

ERA Monitoring 2023

18-months-review of the implementation of the
ERA Policy Agenda ('EU-level Report')

Independent
Expert
Report

ERA Monitoring 2023 - 18-months-review of the implementation of the ERA Policy Agenda ('EU-level Report')

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ERA Monitoring 2023

18-months-review of the implementation of the ERA Policy Agenda ('EU-level Report')

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EXECUTIVE SUMMARY

This **EU-level report is the first 18-months review of the progress towards the priority areas for joint action in the European Research Area (ERA)**, as laid down in the Pact for Research and Innovation in Europe, **and of the implementation of the ERA Policy Agenda**. It is part of the new ERA Monitoring Mechanism (EMM), which also includes the ERA Policy Platform with the ERA Dashboard and Scoreboard as well as country-level reports. In the context of the renewal of the ERA since 2021, the monitoring will allow for evidence-informed policymaking. The present report is the first one of its kind and will serve **as a baseline when assessing future progress at EU-level**.

Purpose of the report

As a baseline study, the report presents the starting point of the revamped ERA at EU-level by

- **Mapping trends towards achieving the ERA priorities over a longer period** as defined in the Pact for Research and Innovation at EU-level through a limited number of measurable indicators.
- **Outlining the implementation state of play of each ERA action** (during the first 18 months of the ERA Policy Agenda), set out in the ERA Policy Agenda 2022-2024, which translates each priority area of the Pact into tangible activities, between January 2022 to July 2023.
- **Providing insights related to Member States and associated countries**, where relevant, to exemplify the findings from the EU-level.

Key insights

- The **ERA Policy Agenda 2022-24 is in full implementation mode**. Several outcomes of ERA Actions have already been achieved, and some ERA Actions have even been completed.
- The **ERA Forum** - with its sub-groups and other implementation instruments - has been **proven to be a successful co-creation body**, bringing together EU Member States, countries associated to Horizon Europe, R&I stakeholders and the European Commission, all joining their efforts to turn the new vision for the European Research Area into reality.
- The mapping of the trends through the Scoreboard and Dashboard indicators show that there are **disparities in progress between the different ERA priorities**:
 - The majority of sub-priorities within the first ERA priority '*Deepening an Internal Market for Truly Functional Knowledge*' show limited progress or stagnation.
 - As regards the second ERA priority '*Taking up Together the Challenges Posed by the Twin Green and Digital Transition, and Increasing Society's Participation in the ERA*', government budget allocations for R&D in the EU show a positive trend.
 - While there is limited data available to measure progress towards ERA priority 3 '*Amplifying Access to Research and Innovation Excellence across the*

Union' and 4 'Advancing Concerted Research and Innovation Investments and Reforms', the findings of this report show a positive trend regarding the total R&D expenditure as a percentage of GDP in Widening Countries.

Notable achievements of the ERA Policy Agenda 2022-24

- ✓ Within the newly created, bottom-up **Coalition for Advancing Research Assessment** (CoARA) European research funders and research performers work on new approaches for research assessment (ERA Action 3);
- ✓ With the aim of promoting attractive research careers, talent circulation and mobility of researchers, the Commission tabled a Council Recommendation on a '**European framework to attract and retain research, innovation and entrepreneurial talents in Europe**' in 2023 (ERA Action 4);
- ✓ A core achievement within ERA Action 6 is the publication of a comprehensive **strategy for tackling foreign interference in EU Higher Education Institutions (HEIs) and Research Performing Organisations (RPOs)**, focusing on values, governance, partnerships, and cybersecurity;
- ✓ **Council Recommendations outlining guiding principles for knowledge valorisation** have been adopted in December 2022, with the aim of improving the management of intellectual property in knowledge transfer activities. An awareness campaign and a mutual learning exercise followed (ERA Action 7);
- ✓ With 11 participating countries, the **Plastic Pirates initiative (within ERA Action 14) was successfully rolled out**, involving more than 5000 young citizens as active participants in campaigning against plastic pollution;
- ✓ Bringing together research and innovation policy actors and managing authorities, **RIMA assesses the innovation divide, increase excellence and capitalise on existing widening instruments** (ERA Action 16);
- ✓ To reinforce evidence-informed policy-making in the ERA, **a new ERA monitoring and evaluation framework has been set up** (ERA Action 19).

While the first ERA Policy Agenda is continuously being implemented, preparatory discussions for the next ERA Policy Agenda (2025-2027) have already started with the ERA Forum and with ERAC in order to identify the actions to be addressed from 2025-2027.

INTRODUCTION

This is the **first 18-months-review of the implementation of the ERA Policy Agenda¹ ('EU-level Report')** in the context of the revamped European Research Area (ERA). It is part of the new ERA Monitoring Mechanism (EMM) and outlines the state of play of the implementation of the ERA Policy Agenda.

As the first report, it serves as a baseline for future monitoring exercises ('baseline report'). It provides an overview of quantitative information identifying the trends towards achieving the priorities set out in the Pact for Research and Innovation in Europe², and presents an overview of qualitative information outlining the state of play of each ERA action defined in the ERA Policy Agenda 2022-2024.

Table 1 presents the ERA Priorities and Actions which are covered in this report.

ERA PRIORITIES	ERA ACTIONS ³
1. Deepening a Truly Functioning Internal Market for Knowledge	1. Enable Open Science, including through the European Open Science Cloud (EOSC)
	2. Propose an EU copyright and data legislative framework for research
	3. Reform the Assessment System for research, researchers and institutions
	4. Promote attractive research careers, talent circulation and mobility
	5. Promote gender equality and foster inclusiveness
	6. Protect academic freedom in Europe
	7. Upgrade EU guidance for a better knowledge valorisation
	8. Strengthen research infrastructures
	9. Promote international cooperation
2. Taking up Together the Challenges Posed by the Twin Green and Digital Transition, and Increasing Society's Participation in the ERA	10. Make EU research and innovation missions and partnerships key contributors to the ERA
	11. An ERA for green transformation
	12. Accelerate the green/digital transition of Europe's key industrial ecosystems
	13. Empower Higher Education Institutions
3. Amplifying Access to Research and Innovation Excellence across the Union	14. Bring Science closer to citizens
	16. Improve EU-wide access to excellence
	17. Enhance public research institutions' strategic capacity

¹ https://commission.europa.eu/system/files/2021-11/ec_rtd_era-policy-agenda-2021.pdf

² <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32021H2122>

³ Due to various reasons, ERA Actions 15, 18 and 20 of the original ERA Policy Agenda 2022-2024 are currently not implemented and are, therefore, not included in this table.

ERA PRIORITIES	ERA ACTIONS ³
4. Advancing Concerted Research and Innovation Investments and Reforms	19. Establish an ERA monitoring system

Table 1: Overview of ERA priorities and actions

The main sections on “**Key Findings**” are structured around the four ERA Priorities and provide *a)* a quantitative assessment of progress towards achieving the ERA priorities based on the indicators applied in the ERA Scoreboard and the ERA Dashboard⁴; and *b)* a qualitative assessment of key initiatives, policies and achievements of each ERA Action in order to establish the current situation related to the implementation of ERA Actions. Each key findings chapter is preceded by a summary box.

The “**Conclusions**” outline the major learnings from the first EU-level Report.

The report is accompanied by **Annexes**, including a methodological note (Annex 1) with an overview of the methodology and limitations, an overview of ERA Scoreboard and Dashboard indicators (Annex 2), additional graphs with ERA Scoreboard and Dashboard indicators (Annex 3), and the OECD STIP Survey categorization (Annex 4⁵).

⁴ For a full analysis of these indicators please refer to the ERA Scoreboard and the ERA Dashboard reports that will be published as part of the ERA Monitoring Mechanism.

⁵ Annex 4 also provides guidance on how to read and interpret the OECD STIP Survey data.

KEY FINDINGS ERA PRIORITY 1: DEEPENING A TRULY FUNCTIONING INTERNAL MARKET FOR KNOWLEDGE

SUMMARY BOX: KEY FINDINGS ERA PRIORITY 1

The quantitative analysis shows mixed progress across the different sub-priorities. Promising trends have been observed within the sub-priorities related to knowledge valorisation and global engagement. A core trend lies in the significant performance variation across Member States, particularly for the indicator related to research infrastructure. Finally, mixed results have been identified for indicators related to researchers' careers and mobility and research assessment and reward systems, with limited data available to establish trends in the sub-priority for open science.

Key findings by action

The **ERA Action 1**, focusing on Open Science, is based on the work that precedes the ERA Policy Agenda but gained momentum since 2021. An EOSC Co-programmed European Partnership has been developed under the Horizon Europe Framework Programme with an expected allocation of around €1 billion in the period 2021-2023 (around EUR 200 million contributed by the EU through Horizon Europe and the remaining through the additional in-kind activities of the members of the EOSC Association). A number of Member States developed new national strategies for Open Science policy in order to mainstream Open Science practices and FAIR principles across national research funding programmes.

Progress has been made in developing the EOSC monitoring system, including the launch in November 2022 of the EOSC Observatory as a policy intelligence tool collecting data on the implementation of EOSC policies and practices from more than 30 countries supporting policy making of open science across Europe. At national level most initiatives were targeted at the research community, in line with outcomes envisioned by the ERA Policy Agenda, and directions outlined in the European strategy for data. The following activities are planned to achieve expected outcomes of the Action 1: a prototype EOSC platform (Q4 2023), the deployment in 2024 by the European Commission of the [Managed Services for the European Open Science Cloud platform](#) for expanding the federation of EOSC infrastructures and related value-added services for scientists and annual reports on the uptake of Open Science practices by the Member States and Associated Countries (2022, 2023, 2024).

ERA Action 2 aims to propose an EU copyright and data legislative and regulatory framework fit for research. Such a framework should enable, among other, access to and reuse of publicly funded R&I results and access to and reuse of publications and data for research purposes. However, barriers and challenges to achieve these objectives currently exist. To address this situation, the expected outcomes or Action 2 are mainly twofold: i) to analyse EU copyright and data legislation to identify barriers and challenges to access and reuse of publications and data in EU and potential impacts on research; ii) to propose legislative and non-legislative measures to address them.

Four independent expert studies were published in 2022 providing insights on the situation and recommendations for potential legislative and non-legislative measures which were discussed with Member States representatives, legal experts and stakeholders during workshops organised in 2022 and 2023. A further study has been launched in 2023 to gather data and evidence on the concrete effects of the EU copyright legislation on research and research stakeholders and to present the rights and obligations that researchers, research organisations, research infrastructures and research service providers have under EU data and digital legislation.

ERA Action 3 focuses on the reforms of the assessment system. To implement this action the Coalition for Advancing Research Assessment (CoARA) was established in 2022. Since its inception, it brought together a broad range of stakeholders with more than 350 organisations joining the coalition. The members include research funders, universities, research centres, associations, national authorities, accreditation bodies and others, joining efforts to reform research assessment.

The policy initiatives and debates in this field recognise the need to revise and diversify the assessment of researchers' qualifications and research, with a focus on teaching, knowledge dissemination, striking a balance between these aspects and the pursuit of research excellence.

ERA Action 4 is dealing with the promotion of attractive research careers, talent circulation and mobility. This action had seen quick progress at the EU-level, with the adoption of the Commission Proposal for a Council Recommendation on a 'European framework to attract and retain research, innovation and entrepreneurial talents in Europe' in 2023.⁶ The key challenge for the implementation of this action is to raise awareness at national level on the need to support attractive research careers, talent circulation and mobility across EU Member States with particular emphasis on the countries that have evidenced lower performance compared to the EU average.

The **ERA Action 5** focuses on promoting gender equality and fostering inclusiveness. The requirement for Horizon Europe applicants to have Gender Equality Plans (GEP) is a key advancement at the EU level and has had impact in the number of institutions adopting GEPs especially in countries without a national GEP requirement. Joint attention has also been put on addressing gender-based violence in the R&I system, which has strong negative consequences on research careers in the EU, and more joint work is under way.

A core challenge lies in the lack of intersectional data across the R&I ecosystem and ensuring the implementation of inclusive GEPs across the R&I institutions across Europe. In addition, the concept of the gender dimension in R&I content continues to be misunderstood and its relevance to research and innovation excellence continues to be underestimated.⁷

ERA Action 6 aims at safeguarding academic freedom across the EU through an action plan and clear guidelines on tackling R&I foreign interference. A core achievement in this field is the publication of a comprehensive strategy for tackling foreign interference in EU Higher Education Institutions (HEIs) and Research Performing Organisations (RPOs), focusing on values, governance, partnerships, and cybersecurity. It was published by the European Commission, in collaboration with the Member States and R&I stakeholders. Moreover, an EP Forum for Academic Freedom has been established to ensure academic freedom and protect scholars and researchers within the EU.

ERA Action 7 addresses various needs of the R&I landscapes in the context of the management of intellectual property in knowledge transfer activities. One core achievement of this action is the adoption of a Council Recommendation on guiding principles for knowledge valorisation.

As part of this initiative, two crucial codes of practice have been established: one for the management of intellectual assets and another one for standardization. They provide comprehensive guidance and detailed support in the domains of intellectual asset management and standardization. Furthermore, an awareness-raising campaign has been initiated to engage various stakeholders and Member States. The EU Knowledge Valorisation Platform is now in operation, facilitating the exchange of best practices.

ERA Action 8 focuses on strengthening sustainability, accessibility and resilience of research infrastructures. In this context, it can rely on initiatives such as ESFRI which has established a European Roadmap for research infrastructure, outlining long-term development plans. This Roadmap is updated on a regular basis.

The Commission adopted its 3rd report on the application of the ERIC Regulation, which will pave the way for strengthening the ERICs in the ERA. ESFRI is preparing the next roadmap with an in-depth analysis of the research infrastructure landscape, aiming at a more consolidated gap analysis based on user needs. Following surveys, recommendation for broader access and main orientations for the revision of the European Charter for Access to Research Infrastructures are being discussed with stakeholders. ESFRI completed its first batch of monitoring ESFRI Landmarks. Cooperation between infrastructures and engagement of stakeholders has been reinforced with the ESFRI Stakeholder Forum, the ESFRI-EOSC task force and the support to the ERIC Forum.

ERA Action 9 aims to promote international cooperation. In 2021 the 'Team Europe' approach was introduced in the European Commission Communication on the Global Approach to Research and Innovation. The aim is to combine resources from the EU, Member States, and the European financial

⁶ <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=COM%3A2023%3A0436%3AFIN>

⁷ https://genderaction.eu/wp-content/uploads/2023/06/101058093_GENDERACTIONplus_D4.1_Benchmarking-and-assessment-report-on-guidelines-for-sex-gender-analysis.pdf

institutions, in particular the European Investment Bank and the European Bank for Reconstruction and Development. By May 2023, 33 Country Team Europe Initiatives (TEIs) and 9 Regional Team Europe Initiatives have been launched.⁸ Regional TEIs have been launched in Latin America and the Caribbean, Middle East, Asia and Pacific, Neighbourhood and Sub-Saharan Africa.

PROGRESS TOWARDS THE OBJECTIVES FOR ERA PRIORITY 1

ERA Priority Area 1 focuses on strengthening the functioning of the internal market. It aims at achieving this through a targeted set of actions focused on the open sharing of knowledge, building robust research infrastructure, increasing gender equality and equal opportunities, making researchers' careers more attractive and sustainable, knowledge valorisation, scientific leadership and academic freedom, and global engagement and international cooperation.

Overall, Priority Area 1 aims to advance progress, excellence and inclusivity in the ERA through collaboration and a strong research framework. The ERA Scoreboard and ERA Dashboard include 19 indicators (see Annex 2) covering this Priority Area.

The analysis of data shows that there has been mixed progress across the sub-priorities for Priority Area 1. While there are promising trends within the sub-priorities related to **knowledge valorisation** and **global engagement**, there has been limited improvement across indicators related to **gender equality, equal opportunities for all and inclusiveness**, as well as a decreasing performance in indicators related to **scientific leadership**.

Breaking down indicators by Member State, there is a clear variation in performance across the EU, particularly for the indicator related to **research infrastructure**. There are mixed results for indicators related to **researchers' careers and mobility and research assessment and reward systems** and limited data available to establish trends in the sub-priority for **open science**.

Sub-priority 1.1: Open science

The first sub-priority of the Pact for R&I aims to support and reward a culture of open science across the Union, such as through open access to publications. As shown in Figure 1, data from this indicator shows an average of 40% of DOI's published in 2019 in the EU were open access. The countries with the highest proportion of open access DOI publications included the Netherlands, Hungary and Sweden, each with over 50% published as open access.

⁸ <https://capacity4dev.europa.eu/resources/team-europe-tracker/dashboard/thematic>

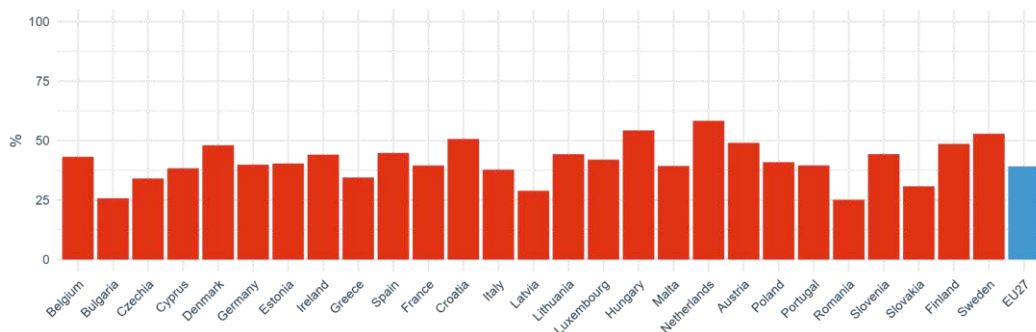


Figure 1. Open access scientific publications with digital object identifier (DOI) as % of total scientific publications with DOI - Data for 2019

Sub-priority 1.2: Research infrastructures

The participation of Member States and Associated Countries in **European Research Infrastructures** (RI) is a key indicator for Priority Area 1 and relates to the second sub-priority of the Pact for R&I.⁹ Figure 2 illustrates the number of European Research Infrastructures that EU Member States were involved in during 2021.

