



European
Commission

Annual Activity Report 2021

Joint Research Centre

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THE DG IN BRIEF

As the science and knowledge service of the European Commission, JRC's mission is to support EU policies with independent scientific evidence throughout the whole policy cycle. The JRC supports EU policies in a variety of key areas from agriculture and food security, to the environment and climate change, as well as in nuclear safety and security and innovation and growth. As a boundary organisation at the interface between science and policy, it provides the cross-sectoral support required by policymakers to tackle increasingly complex societal challenges, combined with the capacity to respond rapidly to policy needs, all in close collaboration with the other Directorates-General. JRC's work has a direct impact on the lives of Europeans through internationally recognised research for crisis and emergencies response, a healthy and safe environment, secure energy supplies, sustainable mobility and consumer health and safety.

The JRC was established following the Treaty on the European Atomic Energy Community (Euratom). It is building its expertise and sharing know-how with EU countries and the scientific community. It works in collaboration with over a thousand organisations worldwide, whose scientists have access to JRC facilities.

The JRC creates, manages and makes sense of scientific knowledge and anticipates emerging issues that benefit from EU level collaboration. Its knowledge centres connect experts to inform policymakers. Its competence centres develop analytical and innovative tools, making them available to policymakers and researchers. The JRC explores new and emerging areas of science. It hosts specialist laboratories and unique research facilities.



Figure 1. JRC is located in 6 different sites, spread across 5 European countries.

The EU's framework programme for research and innovation, Horizon Europe and the Euratom Research and Training Programme funded the JRC during 2021. The JRC contributes to the overall objectives of these programmes while being fully aligned with the political priorities of President von der Leyen's Commission.

The JRC is organised in eleven directorates. Two have corporate responsibilities for strategy, work programme coordination and resources and support services respectively, and nine are scientific directorates of which two are cross-JRC directorates for knowledge management and competences. In addition, two Units are directly linked to the Director-General's office (Communication and new European Bauhaus, respectively). Unlike other Directorates-General of the Commission, the JRC also manages scientific infrastructures and nuclear facilities. The JRC has an ISO certified quality system and several of its laboratories are certified according to ISO 17025.

EXECUTIVE SUMMARY

This Annual Activity Report is a management report of the Director-General of DG JRC to the College of Commissioners. Annual Activity Reports are the main instrument of management accountability within the Commission and constitute the basis on which the College takes political responsibility for the decisions it takes as well as for the coordinating, executive and management functions it exercises, as laid down in the Treaties ⁽¹⁾.

A. Key results and progress towards achieving the Commission's general objectives and DG's specific objectives (executive summary of section 1)

Over the past Multi-Annual Financial Framework, the JRC has substantially developed its capacities as the science and knowledge service of the Commission, as evidenced by impact analyses carried out for the *ex post* evaluation. In 2021, its role was amply confirmed as a source of tools, expertise and data for evidence-based policymaking in the **Better Regulation Toolbox**. This is a milestone for JRC reflecting many years of work on mainstreaming concepts such as resilience, tools such as foresight, and the political ambitions of the Sustainable Development Goals (SDGs) into policymaking. It also marks an enhanced role of evidence for policy making, the core of JRC's mission.

It supported the transition from conception to implementation reflected in the **Commission Work Programme 2021**, contributing to many of the legislative initiatives under the General Objectives, in particular the Green Deal, by modelling policy options, including their social impacts, and by providing analyses, knowledge, tools and methods for the implementation of EU policies. For example, JRC evidence helped to ensure coherence among the proposals in the Fit for 55 package, and to put forward firm targets on e.g. energy efficiency and CO₂ standards for cars and vans.

It promoted the **Sustainable Development Goals (SDGs)**, for example by creating a platform for policymakers for mainstreaming the SDGs in to policies, and for assessing how the intended policies contribute to the SDG framework; and by managing the Commission initiative to link SDGs and the twin transitions to regional development, through the extension of the Smart Specialisation methodology and approach.

The **COVID-19 pandemic** has clearly demonstrated the value of scientific advice for managing and responding to the crisis. In 2021, the JRC continued to contribute significantly to the Commission's crisis response, developing a Scenario Analysis Toolbox to support competent authorities in determining scenarios for the consumption of medical items, and an Omicron-specific COVID-19 detection method based on the widely used

⁽¹⁾ Article 17(1) of the Treaty on European Union

existing PCR test. JRC also assessed in real time the economic situation for the Winter and Spring Economic Forecasts 2021 of DG ECFIN, and analysed social impacts of the pandemic ('loneliness report').

Moving beyond the current COVID-19 pandemic, a further focus was on **resilience**, for example by organising the process for the [the strategic foresight report](#), and by establishing resilience dashboards for the ex post assessment of national resilience and recovery plans.

The **New European Bauhaus** initiative completed its co-design phase with the publication of the [Commission Communication](#) setting out the refined concept. The initiative is now in the implementation phase, with projects selected for the annual prize 2021 and calls for proposals published for the 2022 prizes and conference.

Within the Commission, the JRC is leading important initiatives for the modernisation of the administration, in particular as regards the [digital transformation](#). A number of milestones were reached in 2021, such as the establishment, together with Directorate-General Informatics, of the Data Advisory service for data governance and management, the interim solution of a corporate data catalogue and the Commission-wide use of an e-procurement tool. Given the central role of data in research activities and the high amount of data that the JRC produces and manages, the JRC revised its data policy and data governance structure in line with the recently updated corporate data policies.

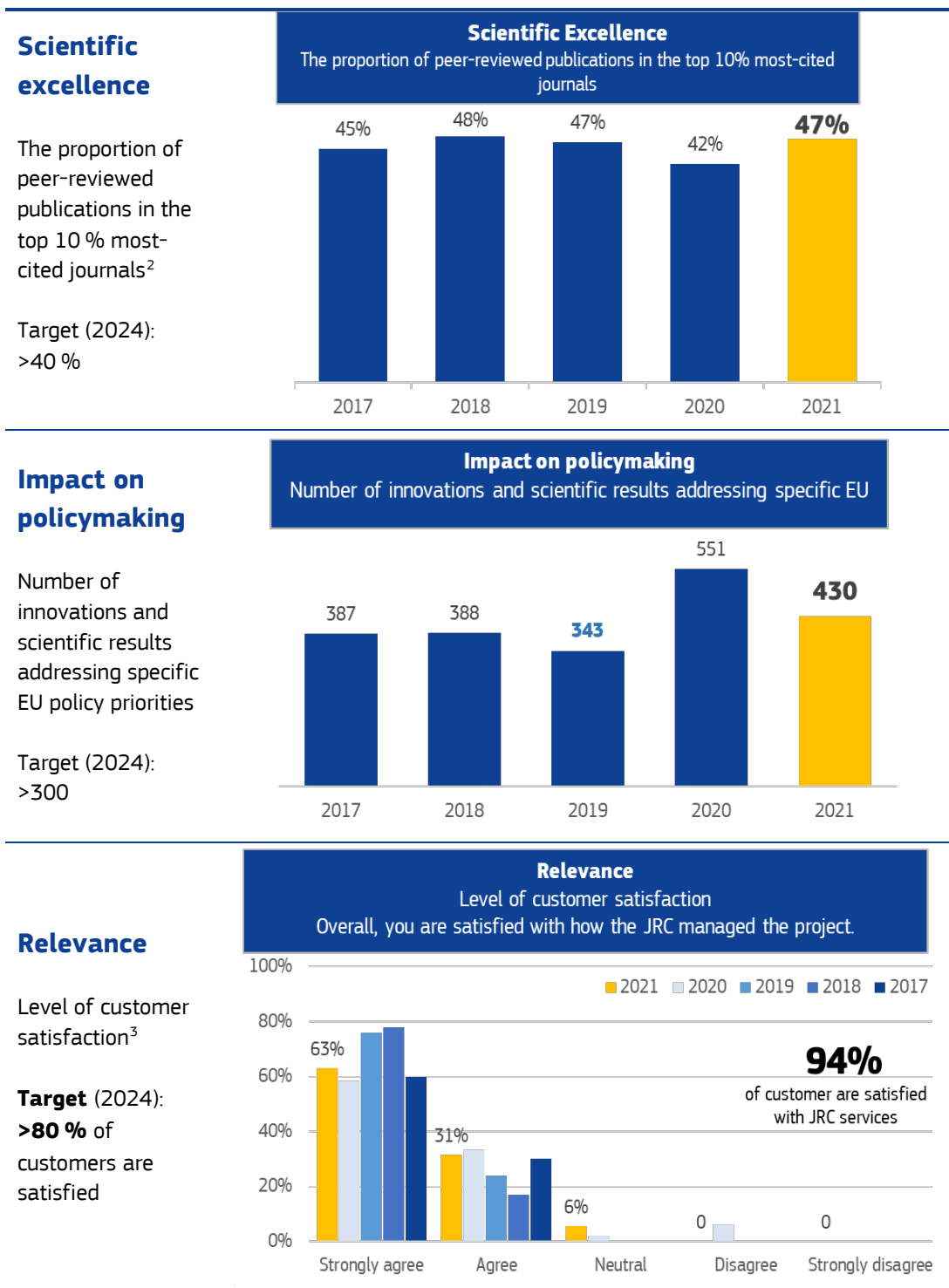
In 2021, the College adopted a Commission decision on the [open source licensing and reuse of Commission software](#), prepared by the **Central Intellectual Property Service** run by the JRC. It also prepared the adoption of a new Communication on IP management at the Commission and a staff working document, setting out the principles and procedures for dealing with IP that belongs to the EU.

Two particular challenges in 2021 were the cuts in the Euratom budget for 2021-2027 and the continued restrictions imposed by the COVID-19 pandemic.

On the former, JRC developed a **nuclear strategy** which is currently being consulted with stakeholders in the European Commission. On the latter, top priority continued to be given to staff and managers on swift and transparent communication, ergonomic assistance, psychosocial well-being, management of remote teams and on-line training. **Business continuity** of site management services was ensured at all times, including safety, security and environmental protection. The plans to modernise infrastructure took shape including launching feasibility studies for renovating Karlsruhe facilities and an architectural contest for a new building in Seville. The JRC's long-term plans to improve energy efficiency of buildings and installations across the sites continued to be implemented.

The key performance indicators (section B) show a rebound in scientific excellence compared to last year, and the number of impacts on policymaking demonstrates the continued high relevance and usage of the JRC's scientific support to policymaking. Customer satisfaction continues at a high level.

B. Key Performance Indicators (KPIs)



C. Key conclusions on Financial management and Internal control (executive summary of section 2.1)

In line with the Commission's Internal Control Framework, the Joint Research Centre has assessed its internal control systems during the reporting year and has concluded that it is effective and the components and principles are present and functioning well overall, but some improvements are needed as minor deficiencies were identified related to supervision, management and execution of procurements and contracts; the coordination of health and safety; and updates of the business continuity and disaster recovery plans. Please refer to AAR section 2.1.3 for further details.

In addition, the Joint Research Centre has systematically examined the available control results and indicators, as well as the observations and recommendations issued by the internal auditor and the European Court of Auditors. These elements have been assessed to determine their impact on management's assurance about the achievement of the control objectives. Please refer to Section 2.1 for further details.

In conclusion, management has reasonable assurance that, overall, suitable controls are in place and working as intended; risks are being appropriately monitored and mitigated. Improvements are necessary concerning the minor deficiency noted above. The following actions are being taken in this respect: enhanced sharing of good practices and their implementation in procurement; updates and testing of business continuity and disaster recovery plans; staffing of the coordination function for health and safety. The Director-General, in his capacity as Authorising Officer by Delegation has signed the Declaration of Assurance.

D. Provision of information to the Commissioner(s)

In the context of the regular meetings during the year between the DG and the Commissioner on management matters, the main elements of this report and assurance declaration, have been brought to the attention of Commissioner Mariya Gabriel, responsible for Innovation, Research, Culture, Education and Youth.

