agreement, represent core objectives of the relevant policy initiatives under the Energy Union strategy. The targets also ensure EU leadership and the competitiveness of the economy and industry in the EU.

The November 2017 *State of the Energy Union* report²³ confirms that the EU has made great progress in all five dimensions of the Energy Union. However, it also stresses the need for new policy initiatives to ensure that the 2030 objectives are met. Moreover,

²¹ The Sendai Framework for Disaster Risk Reduction 2015-2030 (Sendai Framework) is the first major agreement of the post-2015 development agenda, with seven targets and four priorities for action. It was endorsed by the UN General Assembly following the 2015 Third UN World Conference on Disaster Risk Reduction (WCDRR).

²² The Covenant of Mayors for Climate and Energy brings together local and regional authorities voluntarily committing to implementing the EU's climate and energy objectives on their territory.

²³ Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee, the Committee of the Regions and the European Investment Bank of 23 November 2017– Third Report on the State of the Energy Union, COM(2017) 688 final.

the EU is vulnerable to energy supply shortages because of its high overall dependency on energy imports (it imports about 53 % of its fossil fuel needs) and because of the lack of adequate storage and transmission infrastructure across Member States. A number of new policy initiatives were proposed in 2016 (being discussed and adopted in 2017-2018), ranging from security of supply to heating & cooling, effort-sharing regulation, low-emission mobility, the revision of the directives on energy efficiency and the energy performance of buildings, the sustainability of bioenergy and renewables. An enabling framework has also been proposed to support the transition to a low-carbon and circular economy through concrete and short-term measures to help bring tangible results to EU industry, regions, cities, workers and citizens. In addition, specific actions have been proposed to accelerate 'clean energy innovation'. Energy storage is recognised as a necessary provider of flexibility in the transition of the overall energy system, in particular to enable the integration of increasing shares of renewable energy. Recognising the strategic imperative of batteries for the energy transition, in 2017 the Commission launched the European Batteries Alliance and came up in 2018 with a Strategic Action Plan for Batteries²⁴, aiming to make Europe a global leader in sustainable battery production and use. The need for a fully integrated internal energy market justifies new legislative initiatives, such as the new Renewable Energy Directive, the revised Energy Efficiency and Energy Performance of Buildings Directives, the revised emissions trading system and New Market Design Initiative²⁵ and the governance of the Energy Union as part of the "Clean Energy for All Europeans" package.

Finally the EU long term strategy for GHG emissions reduction examines different pathways for the transition to a low carbon economy²⁰.

Relevant Commission policy objectives:

- develop the necessary tools for after 2020 to ensure achievement of the 2030 energy and climate policy objectives and targets and support international efforts to increase energy efficiency and renewable energy;
- develop a long-term (2050) strategy for substantially reducing EU GHG emissions and transforming the economy into a low-carbon sustainable economy, in accordance to the EU commitments in the Paris Agreement;
- support climate targets, foster consumer empowerment and increase security of supply by reducing energy consumption through effective energy efficiency policies at EU and national level (products, buildings, consumer awareness, heating and cooling etc.);
- promote a fully integrated internal energy market with a new deal for consumers;

²⁴ Strategic Action Plan on Batteries (https://ec.europa.eu/transport/sites/transport/files/3rd-mobility-pack/com20180293-annex2_en.pdf). The JRC contributes to the Action Plan through assessment of the quality, safety, competitiveness and innovation of the batteries sector, mapping the availability of raw materials, and work on ecodesign for batteries (see Sections 1.3.2 and 4.1)

²⁵ Clean energy for all Europeans – a rule book for the EU energy market setting out general principles and technical details for public authorities and energy market participants as well as specifying the rights and responsibilities among different energy players.

- implement the 2020 renewable energy and energy efficiency policy and legislation to ensure achievement of the EU 2020 energy and climate policy objectives and targets;
- accelerate the European energy system transformation through an integrated strategic energy technology (SET) plan to implement the fifth dimension of the Energy Union;
- establish a governance system to ensure achievement of the objectives of the Energy Union and assess and monitor progress towards its implementation in all its interlinked and mutually reinforcing dimensions, including the integrated national energy and climate plans and exploiting synergies with other relevant policies such as ambient air policy and projects such as fostering a sustainable transition in coal mining regions;
- enhance security of electricity and gas supply through new and revised legislation, taking account of the benefits of gas storage and security considerations in the financing of infrastructure projects.

Key orientations for the JRC:

- a) **Energy-climate-economy modelling and the Energy Union governance** — develop, validate, and run models for a climate-energy-economy system (including the POTEnCIA and the METIS models) and integrate them with modelling tools that allow to look at non-energy GHG emissions and absorptions; develop and maintain the necessary databases and other relevant models for the use of the Commission's services; carry out relevant techno-economic analysis, in particular mapping the latest evidence on techno-economic costs for energy supply, demand and storage technologies; provide support for impact assessments, carry out energy modelling at national, regional and European level and analyse the results meeting reliability, credibility and transparency criteria; quantify the impact of the policies and measures on air quality and on emissions of air pollutants; develop the capacity to contribute to the design of future energy-climate reference scenarios by ensuring the adequate representation of national and European policies; support the Commission by using analytic tools (modelling and/or other type of quantitative analysis), in its assessment of the national integrated energy and climate plans, required from the Member States in the Commission's proposal for a governance of the Energy Union.
- b) **Energy security** — carry out security assessments of the EU energy supply system and safety, risk and techno-economic analyses for certain energy sources, taking into account the resilience of the supply system to the adverse impacts of climate change and other natural hazards and intentional threats. This work covers security of supply, transmission and distribution of gas and electricity, critical energy infrastructure, and the interconnections with countries outside the EU (including risks and geopolitical factors); analyse privacy and cybersecurity aspects in the energy sector.
- c) **Internal energy market** — assess the development of energy infrastructure and energy markets in the EU, including design of the retail market, new deal for energy consumers, energy poverty and protection of vulnerable consumers, short-medium and long-term storage of renewable energy, integration of LNG and gas storage, super power grids, smart power grids (including interoperability and smart-metering), economic evaluation of self-sufficiency modes, flexibility requirements and gas networks, and the new market design initiative; support measures for digitisation of

energy markets; develop methodologies for the economic valuation of energy security in the evaluation of energy infrastructure projects, including projects of common interest; assess the value and role of energy storage, also in what concerns sector coupling.

d) **Energy efficiency and local climate and energy action** — support the implementation of the current and revised EU energy efficiency legislation, including on energy performance of buildings and on efficient heating and cooling; analyse the development and deployment of energy efficiency technologies; assess technology innovation in energy-intensive industries; support the Covenant of Mayors for Climate and Energy in the EU and beyond, including by assessing national plans on energy efficiency, renewables, emissions reduction, climate adaptation and access to energy, long-term renovation strategies, as well as assessing and reporting on the results and (potential) impact of the initiative with a view to contributing to policy orientation; perform modelling and cost-benefit analyses; support the EU Building Stock observatory and maintain the European Energy Efficiency Platform; support the initiative for Coal and Carbon-Intensive Regions by assessing clean energy transition potential and by identifying priority regions that depend on carbon intensive activities.

e) **Low-carbon energy technologies** — analyse deployment trends of renewables and their impact on climate change mitigation and on other policies such as air pollution; carry out techno-economic assessments of renewable energy technologies and their cost-effective deployment, including by using geo-spatial tools, by assessing the deployment potential in coal and carbon-intensive regions and by analysing relevant renewable energy scenarios and associated policy measures supporting the implementation of the revised directive.

f) **Energy research, innovation and competitiveness** — help to implement the research and innovation and competitiveness dimension of the Energy Union by managing relevant knowledge and available scientific data; support the integrated strategic energy technology SET plan through a strengthened information system and the accelerating clean energy innovation strategy; develop indicators that monitor the progress of energy technology innovation as an input to the annual State of the Energy Union report; support the development of indicators and intelligence through relevant techno-economic analysis; support the operation of the knowledge-sharing facility of the NER 300 funding programme and the management of NER 300-related communication activities and help to design and implement its successor, the Innovation Fund; support in setting up and implementing a monitoring framework for the "Mission Innovation" initiative.