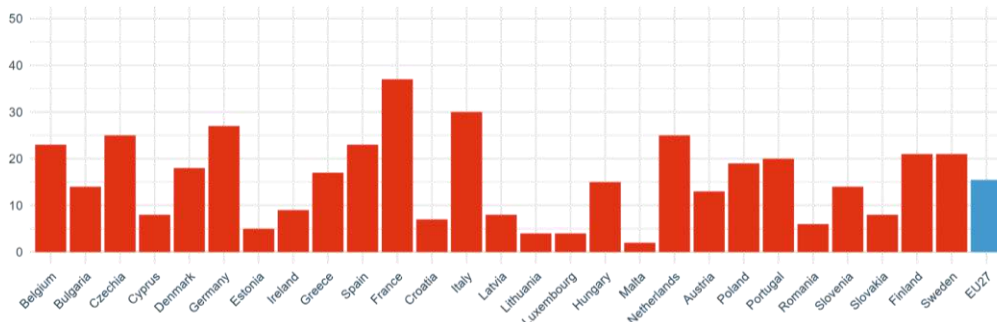


Figure 2. Number of European research infrastructures in which a Member State participated in in 2021.

Sub-priority 1.3: Gender equality, equal opportunities for all and inclusiveness

The next five indicators illustrate the developments over the past decade in relation to the third sub-priority of the Pact for R&I. In general, the relevant indicators show stagnation (e.g., women doctorates in the STEM field), or limited positive changes. Therefore, results

⁹ Please note that the EU-level Report only covers EU Member States, for figures on Associated Countries, please refer to the ERA Scoreboard and the ERA Dashboard.

indicate that despite the efforts and institutional achievements made since the 2012 ERA Communication, gender equality continues to be a key challenge in R&I.

An important dimension in achieving gender equality in R&I is women’s participation within the research and innovation ecosystem and, particularly at top positions, in which women tend to be underrepresented. This dimension is being illustrated by the indicator on the **Share of women in grade A positions in HEIs** from the ERA Scoreboard. As shown in Figure 43 presented in Annex 3, there was limited improvement over time and across the EU. The share of women in grade A positions in HEIs increased by 5 percentage points from 2010 to 2018, reaching a value of 27.2% in 2018.

Another key dimension to understanding progress towards gender equality relies on R&I outputs. The indicator **Proportion of papers with mixed gender authorship** provides valuable insights on this dimension. Figure 44 in Annex 3 shows a clear positive trend across all EU countries as well as at the EU level. There is an increase of 10 percentage points between 2010 and 2020, reaching a value of 62.7% of papers with mixed gender authorship in 2021 at the EU level.

The indicator **Proportion of women in authorships of the top 10% most cited publications** shows a clear stagnation at around 30%, with less than a 5 percentage points increase between 2010 and 2018 (from 28% to 32.6%). Therefore, the combined results could indicate that women have increased their presence and impact in producing R&I outputs and outcomes at the EU level, but remaining barriers impede their fair representation in high-end research teams and their publications.

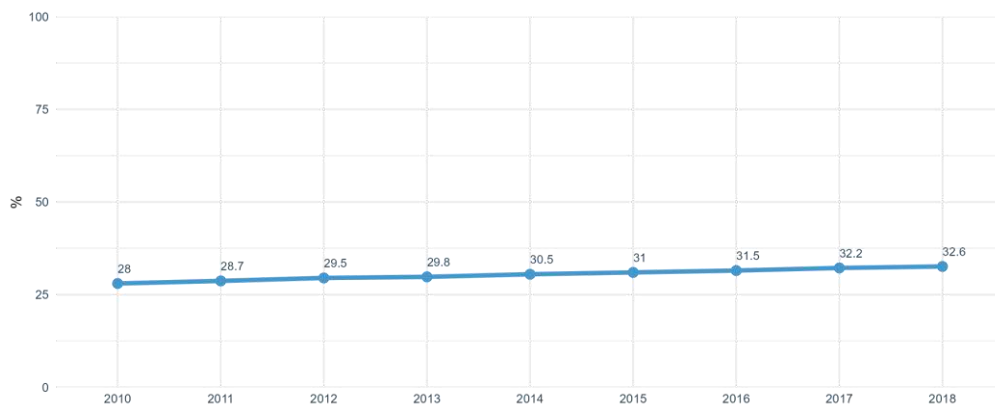


Figure 3. Proportion of women in authorships of the top 10% most cited publications, 2000-2018

The indicator presented in the Annex 3 breaks the data down by Member State. There was significant variation between Member States regarding the proportion of women in authorships of the top 10% of most cited publications, with countries largely ranging between 20%-40%. Member States with the most consistently high rates of women as authors in the top cited publications include Bulgaria, Latvia, Portugal and Romania.

The following indicator focuses on gender equality in the digital field. The **Women in Digital (WiD) index** assesses Member State performance in relation to internet use, internet user skills, specialist skills and employment, from 0 to 100 (being 100 the maximum score). Figure 4 shows that the EU average in 2022 stood at almost 55, evidencing the

underrepresentation of women in the digital economy and the need for further efforts. Nonetheless, 15 EU countries¹⁰ score above the EU average, with a highest value of 80.42 in Finland.

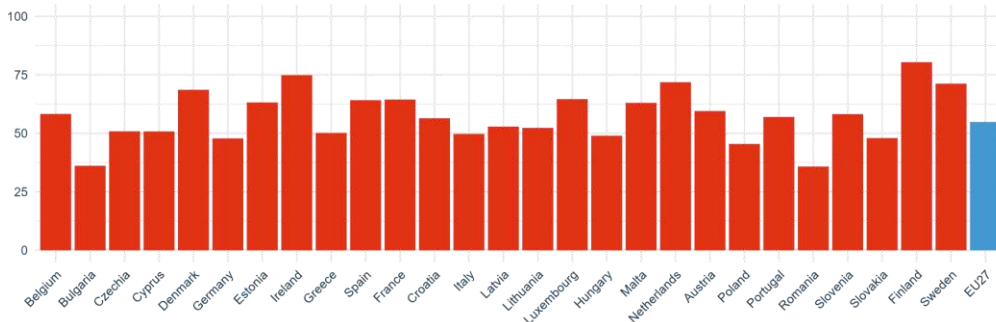


Figure 4. Women in Digital Index.

The indicator **Proportion of women among doctoral graduates in STEM fields** illustrates women’s participation in STEM higher education, a field characterised by a prominent underrepresentation of women. Figure 46, in Annex 3, illustrates a clear stagnation, at the EU level, around the value of 37% for women’s share of doctoral graduates in the field of STEM. This indicates not only a long path towards parity in this field, but also the lack of progress over the past decade. Therefore, horizontal segregation across R&I fields remains as a core challenge in the new ERA.

Sub-priority 1.4: Researchers’ careers and mobility and research assessment and reward systems

The fourth sub-priority of the Pact for R&I aims to make research careers more attractive, improve the balance of researcher mobility across the EU, further develop research assessment systems, and improve reward systems. Relevant ERA Scoreboard and ERA Dashboard indicators show that there is some progress towards the promotion of attractive research careers, talent circulation and mobility, but that this progress remains rather limited at EU-level. At Member State level, some countries show positive progress on the relevant indicators over the past few years.

The indicator related to the **share of foreign doctorate students as a percentage of all doctorate students** offers insights on mobility both at EU and Member State level. The figure below shows that progress on the share of foreign doctorate students from 2014 to 2020 is overall stagnating at EU-level (Figure 5), increasing from 16.3% (2015) to 23.3% (2020). This corresponds to an increase of 7 percentage points over 5 years. The most

¹⁰ Finland, Ireland, the Netherlands, Sweden, Denmark, Luxembourg, France, Spain, Estonia, Malta, Austria, Belgium, Slovenia, Portugal, Croatia in decreasing order.

significant increase occurred between 2019 and 2020 (+4.3 percentage points), but overall progress remains limited.

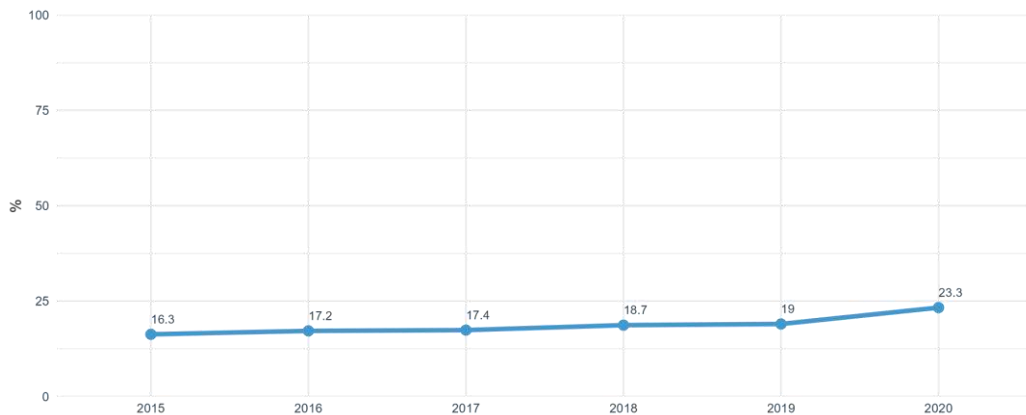


Figure 5. Share of foreign doctorate students as a percentage of all doctorate students.

The Netherlands has the highest share of foreign doctoral students across the period 2013-2020, a share that remains stable over time (between 37.8% in 2013, and 49.8% in 2020). The second highest share is observed in the France (37.9% in 2020). The complete breakdown by Member State for this indicator is presented in Figure 47 in Annex 3.

According to the indicator **'New doctorate graduates (25-34) per 1,000 inhabitants'** from 2015 to 2021 (Figure 6), there were approximately 0.85 doctoral graduates per 1,000 inhabitants. The number remained relatively stable during this period, with a small decrease observed in 2020, before stabilizing around 0.8 again in 2021.

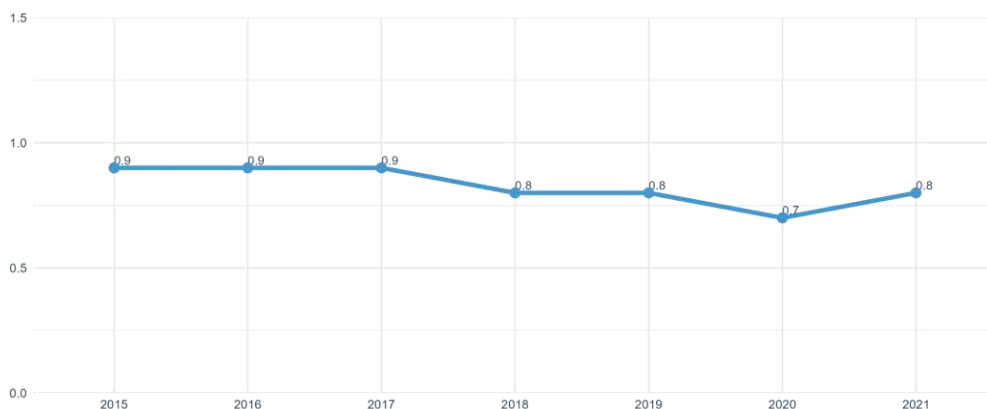


Figure 6. New doctorate graduates per 1,000 inhabitants aged 25-34.

Exploring the Member State trends from 2013 to 2021, as shown in Figure 48 in Annex 3, a slight downward trend can be observed in countries where the share of new doctorate graduates has been above the average. For example, in Denmark, Finland, and Sweden,

the share of new doctoral graduates has slightly decreased, converging with the EU average. On the other hand, in other countries such as Cyprus, Latvia, Lithuania, Poland, Bulgaria, and Malta, the share of doctoral graduates aged 25 to 34 was below the EU average, with no noteworthy upward or downward trends. There was an increase in the share of doctoral graduates in Luxembourg, while Slovenia reported a spike in graduates between 2015 and 2017.

Job-to-job mobility is understood as the movement from an employee to another, from one year to the next.¹¹ Figure 7 on **job-to-job mobility of Human Resources in Science and Technology (HRST)** illustrates the trend from 2010 to 2020.

While progress appeared to be stagnating between 2010 and 2014, some progress can be observed from 2015 to 2019 (2019 corresponding to the peak year, with 7.6%). This rise is illustrative of uninterrupted yet relatively slow progress over the course of 6 years. The data also indicates a sudden drop of 0.8 percentage points from 2019 to 2020, which may be correlated to the consequences of the COVID-19 pandemic. Overall, job-to-job mobility in HRST remains below 10%.

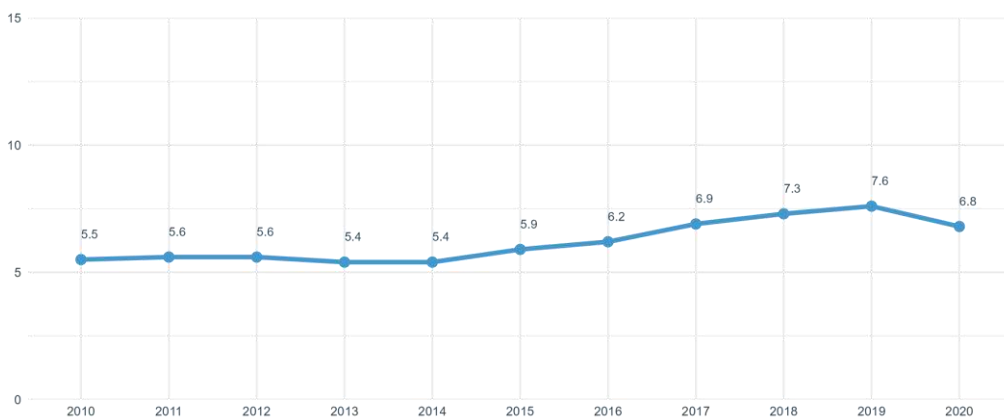


Figure 7. Job-to-job mobility of Human Resources in Science & Technology.

Looking at some Member State trends from 2010 to 2020, as shown in Figure 49 presented in Annex 3, some countries perform well as regards job-to-job mobility of HRST in the ERA and are constantly above the EU-27 trend. This is the case in Denmark, Germany, Estonia, Cyprus, Lithuania, Luxembourg, the Netherlands and Finland.

Sub-priority 1.5: Knowledge valorisation

The Pact for R&I sub-priority related to knowledge valorisation aims to strengthen the cooperation and interlinkages between R&I actors across the EU. The ERA Scoreboard and Dashboard include five indicators that provide an indication of progress related to this sub-priority.

¹¹ OECD (2011), 'Mobility at the workplace', in OECD Science, Technology and Industry Scoreboard 2011, OECD Publishing, Paris.

The **share of public-private co-publications per million population** has generally increased across all Member States over the last 10 years, as shown in Figure presented in Annex 3. The most noticeable increases are in Denmark, Belgium, Cyprus and Luxembourg. As for the EU-27 average, there is a steady increase over the last decade with the share of public-private co-publications increases by around 48 points from 2010 to 2020.

In terms of the **number of PCT patents applications divided by GDP in million euro** there is no substantial change from 2005 until 2015¹². Figure 8 shows that the number of PCT patents has been consistent over the years for the EU.

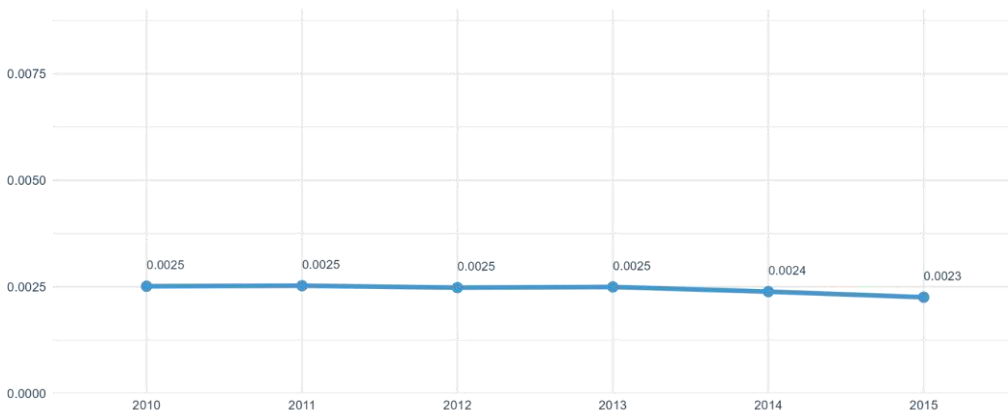


Figure 8. Number of PCT patent applications divided by GDP in million euros.

Belgium, Denmark, Germany, France, the Netherlands, Slovenia, Finland and Sweden all have a higher share than the EU average, as shown in Figure 51 in Annex 3.

The indicator on the **share of innovating firms collaborating with HEIs/public research organisations (PROs) out of all innovative firms** shows a small increase in this type of collaboration over the last decade. Figure 9 shows that the EU level of the share of innovating firms collaborating with HEIs/ PROs slightly increased by 2.4 percentage points between 2010 and 2020.

¹² Data only available up to 2015 (retrieved from: <https://stats.oecd.org/index.aspx?queryid=67138>).

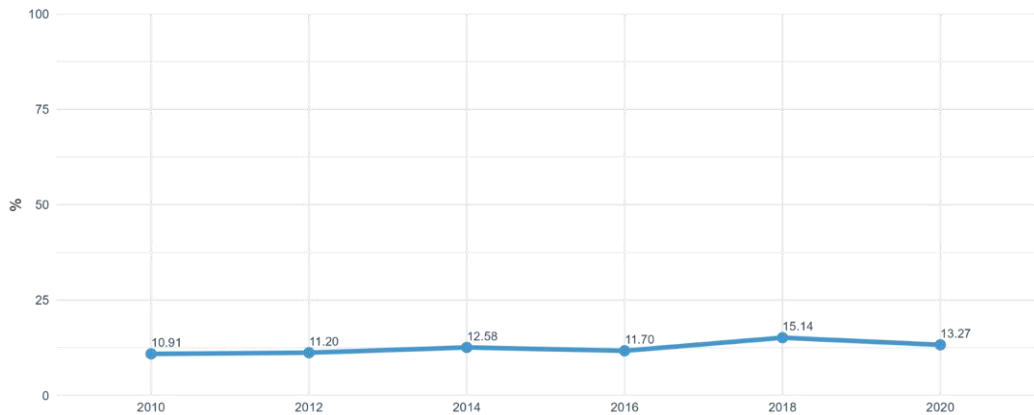


Figure 9. Share of innovating firms collaborating with HEI/PRO out of all innovative firms.

Belgium, Denmark, Germany, Austria, Finland, Slovenia, and Sweden have a higher proportion of innovative firms collaborating with HEI and PRO out of all innovative firms. Data for each Member State is presented in Figure 2 in Annex 3.

With respect to business researchers, the indicator **business enterprise researchers as a percentage of the national total** shows a steady trend since 2010. This share is consistently around 50% as shown in Figure 10.