1. KEY RESULTS and progress towards achieving the Commission's general objectives and DG's specific objectives

EUROPEAN COMMISSION GENERAL OBJECTIVE 7

Specific objective 7.1: The JRC supports evidence-informed policymaking through creating and managing high-quality and fit-for-purpose scientific knowledge



Scientific excellence, impact and efficiency

Between 2014 and 2020, the JRC published around **8000** peer-reviewed publications of which 44% in the top 10% most-cited journals and 6% in the top 1%



In preparation for the *ex post* assessment of JRC in the Framework Programme for Research and the Euratom Research and Training Programme 2014-2020, a bibliometric study on scientific output was carried out, and 50 case studies to illustrate

the impact of JRC were completed. The results show that the JRC's scientists published around 8 000 peer-reviewed scholarly publications including articles (72% of the total), conference papers (14%), book chapters (5%) and reviews (5%).

The JRC-authored publications, weighted according to scientific fields, have been cited 2.3 times above the world average (field weighted citation index). The scientific impact of JRC publications, as measured by some of the main bibliometric indicators, puts it on par with leading universities and the prestigious research organisations, as shown in the table included in Annex 2.

In 2021, a new impact evaluation methodology was introduced. It is based on current practice of research impact assessment by tracing impact pathways of activities, adapted to the JRC. 50 case studies describing activities in 2014-2020 were produced and evaluated against 11 criteria by experts from academia, businesses, NGOs and national administrations.












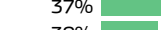


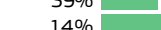


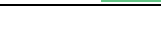


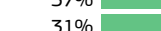














In **86%** of cases, JRC's contribution was instrumental in shaping and implementing EU

Table 1 presents a summary of the results of the experts' assessment. The experts found that the JRC's contribution in 42 (86%) cases was instrumental in **shaping and**

implementing EU policies, and a moderate impact was achieved through the other 7 activities (14%)

Table 1. Results of the JRC case studies' assessment by independent experts.

		High impact	Medium impact	Limited impact	
Polymaking	significance	 86%			0%
	stakeholder reach	 73%			6%
	territorial reach	 94%			0%
Public debate	significance	 41%			22%
	stakeholder reach	 41%			20%
	territorial reach	 63%			22%
Scientific debate	significance	 33%			31%
	stakeholder reach	 33%			37%
Societal impact	significance	 73%			10%
	stakeholder reach	 67%			10%
	territorial reach	 84%			6%

In 2020, the JRC established an internal editorial review board (JERB) to help ensure the overall quality, credibility and impact of JRC scientific publications. During its first year of operation, the JERB reviewed close to 1600 manuscripts. The majority of responding authors in a survey felt that the review helped to improve the manuscripts.

The JRC's **Centre for Advanced Studies** and the **Exploratory Research Programme** provide cutting edge scientific input to emerging thematic areas at the science-policy interface, with a forward-looking horizon of 3-5 years. In 2021, 40 scientists worked on projects addressing the six European Commission priorities and also contributed to the COVID-19 response of the JRC.

Furthermore, through the **Collaborative Doctoral Partnership**, the JRC stayed effectively connected to academic research through 28 co-supervised doctoral projects in policy relevant fields.

The complexity of today's problems in a global world requires holistic and transdisciplinary approaches as well as lateral thinking. To this end, the **Science and Art** programme established a forum of exchange with artists to reflect on new ways of dealing with nature in support to the Green Deal and the New European Bauhaus initiative, in preparation of the next cycle which was launched in December under the title *Naturarchy - Towards a Natural Contract*. It aims to explore how a contract that integrates nature and its phenomena into our society can redefine our anthropocentric relationship with it and contribute to the wider acceptance of the energy transition.

 Responding to crisis and emergencies

The JRC has a long experience in supporting the management of crises and emergencies, whether related to civil security or to health. Notable achievements in 2021 are listed below.

- Development of detection method for the Omicron variant of COVID-19 and of a scenario toolbox for anticipating the consumption of medical supplies (see section on ‘Promoting our European way of life’)
- With Directorate-General Migration and Home Affairs, launch of a [civil protection knowledge network](#) across the EU, with the JRC’s Knowledge Centre for Disaster and Risk Management at its core.
- A test version of a [new global flood monitoring tool](#) as part of the Copernicus Emergency Management Services.

Crisis management is also addressed with innovative approaches as part of the JRC **Exploratory Research Programme** and **Centre for Advanced Studies** where, 14 projects with focus on global risks and disasters were launched.



Communication

The JRC's communication activities aim to foster recognition that good policy decisions must be evidence-informed. They underpin the Commission's key messages and the credibility of EU policies, while positioning the JRC as the science and knowledge service of the European Commission.

The JRC has pursued efforts to communicate the value of its work for the public and policymakers, both at European and national/regional level and in international partnerships.

Communication is considered of increasingly high strategic importance in the JRC, as also reflected in the recently launched initiative to ‘reset, re-imagine and re-energise’ the JRC (3R), where two of in total twenty lines of actions are fully dedicated to improving communication.

Linked to the 3R reflections, a new JRC Communication Unit was launched on 1 June 2021, to integrate and streamline various communication activities previously under multiple Units’ and Directorates’ responsibilities.

In 2021, the JRC has made full use of a diverse portfolio of communication channels, ranging from articles intended for scientists and academic stakeholders, over publications that target policymakers, to a rich online offering of news, virtual content, and social media. To leverage the unique opportunities presented by the JRC’s sites and world-class scientific infrastructure new citizen engagement techniques and innovative methods of communicating and engaging the public have been explored in 2021, e.g. through its new Visitors’ Centre in Ispra (IT) as well as through a new Digital Media Hub to allow for virtual laboratory visits, despite the ongoing pandemic.

In line with current Commission priorities, in 2021, the JRC has worked closely with other Commission services and notably with Directorate-General Communication to leverage synergies and contribute to common projects and joint events linked to COP26, NextGenerationEU, COVID-19/omicron, the Future of Europe, strategic autonomy and the

New European Bauhaus, to name but a few. Moreover, the JRC continuously pursues its advisory role on issues such as dis/misinformation, behavioural sciences, science for policy as well as citizen engagement. In 2021, the greatest media attention was observed for flood and drought alerts, taxonomy linked to the Green Deal, as well as on COVID-19 related activities.

During 2021, the JRC has steadily grown into its role of knowledge manager in the European Commission and major efforts were invested in the development of knowledge platforms (Knowledge and Competence Centres, Communities of Practice) that bring the right people together, regardless of their geographical location or the COVID-19 pandemic.

To comply with EUROPA web presence, the JRC has transferred its EU Science Hub into the EUROPA Web Publishing Platform in February 2022, and further developed EC -or EU-branded websites.

For tangible communication outcomes in 2021, please see the Annex 2.

Working with stakeholders

Beyond its extensive in-house knowledge, the JRC worked together with world-leading partners to enhance the science base for policymaking and reinforced partnerships with international, national and regional stakeholders among them the German Aerospace Centre (DLR) and the National Institute of Standards and Technology (NIST) of the Department of Commerce of the United States of America.

The JRC has promoted a regular and pro-active dialogue with its National Contact Points from Member States and Associated Countries, including through online info-sessions on JRC initiatives, tools and opportunities.

The JRC also maintained and enhanced relations with its interinstitutional partners: the European Parliament, the Council and the Consultative Committees, through various channels. Regular presentations were held at the Research Working Party of the Council and European Parliament Committees. The action plan with the European Parliament's Research Service (EPRS) was developed. A Joint Action Plan between the Committee of the Regions and the 3 DG's in Commissioner Gabriel's portfolio, launched at the end of 2020, was implemented to a significant extent in 2021.

Furthermore, JRC also reached out directly to regional and local stakeholders, most notably through the Science meets Regions programme, boosting evidence-informed policymaking at local level.

The JRC provided open access to 17 physical **research infrastructures** to the research community, public authorities, small and medium enterprises and industry to enhance scientific knowledge and dissemination, boost competitiveness, provide training and capacity building,



The JRC provided open access to **17** physical research infrastructures

and bridge the the innovation gap between less and more technologically advanced regions and countries in Europe. . The JRC also provided access to its Ispra site to four EU SMEs to test their innovative technologies in the Mobility and Energy fields in the framework of the JRC Living Labs initiative

In an exemplary effort of involving stakeholders in forward thinking research, the **Centre for Advanced Studies** engaged with over 100 stakeholders from the JRC, other policy DGs and academia to define relevant policy questions to be answered via computational social science tools. Over 92 questions clustered in 7 foundational and 18 applied themes have been collected. The **EU Academy** is the corporate online learning platform of the European Institutions, focussing on the learning needs of external stakeholders involved in the implementation of EU policies and programmes. In 2021, 18 EU Services hosted contents receiving more than 70 000 visitors from 169 countries.



The European Green Deal

The European Green Deal is a driving force that will transform every aspect of our economy, environment and society from the energy we use, the air we breathe to the food we eat, the way we work, travel, produce and consume products, and shape our built environment. It will enable climate neutrality by 2050 focusing on adaptation, on protecting and preserving our environment and on a new growth strategy for Europe. It will help create jobs and growth, making our economy and industry more innovative, resource efficient, circular and competitive.

The JRC contributed widely to the three of the four packages of the Green Deal. Almost half of the JRC work resources deployed for the Commission priorities are dedicated to the European Green Deal.

'Fit for 55' package.

- In close partnership with Directorate-General Climate Change, Energy and Taxation and Customs Union, the JRC contributed to all initiatives by providing modelling scenarios, taxation data, environmental and socio-economic analyses on the impacts of the Carbon Border Adjustment Mechanism and the revised Energy Taxation Directive, including their effects on carbon leakage, industrial output and trade as well as on households' budgets. The assessments on technical, environmental, economic, behavioural and social aspects of energy efficiency fed into the update of the Energy Efficiency Directive and of the Energy Performance of Buildings Directive. It also supported the revision of the Renewable Energy Directive (REDII) by providing the methodology and calculation of GHG emissions from alternative fuels and informed the formulation of the renewable targets in the heating and cooling sector. In preparation of the Third Energy Package for gas, the

JRC shed light on the role of green hydrogen in the energy system and assessed the impact of projects of common interest on European power and gas systems.

- The [Global Energy and Climate Outlook](#) (GECO 2021) takes stock of recent updates in national pledges announced for the Conference of the Parties (COP 26). It finds these stop global emissions growth over the next decades and lead to declining emissions until 2050, but that substantial further actions are needed to limit global warming to the Paris Agreement targets.
- **Sustainable finance.** A report on criteria for environmentally sustainable economic activities supporting the implementation of the **EU Taxonomy** is delayed to Q1 2022. Following the political agreement on the Taxonomy Regulation between legislators, the JRC delivered a technical assessment of nuclear energy with respect to the 'do no significant harm' criteria of the regulation.

Biodiversity and toxic free environment package

- **Preserving and protecting biodiversity and environment.** The JRC's [Knowledge Centre for Biodiversity](#) launched an action tracker and, together with the EEA and Eurostat, a dashboard to track and report progress of the EU on actions and targets of the EU Biodiversity Strategy for 2030. The [European Forest Fire information System](#) at the JRC noted in its [2021 report](#) that the impact of climate change on forest fires is more noticeable every year.
- **Zero pollution action plan.** The JRC is continuously updating its extensive set of tools for environmental monitoring, including life-cycle based indicators for assessing the environmental impact of EU [consumption](#). These help to progress towards EU policy ambitions, such as circular economy (Circular Economy Action Plan), zero pollution (Zero Pollution Action Plan), sustainable food production (Farm to Fork Strategy) and biodiversity conservation (EU Biodiversity Strategy for 2030).

Support in microplastic and nanoplastic detection

The Centre for Advanced Studies is collaborating with top class scientists on nanoplastic detection, where research needs to step up its efforts.

Furthermore, the biggest [inter-laboratory comparison](#) world-wide to identify and harmonise methods to measure microplastics in water showed that more harmonisation of analytical methods for microplastic quantification in water is needed to obtain reliable and comparable data to measure microplastics.



Sustainable and smart mobility.