3.3. Safe and secure use of nuclear energy

Electricity produced from nuclear power plants constitutes a reliable base-load supply of electricity and plays an important role in energy security (European energy security strategy)²⁶. In the energy roadmap 2050, the Commission, has committed itself to develop the nuclear safety and security framework further in order to reach the highest safety and security standards in the EU and globally. However, this does not affect in

²⁶ Communication from the Commission to the European Parliament and the Council of 28 May 2014 – European Energy Security Strategy, COM/2014/0330 final.

any way Member States' responsibility for nuclear safety and security within their territories.

One of the research priorities of the Energy Union is nuclear energy; the Energy Union Communication (COM(2015) 80) states that the EU must ensure that Member States use the highest standards of nuclear safety, security, radioactive waste management and non-proliferation. Moreover, the EU also has to ensure the health protection of all citizens from ionising radiation.

The main instrument to support nuclear research at European level is the Euratom research and training programme for the period 2019-2020²⁷. It is implemented through direct and indirect actions (the latter actions implemented by Directorate-General for Research and Innovation). The Euratom programme sets out objectives and funding for research activities in nuclear fusion and fission.

The JRC's research focuses on supporting safe, secure and responsible solutions for the operation of nuclear systems, the management and disposal of spent fuel and radioactive waste, nuclear decommissioning, environmental monitoring, emergency preparedness and nuclear competences²⁸. The JRC also helps to maintain appropriate expertise in the nuclear field by monitoring and developing knowledge management tools and by providing training and open access to its research facilities for external researchers. JRC coordinates all these activities with Directorate-General for Research and Innovation and cooperates with relevant technology platforms to foster synergies between direct and indirect actions.

The Euratom Treaty (chapter 7) defines and requires the implementation of a strict system of safeguards throughout the EU to ensure that ores, source materials and special fissile materials are not diverted from their intended uses as declared by the users. Additionally, the Commission implements three safeguard agreements covering the obligations of all EU Member States. The JRC will support other Commission services, mainly Directorate-General for Energy, in this area.

Relevant Commission policy objectives:

- promote safer operation of EU nuclear facilities through improved reactor and fuel cycle safety, radioactive waste and spent fuel management, decommissioning and emergency preparedness;
- sustain safety developments and assessments for innovative reactor systems and related fuel cycles;

²⁷ Council Regulation (Euratom) 2018/1563 on the Research and Training Programme of the European Atomic Energy Community (2019-2020) complementing the Horizon 2020 Framework Programme for Research and Innovation, and repealing Regulation (Euratom) No 1314/2013

²⁸ Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions of 2 May 2013– Energy Technologies and Innovation, COM(2013) 253 final.

- ensure that the EU has efficient and effective systems for completely safeguarding the nuclear fuel cycle;
- promote faster and more efficient harmonisation and standardisation processes to ensure the highest level of nuclear safety, by raising excellence in the nuclear science base;
- ensure highest competence and expertise for nuclear safety assessment in the EU by fostering knowledge management, education and training;
- support the efficient use of research infrastructures by involving the JRC facilities in EU and Member States research programmes;
- provide technical and scientific support to implement EU internal policy, in particular with regard to:
 - Articles 30-36, 39, 41 and 43 of the Euratom Treaty;
 - nuclear safeguards (Chapter 7 of the Euratom Treaty);
 - Council Directive 2014/87/Euratom²⁹;
 - Council Directive 2011/70/Euratom³⁰;
 - Council Directive 2006/117/Euratom³¹;
 - Council Directive 2013/51/Euratom³²;
 - Council Directive 2013/59/Euratom³³;
 - Council Decision 87/600/Euratom³⁴;
 - development of international safety standards and fulfilment of the Euratom obligations under international conventions.

Key orientations for the JRC:

a) Enhancement of **safety of nuclear reactors and nuclear fuels:**

- **collect, analyse and assess the operational experience of nuclear power plants** worldwide, and disseminate information to the Member States' regulatory authorities;

²⁹Council Directive 2014/87/Euratom of 8 July 2014 amending Directive 2009/71/Euratom establishing a Community framework for the nuclear safety of nuclear installations (OJ L 219, 25.7.2014, p. 42).

³⁰Council Directive 2011/70/Euratom of 19 July 2011 establishing a Community framework for the responsible and safe management of spent fuel and radioactive waste (OJ L 199, 2.8.2011, p. 48).

³¹ Council Directive 2006/117/Euratom of 20 November 2006 on the supervision and control of shipments of radioactive waste and spent fuel (OJ L 337, 5.12.2006, p. 21).

³² Council Directive 2013/51/Euratom of 22 October 2013 laying down requirements for the protection of the health of the general public with regard to radioactive substances in water intended for human consumption (OJ L 296, 7.11.2013, p. 12).

³³Council Directive 2013/59/Euratom of 5 December 2013 laying down basic safety standards for protection against the dangers arising from exposure to ionising radiation, and repealing Directives 89/618/Euratom, 90/641/Euratom, 96/29/Euratom, 97/43/Euratom and 2003/122/Euratom (OJ L 13, 17.1.2014, p. 1).

³⁴ Council Decision 87/600/ Euratom of 14 December 1987 on Community arrangements for the early exchange of information in the event of a radiological emergency (OJ L 371, 30.12.1987, p. 76).

- perform research on structural materials for analysis and modelling of **ageing of components and structures** to improve residual lifetime assessment techniques;
- improve the **safety assessments of innovative reactor designs** in synergy with the Generation IV International Forum (GIF);
- generate **reference samples and scientific data** on the safety performance and **develop codes and models for safety assessment** of both conventional and innovative nuclear fuels in operational, transient and accident conditions;
- carry out studies related to the safety of **European small modular reactors**, including identification, technical assessment and key areas for development of European small modular reactor concepts;
- support the **EU's internal policy on nuclear safety** by providing technical and scientific assistance for the implementation of the related EU directives and related EU policy.

b) Enhancement of **safety of spent fuel, radioactive waste management and nuclear decommissioning**:

- develop techniques for **spent fuel and radioactive waste characterisation** and study the physicochemical mechanisms relating to the long-term storage of spent fuel and disposal of radioactive waste;
- carry out studies for the **safety assessment of recycling technologies** aiming at the reduction of the radiological toxicity of wastes through advanced separation and transmutation, determine scientific data and prepare reference samples of spent fuel;
- develop and assess innovative technologies and techniques applied to **nuclear decommissioning**; exchange and disseminate knowledge developed, findings and information.

c) Improvement of **nuclear emergency preparedness and response (EP&R), environmental monitoring, radiation protection and radioecology**:

- ensure the routine and emergency **radiological monitoring of radioactivity levels in the environment** and support Member States and Commission departments on the exchange of information in case of radiation emergency. This includes hosting, maintaining and developing the related rapid alert, information exchange and database systems;
- enhance **preparedness for nuclear or radiological incidents** through severe accident modelling, radiological source term evaluation, and benchmarking of dispersion models;
- support Commission departments and Member States by assessments of **radiation and radioactive contamination measurement methods** and by **proficiency tests**.

d) Assurance and improvement of **nuclear safeguards**:

- pursue the technical and scientific development of **safeguard tools and technologies, destructive and non-destructive methods** and techniques (verification and IT systems, analytical services, training, special equipment, etc.) and **standards and reference materials** to support the Euratom safeguards system;
- operate the **safeguards on-site laboratories** and provide in-field operative support for Euratom inspections;
- develop and test **containment and surveillance approaches** for the nuclear fuel cycle process, from enrichment facilities to geological final disposal.

e) **Promotion of excellence in the nuclear science base for standardisation**:

- study the **fundamental properties and behaviour** of innovative nuclear and structural materials for safety assessment and model validation;
- provide support for the **standardisation and harmonisation of nuclear safety assessments, nuclear data and radiation measurements** in the EU and support collaboration with key partner countries and international organisations (IAEA, OECD-NEA) in the field.

f) Development of **knowledge management, training and education**:

- monitor EU trends in **human resources in the nuclear energy** field and facilitate their mobility throughout the EU;
- develop tools for **knowledge management** and transparency and the dissemination of information;
- preserve, aggregate and **disseminate specific scientific and technical knowledge** on radiation and nuclear safety, safeguards and security by providing operational support and training (including training of Commission staff) and by increasing **access to the JRC nuclear laboratories** for researchers from Member States and international organisations.

g) Development of **nuclear science applications and use of radioisotopes**:

- develop techniques for **medical radiotherapy and radio-diagnosis**;
- contribute to a resilient and sustainable **supply of medical radioisotopes in the EU**;
- develop industrial and **space applications** of nuclear science.