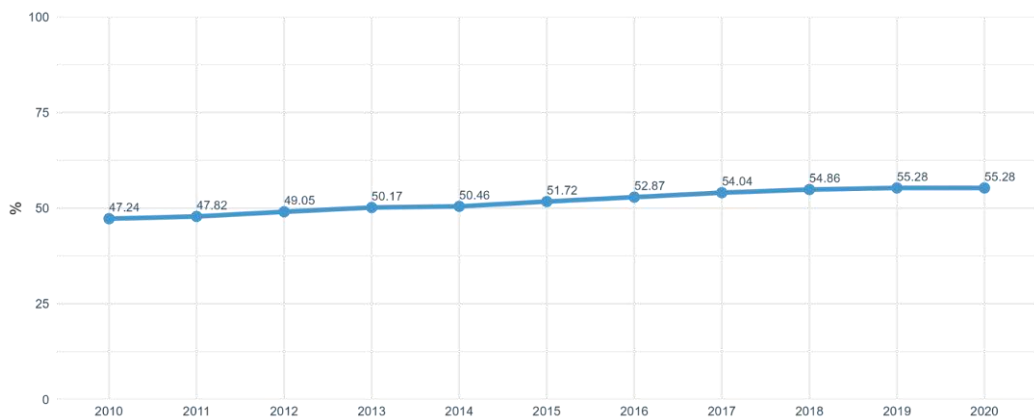


Figure 10. Business enterprise researchers as percentage of national, total.

The corresponding indicator, Figure 53 in Annex 3, provides further insight on the Member State level. Sweden, the Netherlands and Austria score around 15 more percentage points than the European average.

Sweden performs above the European average with respect to **business enterprise researchers in full-time equivalent (FTE) per thousand employments in industry**. In addition to Sweden, Finland and Denmark perform above average on this indicator as illustrated in Figure 54 in Annex 3. The strong performance of Denmark can be attributed to the innate interest of Danish universities to make their research findings and patentable

inventions accessible to commercial enterprise. The Danish technology transfer offices are active players in facilitating cooperation between scientists, companies and other interested parties.¹³

Sweden’s as well as Finland’s business sector contributes to over 70% of funding for research, creating a close knit between private and public R&I activities¹⁴. As for the EU average, it has gradually increased over the last 10 years with a difference of 2.51 points between 2010 and 2020.

Sub-priority 1.6: Scientific leadership

The Pact for R&I sub-priority on scientific leadership targets the capacity and funding for fundamental and applied research, in order to increase the position of the EU as a knowledge society and its ability to respond to crises.

The indicator related to **the number of scientific publications among the top-10% most cited publication worldwide as a percentage of all publications** is supposed to be a measure for efficiency of the research system, as highly cited publications are assumed to be of higher quality. Figure 11 shows the EU level over the years, it shows a steady trend around the 10%, but with a decline of 0.3 percentage points between 2010 and 2020.

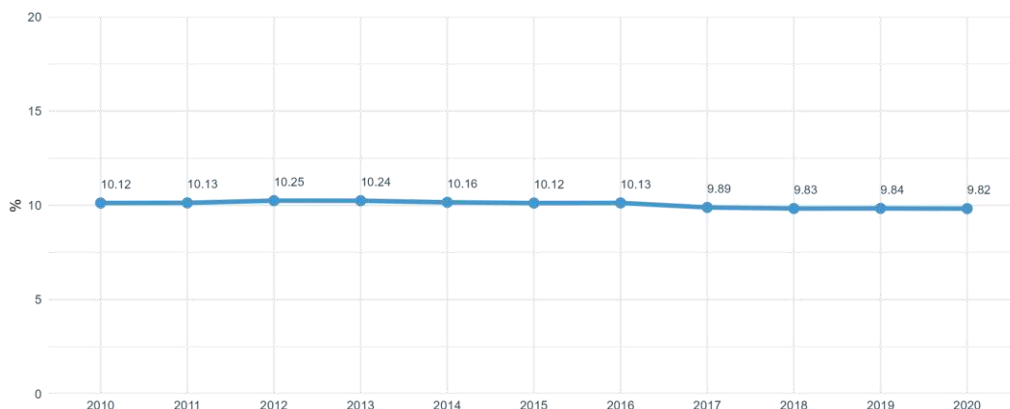


Figure 11. Number of scientific publications among the top- 10% most cited publications worldwide as a percentage of all publications.

Figure 55 in Annex 3 provides a breakdown by Member State on this indicator. While the EU average experienced a slight decrease, some EU countries showed improvement over the years. For example, Latvia, although performing below EU average, exhibited a positive trend between 2010 and 2022. Denmark, Belgium, the Netherlands, and Sweden all performed above average, but like the EU average, showed a slight decrease over the years. Interestingly, Luxembourg’s indicator fluctuated above the EU average, and similar upward and downward trends were observed for Greece (around the EU average) and Malta (below the EU average).

¹³ <https://investindk.com/set-up-a-business/research-and-development>

¹⁴ <https://sweden.se/work-business/study-research/research-in-sweden>; https://www.stat.fi/til/tkke/2019/tkke_2019_2020-10-29_kat_001_en.html

Figure 12 shows the decreasing trend between 2010 and 2022 of the **Academic Freedom Index** in the EU. This indicator is provided by the Friedrich-Alexander-University and assesses de facto levels of academic freedom across the world based on five indicators: freedom to research and teach, freedom of academic exchange and dissemination, institutional autonomy, campus integrity, and freedom of academic and cultural expression.¹⁵

The V-dem¹⁶ project implements and adapts this indicator by making use of 2,197 country experts worldwide, standardized questionnaire and a statistical model. The graph below indicates a decreasing trend of 0.5 percentage points between 2010 and 2022 of the EU average Academic Freedom Index. Especially for 2020 till 2022, this slight decreasing trend seems to speed up.

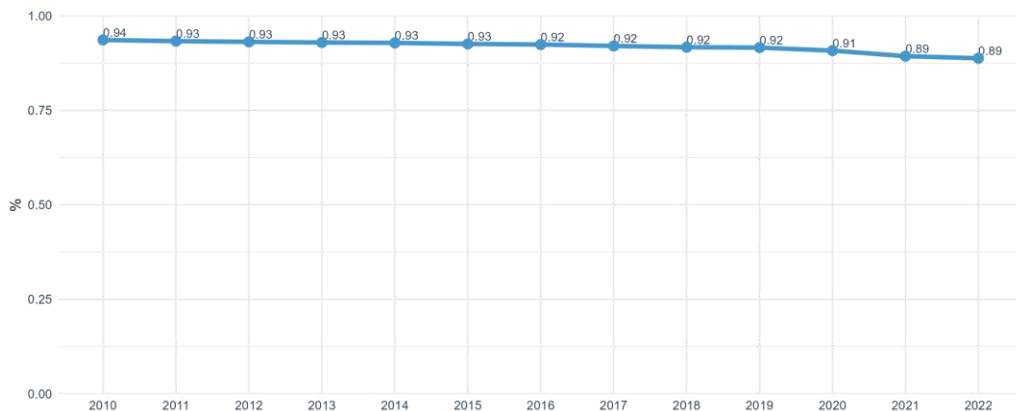


Figure 12. Academic Freedom Index. (AFI)

Regarding the data for the same indicator, presented in Figure 56 in Annex 3, the trend of EU Member States does not significantly differ from the EU average between 2010 and 2022, apart from Hungary. The EU mean remains at around 0.9, which implies high level of academic freedom. Most countries performed slightly better or like the EU average. Notably, Belgium, Germany, and Sweden stood out as performing slightly better than the EU average.

Sub-priority 1.7: Global engagement

The final Pact for R&I sub-priority under the ERA Priority Area 1 focuses on developing a global engagement strategy. The indicator presented in Figure 13 that the **share of international co-publications with non-EU partners in the public sector** has increased constantly between 2010 and 2021.

¹⁵ <https://academic-freedom-index.net/#:~:text=The%20AFI%20assesses%20de%20facto,and%20the%20V%2DDem%20Institute>

¹⁶ <https://www.v-dem.net>

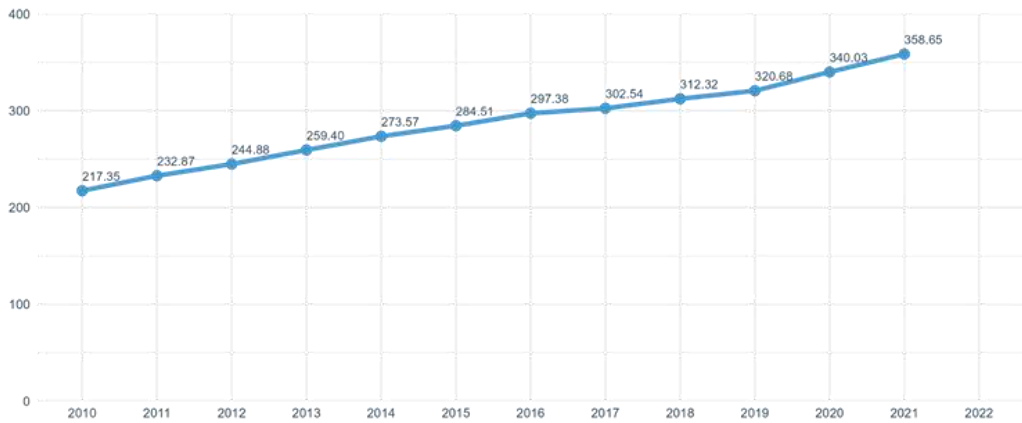


Figure 13. International co-publications with non-EU partners per 1,000 researchers in the public sector.¹⁷

The indicator, presented in Figure 57 in Annex 3, highlights that this same trend can be seen on Member State level. While some countries have had a sharper increase than others, data from the majority of Member States display a consistent increase in international co-publications. The countries with the largest shares of international co-publications include Denmark, Cyprus, and Luxembourg.

There is only limited data available for **European and international co-patenting in European Patent Office applications at national and EU level**. Figure 14 shows that levels of co-patenting have been stable between 2010-2012 in the EU-27 average but have declined in 2013 compared to the previous years.

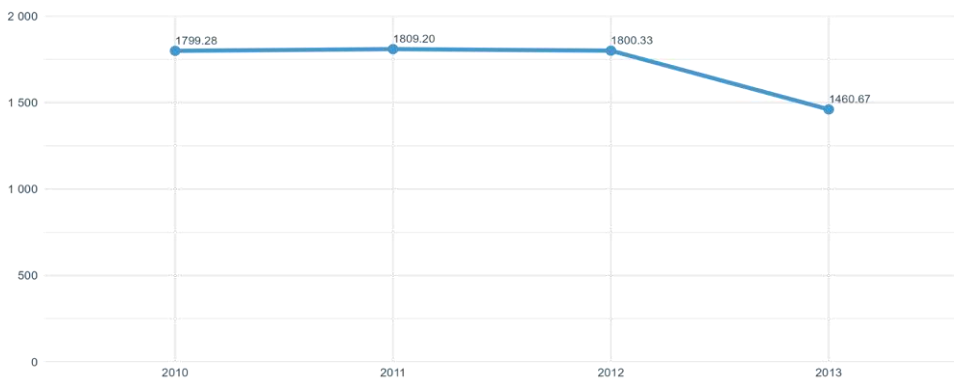


Figure 14. European and international co-patenting in EPO applications at national and EU level.

¹⁷ The EU trend shows the number of international co-publications with non-EU partners. It should be noted that country trends should not be compared directly to this EU-level trend. The reason for this is that at the EU level, international co-publications are counted only where the co-authors are based outside of the EU, whereas at the country level international co-publications are counted where there is at least one co-author from any foreign country i.e., including partners both within and outside of the EU.

IMPLEMENTATION OF THE ACTIONS RELATED TO ERA PRIORITY 1

1. Action 1: Enable the open sharing of knowledge and the re-use of research outputs, including through the development of the European Open Science Cloud (EOSC)

1.1. Purpose of the Action and expected outcomes

Action 1 of the ERA Policy Agenda aims to facilitate a system of open sharing, seamless access, and reliable re-use of research data. Scientific discovery and research impact are highly dependent on an open sharing of scientific data and research outputs. However, there are obstacles to Open Science practices and digital research, as a significant part of scientific data: 1) is not shared openly, (2) never makes it to a trusted and sustainable repository, and (3) is poorly annotated or not formatted in a standardised way allowing for machine-readability.¹⁸

In view of enhancing Open Science (OS) in Europe, the ambition of the EOSC action is to provide an environment that allows researchers, innovators, companies and citizens to publish, find and re-use each other's data and tools (i.e., methods, protocols, software, and publications) for research, innovation and educational purposes.¹⁹ In line with this ambition, the ERA Policy Agenda 2022-2024 envisions three main outcomes:²⁰

- Deploying OS principles and identifying OS best practices;
- Deploying the core components and services of EOSC and integrating existing data infrastructures in Europe, working towards the interoperability of research data;
- Establishing a monitoring mechanism to collect data and benchmark investments, policies, digital research outputs, OS skills, and infrastructure capacities related to the EOSC.

1.2. Implementation of the Action

The implementation of the EOSC is based on long-term collaboration between the European Commission and stakeholders in the European research landscape, which was initiated in 2015. Between 2018 and 2020, the Commission invested EUR 250 million through Horizon 2020 to prototype components of the EOSC. Since June 2021 this initiative received further support at the EU level with the Portuguese Presidency of the Council and the European Commission recognising the implementation of the European Open Science

¹⁸ ERA Portal Austria, Introduction, available at: <https://era.gv.at/era/era-policy-agenda/open-knowledge-sharingeosc>.

¹⁹ European Commission (2021), European Research Area Policy Agenda – Overview of actions for the period 2022-2024, p.4-5.

²⁰ Council of the European Union (2021), Future governance of the European Research Area (ERA), available at: <https://data.consilium.europa.eu/doc/document/ST-14308-2021-INIT/en/pdf>.

Cloud (EOSC) as a major step towards realising a ‘web of FAIR²¹ data and services’ in the ERA. In June 2023, the role of R&I in contributing to addressing societal challenges was reinforced by the Lund Declaration of the Swedish Presidency, on the reuse of high-quality research data.

From 2021 onwards, EOSC is transitioning into a stakeholder-driven approach, co-developed with the entire EOSC community.²² The implementation of the action is based on a formally established **Co-programmed European Partnership on EOSC** under the Horizon Europe Framework Programme. The EOSC Partnership is governed through a tripartite collaboration of the European Commission, the EOSC Association (representing the European research community), and the EOSC Steering Board (representing EU Member States and Associated Countries).²³

It is being implemented according to a **Strategic Research and Innovation Agenda** (SRIA) which was co-developed with the EOSC community. The SRIA sets three core objectives for EOSC: 1) Ensure that OS practices become the ‘new normal’, 2) Enable the definition of standards, and the development of tools and services, to allow researchers to find, access, reuse, and combine results, and 3) Establish a sustainable and federated infrastructure enabling open sharing of scientific results.²⁴

Details of progress achieved towards the expected outcomes of this action are described below.

1. Deploying OS principles and identifying OS best practices.

- Member States and Associated Countries have developed new **national strategies for Open Science policy** for the mainstreaming of Open Science practices and FAIR principles across national research funding programmes. Most countries have also developed action plans for the creation of national platforms and data services to enable the connection of national/regional research infrastructures to the EOSC platform. A recent example is the National Open Science Strategy 2023-2027 of Spain,²⁵ with the strategic objective of guaranteeing interoperable and robust digital infrastructures for Open Science in order to facilitate the integration of Spain’s national Open Science policy into the international ecosystem, including EOSC.²⁶
- Over 25 **national tripartite events** (involving the European Commission, Member States or Associated Countries, and the EOSC Association) and two annual **EOSC Symposiums** have taken place since 2022, bringing together stakeholders from governments, research performing organisations, and research communities across Europe to reflect on the key achievements and

²¹ Findable, Accessible, Interoperable and Reusable.

²² European Commission (2021), European Research Area Policy Agenda – Overview of actions for the period 2022-2024.

²³ ‘Tripartite Collaboration’ on the EOSC website, available at: <https://eosc.eu/tripartite-collaboration>.

²⁴ Strategic Research and Innovation Agenda (SRIA) of the EOSC, available at: <https://eosc.eu/sites/default/files/SRIA%201.1%20final.pdf>.

²⁵ Estrategia Nacional de Ciencia Abierta (ENCA), available at: <https://www.ciencia.gob.es/InfoGeneralPortal/documento/c30b29d7-abac-4b31-9156-809927b5ee49>.

²⁶ ‘Ireland launches National Action Plan for Open Research 2022-2030’ on EOSC website, available at: <https://eosc.eu/news/ireland-launches-national-action-plan-open-research-2022-2030>.

strategic challenges of EOSC implementation, as well as to identify priorities for the years ahead.²⁷

- An '**EOSC Catalogue of Best Practices**' was published in 2023, with illustrative examples from committed countries on EOSC and Open Science practices targeting publications, data, software, infrastructure, etc.²⁸
2. Deploying the core components and services of EOSC and integrating existing data infrastructures in Europe.
- The deployment of the EOSC is supported by relevant EU funding, under Horizon 2020 (2014-2020) and Horizon Europe (2021-2027). During 2023-2024, EUR 130 million are invested into contributing to the objectives of the EOSC Partnership. This is part of co-investment (with in-kind and financial contributions) by the EU and non-EU partners of at least EUR 1 billion foreseen for the period 2021-2027.
 - For example, the ongoing **EOSC-FUTURE project** (April 2021 – September 2023) aims to connect major stakeholders in the EOSC ecosystem, develop scientific use cases in collaboration with the thematic communities, consolidate an EOSC Portal cataloguing, and provide access to several EOSC resources. Other calls, such as the 'Managed Services for the European Open Science Cloud platform'²⁹ and six new calls for proposals under **INFRAEOSC** support accessing quality FAIR services, consolidating the sustainability of the EOSC ecosystem, developing innovative services for EOSC Exchange.³⁰
 - Successful thematic demonstrations of EOSC use cases have also been deployed since 2020. The **BY-COVID project**³¹ (funded under Horizon Europe) aims to make COVID-19 data accessible to scientists in laboratories but also to medical staff in hospitals or government officials. Other key contributions are the **Blue-Cloud** initiative (Blue Cloud project under Horizon 2020 and Blue Cloud 2026 project under Horizon Europe) and the **AqualNFRA** project, which aim to connect FAIR scientific data on the marine and coastal environment, biodiversity, and the water cycle. These projects act as EOSC blueprints in their domains.
 - Finally, the EOSC Tripartite Governance has initiated a strategic discussion on the **governance and sustainability options for EOSC after 2027**, including the possible evolution of the current EOSC European co-programmed partnership after Horizon Europe.³²

²⁷ EOSC Symposium 2023 website, available at: <https://symposium23.eoscfuture.eu/programme>.