The JRC identified the costs and benefits of future policy and technology deployment scenarios to define CO₂ emissions standards for cars and vans, including the costs vehicle users and producers would face under different CO₂ targets options. Further, its research informed the proposal of the post-Euro 6/VI emissions for cars, vans, lorries and buses by assessing the emissions performance, accuracy and stability of portable emission measurement systems.

For the implementation of the **Farm to Fork Strategy**

- [Scenario modelling](#) of an ambitious implementation of the Common Agricultural Policy (CAP) reform proposals, including the quantitative targets for the national CAP Strategic Plans, indicates that it can achieve significant environmental benefits in the form of reductions in greenhouse gases and ammonia emissions as well as in gross nutrient surplus.
- In support to **food security and safety**, the JRC has:
 - o produced the [EU crop map](#) - a first continental high-resolution map of the European Union using Copernicus Sentinel-1 satellite observations with *in situ* LUCAS 2018 data and using machine learning and cloud computing. This increases the accuracy of agricultural monitoring for EU policies.
 - o Developed a new global [food emission database](#) (EDGAR-FOOD) estimating greenhouse gas (GHG) emissions for the years 1990-2015. It is the first emission database of GHGs covering all countries and sectors of the food system, from production to disposal.
 - o Carried out a [study](#) of an EU-wide quality comparison of food products marketed under the same branding in order to assess whether compositional differences can be perceived by human senses.
 - o Supported the fight against food fraud with a new reference material to verify the authenticity of wines, crucial for legal cases
 - o Coordinated the largest [study](#) so far on the authenticity of herbs and spices (showing that 17% of investigated samples were suspicious of having been adulterated).

As a further step to link regional development to the SDGs and the twin transition, the Commission works on connecting Smart Specialisation to Sustainable Development Goals. An extension of S3, the underlying methodology is being piloted in 10 regions of the EU and beyond, as 27 countries worldwide are now using this methodology

The New European Bauhaus (NEB) expresses the EU's ambition of creating beautiful, sustainable, and inclusive places, products and ways of living. It promotes a new lifestyle where sustainability matches style, thus accelerating the green transition in various sectors of our economy. The New European Bauhaus Communication (COM(2021) 573 final) was adopted on 15 September 2021.

The NEB is an innovative and participatory project, which builds on JRC experience in engagement and innovation. The NEB was created with an innovative co-design phase (January – June 2021), engaging on values, calling for experiences rather than opinions (more than 200 contributions – ‘stories’ – were collected) and recruiting a vast and heterogeneous group of partners (more than 300 at the end of 2021). The New European Bauhaus Prize2021 (co-organised with DG REGIO) collected concrete illustrations of the concept through inspiring examples (more than 2000 applications, 20 awards).

The NEB is also a transversal co-creation project inside the Commission, with NEB calls for proposals created across many different EU programmes.



A Europe fit for the digital age

The Commission is proposing actions to ensure that digital technologies help Europe develop and pursue its own vibrant, globally competitive, value-based and inclusive economy and society. Digital is the second component of the ‘twin transition’ in the EU’s political agenda and a potentially powerful enabler of the green transition. The Communication on ‘A Europe fit for the digital age’ identifies five main streams for action: the European digital strategy, the industrial strategy, digital services, cybersecurity and consumers, and research.

Examples of the JRC’s support to CWP 2021 initiatives include:

- The JRC’s research published in 2019 and 2020 supported the **Data Act** with evidence on Business-to-Government and Business-to-Business data sharing.
- **Platform workers**. A planned survey on working conditions was delayed to 2022 because of the COVID-19 pandemic.
- The **updated Industrial Strategy** is proposing new measures to take into account the lessons learned from the crisis and sustain investment. In support of the Open Strategic Autonomy, the 3rd Raw Materials Scoreboard analysed the dependency of metallic raw materials, highlighting that Europe lags behind and has high levels of dependency on other regions for certain raw material production, while domestic production of raw materials secures jobs and added value in the EU, and decarbonisation with circular use of raw materials also offer further opportunities. As one of the key actions in the updated Industrial Strategy, JRC and Directorate-General Internal Market, Industry, Entrepreneurship and SMEs set up the Energy and Industry Geography Lab, a user-friendly online tool that provides geospatial information for companies and energy infrastructure planners.
- The **Action Plan on Synergies between civil, defence and space industries** (February 2021) mandated the Commission to set up an Observatory of Critical Technologies, the preparation of which was ongoing in 2021
- Pending the establishment of dedicated entities to govern the European Cooperate Intelligent Transport Systems (C-ITS) framework, the **review of the intelligent**

transport directive states that the JRC will continue to act as the C-ITS certificate policy authority, the trust list manager, and the C-ITS point of contact.

- Exploring the impact of artificial intelligence, the JRC issued a number of reports on intelligent vehicles.

Support to other initiatives

With the development of the **EU Academy**, the JRC fostered a corporate EU Institutional vision for eLearning for external stakeholders that will contribute effectively to the digital transformation of the Commission and other EU Institutions as public administrations. With more than 80 courses already available online for public or restricted users by the end of 2021 on the pilot platform, and 18 DGs and Agencies already committed to using the platform in 2022, this transition will become reality with the official launch of the platform in 2022.

The European Cybersecurity Atlas

In 2021 the **European Cybersecurity Competence Centre** was established, to strengthen European cybersecurity research, technological and industrial capacities, and the Network of National Coordination Centres. The [European Cybersecurity Atlas](#), launched in 2021, is a digital knowledge management platform used to map, categorise and stimulate collaboration between various entities with cybersecurity expertise across Europe. The Atlas is a joint initiative between the JRC and Directorate-General Communications Networks, Content and Technology.



An economy that works for people

In the last years, globalisation, digitalisation and and global concerns such as the COVID emergency have challenged the economic and social fabric of the EU. Achieving a deeper and fairer Economic and Monetary Union, boosting investment and creating jobs and refocusing the European Semester towards green growth and sustainability count among the flagship ambitions under this priority.

The 2020 Strategic Foresight Report put forward resilience as a key objective for the EU. As a follow-up, the JRC was a key contributor to the indicators, on-line tool and background for the [resilience dashboards](#). These aim to provide a holistic assessment of resilience in the EU and its Member States along the social and economic, green, digital and geopolitical dimensions.

Examples of the JRC's support to CWP 2021 and other initiatives include:

- **Capital markets union:** in support to monitoring the progress towards financial integration, two of the indicators adopted in the [toolkit](#) were developed.
- **Action Plan on the European Pillar of Social Rights.** A report on the future of the welfare state has been postponed to the end of 2022.
- **Completing the Banking Union: Review of the bank crisis management and of the deposit insurance framework.** The JRC developed quantitative technical analyses to support the European Banking Authority in providing advice to the European Commission on funding sources to handle a banking failure in resolution and insolvency.
- In the context of the establishment of an **EU Green Bond Standard**, the JRC complemented previous work on the pricing and effectiveness of green bonds with an analysis of their performance during the COVID period.
- **Contributing to the Union of equality:** in support of inclusive and sustainable recovery plans, a study with the OECD was produced on ‘Access and cost of education and health services preparing regions for demographic change’.

The JRC contributed to the screening of foreign investment transactions and to the monitoring of trends in **Foreign Direct Investments** in the annual report of the Commission to the European Parliament and the Council and through quarterly bulletins for Directorate-General Trade and disseminated to Member States

Economic Forecasts

In cooperation with Directorate-General Economic and Financial Affairs, macro-economic modelling of the economic outlook contributed to the Winter, [Spring and Autumn Economic Forecasts 2021](#). The analyses helped to shed light on the drivers/uncertainties of economic developments in the EU. In 2021 work focussed on (i) the behavioural response of consumers and businesses after the easing of COVID restrictions (Winter/Spring forecasts); (ii) the surge of energy prices (Autumn forecast).



A stronger Europe in the world

Europe strives to strengthen its unique brand of responsible global leadership. It aims to be an assertive geopolitical player, the ‘guardian of multilateralism’ and, to uphold and update the rules-based global order. Through this priority, Europe aims to give new impetus to its relationship with Africa (new Comprehensive Strategy) and with the Western Balkans, where it sees the enlargement policy as an instrument for catalysing comprehensive national reforms.

In this context, the JRC provided scientific evidence and used its scientific networks outside Europe as avenues for science diplomacy and to support Europe’s commitments on the global and multilateral systems.

Examples of the JRC's support to the implementation of CWP 2020 and 2021 initiatives include:

- **Strengthening the EU's contribution to rules-based multilateralism.** The JRC supported the EU's contribution to climate initiatives such as COP26 and the Intergovernmental Panel on Climate Change with modelling the impact on the climate of the pledges of the participating countries, and on migration.
- **The Arctic dimension.** The JRC contributed to the review of the EU Arctic Policy and to the international policy framework, i.e., by providing risk and resilience indicators for some types of regions.
- **Western Balkans and Eastern Partnership:** The JRC's framework for Smart Specialisation in EU enlargement and neighbourhood regions has been included in the [key policy and programming documents](#) for the [Western Balkans and Eastern Partnership](#).
- **Contributing to the Team Europe Initiatives (TEIs).** The JRC supported the programming of the Neighbourhood, Development and International Cooperation Instrument geographical strands promoting inter-continental economic integration along the Europe - North-Africa – Sub-Saharan Africa axis, with the characterisation of strategic corridors, on which regional programmes will be developed. A report will be published in early 2022.

Other initiatives

Through the '**Putting science into standards**' programme the JRC enables innovation and promotes industrial competitiveness in emerging science and technology areas, contributing to the strategic autonomy of Europe by enhancing the positioning of European industry and SMEs through international standardisation. In 2021, a successful workshop on the topic of Organ-on-Chip, one of the top thematic areas in innovation, brought an international community of experts and stakeholders from science, technology, industry and standardisation bodies together to identify the needs of standardisation in this important field.



Promoting our European way of life

Our European Way of Life is built on values of solidarity, equality and fairness.

JRC support in responding to COVID-19 pandemic

Shortly after the discovery of the Omicron variant of Covid-19, JRC developed and validated in silico an Omicron-specific detection method based on the widely used existing PCR test. This can make testing for Omicron much more rapid and less costly.



Furthermore, the JRC is continuously updating the test methods for the reliability of COVID-19 tests.

JRC developed the [Scenario Analysis Toolbox](#) to support the European Medicine Agency, ECDC and Member States in determining scenarios for the consumption of medical items (vaccines, antivirals, etc), which, in the first 3 months of 2021 received more than 1 000 calculations per month.

Social aspects of the COVID-19 pandemic

One of the strong social impacts of the COVID-19 pandemic is on human interactions. The JRC produced the first EU-wide analysis of online media and combined this with survey data to show that [loneliness](#) has doubled with respect to the last survey in 2016.

A qualitative and quantitative study (Kids Digital Lives during Covid Times – KiDiCoTi) informed on the impacts of Covid-19 lockdown forced digital transition on children’s online safety, privacy, education and well-being in 14 countries across Europe. The work fed into the new EU Strategy on the Rights of the Child, the Council recommendation for Blended Learning and a Policy Brief for the G20 in Milan.

In addition to the COVID-19 pandemic support, JRC’s outputs contributed to the preparation and implementation of policy initiatives in the areas of health, migration, and security.

- **European Health Data Space (adoption foreseen in 2022).** The [Knowledge Centre on Cancer](#), launched in 2021, is the first flagship action delivered under Europe’s Beating Cancer Plan (CWP 2020). It maps the latest evidence on cancer, provides healthcare guidelines and quality assurance schemes. In 2021, new section of the European Cancer Information System (ECIS) was launched, with indicators on the extent and types of cancers affecting children (aged 0-19) in Europe.
- **EU Agenda to tackle organised crime (2021-2025).** The JRC, in cooperation with Europol developed the [‘decryption platform’](#) – an important tool to support the fight against serious and organised crime. The platform can help police gain access to encrypted stored evidence in the context of criminal investigations to catch criminals and protect victims of crime, in full respect of fundamental rights and without limiting or weakening encryption.
- **EU Agenda on counter-terrorism.** The JRC contributed to building the capacity of Member States to protect their public spaces with a ‘digital autumn school’ (with Directorate-General Migration and Home Affairs) and a guide to key information on the protection of public spaces.
- The JRC supports implementation of the **European Education Area** in the digital and green priority areas. Commissioner Gabriel launched the version of [SELFIE](#) for teachers, now available in all languages. An online community platform for ‘Education for climate coalition’ was launched as tool for students, teachers and education stakeholders to act collectively on innovative education solutions for environmental sustainability.