4. A deeper and fairer internal market with a strengthened industrial base

4.1. Internal market, industry, entrepreneurship and SMEs

The internal market is key to boosting growth and jobs. The areas with the highest growth potential are services, networks and the digital economy. The recent economic crisis has underlined the importance of a strong industrial sector for economic resilience, implying a secure and sustainable supply of raw materials and prolonging the life of raw materials and of the products along their supply chains. Industry accounts for over 80 % of Europe's exports and private R&I. Almost one in four private sector jobs is in industry and every additional job in manufacturing creates 0,5-2 jobs in other sectors. Industry provides 36 million direct jobs. Its gross value added for the EU27 has increased by 6,4 % between 2009 and 2016 and by 4,7 % for the EU28.

Policies aim to help turn the EU into a smart, sustainable, and inclusive economy by implementing the industrial and sectoral policies under Europe 2020. Support for the 23 million SMEs in the EU is crucial, since they represent some 99 % of businesses³⁵, notably by reducing administrative burdens, making access to funding easier and supporting access to global markets.

Relevant Commission policy objectives:

- implement the internal market strategy;
- implement the renewed EU industrial policy strategy, in particular to encourage the creation and growth of SMEs and the security of supply of raw materials;
- implement EU space policy, in particular the Galileo and Copernicus programmes, protect space infrastructures and space industry;
- monitor and support the development of the regulatory framework for market access, international trade relations and regulatory convergence for cosmetics and medical devices;
- strengthen European defence cooperation and support the competitiveness of Europe's defence industry.

Key orientations for the JRC:

a) **Strengthening the industrial base in the EU single market** — provide support to industrial policy development, notably to support standardisation, including the development and implementation of the next generation of the Eurocodes, reference measurements and materials (including nanomaterials); support the set-up and running of the EU Product Compliance Network (knowledge building, benchmarking of country performance, expertise in product testing, training and technical support to

³⁵ *Annual Report on European SMEs 2013/2014*. The statistics are for 2013.

coordinated enforcement); contribute to material efficiency, scientific and technical support to the implementation of the Plastics Strategy (linked with the key orientation 1.3.2.a); analyse advanced manufacturing and key enabling technologies; analyse industrial sectors (e.g. steel and process industries) to improve their environmental efficiency, energy performance, resilience to climate change, and achieve reductions in GHG and pollutant emissions; identify and monitor the main technological and industrial strategic areas where the EU can have strong competitive advantage potential as a contribution to a vision 2030 for the EU industry.

b) **Space strategy** — continuously monitor and assess the European Global Navigation Satellite System (EGNSS) industrial supply chains; provide technical support for applications, implementation and further development of services, including Galileo Public Regulated Service and security, spatial information analysis and data dissemination tools for Copernicus and EU contributions to civil and international space dialogues taking place primarily through CEOS (Committee on Earth Observation Satellites) and GEO (Group on Earth Observation). Services and products of the Copernicus programme also contribute to common agriculture policy implementation (key orientation 1.1.a), marine environment monitoring (key orientation 1.3.1.a), atmosphere monitoring (key orientation 1.3.3.b), the monitoring of greenhouse gas emissions (key orientation 3.1.1.b) and other climate change-related information and climate services (key orientation 3.1.3.a), indices and quantitative analyses of economic, social and environmental cohesion and development (key orientation 1.6.b), maritime security (key orientation 1.4.b), the fight against irregular migration and trafficking in human beings (key orientation 8.1.a), disaster resilience, emergency and crisis management (key orientation 9.1.1.a) and international cooperation and development (key orientations 9.2.2.a and 9.2.3.b), including in the Arctic region (key orientation 3.1.3.a). Expand the collaborative big data analytics platform for all the aforementioned key orientations in combination with other relevant data sources.

c) **Medical devices and cosmetics** — provide scientific and technical support in regard to the medical devices and *in vitro* diagnostic medical devices regulatory framework; provide technical support to the cosmetics regulatory framework which includes promoting alternative methodologies to animal testing (linked to key orientation 1.3.3.a).

d) **Raw materials** — help to implement actions and EU policies on raw materials and support the management of the EU knowledge base by further developing the Commission's Raw Materials Information System in collaboration with other Commission's services and EU and global stakeholders; monitor and analyse primary and secondary raw materials at European and global levels, as well as their supply chains, contributing to the raw materials scoreboard and circular economy indicators; develop methodologies and provide data for assessing the raw material flows in the economy and the trade flows for raw materials and products along their supply chains; contribute to the criticality assessment for raw materials and to the analyses of the security of raw materials supply, addressing in particular applications such as for dual-use technologies; analyse and contribute to the assessment of security of supply of raw materials for the EU economy, including effects of global trade barriers and responsible sourcing; assess the circularity and sustainability of raw materials in specific supply chains of critical raw materials (e.g. for batteries, in support of the

Commission's involvement in the European Battery Alliance); assess the potential to substitute and recycle materials and components as important mitigation measures to increase resource efficiency and increase EU resilience.

e) **EU defence research** — support the future EU defence research programme through relevant security and dual-use research activities.

f) **EU automotive industry** — in support to relevant Commission services further develop and improve vehicle emissions (both pollutants and CO₂) test procedures for testing in the laboratory and on the road; support the development of next-generation vehicle emission standards (post-Euro 6/VI) for light- and heavy-duty vehicles; perform market surveillance activities to support the enforcement of current vehicle emission standards (including the investigation of potential defeat devices); support the development of international regulation efforts for the safety approval of advanced driver assistance systems up to fully automated vehicles; support European and international regulation and standardisation efforts through performance and safety evaluation of energy storage devices, including batteries for electromobility; develop testing methodology and perform pre-normative research on electric vehicle-to-grid integration (VGI), concentrating on interoperability between smart electric vehicles, their charging stations, smart homes and smart grids. This key orientation is linked to Sections 1.8 and 3.1.1.

g) **Economic analysis in support of internal market and competition policies** — analyse the industrial competitiveness of SMEs and innovative companies; assess the macroeconomic impact of competition policy enforcement in the EU; provide data and analyses on bio-based industries, as part of the Bioeconomy Knowledge Centre (linked to Section 1.7); provide economic analysis of dual food quality.

4.2. Customs risk management policy and the fight against fraud

Under the EU legal framework, customs is the lead authority for control of goods at the external border and has the co-ordinating role in that regard. The Member States' customs authorities are responsible for the supervision and control of all goods entering, passing through or leaving the EU. EU customs authorities raise substantial revenue for the EU and Member States' budgets. They also play an important role in ensuring the security and integrity of the supply chain for international goods, ensuring the security and safety of the EU and its citizens, facilitating and accelerating legitimate trade movements and promoting EU competitiveness.