²⁸ EOSC Future (2023), EOSC Catalogue of Best Practices, available at: <https://zenodo.org/record/7574165>.

²⁹ Managed Services for the European Open Science Cloud (EOSC) Platform, available at: <https://etendering.ted.europa.eu/cft/cft-display.html?cftId=12087>.

³⁰ 'Funding & tender opportunities' on the Single Electronic Data Interchange Area (SEDIA) website of the European Commission.

³¹ Project website, available at: <https://by-covid.org>.

³² 'EOSC Building – Sharing Perspectives and Thoughts for the Future' presentation by Suzanne Dumouchel, Director, EOSC Association, June 2023, publicly available at: https://eosc.eu/sites/default/files/2023-06/20230613_EOSCbuilding-SuzanneDumouchel.pdf.

3. Establishing a monitoring mechanism to collect data and benchmark investments, policies, digital research outputs, OS skills, and infrastructure capacities related to the EOSC.
 - At the end of 2022, the EOSC Steering Board expert group published an 'Opinion **Paper on Monitoring Open Science**' which made recommendations in line with short-term objectives related to monitoring progress towards Open Science policies, and practices in Europe. The recommendations include the implementation of several target indicators by 2024, for example policy on Open Access to publications, and policy on data management.³³
 - This is facilitated by the **EOSC Observatory**,³⁴ a policy intelligence tool co-developed by the Commission, Member States, and Associated Countries. The tool, launched in November 2022, is a one-stop-shop providing policymakers with intelligence on Open Science implementation across Europe. This policy intelligence tool collects and visualises data on the implementation of EOSC policies, initiatives, and financial mechanisms in more than 30 contributing countries. Data and related analytical reports support the ERA Monitoring Mechanism, where appropriate.

In addition, the 'Analysis of the Survey on National Contributions to EOSC 2021' was considered for the subsequent paragraphs looking at the level of financial contribution, and the types of policies implemented on the national level. The survey was conducted among representatives of EU Member States and Associated Countries at the EOSC Steering Board, and aimed to collect data on measures, policies, and practices toward Open Science.³⁵

According to the EOSC 2021 survey, 62% of the committed countries have one or more policies in place promoting Open Science, with many policies being put in place in 2021.³⁶ Based on information provided by the 2023 OECD STIP Survey, Figure 15 shows with respect to the **estimated budget expenditure range** for relevant policies that more than half of the monitored policies fall under lower budget ranges. Most policies are funded within a budget of EUR 1 million and 5 million (50 policies). The OECD STIP survey data includes initiatives that specifically target implementation of this ERA action, as well as those which have broader scope, but are also related to this ERA action.

Estimated financial contributions were most likely to come from relevant ministries (10 countries), and Research Funding Organisations (7 countries).³⁷ Many policies fall under the budget range of between 5 and 20 million (36 policies), and of less than EUR 1 million (37 policies). With respect to the **types of policy instruments**, the most common (Figure 15) are policies on collaborative infrastructures (e.g., academic libraries) and governance support, such as national strategic documents across all three budget categories. Policies providing direct financial support tend to provide between EUR 1-5 million in support. An

³³ European Commission (2022), Opinion paper on Monitoring Open Science, available at: <https://op.europa.eu/en/publication-detail/-/publication/2bcde3e1-7f53-11ed-9887-01aa75ed71a1/language-en/format-PDF/source-280038927>.

³⁴ EOSC Observatory, available at: <https://eoscobservatory.eosc-portal.eu/home>.

³⁵ Analysis of the survey results is based on the answers of 34 EOSC Steering Board members (25 Member countries, 8 Associated Countries, and 1 other country).

³⁶ EOSC Future (2021), Analysis of the Survey on National Contributions to EOSC 2021.

³⁷ Ibid.

example of an initiative with a budget of more than EUR 500 million is the Digital Europe Programme³⁸ at the EU level.

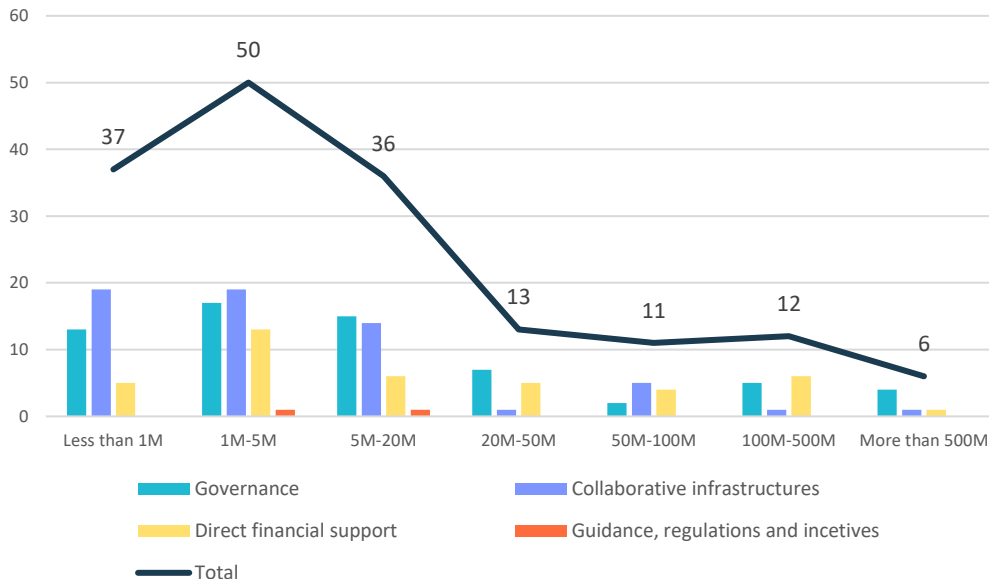


Figure 15: Action 1: Distribution of budget per policy instrument.

In terms of **policy themes**, the EOSC survey results showed that in 2020, 95% of existing policies in Member States and Associated Countries related to addressing open access to data, data management, and/or FAIR and policies addressing preservation and reuse of scientific information. However, the lowest percentage (48%) corresponded to policies addressing citizen science. Policies that were still in the planning phase at the time of the survey showed similar trends.³⁹

2. Action 2: Propose an EU copyright and data legislative and regulatory framework fit for research

2.1. Purpose of the Action and expected outcomes

This action aims to propose an EU copyright and data legislative and regulatory framework fit for research.

³⁸ 'Digital Europe Programme', the EC website, available at: https://commission.europa.eu/funding-tenders/find-funding/eu-funding-programmes/digital-europe-programme_en.

³⁹ EOSC Future (2021), Analysis of the Survey on National Contributions to EOSC 2021.

It should enable, among other:⁴⁰

- Access to (including open access) and reuse of publicly funded R&I results;
- Access to (including open access) and reuse of publications and data for research purposes;
- Data services and infrastructures managed for the benefit of research stakeholders; and
- Flow of research knowledge and data across the EU.

Barriers and challenges to achieve these objectives, however, currently exist. To address this situation, the expected outcomes of the ERA Action 2 are twofold:

(i) identify barriers and challenges to access and reuse of publicly funded R&I results and of publications and data for scientific purposes, and identify potential impacts on research, through an analysis of relevant provisions under EU copyright and data legislation and related regulatory frameworks, and of relevant institutional and national initiatives;

(ii) propose legislative and non-legislative measures to improve the current EU copyright and data legislative and regulatory frameworks. 14 Member States have committed to this action: Austria, Belgium, Czechia, Denmark, Estonia, France, Germany, Hungary, Italy, the Netherlands, Portugal, Slovakia, Slovenia, and Spain. Seven ERA Forum stakeholders have also committed to Action 2. These are: CESAR, EU Life, European University Association, Science Europe, SPARC Europe, The Guild, and YERUN.

2.2. Implementation of the Action

There are two key parts to Action 2: **copyright legislation** and **data legislation** (data access infrastructures). As foreseen, in 2021, four independent expert studies were commissioned by DG RTD and published in 2022 to examine the existing and possible upcoming barriers:

- Study on EU copyright and related rights and access to and reuse of scientific publications, including open access - Exceptions and limitations, rights retention strategies and the secondary publication rights;
- Study on EU copyright and related rights and access to and reuse of data;
- Study on the Open Data Directive, Data Governance and Data Act and their possible impact on research;
- Study on the Digital Services Act and Digital Markets Act and their possible impact on research.

⁴⁰ European Commission (2021), European Research Area Policy Agenda – Overview of actions for the period 2022-2024, p.5.

The study on EU **copyright and related rights and access to and reuse of data**,⁴¹ as well as the study on EU copyright and related rights and access to and reuse of scientific publications, including open access⁴² examined the impact on access to data resources for scientific research and whether EU copyright legislation in place (e.g. Information Society Directive, Directive on Copyright in the Digital Single Market) fosters the reuse of scientific publications, as well as fundamental rights of both authors and researchers within this framework.

There are legal barriers encountered by researchers and institutions when obtaining access to scientific publications due to the copyright and licensing conditions in publishing agreements. Non-legislative and legislative solutions are discussed including: rights retention strategy; targeted harmonisation of copyright contract law; making mandatory the scientific research exception of Article 5(3) (a) ISD; introducing an EU-wide Secondary Publication Right (SPR); and a European harmonisation of authorship and first ownership of copyright, in general or in scientific publications.⁴³ Some Member States have already introduced amendments into their national copyright legislation enacting an SPR for publicly-funded scientific publications.⁴⁴

In terms of **data legislation**, two of the studies published in 2022 in turn examine the Open Data Directive, Data Governance Act, and Data Act,⁴⁵ and the Digital Services Act and Digital Markets Act,⁴⁶ and their impacts on research. This includes access to data, research data sharing and reuse, impact on research performing organisations, research funding organisations, and research infrastructures.

Key challenges highlighted involve the fact that researchers feel a strong sense of ownership towards their research data and value 'trust' in data sharing; researchers criticised the lack of clear and specific legal framework for opening datasets, especially where there are regional specific policies and regulations to consider. For example: having few common standards in terms of structures, formats, language, security is an obstacle to sharing data; researchers indicate they do not always know how and under what conditions they can share confidential data; and researchers say that they have difficulties choosing appropriate data licenses.⁴⁷

As a continuation and accompaniment to these studies, there have been two workshops with ERA Forum representatives, experts, and other stakeholders. The first workshop, in June 2022, presented and discussed the results of the four expert studies. The second workshop, in February 2023, further identified barriers, challenges and potential measures to support an EU copyright and data legislative and regulatory framework fit for research.

⁴¹ European Commission (2022), Study on EU copyright and related rights and access to and reuse of data, available at: <https://op.europa.eu/en/publication-detail/-/publication/5c5153a4-1146-11ed-8fa0-01aa75ed71a1>

⁴² European Commission (2022), Study on EU copyright and related rights and access to and reuse of scientific publications, including open access – Exceptions and limitations, rights retention strategies and the secondary publication right, available at: <https://op.europa.eu/en/publication-detail/-/publication/884062d5-1145-11ed-8fa0-01aa75ed71a1>

⁴³ Ibid.

⁴⁴ European Commission (2021), European Research Area Policy Agenda – Overview of actions for the period 2022-2024, p.5.

⁴⁵ European Commission (2022), Study on the Open Data Directive, Data Governance and Data Act and their possible impact on research, available at: <https://op.europa.eu/en/publication-detail/-/publication/a313139b-1147-11ed-8fa0-01aa75ed71a1>

⁴⁶ Ibid.

⁴⁷ Ibid., p. 11.

This was especially pertinent in light of the recent adoption of the Digital Markets Act and Digital Services Act, as well as the Open Data Directive, Data Governance Act and Data Act. The discussion highlighted that the differences in national rules regarding copyright and data legislation is making it difficult for the international research sector to access and share data in a secure and useful way.⁴⁸

Two new studies have been launched in 2023. One regarding EU copyright legislation to: i) evaluate the concrete effects of the EU copyright framework on research, including evidence/data gathering (literature review, consultation, interviews etc.) on concrete impacts on researchers, research funding and performing organisations and on other affected stakeholders, including copyright right holders; ii) to further elaborate on areas in need of improvement; and iii) to evaluate the effects of potential interventions.

The other concerned EU data and digital legislation to: i) identify the relevant provisions for researchers, research organisations, research infrastructures and research services providers under specific EU data and digital legislation; and ii) assess and present how they can comply with the obligations and benefit from the rights they may have under these acts.

This further work will feed into the proposals for legislative and non-legislative measures in 2024, which is the main aim of Action 2. Action 2 also contributes to various existing EU policies. These include the EU's Open Science Policy, the EU's Action Plan on Intellectual Property, and the Commission Recommendation on access to and preservation of scientific information. The way in which Action 2 contributes to these policy initiatives is detailed below.

An important aspect affecting the implementation of Action 2 is the close relationship of the ERA to the **EU's Open Science policy**, which aims to foster a standard method of working under research and innovation programmes, improving the quality, efficiency, and responsiveness of research. Access and reuse of publications, data and other research results are at the core of Open Science and of the EU's Open Science policy. As such, Horizon Europe beneficiaries are required to ensure immediate open access to scientific publications and the management of research data according to the FAIR principles.

The work under ERA Action 2 is also linked to the **EU's Action Plan on Intellectual Property**. This was designed to help companies, in particular SMEs, to make the most of their inventions to ensure that these benefit our economy and society. The Plan aims to not only protect intellectual property, but also to boost the uptake of intellectual property by SMEs and facilitate the sharing of intellectual property to increase technological uptake in industry.

This further links to ERA Action 7 and the development of the **Code of Practice for the Smart Use of Intellectual Property** by the Commission's Community of Practice dedicated to identifying best practices that can effectively boost intellectual asset management.⁴⁹

⁴⁸ Science Europe (2023), An EU Copyright & Data Legislative Framework Fit for Research?, available at: <https://www.scienceurope.org/news/an-eu-copyright-data-legislative-framework-fit-for-research/>

⁴⁹https://research-and-innovation.ec.europa.eu/research-area/industrial-research-and-innovation/eu-valorisation-policy/knowledge-valorisation-platform/code-practice-smart-use-intellectual-property_en#:~:text=Contact-About%20the%20code%20of%20practice,an%20online%20community%20of%20practice.

Further related to the management of intellectual property rights and promoting open access is the **2018 Commission Recommendation on access to and preservation of scientific information**.⁵⁰ This asks Member States to:

- Set and implement clear policies (as detailed in national action plans) for the dissemination of, and open access to, scientific publications resulting from publicly funded research;
- Ensure, in compliance with the EU acquis on copyright and related rights, that as a result of these policies or action plans, researchers, when entering into contractual agreements with scientific publishers, retain the necessary intellectual property rights, inter alia, to comply with the open access policy requirements. This concerns in particular self-archiving and re-use (notably through text and data mining);
- Ensure that research funding institutions responsible for managing public research funding and academic institutions receiving public funding implement the policies and national action plans at national level in a coordinated way by providing guidance to researchers on how to comply with open access policies, and supporting them to do so, especially regarding the management of their intellectual property rights to ensure open access to their publications.

3. Action 3: Advance towards the reform of the assessment system for research, researchers and institutions to improve their quality, performance and impact

3.1. Purpose of the Action and expected outcomes

ERA Action 3 of the ERA Policy Agenda aims to advance towards a reform of the research assessment system, with the goal of assessing the quality, performance, and impact of research and researchers using more suitable criteria and procedures.

The assessment of research projects, researchers, and institutions is crucial for ensuring a well-functioning R&I system and to improve the quality, performance and impact of research. While some research funding and performing organisations have begun to enhance their assessment tools, the current system still often relies on inadequate and narrow methods, and the advancement in improving research and researcher assessment across Europe has been slow, limited, and fragmented.⁵¹

In view of the objective to advance towards the reform of the assessment system for research, researchers and institutions to improve their quality, performance and impact, Action 3 aims to reward open science practices in terms of open collaboration, knowledge and data sharing to increase quality, efficiency and trust, establish coalitions between relevant stakeholders and identify potential administrative and legal barriers to institutional

⁵⁰ <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:32018H0790>

⁵¹ DG RTD, Action 3: Advance towards the reform of the Assessment System for research, researchers and institutions to improve their quality, performance and impact – Explanatory document.

changes. The three **expected outcomes** outlined in the ERA Policy Agenda 2022-2024 are:⁵²

- Analysis of legal and administrative barriers at national and trans-national level for a modern research assessment system;
- Create a Coalition of European research funders and research performers who agree on a new approach for research assessment, following wide and inclusive consultations at European and international level;
- Implementation plan of the coalition to roll-out the new approach, including pilots in different domains.

3.2. Implementation of the Action

The overarching aim of Action 3 is for research and researchers to be evaluated based on their intrinsic merits and performance rather than on the number of publications and where these are published, promoting qualitative judgement and peer-review, supported by a more responsible use of quantitative indicators.

The starting point of reforming the research assessment system was the **2018 Commission Recommendation**⁵³ to Member States to set and implement clear policies to reward a culture of collaboration and sharing of knowledge and data.

The improvement of the research assessment system was set as a strategic objective in the **Commission Communication on a new European Research Area for Research and Innovation** and reiterated in the **Council Conclusions on the new European Research Area**⁵⁴ of 1 December 2020. The **Council conclusions on attractive and sustainable researchers' careers and working conditions**⁵⁵ of 28 May 2021 also stressed that research assessment system, which are an integral part of attractive and productive careers, should explore more talent-based and diversity-sensitive quality measurement systems.

Following the inclusion of the priority action for reforming the assessment system for research, researchers and institutions to improve their quality, performance and impact in the **ERA Policy Agenda 2022-2024** 'within the path set by the Council Conclusions on Research assessment and implementation of Open Science'⁵⁶ of 10 June 2022, steps were taken to foster alignment on research and assessment reforms.

⁵² European Commission (2021), European Research Area Policy Agenda – Overview of actions for the period 2022-2024, p 6.

⁵³ Commission Recommendation (EU) 2018/790 of 25 April 2018 on access to and preservation of scientific information, available at: <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32018H0790>

⁵⁴ Council conclusions on the European Universities initiative – Bridging higher education, research, innovation and society: Paving the way for a new dimension in European higher education 2021/C 221/03, available at: <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52021XG0610%2802%29>.