Giving Europeans a stronger role in decision making starts with rethinking the way EU policies are prepared and decided. This means strengthening EU's capacity to anticipate societal challenges, by creating policies that are informed through the best possible evidence, but which also respond to the different values and concerns of citizens and regional/territorial specificities, including demography. At the same time, growing complexities, including spreading of social media and global information technologies could pose threats to democracy.

In support to strengthening the EU's democratic foundations, as well as stepping up Europeans' engagement in the policymaking, research on how to improve evidence-informed policymaking and communication with citizens resulted in a flagship report on how values and identities can be factored in.

To help fulfilling the President's strong pledge for an Institution capable of communicating with citizens to engage them in the political debate, the JRC established a [Competence Centre on Participative and Deliberative Democracy](#), providing methodological toolboxes and protocols for citizen engagement initiatives. A practical example is the [digital platform](#) for the Conference on the Future of Europe. It developed **new approaches to communicate** JRC's science in comprehensive and innovative ways. Thanks to [JRC Digital Media Hub](#), visitors have concrete examples of how JRC research links to our daily lives in the European Union and Commission priorities through a unique online collection of best digital communication material.

Examples of the JRC's support to CWP 2021 initiatives included:

- **Transparency and democracy package.** JRC's research in the frame of the [Enlightenment 2.0](#) initiative, including on how social media changes people's political behaviour, was used as part of the evidence base for the initiative on greater transparency in paid political advertising.
- **Long-term vision for rural areas.** In 2021, the Knowledge Centre on Migration and Demography (KCMD) acted as a key partner supporting Vice President Suica in her mission to bring demographic analysis to the heart of EU policy-making and increase demographic resilience in the EU. The JRC's report titled '[Demographic Landscapes of EU Territories](#)', published in February, was referenced extensively in the EU's Long Term Vision for Rural Areas. The [Atlas of Demography](#), launched in April, is fast becoming a reference tool, connecting demographic analysis to EU policies.
- A qualitative and quantitative study (Kids Digital Lives during Covid Times – KiDiCoTi) informed on the impacts of Covid-19 lockdown forced digital transition on children's online safety, privacy, education and well-being in 14 countries across Europe. The work fed into the new **EU Strategy on the Rights of the Child**, the Council recommendation for Blended Learning and a Policy Brief for the G20 in Milan.



The JRC was instrumental in shaping several aspects of the **Better Regulation Guidelines**: the mainstreaming of the Sustainable Development Goals, and the simplification of the consultation procedure with a single ‘Call for evidence’. Several of its modelling tools and information systems are part of specific tools (such as those for territorial impact assessment (reference to territorial baseline and data bases, LUISA Territorial Modelling Platform, RHOMOLO, Urban Data Platform Plus, the de facto standard repository for quantitative knowledge and indicators at all territorial levels in Europe). More generally, JRC services (Central Intellectual Property Service, Data Advisory Service; MIDAS (CC Modelling)), data (JRC data catalogue) and expertise (Knowledge for Science Platform, Science for Policy Handbook) are listed as sources for ‘Evidence-informed policymaking’. The Megatrends Hub and the Competence Centre for Foresight are services that can be called on under the tool ‘Strategic Foresight for Impact Assessments and Evaluations’. Life-cycle assessment is acknowledged by the European Commission as a method for decision making, and the JRC-developed ‘European Platform on Life-Cycle Assessment’ and guidance tools are part of the toolbox concerned.

JRC support in monitoring the Sustainable Development Goals

Upon request of the Secretariat-General, the JRC created the [KnowSDGs](#) (Knowledge base for the Sustainable Development Goals) web platform, which organises JRC knowledge and makes available JRC tools, indicators, methods and data to support the evidence-based implementation of the SDGs and their mainstreaming in policies. The platform has been presented to Commission services and in the Council.

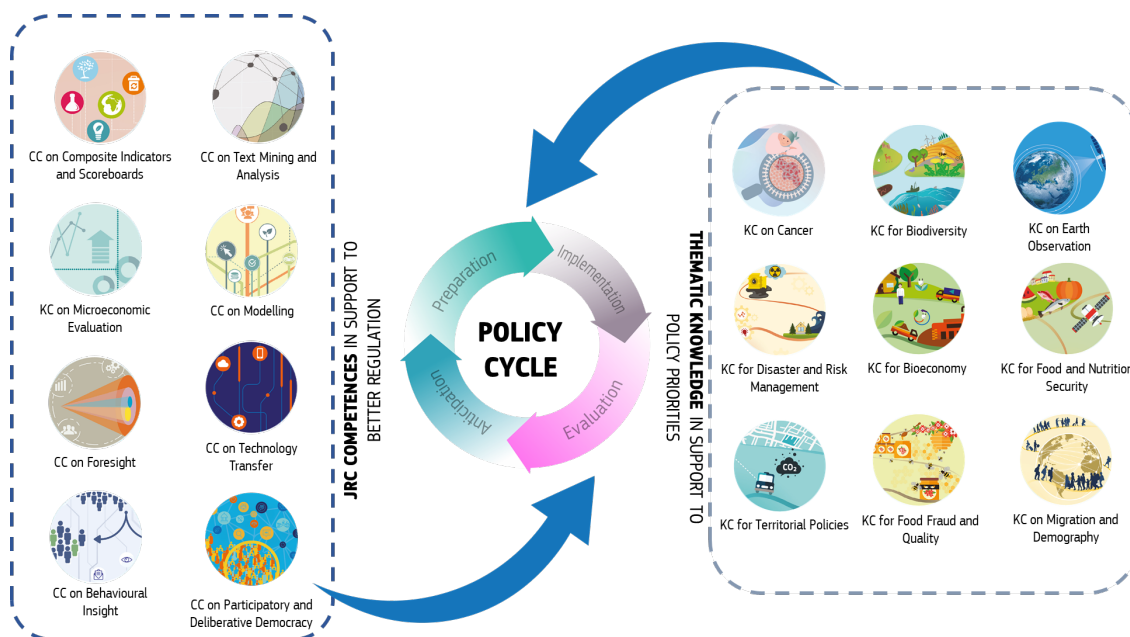


Figure 2. Overview of JRC’s role in support to the policy cycle. The various competence and knowledge centres in the JRC provide competences and thematic knowledge to the policy cycle.

The JRC is helping the Commission in its ambition to put strategic foresight at the heart of the EU policy process. In support to the Commission's 2021 Strategic Foresight Report, the JRC assessed how the EU can position itself in [open strategic autonomy](#) with respect to major global trends. This work was also used in a session during the ESPAS 2021 conference. Newsletters on 'European Territories' and 'Synergies between Civil, Defence and Space Industries' provided foresight perspectives to the College on the occasion of the adoption of the relevant policy initiatives.

specific objective 7.2: The JRC operates modern, sustainable and open research campuses

Unlike other DGs, the JRC owns and manages buildings and related infrastructure on all of its sites, except Brussels. The main infrastructure works delivered, as scheduled in 2021, were:

- **in Geel:** upgrade of the ICT physical network;
- **in Ispra:** the signature of the contract for the refurbishment of the tri-generation power plant and the preparatory work for the construction of the hosting building;
- **in Karlsruhe:** the continuation of the construction of Wing M, the preparation of the feasibility studies of the renovation of Wing A and Wing B;
- **in Seville:** the launch of the architectural design contest for a new building and the enlargement of the current premises to cover the current needs.

Due to the COVID-19 crisis, some of the planned activities have not been fully achieved (e.g. in Ispra the construction of the INS3L facility - Ispra Nuclear Safeguards, Security and Standardisation Laboratory; the finalisation of the Citizen space).

In line with the European Green Deal ambitions (Commission general objective 1), the JRC has made progress towards compliance with the energy efficiency and energy performance directive (see the performance tables in annex 2).

Specific objective 7.3: The Commission has appropriate capacity to manage risks related to intellectual property rights and be compliant with the rules and regulations

The JRC manages the intellectual property (IP) portfolio of the European Commission, including the European Emblem. It is also responsible for raising awareness of IP issues with EC staff and setting out principles and procedures for IP management. In 2021, the College adopted a Commission decision on the open source licensing and reuse of Commission software, prepared by the Central IP Service. It also prepared the adoption of a new Communication on IP management at the Commission and a staff working document, setting out the principles and procedures for dealing with IP that belongs to the EU.

The Central IP Services continued to promote the use of EURECA⁴, the corporate platform for IP management that the JRC has designed and set up. The number of Directorates-General and Services that have entered at least one IP asset into EURECA rose from 16 to 30 and more than 750 assets have now been uploaded to the EURECA platform.

The management of the portfolio of patents and trademarks required a similar number of actions as in 2020, around 800. Also the number of requests for legal advice on intellectual property issues from Commission staff remained stable. In 2021, 595 new requests were received, 66% of which concerned copyright protected assets. IP assets that raised most questions were written works (141), followed by software (122) and databases/data/datasets (82).

Awareness raising activities mainly included online training sessions, reaching 930 colleagues.

⁴ EU intellectual property Resource Catalogue

EUROPEAN COMMISSION GENERAL OBJECTIVE 1

Specific objective 1.1: The JRC progressively decommissions its disused nuclear facilities and safely disposes of its radioactive waste

Decommissioning and waste management are an integral part of the life-cycle of JRC's nuclear research facilities. JRC's Nuclear Decommissioning and Waste Management Programme fulfils the final aim of returning the land used to a 'green-field status'. (D&WMP) with a set of specific activities and projects.

Two major steps have been taken in 2021 to increase flexibility in resources and strengthen the monitoring and evaluation framework. First, JRC's activities are included in a new instrument part of the Multi-annual Financial Framework 2021-2027, the 'Nuclear Safety and Decommissioning Programme'; secondly, the establishment of a dedicated directorate starting in 2021, separate from research activities, will facilitate the implementation of the programme in line with its operational character.

Different levels of advancement/implementation characterise the situation at the four nuclear sites of the JRC.

In Ispra, most of the nuclear facilities ceased to operate before 1999 and there is a well-established organisational structure implementing the programme. The objectives include safe conservation, pre-decommissioning, decommissioning and waste management targets covering a variety of obsolete large installations. In 2021, the implementation of the programme has been delayed by the COVID-19 pandemic. However, a significant part of the cyclotron components (shut down in 2014) was relocated to a European research centre and a massive clean up of hot-cells in LCSR (Laboratorio Caldo Studi e Ricerche) was accomplished. Feasibility studies for the assessment of off-site long term storage of nuclear material have been launched. There are some delays in obtaining authorisations from national authorities for a waste treatment process and the decommissioning of the ESSOR reactor.

In Karlsruhe, the declarations for the low-level radioactive waste packages have been updated according to plan.

In Petten, an important goal for 2021 has been to establish a framework contract with the Dutch operator to remove and dispose the historical waste still present on site. The contract has been finalised and is expected to be signed with a slight delay in early 2022.

In Geel, based on the established inventory of nuclear material, transport options for removal of the material have been investigated in order to perform transports in 2022. Removal of obsolete pieces of equipment will be continued.

Specific objective 1.2: Establish links and tools for nuclear decommissioning knowledge sharing and dissemination with stakeholders in the Member States

Knowledge sharing is the second component foreseen in the Commission proposal for the nuclear D&WMP of the JRC under the new Multiannual Financial Framework 2021-2027. The main activity for 2021 has been the finalisation of the concept for the dissemination and sharing of good practices and experiences among Member States, in view of launching its operational implementation with a first version of the Knowledge Management platform ready in 2022.