Under the Union Customs Code,³⁶ **customs controls** must be based primarily on electronic risk analysis, and carried out in a common risk management framework. The Council endorsed³⁷ a comprehensive *EU strategy and action plan on customs risk management*³⁸, developed by the Commission and the Member States together, and

³⁶ Regulation (EU) No 952/2013 of the European Parliament and of the Council of 9 October 2013 laying down the Union Customs Code (OJ L 269, 10.10.2013, p. 1).

³⁷ Council Conclusions of 4th December 2014 on *EU strategy and action plan on customs risk management: tackling risks, strengthening supply chain security and facilitating trade*.

³⁸ Communication from the Commission to the European Parliament, the Council and the European economic and social Committee of 21 August 2014 on the EU Strategy and Action Plan for customs risk management: tackling risks, strengthening supply chain security and facilitating trade, COM(2014) 527 final.

providing a comprehensive agenda for strengthening risk management. It aims to improve information availability and sharing, to strengthen risk analysis capacities at every level, and to enhance co-operation across customs, other authorities and trade.

In accordance with Council Regulation (EC) No 515/97³⁹, the Commission is establishing centralised databases as an additional tool that the Commission and Member States can use to fight customs-related fraud.

Relevant Commission policy objectives:

- protect EU financial interests by combating fraud, corruption, illicit trade and any other unlawful activities;
- strengthen the security and protection of citizens and supply-chain security while facilitating legitimate international trade;
- develop and increase cooperation between customs authorities and with other tax administrations, government agencies and the business community.

Key orientations for the JRC:

a) **Customs risk management and the fight against fraud** — carry out research and analysis and develop and test new technologies, prototypes, applications as well as data infrastructures and systems to help manage safety, security, financial and other customs risks connected with the cross-border movement of goods; combat fraud and other types of criminal activity, e.g. enhance customs risks analysis and anti-fraud intelligence by strengthening EU and national analytical capacities; support the fight against trafficked, smuggled or counterfeited goods; standardise analytical data and create libraries of analytical data for illicit substances; provide reference systems and certified reference materials.

5. A deeper and fairer Economic and Monetary Union

5.1. Economic and Monetary Union

The *Five Presidents' Report*⁴⁰ together with the *Reflection paper on the deepening of the economic and monetary union*⁴¹ (EMU) set out concrete measures to move towards a stronger union that contributes to jobs, growth and prosperity. Public finances have been considerably stretched in recent years, with the crisis entailing a sharp increase in public sector debt. As the economy starts growing again, the EMU needs to address the social and economic divergences that emerged with the crisis, and keep on reinforcing itself against shocks.

³⁹ Council Regulation (EC) No 515/97 of 13 March 1997 on mutual assistance between the administrative authorities of the Member States and cooperation between the latter and the Commission to ensure the correct application of the law on customs and agricultural matters (OJ L 82, 22.3.1997, p. 1).

⁴⁰ The Five Presidents' Report: Completing Europe's Economic and Monetary Union, 22 June 2015.

⁴¹ Reflection paper on the deepening of the economic and monetary union, 31 May 2017.

Relevant Commission policy objectives:

- promote macroeconomic and fiscal stability in the euro area and in the EU;
- promote sustainable investment in the EU;
- improve the efficient functioning of EMU.

Key orientations for the JRC:

a) **Socio-economic analyses** - model and carry out socioeconomic analyses to improve macroeconomic, budgetary, structural, and financial developments and policies in the EU.

5.2. Financial stability, financial services and Capital Markets Union

The *Five Presidents' Report* and the *Reflection paper on the deepening of the economic and monetary union* recommend completing the financial union, as economic, monetary and financial unions are complementary and mutually reinforcing. The completion of the Banking Union has become an important step towards strengthened financial stability. A well-regulated Capital Markets Union encompassing all Member States should mobilise capital in Europe and channel it to all companies, including SMEs, so that they can carry out the long-term sustainable projects needed to grow and create jobs. In addition to this, as laid out in the Commission *action plan on FinTech*⁴², technological advances can make European markets more integrated, safer and easier to access.

The Commission *action plan on financing sustainable growth*⁴³ has underlined the importance of reorienting capital flows towards sustainable investment, in order to achieve sustainable and inclusive growth as well as manage financial risks linked to climate change.

Relevant Commission policy objectives:

- support growth and job creation by improving the investment environment and the long-term financing of the economy;

⁴² Communication from the Commission to the European Parliament, the Council, the European Central Bank, the European Economic and Social Committee and the Committee of the Regions of 8 March 2018 - FinTech action plan: For a more competitive and innovative European financial sector COM(2018) 109 final.

⁴³ Communication from the Commission to the European Parliament, the European Council, the Council, the European Central Bank, the European Economic and Social Committee and the Committee of the Regions of 8 March 2018 - Action plan on financing sustainable growth, COM(2018) 97 final.

- work towards a fully-fledged Banking Union to shore up the EU's resilience against financial crises and to protect depositors, deepen capital markets integration and incorporate sustainability into the EU's regulatory and financial policy framework.

Key orientations for the JRC:

a) **Capital Markets Union and Banking Union** — carry out quantitative analyses for the development of the Capital Markets Union and for the completion of the Banking Union.

b) **Financial sector** — assess initiatives related to the regulation of the financial sector and to new dynamics and risks, including sustainable finance and financial technologies; maintain and further develop a data infrastructure for analyses of the EU financial sector. The assessment of initiatives includes support with the development of impact assessments in terms of quantification and modelling.

5.3. Taxation

The *Five Presidents' Report* calls for the development of an integrated framework for sound and integrated fiscal policies in the EU. The EU needs to build trust in its common fiscal governance framework, which will help to prepare the ground for further steps. Fiscal policy is indeed an important instrument to promote a more resilient and fair economy.

Tax fraud, tax avoidance, and aggressive tax planning are major problems the EU is currently facing. Uncoordinated national measures are being exploited by companies to evade taxation in the EU. This leads to significant revenue losses for Member States, a heavier tax burden for individuals and competitive distortions for businesses that pay their share. The Commission initiatives on corporate taxation⁴⁴ and VAT⁴⁵, along with the *Communication on Fair Taxation of the Digital Economy*⁴⁶ set out to tackle those issues.

Relevant Commission policy objectives:

- fight tax fraud and tax avoidance, harmful tax practices and aggressive tax planning including in the digital economy; create fair and efficient tax systems and promote greater cooperation between tax administrations;

- develop fiscal policy to promote a resilient and fair economic integration.

Key orientations for the JRC:

a) **Tax fraud and tax avoidance** — fiscal modelling analysis to analyse the fiscal and fairness impact of tax fraud and tax avoidance, including corporate tax and VAT fraud.

⁴⁴ Commission Action Plan for a Fair and Efficient Corporate Tax System in the European Union, 17 June 2015

⁴⁵ Commission action plan on VAT: Towards a single EU VAT area, 7 April 2016

⁴⁶ Commission Fair Taxation of the Digital Economy, 21 March 2018

b) **Fiscal policies** — perform micro-economic analysis and macro-economic modelling of fiscal policies, using tools such as the EUROMOD⁴⁷ microsimulation model, to assess the impact of these policies both in terms of fairness and resilience.

6. A balanced and progressive trade policy to harness globalisation

6.1. Trade policy

EU trade policy is addressed in two of the Commission's 10 priorities: 'balanced and progressive trade policy to harness globalisation' and 'Europe as a stronger global actor'. The Commission is committed to implementing its 2017 Balanced and Progressive Trade Policy to Harness Globalisation strategy⁴⁸ which aims to ensure a sustainable and transparent trade policy based on values that help harness globalisation and ensure a balanced approach on open and fair trade agreements. It also sets out to guarantee that foreign investment remains a major source of growth in the EU while protecting the EU's essential interests.⁴⁹

Relevant Commission policy objectives:

- contribute to European smart, inclusive and sustainable growth by ensuring the best trade conditions and opportunities for EU operators, workers and consumers;
- ensure open and fair trade policy that fosters sustainable economic, social, and environmental development in all participating countries, including developing countries;
- modernise investment protection to make it more fair, transparent and objective.