⁵⁵ Council conclusions on Deepening the European Research Area: Providing researchers with attractive and sustainable careers and working conditions and making brain circulation a reality, available at: <https://www.consilium.europa.eu/media/49980/st09138-en21.pdf>

⁵⁶ Council conclusions on Research assessment and implementation of Open Science, Council document 10126/22 available at: <https://www.consilium.europa.eu/media/56958/st10126-en22.pdf>

In December 2021, the European Commission issued a call for expressions of interest from stakeholder organisations to join the **Coalition for Advancing Research Assessment (CoARA)**.⁵⁷ As of September 11, 2023, the CoARA has grown to include 537 member organisations from around the world, all of whom have signed the agreement.⁵⁸ The member organisations encompass various types, such as:

- Universities, and their associations;
- Research centres, research infrastructures, and their associations;
- Academies, learned societies, and their associations, and associations of researchers;
- Public or private research funding organisations and their associations;
- National/regional authorities or agencies that implement some form of research assessment and their associations;
- Other relevant non-for-profit organisations involved with research assessment, and their associations.

One of the most important milestones was the **agreement on reforming research assessment of July 2022**⁵⁹, which was one of the expected outcomes set by the ERA Policy Agenda 2022 -2024 (see 7.2 Achievements). The agreement established a common direction for research assessment reform, while respecting the signatory organisations' autonomy. The core commitments include:

- Recognising the diversity of contributions to, and careers in, research in accordance with the needs and nature of the research;
- Base research assessment primarily on qualitative evaluation for which peer review is central, supported by responsible use of quantitative indicators;
- Abandon inappropriate uses in research assessment of journal- and publication-based metrics, in particular inappropriate uses of Journal Impact Factor (JIF) and h-index;
- Avoid the use of rankings of research organisations in research assessment.

The **European Research Council (ERC)**, which signed the agreement on reforming research assessment, also contributes to improving the quality, performance, and impact of research. The ERC set up a task force to conduct a comprehensive examination of the ERC's way to assess researchers and research proposals, considering concerns expressed by the research community. Subsequently, the Scientific Council of the ERC approved **modifications** based on the task force's recommendations, which are **implemented in the 2024 Work Programme**.

⁵⁷ <https://coara.eu>

⁵⁸ <https://coara.eu/coalition/membership>

⁵⁹ Agreement on reforming research assessment (2020), available at: https://coara.eu/app/uploads/2022/09/2022_07_19_rra_agreement_final.pdf

The ERC reaffirmed its commitment to excellence as the sole criterion for selecting researchers and projects and implemented a shift towards a holistic and comprehensive evaluation of researchers beyond traditional metrics. To support diversity and fairness the changes will consider factors such as career stage and personal context, avoiding bias towards specific research types or outputs. The Scientific Council will closely monitor the effects of these changes and make refinements as needed in response to feedback from applicants, evaluation panels, and the broader scientific community.⁶⁰

Another example represents the Open and Universal Science funded under the 'Widening participation and strengthening the ERA' part of a Horizon Europe Call (Work Programme 2021-2022).⁶¹ The project develops coordination and support measures to reform the assessment of research and researchers at Research Performing Organisations (RPOs) and Research Funding Organisations (RFOs) towards a system that incentivises and rewards researchers to take up Open Science practices.⁶²

In addition to the CoARA and the ERC, national authorities and the European Commission are **relevant actors** in the implementation of Action 3. National authorities play a vital role in developing policies and legislative frameworks that support this reform and encourage collaboration among stakeholders.⁶³ The European Commission acts as a facilitator in the preparation of the Agreement and has joined the Coalition as a research and innovation funder. The Commission participates on equal terms with other members of the Coalition in its operations.⁶⁴

Figure 16, below, which builds on data provided by the 2023 OECD STIP Survey, shows that most policy initiatives associated with Action 3 were implemented with a **budget** of less than EUR 1 million. 26 policies fall under a budget of less than EUR 1 million, while 10 policies are allocated between EUR 1 million and EUR 5 million. Additionally, eight policy initiatives received a budget of EUR 5-20 million, four initiatives received EUR 20-50 million, three initiatives received EUR 50-100 million, and four initiatives received EUR 100-500 million. Only one policy initiative benefited from funding exceeding EUR 500 million⁶⁵.

The policy initiatives with a high estimated budget expenditure were national-level funding programmes. The policy initiatives, benefitting from a budget of over EUR 100 million per year, were deployed in Hungary, Greece, Romania and Croatia, whilst the one policy initiative with over EUR 500 million was French. For instance, the General Secretariat for Investment in France holds the responsibility of maintaining the coherence of the State's investment policy. It accomplishes this by conducting assessments of investment projects and providing support while also facilitating thematic investment evaluation mechanisms.

⁶⁰ <https://erc.europa.eu/news-events/magazine-article/research-assessment-ScC-view>.

⁶¹ <https://ec.europa.eu/info/funding-tenders/opportunities/portal/screen/opportunities/topic-details/horizon-widera-2021-era-01-45>

⁶² See Open Universal Science website, <https://opusproject.eu/about>.

⁶³ DG RTD, Action 3: Advance towards the reform of the Assessment System for research, researchers and institutions to improve their quality, performance and impact – Explanatory document.

⁶⁴ <https://coara.eu/agreement/faq>

⁶⁵ 'Secrétariat général pour l'investissement (SGPI)', French government website, available at : <https://www.gouvernement.fr/secretariat-general-pour-l-investissement-sgpi>

National policy examples

At the national level, several policy debates are taking place related to Action 3. For instance, **Slovenia** has commissioned several research projects under the framework of Targeted Research Programs (CRP) to support the reform of science assessment in the country. Additionally, seven signatories of the Coalition for Advancing Research Assessment (CoARA) are actively involved in the implementation of Action 3. In **Estonia**, debates surrounding the diversification of research assessment reforms are gaining momentum. It is crucial to highlight that due to the high autonomy of Estonian research organisations, the development of career paths and researcher assessment systems is taking place in a decentralised manner.

Concerning the **types of policy instruments** employed to promote the objectives of Action 3, governance support (76%) is by far the most used policy instrument. Direct financial support (i.e., grants and public funding to promote the open science model) was also used, albeit significantly less (12%). Guidance, regulation, and incentives (6%) and collaborative infrastructures (5%) were less common, whilst indirect financial support was the least used instrument.

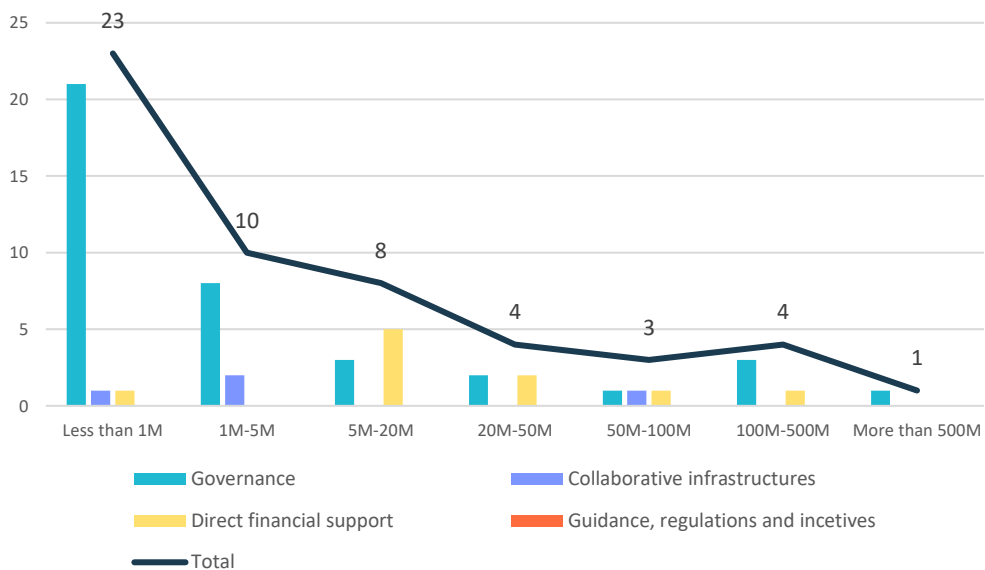


Figure 166: Action 3: Distribution of budget per policy instrument

4. Action 4: Promote attractive research careers, talent circulation and mobility

4.1. Purpose of the Action and expected outcomes

This action aims at strengthening research careers in Europe and at making them more attractive for EU and international research talents. It seeks to provide researchers with enhanced working conditions and with the necessary instruments to undertake excellent research. The action also tackles the challenges posed by current skills mismatches, which

can negatively affect inter-sectoral and inter-disciplinary mobility as well as the whole cycle of knowledge production, circulation and valorisation.⁶⁶

On the basis of the expected outcomes defined by the Council, the Commission has identified 3 strands of activities to be implemented in the context of the action:⁶⁷

- The development of a European framework for research careers, to address in a comprehensive way all challenges related to research careers in Europe;
- The exchange of best practices and mutual learning to foster inter-sectoral mobility, more balanced talent circulation, and researchers' skills;
- Developing or improving tools in support of research careers. This includes existing instruments such as EURAXESS, RESAVER, or the Human Resources Strategy for Researchers (HRS4R, the implementation mechanism for the Charter and Code for Researchers), as well as the development of new ones, such as a European Competence Framework for Researchers (ResearchComp), the ERA Talent Platform as a one-stop-shop for researchers, and a Research and Innovation Careers Observatory.

4.2. Implementation of the Action

ERA Action 4 is in line with the **Commission Communication 'A New ERA for Research and Innovation'**⁶⁴, and with recommendations issued by the Council of the European Union in 2021. The **Council Conclusions of 28 May 2021 on 'Deepening the European Research Area: providing researchers with attractive and sustainable careers and working conditions and making brain circulation a reality'**⁶⁸ called for a development of an 'internal market for research', which is able to provide better framework conditions for research careers.⁶⁹

The Council also referred to the revision of the 2005 **Charter and Code for Researchers**, which constitutes the basis for the **Human Resources Strategy for Researchers (HRS4R)**⁷⁰. The need to promote the attractiveness of research careers and mobility was also outlined in the **2021 Council recommendation on a 'Pact for Research and Innovation in Europe'**, which underlined the need to equip Europe's researchers '*with the training and skills required to meet the changing needs of the researcher role across the Union*'.⁷¹ The **Council Recommendation on a European framework for research careers**, proposed by the Commission in July 2023, responds to these calls. It also

⁶⁶ European Commission (2021), European Research Area Policy Agenda – Overview of actions for the period 2022-2024, p.7.

⁶⁷ Information provided by DG RTD.

⁶⁸ Council of the European Union (2021), Deepening the European Research Area: Providing researchers with attractive and sustainable careers and working conditions and making brain circulation a reality - Council conclusions (adopted on 28/05/2021), available at: <https://data.consilium.europa.eu/doc/document/ST-9138-2021-INIT/en/pdf>

⁶⁹ Council of the European Union (2021), Improving conditions for research careers in Europe: Council adopts conclusions, Press release, available at: <https://www.consilium.europa.eu/en/press/press-releases/2021/05/28/improving-conditions-for-research-careers-in-europe-council-adopts-conclusions>.

⁷⁰ Over 1,400 organisations currently endorse the Charter and Code for Researchers, and over 700 have received the HRS4R award.

⁷¹ Council of the European Union, Council Recommendation on a Pact for Research and Innovation in Europe, p.13, available at: <https://data.consilium.europa.eu/doc/document/ST-13701-2021-INIT/en/pdf>

includes a **new Charter for Researchers**, developed following the guidance received from a dedicated report issued by the European Research Area and Innovation Committee (ERAC).⁷²

Implementation modalities of Action 4 rely on close cooperation between the Commission, Portugal and the Coimbra Group, which offered to sponsor this action. *Ad hoc* workshops take place with the participation of Member States, Associated Countries, stakeholders and experts to discuss relevant topics. A synergetic approach with other ERA Actions is ensured. In this regard, in a first meeting of the ERA Forum Action 4 delegates hosted by the European Commission on 1 February 2023, synergies of this Action with Actions 3, 5, 6, 13 and 17 were highlighted.⁷³

In particular, the European framework for research careers will cover aspects related to Open Science (Action 1), researchers' assessment (Action 3), gender equality (Action 5), freedom of scientific research (Action 6), and will support research careers in Higher Education Institutions (Action 13) and in research management (Action 17).⁷⁴

Regarding the first key strand of activities towards the development of a European framework for research careers, effective interaction with Member States, Associated Countries and stakeholders committed to Action 4 has allowed for a swift start of the implementation phase⁷⁵. This includes the adoption of the **Commission Proposal for a Council Recommendation on a 'European framework to attract and retain research, innovation and entrepreneurial talents in Europe'**.⁷⁶ The framework includes recommendations on:

- The recognition of research professions, and interoperability and comparability of research careers;
- Recruitment and working conditions;
- Researchers' skills for inter-sectoral and interdisciplinary careers and for entrepreneurship and innovation;
- Career development and progression;
- Balanced circulation of talents and making the Union an attractive destination;
- Support actions for research careers;
- Monitoring of research careers.

The proposal also includes in the annex the new Charter for Researchers.

⁷² <https://www.consilium.europa.eu/en/council-eu/preparatory-bodies/european-research-area-and-innovation-committee-erac>

⁷³ Coimbra Group (2023), European Research Area (ERA) Forum launches work on research careers, available at: <https://www.coimbra-group.eu/european-research-area-era-forum-launches-work-on-research-careers>.

⁷⁴ DG RTD, Promoting attractive research careers, talent circulation and mobility_explanatory document, p.9

⁷⁵ Information provided by DG RTD.

⁷⁶ European Commission (2023), Proposal for a COUNCIL RECOMMENDATION on a European framework to attract and retain research, innovation and entrepreneurial talents in Europe, 2023/0285, available at: <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=COM%3A2023%3A0436%3AFIN>

Regarding the second and third key strands of activities, swift implementation also allowed for: the launch of the ResearchComp website⁷⁷ to foster researchers' transversal skills and support inter-sectoral mobility⁷⁸; the launch of a Mutual Learning Exercise on Inter-sectoral mobility and knowledge valorisation, covering both Action 4 and Action 7; preparatory work for the development of the ERA Talent Platform⁷⁹, of the Research and Innovation Careers Observatory, and of a Horizon Europe pilot in support of early-career researchers which will focus on an investment approach to support organisational change for attractive and interoperable research careers.⁸⁰

Action 4 is being deployed in synergy with other EU-level strategies, such as the **European Strategy for Universities**, which aims at developing a framework for attractive and sustainable careers in higher education 'in synergy with the research career framework developed under the ERA'.⁸¹ The Strategy additionally aims at ensuring that universities provide the right tools to achieve excellence in research, a dimension that plays an important role in the effort to offer better working conditions and opportunities to researchers across the ERA.

As regards funding and funding opportunities in relation to Action 4, the **Horizon Europe** programme part dedicated to *Widening Participation and Strengthening the ERA* includes a dimension on reforming and enhancing the EU R&I system, which comprises an element related to the 'attractiveness of research careers and the links with higher education'.⁸²

The achievement of ambitions under Action 4 is supported by Horizon Europe calls, such as: those related to gender inclusiveness, which participate in improving career paths in research; ERA-Chairs⁸³, which aim to attract high-level researchers to a university or research centre located in a Widening Country; ERA Talents⁸⁴, which aim to boost the interoperability of careers and employability of R&I talents; and ERA Fellowships⁸⁵, which are provided to excellent researchers undertaking cross-border mobility. The European Cooperation in Science and Technology (COST)⁸⁶ actions are also worth mentioning, as they provide opportunities for researchers to boost their careers and contribute to promoting talent circulation.

⁷⁷ Information provided by DG RTD.

⁷⁸ The European Competence Framework for Researchers (ResearchComp) identifies the transversal skills researchers should have for successful inter-sectoral careers, and through a new dedicated website launched in July 2023 and targeting researchers, universities, training providers, and employers, it promotes awareness and training.

⁷⁹ The ERA Talent Platform to be developed under action 4 will act as a one-stop-shop for researchers and will include a revitalised EURAXESS. The EURAXESS' 'Researchers in Motion' can be used by researchers to get free tailored information and support to boost their careers through mobility. See: <https://euraxess.ec.europa.eu>.

⁸⁰ Information provided by DG RTD.

⁸¹ European Commission (2022), European Strategy for Universities, p. 26, available at: <https://education.ec.europa.eu/sites/default/files/2022-01/communication-european-strategy-for-universities-graphic-version.pdf>.

⁸² https://research-and-innovation.ec.europa.eu/funding/funding-opportunities/funding-programmes-and-open-calls/horizon-europe/widening-participation-and-spreading-excellence_en

⁸³ See https://rea.ec.europa.eu/funding-and-grants/horizon-europe-widening-participation-and-spreading-excellence/era-chairs_en

⁸⁴ https://rea.ec.europa.eu/funding-and-grants/horizon-europe-widening-participation-and-spreading-excellence/era-talents_en

⁸⁵ See https://rea.ec.europa.eu/funding-and-grants/horizon-europe-widening-participation-and-spreading-excellence/era-fellowships_en

⁸⁶ See: <https://www.cost.eu>

In addition, as mentioned above, the **RESAVER Pension Fund**, created by a consortium of employers and initially supported by the European Commission through Horizon 2020, is closely related to also Action 4 as it offers a pan-European pension solution for research organisations and their employees. This initiative facilitates the mobility of researchers during their careers, enabling them to remain affiliated with the same pension arrangements when moving between countries and jobs.⁸⁷ Under Action 4, RESAVER will be supported for wider uptake both in terms of geographical expansion and uptake in the countries where RESAVER is already operational, as well as the continuous improvement of its offerings.

The 2023 OECD STIP Survey provides information on policies and initiatives at EU and national levels on trends in science, technology and innovation policy. Its 2023 edition provides additional relevant insights into budget allocation for policies related to Action 4.⁸⁸

Figure below shows the **distribution of budget allocation** for policies related to Action 4 at EU level (27 Member States). It indicates that most Action 4-related policies tend to fall under the lower budget ranges, with the majority of policies being funded within a budget between EUR 1 million and EUR 5 million (205 policies) or of less than EUR 1 million (199 policies). Only 49 policies benefit from a funding range between EUR 100 and EUR 500 million. These policies are mostly related to EU funding (e.g., Marie Skłodowska-Curie Actions)⁸⁹ or Government investment policies at national level (e.g., 'Pakt für Forschung und Innovation' in Germany⁹⁰). Examples of initiatives with budgets of more than EUR 500 million include German Research Foundation (DFG) grants⁹¹ and the Polish Operational Programme for Smart Growth, particularly the priority axis IV on 'Increasing the Research Potential'⁹².

Figure also shows the distribution of policy instruments related to Action 4 at EU level (27 Member States). The major policy instrument related to Action 4 is direct financial support (402 policy instruments), followed by governance instruments (142 policy instruments). Indirect financial support is the policy instrument used in a minority of cases (53 policy instruments). Overall, governance tools include strategies, plans, reforms, regulatory tools, consultations of relevant stakeholders, the development of standards and certification, or public awareness campaigns.

