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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 1314/2013, to be carried out through direct actions by the Joint Research Centre in 2018-2019, and amending Commission Implementing Decision C(2017)1288

Key orientations for the Joint Research Centre's multi-annual work programme for 2018-2019

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. It is based on the idea that jobs, growth and investment will only return to Europe if there is the right regulatory environment. With this in mind, the Commission's better regulation agenda¹ 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.

As part of its mission **to support EU policies with independent evidence throughout the policy cycle**, the Joint Research Centre (JRC) 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 monitor existing ones. As a 'boundary' organisation at the interface between science and policy, the JRC has a very good understanding of how policy initiatives are working and whether improvements are needed. It is well placed to provide the comprehensive, cross-sectoral policy support that policymakers need to tackle increasingly complex social challenges.

The JRC will support **better regulation** initiatives in all areas of its work programme. It will continue to provide Commission with specific expertise on modelling, data and statistics and their analysis, risk assessment methodologies, monitoring tools that it designs or audits, advice on scientific and technical aspects having to do with the feasibility and enforceability of limits/targets, and training on issues such as sensitivity analysis, sensitivity auditing, counter-factual analysis, indicator framework development and lifecycle assessment.

This cross-cutting expertise on specific scientific methods and analytical tools which can be applied in any policy area will be strengthened. The JRC's **Competence Centres**² on composite indicators and scoreboards, microeconomic evaluation, modelling, and data and text mining will provide support at all stages of the Commission policy cycle. Innovation and experimentation will be promoted through the JRC policy innovation laboratory. This lab will promote system and design thinking, future-oriented work, behavioural research, and stakeholder and citizen engagement.

¹ Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions Better regulation for better results - An EU agenda; COM/2015/0215 final; 19. 5, 2015.

² Competence centres bring together analytical and methodological expertise that can be used across the Commission, in any policy area.

Better regulation also relies on a transparent process, which involves all stakeholders. The JRC will be looking at innovative processes to engage people in communicating on scientific and policy-making issues. It will also propose ways to improve quantification in impact assessments, *ex post* evaluations and fitness checks. Finally, it will provide on-request support to the Regulatory Scrutiny Board.

As the amount of data and knowledge grows, there is a greater need for systematic reviews to help policymakers make sense of available knowledge. Therefore, to support the Commission's objective of improving the way it manages knowledge, the JRC is building on its strong capacity to produce knowledge by developing skills in **knowledge management**. In doing this, it is also contributing to the Data4Policy group activities covering all aspects on the better use of data.

New **knowledge centres** bring together expertise from inside and outside the Commission so that all the relevant data, knowledge and intelligence in a specific policy area can be accessible. This will also help to ensure a better coordination of policies. Together with interested Commission departments, the JRC is running knowledge centres for disaster risk management, bioeconomy, territorial policy, and migration and demography. A knowledge centre on food fraud and quality will be launched early 2018 to help the Commission address issues such as dual quality food products.

Together with other Commission departments, the JRC has developed a **conceptual framework for resilience** that can be used in EU policy making. As a follow-up to the conceptual framework, the JRC will develop a dashboard for the resilience of the EU and its Member States. This will make it possible to continuously monitor the resilience (risk, vulnerability, and capacity to cope) of European society, assess the impact of existing policies on resilience and provide guidance for new policies. It will also be possible to stress test the system's overall ability to be resilient and identify the most relevant policy interventions to support resilience of all entities.

The JRC is also building a knowledge base on **fairness** to support policies aimed at building a society that people feel is fair. A first report tackles fairness from different possible angles: income inequality and equality of opportunity, the spatial dimension of fairness, and perceptions and attitudes. In 2018, more work will be carried out to fully understand what drives people's perceptions of fairness. JRC will also develop a socioeconomic atlas of Europe that will show socioeconomic data at different levels of aggregation, which will capture disparities within countries. Finally, JRC will adopt a multi-dimensional approach to study equality of opportunity and explore the implications for those engaged in policymaking.

The JRC will continue strengthening its support for the **European Semester** process through country knowledge-sharing platforms, ensuring that the Commission has the essential intelligence available for the Semester and more widely for all policies. It will also step up support to Member States, in particular through the new structural reform support programme.

Scientific excellence and relevant policy advice depend on **partnerships and collaboration**. The JRC works with Member States, regional and local players, associated, candidate and neighbourhood countries, 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.

There will be more engagement with the candidates for EU accession and the European neighbourhood policy countries. Particular effort will be devoted to the six Western Balkan countries in the pre-accession stage with a focus on building up capacity for technology transfer and innovation. This will be done via a tool visualising public investment priorities for innovation that can be used to find potential partners for collaboration. 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. International cooperation will focus on the United States, Brazil, China, Japan, South Africa, India and Mexico, in accordance with the EU roadmaps for research and innovation international cooperation. At regional level, the JRC will strengthen its cooperation with the African Union, 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.

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.

Building on its **training and education** experience, a '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 co-supervision of students on topics with clear value added for policy implementation at EU, national and regional levels. With the setting-up of a Centre for Advanced Studies and Collaborative Doctoral Partnerships, the JRC is strengthening its relations with the best research institutions and universities with access to the best experts and state-of-the-art knowledge.

II. A work programme supporting the Commission's priorities

The JRC's work programme is updated annually to respond to the Commission's priorities. In parallel, the strategic focus of its work is strengthened through the long-term orientation set out in the JRC strategy 2030.

The key orientations for the JRC's multi-annual work programme for 2018-2019, which support the priorities set out by the Juncker Commission, are:

- organised according to the 10 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 by institutional resources (i.e. operational funding for the JRC from Horizon 2020 and its complementary Euratom programme). The JRC's participation in Horizon 2020 and its predecessor the 7th Framework Programme (FP7) also provides valuable access to European and international research networks and helps to build up core competences.

The JRC's key contributions to the main areas of the Commission's work programme for 2018 are set out below.

A new boost for jobs, growth and investment

In support of the initiative **towards a sustainable Europe by 2030** and the follow up to the UN Sustainable Development Goals, the JRC will carry out a 'distance to SDGs' analysis, analyse the inter-linkages between different Goals, and contribute to the SDGs multi-stakeholders platform.

To facilitate territorial policy development and investments, the JRC and DG Regional Policy have set up a Knowledge Centre for Territorial Policies. In 2018 and 2019, work will focus on establishing a database with key regional economic indicators, creating catalogues of territorial datasets, launching the front-end territorial indicators dashboard, disseminating the Territorial reference scenario 2017, and setting up and running a community of practice. The JRC's territorial intelligence and the use of analytical models underpin the development, implementation and assessment of cohesion policy.

The JRC will continue to develop its smart specialisation (S3) platform, set up with DG Regional Policy to support national and regional authorities for the implementation of smart specialisation strategies, to help reform national/regional research and innovation systems and promote international collaboration. In order to address the diversity of Europe's regions, the S3 Platform will reinforce its support to the development of smart specialisation at national and regional level, with particular focus on mutual learning and sharing of good practices in innovation policy implementation, governance and monitoring.

The S3 Platform will: i) perform data analysis, provide advice and encourage mutual learning for the implementation of smart specialisation strategies, ii) develop Thematic Smart Specialisation Platforms to boost innovation and investment projects through interregional cooperation; iii) further develop the smart specialisation concept and methodology based on lessons learnt and the smart specialisation strategies' impact assessment.