2. MODERN AND EFFICIENT ADMINISTRATION AND INTERNAL CONTROL

This section explains how the JRC delivered the achievements described in the previous section. It is divided into two subsections.

The first subsection reports the control results and other relevant information that supports management's assurance on the achievement of the financial management and internal control objectives⁵. It includes the information necessary to establish that the available evidence is reliable, complete and comprehensive. It covers all activities, programmes and management modes relevant to the JRC.

The second subsection deals with the other aspects for a modern and efficient administration: human resources, digital transformation and information management and sound environmental management.

2.1. Financial management and internal control

Assurance is provided on the basis of an objective examination of evidence of the effectiveness of risk management, control and governance processes.

This examination is carried out by management, who monitors the functioning of the internal control systems on a continuous basis, and by internal and external auditors. The results are explicitly documented and reported to the Director-General. The following reports have been considered:

- management reports of sub-delegated authorising officers,
- the contribution of the Director in charge of Risk Management and Internal Control (RMIC), including the results of internal control monitoring at DG level,
- the reports of the *ex post* supervisory controls performed on a sample of the JRC's financial and procurement transactions,
- the limited conclusion of the internal auditor on the state of control, and the observations and recommendations reported by the Internal Audit Service (IAS),
- the observations and the recommendations reported by the European Court of Auditors (ECA).

These reports result from a systematic analysis of the available evidence. This approach provides sufficient guarantees as to the completeness and reliability of the information

⁵ Art 36.2 FR: a) effectiveness, efficiency and economy of operations; b) reliability of reporting; c) safeguarding of assets and information; d) prevention, detection, correction and follow-up of fraud and irregularities; and e) adequate management of risks relating to the legality and regularity of underlying transactions

reported and results in a complete coverage of the budget delegated to the Director-General of the JRC.

This section covers the control results and other relevant elements that support management's assurance. It is structured into 2.1.1 Control results, 2.1.2 Audit observations and recommendations, 2.1.3 Effectiveness of internal control systems, and resulting in 2.1.4 Conclusions on the assurance.

2.1.1. Control results

This section reports and assesses the elements identified by management which support the assurance on the achievement of the internal control objectives (ICO)⁶. The DG's assurance building and materiality criteria are outlined in AAR Annex 5. The AAR Annex 6 outlines the main risks together with the control processes to mitigate them and the indicators used to measure the performance of the relevant control systems. Annex 7 provides extensive reporting on the components of the financial management and internal control.

The JRC finances its **research activities** through the voted budget and supplementary credits as presented in the Annex 7 and Figure 2.1.1-1, detailing the JRC's financing sources for 2021. In addition, the JRC finances its research activities through the following activities:

- **competitive activities** in line with the Council Decision C126 of 26 April 1994 on the role of the JRC that requires that additional revenue be generated through competitive activities (up to 15 % of the institutional budget⁷). These may be defined as the provision by the JRC of scientific and technical services to other bodies both within the European Institutions and for third parties. The total cashed payments (revenue) actually achieved for JRC services in 2021 was €94.9M (24.63%).
- During 2021, the JRC received **cross-sub-delegated authority** to use the budgetary resources of other Directorates-General and services of the Commission. Such authorisations are linked to specific research projects or actions. The JRC has not provided cross-sub-delegations to other DGs of the European Commission. In addition, the JRC has put in place **co-delegations** type I, II and III⁵ (art. 3.2 of the Internal Rules) with other Directorates-General of the European Commission. Being a Commission service itself, the JRC is required to implement the appropriations

⁽⁶⁾ 1) Effectiveness, efficiency and economy of operations; 2) reliability of reporting; 3) safeguarding of assets and information; 4) prevention, detection, correction and follow-up of fraud and irregularities; and 5) adequate management of the risks relating to the legality and regularity of the underlying transactions, taking into account the multiannual character of programmes as well as the nature of the payments (FR Art 36.2). The 2nd and/or 3rd Internal Control Objective(s) (ICO) only when applicable, given the DG's activities.

⁷ The institutional budget means 'budget for JRC (direct actions) under the Framework Programme for Research'.

subject to the common Commission rules, responsibilities and accountability arrangements and therefore payments related to the sub-delegations received are subject to the same financial circuits and controls in place. Statements of assurance on the effective and sound use of these funds were received or provided to the Directors-General concerned. Around 58 % of the JRC's financing sources are dedicated to staff costs. It is important to note that the salary payments are authorised and carried out by the Paymaster's Office (PMO) as part of vertical co-delegations

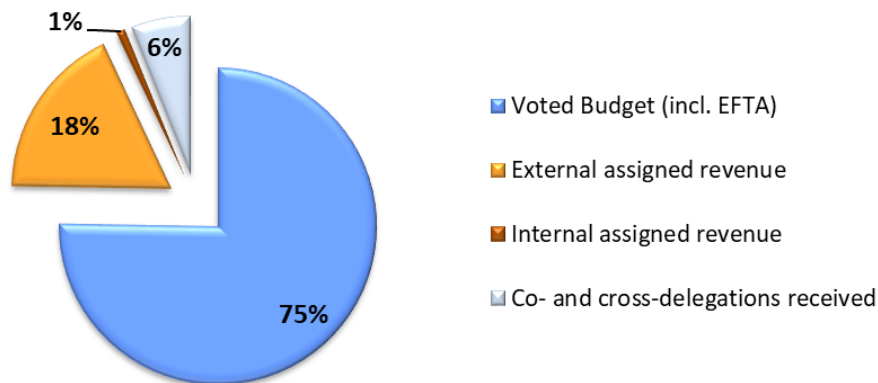


Figure 2.1.1-1. Financing sources in payment appropriations

In 2021, the JRC had EUR 30 440 000 (representing 7.1 % of its total financing sources in payments) allocated to **decommissioning activities** under the new Nuclear Safety and Decommissioning Programme in the MFF 2021-2027. The JRC's decommissioning and waste management (D&WM) programme was started in 1994. This programme aims to dismantle former, obsolete Euratom nuclear installations (historical liabilities) as well as to plan for (and execute in the future) the long-term dismantling of installations which are still in use (future liabilities). Four JRC sites are involved: Ispra, Karlsruhe, Petten and Geel.

All **JRC's operational activities**, both expenditure and revenue, are carried out under **direct management mode** which has been assessed as having a relatively low inherent risk. The risks are effectively mitigated by means of controls as detailed in Annex 6.

The JRC carries out its expenditure operations through procurement operations. The relevant control system(s) (RCS) for budget implementation covering the JRC's procurement is available in Annex 6. The type of procurement procedures carried out by the JRC during 2021 is described in Annex 7.

The additional income generated through competitive activities is used for purchasing scientific equipment and services, hiring temporary staff, and for financing part of the JRC's infrastructure used for these tasks. An RCS covering the JRC's income from contractual activities is available in Annex 6.

The financial circuit 1, used for the majority of the transactions at the JRC, provides a clear segregation between the operational and financial roles, respectively, and financial agents

are hierarchically independent from the authorising officer. Annex 7 provides detailed information on JRC's financial circuits.

The main indicators and/or conclusions on each control objective for the JRC's operational activities are summarised in the overall control results conclusion table (Table 7.4 in Annex 7). Based on these results, the JRC concludes that the control results are factual, complete and reliable. JRC's management factually concludes that the control results, presented in the following sections and related annexes are complete and reliable and thus provide reasonable assurance about the achievement of the internal control objectives.

In line with the 2018 Financial Regulation, DG JRC's assessment for the new reporting requirement is as follows:

- Cases of "confirmation of instructions" (new FR art 92.3)
- Cases of financing not linked to costs (new FR art 125.3)
- Financial Framework Partnerships >4 years (new FR art 130.4)
- Cases of flat-rates >7% for indirect costs (new FR art 181.6)
- Cases of "Derogations from the principle of non-retroactivity [of grants] pursuant to Article 193 FR" (new Financial Regulation Article 193.2)

There are no such cases for the JRC.

Overview table (amounts in EUR million)

Risk-type / Activities	Grants (e.g. actual costs based, or lump sums, or entitlements)	Procurement (e.g. minor or major values)	Shared mngt (MS's OPs, PAs, etc) + EAC (for NAs)	Cross-delegations to other DGs (other AOxDs)	Contributions and/or funds to EE (EU Agency, EA, JU)	Delegation / Contribution agreements with EE (EIB, Int-Org, etc)	Other (describe any other expenditure not covered by the previous columns)	Total Expenditure	NEI, e.g. Revenues, Assets, OBS ((in)tangible or financial assets & liabilities)
Payments		260						260	94.9
Intangible assets									9.7
Property, plant and equipment									235.5
Inventories									53.4
Totals (coverage)									
Links to AAR Annex 3	Overall total (m EUR); see Table 2 – payments made						Overall total (m EUR)	n/a	Table 4 – assets

Legend for the abbreviations: OP=Operational Programme, PA=Paying Agency, NA=National Agency, AOxDs =Authorising Officer by Cross-Delegation, EA=Executive Agency, JU=Joint Undertaking, NEI =Non-Expenditure Item(s), OBS= Off-Balance Sheet, ICO = Internal Control Objective, L&R=Legality and Regularity, SFM= Sound Financial Management, AFS= Anti-Fraud Strategy measures, SAI=Safeguarding Assets and Information, TFV=True and Fair View, RER=Residual Error Rate, CEC=Cost-effectiveness of controls, Mngt =Management

1. Effectiveness of controls

a) Legality and regularity of the transactions

The JRC is using internal control processes to ensure the adequate management of the risks relating to the legality and regularity of the underlying transactions it is responsible for, taking into account the multiannual character of programmes and the nature of the payments concerned.

The control objective is to ensure that the JRC has reasonable assurance that the total amount of any financial operation authorised during the reporting year, which would not be in conformity with the applicable contractual or regulatory provisions, does not exceed 2 % of the authorised payments or revenue concerned. To reach this conclusion, the JRC reviewed the results of the key controls in place (as described below). For each item, materiality is assessed in accordance with Annex 5.

The main risks together with the control processes aimed to mitigate them and the indicators used to measure the performance of the control systems, are outlined in Annex 6.

- Procurement in direct management mode

Financial management and control of 'Procurement in direct management mode' (Annex 6 RCS No 1) is grouped around three main stages: 1) procurement (from the assessment of needs to the selection of the suppliers - award decision), 2) financial transactions (from establishing the financial commitment to payment and contract monitoring) and 3) supervisory measures (including *ex post* controls and management checks). In addition to the controls performed during the financial circuits, the JRC has made use of five main supervisory measures (including associated indicators) to assess the legality and regularity of its work, namely exception reporting, the Public Procurement Advisory Group (PPAG), accounting controls, *ex post* supervisory controls and the assurance statements from sub-delegated authorising officers.

Exception reporting

In total 103 exceptions and non-compliance events were recorded in the central register in 2021, 30 of which were classified as exceptions. The exceptions were linked to deviations from standard financial and procurement procedures which cannot be directly associated with a material loss. To put the exception reporting into context, the JRC dealt in 2021 with 22 543 transactions and 16 461 of them were payments. The exceptions and non-compliance events amount to 0.46% of the total number of transactions, meeting the target set in the Management Plan (less than 1% of transactions subject to exception). For further details refer to Annex 7.

The Public Procurement Advisory Group (PPAG)

The PPAG is a consultative body providing *ex ante* controls on the correct application of tendering procedures. The PPAG must be consulted on procurement files for high value

contracts (\geq EUR 500 000) and for most contracts procedure negotiated that are based on the Financial Regulation 2018 (hereafter FR), Annex 1, point 11⁸.

In 2021, 137 files were submitted to the PPAG; 79 files were screened by the PPAG, representing a value of approximately EUR 162 million⁹. Two procedures received an unfavourable opinion and an additional one was withdrawn before the formal opinion and the procedure cancelled. This demonstrates that the PPAG is an effective *ex ante* instrument for avoiding procedural errors and ensuring the respect of the procurement principles, thus preventing complaints by tenderers in those procedures.

