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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 by means of direct actions by the Joint Research Centre for the period 2017-2018, and amending Commission Implementing Decision C(2016) 730

Key orientations for the Joint Research Centre's multi-annual work programme for 2017-2018

I. Introduction

The Commission President's agenda for jobs, growth, fairness and democratic change focuses on 10 policy areas in which the European Union can make a real difference. The accompanying guidelines point out that 'jobs, growth and investment will only return to Europe if we create the right regulatory environment'. Accordingly, the Commission introduced the better regulation agenda to improve the design of EU policies and laws so that they achieve their objectives at minimum cost. Better regulation must be based on rigorously established, objective evidence. The Joint Research Centre's (JRC's) mission is to support EU policies with independent evidence throughout the policy cycle. As a 'boundary' organisation at the interface between the scientific and policy spheres, and at the same time a Commission service, the JRC is well placed to provide the holistic, cross-silo policy support that policy-makers need to tackle increasingly complex social problems.

The JRC works across all policy areas with Member States, European stakeholders and international partners, providing data and analysis which supports the design of new policy initiatives and legislative proposals and the monitoring of existing ones. This gives it a unique understanding of how well policy initiatives are working and whether improvements are needed.

The JRC's work programme is updated annually to respond to the Commission's needs. In parallel, the strategic focus of its work will be strengthened through the long-term orientation set out in the new *JRC Strategy 2030*, which includes 10 priority thematic developed with input from partner directorates-general (DGs).

In support of the Commission's objective of improving the way it manages knowledge, the JRC is strengthening its knowledge management capacity and supports the work of the Information Management Steering Board[1]. It will develop tools and platforms to facilitate knowledge-sharing and collaborative working. It will build up knowledge bases for key thematic areas and geographical entities. It will operate a number of 'Commission knowledge centres' in key policy areas and put its methodological skills at the disposal of Commission services though JRC competence centres.

Knowledge centres create, collate, validate and structure scientific knowledge from the Commission and other partners, for a specific policy area or across policy areas. They put this knowledge in context and make it comparable and easily accessible and applicable to policy questions. They will also provide a platform for coordinating the knowledge requirements of Commission services more effectively. In 2015 and 2016, the Commission launched knowledge centres for disaster risk management, migration and demography, and territorial policies. In 2017, knowledge centres will be launched for bioeconomy and food authenticity.

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[1] The Information Management Steering Board is mandated by the College to implement the strategy described in the communication to the Commission on "Data, information and knowledge management at the European Commission" C(2016) 6626 final.

Competence centres bring together analytical and methodological expertise, such as modelling or data-mining that can be used across the Commission, independently of theme. Competence centres on composite indicators and on microeconomic evaluation were launched in 2016. Competence centres on modelling and on data and text-mining are also developed.

The JRC will strengthen 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). An inventory of relevant geographical data will include country, regional and local knowledge.

In support of cross-sectorial policies and to help break down silos, the JRC is strengthening its inter-disciplinary and collaborative activities, leading to more comprehensive, integrated assessments. Examples are smart cities, the Sustainable Development Goals (SDGs) and the water-energy-food nexus and climate action.

Partnerships and cooperation with Member States at national and regional levels will be strengthened. Structured collaboration with the European Institute of Innovation and Technology and involvement in the Knowledge Innovation Communities, will give the JRC access to wide-ranging and interdisciplinary research and networks of private and public partners across Europe. A more strategic approach will be taken to international cooperation, with a focus on the United States, Brazil, China, Japan, South Africa, India and Mexico in accordance with the EU multi-annual roadmaps for targeted international cooperation[2], whilst scientific cooperation with international organisations, in particular the United Nations (UN), the Organisation for Economic Co-operation and Development (OECD), the World Bank (WB) and European Organization for Nuclear Research (CERN), will be stepped up.

Open access underpins European research and attracts the best scientists from around the world. The JRC is preparing to 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.

JRC's well-established education and training programmes will drive closer relations with higher education institutions in Europe and enable co-supervision of students on topics with clear added value for policy implementation at EU, national and regional levels.

The JRC is also working closely with the new Scientific Advice Mechanism[3] in pursuit of its complementary mission to provide the Commission with high-quality, timely and independent scientific advice

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[2]SWD(2016) 329 of 13.10.2016
[3]https://ec.europa.eu/research/sam/index.cfm?pg=about

II. A work programme supporting the Commission's 10 priorities

The key orientations for the JRC's multi-annual work programme for 2017-2018, 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');

- based on the Horizon 2020 work programme for 2017-2018;

- funded either by institutional resources (i.e. operational funding for the JRC from Horizon 2020) or competitive resources (i.e. additional funding from policy DGs and grant funding from Horizon 2020 and Euratom programme). The JRC's participation in Horizon 2020 and its predecessor FP7 also provides valuable access to European and international research networks and helps in building up core competences.

The JRC's key contributions to main areas of the Commission's work programme for 2017 are set out below.

A new boost for jobs, growth and investment

In order to facilitate place-based policy development and investments, the JRC and DG REGIO have set up a Knowledge Centre for Territorial Policies. The JRC's territorial intelligence and the use of analytical models underpin the development, implementation and assessment of cohesion policy. It will also support the implementation of sustainable urban actions, including the Covenant of Mayors for Climate and Energy.

The JRC will continue to develop its smart specialisation (S3) Platform to help regions make smarter and more targeted use of the European Structural and Investment Funds (ESIFs). The S3 Platform provides advice to EU countries and regions for the design and implementation of their Smart Specialisation Strategy. A new monitoring function will allow analysis as to whether funds have been allocated on the basis of smart specialisation strategies, and assessment of the concrete results. Smart specialisation will be expanded to other key EU policy programmes and initiatives, in particular energy policy, higher education, research circular economy and the digitisation of industry.

JRC will provide socioeconomic analysis on skills and determinants of employability, and the changing nature of work, and contribute to the assessment of policy programmes designed to help people into work.

The Research and Innovation Observatory will continue to monitor and analyse research and innovation (R&I) developments in Member States and provide input into the European Semester. This work will be complemented by macro-economic simulations assessing the impact of R&I policy reforms on economic growth and employment in selected countries.

A connected digital single market

The JRC will provide qualitative and quantitative socio-economic research in support of the Digital Economy, Digital Living and Digital Society analysing the various parts of the digital value-chain: underpinning technologies, innovation and entrepreneurship, economics of the Digital Single Market and current and future supporting policy needs. The JRC will also support the midterm review of the Digital Single Market. It will also identify and analyse security and privacy issues relating to the new and emerging technologies that are driving the digital single market (such as the increasing number of connected objects, Artificial Intelligence, digital identities and electronic currencies). It will further supply technical and scientific service to promote more efficient use of the radio spectrum and to validate proposals on spectrum sharing for mobile broadband. The JRC will develop tools to enable consumers to assess the data protection and privacy issues of digital services and of new technologies (such as cloud storage, smart sensor technology and video drones). The JRC will support the implementation of interoperability solutions and the use of ICT infrastructures to maximise the use of (Big) Data from multiple sources, including assessing the costs and benefits of the open data economy and integration of new data sources (sensors, citizen science, etc.).

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

Through scientific evidence and technical work, the JRC will support the implementation of existing, and the development of new policy initiatives under the five dimensions of the Energy Union: (i) decarbonisation of the economy and reduction of 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.

The JRC's support will cover *inter alia* the development and validation of accounting methodologies for Greenhouse Gas (GHG) emissions in the framework of international climate change commitments, the contribution to decarbonisation of the economy through pre-standardisation work on selected energy technologies and the assessment of national plans and reports on energy efficiency and renewables.