The JRC's work on smart specialisation is being extended to other key EU policy programmes and initiatives, e.g. higher education, enlargement/neighbourhood, the circular economy and transition into a low-carbon industry and low-carbon economy. It will also be linked to the JRC's technology transfer activities.

JRC will provide socioeconomic analysis on the employment effects of major trends such as digitalisation, technological change and transition to a low-carbon economy, on skills and determinants of employability and job creation, and the changing nature

of work. It will also help to assess policy programmes designed to help people into work. The JRC will continue its work on the new Social Scoreboard and social indicators for monitoring the proposed principles of the European Pillar of Social Rights.

To further support implementation of food and feed safety legislation and address the arising issues of food quality and food fraud, the JRC will launch a Knowledge Centre for Food Fraud and Quality. It will provide expert knowledge on the food chain, food composition and traceability systems in general as well as support to the coordination of networks, the development of dedicated analytical methods, text mining, data banking, the development of reference materials, knowledge transfer, and training.

The JRC will also support the Commission in addressing the issue of **dual quality food**. It will develop a robust harmonised testing approach and guidelines that can be used in any future investigations. Work will focus on elaborating a harmonised sampling and testing approach, including data evaluation and outlining how to organise a pan-EU testing campaign. It will also supervise a comparative exercise with several Member States to check whether certain quality-relevant characteristics of food products sold in the single market under the same brand and same packaging are indeed different. This should create reliable and comparable evidence on dual quality food practices.

A connected digital single market

The JRC will continue to support the digital single market initiatives. It will provide qualitative and quantitative socioeconomic research on the digital economy, digital living and digital society, analysing the various parts of the digital value-chain (i.e. underpinning technologies, innovation and entrepreneurship, economics of the digital single market). It will assess the economics of online platforms and online multi-sided markets in support of the new initiative on **fairness in platform-to-business relations**. It will further explore the impact of the digital transformation and artificial intelligence on societies, ethics, economies, governance and public policies.

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 (such as the increasing number of connected objects and the internet of things, artificial intelligence, digital identities and distributed ledgers technologies).

It will further supply technical and scientific services to promote a more efficient use of the radio spectrum, validate proposals on spectrum sharing for mobile broadband and promote large-scale digitisation through vertical integration of 5G technologies.

The JRC will develop tools to assess the performance of emerging technologies in urban environments (such as smart sensor technology and unmanned systems). It will support the implementation of interoperability solutions and the use of ICT infrastructures to maximise the use of (big) data from multiple sources. This includes assessing the possibilities that public and publicly funded data offer to innovation and science

In this framework, the JRC is looking at cross-cutting issues such as interoperability, standardisation, security and privacy to take advantage of smart energy in application

areas such as mobility, building automation, smart living and smart cities. In doing this, it is seeking to support the use of interoperable solutions in real-life.

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

Through scientific evidence and technical work, the JRC will help to implement and monitor existing policy initiatives and develop new ones under the five dimensions of the **Energy Union**: (i) decarbonising the economy and reducing greenhouse gas (GHG) emissions, (ii) increasing the security of energy supply, (iii) improving energy efficiency, (iv) integrating the internal energy market, (v) promoting research, innovation and competitiveness.

Support will include developing and validating accounting methodologies for greenhouse gas (GHG) emissions in international climate change commitments and helping to decarbonise the economy through pre-standardisation work on selected energy technologies.

The JRC will support the governance of the Energy Union by contributing to the annual State of the Energy Union report and supporting the assessment of the integrated national energy and climate plans.

Furthermore, the JRC will improve the availability of data, information and analyses on specific topics, such as alternative fuels and their sustainability, e-mobility, connected and automated vehicles, resource and energy efficiency, low-carbon energy technologies, heating & cooling, energy storage and biomass supply and demand.

For energy infrastructures, a robust methodology will be developed and validated to assess infrastructure projects, including resilience to the impact of climate change and suitability in different future climatic conditions. In the area of modelling, the JRC energy-economy modelling toolbox will be further developed.

The JRC will continue to 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 continue to support the development and consolidation of 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.

A deeper and fairer internal market with a strengthened industrial base

With its extensive scientific and technical expertise, the JRC will continue to support the European single market, including for services, and a renewed EU industrial policy strategy.

It will contribute to 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, development of a recognised methodology and conducting life cycle assessments of the use of alternative feedstock for plastic production, and indicators on secondary raw materials to monitor the circular economy.

In support of the bioeconomy, the new Bioeconomy Knowledge Centre will collect, structure and make accessible knowledge on the bioeconomy, the sustainable

production of renewable biological resources and their conversion into products. Such knowledge will come from a wide range of scientific disciplines and sources.

The JRC will contribute to the new security and defence initiatives to better support European defence cooperation and the competitiveness of Europe's defence industry.

It will use its in-depth knowledge of Europe's industrial landscape to contribute to regulatory fitness checks for various industrial sectors and also contribute to a framework for measuring European competitiveness across Member States and industries.

The JRC will tackle scientific aspects of implementing the new regulations on medical devices and *in vitro* diagnostics. It will address key objectives of the new legal framework: improved quality and safety of devices (e.g. pre-market scrutiny), stronger post-marketing surveillance/vigilance and greater transparency.

The JRC will further support the development and implementation of European emission and fuel consumption standards and test procedures for light- and heavy-duty road vehicles and support the tighter market surveillance for motor vehicles. It will also help to develop globally harmonised test procedures, including for electric and hybrid vehicles, and standards for interoperability. In the case of electric vehicles, the JRC will seek to ensure complementarity and synergies with the action on batteries in the Horizon 2020 work programme 2018-20.

To support implementation of the EU space strategy adopted at the end of 2016, the JRC prototype platform will analyse Copernicus Earth observation data and support the uptake of earth observation data for digitising industry and building an EU data economy. JRC's expertise in global navigation satellite system technologies will support the impact assessment of the EU governmental satellite communications programmes.

A deeper and fairer Economic and Monetary Union

For the European Semester, the JRC supports the coordination of economic policies by helping to monitor Member States' economies and fiscal policies. This involves developing models and tools to assess the resilience and fairness of these policies.

The JRC also contributes to the integration of capital markets and the **completion of the Banking Union**. On capital markets, the JRC will identify the bottlenecks and possible medium to long-term impact of a **Capital Markets Union** and how it effects financial integration and risk-sharing in Europe. In line with the Capital Markets Union mid-term review, the JRC will contribute to policies supporting alternative financing sources for firms. Following the Commission's call for evidence on post-crisis reforms, the JRC will provide analysis on existing and upcoming financial regulation including banking rules and the European Deposit Insurance Scheme. It will also monitor financial stability, detect emerging risks, and identify changes in market dynamics.

In support of the Commission's taxation agenda, JRC will extend its modelling capacities around EU corporate tax reforms. It will also develop tools to capture the tax implications of the digital economy in support of the initiative on **fair taxation in the digital economy**.

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

The JRC contributes to the two main strands of work of the **European agenda on security**. Under the strand 'counter-terrorism initiatives and the fight against organised crime', the JRC helps to develop new capacities for assessing and countering hybrid threats, develop operational systems for securing borders, find innovative tools to fight cybercrime, online child sexual abuse and cyber-enabled crime, including providing for digital forensic solutions to decrypt encrypted files, improve biometric automatic processes, and perform targeted communication interception.