Key orientations for the JRC:

a) **Trade analysis** — provide support (methodological, modelling, and analytical) for impact assessments of free trade agreements and the socioeconomic and environmental implications of external trade, including on agri-food markets and raw materials (see also Sections 1.1. and 4.1); analyse foreign direct investment (FDI) flows into the EU.

⁴⁷ EUROMOD - Tax-benefit microsimulation model for the European Union.

⁴⁸ Commission Communication: A Balanced and Progressive Trade Policy to Harness Globalisation, 13 September 2017, COM(2017) 492 final

⁴⁹ Commission Communication of 13 September 2017 on Welcoming Foreign Direct Investment while Protecting Essential Interests, COM(2017) 494 final

7. An area of justice and fundamental rights based on mutual trust

7.1. Justice, consumers and gender equality

European justice, consumer and gender equality policies aim to uphold and strengthen the rights of people living in the EU, be it in their capacity as citizens, consumers, entrepreneurs or workers.

The European consumer agenda provides the strategic vision for EU consumer policy. Its objectives include promoting consumer safety, increasing knowledge of consumer rights, and better enforcing consumer rules.

Relevant Commission policy objectives:

- ensure a high level of consumer protection, empowering consumers and placing them at the heart of the internal market.

Key orientations for the JRC:

a) **Consumer markets and products** — analyse statistical indicators and methodologies to monitor consumer behaviour and market performance (see also key orientation 4.1.g); develop data collection systems and their interoperability for product safety and market surveillance (see also key orientation 4.1.a); develop harmonised testing approaches to check certain quality-relevant characteristics of food and consumer products.

7.2. Home affairs and security

Home affairs policies are based on core European values and principles: freedom, democracy, the rule of law, equality, tolerance, and respect of human rights. Terrorism, organised crime (including smuggling of irregular migrants and trafficking in human beings), and cybercrime are complex and evolving security challenges that cross European borders. The terror attacks on public spaces that have unfolded in the last years confront Europe with challenges that defy the capacity of individual countries to act alone and require a coordinated and collaborative European approach. Strengthening Europe's fight against terrorism and organised crime, including cybercrime and the means to support them, and strengthening our defences and resilience are essential to build an effective and genuine security union.

Relevant Commission policy objectives:

- help to establish an effective and genuine security union, while safeguarding freedom, in order to combat terrorism, organised crime (including smuggling of irregular migrants and trafficking in human beings) and cybercrime across European borders.

Key orientations for the JRC:

a) **Critical infrastructure and public spaces protection** — provide scientific support and research to strengthen critical infrastructure and protect public spaces such as

buildings, urban centres, shopping malls, concert halls, transport hubs etc.; contribute to standardisation activities leading to enhanced security; understand and model vulnerabilities and interdependencies, including through: synthesis and sharing of knowledge, exchange of good practices, exercises and networks for critical infrastructure operators, and training and awareness programmes for national authorities and operators of critical infrastructures.

b) **CBRN-E** — help to implement action plans on chemical, biological, radiological, nuclear and explosive materials (CBRN-E) and implement Regulation EU 98/2013 on explosives precursors. This support includes scientific advice, research and development; support to the standardisation process for CBRN-E related detectors and other equipment; exchange good practices among users and manufacturers of CBRN-E detectors and related equipment; develop a single market for security products and certifications of security-related systems and their components such as industrial control systems as well as for explosive precursors; provide training, exercises and capacity building on nuclear security including the actions at EUSECTRA (see also key orientation 9.1.2.d).

c) **Emerging and hybrid threats and resilience** — support community resilience against all threats; understand and develop methodologies to counter emerging threats, such as hybrid threats and insider threats; understand how new technologies such as social media, mobile applications and virtual reality can be used to improve citizens' security and the security perception; provide support to the development of open source policies and strategies (e.g. Europe Media Monitor).

d) **Law enforcement** — provide technical support, intelligence techniques and research to improve operational cross-border cooperation and assist the European Union Agency for Law Enforcement Cooperation (Europol) and Member State law enforcement authorities in areas such as early warning and risk analysis, terrorism, cybercrime, child sexual exploitation, new psychoactive substances, including support to the European Monitoring Centre for Drugs and Drug Addiction. This technical support is provided through digital forensics, the collection of digital evidence from smart environments and open-source intelligence.

e) **Border protection and document security** — increase security of external borders (e.g. help to design and implement the EU entry-exit system, contribute to the protection of external borders and the efficient processing of short-stay visa applications); increase the security features of ID cards and residence documents; strengthen the capacity of FRONTEX to carry out border controls, risk analysis and joint operations at external borders; provide technical support and research to strengthen large EU information systems, including for the free movement of EU citizens (e.g. interoperability, new biometric arrangements, resident permits, digital identity management, smart card security, etc.) and to close information gaps.

Furthermore the JRC is working on raising awareness on the security and defence dimension of other EU policies (maritime, aviation, energy and research). JRC's work on disaster resilience, emergency and crisis management, including its internal dimension is summarised in Section 9.1.1.

8. Towards a new policy on migration

8.1. Migration

Migration and refugee flows represent one of the greatest political and social challenges the EU faces. The migration crisis which has been unfolding since 2015 showed the need for a clearer and more consistent common European policy, based on solidarity and shared responsibility among Member States. The Commission has taken a number of initiatives to tackle these issues and manage the flows in a fair and sustainable way. The main policy framework is the European Agenda on Migration adopted in May 2015. This agenda sets out objectives to tackle migration-related challenges in the immediate, medium and longer term while combining internal and external dimensions: saving lives at sea, targeting criminal smuggling networks, working in partnership with third countries, reducing the incentives for irregular migration, addressing the root causes of irregular migration and forced displacement in third countries, improving the functioning of return policies, improving border management and strengthening protection of the EU external borders, reforming the Common European Asylum System, and developing an effective and attractive policy on legal migration. The European Agenda on Migration was strengthened in September 2018 with targeted legislative proposals from the Commission to better protect the Union's external borders by further strengthening the European Border and Coast Guards with an additional 10,000 European border guards by 2020 and to further develop the European Asylum Agency thus increasing the Member States' capacity to process asylum seekers and to also accelerate the return of irregular migrants.

Relevant Commission policy objectives:

The State of the Union address by President Juncker of 12 September 2018 sets out the policy priorities until the end of this Commission's mandate, including in the field of migration:

- complete the work on a reform of the Common European Asylum System based on the principles of responsibility and solidarity, including proposals to reform the Dublin system, the setting-up of an European Union Asylum Agency (including amended proposal), the new recast of Eurodac⁵⁰, the review of the Reception Conditions Directive, the proposals for a Qualification Regulation and for an Asylum Procedures Regulation as well as the Union Resettlement Framework;
- further reinforce the protection of EU external borders, including a new proposal to further strengthen the capacities of the European Border and Coast Guard Agency,

⁵⁰ Regulation (EU) No 603/2013 of the European Parliament and of the Council of 26 June 2013 on the establishment of 'Eurodac' for the comparison of fingerprints for the effective application of Regulation (EU) No 604/2013 establishing the criteria and mechanisms for determining the Member State responsible for examining an application for international protection lodged in one of the Member States by a third-country national or a stateless person and on requests for the comparison with Eurodac data by Member States' law enforcement authorities and Europol for law enforcement purposes, and amending Regulation (EU) No 1077/2011 establishing a European Agency for the operational management of large-scale IT systems in the area of freedom, security and justice (OJ L 180, 29.6.2013, p. 1).

enabling it to establish a standing corps of 10,000 EU border guards by 2020, strengthening its powers in the field of return and allowing it to operate in partner countries outside the EU;

- promote more legal pathways, through the launch of pilot projects on legal migration with third countries, increased resettlement efforts and the adoption of the proposal on a reform of the Directive on the entry and residence of third country nationals for the purpose of highly skilled employment ('Blue Card proposal')⁵¹;

- a more effective policy on returns, including a new proposal to further strengthen and enhance the coherence and effectiveness of our return policy, ensure swift returns of those not entitled to international protection and reduce the incentives for irregular migration;

- reinforce partnerships with key countries of origin and transit countries to tackle the root causes of irregular migrations and promote economic and employment opportunities, security and development (including actions to address land degradation neutrality) in these countries.