The JRC will also provide support to the governance of the Energy Union. Furthermore, the JRC will improve the availability of data and analyses on specific topics, such as alternative fuels, resource and energy efficiency, low-carbon energy technologies, and biomass supply and demand. In the area of energy infrastructures, a robust methodology will be developed and validated for the assessment of infrastructure projects including the resilience to the impacts of climate change and the suitability in the face of different future climatic conditions. In the area of modelling, work includes further development and deployment of the JRC energy-economy modelling toolbox. In line with the EU's objectives, the JRC is also enhancing its work to improve the resilience of EU infrastructures and society against the effects of climate change.

The JRC will continue to provide technical and scientific support for developing, implementing and monitoring EU policies on nuclear safety, security and radiation protection (including education, training and information), taking account of 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 (SNE-TP), the Implementing Geological Disposal of Radioactive Waste Technology Platform (IGD-TP) and the European Nuclear Energy Forum.

A deeper and fairer internal market with a strengthened industrial base

The JRC's extensive expertise in standardisation will continue to support the internal market. It will also use its in-depth knowledge of Europe's industrial landscape to contribute to regulatory fitness checks for various industrial sectors and a framework for measuring European competitiveness across Member States and industries. It will provide support to the circular economy package, notably on raw materials and bioeconomy, and on medical devices.

The JRC also continues to contribute to the development and implementation of Global Satellite Navigation Programme (Galileo), the European Geostationary Navigation Overlay Service (EGNOS), the Earth Observation component of the EU Space Strategy and to the improvement of the interoperability and quality of Copernicus data, including with other sources of data, to maximise the societal and socio-economic benefits of Earth Observation.

Services and products of the Copernicus programme contribute to Common Agriculture Policy implementation, marine-environment monitoring, atmosphere-monitoring, green-house gas emissions monitoring and other climate change-related information, indices and quantitative analyses of economic, social and environmental cohesion and development, maritime security, addressing illegal immigration and trafficking in human beings, disaster resilience, emergency and crisis management and international cooperation and development.

The JRC supports the development and implementation of European emission standards and test procedures for light- and heavy-duty road vehicles. It also supports the development of globally harmonised test procedures for electric and hybrid vehicles, and standards for interoperability

A deeper and fairer economic and monetary union

The JRC is studying the resilience and fairness implications of financial instruments and pension systems for households. It supports monitoring of Member States' economies and fiscal policies as part of the European Semester, and assesses the potential effects of corporate tax reforms in the EU.

The JRC will identify the bottlenecks and possible medium to long-term impacts of a capital markets union and its effects on financial integration and risk-sharing in Europe. To support the development of a capital markets union, it will analyse Member States' convergence towards a common financial market, how debt bias in the banking sector affects financial stability and how new taxes in the banking sector could reduce systemic risk. This will involve studying the potential impact of removing legislative differences, creating a reference network for policy-oriented research on economic and financial matters, developing a new multi-country model and extending taxation modelling activities.

An area of justice and fundamental rights based on mutual trust

The JRC contributes to the two main strands of work of the European agenda on security. In support of the fight against terrorism, it helps in the development of innovative solutions to decrypt encrypted files, track terrorism propaganda videos and perform targeted communication interception. Under the strand strengthening

resilience, the JRC works on disaster risk management with a dedicated Knowledge Centre, protection of critical infrastructure, early warning and information systems to detect natural disasters, health emergencies, humanitarian crises and conflicts as well as nuclear safety and security.

The JRC's work also supports several Commission services under the EU's joint framework on countering hybrid threats and on maritime security. The JRC has developed a number of global tools that are 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) for identifying countries at high risk of conflict and those for which the risk is worsening significantly.

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, including the relocation of asylum-seekers, securing external borders, attracting skilled migrants and identifying and addressing the root causes of migration.

To help implement the agenda, the JRC has integrated its migration work and set up a Knowledge Centre on Migration and Demography, which will provide policy-relevant knowledge and evidence-based analysis to support EU policy-making. It will focus on migration monitoring and early warning, root causes and impacts of migration, and enhancing operational systems for securing borders.

A stronger global actor

Today's interconnected and interdependent societies are facing unprecedented global challenges and transnational security threats, such as climate change, extreme poverty and instability. However, this also opens up new opportunities for more sustainable development, equity and peace. To enhance the EU's and its partners' resilience in this changing global environment, the JRC has taken a number of new initiatives to assist Commission services, with the monitoring and implementation of the 2030 agenda for sustainable development and its Sustainable Development Goals and Targets (SDGs), particularly in the areas of food security and nutrition, environment and biodiversity, resource efficiency and sustainable production and consumption, climate, energy and urban development. The JRC will consolidate its knowledge across these sectors and develop and organise related information, indicators, methods and data within the Commission, facilitating the integration and coherence of the EU's social, economic and environmental policies, as required to achieve the globally agreed targets by 2030.

A Union of democratic change

The JRC will support better regulation initiatives in all areas of its work programme. It will continue to support Commission services with specific expertise, including modelling, the provision and analysis of data and statistics, risk assessment methodology, the design of monitoring schemes, the drafting of technical specifications, and advice on scientific and technical aspects of feasibility and enforceability of limits/targets. JRC also offers training to Commission staff on issues such as sensitivity analysis, sensitivity auditing, counter-factual analysis and lifecycle assessment.

The JRC will strengthen its horizontal support in terms of analytical and methodological competences that can be used across the Commission. It will bring

innovation to EU policy-making through the EU policy lab, which provides a safe space where policy DGs can experiment with new ways of working and collaborating. The JRC's competence centres on composite indicators and scoreboards, microeconomic evaluation, and modelling will provide support at all stages of the Commission policy cycle.

III. Key orientations for support to EU policies

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

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, including monitoring, will be one of the priorities in the coming years. At the same time, from the beginning of his mandate, simplification of the CAP has been one of Commissioner Hogan's top priorities in order to make European agricultural economy more competitive, preserve and create jobs and to contribute to a sound development of rural areas. The implementation of the CAP in 2014-2020 will see its first evaluation in 2018 (mid-term review). In parallel, initial discussions are taking place on the design of the *CAP post-2020*, including a new dimension based on the climate change mitigation potential of agriculture and the need to adapt to climate change. The October 2014 European Council decided to set GHG emission reduction targets of 30 % by 2030 (as compared with 2005) for non-ETS sectors, including agriculture, and called for a proposal on how to include land use, land-use change and forestry (LULUCF) in the EU's 2030 GHG mitigation framework. An important issue for policy-making is to assess the cost-effective mitigation potential of agriculture and to understand the implications for the Member States.

Income disparities throughout the food chain have been a prominent issue over the last few years and represent one of Commissioner Hogan's priorities.

Relevant Commission policy objectives:
  – 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;
  b) **environmental needs -** develop methods and tools for the integrated assessment of agriculture, rural development and the economic impact of taking into account the environment at farm and regional level (so that CAP instruments can be tailored to environmental needs);

c) **resource efficiency and climate change -** model soil, water and ecosystem dynamics in order to improve their sustainable management in agricultural systems, and make a better use of the potential of bioeconomy. Study the effects of climate change on the agricultural sector, assess the potential of climate change mitigation and adaptation strategies;

d) **agricultural market, trade and food security -** carry out economic analysis of the competitiveness and trade relations of the European agri-food sector), the performance of European agri-food systems (including the food chain) and their linkages to jobs and growth as well as contribution to European and global food security.