Accounting controls

The main aim of accounting controls is to assure the quality and reliability of the accounts and underlying transactions through methodical checks on the accounting records (data) and timely communication and correction of the errors. The controls carried out in 2021 have followed the Annual Accounting Quality Plan, sent to DG BUDG along with the Accounting Risk analysis. The controls performed are additional to the ex-ante controls performed by Financial Verifying Agents and Sub Delegated Authorising Officers on each transaction, in compliance with the Financial Regulation.

The controls on the General Ledger (GL) account of invoices were performed periodically according to the Accounting Quality plan. A vast majority of invoices is subject to one of the following controls: operational/administrative coherence, Legal Entity default GL, greatest amounts checked, asset risk-based analysis, random sample. The errors detected are either corrected in ABAC or by means of an accounting adjustment at the year end.

In February 2022, after the Accounting closure and the related accounting adjustment, a random stratified sample was extracted representing 40% of the amount of invoices and internal documents received. The errors detected on the sample —not corrected either in ABAC or by means of an accounting adjustment— have been duly extrapolated leading to an estimated accounting error rate of 0,67%, thus confirming the reliability of the accounts. The only type of error detected is related to a wrong GL account within the administrative expense category. No other type of error has been detected (e.g. asset expensed; GL account belonging to another category (operational vs. administrative)).

It is important to highlight that all the errors mentioned above are of an accounting reclassification error and do not lead to irregular payments.

⁸ Contracts between EUR 60,001 and EUR 499,999 and contracts deriving from some negotiated procedures (repetition of similar services/works, additional deliveries, for some cases based on FR, Annex 1, point 12 and cases based on FR, Annex 1, point 14(2)) are also submitted to the PPAG for advice on the basis of a sampling system using a risk-based method.

⁹ 58 were not selected by the sampling system (representing a value of roughly EUR6,8 million)

DG BUDG's validation of JRC local system, started in December 2020, led to 5 recommendations. The JRC has prepared an action plan which is expected to be completed by June 2022.

Ex post supervisory controls

As part of its control strategy, to determine whether there had been material losses (e.g. due to errors) and whether financial rules and procedures were respected, the JRC periodically carries out checks on the accuracy and regularity of its *ex ante* controls, via *ex post* controls on a sample of financial transactions.

Whilst a variety of formal errors were noted, neither systematic errors nor weaknesses in the JRC's control system were observed and no procurement issues were identified. More information on the *ex post* controls is presented in Annex 7.

Since the **detected error rate is 0 %**, the JRC estimated its **average error rate (AER)** by taking a most conservative and prudent approach to be at **0.5 %**.

Table 2.1.1.1 -1. Results of 2021 ex post controls.

Sampled transactions	Sample size: number	Sample size: value (EUR)	% of total value of transactions	Detected error rate (% of total)
Payments	112	31 616 341	12.2 %	0 %
Procurement	75	11 514 938	4.1 %	0 %

Management reports from sub-delegated authorising officers

The authorising officer by delegation (AOD) has the overall responsibility for the budget execution. In these duties, s(he) is assisted by competent authorising officers by subdelegation (AOSD).

In accordance with paragraph 4.8 of the Charter of tasks and responsibilities of authorising officers by subdelegation, all 134 assured the JRC Director-General that during the reporting period they effectively managed the risks associated with their activities; did not raise any matter of importance which might compromise the sound management of appropriations or prevent the attainment of objectives; filed the appropriate exceptions/non-compliance events linked to not respecting standard procedures, rules and regulations, where necessary; no request for written confirmation has been formulated; concluded that no incidents which could have damaged the reputation of the organisation occurred.

- Revenue operations through competitive activities

All income and expenses for competitive activities are subject to *ex ante* controls and to the JRC financial circuits. Financial management and control of the JRC's revenue operations through competitive activities (Annex 6 RCS No 2) is grouped around three phases: 1) contract proposal (assessment and valuation of proposal), 2) contract preparation (from

signature of contract to forecast of revenue) and 3) contract implementation (including financial management of the contract).

Revenue operations are also subject to the same legality and regularity indicators which are applied to payment and procurement transactions. None of these controls unveiled errors with impact on compliance of the revenue transactions.

During 2021 as a result of the JRC's financial circuits, 16.5 % of the forecast of revenue transactions and 8.7 % of recovery orders (i.e. invoices) have been subject to correction. These errors did not materialise due to the effectiveness of the *ex ante* controls carried out. It can be concluded that the controls carried out on the contractual activities contribute positively to the legality and regularity of the JRC's revenue operations.

- **Conclusion on the assessment as regards legality and regularity**

JRC's portfolio consists of segments with a relatively low error rate. This is, respectively, thanks to the inherent risk profile of the JRC's operational activities, both expenditure and revenue, carried out under direct management mode and the performance of the related control systems.

Over 2021, the COVID-19 crisis continued to overshadow all other contributing factors towards meeting the targets. However, most of the negative effects continue to be mitigated by the adoption of flexible working techniques and increasing digitalisation of finance and procurement processes .

In conclusion, based on the analysis of the results of the above-mentioned control sources, no significant weakness has been unveiled which could have a material impact as regards the legality and regularity of the procurement and revenue operations. Therefore, it is possible to conclude that the internal controls systems implemented by the JRC provide sufficient assurance to adequately manage the risks relating to the legality and regularity of the underlying transactions.

The **estimated overall risk at payment** for 2021 expenditure amounts to EUR 1.3 million, representing 0.5 % of the DG's total relevant expenditure for 2021, despite the fact that the detected error rate was 0 %. This is the AOD's best, conservative estimation of the amount of relevant expenditure during the year not in conformity with the contractual and regulatory provisions applicable at the time the payment was made. This expenditure will subsequently be subject to *ex post* controls and a proportion of the underlying errors will be detected and corrected in subsequent years. The conservatively **estimated future corrections** for 2021 expenditure amount to 0.05%. This is the amount of errors that the DG conservatively estimates will be identified and corrected by controls planned to be carried out in subsequent years. The difference between those two amounts results in the **estimated overall risk at closure**, EUR 1.17 million, representing **0.45 %** of the DG's total relevant expenditure for 2021. All the above mentioned indicators have been stable over the last 5 years. For an overview at Commission level, the DGs' estimated overall risk at payment, estimated future corrections and risk at closure are consolidated in the AMPR.

Details of the JRC's estimated overall amount at risk at closure and estimated future corrections can be found in Annex 9.

Table X. Estimated risk at payment and at closure (amounts in EUR million). The full detailed version of the table is provided in Annex 9.

JRC	Relevant expenditure	Estimated risk (error rate %) at payment		Estimated future corrections and deductions		Estimated risk (error rate %) at closure	
(1)	(2)	(3)		(4)		(5)	
	m EUR	m EUR	%	m EUR	%	m EUR	%
RCS1 - Procurement	260.3	1.3	0.5	0.13	0.05	1.17	0.45
EDF – European Development Fund	0.62	0	0.5	0	0.05	0	0.45
DG total	260.3 m EUR	1.3 m EUR	0.5%	0 m EUR	0.05%	1.17 m EUR	0.45%

b) Fraud prevention, detection and correction

The JRC has developed and implemented its own anti-fraud strategy since 2013 on the basis of the methodology provided by OLAF. It is updated every three years or when necessary. It was last updated in December 2020. Its implementation is being monitored and reported to the management through annual reports. All necessary actions except one have been implemented. The implementation of the missing action is in progress and its completion is expected for 2022. Further information can be found in Annex 7.

The JRC also contributed to the Commission anti-fraud strategy. OLAF's did not issue any financial recommendations in 2021.

The results achieved during the year, thanks to the anti-fraud measures in place, can be summarised as follows: (1) targeted awareness-raising actions for newcomers, financial officers and managers; (2) reinforced JRC 'Scientific integrity framework' and 'research ethics board' as well as guidelines and tools for responsible conduct of research in the scientific project management cycle; (3) contribution to OLAF subgroups; (4) assessment of fraud risk in the JRC process-based risk management exercise; (5) timely corrective measures concerning a potential fraud case. More details on the results achieved in 2021 could be found in Annex 7.

On the basis of the available information, the JRC has reasonable assurance that the anti-fraud measures in place are effective.

c) Other control objectives: safeguarding of assets and information, reliability of reporting (if applicable)

The JRC is spread over 6 sites in 5 different countries with more than 40,000 fixed assets with a net book value of about 237 EUR million. The fixed assets are ranging from simple

office furniture to complex scientific and laboratory equipment, including nuclear facilities and buildings.

The following **measures** are put in place to counterbalance the main risks potentially affecting the JRC sites, i.e. accidents, unauthorised access, intentional acts against safety and security including against the protection of sensitive documents. Regular safety inspections are being carried out on JRC sites regarding laboratory facilities and hazardous materials, by the JRC itself, external consultants and visits by national authorities. Organisational measures are implemented to ensure that access to JRC sites and critical assets are controlled. Personal security clearances are issued to those staff required to deal with classified information. Certification of laboratories and institutes to internationally recognised quality management standards help to offset risks and ensure compliance with norms and regulations. The JRC strives to perform physical localisation checks of the inventoried items at least on a three-year basis, which is respected in general. The JRC owns stock with a value of EUR 58,3 million (as reported in the JRC's Balance Sheet in Annex 3, Table 4).

The JRC is the business domain owner for the **eProcurement Programme** which is part of the Commission's actions to put in place a single data interchange area for submitting, storing and processing data in grant and procurement procedures. The progress during 2021 is detailed in Annex 7 and section 2.2.4.

Based on an assessment of the controls in place on the safeguarding of the JRC's assets, management considers that the control results are complete and reliable and that the control objective is achieved. Refer to Annex 7 for further information on safeguarding of assets.

2. Efficiency of controls

Based on an assessment of the most relevant key indicators and control results, the JRC has assessed the efficiency of the control system and reached a positive conclusion.

The JRC executed more than 99% of its payments on time during the course of 2021 which puts it above the EC average score. This represented a significant increase of 3% over the previous year's figure, 99% compared to 96%.

Timely Payments	JRC Score	EC Score
<p>0% 25% 50% 75% 100%</p> <p>EC (98%) 99%</p>	99%	98%

The contractual cashing indicator (as a percentage of the institutional budget) has increased from 20.83 % of last year to 25.03 %, which remains significantly higher than

the target of 15 %. The JRC has reached a positive conclusion on the efficiency of contractual cashing indicator.

3. Economy of controls

a) Procurement in direct management mode

The JRC has produced an estimation of the costs of control of the three main stages related to 'procurement in direct management mode'. The criteria for the calculation and the indicators used are shown in Annex 6 RCS No 1.

A quantitative estimation of the volume of errors prevented and detected is not available, therefore it is not possible to quantify the related benefits, other than the EUR 900 recovered as a result of these controls (Annex 3, Table 8). The main benefit is that the controls performed ensure that errors are detected and corrected and that potential litigations or contestations from tenderers are kept to a minimum.

In consequence, as it is not possible to determine the cost-effectiveness of controls by comparing costs with benefits, it is necessary to consider the efficiency indicators retained.

The overall costs of control related to 'procurement in direct management mode and of financial transactions' in 2021 was EUR 9 411 726, which represent 3.62 % of the total value of payments executed by the JRC during the year.

Adding *ex post* controls and those not directly attributable to the control strategies brings total cost of controls for 2021 to 3.83 % of total associated payments. For further detail please see Annex 7, Table Y.

b) Revenue operations through competitive activities

The overall cost of control related to 'revenue operations from competitive activities' in 2021 was EUR 300 408 , which represents 0.20 % of total competitive project value for the year (EUR 147 212 527.12). The overall cost of control indicator has increased slightly from last year's value of 0.19 % . For further detail please see Annex 7, Table Y .

JRC considers that the necessity of the controls performed on revenue operations process is undeniable, as they are a regulatory requirement. Furthermore, the JRC considers that these controls are necessary to mitigate the risks outlined in Annex 6 (RCS No 2). The costs of controls incurred for the three main phases of the JRC's revenue operations through contractual activities have been estimated. The criteria for the calculation and the indicators used are shown in in Annex 6 RCS No 2. As mentioned in the previous section, it is not possible to quantify all of the costs and benefits of controls. Estimating the intangible benefits is particularly problematic.