Under the strand 'strengthening resilience', the JRC works on disaster risk management with a dedicated knowledge centre, the protection of critical infrastructure and soft targets such as public spaces, early warning and information systems to detect natural disasters, health emergencies, humanitarian crises and conflicts, and nuclear safety and security.

The JRC has developed a number of global tools used by the EU and internationally, such as the index for risk management and the global conflict risk index. The latter serves as the starting point in the EU's conflict early-warning system (EWS) to identify countries at high risk of conflict and countries for which the risk is worsening significantly. This will support the **EU Civil Protection Mechanism**.

The JRC's work also supports the efforts of several Commission departments to strengthen the security dimensions of their policies (e.g. maritime and aviation, energy, research and innovation, customs, space, etc.), and the JRC supports the future EU defence research programme through relevant security and dual-use research activities.

Towards a new policy for migration

The Commission's European agenda on migration outlined an immediate response to the refugee crisis and set out a longer-term approach to managing migration. This included implementing of the hotspot approach, relocating asylum-seekers, reforming of the common European asylum system, reinforcing external borders, a new policy on legal migration, more coordinated return policies and reinforcing partnerships with countries of origin and transit.

To help implement the **EU Agenda on Migration**, the JRC has strengthened the analytical capacities of its Knowledge Centre on Migration and Demography which provides policy-relevant knowledge and evidence-based analysis to support EU policy making. It will focus on migration monitoring and early warning, analysis of root causes (including land degradation aspects) and impacts of migration.

A stronger global actor

Today's interconnected and interdependent societies are facing unprecedented global challenges and transnational security threats, such as climate change, increasing inequalities, extreme poverty and instability. However, this also opens up new opportunities for more sustainable development, equity and peace.

The JRC has taken a number of new initiatives to assist Commission departments with the monitoring and implementation of the UN's 2030 agenda for sustainable development and its sustainable development goals and targets (SDGs) under the new

European consensus on development. It has done this to make the EU and its partners more resilient in this changing global environment. The JRC will provide support particularly in the areas of food security and nutrition, the sustainable management of natural resources, the environment and biodiversity, resource efficiency, circular economy and sustainable production and consumption, climate, energy, urban development, and inequalities. The JRC will consolidate its knowledge across these sectors and develop and organise related information, indicators, methods and data within the Commission. This will facilitate the integration and coherence of the EU's social, economic and environmental policies, which is required to achieve the globally agreed targets by 2030.

The JRC supports EU policy (the Instrument for Nuclear Safety Cooperation) to reinforce nuclear safety globally. It cooperates with the International Atomic Energy Agency on nuclear safeguards and helps to increase global nuclear security through cooperation with the main international players.

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

The policy priorities for agriculture focus on three societal challenges: food and nutrition security, jobs and growth, and climate change. Worldwide population growth, income disparities, the scarcity of natural resources and climate change are the driving forces behind shifting production patterns and systems in EU agriculture.

The most recent reform of the common agricultural policy (CAP) prepared the framework for adapting to economic and environmental concerns. The new CAP entered into force in 2015, and its implementation continues to be a priority for the JRC. A major change proposed as from 2018 for implementation is to move from the traditional ‘control’ approach based on a 5 % sample to a 100 % monitoring approach covering every field and farm.

In 2017 the Commission consulted widely on simplification and modernisation of the CAP post 2020. The CAP post-2020 will include a new dimension based on agriculture's potential to mitigate climate change and the need to adapt to climate change to comply with the 2014 decision by the Council on the target to reduce GHG emissions by 30 % by 2030. Also discussed are ideas to assess and possibly reward good environmental performance in the future CAP through indicators and possible ‘benchmarks’.

Income disparities throughout the food chain have been a prominent issue over the last few years and are one of Commissioner Hogan’s priorities. A policy proposal is being prepared on this.

Relevant Commission policy objectives:

- simplify and modernise the CAP to maximise its contribution to the Commission’s 10 priorities and to the sustainable development goals (SDGs);
- promote sustainable food production, with a focus on farm income, agricultural productivity and price stability;
- promote the sustainable management of natural resources and climate initiatives, with a focus on GHG emissions, biodiversity, soil 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.

Key orientations for the JRC:

- a) **CAP implementation** — develop efficient and innovative tools to implement agricultural legislation, considering also the opportunities of big data and remote sensing and benefiting from the free and open access to Copernicus satellites; help to set standards and provide technical guidance for an optional monitoring approach as from 2018;

b) **environmental needs** — develop methods and tools for the integrated assessment of agriculture, rural development and the environment, taking into account the economic impact at farm and regional level (so that CAP instruments can be tailored to environmental needs); analyse farmers' behaviour towards environmentally friendly practices and the uptake of new technologies;

c) **resource efficiency, climate change and food security** — develop knowledge and models on soil, water and ecosystem dynamics in order to improve their sustainable management (socioeconomic and environmental dimensions) in agricultural systems, and make better use of the potential of the bioeconomy. Study the effects of climate change on the agricultural sector, assess the potential of climate change mitigation and adaptation strategies; forecast crop yields, production and demand in support of European food security (and global food security, which is covered under key orientation 9.2);

d) **agricultural market and trade** — analyse the competitiveness and trade relations of the European agri-food sector, and the performance of European agri-food systems (including the food chain). Provide detailed analysis of policy options for the CAP beyond 2020 based on economic and agricultural models.

1.2. Education, culture, youth and sport

EU education and training policy is designed to support national action and help address common challenges. Equal access to high-quality education is a priority. It is to be tackled by reaching out to the most disadvantaged and by integrating people with diverse backgrounds (including newly arrived migrants), thus fostering upward social convergence. To facilitate this process, the education and training strategic framework (ET2020) has common objectives and benchmarks, which are monitored annually. Moreover, the rapidly evolving needs for skills need to be anticipated.

The cultural and creative sectors have shown exceptional resilience to the economic crisis and are well placed to grow further because of their role as forerunners in digital innovation and the fact that they are a source of entrepreneurship. However, they remain undervalued and unrecognised, not least because concrete evidence of their potential is lacking.

Relevant Commission policy objectives:

In May 2017, new priority areas for cooperation with the Member States were adopted, including:

- tackling future skills mismatches and promoting excellence in skills development;
- building inclusive and connected higher education systems;
- ensuring higher education institutions contribute to innovation and overall streamlining of EU support for higher education;
- supporting effective and efficient higher education systems;
- developing better and more inclusive schools;

- supporting teachers and school leaders for excellent teaching and learning; and,
- improving governance of school education systems to make them more effective, equitable and efficient.

The key policy priority for the cultural and creative sectors is to better understand their economic potential to generate growth, create jobs and produce social effects. As specified in the 2015-2018 EU Work Plan for Culture, one of the four priority areas concern the cultural and creative sectors, in particular the role of the creative economy in boosting innovation. In addition, 2018 will be the European Year of Cultural Heritage, offering an opportunity for the JRC to highlight its scientific activities related to cultural heritage.

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) 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, refugees and other minorities into the education system, and early childhood learning; study digitisation's impact on education and training practices and systems;
- c) **cultural and creative sectors** — to 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 between now and 2020 is guided by the Commission's 10 political priorities, the sustainable development goals (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.

In line with the Commission priorities, 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 are used in a more sustainable way. The follow-up to the 2016 EU Action for Sustainability should ensure implementation of the United Nations sustainable development goals (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.