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, to be tackled by reaching out to the most disadvantaged and integrating people with diverse backgrounds (including newly arrived migrants), thereby fostering upward social convergence. To facilitate this, the education and training strategic framework (ET2020) set common objectives and benchmarks, which are monitored annually.

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

Relevant Commission policy objectives:

In November 2015, new priority areas for cooperation with the Member States were adopted, including:

- relevant and high-quality knowledge, skills and competences developed through lifelong learning, focusing on learning outcomes for employability, innovation, active citizenship and wellbeing;
- inclusive education, equality, equity, non-discrimination and the promotion of civic competences;
- open and innovative education and training, fully embracing the digital era;
- transparency and recognition of skills and qualifications to facilitate learning and labour mobility;
- sustainable investment, quality and efficiency of education and training systems;
- create more and equal access to high quality inclusive education and employment for all young people and promote active citizenship, social inclusion and solidarity among them.

The key policy priorities for cultural and creative sectors are to:

- improve understanding of the economic potential of cultural and creative sectors in terms of growth, job creation and social effects;

– promote culture as a catalyst for innovation by maximising the sector's contribution to jobs and growth, particularly among the young.

<u>Key orientations for the JRC</u>:

   a) **education and training systems** - monitor trends under EU policy strategies (e.g. Europe 2020 and ET2020) 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, role of (higher) education for regional development and smart specialisation, education and societal wellbeing, integrating vulnerable groups such as migrants, refugees and other minorities into the education system, and early childhood learning; study the impact of digitisation on education and training practices and systems;

   c) **cultural and creative sectors** - develop evaluation tools to measure and monitor cultural activities and creativity at city level to assess the impact of specific culture-oriented initiatives on economic and social development (see also section 11.1.c).

1.3   Environment

EU environment policy in the period to 2020 is guided by the 7th Environmental Action Programme (EAP) (2014-2020), 'Living well, within the limits of our planet'. The three thematic pillars of the 7th EAP are:

   ➢ protecting the Union's natural capital;

   ➢ transforming the Union into a resource-efficient, green and competitive low-carbon economy;

   ➢ safeguarding citizens from environment-related pressures and risks to health and wellbeing.

In line with new Commission priorities, the main environment policy orientations include a renewed focus on the implementation of existing legislation and its review under the better regulation initiative and on 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 (UNSDGs), 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 global dimension of many environmental challenges means that the EU has a strong interest in cooperating with international partners, notably on the follow-up to the Rio+20 summit.

Relevant Commission policy objectives:

- enable EU citizens to live well, within the planet's ecological limits, in an innovative, circular economy where biodiversity is protected, valued and restored, environment-related health risks are minimised in ways that enhance society's resilience, and growth has been decoupled from resource use, *inter alia* by improving implementation of EU environment legislation, improving environmental integration and policy coherence, and improving the knowledge and evidence base for Union environment policy.

Key orientations for the JRC:

1.3.1 *Protecting and enhancing our natural capital*

a) **the 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 for the monitoring and assessment of chemical, biological and ecological water quality. Develop standards and reference materials for pollutants for fresh and marine waters, setting consistent and comparable nutrient boundaries across Europe; develop minimum quality requirements for water reuse (also contributing to the circular economy – see section 1.3.2.a); develop the knowledge base, including the modelling framework on oceans and coastal environments, in particular for the Marine Strategy Framework Directive. 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. Support the development of a holistic 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 of the EU biodiversity strategy, notably by assessing 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 by modelling soil functions and developing the European Soil Data Centre (ESDAC); monitor and model land and soil degradation and desertification; and participate in networks such as the Global Soil Partnership.

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 the implementation of product policy and

facilitate information exchange on best practice. 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. Support the management of the EU raw materials knowledge base (see also KO 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 life-cycle methodologies, data and analyses for sustainable consumption and production and other circular economy related policy actions, including the assessment of the product-waste interface (i.a. reparability, durability, and recyclability), and the environmental footprint of products and organisations. Assess environmental and industrial policies.

b) **environmental knowledge, information and indicators** - develop environmental indicators and lifecycle-based methods for incorporating environmental considerations into other policies, e.g. via the better regulation toolbox, and for the roadmap to a resource-efficient Europe. Contribute to the Environment Knowledge Community (EKC) as a better way to generate, plan and share environmental knowledge, including through the EKC Knowledge Innovation Projects (KIPs). Implement the infrastructure for spatial information in the European Community (INSPIRE) and the shared environmental information system.

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

a) **chemicals and nanomaterials** - support the implementation of the chemicals' legislations and policy development in cross-cutting areas. Set up a toxicology knowledge base and further develop and maintain the Information Platform for Chemical/Nanomaterial Monitoring IpCheM, including the nanomaterial repository, especially in view of supporting the European Human Biomonitoring Initiative (HBM4EU). Support mutual acceptance of chemicals and nanomaterial data at international (e.g. OECD) level; develop and promote alternatives to animal testing; develop methodologies, standards and reference materials for nanomaterials (also see key orientation 4.1);

b) **air quality, pollutant emissions and industrial accident prevention** - monitor and model ambient air quality and emissions (for vehicle emissions see also key orientation 4.1.a); carry out integrated impact assessments of air quality and climate policies and provide tools to facilitate air quality management at national, regional and local level; support the implementation of EU air quality policies through harmonisation and standardisation programmes, the improvement and the validation of innovative methods; determine best available techniques for implementing the Industrial Emissions Directive; develop information systems on, and carry out analyses of, industrial accidents.

1.4 Maritime affairs and fisheries

Policies in the field of maritime affairs and fisheries aim at developing the potential in the European maritime economy for creating new jobs and securing sustainable fisheries, a stable supply of seafood (including farmed fish/aquaculture), healthy seas and prosperous coastal communities. An integrated approach is taken, that covers all maritime policies, including the reformed common fisheries policy (CFP) and the

integrated maritime policy (IMP). The latter provides for increased coordination between policy areas, such as blue growth, integrated maritime surveillance, the marine environment and sea-basin strategies.

In the framework of better regulation, the JRC provides support to a fitness check of maritime legislation (e.g. the Vessel Traffic Monitoring and Information System and the Reporting Formalities Directive) and an evaluation of Community financial measures for CFP implementation.

Relevant Commission policy objectives:

- foster implementation of the IMP in a way that complements cohesion policy and the CFP;

- foster implementation of the CFP by promoting sustainable and competitive fisheries and aquaculture, and developing synergies between fish stock and ecosystem modelling;

- advance ocean governance internationally and develop the EU's maritime economy to promote jobs and growth;

- step up the fight against illegal, unreported and unregulated fishing through an effective EU fisheries control system and a suitable data collection framework;

- contribute to the long-term sustainability of fisheries and aquaculture worldwide through active involvement in international organisations and by concluding sustainable fisheries partnership agreements with non-EU countries;

- develop a common information system so that authorities interested or active in maritime surveillance can have access to means of exchanging and sharing information and data.

Key orientations for the JRC:

a) **CFP (Common Fisheries Policy) implementation -** 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 spatial planning and coastal management** - develop and collate knowledge for maritime spatial planning and coastal management, and the relevant knowledge management tools (EU 'atlas of the seas' and Marine Competence Centre);

c) **maritime security** - improve EU maritime surveillance systems, enhance their interoperability and provide support to implement selected actions under the EU Maritime Security.