Key orientations for the JRC:

a) Support the implementation of the **external dimension of the European Agenda on Migration**, in particular the Partnership Framework and the new Global Compact for Migration and Global Compact on Refugees and improve the effectiveness of migration-related EU actions and resources. This includes analysing migration drivers and developing informed migration scenarios as well as issuing Migration Profiles and an Atlas of Migration.

b) Support **legal migration, integration and asylum** — analyse the impact of admission and integration policies and examine factors enabling integration; measure the impact of migration on economic growth, the labour market, employment, welfare, education and demographics; study public perceptions and attitudes towards migrants; explore the local dimension of integration (e.g. cities where most of the integration issues arise) and assess likely scenarios for demographic changes in Europe; address data on children in migration including age assessment; support the further development of the Common European Asylum System.

c) Operate the **Knowledge Centre for Migration and Demography** — collect and organise the wealth of existing but fragmented data to support EU policies, harness the potential of innovative data sources and create new datasets to address data gaps; provide policy-oriented research and evidence-based analyses; increase the uptake of research, and strengthen partnerships and outreach.

⁵¹ Communication from the Commission to the European Parliament and the Council of 12 September 2018 - Enhancing legal pathways to Europe: an indispensable part of a balanced and comprehensive migration policy, COM(2018) 635 final

9. Europe as a stronger global actor

9.1. Global safety and security

A globalised world marked by complexity, uncertainty, and opportunity requires effective responses to safety and security threats. It also requires a Union able to improve the coherence of its external actions, ranging from EU foreign and security policies and risk management strategies, to international cooperation, development, and humanitarian assistance. With the Global Strategy on EU Foreign and Security Policy, the EU committed to focusing on human security, addressing conflict prevention and security issues, and also sustainable development, disaster resilience and humanitarian crises.

9.1.1. Fight against security and safety threats, crisis management and disaster resilience

Relevant Commission policy objectives:

- help to establish a coherent cross-sectoral EU risk management policy that promotes a comprehensive approach to all natural and man-made risks; this work is based on technical analysis of risk assessments (possibly supporting the revision of relevant guidelines) and planning, in view of developing an EU-wide overview of internal and international risks, improving the resilience of critical infrastructures, improving the data and knowledge base, sharing good practices and applying minimum standards for data related to disaster losses, in synergy with the United Nations International Strategy for Disaster Reduction (UNISDR)-led progress reporting exercise on Sendai targets achievement;
- improve the effectiveness of policy measures and practices to prevent, prepare for and respond to all types of disaster at EU and Member State level also taking climate change into consideration;
- improve the knowledge and evidence base for humanitarian aid programmes;
- support the Emergency Response Coordination Centre (the EU's response platform), by providing scientific advice during emergencies and offering scientific and analytical capacities/systems for humanitarian aid and for cooperation and coordination between the countries participating in the EU Civil Protection Mechanism;
- increase the resilience (preparedness and response) of EU and non-EU countries to crises and disasters, including recovery and reconstruction along the principles of 'building-back-better' (BBB-UNISDR).

Key orientations for the JRC:

- a) **Disaster resilience, emergency and crisis management** — provide scientific and analytical services, develop tools and build capacity to support the entire disaster risk management cycle (disaster prevention, preparedness, response and recovery), including via a dedicated Knowledge Centre for Disaster Risk Management, and the

damage assessment of natural disasters in the context of application for Solidarity Fund assistance; promote the integration of research communities for seismology and earthquake engineering; provide an evidence base for disaster risk management solutions, including ecosystem based disaster risk reduction; provide assistance for risk vulnerability and crisis assessment to improve the knowledge base for humanitarian emergencies and disasters in accordance with the Sendai framework and the Agenda 2030 (SDGs) both inside and outside the EU; develop an European fire engineering approach to be incorporated in fire safety regulations of the Member States.

b) **Resilient societies** — apply the resilience knowledge and tools to understand the level of resilience of European societies; help to develop new measures to make societies more resilient to external long-term crisis and conflicts; provide support to the definition of the EU defence strategies to improve the EU internal and international resilience.

c) **Fight global, trans-regional and emerging threats** — support activities contributing to stability and peace through analysis, the provision of methods and tools, capacity-building and collaborating with international partners to monitor precious raw materials; ensure maritime security and counteract global and trans-regional threats, including climate change; develop early-warning systems and capacity-building activities.

9.1.2. Global nuclear safety and security

The JRC provides independent, customer-driven scientific and technological support for formulating, developing, implementing, and monitoring EU global policies in nuclear safety and nuclear safeguards.

To increase nuclear safety in its Member States and beyond, the EU has set up a strong nuclear safety regulatory framework. The JRC supports technically other Commission departments in the implementation of this framework. Through the Instrument for Nuclear Safety Cooperation and its promotion of the Vienna declaration on nuclear safety, this framework helps to improve nuclear safety and ensure effective nuclear safeguards worldwide. The JRC promotes the EU's internal policy at international technical fora, cooperates in the implementation of these policies and manages a network of European nuclear safety authorities. This network was set up to allow closer collaboration, share operating experience and attain consistency in the development of international technical standards and guidance. The JRC supports technically the EU effort for the implementation of Annex III of the JCPoA⁵²

The EU plays a key role in developing global nuclear security architecture, and the JRC helps to address the challenge of improving nuclear security. The overall objective of the EU CBRN-E action plan is to reduce the threat and consequences of CBRN-E incidents of accidental, natural, and intentional origin in the EU. The JRC provides technical assistance to support the action plan and the EU CBRN-E Centres of Excellence Initiative, aimed at preventing incidents and building capacities for emergency response in partner countries.

⁵² Joint Comprehensive Plan of Action (Vienna, 14 July 2015) Annex III: Civil nuclear cooperation

The JRC cooperates technically with and supports the IAEA on nuclear safeguards under the Commission cooperative support programme, set up in close cooperation with the Euratom Safeguards Authority.

As the Euratom implementing agent for the Generation IV International Forum (GIF), the JRC will continue to coordinate the EU's contribution to the GIF, ensuring the proper science and technology feedback for JRC and DG RTD programmes.

Relevant Commission policy objectives:

- provide technical and scientific support to implement EU policies, instruments and programmes on nuclear safety, security and radiation protection in non-EU countries;
- develop international safety research cooperation with key partner countries and relevant international organisations, helping to develop international standards, (including IAEA safety standards and guidance documents);
- contribute to develop an efficient and effective system for combating illicit trafficking and nuclear forensics, including technical training, in support of EU internal and external nuclear security;
- support the implementation of EU policies on home affairs, energy, trade, customs, industry and global security including the implementation of CBRN-E related policies;
- provide technical support for the implementation of the Commission support programme to IAEA in the field of nuclear safeguards;
- as the implementing agent, coordinate the Euratom contribution to the GIF, (as required under Council Decision 14929/05⁵³).