JRC 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 2018-20, notably those for 'Building a low-carbon, climate resilient future' and the focus area on 'Connecting economic and environmental gains– the Circular Economy'.

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, ensuring greater environmental integration and policy coherence, and increasing the knowledge and evidence base for EU environment policy.

Key orientations for the JRC:

1.3.1. Protecting and enhancing our natural capital

a) **freshwater and marine environment** — 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; provide integrated analyses of water allocation across economic sectors for Europe and other regions of the world (water-energy-food-ecosystems); 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 — see key orientation 1.3.2.a); develop the knowledge base, including the integrated modelling framework for freshwater and marine environment, targeting in particular the Marine Strategy Framework Directive (linked to key orientations in 1.4) 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, forests and soils** — support the implementation and final evaluation of the EU biodiversity strategy, notably by assessing ecosystem conditions, ecosystem services and natural capital accounting in the context of the environmental knowledge community, the green infrastructure, the invasive alien species information system, 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, 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. JRC will continue activities on soil 'point' contamination and close data and knowledge gaps in particular on soil biodiversity and soil diffuse pollution. JRC will support growing soil and land related activities at international level in particular on SDGs, FAO and the Global and European Soil Partnerships, UN Convention to Combat Desertification (UNCCD) Land Degradation Neutrality, the Intergovernmental Panel on Climate Change (IPCC) and the Intergovernmental science-policy Platform on Biodiversity and Ecosystem Services (IPBES) as well as networks like 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 facilitating the exchange of information on best practices. Determine best available techniques and develop indicators for waste management, and assess how to optimise energy recovery from waste in line with the EU waste hierarchy. Help to manage the EU raw materials knowledge base (see also key orientation 4.1.a) and develop quality criteria for secondary raw materials. Support the eco-innovation action plan, in particular the environmental technology verification programme. Develop lifecycle methodologies, data and analyses for sustainable consumption and production and other actions related to circular economy policy, such as the plastics strategy, which includes assessing the product-waste interface (i.e. reparability, durability, and recyclability), and the environmental footprint of products and organisations. Develop and deploy a set of indicators for the sustainability assessment of buildings. Assess environmental and industrial policies, coupled with economic assessments, e.g. real cost assessment, to make this approach more attractive to European companies.

b) **environmental knowledge, information and indicators** — develop environmental indicators and lifecycle-based methods for the roadmap to a resource-efficient Europe and for incorporating environmental considerations into other policies, e.g. via the better regulation toolbox. As a better way to generate, plan and share environmental knowledge, contribute to the environmental knowledge community, including through its knowledge innovation projects. 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 for nanomaterials, and support policy development in cross-cutting areas. Set up a toxicology 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 orientation 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 and 4.1.a); carry out integrated impact assessments of air quality and climate policies 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; 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 aquaculture

The challenge with policies on maritime affairs, fisheries and aquaculture is not only to ensure that marine resources are used in a responsible way to maintain the fragile balance in marine ecosystems. The challenge is also to further develop the European maritime economy's potential to create new jobs and secure sustainable fisheries, a stable supply of seafood, healthy seas and prosperous coastal communities. An integrated approach is taken that covers all maritime policies, including the reformed common fisheries policy to ensure sustainable EU fisheries by 2020, and the integrated maritime policy to provide a coherent approach to maritime issues. The latter provides for increased coordination between different policy areas, such as blue growth, integrated maritime surveillance, the marine environment and sea-basin strategies.

In 2017, the EU has further positioned itself as a global champion of sustainably managed oceans by hosting the 4th Our Ocean Conference and by signing the MEDFISH4EVER declaration stepping up international commitments to save Mediterranean fish stocks and ensure marine protection and the sustainable development of the blue economy across the world.

Relevant Commission policy objectives

- develop the potential of the European maritime economy, including supporting the BLUEMED initiative for blue growth and jobs in the Mediterranean³;
- secure sustainable fisheries, a stable supply of seafood, healthy seas and prosperous coastal communities, in line with the FOOD 2030⁴ and Sustainable Development Goal 14;
- promote maritime policies to foster the blue economy;
- develop and carry out policies based on the common fisheries policy including an effective EU fisheries control system and a suitable data collection framework;
- advance ocean governance internationally and contribute to the long-term sustainability of fisheries and aquaculture worldwide by being actively involved in international organisations and by concluding sustainable fisheries partnership agreements with non-EU countries and by supporting cooperation in marine and maritime research and innovation with third countries bordering the Atlantic Ocean, following the Galway⁵ and Belém⁶ Statements.

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) **maritime security** — improve EU maritime surveillance systems, enhance their interoperability and provide support to implement selected actions under the EU maritime security strategy (work on security is covered under key orientations in Section 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 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 2016*, life expectancy across EU Member States has increased by more than 6 years since 1990, rising from 74.2 years in 1990 to 80.9 years in 2014, but inequalities persist both between and within them. This is largely due to different levels of exposure to health risks, but also to unequal access to high-quality care. Physical inactivity is a major societal problem in

³ <http://www.bluedmed-initiative.eu/>

⁴ https://ec.europa.eu/research/bioeconomy/pdf/european_research-innovation_for_food_and_nutrition_security.pdf#view=fit&pagemode=none

⁵ https://ec.europa.eu/research/iscp/pdf/galway_statement_atlantic_ocean_cooperation.pdf

⁶ https://ec.europa.eu/research/iscp/pdf/belem_statement_2017_en.pdf

Europe as well as globally, with a great impact on people's wellbeing: the lack of physical activity is the fourth leading risk factor for global mortality causing 6% of deaths in the world and costing €80 billion in the EU.

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.

A persistent gap is the lack of harmonised data on the prevalence of endocrine-mediated diseases and parameters (e. g, sperm quality) at the EU level. There are often indications that certain of these diseases are increasing, with speculation that endocrine disrupters could play a role. Having more harmonised and verified data would be useful to support evidence-based policy making.

Health can be promoted through *preventive* measures (e.g. healthier lifestyle to prevent obesity and subsequent disease burden, including cancer; better understanding of causative factors for diseases/conditions) and *curative* measures (e.g. use of medicines and medical technology).

Relevant Commission policy objectives:

- improve and protect human health, reduce health inequalities, support the reform of health systems and fight discrimination;
- support the development of innovative and sustainable healthcare systems and new technologies in the EU;
- prevent non-communicable disease (particularly cardiovascular diseases, obesity, diabetes, and cancer) and promote good health and nutrition in an ageing Europe using appropriate measures;
- support with scientific advice and risk assessment, Commission policies and proposals related to consumer safety, health and the environment;
- protect Europeans from a range of cross-border health threats and ensure a fully coordinated response in the event of a crisis;
- assure harmonised measurement methods;
- 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 standardisation, harmonisation, and improvement of healthcare and health information in the EU, the initial focus is on cancer and rare diseases. This includes the coordination/development of European disease registries, the launch of an

innovative and comprehensive quality-assured healthcare pathway (starting with breast cancer, followed by colorectal cancer), monitoring cross-border health threats, and reference systems including certified reference materials for health measurements. As for the promotion of a healthier society, the focus is on physical activity, nutrition, alcohol and tobacco, all in the framework of non-communicable disease prevention. This includes support in fighting obesity, both childhood and adult, in line with the Tartu call for healthy life style. Promotion of a healthier society will further be supported through an action to help member states to reach the sustainable development goals on health, by selecting and evaluating interventions for implementation in member states; in particular through the management of the best practice portal (submission, evaluation and dissemination of best practices)

b) **supporting nano-related policies, health technology assessment** —monitor chemical data and implement endocrine disruptors criteria; disseminate novel toxicity approaches;