1.5 Health and food safety

1.5.1 Health

Promoting the health of European citizens is a priority, to prevent unnecessary suffering, of course, but also as part of the strategy to increase the employment rate. The health sector offers great potential to promote growth, create new jobs, ensure fairness and trigger productivity gains through innovative technologies. As documented in the Health at a Glance: Europe 2016 life expectancy across EU member states has increased by more than six years since 1990, rising from 74.2 years in 1990 to 80.9 years in 2014, yet inequalities persist both across and within countries. This is largely due to different exposure to health risks, but also to disparities in access to high-quality care.

Relevant Commission policy objectives:

- – improve and protect human health, reduce health inequalities, support health systems reform and fight discrimination;
- – support the development of innovative and sustainable healthcare systems and new technologies in the EU;
- – prevent disease and promote good health and nutrition in an ageing Europe using appropriate measures;
- – protect European citizens from a range of cross-border health threats and ensure a fully coordinated response in the event of a crisis;
- – evaluate the action plan against the rising threats from antimicrobial resistance.

Key orientations for the JRC:

- a) **healthcare and health information** - the standardisation, harmonisation and improvement of healthcare and health information in the EU, with an initial focus on cancer and rare diseases; this includes the coordination/development of European health 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 for health measurements;
- b) **promotion of a healthier society -** action in the field of physical activity, nutrition, alcohol and tobacco in the framework of chronic disease prevention;
- c) **support for nano-related policies**, **health technology assessment** - chemical monitoring data and implementation of endocrine disruptors criteria; dissemination of novel toxicity approaches.

1.5.2 Food safety

Food Safety policies aim at ensuring a high level of protection of human health regarding the food industry. In 2015, 3 049 original notifications related to non-compliance with EU food legislation were sent through the EU's rapid alert system for food and feed. The objective of the Animal Health policy is to raise the health status and improve the conditions of the animals in the EU, in particular food-producing

animals, whilst permitting intra-Community trade and imports of animals and animal products in accordance with the appropriate health standards and international obligations. EU rules on plant health aim to protect crops, fruits, vegetables, ornamentals and forest from harmful pest and diseases by preventing their introduction into the EU or their spread within the EU.

Relevant Commission policy objectives:

- – ensure a high level of safety in the food and feed chain;

- – evaluation and follow-up of food legislation;

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

- – amendment of 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;

- – implementation of the Official Controls Regulation (Regulation (EC) 882/2004);

- – New Animal and Plant Health Law.

Key orientations for the JRC:

a) **food and feed safety** - management of six EU reference laboratories, including the development of harmonised/validated methods and new analytical tools in the area of food and feed safety control and the pre-marketing authorisation of GMOs and feed additives;

b) **food and feed fraud** - assistance in the fight against food fraud; production of certified reference materials for food and feed analysis;

c) **plant health** - protection of plant health by early detection and plant health monitoring initiatives; support for 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 Europe 2020 strategy objectives and the Investment Plan for Europe priorities. The policy is an integral part of European economic governance and contributes to the European Semester process. Cohesion policy invests in economic, social and territorial cohesion through the ESIFs.

Relevant Commission policy objectives:

- – economic, social and territorial cohesion by reducing disparities between the levels of development of regions and countries of the EU;

- – strengthen performance of EU investments and space-based policy development;

- develop strengthened cooperation with non-EU countries through macro-regional strategies;

- coordinate urban policies.

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 an integrated modelling capacity 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** - 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. 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:

- 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; enhance 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.

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)-sectorial levels. Research and Innovation Observatory for the collection, production and dissemination of data and analysis related to national research and innovation policies. Indicators, scoreboards, information systems and web platforms for monitoring and analysing the implementation of EU research and innovation policies. Foresight support and horizon scanning for the identification of research and innovation priorities;

b) **fuel cells and hydrogen technologies –** support under the Fuel Cells and Hydrogen Joint Undertaking, typically in cross-cutting areas, such as safety regulations, codes and standards;

c) **low-carbon energy observatory** - provide data, analysis and intelligence on the state of the art of different energy supply technologies, their industrial development, market barriers and global competition;

d) **bioeconomy -** develop a Knowledge Centre providing data collection, analysis, dissemination and modelling on the bioeconomy, and the assessment of food and nutrition security. On an ongoing basis, provide data and analysis on sustainable biomass supply and demand at EU and global scale, covering all uses of biomass, to provide a basis for coherent policies on the bioeconomy, including relevant agriculture, food, environment, energy and industry policies. JRC work on the bioeconomy will be closely interconnected with work described in chapters 1.1 (agriculture and rural development), 1.3 (environment), 1.5 (health and food safety), 3.1 (climate action) and 3.2 (energy).

1.8 Transport

The transport sector is very important both in terms of employment and value (5.1 % of total employment and 5.1 % 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 23 % of GHG emissions (excluding international maritime).[4] The objectives of EU policy in the area of transport are described in the 2011 White Paper, with initiatives aiming at increasing the efficiency of the transport system and its competitiveness, removing major barriers in key areas, while at the same time dramatically reducing dependence on imported oil and cutting carbon emissions in transport by 60 % by 2050. The Low-emission mobility strategy adopted in 2016 further frames the initiatives that the Commission is planning in the coming years aiming at increasing the efficiency of the transport system, speeding up the deployment of low-emission alternative energy for transport and moving towards zero-emission vehicles.

Relevant Commission policy objectives:

- ensure that GHG emission reductions and climate resilience in the transport sector contribute to the achievement of EU targets;

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[4]Including international maritime, transport provides about 25% of the total greenhouse gas emissions. International maritime is outside the scope of the targets established in the climate and energy packages for 2020 and 2030.

- 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.

<u>Key orientations for the JRC</u>:

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 contribute to the development of standards supporting the implementation of the alternative fuels infrastructure in the framework of the Alternative Fuels Infrastructures Directive (AFI); assessment of the relevant national AFI policy frameworks; and modelling of and support for electro-mobility standardisation;

c) **transport policy analysis** - socioeconomic analyses of the transport sector, using transport models, quantitative methodologies, data, scenarios and technology watch; congestion indicators; and harmonise transport data with spatial and environmental information;

d) **intelligent transport systems and electronic tools** - technical support for the implementation of the 'digital tachograph', in particular the preparation of new technical specifications; support for the development of cooperative intelligent transport systems; development of 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, 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

The need for job creation in the short and medium term, particularly for young people, the long-term unemployed and potentially (given recent developments) for refugees, is a pressing policy issue. To help boost investment and foster the demand for labour, the European Fund for Strategic Investments (EFSI) was introduced in 2015, together with the European Investment Advisory Hub.

In 2016, to support the supply side of labour markets, the Commission introduced the new skills agenda for Europe, which calls for action on skills development, especially for the low-skilled, a better use of skills and anticipation of future skills needs.

The Commission plans to establish a 'European pillar of social rights', on which a broad consultation was launched in 2016 as part of the Commission's work on a deeper and fairer EMU. The pillar should build on and complement the existing EU social *acquis* in order 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;

- reinforce 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 a European pillar of social rights;

- protect workers from the risk related to chemicals, carcinogens and mutagens at work.

Key orientations for the JRC:

a) **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 11.1;

b) **European pillar of social rights** - support the establishment of a European pillar of social rights and the updating of the social *acquis* through analysis of the changing nature of work and welfare systems, collaborative economy and health and safety at work;

c) **skills and employment** - provide analysis of the distribution and evolution of skills and their links with employment potential.

2 A connected digital single market

2.1 Digital economy and society

The internet and digital technologies have a huge transformational impact on our economy and society. 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 May 2015, the Commission launched its ambitious Digital Single Market strategy, with 16 initiatives to be launched by end of 2016 and implemented in the next few years.