Direct financial support can include institutional funding, various types of grants, procurement programmes dedicated to R&D&I, loans, credit and scholarships, equity financing or innovation vouchers. Indirect financial support includes social contributions

⁸⁷ Euraxess (2017), Flexibility of the Future – A pension that travels with your researchers, wherever they go... - RESAVER, Giving you the facts, p.2, available at https://www.euraxess.it/sites/default/files/policy_library/resaver_pension_factsheet-2017q1.pdf. See also: <https://www.resaver.eu>.

⁸⁸ The corresponding STIP Survey Themes for Action 4 are: Theme 24 'research and technology infrastructures', Theme 25 'internationalisation in public research', Theme 34 'Commercialization of public research results', Theme 51 'STEM skills', Theme 52 'Doctoral and postdoctoral researchers', Theme 53 'research careers', and Theme 55 'International mobility of human resources'. A wide range of initiatives are covered by these themes among the different Member States (e.g. policies, projects, funds, programmes).

⁸⁹ Data from the 2023 OECD STIP Survey.

⁹⁰ 'Pakt für Forschung und Innovation', Joint Science Conference – GWK website, available at: <https://www.gwk-bonn.de/themen/foerderung-von-ausseruniversitaeren-wissenschaftseinrichtungen/pakt-fuer-forschung-und-innovation>

⁹¹ 'Individual Research Grants, the German Research Foundation (DFG) website, available at: www.dfg.de/en/research_funding/programmes/individual/research_grants

⁹² 'Operational Programme for Smart Growth', Smart Growth programme website, available at: <https://www.poir.gov.pl/en/site/about-the-programme>

reliefs to foster corporate or private investment in R&D, as well as risk sharing schemes (i.e. to cover part of the losses that can be faced by lenders).

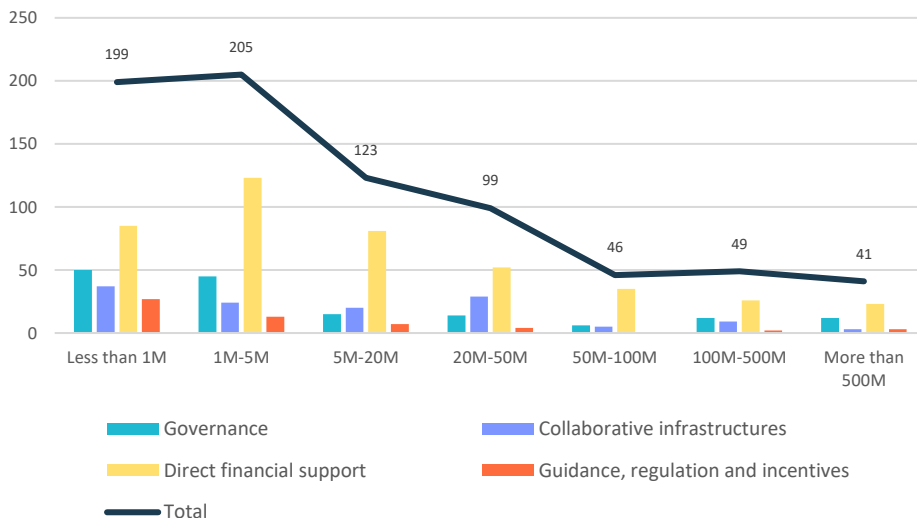


Figure 17: Action 4: Distribution of budget per policy instrument

5. Action 5: Promote gender equality and foster inclusiveness, taking note of the Ljubljana Declaration

5.1. Purpose of the Action and expected outcomes

This action aims at promoting inclusive gender equality in the ERA, while continuing to progress towards the three objectives that have underpinned the gender equality priority in the ERA since the 2012 Communication, i.e., promoting gender equality in careers at all levels, enhancing gender balance in decision-making, and integrating the gender dimension into research content.⁹³

The new inclusiveness dimension of gender equality policies in the ERA Policy Agenda 2022-2024 aims to better tackle intersections between gender and other social categorisations and personal identities (i.e. address intersectionality), as well as to take into account inclusiveness at the geographical and sectorial levels to ensure that all countries are on board, and that the innovation actors and the private sector are also involved, considering in particular the significant under-representation of women in the STEM-oriented innovative entrepreneurship domain.

The accomplishment of these objectives is interrelated in particular with the implementation of **Gender Equality Plans** (GEPs) in Horizon Europe as key drivers of institutional change.

⁹³ https://era.gv.at/public/documents/4587/05_-_Gender_equality_explanatory_document_revised.pdf

Having a GEP has been set as an eligibility criterion for all public bodies, higher education institutions and research organisations from EU Member States and Associated Countries aiming to participate in the Horizon Europe calls with deadlines in 2022 and onward.⁹⁴ This shift has been supported by a growing number of Member States that have a GEP requirement in place at national level.⁹⁵

The **Ljubljana Declaration on Gender Equality in Research and Innovation**, a core commitment to mainstream gender equality spearheaded by the Slovenian Presidency and endorsed by 25 Member States and the European Commission, also evidenced the role of GEPs as key policy instruments to achieve long-term and sustainable institutional change in the new ERA.⁹⁶

The approach to gender equality in R&I, as established in the Communication of 30 September 2020 on '**A new ERA for Research and Innovation**'⁹⁷ emphasises *inclusive* GEPs as a key priority in the new ERA and acknowledges that 'other characteristics such as racial and ethnic origin, disability, socioeconomic background or sexual orientation interact and can reinforce intersectional and specific forms of discrimination that may limit the impact of measures focused only on one characteristic'.⁹⁸ In addition, the Ljubljana Declaration identifies the need to address gender-based violence (GBV) in R&I, and to strengthen monitoring and evaluation of gender equality, including developing appropriate indicators to measure progress.

These EU-level initiatives aim to address some of the persistent inequalities and challenges in relation to gender equality across the R&I ecosystem in Europe, which are evidenced by key EU publications such as the She Figures⁹⁹.

Consequently, Action 5 envisages the following four outcomes:

- Develop a policy coordination mechanism to support all aspects of gender equality through inclusive Gender Equality Plans and policies, and a dedicated EU network on their implementation;
- A strategy to counteract gender-based violence, including sexual harassment, in the European R&I system and ensure gender equal and inclusive working

⁹⁴ REGULATION (EU) 2021/695 OF THE EUROPEAN PARLIAMENT AND OF THE COUNCIL of 28 April 2021 establishing Horizon Europe – the Framework Programme for Research and Innovation, laying down its rules for participation and dissemination, and repealing Regulations (EU) No 1290/2013 and (EU) No 1291/2013, available at: <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32021R0695&from=EN>. and COUNCIL DECISION (EU) 2021/764 of 10 May 2021 establishing the Specific Programme implementing Horizon Europe – the Framework Programme for Research and Innovation, and repealing Decision 2013/743/EU, available at: <https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:32021D0764&from=EN>

⁹⁵ <https://data.consilium.europa.eu/doc/document/ST-1202-2021-INIT/en/pdf>; https://h2020.generationer.eu/wp-content/uploads/2021/12/741466_Guidance-on-GEP-implementation-for-national-authorities-in-MS.pdf

⁹⁶ https://www.gov.si/assets/ministrstva/MIZS/Dokumenti/PSEU/Ljubljana-Declaration-on-Gender-Equality-in-Research-and-Innovation-_endorsed_final.pdf

⁹⁷ EUR-Lex - 52020DC0628 - EN - EUR-Lex (europa.eu)

⁹⁸ European Commission, 'Towards inclusive gender equality in Research and Innovation', Publication Office of the European Union, May 2022, available at: https://apre.it/wp-content/uploads/2022/07/KI0122349ENN.en_.pdf.

⁹⁹ <https://ec.europa.eu/research-and-innovation/en/knowledge-publications-tools-and-data/interactive-reports/she-figures-2021>

environments through institutional change in research funding and performing organisations;

- A policy approach to inclusive gender equality, that addresses gender mainstreaming and opening to intersectionality with other diversity dimensions to advance the new ERA;
- Develop principles for the integration and evaluation of the gender dimension in R&I content in cooperation with national RFOs.¹⁰⁰

5.2. Implementation of the Action

The European Commission, through **Horizon Europe**, has addressed gender equality at three crucial levels, that support Action 5.

First, it has introduced having a GEP as an eligibility criterion for certain categories of legal entities – core ones for ERA policy – from EU Member States and Associated Countries. This is done through a self-declaration at the proposal stage. Random compliance checks will be conducted annually, and a pilot is ongoing. This will provide key insights on GEP implementation and hence, gender equality and inclusiveness progress in the ERA, and ERA-supporting Horizon Europe projects funded under the ‘Widening participation and Strengthening the European Research Area’ (WIDERA) work programme are also monitoring GEP implementation at the national and institutional levels.¹⁰¹

Second, the integration of a gender dimension into research and innovation content is a requirement by default, unless the topic description explicitly specifies otherwise, and is evaluated under the excellence criterion.

Third, the programme has defined gender balance as a core objective. Therefore, it has set a target of 50% women in Horizon Europe related boards, expert groups and evaluation committees, and, furthermore, gender balance among researchers has been set as a ranking criterion for proposals with the same score.

The Horizon Europe WIDERA Work Programme directly supports the implementation of Action 5.¹⁰² Calls addressing inclusive gender equality in the ERA were launched as part of the 2021-2022 work programme. Additionally, further calls explicitly mentioning the objectives of Action 5 of the ERA Policy Agenda 2022-2024 are included in the 2023-2024 work programme, including the Policy support to facilitate the implementation of a zero-tolerance approach towards gender-based violence in the ERA.

Gender equality across the R&I ecosystem and, particularly, across R&I institutions has been strongly promoted through different EU-funded projects. In this context, project GENDERACTIONplus, funded under the 2021-2022 WIDERA work programme, was

¹⁰⁰ Gender equality in research and innovation, at https://research-and-innovation.ec.europa.eu/strategy/strategy-2020-2024/democracy-and-rights/gender-equality-research-and-innovation_en.

¹⁰¹ https://genderaction.eu/wp-content/uploads/2023/07/GENDERACTIONplus_D6.1_Benchmarking-analysis-of-monitoringevaluation-of-GEPs.pdf

¹⁰² https://ec.europa.eu/info/funding-tenders/opportunities/docs/2021-2027/horizon/wp-call/2023-2024/wp-11-widening-participation-and-strengthening-the-european-research-area_horizon-2023-2024_en.pdf

launched in June 2022, as a follow-up to project GENDERACTION¹⁰³. This project aims at supporting the coordination of gender equality and inclusiveness objectives of the new ERA through capacity building, mutual learning, and policy coordination. To this end, the project has formed two trans-national Communities of Practice, one of national authorities and one of national Research Funding Organisations.¹⁰⁴

Action 5 is also building on the Horizon 2020-funded project UniSAFE¹⁰⁵ which focuses on gender-based violence (GBV) in higher education and research, and has generated new research findings into the severity of the issue across the EU, with 62% of the more than 42,000 student and staff respondents declaring having experience at least one form of GBV. The project has developed two White Papers and recommendations for key stakeholders¹⁰⁶ and launched an extensive toolkit for research-performing organisations (RPOs)¹⁰⁷. The 2023 WIDERA topic on policy support for the implementation of a zero-tolerance approach towards GBV in the ERA will follow up on UniSAFE in supporting even more directly the specific related outcome set for Action 5, i.e., a strategy to counteract GBV, including sexual harassment, in the European R&I system.

The Action 5 work on GBV actually kicked off in November 2022 with the Czech Presidency Conference on Ending GBV in Academia and the resulting Call for Action¹⁰⁸, to which the Spanish Presidency responded in particular by organising a follow-up presidency conference in October 2023¹⁰⁹, both conferences showcasing the UniSAFE findings and tools.

At the EU policy level, there are initiatives such as the **EU strategy for universities**, in which the European Commission is committed to strengthening women's and girls' participation in STEM studies and careers through a roadmap of activities that have synergies with Action 5, just as Action 5 has synergies with other ERA Policy Agenda 2022-2024 actions, in particular Actions 3, 4 and 13.

Furthermore, in 2022, through the Horizon Europe WIDERA work programme, the European Commission established the **EU Award for Gender Equality Champions**, a new prize recognising academic and research organisations driving the change towards gender equality in research and innovation through (inclusive) GEPs¹¹⁰ and which is meant as a complement to the GEP eligibility criterion introduced in Horizon Europe as well as an incentive for achieving the ERA Action 5 objectives.

Importantly, based on the impactful work developed by the ERAC Standing Working Group on Gender in Research and Innovation,¹¹¹ the **ERA Forum** has set up a subgroup on **Inclusive Gender Equality in the European Research Area** to support the implementation of ERA Action 5. The subgroup kicked-off its activities in March 2023, is co-chaired by the Czech Republic, and gathers nominated representatives from 22 Member

¹⁰³ <https://genderaction.eu>

¹⁰⁴ <https://genderaction.eu/events/rfos-community-of-practice-meets-second-time>

¹⁰⁵ <https://unisafe-gbv.eu/>

¹⁰⁶ <https://zenodo.org/communities/unisafe/?page=1&size=20>

¹⁰⁷ <https://unisafe-toolkit.eu/>

¹⁰⁸ <http://gbv2022.soc.cas.cz/index.html>

¹⁰⁹ <https://www.conferencegenderacademia.com/>

¹¹⁰ https://research-and-innovation.ec.europa.eu/funding/funding-opportunities/prizes/eu-award-gender-equality-champions_en

¹¹¹ <https://www.consilium.europa.eu/en/council-eu/preparatory-bodies/european-research-area-and-innovation-committee-erac>

States, 3 Associated Countries, and 14 stakeholder organisations¹¹². Furthermore, a Task Force on GBV was created withing the ERA Action 5 in October 2023.

As highlighted earlier, Action 5 not only focuses on advancing gender equality but also on **fostering inclusiveness**, in particular through intersectionality. As defined by the European Institute for Gender Equality (EIGE),¹¹³ intersectionality is the '*analytical tool for studying, understanding and responding to the ways in which sex and gender intersect with other personal characteristics/identities, and how these intersections contribute to unique experiences of discrimination*'. However, to help better frame intersectionality and inclusiveness in the context of R&I, a policy-support project is funded under the 2021 WIDERA work programme, project INSPIRE, with the ambition of creating a European Centre of Excellence on inclusive gender equality in R&I¹¹⁴.

National policy examples

Several national policies and initiatives have been developed in the past years to better support the inclusion of marginalised groups. The DG Research and Innovation pilot report on *Approaches to inclusive gender equality in research and innovation (R&I)*¹¹⁵ published in September 2022 compiles a review of emerging practices for inclusive gender equality in national R&I systems across Europe. For example, the **Netherlands** developed in 2020 an integrated 'National action plan for more diversity and inclusion in higher education and research' that includes other grounds of discrimination besides gender.¹¹⁶

Another example is in **Austria**, where the *National strategy on the social dimension of higher education - Towards more inclusive access and wider participation* incorporates the intersectional perspective to gender equality¹¹⁷. This strategy considers the interaction of 'diversity markers', which can be gender, ethnic/migrant origin, disability and/or chronic illness, a lower socio-economic background, care responsibilities, or early school leavers. In defining actions to enhance the access to higher education for underrepresented groups. Similarly, in **Norway**, the Committee for Gender Balance and Diversity in Research (KIF) considers how gender and ethnicity interact and foster inequalities in higher education institutions and research institutes¹¹⁸.

For further assessing the impact of its policies and the relation between gender equality and intersectionality, DG Research and Innovation also commissioned a *study to examine the*

¹¹² The ERA Action 5 subgroup gathers 22 Member States (AT, BE, BG, CY, CZ, DE, DK, EE, ES, FI, FR, HR, IE, LT, LU, LV, NL, PL, PT, SE, SI, SK), 3 Associated Countries (GE, NO, IL) and 14 Stakeholder umbrella organisations from 5 categories: Category 1 - Higher education institutions (AURORA, CESAER, Coimbra Group, EUA, EuroTech, The Guild, YERUN); Category 2 - Research performing organisations (EARTO, EASSH, EU-LIFE, G6); Category 4 - Individual Researchers & Innovators (Eurodoc); Category 6 - Academies of Science (ALLEA); Category 7 - Research funding organisations (Science Europe).

¹¹³ EIGE. Glossary and thesaurus. <https://eige.europa.eu/publications-resources/thesaurus/terms/1050>

¹¹⁴ <https://www.inspirequality.eu/>

¹¹⁵ European Commission, Directorate-General for Research and Innovation, *Approaches to inclusive gender equality in research and innovation (R&I)* -, Publications Office of the European Union, 2022, <https://data.europa.eu/doi/10.2777/004694>

¹¹⁶ <https://www.government.nl/documents/reports/2020/09/01/national-action-plan-for-greater-diversity-and-inclusion-in-higher-education-and-research>

¹¹⁷ Austrian Federal Ministry of Education, Science and Research, n.d., 'Universities', available from: [https://www.bmbwf.gv.at/en/Topics/Higher-education---universities/Higher-education-system/Universities.html#:~:text=The%20Universities%20Act%20\(%20UG%20\)%20entered,financed%20by%20the%20public%20purse](https://www.bmbwf.gv.at/en/Topics/Higher-education---universities/Higher-education-system/Universities.html#:~:text=The%20Universities%20Act%20(%20UG%20)%20entered,financed%20by%20the%20public%20purse)

¹¹⁸ Kifinfo, n.d., 'KIF Committee's recommendations for gender balance', available at: <https://kifinfo.no/en/kif-committees-recommendations-gender-balance>

impacts that EU and national policies and programmes supporting or imposing Gender Equality Plans (GEPs) in research organisations have actually had on gender equality across the ERA. This study focused not only on GEPs but also on inclusive GEPs. The key research findings, good practice examples, and policy recommendations from the study were discussed in an event conducted in March 2023¹¹⁹, and the study will soon be available.

In addition, the GENDERACTIONplus project has recently carried out a benchmarking on intersectionality and inclusiveness in R&I, which underscores that while intersectionality and inclusiveness are increasingly supported as a general approach, this principle has until now very rarely been operationalised in concrete policies and actions.¹²⁰

Finally, the 2023 OECD STIP Survey provides key information on policies and initiatives both at the EU level but also national on trends in science, technology and innovation policy. Regarding policies related to Action 5, the **budget distribution** presented in Figure 18 illustrates that the funds allocated to policies promoting ERA Action 5 tend to fall under the smallest budget ranges (less than EUR 1M, between EUR 1 and 5M and between EUR 5 and 20M), partially as a result of the prominence of governance as the policy instrument most used within this action.