1.5.2. Food safety, food quality and food fraud

Food safety policies aim to ensure a high level of protection of human health in the food industry. In 2015, some 3 049 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. 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;

- ensure evaluation and follow-up of food legislation;

- carry out a REFIT evaluation of Regulation (EC) No 1924/2006 on nutrition and health claims relating to foods;

- amend Regulation (EC) No 1829/2003 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 Official Controls Regulation (Regulation (EU) 2017/625);

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

- 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 and the pre-marketing authorisation of genetically modified organisms and feed additives;

b) **food and feed quality and fraud** — manage a Knowledge Centre on Food Fraud and Quality (see also key orientation 7.1.b); assist in the fight against food fraud; produce certified reference materials for food and feed analysis; develop a harmonised testing approach to assess alleged differences in quality of food products;

c) **plant health** — protect plant health through early detection and plant health monitoring initiatives; support the establishment of a priority list of plant pests in the Union.

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. 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:

- 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 space-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 **Knowledge Centre for Territorial Policies** was set up in 2016. The following activities all contribute to its objectives:

a) **territorial modelling for impact assessment of policies and investments** — develop a capacity to do integrated modelling to better assess the impact of

investments and policies in regions, cities and macro-regions, including demographic trends, and climate change impacts;

b) **economic, social and environmental cohesion and development** — develop indices and quantitative analyses at urban, regional and macro-regional levels;

c) **support for macro-regional and smart specialisation strategies** — develop integrated processes and qualitative methods to support the development, implementation and monitoring of smart specialisation strategies and capacity building at national, regional, urban 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, Commissioner Carlos Moedas has set three goals for EU research and innovation policy:

- open innovation: involve society (researchers, entrepreneurs, users, governments, regions, civil society) in the innovation process to engage in and capitalise on the results of R&I; create a regulatory environment for innovation, supporting innovation ecosystems and funding mechanisms;

- open science: open up access to research results and underlying data, setting standards for the management, interoperability and quality of scientific data; improve standards to promote research integrity and combat scientific misconduct; foster inter and transdisciplinary approaches;

- open to the world: translate Europe's global position in science into a leading voice in global debates; intensify science diplomacy and global scientific collaboration; move from collaborative projects to partnerships with regions and countries.

For the final work programme under Horizon 2020⁷, the Commission has set out five major priorities:

- increased investment in sustainable development and climate related R&I:

⁷ <https://ec.europa.eu/programmes/horizon2020/en/h2020-section/cross-cutting-activities-focus-areas>

- 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.

These priorities are founded on overall EU policy priorities, and a significant proportion of the budget has been focused on these. These include in particular, initiatives in key areas like the digital single market, (high performance computing, ICT, SMEs), Energy Union, mobility (batteries), space and the circular economy including work on plastics. Priorities are also addressed through 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'.

Together, these show how research and innovation contribute across the Commission's political priorities. They do not represent a new policy initiative or funding programme as such, but a way to strengthen existing programmes.

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. Manage the Research and Innovation Observatory through the collection, production and dissemination of data and analysis related to national research and innovation policies. 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. Promote the exchange of best practices among research organisations on intellectual property management and technology transfer including on new financial instruments, ecosystems designs and opening of research infrastructure;

b) **fuel cells and hydrogen technologies** — support the Fuel Cells and Hydrogen Joint Undertaking by monitoring and assessing the technologies and 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, collecting, analysing, disseminating and modelling data on the bioeconomy and assessing food

and nutrition security. Provide data and analysis on sustainable biomass supply and demand at EU level and worldwide, covering all types and uses of biomass, to provide a basis for coherent policies on the bioeconomy, including relevant agriculture, food, environment, climate, energy and industry policies. Contribute to the Revision of the Bioeconomy Strategy in 2018 inter alia taking the point of view of the Industrial Policy. JRC work on the bioeconomy will be closely interconnected with work described in Sections 1.1 (agriculture and rural development), 1.3 (environment), 1.5 (health and food safety), 3.1 (climate action) and 3.2 (energy) and 4.1 (industrial base).

1.8. Transport

The transport sector is very important because of the employment and value it creates (5.2 % of total employment and 5 % of European gross added value), but also because of its links with energy and climate policy and objectives. It is highly dependent on oil and oil products (94 %), and responsible for 24 % of GHG emissions (excluding international maritime) and is the main cause of reduced air quality 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 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 further framed the initiatives planned in the coming years to increase the efficiency of the transport system, speed up the deployment of low-emission alternative energy for transport and move towards zero-emission vehicles. Many of these initiatives (e.g. revision of the Eurovignette Directive, revision of Clean Vehicles Directive, recast of Regulations on CO₂ standards for cars and vans) have been already proposed by the Commission (i.e. Mobility Packages of May and November 2017).

Relevant Commission policy objectives:

- ensure that GHG emission reductions and climate resilience in the transport sector help to achieve EU targets;
- promote the efficient 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 and develop the transport innovation and monitoring information system (TRIMIS);
- b) **alternative fuels** — 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;

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; and 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; develop electronic tools in support of quality inland water transport across Europe;

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 carry out performance testing and analysis of aviation security technologies.

1.9. Employment, social affairs, skills and labour mobility

Almost 8 million jobs have been created during the mandate of this Commission, in part thanks to EU-level actions. The European Fund for Strategic Investments (EFSI), a strengthened Youth Employment Initiative and Youth Guarantee, 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;
- establish and monitor a 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) **European pillar of social rights** — help to establish the core principles of the pillar by analysing what makes a society fair;
- 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

The internet and digital technologies are transforming our economy and society on a huge scale. However, fragmentation and barriers in digital services across the EU reduce the chance of reaping the full benefits of the digital economy in the EU single market, estimated at EUR 415 billion per year, and hundreds of thousands of new jobs. In 2016, the Commission launched its ambitious digital single market strategy, with 16 initiatives. By the mid-term review in May 2017, 35 legislative proposals and policy initiatives had already been delivered.

The JRC is helping the Commission to shape and implement these initiatives. Their aim is to ensure that Europe's economy, industry and employment take full advantage of what digitisation offers, make the EU's digital world a seamless marketplace by breaking down barriers to cross-border online activity, support e-infrastructure development, and design rules/guidelines which match the pace of technological change.

JRC work towards the digital single market will take into account and wherever possible develop synergies with the focus areas under the Horizon 2020 work programme 2018-20 on 'Digitising and transforming European industry and services'; and 'Boosting the effectiveness of the Security Union' notably in relation to cybersecurity. Other synergies will be sought with the planned special effort under the Horizon 2020 work programme 2018-20 for a pilot action for the development of a European network of cybersecurity competence centres.

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.

Key orientations for the JRC:

- a) **impact of digital technology and transformation on society** — assess the impact of digital technology, of collaborative and platform economy, and related economic models on growth, jobs and consumer welfare in the EU; measure the economic impact of policy initiatives in the European Data Economy, notably Free Flow of Data; investigate digitally-enabled innovation and entrepreneurship; analyse the uptake of artificial intelligence and the deployment of digital transformations in human societies and their impact on governance, public services, and human-machine interactions;
- 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; support to the Roam-Like-At-Home initiative;
- 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;

d) **interoperability of e-infrastructures** — provide technical support for the interoperability of e-infrastructures (helping to modernise the digital public services) and open access (supporting open science); use the convergence of big data with online tools (supporting citizen science) and assess the interoperability of energy services (in support of digitisation of the energy system); analyse the impact of interoperability and standardisation on intellectual property rights.