The benefits of control in non-financial terms cover: accepting only project proposals which have an acceptable level of risk, which are in line with the JRC work programme and which meet customer expectations, deterrents, efficiency gains, limiting the risk of litigation,

respect of contractual provisions, system improvements and, as mentioned above, compliance with regulatory and research programme provisions.

4. Conclusion on the cost-effectiveness of controls

Based on the most relevant key indicators and control results, the JRC has assessed the effectiveness, efficiency and economy of its control system and reached a positive conclusion on the cost-effectiveness of the controls for which it is responsible.

The error rates and the cost of controls remain below the materiality threshold and the timeliness of payments is significantly higher than the target. JRC's control environment and control strategy remained stable during the reporting year compared to previous years, the conclusion on the cost-effectiveness of controls is deemed to be unchanged. Those cost of control actions affected by the COVID-19 crisis have been updated to digital and remote working with no identified negative effects to the control environment.

2.1.2. Audit observations and recommendations

This section sets out the observations, opinions and conclusions reported by auditors, including the limited conclusion of the Internal Auditor on the state of internal control. Summaries of the management measures taken in response to the audit recommendations are also included, together with an assessment of the likely material impact of the findings on the achievement of the internal control objectives, and therefore on management's assurance.

1. Audit work carried out by the EC Internal Audit Service during the reporting year

During the reporting period, the Internal Audit Service (IAS) finalised three audits:

- 1) on the JRC's support to EU policy and knowledge management (one very important recommendation),
- 2) on accounting of assets (one very important recommendation) and
- 3) a multi-DG audit on Commission's policy for data, information and knowledge management¹⁰.

The IAS also carried out a multi Directorate-General audit on data protection, to which the JRC was associated. For this audit, no recommendations were formulated for the JRC. Additionally, the IAS initiated two engagements, both ongoing: a multi-DG audit on performance framework for research¹¹ to which the JRC is an associated service and a consultancy engagement on the construction and completion of wing M in Karlsruhe. The latter is upon the initiative of the auditee as potential weakness/risks might be present and the JRC has already mitigating actions in place. Finally, the JRC responded to IAS

¹⁰ Lead audited services : Secretariat-General

¹¹ Lead audited services : Directorate-General for Research and Innovation

requests for input in the context of the audit on the management and monitoring of compliance with the Commission's IT security framework in the Directorate-General for Informatics and of the audit on European Commission actions against food fraud at Directorate-General for Agriculture and Rural Development.

No critical recommendations were issued by the IAS. As for the **very important** recommendations:

- There are no long overdue¹² pending recommendations
- One is under implementation stemming from the audits on JRC's support to EU policy and knowledge management. Its implementation is on track. More details are provided later in this section.
- As a result of IAS follow-up audits: three were closed, one under the decommissioning and waste management programme implementation audit (on human resources management), one under the audit on IT governance and project management practices and procedures (on IT project management practices) and one under the audit on recruitment of temporary scientific staff (on recruitment strategy); two were reopened, one under the scientific project management audit (on monitoring of scientific projects' and work packages' execution), one under the recruitment of temporary scientific staff audit (on monitoring the recruitment process). The latter was downgraded. Both have been implemented by the JRC.
- Four have been declared completed and the JRC is awaiting the IAS decision: the above mentioned one on scientific project management, two on site management and infrastructure support services (about respectively governance & organisation and human resources management) and one on accounting of assets (about process documentation, guidance & methodology).

The Internal Auditor, in its limited conclusion, stated that the JRC internal control systems in place for the audited processes are effective, except for the observation giving rise to **one very important recommendation** on definition of priorities, identification of needs and assessment of the requests under the audit on JRC's support to policy and knowledge management. The audit found that there is no overall coordination at Commission level to identify the Commission-wide priorities that should drive the JRC's policy support work. The timing, the lack of both formal consultations at the right level and of a requests tracking system may also result in sub-optimal policy support and an incorrect reflection of priorities in the JRC work programme.

The JRC responds to this recommendation through multiple processes for setting up its priorities and identifying where the JRC's science and knowledge can most add value in supporting EU policies:

- In cooperation with the SG, the JRC will organise five cluster meetings in early 2022 covering all six Commission priorities, with over 30 policy DGs to kick-start a new strategic engagement with policy DGs in preparation of the work programme and to

¹² More than 6 months

have a strategic approach to the JRC's priority setting. Enhanced consultations will continue during the whole process.

- The interservice consultation of the JRC work programme 2023-2024 will be extended, as it was the case already for the previous work programme.
- A mechanism to get a structured and systematic overview of requests is under preparation.

Implementation is on track (scheduled for 31/03/2022) and stands at 70% completion. Due to the 'reset, re-imagine, re-energise' exercise, the DG currently undertakes and which will affect the work programme process, there might be a delay of a couple of months for fully implementing this recommendation.

Refer to Annex 7 for further details.

2. ECA audits

The JRC has no critical or very important findings from the European Court of Auditors (ECA) audits, and no overdue actions. More information on the follow-up of recommendations is presented in Annex 7.

In general, during ECA audits, the JRC is an associated DG together with other Commission services, as it disposes of a wide range of expertise in many of the scientific areas underpinning the policy (measures) being audited, monitors the implementation of many policy measures and provides technical support to the stakeholders concerned. The full list of reports published in 2021 and ongoing audits/reviews to which JRC was associated is included in Annex 7.

ECA found no errors in the sampled JRC transactions as part of the **Statement of Assurance** for 2020. Therefore, The ECA's annual report¹³ 2020 contained no reference to the JRC in respect of the error rate. In 2021, the ECA reviewed two JRC transactions. The reviews were closed with no findings.

2.1.3. Assessment of the effectiveness of internal control systems

The Commission has adopted an Internal Control Framework based on international good practice, to ensure the achievement of its policy and management objectives. Compliance with the internal control framework is a compulsory requirement.

The JRC uses the organisational structure and the internal control systems suited to achieving its policy and internal control objectives, and has due regard to the risks associated with the environment in which it operates.

The JRC continued to work with the integration of the Commission's internal control framework as well as its own integrated management system (IMS) based on the international quality standard ISO 9001. Such integration allows the JRC to combine

¹³ 2021/C 430/07

requirements from different sources including legal requirements, in one management approach.

The JRC has assessed its internal control system during the reporting year and has concluded that it is effective and that the overall system is present and functioning as intended, but some improvements are needed. One moderate deficiency found is linked to procurement supervision and contract execution. In addition, the health and safety process data collection and analysis, should be improved and harmonised at corporate level. The effectiveness of the BCP and the IT Disaster Recovery Plans also need to be also improved and further tested.

The improvements and/or remedial measures implemented or envisaged are already documented in action plans and are being followed-up.

2.1.4. Conclusions on the assurance

This section reviews the assessment of the elements already reported above (in Sections 2.1.1, 2.1.2 and 2.1.3), and the sub-conclusions already reached. It draws an overall conclusion to support the declaration of assurance and whether it should be qualified with reservations.

The assessment of the elements and the conclusions reported in these sections result from a systematic analysis of the evidence available. The following elements provide sufficient guarantees as to the completeness and reliability of the information reported and results in a comprehensive coverage of the budget delegated to the Director-General of the JRC:

- the JRC's internal controls systems provide sufficient assurance to adequately manage the risks relating to the legality and regularity of the underlying transactions,
- the JRC has implemented appropriate *ex ante* and *ex post* controls, to the extent that they remain cost-effective,
- the JRC has put in place suitable control measures to limit risks of error and prevent, detect and correct fraud and irregularities,
- recommendations issued by the JRC's auditing bodies do not raise any assurance implications and are being implemented as part of the ongoing continuous efforts in terms of further improvements,
- the JRC's internal control systems provide sufficient assurance with regards to the achievement of the other internal control objectives,
- resources were used for the intended purposes, sound financial management was applied, and the non-omission of significant information was ensured.

In conclusion, based on the elements reported above, management has reasonable assurance that, overall, suitable controls are in place and working as intended; risks are being appropriately monitored and mitigated; and necessary improvements and reinforcements are being implemented. The Director General, in his capacity as Authorising Officer by Delegation has signed the Declaration of Assurance.

2.1.5. Declaration of Assurance

I, the undersigned,

Director-General of the Joint Research Centre

In my capacity as authorising officer by delegation

Declare that the information contained in this report gives a true and fair view¹⁴.

State that I have reasonable assurance that the resources assigned to the activities described in this report have been used for their intended purpose and in accordance with the principles of sound financial management, and that the control procedures put in place give the necessary guarantees concerning the legality and regularity of the underlying transactions.

This reasonable assurance is based on my own judgement and on the information at my disposal, such as the results of the self-assessment, ex-post controls, the work of the Internal Audit Service [and the lessons learnt from the reports of the Court of Auditors - delete this if not applicable] for years prior to the year of this declaration.

Confirm that I am not aware of anything not reported here which could harm the interests of the institution.

Brussels, 01 April 2022

(Signed)

Stephen Quest

¹⁴ True and fair in this context means a reliable, complete and correct view on the state of affairs in the DG/Executive Agency.

2.2. Modern and efficient administration – other aspects

2.2.1. Human resource management

In support of its business operations, the JRC aims to recruit, train, motivate and retain highly qualified staff so that the effective and efficient operation of the DG as well as the promotion of equal opportunities and diversity can be ensured. In line with the ongoing JRC 'Reset, re-Imagine, re-energise' transformation process, several groups are working on an initial set of 20 actions, including several HR strategic targets, especially relating to staff engagement, culture and trust, flexible working, talent management, and agile working. As this work will provide essential input to the local JRC HR strategy, the initial concept papers will need to await updating until the outcome of these working groups is more mature.

Following the unpredictable circumstances caused by the **COVID-19 pandemic**, during 2021 hybrid working conditions continued. It was necessary to continue to give top priority to the support to staff and managers on swift and transparent communication, ergonomic assistance, psychosocial well-being, management of remote teams and on-line training. The Director-General and Senior Management at all sites set up new formats to organise frequent all-staff on-line gatherings. The JRC HRBC team, in close collaboration with HR.AMC8 and the Ispra Medical Service, issued a comprehensive 'well-being package' to all management staff at the beginning of 2021. This package includes dedicated workshops for managers and supervisors on preventing psycho-social risks, visits of the psychosocial support teams to unit meetings, comprehensive guidelines, including 'cue cards' for managers to support staff well-being. Some first 'return to work' tools were designed, including a package for light 'Let's Reconnect' team events. Services on all sites provided intensive support to provide staff with optimal ergonomic tools and equipment to facilitate teleworking.

Despite the challenging context, the JRC continued to develop its **talent management and career development programmes** covering strategically important competence areas throughout 2021. A first customised talent management programme for aspiring talent (targeting in the first session female staff with identified management potential) was rolled out with very positive feedback from the participants. A call for a second cycle was launched in autumn, to be broadened in 2022. With this programme specific attention is given to enable JRC to reach the targets of first female appointments to middle management positions following the Commission Decision on the targets for first female management appointments. JRC currently has 19 female middle managers (29%), a slight increase in comparison to the baseline of 1st of December 2019 when it had 14 (22%).

Leadership development opportunities for the JRC managers continue to be promoted, helping them engage with staff by supporting their development and be sensitive to their well-being. Based on the 180° feedback survey from their staff done in 2020, all managers and the senior management team participated in customised coaching and feedback sessions.

To enhance the positive trend in staff engagement and underpin the high levels of staff well-being, dedicated pulse surveys were launched. The staff engagement index (baseline 68% in the 2018 staff survey) slightly dropped to 66% at the beginning of 2021, but increased again to the previous level in the second half of the year. Following the new staff satisfaction survey which was launched at the end of 2021, the staff engagement index increased to 71% (compared to 72% Commission average).

In October 2021, EPSO launched a **competition** for AST and AST-SC technicians, including laboratory and building technicians targeted for the JRC sites.