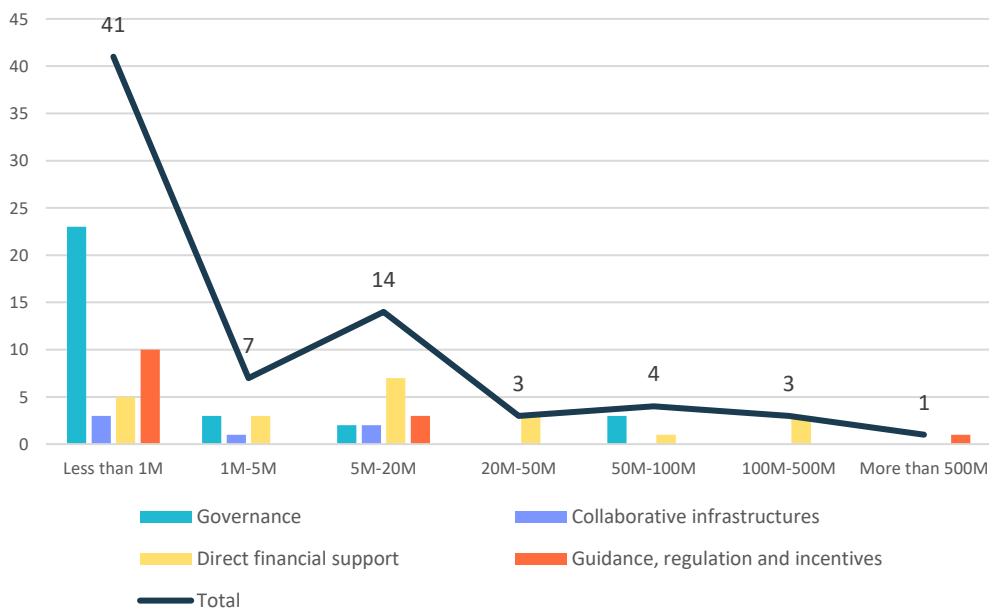


Figure 17: Action 5: Distribution of budget per policy instrument

¹¹⁹ <https://research-innovation-community.ec.europa.eu/events/3Qjx4x09PWZni0QK9RRReB/overview>

¹²⁰ https://genderaction.eu/wp-content/uploads/2023/05/GENDERACTIONplus_D2.1_Benchmarking-report-on-terminology-and-policy-on-intersectionality.pdf

6. Action 6: Protect academic freedom

6.1. Purpose of the Action and expected outcomes

Freedom of scientific research and academic freedom is safeguarded by Article 13 of the Charter of Fundamental Rights of the EU (2000/C 364/01).¹²¹ Both are fundamental pillars of the EU's commitment to safeguarding knowledge and promoting intellectual autonomy. However, the autonomy of scientific research and academic institutions often faces threats in cases where foreign actors exert control over international academic and research collaborations.

Repression can extend beyond borders, endangering HEI's, research performing organisations, and individual scholars who may be compelled to engage in self-censorship. In response, this action seeks to protect freedom of scientific research and promote the development of tools to address foreign interference in research and innovation (R&I) and facilitate collaboration among Member States on this topic.

ERA Action 6 consists of two main elements¹²²:

- Fostering the formulation of a comprehensive policy framework aimed at preserving and promoting academic freedom throughout Europe.
- Providing substantial backing to HEIs, RPOs and RTOs in their efforts to identify and address issues related to foreign interference in Research and Innovation (R&I) activities.

Statements have been published to define academic freedom.¹²³ Annex I of the European Higher Education Area (EHEA) Rome 2020 ministerial Communiqué¹²⁴ defines it as the 'freedom of academic staff and students to engage in research, teaching, learning, and communication in and with society without interference nor fear of reprisal'.

The Bonn Declaration on Freedom of Scientific Research published in 2020¹²⁵ mentions that freedom of scientific research is a broad concept which is related to freedom of expression, freedom of association, freedom of movement, and the right to education, among other rights. It includes the freedom to independently formulate research inquiries, select and refine theoretical frameworks, collect empirical data, and apply rigorous academic research methodologies. It also encompasses the ability to challenge established conventions and present innovative concepts.

This action aligns with ERA Priority 1, which aims to deepen a truly functioning international market for knowledge, by ensuring the protection and monitoring of academic freedom.

¹²¹ https://www.europarl.europa.eu/charter/pdf/text_en.pdf

¹²² https://era.gv.at/public/documents/4589/06__Academic_freedom_in_europe_explanatory_document_revised.pdf

¹²³ <https://era.gv.at/era/era-policy-agenda/era-actions-templates>

¹²⁴ https://ehea.info/Upload/Rome_Ministerial_Communique_Annex_I.pdf

¹²⁵ https://www.bmbf.de/bmbf/shareddocs/downloads/files/_drp-efr-bonner_erklaerung_en_with-signatures_maerz_2021.pdf?__blob=publicationFile&v=1

Action 6 also contributes to the objectives of the G7 Working Group on the Security and Integrity of the Global Research Ecosystem (SIGRE).¹²⁶

This Action is expected to have four outcomes¹²⁷:

- Facilitate the development of a policy approach to safeguard the freedom of scientific research in Europe, based on the Bonn Declaration on freedom of scientific research by publishing the first European monitoring report on the freedom of scientific research.
- Organise mutual learning exercise on tackling R&I foreign interference among interested MS.
- Set up of a one-stop shop European digital platform on academic freedom and foreign interference in R&I.
- Develop Open-Source Intelligence Tool (OSINT) for research organizations and universities, offering easily accessible information on foreign institutions, individuals, technologies, affiliations, research projects and universities.

6.2. Implementation of the Action

On 18 January 2022, the European Commission released a **Staff Working Document on Tackling Research and Innovation Foreign Interference**.¹²⁸ It provides a comprehensive strategy for tackling foreign interference in EU HEIs and RPOs across four categories: values, governance, partnerships, and cybersecurity:

- In terms of values, the strategy involves identifying countries and partner institutions where academic freedom is at risk, conducting vulnerability assessments, providing training to personnel, and supporting scholars and researchers working on sensitive topics.
- The governance aspect emphasises the need for a Code of Conduct for Foreign Interference, the establishment of a Foreign Interference Committee, and procedures for identifying and addressing internal conflicts of interest.
- Regarding partnerships, the strategy suggests developing risk management systems, performing due diligence on potential partners, negotiating robust partnership agreements, and monitoring their implementation.
- Cybersecurity measures focus on raising awareness of risks, training personnel in cyber hygiene, implementing detection and prevention measures, and establishing incident response and recovery procedures.

¹²⁶ https://www.bmbf.de/SharedDocs/Downloads/de/2022/220812-g7-sigre-paper.pdf?__blob=publicationFile&v=3

¹²⁷ https://era.gv.at/public/documents/4589/06_-_Academic_freedom_in_europe_explanatory_document_revised.pdf

¹²⁸ <https://op.europa.eu/en/publication-detail/-/publication/3faf52e8-79a2-11ec-9136-01aa75ed71a1/language-en>

National policy example

Beyond the EU, **Norway** has demonstrated a commitment to academic freedom through policy initiatives. In the recently revised Long-term Plan for Research and Higher Education, specific objectives and priority areas were outlined, serving as a tool for coordinating the government's research policy. The government's white paper on the governance of public universities and university colleges presented in 2021 by the Norwegian Parliament, explicitly supports academic freedom and university self-governance, proposing changes to implement this policy.

The European Commission published its **European Strategy for Universities**¹²⁹ on January 18, 2022, committing to ensuring academic freedom in higher education institutions at the heart of all higher education policies developed at the EU level, as well as the Bologna Process. It was accompanied by a proposal for a Council Recommendation on bridging gaps for effective European higher education cooperation, as well as a European Commission staff working document on what is required to foster and protect academic freedom, institutional autonomy, and fundamental values. On April 6, 2022, the EU ministers for higher education adopted Council conclusions and recommendations for strategic autonomy and emphasise freedom of scientific research across Europe.¹³⁰

The Protection of Higher Education Institutions and Research Organisations against conventional and Non-conventional Threats project, launched in June 2021, is part of **the Horizon Europe Framework Programme**. The goals of this project are to enhance the awareness of HEIs and research organisations regarding both conventional and unconventional threats, to strengthen their capabilities to prevent and address non-conventional threats and to enhance their resilience. Additionally, it aligns with EU actions promoting academic freedom and seeks to advance the objectives of this ERA action¹³¹.

Recognising the significance of academic freedom, EP President Roberta Metsola initiated the STOA initiative called the **EP Forum for Academic Freedom**, during a conference held on 28 November 2022.¹³² A key outcome of this initiative is the creation of an annual **Academic Freedom Monitor**, which will assess the state of academic freedom within the EU. The newly established EP Forum for Academic Freedom aims at raising awareness about the magnitude of threats faced by academics and scientists within the EU.

¹²⁹ <https://education.ec.europa.eu/document/commission-communication-on-a-european-strategy-for-universities>

¹³⁰ <https://data.consilium.europa.eu/doc/document/ST-7936-2022-INIT/xx/pdf>

¹³¹ <https://ec.europa.eu/info/funding-tenders/opportunities/portal/screen/opportunities/topic-details/horizon-widera-2021-era-01-50;callCode=HORIZON-WIDERA-2021-ERA-01;freeTextSearchKeyword=;matchWholeText=true;typeCodes=1;statusCodes=31094501,31094502,31094503;programmePeriod=null;programCcm2Id=null;programDivisionCode=null;focusAreaCode=null;destinationGroup=null;missionGroup=null;geographicalZonesCode=null;programmeDivisionProspect=null;startDateLte=null;startDateGte=null;crossCuttingPriorityCode=null;cpvCode=null;performanceOfDelivery=null;sortQuery=sortStatus;orderBy=asc;onlyTenders=false;topicListKey=callTopicSearchTableState>

¹³² <https://www.europarl.europa.eu/stoa/en/about/stoa-network>

7. Action 7: Upgrade EU guidance for a better knowledge valorisation

7.1. Purpose of the Action and expected outcomes

This Action aims to address the various needs of the R&I landscapes in the context of the management of intellectual property in knowledge transfer activities. It aims to catalyse the move from the traditional concept of knowledge transfer to valorisation of knowledge assets. It also addresses the increasingly complex knowledge value-chains, new market opportunities created by emerging technologies, new forms of industry-academia collaborations and involvement of citizens, as well as reciprocity in the management of intellectual property in international R&I cooperation.

The goal of this action is to establish a unified approach to measures and policy instruments that enhance knowledge sharing and valorisation in Europe. This Action includes the following 3 expected outcomes:

- Develop and endorse Guiding Principles for knowledge valorisation;
- Development of a Code of Practice for smart use of IP together with stakeholders;
- Development of a Code of Practice for researchers on standardisation.

The Guiding Principles for knowledge valorisation will entail a political commitment co-designed with, and endorsed by, Member States. The intent of the Guiding Principles is to cater to the needs and feedback of knowledge valorisation actors, and to present a legal reference to encourage knowledge circulation and valorisation in Europe.

These guidelines will also help address knowledge valorisation gaps in Member States and guarantee that Widening Countries can better benefit from R&I results. Codes of Practice will offer guidance to R&I professionals on the implementation of specific aspects of knowledge valorisation, such as intelligent intellectual property management and standardization for effective knowledge uptake.

7.2. Implementation of the Action

On 22 December 2022, the Council of the EU adopted a **Recommendation on the guiding principles for knowledge valorisation**.¹³³ The purpose of the Recommendation is to establish a unified approach to policy principles and measures for national, regional, and local policymakers, with the goal of optimizing the translation of research and innovation outcomes into solutions that have a positive impact on society. The Recommendation was enacted on 1st March 2023 to reinforce the implementation of the guiding principles in knowledge valorisation. A Code of Practice on intellectual assets management¹³⁴ and a Code of Practice on standardization¹³⁵ were adopted. These codes

¹³³ https://research-and-innovation.ec.europa.eu/research-area/industrial-research-and-innovation/eu-valorisation-policy/knowledge-valorisation-platform/guiding-principles-knowledge-valorisation-implementing-codes-practice_en

¹³⁴ <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32023H0499&qid=1678171231088>

provide comprehensive guidance on managing intellectual assets and standardisation, respectively, offering more detailed support in these areas of knowledge valorisation.

To engage stakeholders and Member States in the implementation of the recommendations, the European Commission launched an **Awareness raising campaign** on knowledge valorisation¹³⁶ in March 2023, which received much commitment from Member States for hosting national awareness raising events. In addition, the campaign also includes stakeholder events organised by the European Commission. In parallel, a **Mutual Learning Exercise on knowledge valorisation**¹³⁷ was launched in March 2023 with the aim of defining concrete operational recommendations and delivering a policy toolbox identifying best practices and strategies, helping to implement the guiding principles in the Member States.

In addition, a Coordination and Support Action on fostering knowledge valorisation through societal and cultural interactions is funded by the Horizon Europe Framework Programme. It aims to enhance collaboration between arts, citizens, and industry to foster innovative, socially accepted solutions to societal challenges, while engaging diverse communities and enhancing skill development for a prepared, recoverable, and transition-ready society¹³⁸.

The **EU Knowledge Valorisation Platform**¹³⁹ facilitates the exchange of good practices on knowledge valorisation to enhance the capacities and skills of stakeholders at all levels in line with the EU guidance developed under Action 7. The registry of good practices, which is filled by Member States and stakeholders themselves, counts more than 100 examples from across Europe and covering all knowledge valorisation channels.

The **EU Knowledge Valorisation Week** is a yearly event that brings together knowledge valorisation actors across Europe. It provides a unique occasion for studying and learning from excellent examples, discussing current trends and challenges in valorisation, and highlighting opportunities with a wide range of stakeholders. The 2023 edition of the Week (25-28 April 2023)¹⁴⁰ focused on knowledge valorisation for sustainability, management of intellectual assets and industry-academia cooperation. Two **communities of practice**¹⁴¹

¹³⁵ https://research-and-innovation.ec.europa.eu/research-area/industrial-research-and-innovation/eu-valorisation-policy_en#modal

¹³⁶ https://research-and-innovation.ec.europa.eu/research-area/industrial-research-and-innovation/eu-valorisation-policy/knowledge-valorisation-platform/thematic-focus/join-european-union-campaign-boost-knowledge-valorisation_en

¹³⁷ https://research-and-innovation.ec.europa.eu/research-area/industrial-research-and-innovation/eu-valorisation-policy/knowledge-valorisation-platform/thematic-focus/mutual-learning-exercise-knowledge-valorisation_en

¹³⁸ [https://ec.europa.eu/info/funding-tenders/opportunities/portal/screen/opportunities/topic-details/horizon-cl4-2023-human-01-](https://ec.europa.eu/info/funding-tenders/opportunities/portal/screen/opportunities/topic-details/horizon-cl4-2023-human-01-33;callCode=null;freeTextSearchKeyword=knowledge%20valorisation;matchWholeText=true;typeCodes=0,1,2,8;statusCodes=31094501,31094502,31094503;programmePeriod=null;programCcm2Id=43108390;programDivisionCode=null;focusAreaCode=null;destinationGroup=null;missionGroup=null;geographicalZonesCode=null;programmeDivisionProspect=null;startDateLte=null;startDateGte=null;crossCuttingPriorityCode=null;cpvCode=null;performanceOfDelivery=null;sortQuery=sortStatus;orderBy=asc;onlyTenders=false;topicListKey=topicSearchTablePageState)

[33;callCode=null;freeTextSearchKeyword=knowledge%20valorisation;matchWholeText=true;typeCodes=0,1,2,8;statusCodes=31094501,31094502,31094503;programmePeriod=null;programCcm2Id=43108390;programDivisionCode=null;focusAreaCode=null;destinationGroup=null;missionGroup=null;geographicalZonesCode=null;programmeDivisionProspect=null;startDateLte=null;startDateGte=null;crossCuttingPriorityCode=null;cpvCode=null;performanceOfDelivery=null;sortQuery=sortStatus;orderBy=asc;onlyTenders=false;topicListKey=topicSearchTablePageState](https://ec.europa.eu/info/funding-tenders/opportunities/portal/screen/opportunities/topic-details/horizon-cl4-2023-human-01-33;callCode=null;freeTextSearchKeyword=knowledge%20valorisation;matchWholeText=true;typeCodes=0,1,2,8;statusCodes=31094501,31094502,31094503;programmePeriod=null;programCcm2Id=43108390;programDivisionCode=null;focusAreaCode=null;destinationGroup=null;missionGroup=null;geographicalZonesCode=null;programmeDivisionProspect=null;startDateLte=null;startDateGte=null;crossCuttingPriorityCode=null;cpvCode=null;performanceOfDelivery=null;sortQuery=sortStatus;orderBy=asc;onlyTenders=false;topicListKey=topicSearchTablePageState)

¹³⁹ https://research-and-innovation.ec.europa.eu/research-area/industrial-research-and-innovation/eu-valorisation-policy/knowledge-valorisation-platform_en

¹⁴⁰ <https://research-innovation-community.ec.europa.eu/events/rF2UaVBFdp7axYkmpZ0Q4/overview>

¹⁴¹ https://research-and-innovation.ec.europa.eu/research-area/industrial-research-and-innovation/eu-valorisation-policy/knowledge-valorisation-platform/thematic-focus/communities-practice-complete-their-work-co-create-codes-practice-industry-academia-collaboration_en

were launched in March 2023 to develop further guidance for R&I actors in the field of industry-academia collaboration and citizen engagement for knowledge valorisation.

The EU has implemented a range of actions to promote knowledge valorisation and bridge the gap between research and practical applications. These actions include - among other initiatives- the **contractual public-private partnerships (cPPPs)** that aim to align public and private investments to expedite the translation of research findings from the laboratory to market-ready products and solutions, and the European Innovation Council schemes that support game changing innovations throughout the lifecycle from early-stage research to proof of concept, technology transfer, and the financing and scale up of start-ups and SMEs.

To support the early-stage development of research outputs, the European Research Council (ERC) offers the **Proof of Concept (ERC-POC) program**¹⁴². The ERC-POC program provides funding to cover activities that bridge the gap between research discoveries and the commercial or social viability of propositions. By nurturing promising research outcomes, the program enhances the potential for economic and societal impact.

The **Marie Skłodowska-Curie Actions (MSCA)**¹⁴³ act as enablers for innovation, notably by attracting, training and retaining the research human capital that would drive innovation forward. With its emphasis on transferable skills training, inter-sectoral inter-disciplinary collaborations and promotion of innovative and entrepreneurial mind-sets, the programme nurtures the innovative potential of researchers in the EU innovation landscape.