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 framework'⁸ 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 strategy⁹ adopted by the Commission in February 2015, with specific policy and legislative proposals to be adopted over the next few years.

The 2013 EU **strategy on adaptation to climate change**¹⁰ 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. In 2016, the Commission launched an evaluation of the EU adaptation strategy. The results are to be available by mid-2018.

In 2018-2019, the JRC will continue to help develop new laws and policies and implement legislation to meet the commitments made under the Paris Agreement.

The JRC will ensure strong links and identify areas for added value between its own activities in support of the Energy Union, and the relevant focus areas under the Horizon 2020 work programme 2018-20, notably those for 'Building a low-carbon,

⁸EUCO 169/14, European Council Conclusions of 24 October 2014.

⁹COM/2015/080 Final: 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 A Framework Strategy for a Resilient Energy Union with a Forward-Looking Climate Change Policy.

¹⁰COM(2013)216 Final: Communication from the Commission to the European Parliament, the Council, the European and Social Committee, and the Committee of the Regions An EU Strategy on adaptation to climate change.

climate resilient future'; and the focus area on 'Connecting economic and environmental gains– the Circular Economy'.

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 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;
- 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; maintain and further develop integrated set 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 States;

b) **GHG and air pollutants emissions modelling** — monitor, report and verify energy-related, agricultural and forestry (Land Use, Land-Use Change and Forestry, LULUCF) 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);

c) **vehicle emissions** — provide technical support to the 2018 mobility packages for implementing and developing policy measures to decarbonise the transport sector; specifically, support the further development of the CO₂ certification procedures for light and heavy-duty vehicles, including effective market surveillance mechanisms such as in-service conformity testing; analyse real-world fuel consumption and CO₂ emissions of light- and heavy-duty road vehicles; support the development of

advanced consumer information systems in relation to CO₂ and fuel consumption (also exploring feasibility to include air pollutant emissions); assess eco-innovation CO₂ savings and derogations for small-volume manufacturers of cars and vans and assess innovation scenarios for smart mobility technology;

d) **alternative fuels for transport** — assess the environmental sustainability, technological development and costs of bioenergy and biofuels and associated savings on GHG and pollutant emissions, including ‘well-to-wheel’ analyses and support for alternative fuels legislation; support the Commission's work on alternative fuels for aviation;

e) **support the operations of climate innovation funds** — 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.

3.1.2. Adaptation

a) to support the review and update of the EU adaptation strategy and to meet the objectives of the Sendai framework for disaster risk reduction¹¹ 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 Energy¹², further covered under key orientation 3.2.d).

3.1.3. Climate science, research and observations

a) advance our understanding of how climate change interacts with other parts of the Earth's system; in particular the vulnerability of the Arctic region to climate change and translate the findings into specific strategies for mitigation, adaptation and sustainable developments.

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 2014, the EU adopted ambitious 2030 energy and climate targets to ensure, and monitor progress towards, this long-term transition, expressing the ambition to become the world's number one in renewables. These

¹¹ 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).

¹² 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.

targets, after evaluation and revision in the context of 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* report¹³ 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, 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, 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. 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 Design¹⁴ Initiative and the governance of the Energy Union as part of the "Clean Energy for All Europeans" package.

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;
- promote a fully integrated internal energy market with a new deal for consumers;
- 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

¹³COM(2017) 688 final: https://ec.europa.eu/commission/sites/beta-political/files/third-report-state-energy-union_en.pdf.

¹⁴ 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.

climate plans. and exploiting synergies with other relevant policies such as ambient air policy;

- 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 POTEnCIA model), including the development and maintenance of necessary databases or other available energy models for the Commission; 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 and carry out energy modelling at national, regional and European level and analyse the results meeting reliability, credibility and transparency criteria; including as far as possible quantification of 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 and make available to European stakeholders the tools to use or develop energy system modelling; timely support to 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. This work covers security of supply, transmission and distribution of gas and of electricity, as well as the safety of offshore oil and gas operations, including tools for accident reporting and capacity building measures. Analyse privacy and cybersecurity 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 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), 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 EU energy efficiency legislation, including on energy performance of buildings and on efficient heating & cooling; provide technical support for the development of the legislative framework for after 2020; 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 plans on energy efficiency, renewables, emissions reduction, climate adaptation and access to energy, 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; develop and maintain the European Energy Efficiency Platform (E3P);

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 and by analysing relevant renewable energy scenarios and supporting the implementation of the revised directive; perform pre-standardisation work on photovoltaic and other renewable energy technologies;

f) **energy research, innovation & competitiveness** — help to implement the research and innovation and competitiveness (RIC) 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.

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)¹⁵. 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 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 2014-2018¹⁶ (the Euratom programme) 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.

¹⁵Communication from the Commission to the European Parliament and the Council European Energy Security final Strategy COM/2014/0330.

¹⁶Council Regulation (Euratom) No 1314/2013 on the Research and Training Programme of Euratom (2014-2018) complementing the Horizon 2020 Framework Programme for Research and Innovation.

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 competences¹⁷. 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 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;
- 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:
 - Euratom Treaty Articles 30-36, 39, 41 and 43;
 - nuclear safeguards (Euratom Treaty Chapter 7);
 - the Nuclear Safety Directive¹⁸;
 - the Spent Fuel And Radioactive Waste Management Directive¹⁹;

¹⁷Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions: Energy Technologies and Innovation (COM(2013)253).

¹⁸Council Directive 2014/87/Euratom of 8 July 2014 amending Directive 2009/71/Euratom.

- Spent Fuel and Radioactive Waste Management Shipments Directive²⁰;
- the Euratom Drinking Water Directive²¹;
- the Basic Safety Standards Directive²²;
- Community arrangements for the early exchange of information in the event of a radiological emergency²³;
- development of international safety standards and fulfilling 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;
- 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 to support the development of **European small modular reactors**, including identification, technical assessment and key areas for development (safety, economics and licensing) 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;

¹⁹Council Directive 2011/70/Euratom of 19 July 2011.

²⁰ Council Directive 2006/117/Euratom of 20 November 2006.

²¹ Council Directive 2013/51/Euratom of 22 October 2013.

²²Council Directive 2013/59/Euratom of 5 December 2013.

²³ Council Decision 87/600/ Euratom of 14 December 1987.

- carry out studies for the reduction of the radiological toxicity of wastes through advanced separation and transmutation and for the **safety assessment of recycling technologies**; 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**:

- support Member States and Commission departments on the exchange of information in case of radiation emergency and on routine and emergency **radiological monitoring of radioactivity levels in the environment**. This includes hosting, maintaining and developing the related rapid alert, information exchange and database systems, ensuring their availability;

- develop severe accident modelling, radiological source term evaluation, accident management of nuclear power plants and enhance **preparedness for nuclear or radiological incidents** through benchmarking of dispersion models;

- support Commission departments by assessments of **radiation and radioactive contamination measurement methods**.