The JRC is supporting the Commission in shaping and implementing these initiatives aimed at ensuring that Europe's economy, industry and employment take full advantage of what digitisation offers, making the EU's digital world a seamless marketplace by breaking down barriers to cross-border online activity, supporting e-infrastructure development and designing rules/guidelines which match the pace of technological evolution.

Relevant Commission policy objectives:

- – better access for consumers and businesses to online goods and services across Europe;

- – creating the right conditions for digital networks and services to flourish;

- – maximising the growth potential of the European digital economy.

Key orientations for the JRC:

a) analysis in **ICT-led innovations**, the impact of digital technology and related economic models on growth, jobs and consumer welfare in the EU, with a particular focus on policy priorities related to the EU digital single market and the digital agenda for Europe;

b) development of IT tools and methodologies to analyse **the radio spectrum** inventory and the security of digitally connected objects ('Internet of Things') and of new technologies (e.g. 5G, Quantum Technologies);

c) **cybersecurity** analyse data protection and privacy issues of the new telecommunication paradigms, strengthen the information base on counterfeiting and provide policy options to introduce the 'privacy by design' approach in the development of the new communication and online services;

d) technical support related to the **interoperability of e-infrastructures** (supporting the digital European Research Area) and open access (supporting open science); use of the convergence of big data with online tools (supporting citizen science) and assessment of the interoperability of energy services (in support of smart grids).

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

3.1 Climate action

Domestically, the EU's climate policy is aimed at encouraging the transition towards a low-carbon and climate-resilient economy in the EU to help slow down global warming, support the recovery of the ozone layer and mainstream climate policy into other EU policies and programmes. After the entry into force of the Paris agreement on climate change in November 2016, the EU will continue to drive 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'[5] set specific targets and confirmed the core structure of the EU's climate and energy policy up to 2030. This now features as an integral building block of the Energy Union Strategy[6] adopted by the European Commission in February 2015, with

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[5]EUCO 169/14, European Council Conclusions of 24 October 2014.
[6]COM/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.

specific policy and legislative proposals scheduled to be adopted over the course of the next few years.

The 2013 EU **Strategy on Adaptation to Climate Change**[7] contributes to a more climate-resilient Europe by enhancing the preparedness and capacity to respond to the impacts of climate change at local, regional, national and EU levels, developing a coherent approach and improving coordination.

In 2017-2018, the JRC will support the development of new laws and policies and implementation legislation to meet the commitments made under the Paris Agreement.

Relevant Commission policy objectives:

– further develop and achieve a well-functioning EU carbon market;

– create and maintain a fair and operational framework for GHG emission reductions in non-ETS sectors (agriculture, forestry, land use, buildings, transport, waste);

– Further decarbonise the transport sector;

– Increase the resilience of EU society and partner countries against the effects of climate change;

– optimise and efficiently manage financial incentives to support the innovation-based transition to a low-carbon and climate-resilient economy in the EU;

– contribute to effective international negotiations (UNFCCC, Kyoto, Paris, ICAO, IMO, 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; further develop in-house capacity to carry out such assessments;

b) **GHG emissions from agriculture and LULUCF** - monitor, report and verify energy-related, agricultural and forestry emissions to meet legal obligations at EU and international level; modelling and other analyses on how to integrate the assessment of these emissions into EU and international legislation; GHG emissions and mitigation options in agriculture; compiling global emissions inventories;

c) **vehicle emissions** - technical support for implementing and developing policy measures to decarbonise the transport sector; specifically, analysing the real-world fuel consumption and CO_2 emissions of light- and heavy-duty road

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[7]COM(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.

vehicles awarding; support the assessment of eco-innovation CO_2 savings and derogations for small-volume manufacturers of cars and vans and assess smart mobility technology innovation scenarios;

d) **alternative fuels for transport** - assess the environmental sustainability, technological development and costs of bioenergy and biofuels and of associated GHG emissions savings, including 'well-to-wheel' analyses and support for alternative fuels legislation;

e) **support the operations of climate innovation funds** - technical support for the knowledge sharing facility of the NER 300 funding programme, management of NER 300-related communication activities as well as provision of support for the design and implementation of its successor, the Innovation Fund.

3.1.2 *Increasing resilience to climate change*

a) Assess climate change impacts (economic and non-economic), vulnerability, resilience, and adaptation options in the EU and globally to support the review and update of the EU adaptation strategy and to meet the objectives of the Sendai framework for Disaster risk reduction (DRR) and the Sustainable Development Goals. In conjunction with the Knowledge Management Centres on DRR, on Migration, and on Territorial planning, respectively assess impacts of weather extremes, study the links between climate change and displacement/migration, and urban resilience (including support to the adaptation activities under the Covenant of Mayors for Climate and Energy, further covered under Key Orientation 3.2.d).

3.1.3 *Climate science and observations*

a) advance our understanding of how climate change interacts with other parts of the Earth's system (e.g. ice and forests) and translate the findings into policy guidelines.

3.2 Energy

The EU's energy policy aims to promote the energy transition towards 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, while it expressed the ambition to become the world's number one in renewables. These targets, after evaluation and revision in the context of last year's COP21 Agreement, represent core objectives of the relevant policy initiatives under the energy union strategy.

The November 2015 *State of the Energy Union* report[8] confirms that the EU has made great progress in all five dimensions of the energy union, but at the same time, it stresses the need for new policy initiatives to ensure that the 2030 objectives are met.

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[8]COM(2015) 572 final: http://ec.europa.eu/priorities/energy-union/state-energy-union

Moreover, the EU is vulnerable to energy supply shortages because of its high overall energy import dependency (it imports about 53 % of its fossil fuel needs) and 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 energy efficiency directives, the energy performance of building, the sustainability of bioenergy, and renewables. The need for a fully integrated internal energy market justifies new legislative initiatives, such as the new electricity market design, the new electricity deal for consumers and Governance of the Energy Union. Furthermore, the need for a fully-integrated internal energy market justifies new legislative initiatives, such as the new market design and the new deal for consumers.

Relevant Commission policy objectives:
- 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;

- 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. Develop the necessary tools for the time period after 2020 to ensure achievement of the 2030 energy and climate policy objectives and targets and support the international efforts to increase energy efficiency and renewable energy;

- accelerate the European energy system transformation through an integrated Strategic Energy Technology (SET) Plan to implement the fifth dimension of the Energy Union;

- establish a Governance system to ensure achievement of the objectives of the Energy Union and assess and monitor progress towards its implementation in all its interlinked and mutually reinforcing dimensions, including the integrated national energy and climate plans.

Key orientations for the JRC:
a) **energy-climate-economy modelling** – develop, validate, and run models for climate-energy-economy system, including development and maintenance of necessary databases or of other available energy models to the Commission; carry out relevant techno-economic analysis, in particular mapping latest evidence on techno-economic costs for energy supply and demand technologies; provide support for impact assessments and carry out energy modelling at national, regional and European level and analysis of the results; develop the capacity to contribute to the design of future energy-climate reference scenarios and make available to European stakeholders the tools to use or develop energy system modelling;

b) **energy security** – carry out security, safety, risk and techno-economic assessments of the EU's energy supply from conventional and unconventional

resources (oil, natural gas); integrate resilience to the adverse impacts of climate change. This work includes 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, 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 (PCI); provide background data and analysis which can support the preparation of future energy prices and costs reports;

d) **energy efficiency** – support the implementation of the EU legislation in areas of renewable energy and energy efficiency, including on the efficient heating & cooling; provide technical support for the development of the legislative framework for the time period 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 the assessment of plans on energy efficiency, renewables, emissions reduction, climate adaptation and access to energy; perform modelling and cost-benefit analyses; support through analytic tools, modelling and/or assessment the implementation of the Energy Union Governance Regulation, which requires from the Member States the preparation of national integrated energy and climate plans;

e) **low carbon energy technologies** –carry out techno-economic assessments of renewable energy technologies and their cost-effective deployment, including by using geo-spatial tools and by analysis of relevant renewable energy scenarios and support of the implementation of the revised directive; perform pre-standardisation work on photovoltaic and other renewable energy technologies; prepare a web-based CO2 Storage Atlas for publication and further updating;

f) **energy Research, Innovation & Competitiveness (RIC)** – Support the implementation of the Research and Innovation and Competitiveness (RIC) dimension of the Energy Union, through the management of relevant knowledge and available scientific data; support the integrated SET Plan through a strengthened information system (SETIS) and the ACEI (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 and energy systems modelling.