Key orientations for the JRC:

- a) Provide technical assistance and scientific **support to EU partner countries and international institutions** to help implement the Instrument for Nuclear Safety Cooperation, the Commission support programme to the IAEA and the Instrument contributing to Stability and Peace, and participate in related international working groups.
- b) Develop methods, technologies and standards to **detect nuclear and radioactive materials outside regulatory control** and to fight the illicit trafficking of such materials.
- c) Contribute to the **EU nuclear non-proliferation** analysing open source information and providing technical and statistical support to the modernisation of EU dual-use export control policy and the development of an EU export control network; provide training and operational support for Member States and international organisations.

⁵³ Council Decision of 2nd December 2005 concerning the approval of the accession of the European Atomic Energy Community to a Framework Agreement for International Collaboration on Research and Development of Generation IV Nuclear Energy Systems

d) Increase **technical knowledge of nuclear security** using the European Nuclear Security Training Centre to help Member States, partner countries and international institutions (IAEA, etc.).

e) Contribute to safeguards, proliferation resistance, and the physical protection of **innovative designs of nuclear reactors** in collaboration with the GIF.

9.2. International cooperation and development

Through its international cooperation and development policy, the EU is committed to eradicating poverty and driving global sustainable development, as defined in the 2030 Agenda for a fairer, sustainable, resilient and more stable world and in accordance with the new European Consensus on Development⁵⁴. The Consensus is a cornerstone of EU relations with the outside world, alongside foreign, security and trade policy (and international aspects of other policies, such as environment, agriculture and fisheries). The EU focuses on certain sectors of intervention, depending on the needs of partner countries, and promotes ‘policy coherence for development’.

Relevant Commission policy objectives:

- eradicate poverty by promoting good governance, address inequalities and promote gender equality;
- foster global sustainable development by addressing its social, environmental and economic dimensions in an integrated way;
- achieve food security for all people, improve nutrition and promote sustainable agricultural systems;
- preserve and promote global public goods, including a stable climate and a protected biodiversity;
- promote the circular economy, resource efficiency and sustainable consumption and production;
- address the root causes of conflicts and forced displacement;
- make aid and development more effective by improving the coordination between humanitarian, security and development actions, in particular;
- pursue a fair, responsible and sustainable supply of raw materials from global markets;
- contribute effectively to the implementation of international agendas, and to the work of relevant fora, conventions, etc.

⁵⁴ https://ec.europa.eu/europeaid/sites/devco/files/european-consensus-on-development-final-20170626_en.pdf

Key orientations for the JRC:

9.2.1. 2030 Agenda for Sustainable Development

a) In line with the new European Consensus on Development, contribute to the implementation and monitoring of SDGs and to the analysis of development aid by developing knowledge management tools, methodologies, information, indicators and data. In doing this, make it easier to design and formulate programming along relevant SDGs, incorporate the social, economic, environmental and Policy Coherence for Development (PCD) dimensions into design and formulation of programming needed to achieve the SDGs in partner countries, identifying and addressing interlinkages between the 17 Goals; develop analytical tools to assess SDG integration at country level; explore how Science Technology and Innovation (STI) roadmaps can support the SDGs implementation in developed and developing countries; support Policy Coherence for Development (PCD), aid effectiveness and accountability and mainstream the SDGs across sectorial policies to support the formulation of a sustainable strategy post 2020, taking into account international monitoring frameworks, the global definition of cities and rural areas, which is being developed by the EU, FAO, OECD, UN-Habitat and WB, and indicators and national monitoring efforts, and collaborating with relevant international Earth Observation monitoring programmes (including in-situ and space-borne measurements).

9.2.2. Food security and nutrition, rural development and sustainable agriculture

a) Monitor agricultural resources and identify hot spots of agricultural shortage globally, in support of SDG implementation; analyse situations of food and nutrition security and support partner countries on the development of their information systems; provide support with economic and biophysical modelling and information systems to help policy making and resilience building; better understand nutritional needs in particular for mothers in reproductive age and children; play a key role in international initiatives such as the Integrated food security Phase Classification (IPC) Cadre Harmonise (CH), Global Report on Food Crises and the Global Network Against Food Crises (European food security is covered under key orientation 1.1.c); building on the work of the Knowledge Centre on Global Food and Nutrition Security, provide an advanced knowledge base to help achieve zero hunger in 2030; foster exchange and use of data, information and tools between Commission services involved in food and nutrition security; identify key topics where better knowledge is needed for action at EU level and help make collective progress, in liaison with relevant partner DGs and main international agencies concerned (see also key orientation 1.1.c for European food security)

9.2.3. Climate change, environment, natural resources, water and energy

a) Carry out analysis, help build capacity and provide data, maps and methodologies on the extent of the vulnerability and exposure to climate change in developing countries, in support of SDG implementation, including the role of climate change in food and nutrition security; inform and support the preparation and implementation of programmes aimed at climate change adaptation and sustainable energy under the global Covenant of Mayors for Climate and Energy, building on the experiences with the EU Covenant of Mayors and the Global Climate Change Alliance flagship initiative; share best practices in support of international, bilateral and regional climate and energy cooperation initiatives, including on energy efficiency, renewable energy

and climate adaptation as well as how to use modelling tools to prepare and inform climate policies.

b) Monitor, provide scientific advice, develop ICT tools, disseminate information and build capacity for partners in third countries to support multilateral or bilateral agreements on natural capital and sustainable management of natural resources, in support of SDG implementation, with a focus on forestry, land, and land use change, soil, biodiversity, ecosystem services, agricultural and non-agricultural raw materials, air and water, where appropriate in cooperation with relevant international organisations and conventions, including the African Union (through the dedicated knowledge platform for Africa organised according to the SDGs), FAO, the United Nations Educational, Scientific and Cultural Organization (UNESCO), the UN environment programme, the Union for the Mediterranean, the UN Economic Commission for Europe, UNCCD, IPBES, the Arctic Council and its subsidiary bodies and the International Resource Panel.

9.3. Neighbourhood and enlargement negotiations

At the heart of the EU's neighbourhood and enlargement policies is the stabilisation of the region in political, socio-economic and security-related terms. Through the European Neighbourhood Policy, the EU offers to partner countries the possibility of a special relationship building on a mutual commitment to common values. The EU is committed to supporting the economic development of its partner countries, while keeping a strong focus on democracy and human rights, the rule of law, good governance, market economy principles and sustainable development. This commitment translates into the implementation of regional and bilateral programmes and projects in a broad spectrum of policy areas, such as innovation, energy and climate efficiency, technology transfer and capacity building.

Relevant Commission policy objectives:

- support Europe's eastern and southern neighbourhood's reform and democratic consolidation, and strengthen the prosperity, peace, stability and security in these regions, notably with the Western Balkans;
- increase close cooperation, association and partnership with Neighbourhood countries to further strengthen ties;
- in the enlargement area, assist those countries with a perspective to join the EU, in meeting the criteria defined by the Treaty of European Union and the European Council, in particular in line with the Commission strategy for *A credible enlargement perspective for and enhanced EU engagement with the Western Balkans* from February 2018⁵⁵.

⁵⁵ Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions of 6 February 2018 - A credible enlargement perspective for and enhanced EU engagement with the Western Balkans, COM(2018) 65 final

Key Orientations for the JRC:

a) Capacity building — support the development and implementation of smart specialisation strategies in enlargement and Horizon 2020 associated countries; strengthen the technology transfer capacity; provide urban data and analysis in Syria to support humanitarian and development actors in monitoring and responding to humanitarian and recovery interventions; support the implementation of the Eurocodes in the Balkan non-EU countries.

b) Sustainable policies — provide neighbourhood countries with technical and scientific assistance, analytical methodologies and tools to support local authorities in formulating and implementing sustainable policies in the framework of the Covenant of Mayors, including by providing guidelines for Sustainable Energy and Climate Action Plans; provide information and data about air quality and greenhouse gas emissions in support of the accession process of the Western Balkans to the EU.