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) **promote excellence in the nuclear science base for standardisation**:

- develop an understanding of 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 assessment 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. 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 businesses²⁴, 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;
- 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, reference measurements and materials (including nanomaterials); support the proper functioning of the single market for food products (key orientation 7.1.b); contribute to material efficiency and circular economy; analyse advanced manufacturing and key enabling technologies; SMEs and innovative companies, industrial competitiveness; 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 other pollutant emissions; provide data and analyses on bio-based industries, as part of the Bioeconomy knowledge centre (key orientation 1.7); further develop and improve vehicle emission test procedures for testing in the laboratory and on the road; support the monitoring of the European vehicle market and its compliance with European regulations on emissions; support European and international regulation and standardisation efforts through performance and safety evaluation of energy storage devices, including batteries for electromobility;

b) **space strategy** — provide support for Galileo and the European global navigation satellite systems, including signal, receivers and technical support for policy development and the management of R&D assets and resulting intellectual property rights; 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. Services and products of the Copernicus programme also contribute to common agriculture policy implementation (key orientation 1.1.a), marine environment monitoring (key orientation 1.3.1a), 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 illegal immigration 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).

c) **medical devices and cosmetics** — provide scientific and technical support in regard to the revised 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.

d) **raw materials** — help to implement actions and EU policies and monitor the progress of the implementation plan for the European innovation partnership on raw materials. Monitor and analyse primary and secondary raw materials at European and global levels, contributing to the raw materials scoreboard and circular economy indicators. Support the management of the EU knowledge base on raw materials by developing the raw materials information system in collaboration with European and global stakeholders and partners. Develop methodologies and provide data for assessing the raw material flows in the economy and the trade flows for raw materials. Contribute to the criticality assessment for raw materials and to the analyses of the security of raw materials supply, addressing in particular energy applications such as dual-use. 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.

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,²⁵ **customs controls** must be based primarily on electronic risk analysis, and carried out in a common risk management framework. The Council endorsed²⁶ a comprehensive *EU strategy and action plan on customs risk management*²⁷, developed by the Commission and the Member States together, and providing a comprehensive agenda for strengthening risk management. It aims to

²⁵ Regulation (EU) No 952/2013 of the European Parliament and of the Council of 9 October 2013 laying down the Union Customs Code

²⁶ 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*

²⁷ COM (2014) 527 of 21st August 2014 Communication from the Commission to the European Parliament, the Council and the European economic and social Committee on the EU Strategy and Action Plan for customs risk management: Tackling risks, strengthening supply chain security and facilitating trade

improve information availability and sharing, to strengthen risk analysis capacities at every level, and to enhance co-operation across customs, other authorities and trade.

With the amendment of Regulation (EC) No 515/97²⁸, 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, prototype, applications as well as data infrastructure 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 investigation by using trade data on the status and movement of cargo containers and customs declarations in cooperation with Commission departments and the customs authorities, support the fight against evasion of customs duties and quotas and against trafficked, smuggled or counterfeited goods, and analyse unknown substances; standardise analytical data and create libraries of analytical data for illicit substances, support an increased use of handheld equipment by customs officers on the field; 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*²⁹, which will be implemented in stages to complete EMU in the coming 10 years, sets out concrete measures to move towards a stronger union that contributes to jobs, growth and prosperity. Putting the public finances of Member States on a sound and sustainable footing is critically important for the stability and prosperity of the euro area. Public finances have been considerably stretched in recent years, with the crisis entailing a sharp increase in public sector debt.

²⁸Regulation (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.

²⁹ The Five Presidents' Report: Completing Europe's Economic and Monetary Union, 22 June 2015

Relevant Commission policy objectives:

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

Key orientations for the JRC:

- a) 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* recommends 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.

Relevant Commission policy objectives:

- support growth and job creation by improving the investment environment and the long-term financing of the economy;
- 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) carry out quantitative analyses and behavioural studies for the development of the **Capital Markets Union** and completion of the **Banking Union**;
- b) assess initiatives related to the **regulation of the financial sector** and to new dynamics and risks, notably sustainability issues; 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

Tax fraud, tax evasion, and aggressive tax planning are major problems the EU is currently facing. The rules that govern corporate taxation are out of step with the modern economy, especially in light of technological developments. 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. A new EU approach for fair and efficient corporate taxation is set out in the June 2015 action plan and in the September 2017 Communication on a tax system suited for the digital single market. Tax policy strategies should also aim to ensure sustainable fiscal consolidation strategies by which profits are taxed where value is created. 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.

Relevant Commission policy objectives:

- fight tax fraud and tax evasion, harmful tax practices and aggressive tax planning; create fair and efficient tax systems and promote greater cooperation between tax administrations;
- modernise and simplify tax rules.

Key orientations for the JRC:

a) **corporate taxation** — perform modelling to support the action plan for fair and efficient corporate taxation in the EU and the Communication on a tax system in the digital single market; carry out analyses of the effects of corporate taxes and in particular develop modelling tools for assessing the impact of anti-avoidance rules, the harmonisation of specific rules, changes in tax treaties and future EU policy initiatives;

b) **fiscal policies** — perform modelling and economic analyses of tax policies using the EUROMOD³⁰ microsimulation model.

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 implement its 'Trade for All' strategy³¹ in order to ensure a sustainable and transparent trade policy based on values that helps to harness globalisation and ensures a balanced approach on open and fair trade agreements.

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;

³⁰ EUROMOD - Tax-benefit microsimulation model for the European Union.

³¹ Trade for all – Towards a more responsible trade and investment policy;

<http://trade.ec.europa.eu/doclib/html/153846.htm>.

- foster sustainable economic, social, and environmental development in all participating countries, including developing countries;
- finalise agreements with Japan, Singapore and Vietnam; pursue negotiations with Mexico and Mercosur; launch negotiations with Australia and New Zealand.

Key orientations for the JRC:

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

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** — analyse statistical indicators and methodologies to monitor consumer behaviour and market performance; develop data collection systems and their interoperability for product safety and market surveillance; apply behavioural insights;

b) **dual quality of food products** — develop a robust harmonised testing approach and guidelines that could be used in potential further investigations including a harmonised sampling and testing approach and data evaluation; supervise a comparative exercise involving several Member States to check whether certain quality-relevant characteristics of food products that are sold in the single market under the same brand and same packaging are indeed different.

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 soft targets that have unfolded in the last

three 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 soft target protection** — help to strengthen critical infrastructure and protect soft targets such as buildings, urban centres and public spaces; contribute to standardisation activities leading to security; understand and model vulnerabilities and interdependencies, including through: synthesis and sharing of knowledge, exchange of good practice, 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 support and research. Support the standardisation process for CBRN-E related detectors and other equipment. Exchange good practice 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;

c) **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 apps and virtual reality can be used to improve citizens' security and the security perception; provide support in the development of open sources 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 Police Office (EUROPOL) and Member State authorities in law enforcement in areas such as cybercrime and child sexual exploitation, digital forensics, the collection of digital evidence from smart environments, open-source intelligence, and new psychoactive substances, including support for early warning and risk analysis;

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 effective processing of Schengen visas); 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 close information gaps;

f) increase the **security and defence dimension of other EU policies** (e.g. maritime (key orientation 1.4.c), aviation (key orientation 1.8.e), energy (key orientation 3.2.b), research, etc.).

JRC work on disaster resilience, emergency and crisis management, including its internal dimension, is summarised in the section 9.1.1.