3.3 Safe and secure use of nuclear energy

Electricity produced from nuclear power plants constitutes a reliable base-load supply of emission-free electricity and plays an important role in energy security (European Energy Security Strategy)[9]. In the Energy Roadmap 2050, the Commission, without prejudice to Member States responsibility for nuclear security within their territories, 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.

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, waste management and non-proliferation. Moreover, the EU has also 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 2014-2018[10] (hereinafter the Euratom Programme) implemented through direct and indirect actions. The Euratom Programme sets out objectives and funding for research activities in nuclear fusion and fission.

The JRC's research focuses on supporting safe, secure and responsible solutions for the operation of nuclear systems, the management and disposal of radioactive waste, nuclear decommissioning, environmental monitoring, emergency preparedness and nuclear competences.[11] The JRC also contributes to maintaining 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. In all the above activities, JRC coordinates with DG RTD 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 DG ENER, in this area.

Relevant Commission policy objectives:

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

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[9]Communication from the Commission to the European Parliament and the Council European Energy Security final Strategy   COM/2014/0330
[10]Council 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.
[11]Communication 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).

- 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 State research programmes;

- provide technical and scientific support for the implementation of EU internal policy, in particular with regard to:
    o Euratom Treaty Articles 36, 39, 41 and 43;
    o Nuclear safeguards (Euratom Treaty Chapter 7);
    o Nuclear Safety Directive12;
    o Spent Fuel and Radioactive Waste Management Directive13;
    o Basic Safety Standards14.

Key orientations for the JRC:

3.3.1 *Safety of nuclear reactors and nuclear fuels*

a) collection, analysis, and assessment of nuclear power plants' operational experience worldwide, and dissemination of information to the Member States' regulatory authorities;

b) research on structural materials for analysis and modelling of ageing of components and structures with a view to improving residual lifetime assessment techniques;

c) improvement of the safety assessments of innovative reactor designs in synergy with the Generation IV International Forum (GIF);

d) generation of reference samples and scientific data on the safety performance and development of codes and modelling for safety assessment of both conventional and innovative nuclear fuels in operational, transient and accident conditions;

e) support the EU's internal policy on nuclear safety by providing technical and scientific assistance for the implementation of the EU Nuclear Safety, Nuclear Waste and Spent Fuel and Basic Safety Standards Directives and related EU policy.

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[12]Council Directive 2014/87/Euratom of 8 July 2014 amending Directive 2009/71/Euratom .
[13]Council Directive 2011/70/Euratom of 19 July 2011.
[14]Council Directive 2013/59/Euratom of 5 December 2013.

3.3.2 Safety of spent fuel, radioactive waste management and nuclear decommissioning

a) development of techniques for spent fuel and nuclear waste characterisation and study of the physico-chemical mechanisms relating to the long-term storage of spent fuel and disposal of nuclear waste;

b) studies for the reduction of the radiological toxicity of wastes through advanced separation and transmutation and for the safety assessment of recycling technologies. Determination of scientific data and preparation of reference samples of spent fuel;

c) development and assessment of innovative technologies and techniques applied to nuclear decommissioning. Exchange and dissemination of knowledge developed, findings and information.

3.3.3 Nuclear emergency preparedness and response (EP&R), environmental monitoring and radiation protection

a) support for Member States an Commission services on the exchange of information in case of emergency and on radiological monitoring and measurements relating to radioactivity in the environment, including hosting, maintaining and developing the related database and reporting system;

b) development of severe accident modelling, radiological source term evaluation, accident management of nuclear power plants and enhancement of preparedness for nuclear or radiological incidents through benchmarking of dispersion models.

3.3.4 Nuclear safeguards

a) technical and scientific development of destructive and non-destructive methods and techniques (verification and informatics systems, analytical services, training, special equipment, etc.) and of standards and reference materials to support the Euratom safeguards system. Operation of the Safeguards on-site laboratories and in-field support for Euratom inspections;

b) development of containment and surveillance techniques in the nuclear fuel cycle process, from enrichment facilities to geological final disposal.

3.3.5 Promote excellence in the nuclear science base for standardisation

a) understanding the fundamental properties and behaviour of innovative nuclear and structural materials for safety assessment and model validation;

b) support for the standardisation and harmonisation of radiological measurement methods in the EU and collaboration with key partner countries and international organisations (IAEA, OECD-NEA) in the field.

3.3.6 *Knowledge management, training and education*

a) monitoring EU trends in human resources in the nuclear energy field and facilitating the mobility of human resources in the sector throughout the EU. Developing tools for knowledge management and for transparency and dissemination of information;

b) preserving, aggregating and disseminating specific scientific and technical knowledge related to nuclear safety, safeguards and security by providing operational support and training and by increasing access to the JRC nuclear laboratories for researchers from Member States and international organisations.

3.3.7 *Nuclear science applications and use of radioisotopes*

a) development of techniques for medical radiotherapy and radio-diagnosis; contribution to a resilient and sustainable supply of medical radioisotopes in the EU; development of industrial and space applications.

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 importance of a strong industrial sector for economic resilience has been underlined by the recent economic crisis. 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[15].

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 businesses[16], notably by reducing administrative burdens, facilitating access to funding and supporting access to global markets.

Relevant Commission policy objectives:

– implement the internal market strategy;

– implement an integrated industrial policy, 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;

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[15]Press Release IP/14/42 (22 January 2014). Statistics are for 2013.
[16]Annual Report on European SMEs 2013/2014. Statistics are for 2013.

- monitor and support the development of the regulatory framework for market access, international trade relations and regulatory convergence for cosmetics and medical devices.

Key orientations for the JRC:

a) **strengthening industry in the single market** - industrial policy development, notably to support standardisation, reference measurements and (nano-)materials; support for industrial sectors to enhance their environmental efficiency, energy performance, resilience to climate change, and achieve reductions in the intensity of GHG emissions, including vehicle emission test procedures and assessment of innovative technologies; material efficiency and circular economy; advanced manufacturing and key enabling technologies; SMEs and innovative companies, industrial competitiveness;

b) **space strategy** - support for Galileo and the EGNOS, including signal, receivers and technical support for policy development and the management of R&D assets and resulting IPR; technical support for applications, implementation and further development of services, including Galileo PRS 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 CAP implementation (KO 1.1.a), marine-environment monitoring (KO 1.3.1a), atmosphere-monitoring (KO 1.3.3.b), green-house gas emissions monitoring (KO 3.1.1.b) and other climate change-related information (KO 3.1.3.a), indices and quantitative analyses of economic, social and environmental cohesion and development (KO 1.6.b), maritime security (KO 1.4.c), addressing illegal immigration and trafficking in human beings (KO 8.1.a), disaster resilience, emergency and crisis management (KO 9.1.1.a) and international cooperation and development (KOs 9.2.2.a and 9.2.3.b).

c) **medical devices and cosmetics** - support to the implementation and management of the revised medical devices and *in vitro* diagnostic medical devices regulatory framework through scientific, technical and related logistic means; support to the cosmetics regulatory framework including through promotion of alternative methodologies to animal testing.

d) **raw materials -** support the implementation of actions and EU policies and monitor the progress of the implementation plan for the European Innovation Partnership on Raw Materials. Monitor the primary and secondary raw materials global and European markets and 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 for assessing the raw materials 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.