10. A Union of democratic change

The Commission is committed to improving the quality of EU policy and law making to ensure that legislation better serves the people it affects. It is also opening up the policymaking process to citizens' inputs, boosting transparency. It formulated its commitment to better regulation in the better regulation package adopted in May 2015. Better regulation involves every proposal and respects the principles of subsidiarity (no EU intervention when an issue can be dealt with effectively by Member States) and proportionality, which are at the heart of the Commission's work.

10.1. Methodological support for better regulation

Better regulation is about designing EU policies and laws that achieve their objectives at minimum cost. It ensures that policy is prepared, implemented and reviewed in an open, transparent manner, informed by the best available evidence and backed up by input from stakeholders.

Relevant Commission policy objectives:

- make sure that policy decisions take due account of lessons from past EU action ('evaluate first' principle); carry out *ex post* evaluations based on appropriate, real data to assess whether policies have achieved their objectives;
- assess quantitatively and qualitatively any relevant impact of policy initiatives, clearly presenting the assumptions applied in the assessment;
- monitor progress towards achieving policy objectives;
- carry out *ex post* evaluations of the effectiveness of EU investment programmes;
- gather solid empirical evidence on the actual effectiveness of budgetary, economic, and structural reforms in Member States in order to provide evidence-based country recommendations that are fit for purpose for the European Semester.

Key orientations for the JRC:

- a) **Competence Centre on Modelling** — contribute to the development of high-quality methodologies and tools to assist impact assessments of policy proposals and policy options, and promote a responsible use of modelling at EU and Member State level.
- b) **Competence Centre on Microeconomic Evaluation** — provide technical advice, methodological support, specialised training and exchange on counter-factual impact evaluations.
- c) **Competence Centre on Composite Indicators and Scoreboards** — help to develop monitoring and benchmarking tools.

10.2. Support for innovative policy-making

The Commission is committed to making the EU more democratic, bringing it closer to its citizens, giving the relationship with the European Parliament a new lease of life and working more closely with national parliaments.

Through its **EU Policy Lab**, the JRC helps to bring innovation to public policy making by combining **foresight, behavioural insights, science and technology studies** and **design for policy**. The policy lab offers a ‘safe’ space **to co-design projects** and policy initiatives with the engagement of experts, stakeholders, citizens and policy-makers, in line with better regulation principles. It creates the conditions for the Commission to experiment with new ways of engaging with complexity and uncertainty and developing new forms of inclusive stakeholder and citizen engagement processes.

In addition, the JRC is developing citizen engagement online and physical spaces to better engage citizens in all phases of policy development. In order to support the endeavour on engagement of citizens across the policy cycle, it manages a dedicated Community of Practice on Citizen Engagement.

The JRC’s **media monitoring** and analysis tools (e.g. multilingual information text-mining and tools to analyse online information sources) support informed decision-making across all policy areas in the Commission and in other EU institutions (the European Parliament, the Council and the European External Action Service).

Key orientations for the JRC:

- a) **Support innovation in EU policy-making** — develop generic tools and processes, taking into account anticipation, behavioural insights, design for policy, citizens’ engagement, media monitoring, data and text-mining, including support to the detection and handling of disinformation ("fake news").

11. A stronger knowledge management capacity

11.1. Tools and skills for knowledge management

The effective management and uptake of data, information and knowledge is a critical challenge for the Commission: not only does the Commission's ability to design and implement result-oriented policies rely on the quality of this process but so do its authority and credibility within the EU and as a global player. Whereas a corporate

strategy on data, information and knowledge management was set out⁵⁶ and is now being implemented throughout the Commission, existing knowledge largely remains scattered across different DGs and Services. The generation of new knowledge requires better coordination on policy needs, but also upgraded methods and skills for informing policy, in light of the increasing complexity of both science and policymaking, and of the post-fact climate.

If the Commission has a greater capacity to manage knowledge and inform its policymaking through evidence, it will be easier to steer and coordinate multi-disciplinary work across the services and contribute to a more collaborative working environment and ultimately to more evidence-based and coherent policies.

Relevant Commission policy objective:

- continue strengthening the Commission's knowledge-management capacity.

Key orientations for the JRC:

a) **Translation of knowledge into policy** — develop new concepts, methods, and skills to support better evidence-informed policy making; facilitate translation of data, information and knowledge into EU policies through: research and training on evidence-for-policy; greater collaboration; improvement of collecting, sharing and sense-making of country, regional and local knowledge; contribute to the development of knowledge management capacity and to its translation in evidence for policy making also outside the EU.

b) **Knowledge-management methods, tools and processes** — develop thematic knowledge mapping capacity and deploy common methods for the acquisition, sharing and communication of knowledge in support of policy-making; further develop existing knowledge communities; provide access to knowledge sources and maximise the dissemination of JRC science results including the open access policy; facilitate communities of practice and promote a culture of knowledge sharing and learning.

c) **Support the European Commission's data management and exploitation** — coordinate the development of an inventory of data assets owned or acquired by different Directorate Generals and the related data catalogue; further develop existing knowledge communities and contribute to their task forces; develop initiatives and an infrastructure to provide solutions for the analysis and visualisation of data as a service to the whole organisation; contribute to the development of corporate policies and guidelines on data management, including data architecture, data licensing and related legal aspects, data dissemination, data analytics, data quality and data security; provide advisory services and training on relevant topics of interest for all European Commission's services.

⁵⁶ Communication to the Commission of 18 October 2016 on Data, Information and Knowledge Management at the European Commission C(2016) 6626 final and related Staff Working Document, SWD(2016) 333 final

11.2. Intellectual property rights

The EU aims to foster a competitive economy based on knowledge and innovation. If knowledge and innovation are to flourish, intellectual work and intangible assets need protection and Intellectual Property Rights (IPR) provide that protection. At the same time, information paid for by the public purse has to be widely available for further use for commercial or non-commercial purposes. Sharing publicly funded information also applies to research results. In light of the above, the Commission needs to ensure the sound management of its IPR assets, as well as respect for IP owned by third parties.

The JRC is responsible for the administrative execution of IPR-related decisions and for ensuring effective exercise of the delegated powers and providing support to the Commission in IPR-related matters, in consultation with the Legal Service.

Relevant Commission policy objectives⁵⁷:

- protect and enforce the EU's intellectual property rights;
- ensure usability of Commission content in line with Commission decision 2011/833/EU on the re-use of Commission documents through promoting an enabling licensing framework.

Key orientations for the JRC:

a) **Intellectual property rights** — manage the JRC's and the Commission's portfolio of property rights; advise and assist the Commission on intellectual property matters; increase awareness of intellectual property rights within the Commission and in the European Parliament.

Evaluation of the impact of the JRC's work programme

In line with the Regulation establishing the Horizon 2020 framework programme, the Commission will monitor annually the implementation of Horizon 2020 and the Horizon 2020 specific programme (JRC's direct actions) and perform *ex post* evaluations of the nuclear and non-nuclear Horizon 2020 programmes.

Furthermore, under the decision establishing the Horizon 2020 specific programme and the Regulation on the Euratom research and training programme (2014-2018) complementing the Horizon 2020 framework programme, two key indicators were established to assess the results and impacts of the JRC's direct actions. These indicators refer to the number of occurrences of a tangible specific impact on European policies resulting from technical and scientific support provided by the JRC, and the number of peer-reviewed publications in high-impact journals. These indicators may be refined during the implementation of Horizon 2020.

⁵⁷ Communication to the Commission of 16 February 2012 - Towards a more effective management of intellectual property rights at the European Commission, SEC(2012) 103.

The JRC's work programme will be subject to an annual internal evaluation, which provides coherent information on the two official indicators and will be used for:

- (a) the mid-term and *ex post* evaluations of both Horizon 2020 programmes;
- (b) reporting as part of the Commission's strategic planning and programming cycle.

The indicators will form part of the JRC's wider set of indicators under the Commission's performance framework for spending and non-spending programmes.