Following the decision of senior management to aim for alignment of the **JRC Scientific Trainees programme** with the corporate Commission's 'Blue Book Traineeship' scheme, a first pilot was launched in 2021. For the first time an unique call for interest, covering all expected needs for 2022, was launched. 540 applications were received and screened, resulting in an approved database of candidates for traineeship. The final selection of trainees will be finalised early 2022 by the scientific units and around 70 should start in March 2022.

The **staff mobility package** was updated and converted to a Career Development Package. This comprehensive tool provides staff with a very practical overview of all programmes, initiatives, tools and support services available for their career development. As part of the Commission's Career Week, a full day was dedicated to promote the attractiveness of the JRC working place.

With the **Collaborative Doctoral Partnership, Exploratory Research Programme** and the **Centre for Advanced Studies**, the JRC is complementing its competence base with experts and motivated young scientists with expertise in specific fields relevant for upcoming policy challenges. With project topics that are scientifically novel and cutting edge while at the same time addressing important policy questions, the three programmes attracted a high number of applicants, allowing to choose the best skill and competence sets for the research. Furthermore, the motivation among these scientists is high to work also with the JRC curators, designers, and artists to engage in transdisciplinary thinking to address complex issues.

As a human-centric organisation, the JRC is also keen on developing a dynamic and active JRC Alumni network to stay connected to its staff after they leave the organisation. The 2021 annual workshop clearly highlighted the benefit of online and virtual events for the alumni network.

Reports on outputs defined in the Management Plan 2021 and on objectives and indicators set up in the Strategic Plan 2020-2024 are available in Annex 10.

2.2.2. Digital transformation and information management

The JRC has a long-standing expertise in providing digital solutions in support to European policies, whether through platforms for data collection, for monitoring indicators and progress; devising platforms for collaboration and information sharing; giving advice and

support for effective knowledge management and evidence-based policies. The success and rising demand for JRC's digital solutions would not be possible without making sure that the valuable assets shared via these tools are protected and the information provided is trusted.

The JRC is the business domain owner for the **eProcurement** Programme. During 2021 the eProcurement Programme Charter was endorsed by the Information and Communication Technology Board in its June meeting.

The eProcurement Programme aims to simplify, harmonise and digitise the end-to-end procurement process for the Commission departments and other EU institutions, bodies or agencies. The objective is to create unique integrated interfaces for both suppliers and internal users when they perform their procurement activities, hiding the complexity of the system which integrates with many other corporate systems, such as SUMMA, Compass Corporate and SEDIA Funding & Tenders Portal. Significant efficiency gains are expected in the management of procurement in the Commission including a reduction of local procurement systems replaced by the corporate solution.

The development and roll-out of the different modules of the corporate solution has been ongoing throughout 2021 with good progress having been made. In particular, ePreparation (the JRC-led business process) is now being used by all Commission services and, following agreement of a technical solution by DG DIGIT, is being rolled out to other EU institutions, regulatory agencies and bodies.

A future-proof, end-to-end **ICT architecture** is currently being implemented that defines capabilities aligned to business needs and supports the JRC 2030 strategy. This architecture addresses the multiple challenging needs for a cost effective, fit for purpose, secure and well-coordinated ICT environment. The following concrete results were achieved in 2021:

- It was agreed that DIGIT would deploy **Welcome in the JRC** and the preparatory activities related to the transfer of the physical network are on-going.
- Furthermore a project was launched to set up a **single scientific domain** in which scientific ICT services will be grouped which are now present in different separate JRC domains. A major consolidation exercise was launched in order to centralise and consolidate the scientific ICT infrastructure. An application development platform was put in production for the scientists and a central service catalogue adapted to the needs of the JRC will be available early 2022.
- Regarding **ICT security** significant progress was made with the ICT security plans and different actions were launched such as the installation of a white listing proxy or the facilitation of vulnerability testing.
- Skype for Business was installed in the whole of JRC.
- The virtual desktop facility, as an alternative to powerful workstations and for isolated development environments, was delayed and will now be available by mid 2022.

Given the central role of data in research activities and the high amount of data that the JRC produces and manages, the JRC opted for adopting a **data policy**¹⁵ (adopted in 2015, revised in 2019) that laid out the necessary basis to grant transparency obligations and legal commitments, and provided a framework for better data management. The JRC also set up a **data governance** (2018). Based on these first three-years experience and taking into account the EC data governance and policies that came into operation in the meanwhile, the JRC data policy and the JRC data governance structure¹⁶ have been revised. The JRC has addressed some of the principles from the corporate data policies by identifying the data owner and data steward functions within the organisation, by maintaining an internal data catalogue and by working on a data repository for its data assets. It will continue this work over the next years to fulfil the objective.

In the framework of the **Information Management Steering Board (IMSB) work programme** 2020-2021, the JRC established a Data Advisory service that provides support to EC staff on data-related matters. All the milestones, deliverables and targets set for 2021 have been achieved by the deadlines fixed. Furthermore, the JRC is leading the creation of a corporate data catalogue, where EC key data assets will be recorded and discoverable. The interim data catalogue solution agreed upon by the IMSB in February 2021 was launched in May 2021 and is fully operational. Trainings for all DGs and Executive Agencies have been organised throughout 2021.

JRC is collaborating with CERN and other research institutions and libraries on a CERN knowledge transfer project called Invenio Research Data Management (InvenioRDM). The aim of this project is to develop an **institutional research data repository** that allows researchers to manage and store/archive outputs of their research activities. Due to delays of the project in 2020 and 2021, the target of releasing the repository in Q4 of 2021 could not be met. A pilot is expected to be released in 2022.

The **One-Stop Shop for Collaboration** (OSS), led by JRC in partnership with DG HR, DIGIT and SG and JRC. continued providing advice and support to Commission staff and services on all aspects of Knowledge sharing and collaboration, thus playing a key role in the Commission's evolution into a better knowledge organisation. In 2021, besides providing specific consultancy to several DGs (inter alia BUDG, ECHO, TAXUD, ENV and OLAF), the OSS supported major corporate initiatives such as the rollout of M365 in the Commission, the Flexible new ways of Working (linked to the moves of DGs into open spaces and post-covid 19 hybrid ways of working), and the Corporate Country Knowledge initiative. On the latter, the JRC was leading a corporate action (2020-2021 IMSB WP) on analysing solutions for managing country knowledge. A Commission-wide survey conducted in 2021 helped identifying colleagues' critical success factors, key pain points, constraints and other important country knowledge experiences. The survey confirmed that the role of country

¹⁵ <https://ec.europa.eu/jrc/data-policy>

¹⁶ The JRC Data Governance is the decision-making structure over data management matters in the JRC. It currently comprises a Data Committee, a Data Contact Points network, a Chief Data Officer, and a Secretariat

knowledge is crucial to many policy-making processes and resulted in a Survey Data Report and a proposal for a way forward, outlining quick wins and longer term actions. Welcomed by the IMSB in September, this proposal led to a new mandate for JRC in the IMSB Rolling Action Plan 2022-2024 to collaborate further with interested Services to develop the actions in practice.

Finally but not less importantly, the JRC contributed to the Commission's effort to promote excellence and professionalisation in policymaking, leading the development of two '**competence frameworks**' capturing the collective set of transversal skills, attitudes and knowledge needed respectively for researchers and policymakers working at the science-policy interface. The draft frameworks were published online in summer 2021, gathering comments and feedback from practitioners and stakeholders, which will serve for further consolidation in view of their definitive release in 2022.

In the area of **data protection**, the planned data protection awareness campaign targeting the JRC middle management has been successfully conducted reaching almost 100% of JRC middle managers. Also, in 2021 a review of 2/3 of all JRC records was launched, which further contributed to raising the awareness about the issue of data protection, both among middle managers and among the staff responsible for the reviewed records.

The **EU Academy** is a modern e-learning platform developed to support the training activities organised by the Commission and other EU Institutions to support the implementation of EU policy and to foster the digital transformation of public administrations. By end of 2021, the platform already features more than 80 courses. 18 policy DGs committed to use the platform in 2022, when the EU Academy will be officially launched. In 2021, the platform received approximately 70,000 visitors from 169 countries.

2.2.3. Sound environmental management

In line with the implementation of the JRC site development plans and the corporate EC EMAS¹⁷ strategy, the JRC will further pursue its multi-annual programmes, seeking to reduce energy consumption through efficiency measures, such as by substituting fossil energy sources with renewable ones, and promoting sustainable transport.

In particular, the JRC has:

- continued to deliver inputs on the 'Greening the Commission' Communication and on other initiatives, led by DG HR,
- explored new awareness raising methods, such as the JRC Living Lab Gamification pilot project, and communicated about it,

¹⁷ **EU Eco-Management and Audit Scheme (EMAS)** is a premium management instrument developed by the European Commission for companies and other organisations to evaluate, report, and improve their environmental performance. EMAS is formalised in [Regulation \(EC\) No 1221/2009 \('EMAS III'\)](#)

- actively supported actions launched by the Office for Infrastructure and Logistics in Brussels (OIB) such as the implementation of the waste sorting station system as well as the reduction of comfort hours in Brussels,
- continued its programmed actions on thermal insulation of buildings as part of general upgrades (e.g., insulation of buildings 69c and 58c) at the Ispra site,
- increased the photovoltaic energy production in Ispra,
- assessed high energy loads in Ispra laboratories,
- continued substituting parts of the Ispra service car fleet with e-cars,
- set-up a monitoring and reporting system for data on Green Public Procurement.

2021 data cannot be considered as 'normal' due to the COVID-19 pandemic, associated with lockdown in Member States and rearrangements of working conditions. In fact, only a fraction of staff worked at the workplace. This had of course an impact on the achievement of goals (targets). For example, while on one side, reductions in consumptions of e.g. paper or water might have been higher than expected, specific measures like air conditioning systems, no longer recirculating air to help containing the spread of viruses, resulted in higher than expected reductions in energy consumption and CO₂ emissions.

2.2.4. Example(s) of initiatives to improve economy and efficiency of financial and non-financial activities

The JRC has during the course of 2021 continued to introduction simplification initiatives to improve economy and efficiency of financial activities.

As the business domain owner for the eProcurement Programme the JRC has been able to stimulate an accelerated drive throughout the Commission services, other institutions, agencies and bodies towards paperless procurement.

This will lead to a huge reduction in the number of human errors and automation of processes such as automatic ex-ante publicity, a legal requirement under the Financial Regulations for low and medium value procedures. This notwithstanding the many other major benefits associated with working digitally (e.g. 'green working', minimising of delays, remote working etc.)

The year also saw the benefit of the JRC owned solution for ePreparation – PPMT- further capitalised upon by:

- Increased integration with other eProcurement solutions: eNotices, TED eTendering, eSubmission, MAP, the Funding and Tenders portal and the eProcurement contract management solution
- Improvement of the support for negotiated low and middle value procedures
- Making the PPMT solution for very low value purchases available to all Commission services.
- PPMT being rolled-out to other EU Institutions and bodies.

Overall, satisfactory progress was made towards completion of the eProcurement Work Programme for 2021, in particular with respect to the preparation and submission solutions.

In parallel, as Lead Editor of the RUF Working Group on simplification of finance and procurement transactions the JRC made a proposal concerning the reduction in regularisation for low-risk transactions – that was then expanded upon and applied by DG BUDG at Commission level

This recommendation will save many hundreds of hours of unnecessary administrative work with very little if any increased risk. It is part of the JRC's ongoing efforts to apply a consistent risk-based approach to its finance and procurement activities.

We have also continued to professionalise the operational community involved in procurement activities. Dedicated meetings for operational colleagues continued throughout the year via the Operational Procurement Network (OPN). A new intranet page procurement for operational staff was also created during the course of the year to provide technical staff and Operational Initiating Agents (OIAs) with an easy access to the right information at the right time when using JRC financial resources.

Remote training is now provided on finance and procurement on a regular basis. The training is designed to be very practical and user friendly tailored to the needs of the JRC scientific and technical communities.

The Network and associated intranet site and training were very successful and correctly recognised and received a JRC Award for Excellence in Administration.