4.2 Customs policy and the fight against fraud

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. With the amendment of Regulation (EC) No 515/97[17], the Commission is establishing centralised databases as an additional tool for both the Commission and Member States in the fight against customs-related fraud.

Relevant Commission policy objectives:

– protect the financial interests of the EU 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 enhance cooperation between customs authorities and with other tax administrations, government agencies and the business community.

Key orientations for the JRC:

a) **against fraud** - carry out research and analysis, and develop new technologies, applications and systems to contribute to combating fraud and other types of criminal activity, which threaten the supply chain, e.g. by enhancing customs risk analysis by using trade data on the status and movement of cargo containers, supporting the fight against evasion of customs duties and quotas, and that against trafficked, smuggled or counterfeited goods, and analysing unknown substances;

b) **training for custom authorities** - establish pilot programmes to build capacity among, and provide training to, custom authorities on how to use applications or technologies, and how to share information and best practice.

5 A deeper and fairer Economic and Monetary Union

5.1 Economic and Monetary Union

The *Five Presidents' Report[18]*, 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.

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[17]Regulation (EC) No 515/97 of 13 March 1997 on mutual assistance between the administrative authorities of the Member States and cooperation between the latter and the Commission to ensure the correct application of the law on customs and agricultural matters.

[18]https://ec.europa.eu/priorities/publications/five-presidents-report-completing-europes-economic-and-monetary-union_en

Relevant Commission policy objectives:
- – promote macro-economic 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 28 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 that are needed to expand 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.

Key orientations for the JRC:
a) quantitative analyses 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; maintain and further develop a data infrastructure for analyses of the EU financial sector;
c) analyse the social dimension of EMU.

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. 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 citizens and competitive distortions for businesses that pay their share. The Commission's June 2015 action plan sets out a new EU approach for fair and efficient corporate taxation. Tax policy strategies should also aim to ensure

sustainable fiscal consolidation strategies. 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** - modelling to support the action plan for fair and efficient corporate taxation in the EU; 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** - modelling and economic analyses of tax policies using the EUROMOD microsimulation model.

6 A reasonable and balanced free trade agreement with the United States

6.1 Trade policy

EU trade policy is addressed in two of the Commission's 10 priorities: 'a reasonable and balanced free trade agreement with the United States' and 'Europe as a stronger global actor'. The Commission's October 2015 'Trade for All' strategy[19] highlights trade policy as an effective tool to create economic opportunities for all stakeholders and to set global rules that reflect European values, e.g. tackling unfair competition, respecting and advancing labour rights, environmental protection and robust regulation.

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;

– foster sustainable economic, social, and environmental development, in all participating countries, including developing countries.

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[19]http://trade.ec.europa.eu/doclib/html/153846.htm

As part of its project on applied economic analysis of industrial competitiveness, sustainable production and consumption and EU trade (see section 4.1), the JRC provides methodological, modelling, and analytical support for impact assessments of free trade agreements and the socioeconomic and environmental implications of external trade. The JRC also provides expertise non-proliferation and strategic trade controls (see section 9.1).

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

7.1 Justice, consumers and gender equality

European policies in the field of justice, consumers, and gender equality aim to uphold and strengthen the rights of people living in the EU, whether they are acting as citizens, consumers, entrepreneurs, or workers.

The European consumer agenda provides the strategic vision for EU consumer policy. Its objectives include promoting consumer safety, enhancing knowledge of consumer rights, and strengthening the enforcement of consumer rules.

Relevant Commission policy objectives:

- – ensure a high level of consumer protection, to empower consumers and place 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; data collection systems and their interoperability for product safety and market surveillance; application of behavioural insights.

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, and cybercrime are complex and evolving security challenges that cross European borders. The terror attacks that have unfolded in 2015 and 2016 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:

- – contribute to establishing an effective and genuine security union, while safeguarding freedom, in order to combat terrorism, organised crime, and cyber-crime across European borders.

Key orientations for the JRC:

a) support to strengthen critical infrastructure and community resilience against all threats; improve critical infrastructure protection, understand and model vulnerabilities and interdependencies, including through synthesis and sharing of knowledge, exchange of good practice, exercises and networks related to critical infrastructure operators, training and awareness programmes for national authorities and operators of critical infrastructures;

b) support the implementation of Action Plans on chemical, biological, radiological, nuclear (CBRN) and explosives (E) and of Regulation EU 98/2013 on explosives precursors, including through the provision of 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) 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;

d) provide technical support, intelligence techniques and research to improve operational cross-border cooperation and assist Member State authorities in law enforcement in areas such as cybercrime (using European Media Monitor EMM and Open Source Intelligence OSINT) and digital forensics (including the online sexual abuse of children), open-source intelligence and new psychoactive substances, including support for early warning and risk analysis;

e) provide technical support and research to strengthen EU large information systems (e.g. identity document security, data quality and biometrics, interoperability); close information gaps in the field of security; enhance security at the external border (e.g. support for the design and implementation of the EU entry-exit system).

8   Towards a new policy on migration

8.1   Migration

Migration and refugee movements are some of the biggest political, social, and demographic challenges the EU faces. 2015 saw unprecedented numbers of asylum-seekers entering the EU, testing the limits of solidarity among Member States. The Commission has taken a number of initiatives to tackle the crisis. The main policy instrument is the European agenda on migration adopted in May 2015, which sets out objectives to tackle the crisis in the immediate, medium and longer term: tackling the root causes, border management, strengthening the common European asylum system combatting smuggling of migrants; improving the functioning of return policy and making legal migration more attractive.

Relevant Commission policy objectives:

- – contribute to ensuring a high level of security in the EU, while facilitating legitimate travel, through a uniform and high level of control at the external borders and the effective processing of Schengen visas, in line with the EU's commitment to fundamental freedoms and human rights;

- – contribute to the effective management of migration flows and to the implementation, strengthening, and development of the common policy on asylum, relocation, subsidiary, and temporary protection, and the common immigration policy, while fully respecting the rights and principles enshrined in the EU Charter of Fundamental Rights.

Key orientations for the JRC:

a) enhance the capacity of the European Agency for the Management of Operational Cooperation at the External Borders of the Member States of the European Union (FRONTEX) to carry out border controls, risk analysis and joint operations at the external borders; enhance European Police Office (EUROPOL)'s capacity to fight illegal immigration and the trafficking of human beings; enhance the capacity of FRONTEX's, (European Asylum Support Office (EASO)'s and European Union Agency for Fundamental Rights (FRA)'s operational and technical systems for managing migration;

b) improve the EU's underlying border-control IT systems for migration through work on biometrics, digital identity management and smart card security;

c) support EU policy on addressing push and pull factors and reducing the incentives for people to migrate, including climate change as a root cause of forced displacement/migration;

d) analyse the impacts of migration on the EU labour force and fiscal, education and welfare systems on the basis of medium-term demographic projections; enhance the spatial dimension of integration (e.g. to account for cities where most of the integration issues arise);

e) support early warning, risk analysis and prediction for enhanced situational awareness of migration flows;

f) operate the **Knowledge Centre for Migration and Demography,** which will provide policy-oriented research and evidence-based analyses, observatories, partnerships, and capacity-building.