8. Towards a new policy on migration

8.1. Migration

Migration and refugee movements are some of the greatest political, social, and demographic challenges the EU faces. Unprecedented numbers of migrants entering the EU in 2015, challenging solidarity 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 instrument 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: tackling the root causes of irregular migration; improving border management; strengthening the Common European Asylum System, combating the smuggling of migrants, improving the functioning of return policies and making legal migration more attractive. (strengthening legal migration and integration.

Relevant Commission policy objectives:

A Communication on the Delivery of the European Agenda on Migration was adopted on 27 September 2017. It includes a mid-term review of the European agenda on migration and sets out new initiatives from the Commission to address key areas where further efforts are needed in the coming months:

- a reform of the Common European Asylum System based on both responsibility and solidarity and including proposals to reform the Dublin system, the setting-up of an Asylum Agency, reform of Eurodac³², review of the Reception Conditions Directive, the Asylum Qualifications Directive and the Asylum Procedure Directive as well as the EU resettlement framework;

³² 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 (recast).

- an adoption of a new resettlement programme of at least 50,000 persons in need of protection by October 2019;
- the promotion of more legal pathways, through the launch of pilot projects on legal migration with third countries and the adoption 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');
- a more effective policy on returns;
- reinforced 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 partnership framework and the new global compacts and improve the effectiveness of migration-related EU actions and resources;
- b) facilitate the protection of children in migration by improving data and methods for biometric registration and assessment of their age;
- c) support EU policies addressing push and pull factors of migration and other population displacements;
- d) analyse the impact of admission and integration policies; examine factors enabling integration; measure the impact of migration on economic growth, the labour market, employment, wages, health, welfare, education, research, wellbeing, and demographics and 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;
- e) support early warning, risk analysis and projection for greater situational awareness of migration flows;
- f) operate the **Knowledge Centre for Migration and Demography**, provide policy-oriented research, evidence-based analyses and observatories, increase the uptake of research, and strengthen partnerships and outreach.

The JRC will ensure complementarity and synergies with its work on migration and the other significant programme of work on this under Horizon 2020 work programme 2018-20.

9. Europe as a stronger global actor

9.1. Global safety and security

A globalised world marked by complexity, incalculable risk, 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 its new global strategy, the EU has committed itself to focusing on human security, addressing traditional 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 risk assessments and planning, support for developing an EU-wide overview of risks and 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;
- 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, 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, and 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 2030 agenda (SDGs);
- 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. Support defence operations to improve resilience in Europe and beyond;

c) **fight global, trans-regional and emerging threats** — support activities contributing to stability and peace (including 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 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.

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 14929/05).

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) provide technical and statistical support to the modernisation of EU dual-use export control policy, and the development of an EU export control network; analyse open source information a contribution to the **EU nuclear non-proliferation**; provide training and operational support for Member States and international organisations;
- d) help Member States, partner countries and international institutions (IAEA, etc.) to increase **technical knowledge of nuclear security** using the European Nuclear Security Training Centre.
- 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 development. This policy 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 world poverty by promoting good governance, address inequalities and promote gender equity;
- achieve food security for all people, improve nutrition and promote sustainable agricultural systems;
- foster global sustainable development by addressing its social, environmental and economic dimensions in an integrated way;
- preserve and promote global public goods, including a stable climate;
- 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 and sustainable supply of raw materials from global markets;
- contribute effectively to the implementation of international agendas, fora, conventions, etc.

Key orientations for the JRC:

9.2.1. 2030 agenda on sustainable development

a) under the new European consensus on development, help to monitor and implement the SDGs by developing and integrating knowledge management tools and organising information on related policies, indicators, methods, and data. In doing this, make it easier to incorporate the social, economic, and environmental information needed to achieve the SDG targets, identifying interlinkages (trade-offs and co-benefits) and taking into account international monitoring frameworks and indicators and national monitoring efforts, and collaborate with relevant international Earth monitoring and observation programmes.

9.2.2. Food security and nutrition, rural development and sustainable agriculture³³

a) monitor agricultural resources, analyse situations of food and nutrition insecurity (including food poverty) through a food system approach; provide support with economic and biophysical modelling and information systems to help build communities that are more resilient, especially to the impacts of climate change. Provide an advanced knowledge base to help achieve zero hunger in 2030; forecast crop yields and production to support global food security (European food security is covered under key orientation 1.1.c).

³³This key orientation focuses specifically on JRC projects contributing to development policies on food and nutrition security, rural development and sustainable agriculture'. The orientation is intrinsically linked to 'agriculture and rural development' policy.

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

a) carry out analysis, help build capacity, and provide data, maps and methodologies on the extent of and vulnerability to climate change in developing countries; inform the preparation and implementation of programmes aimed at climate change adaptation and actions under the global Covenant of Mayors for Climate and Energy, building on the experiences with the EU Covenant of Mayors;

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, with a focus on forestry, land, and land use change, soil, biodiversity, ecosystem services, agriculture, air and water, where appropriate in cooperation with relevant international organisations and conventions, including the FAO, the UN environment programme, the UN Economic Commission for Europe, UNCCD, IPBES and the International Resource Panel.

9.2.4. Energy

a) map out and monitor activities, develop geographical information system tools, support sustainable energy planning and the implementation of the Covenant of Mayors, share best practice and build capacity in support of international, bilateral, and regional energy cooperation initiatives, including on energy efficiency and renewable energy.

9.2.5. Horizontal policies: aid effectiveness, transparency and policy coherence

a) develop methodologies, indicators and ICT tools, and carry out macro and microeconomic analyses of development issues in support of the agenda for change, policy coherence for development and aid effectiveness; focus on measuring the impact of EU aid.

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 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.

The JRC will help to build an EU based on transparency and dialogue between the Commission and its major stakeholders.

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:

- Competence Centre on Modelling** — contribute to high-quality impact assessments of policy proposals and policy options, and promote a responsible use of modelling at EU and Member State level;
- Competence Centre on Microeconomic Evaluation** — provide technical advice, methodological support, specialised training and exchange on counter-factual impact evaluations;
- 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.

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 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** by developing generic tools and processes, taking into account anticipation, behavioural insights, design for policy, citizens' engagement, media monitoring, data and text-mining.

11. A stronger knowledge management capacity

11.1. Tools and skills for knowledge management

The effective management 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. However, knowledge remains scattered across the Commission, and the generation of new knowledge is still uncoordinated.

If the Commission has a greater capacity to manage knowledge, 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:

- strengthen the Commission's knowledge-management capacity.

Key orientations for the JRC:

a) **translation of knowledge into policy** — develop knowledge management methods, concepts and skills to translate data, information and knowledge into better EU policies, including through training and the collecting and sharing of country, regional and local knowledge;

b) **knowledge-management methods and tools** — develop common platforms for the use and sharing of data, information, and knowledge in support of policy-making; contribute to ensuring existing and new platforms and information systems interoperability; provide access to knowledge sources and maximise the use of data and information for better policy-making; facilitate communities of practice and improve knowledge-based communication; create a culture of knowledge sharing and learning.

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 IP rights 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.

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 objective³⁴:

- protect and enforce the EU's intellectual property rights.

Key orientations for the JRC:

a) manage the JRC's and the Commission's **portfolio of intellectual 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;

b) promote **collaboration** on intellectual property rights and technology.

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.

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

³⁴Towards a more effective management of intellectual property rights at the European Commission, Communication to the Commission (SEC(2012) 103).