All work under this section will contribute to the Knowledge Centre for Migration and Demography.

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 and the Union's ability 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:
- contribute to establish a coherent cross-sectoral EU risk management policy which promotes a holistic approach to all natural and man-made risks; this work is based on risk assessments and planning, support for the 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 for prevention, preparedness and response as regards 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 (ERCC) as the EU's response platform, with 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 EU's and non-EU countries' resilience (preparedness and response) to crises and disasters;
- address global security challenges with international partners, including CBRN risk mitigation and the security and development nexus, in particular in support of the Instrument contributing to Stability and Peace.

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 provide assistance for risk vulnerability and crisis assessment to improve the knowledge base for humanitarian emergencies and disasters;
b) **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 reinforce nuclear safety on the territory of its Member States and beyond, the EU has set up a strong nuclear safety regulatory framework and, through the Instrument for Nuclear Safety Cooperation (INSC) and in its promotion of the Vienna declaration on nuclear safety, it contributes to the improvement of nuclear safety and effective nuclear safeguards worldwide. The JRC cooperates in the implementation of these policies and manages a network of European nuclear safety authorities established to allow closer collaboration and share operating experience.

The EU plays a key role in developing global nuclear security architecture and the JRC contributes to address the challenge of improving nuclear security. The overall objective of the EU CBRN action plan is to reduce the threat and consequences of CBRN incidents of accidental, natural, and intentional origin in the EU. The JRC provides technical assistance in support of the action plan and the EU CBRN 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.

Commission policy objectives:
- provide technical and scientific support for the implementation of EU policies, instruments or programmes in nuclear safety, security and radiation protection in non-EU countries;
- develop international safety research cooperation with key partner countries and relevant international organisations contributing to the development of international standards, (including IAEA safety standards and guidance documents);
- contribute to the development of 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 EC 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) technical assistance and scientific support to EU partner countries and international institutions for the implementation of the Instrument for Nuclear Safety Cooperation, EC support programme to the IAEA and Instrument contributing to Stability and Peace, and participation in International Working Groups;

b) development of methods, technologies and standards for the detection of nuclear and radioactive materials outside regulatory control and fighting the illicit trafficking of such materials; supporting EU policy on nuclear non-proliferation through the implementation of the EU export control regime and the analysis of open source information. Operational support for Member States and international organisations;

c) support for Member States, partner countries and international institutions (IAEA, etc.) to enhance technical knowledge on nuclear security using the European Nuclear Security Training Centre (EUSECTRA). Training to support the implementation of the EU non-proliferation policy;

d) contributing to safeguards, proliferation resistance, and physical protection of innovative designs of nuclear reactors in synergy with the GIF.

9.2   International cooperation and development

The EU's international cooperation and development policy commits it to eradicating poverty and driving global sustainable development, as defined in the 2030 agenda for a fairer, sustainable, resilient and more stable world. Alongside foreign, security and trade policy (and international aspects of other policies, such as environment, agriculture and fisheries), it is a cornerstone of EU relations with the outside world. 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, address inequalities and promote gender equity;

– 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;

– enhance aid and development effectiveness, including by improving the coordination between humanitarian, security and development actions;

– pursue fair and sustainable supply of raw materials from global markets.

Key orientations for the JRC:

9.2.1 *2030 agenda on sustainable development*

    a) support the monitoring and implementation of the SDGs by developing and integrating knowledge management tools and organising information on related policies, indicators, methods, and data, facilitating the integration of the social, economic, and environmental information necessary to achieve the SDG targets, the SDG targets, taking into account international monitoring frameworks and indicators, and national monitoring efforts.

9.2.2 *Food security and nutrition, rural development and sustainable agriculture[20]*

    a) monitor agricultural resources, analyse situations of food and nutrition insecurity (including food poverty) and provide support with modelling and information systems to build more resilient communities in countries, including to the impacts of climate change.

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

    a) analysis, capacity-building, provision of data, maps and methodologies on the extent of and vulnerability to climate change in developing countries, including guidance towards a more targeted allocation of climate finance;

    b) monitoring, provision of scientific advice, development of ICT tools, dissemination of information and capacity-building for partners in developing countries, to support multilateral or bilateral agreements related to natural resources, with a focus on forestry, land, and land use change, soil, raw materials, biodiversity, ecosystem services, agriculture and water, where appropriate in cooperation with relevant international organisations, including FAO, UNEP, and the International Resource Panel.

9.2.4 *Energy*

    a) map out and monitor activities, develop geographical information system (GIS) tools, provide technical assistance, share best practice and build capacity in support of international, bilateral, and regional energy cooperation initiatives, including renewable energy.

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

    a) Develop methodologies, indicators and ICT tools, and carry out macroeconomic 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.

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[20]This key orientation focuses specifically on JRC projects contributing to development policies in the field of 'food and nutrition security, rural development and sustainable agriculture'. It is intrinsically linked to the 'agriculture and rural development' policy area.

10 A Union of democratic change

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

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

10.1 Methodological support for better regulation

Better regulation is about designing EU policies and laws so that they 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 involving stakeholders.

Relevant Commission policy objectives:

- make sure that any 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, as well as qualitatively, all relevant impacts of policy initiatives, clearly presenting assumptions applied in the assessment;

- monitor progress towards achieving policy objectives;

- carry out ex post quantitative 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 the framework of the European Semester in order to provide evidence-based country recommendations that are fit for purpose.

Key orientations for the JRC:

a) **competence Centre on Modelling** - contribute to high-quality impact assessments of policy proposals and policy options, and promote their application at EU and Member State level;

b) **competence Centre on Microeconomic Evaluation** - provide technical advice, methodological support, specialised training and exchange on counterfactual impact evaluations;

c) **competence Centre on Composite Indicators and Scoreboards** - contribute to developing 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 a new lease of life to the relationship with the European Parliament and working more closely with national parliaments.

Through its **EU policy lab**, the JRC contributes to bringing innovation to public policies by combining **foresight, behavioural insights,** and **design for policy**. The policy lab offers a 'safe' space **to co-design projects** and policy initiatives with the engagement of stakeholders 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.

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** through the development of generic tools and processes, including 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 its ability to design and implement result-oriented policies rely on the quality of this process, but so does its authority and credibility within the EU and as a global actor. However, knowledge remains scattered across the Commission and the generation of new knowledge is still uncoordinated.

A stronger Commission knowledge-management capacity will facilitate the steering and coordination of 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** - translate data, information and knowledge into policy, including through training and an inventory of country, regional and local knowledge;

b) **knowledge-management methods and tools** - develop common platforms for the use of data, information, and knowledge in support of policy-making;

provide access to knowledge sources; facilitate communities of practice and improve communication.

11.2 Intellectual property rights

Relevant Commission policy objective[21]:

– 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 H2020 programmes.

Furthermore, under the decision establishing the Horizon 2020 Specific Programme and the Regulation on the Euratom Research and Training Programme (2014-2018) of the European Atomic Energy Community (Euratom) complementing the Horizon 2020 framework programme, two key indicators were established to assess the results and impacts of the JRC's direct actions. They refer to the number of occurrences of tangible specific impacts 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 H2020.

The JRC's work programme will be subject to an annual internal evaluation, which will provide 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.

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