In addition to these initiatives, the EU established **EIT Knowledge and Innovation Communities (KICs)**¹⁴⁴ that bring together businesses, research centres, and universities. Furthermore, the **Standardisation Booster**¹⁴⁵ was established with funding from Horizon Europe, to assist researchers in testing the relevance of their results for standardization.

Other initiatives include the **European IPR Helpdesk**,¹⁴⁶ which supports SMEs and research activities in managing and valorising intellectual property rights, and the **IP Booster**,¹⁴⁷ a specialised service assisting public research organizations in extracting value from their research results. To enhance knowledge dissemination, the **Horizon Results Platform**¹⁴⁸ serves as a central hub for showcasing the outcomes of Horizon 2020 projects, enabling stakeholders to connect with innovators and industry players.

With respect to budget the 2023 OECD STIP Survey shows (see Figure 18) that the funds allocated to policies strengthening the ERA Action 7 tend to fall under the medium budget ranges (less than EUR 1M, between EUR 1 and 5M and between EUR 5 and 20M), with fewer policies receiving high volume of fundings (between EUR 100M and EUR 500M and over EUR 500M). Examples of governance initiatives with budgets of more than EUR 500 million include the National Strategy for Research, Innovation and Smart Specialisation

¹⁴² <https://erc.europa.eu/news-events/news/Proof-of-Concept-Grants-2022#:~:text=The%20Proof%20of%20Concept%20grant,made%20through%20their%20ERC%20projects.>

¹⁴³ <https://marie-sklodowska-curie-actions.ec.europa.eu/about-msca>

¹⁴⁴ <https://eit.europa.eu/our-communities/eit-innovation-communities>

¹⁴⁵ <https://hsbooster.eu/about-0>

¹⁴⁶ https://intellectual-property-helpdesk.ec.europa.eu/regional-helpdesks/european-ip-helpdesk_en

¹⁴⁷ <https://ipbooster.meta-group.com>

¹⁴⁸ <https://ec.europa.eu/info/funding-tenders/opportunities/portal/screen/opportunities/horizon-results-platform>

2022-2027¹⁴⁹ in Romania and the Enterprise Policy - "To The Top"¹⁵⁰ in the Netherlands. An example of a direct financial support instrument within the highest budget range includes the Programme of Revitalisation and Training on Processes of Exchange and Knowledge Transfer funded by the Spanish National Research Council.

With respect to the **types of policy instruments** being employed to push forward the objective of Action 7, direct financial support is the most used instrument. This financial support includes project grants, institutional funding for public research, credits, or loans for firms. The second two most used instruments are governance and guidance, regulation, and incentives. Governance entails instruments such as strategies, action plans, reform of governance structure or public awareness campaigns. Guidance, regulation, and incentives constitute instruments that ease business procedures, public practices and legislations, cross-border funding and adaptation of intellectual property.

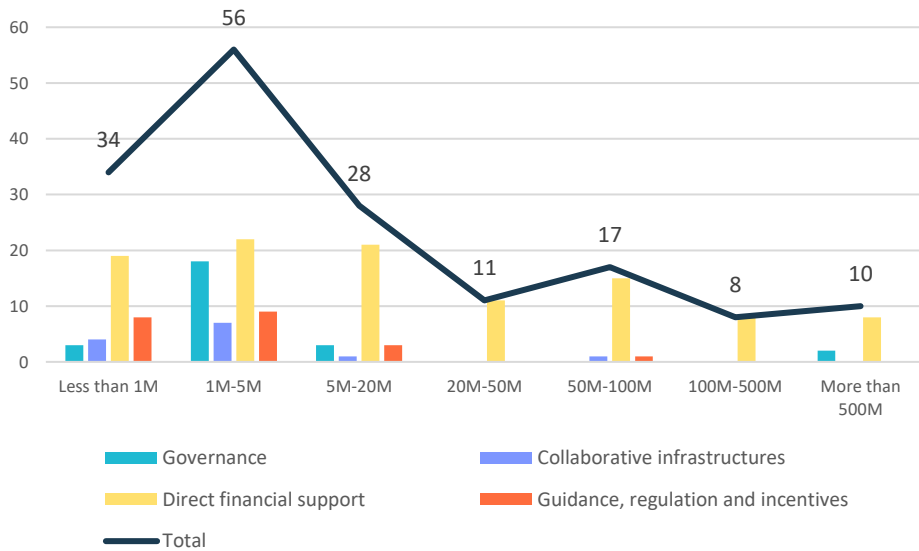


Figure 18: Action 7: Distribution of budget per policy instrument

¹⁴⁹ 'Strategia Națională de Cercetare, Inovare și Specializare Inteligentă 2022-2027', Romanian government website, available at: <https://www.research.gov.ro/transparența-decizională/strategia-națională-de-cercetare-inovare-si-specializare-inteligenta-2022-2027>

¹⁵⁰ 'Corporate policy in focus', Ministry of Economy Affairs and Climate website, available at: www.bedrijvenbeleidinbeeld.nl

8. Action 8: Strengthen sustainability, accessibility and resilience of research infrastructures

8.1. Purpose of the Action and expected outcomes

ERA Action 8 aims to reinforce Europe's research and innovation system through a set of European-level initiatives in the field of research infrastructures. The goal is to strengthen sustainability in terms of funding and investments, ensuring for researchers and innovators equal opportunities to access services provided by European infrastructures and increasing the impact of the investment made in research infrastructures on economy and society.¹⁵¹

European-level activities have contributed to the development of a mature research infrastructure landscape. Existing frameworks like the ESFRI Roadmap, the European Charter for Access to research infrastructures and the ERIC Legal Framework will be improved. Furthermore, through enhanced analysis and the implementation of new funding models and performance monitoring methodologies, persistent and emerging challenges will be effectively addressed.

This Action aims to achieve five outcomes, with a focus on sustaining long-term excellence and competitiveness within the ERA:

- Strategic analysis of the European Research Infrastructure landscape;
- Broader and more sustainable access for all countries to European research infrastructures and their services and revision of the European Charter of Access to Research Infrastructures;
- Update of the ESFRI Roadmap and implementation of the research infrastructures performance monitoring framework;
- Report on the ERIC Framework;
- Increased cooperation between research infrastructures, e-infrastructures and stakeholders, including through EOSC.

Action 8 addresses European research infrastructures and their interface with technology infrastructures, which is also relevant to Action 12, where technology infrastructures linked to Industrial policy will be addressed.

8.2. Implementation of the Action

As this Action by far pre-dates the first ERA Policy Agenda, a number of tools already exist to support its implementation. First, the **European Strategy Forum on Research Infrastructures (ESFRI)**¹⁵², established in 2002, is a platform for coordinating and prioritising the development of European research infrastructures, involving national

¹⁵¹ European Commission (2021), European Research Area Policy Agenda – Overview of actions for the period 2022-2024, p.10-11.

¹⁵² https://research-and-innovation.ec.europa.eu/strategy/strategy-2020-2024/our-digital-future/european-research-infrastructures/esfri_en

governments, the scientific community, and the Commission. It plays a vital role in identifying and promoting key research infrastructures that are crucial for addressing major scientific challenges and driving European research and innovation.

The **ESFRI Workplan for 2022-2023** is ambitious as it focuses on implementing a number of activities entrusted to ESFRI by the Competitiveness Council's Council Conclusions and Action 8 of the ERA Policy Agenda. To accomplish this, specialised ESFRI expert groups have been established to propose action plans and carry out mandates related to improving access to research infrastructures, ensuring sustainable funding, assessing impact, fostering industry collaboration, promoting international cooperation, conducting strategic analysis, enhancing transparency, and engaging stakeholders.¹⁵³

Second, the **European Research Infrastructure Consortium (ERIC)**, established in 2009, reflects the European commitment to facilitating collaborative research and efficient utilisation of research infrastructures among member countries. The increasing number of ERIC applications and the growing community of established ERICs serve as clear indicators of the success of this legal entity. Furthermore, this success has served as an inspiration for the emergence of another distinct legal entity, the **European Digital Infrastructure Consortium (EDIC)** which focuses on advancing digital infrastructure initiatives within the European context.

National policy examples

Czechia has an Innovation Strategy and Smart Specialisation Strategy to prioritize R&D&I. It supports large research infrastructures, aims to strengthen collaboration between research and industry, and increase participation in EU Framework Programmes.

Cyprus is developing its National R&I Strategy 2030, which will address the government's priorities in R&I and the needs of the national R&I ecosystem. The strategy will be based on the 'Innovate Cyprus 2019-2023' framework and the national long-term strategy 'Vision 2035'. The pillar 'competence and excellence' aims to support research capacity and excellence by focusing on human resources, research infrastructures, and open science.

Finland is also committed to improving research infrastructures and creating an environment that fosters innovation within its commitment to reach a 4% R&D investment level by 2030. Efforts are being made to strengthen research infrastructure, including increasing funding for universities, universities of applied sciences, and public research institutes.

Third, **research infrastructures** are also recognised as a fundamental pillar within **Horizon Europe** and, hence, the key funding program for fostering research infrastructures in the period 2021-2027. Within the program, significant funding has been allocated to research infrastructures, including universities, public research organizations, and private research centres, to support their efforts in advancing knowledge, driving innovation, and addressing societal challenges. Horizon Europe offers various funding opportunities, such as grants for

¹⁵³ <https://www.esfri.eu/esfri-workplan>

research projects, fellowships, and collaborative initiatives, enabling research institutions to pursue cutting-edge research and develop innovative solutions.¹⁵⁴

During the reporting period the following activities can be highlighted:

- Strategic analysis of the European Research Infrastructure landscape.

The Landscape analysis is decoupled from the ESFRI Roadmap: a new methodology developed by ESFRI was implemented, with surveys, more strategic gap analysis based on user needs and considering impact as well. Ongoing work is taking place in parallel per large domain and on cross-cutting aspects with contribution of several ESFRI Groups.

- Broader and more sustainable access for all countries to European research infrastructures and their services and revision of the European Charter of Access to Research Infrastructures.

Surveys to identify evolving needs and challenges to access were completed. Key findings and recommendations (on legal, institutional, financial and technical aspects) as well as main orientations for the revision of the Charter were discussed at within ESFRI and with ESFRI Stakeholders.

- Update of the ESFRI Roadmap and implementation of the research infrastructures performance monitoring framework.

The steps towards the next ESFRI Roadmap and general timeline are under discussion. With regards to monitoring: a first batch of 12 ESFRI Landmarks was completed, and a public report is available (highlighting overall good performance of the RIs but sustainable funding still a challenge). A second batch (11 Landmarks) has been launched and will be followed by third and last batch (8 Landmarks).

- Report on the ERIC Framework

The third Commission report on the application of the ERIC Regulation was adopted in August 2023. With 26 ERICs and several in the pipeline, the legal framework is instrumental in structuring and integrating resources within the ERA. However, the financial and operational sustainability of the ERICs remain a challenge. The report recommends that further effort is needed to strengthen the access of programmes of the ERICs and the availability of their services, to increase synergies among the different potential funding sources, to facilitate the engagement with international partners, and to address several operational challenges.

- Increased cooperation between research infrastructures, e-infrastructure and stakeholders, including through EOSC.

Several cooperation channels have been put in place or have been reinforced, which includes regular engagement of the ESFRI Stakeholder Forum and the ESFRI-EOSC task force, which is to ensure a structured interface between the ESFRI Forum and the EOSC Steering Board beyond the current ad-hoc cooperation. It should help reduce the

¹⁵⁴ https://research-and-innovation.ec.europa.eu/system/files/2022-06/ec_rtd_he-investing-to-shape-our-future_0.pdf

fragmentation of the research data landscape in Europe and assist in increasing FAIR research data productivity in Europe. Moreover, the ERIC Forum received a new Horizon Europe grant for further cooperation among ERICs, integration in ERA and contribution to EU policies.

9. Action 9: Promote international cooperation

9.1. Purpose of the Action and expected outcomes

ERA Action 9 has a strategic focus on promoting a positive environment and level playing field for international cooperation based on reciprocity. This approach considers shared values and principles, respecting high ethical standards, academic freedom, and human rights in international R&I cooperation, promoting rules-based multilateralism, pursuing reciprocal openness and modulating its bilateral relations in R&I in line with European interests and values to maintain the EU's strategic autonomy.

There are four specific outcomes that this ERA Action aims to achieve:

- Further develop values and principles for international cooperation in R&I as set out in the Council Conclusions on the Global approach to Research and Innovation - Europe's strategy for international cooperation in a changing world to be promoted in multilateral dialogues with partner countries and international fora;
- Launch one pilot initiative on the Team Europe approach for a specific world region and/or topic;
- Develop a European Science Diplomacy Agenda;
- Promote a coordinated joint approach for engagement in multilateral initiatives.

Action 9 is particularly related to Action 6: Deepening the ERA Through Protecting Academic Freedom. Both actions relate to the EU's strategic autonomy in protecting its researchers and innovation stakeholders. The EU intends to lead by example, in respecting high ethical standards, academic freedom and human rights when cooperating with countries and regions outside Europe.

9.2. Implementation of the Action

In May 2021 the European Commission published a **Communication on the Global Approach to Research and Innovation**. It sets out the EU's approach to international cooperation in R&I preserving openness, promoting a level playing field and reciprocity underpinned by fundamental values and strengthening multilateral partnerships. Key to this communication is the 'Team Europe' approach combining resources from the EU, its Member States, and the European financial institutions, in particular the European Investment Bank and the European Bank for Reconstruction and Development to achieve greater impact.

According to the Team Europe Initiative and Joint Programming Tracker managed by the European Commission's Directorate-General for International Partnerships, in the area of Science, Technology, Innovation and Digital Team 33 Country Team Europe Initiatives (TEIs) and 9 Regional Team Europe Initiatives have been launched by May 2023.¹⁵⁵ Regional TEIs have been launched in Latin America and the Caribbean, Middle East, Asia and Pacific, Neighbourhood and Sub-Saharan Africa.

In its **Conclusions on the Communication of the Commission on the Global Approach to Research and Innovation** (September 2021), the Competitiveness Council called on the Commission and the European External Action Service to 'develop a European Science Diplomacy Agenda and to present it to the Council, to explore designating science focal points in order to ensure adequate capacities for science in Union delegations, to foster cooperation with Member States' science counsellors in third countries, [...] and to report to the Council on their progress by 2023.'¹⁵⁶

The Council Conclusions on the Future Governance of the ERA recommended "setting up a standing subgroup of the ERA Forum, co-chaired by Member States and the Commission, to take into account and continue the work done by SFIC". On 15 February 2022, the mandate of the **ERA Forum Standing Subgroup on the Global Approach** was adopted. Its main tasks - as described in the mandate - echo the initiatives listed in the ERA Policy Agenda. Until October 2023, the standing sub-group of the ERA Forum on the Global Approach has met nine times.

By mid-2023, after various consultations with stakeholders, a draft structure of a **European framework for science diplomacy** has been developed, which is also reflected in the Global Approach Implementation Report published in May 2023. Following a discussion about science diplomacy at the informal Meeting of Research Ministers on 28 July 2023 in Santander, informal working groups involving both the science and diplomacy spheres will be set up to develop concrete proposals to be included in a future framework. A European Science Diplomacy Agenda launch conference has been scheduled for the end of 2023.

As regards the **Multilateral Dialogue on Principles and Values**, the Commission launched the multilateral dialogue with a successful event in July 2022 following the Marseille Declaration and the Council Conclusions for Principles and Values for International Cooperation in Research and Innovation. Following this launch event, a series of thematic workshops, each focusing a specific value or principle in R&I, have been held.¹⁵⁷

Two **Team Europe pilots** have been launched on China and on Africa. On R&I cooperation with China, work is being done in the framework of the EUKNOC 2.0, the EU R&I Knowledge Network on China. It has proven to be a valuable platform for Member States, stakeholders, and experts to exchange information and experiences regarding R&I cooperation with China and promote a common response. On R&I cooperation with Africa, a drafting team was established under the standing sub-group in 2022 which as a first step formulated an operational framework for how a Team Europe pilot might be developed in

¹⁵⁵ <https://capacity4dev.europa.eu/resources/team-europe-tracker/dashboard/thematic>

¹⁵⁶ <https://data.consilium.europa.eu/doc/document/ST-12301-2021-INIT/en/pdf>

¹⁵⁷ Full information on these workshops, including the notes setting out the concept and content of workshop, together with the final reports from the workshops is available on https://research-and-innovation.ec.europa.eu/strategy/strategy-2020-2024/europe-world/international-cooperation/multilateral-dialogue-values-and-principles_en.

support of implementing the AU (African Union)-EU Innovation Agenda. The framework focusses on strengthened policy coordination as well as coordinated investment at EU and national level.

Last, but not least, as regards **multilateral initiatives and platforms**, the standing sub-group concluded that further discussions regarding the scope and the added value of the initiative was needed. The focus of the exercise would be on the cooperation and coordination between the Commission and the Member States in the context of existing R&I multilateral initiatives/platforms.

Beside the work in the context of the standing sub-group, international R&I cooperation is also a key pillar of **Horizon Europe**, thus underpinning ERA Action 9. Horizon Europe includes targeted actions with key non-EU partners, including the first ever 'Africa Initiative' to enhance cooperation with Africa to promote actions targeted to finding locally adapted solutions to challenges which often hit Africa hardest. The calls for proposals require or encourage participation of African entities.¹⁵⁸

The 2023 OECD STIP Survey provides additional insightful information on the **budget**. The policies related to Action 9 are rather small in the majority (under EUR 1M and EUR, 1M-5M). The four policy initiatives linked to the highest budget (more than EUR 500 M) are related to direct financial support and governance (Figure 20). The governance instruments include the Bulgarian National Strategy for Development of Scientific Research 2030¹⁵⁹ and the Romanian National Strategy for Research, Innovation and Smart Specialisation 2022-2027¹⁶⁰. The direct financial support instruments include the contribution of the Slovak Republic to the Horizon Europe Framework Programme and the German membership to European Space Agency (ESA).

The policy instruments related to Action 9 fall mostly into two categories: direct financial support and governance. Guidance, regulation and incentives only account for few of the policies, while a considerable number of policies exist for collaborative infrastructures.

¹⁵⁸ https://www.eeas.europa.eu/eeas/africa-initiative-launched-part-first-horizon-europe-work-programme_en

¹⁵⁹ 'Updated National Strategy for the Development of Scientific Research in the Republic of Bulgaria 2017-2030' available at: <https://www.strategy.bg/StrategicDocuments/View.aspx?lang=bg-BG&Id=1231>

¹⁶⁰ <https://www.research.gov.ro/transparenta-decizionala/strategia-nationala-de-cercetare-inovare-si-specializare-inteligenta-2022-2027>

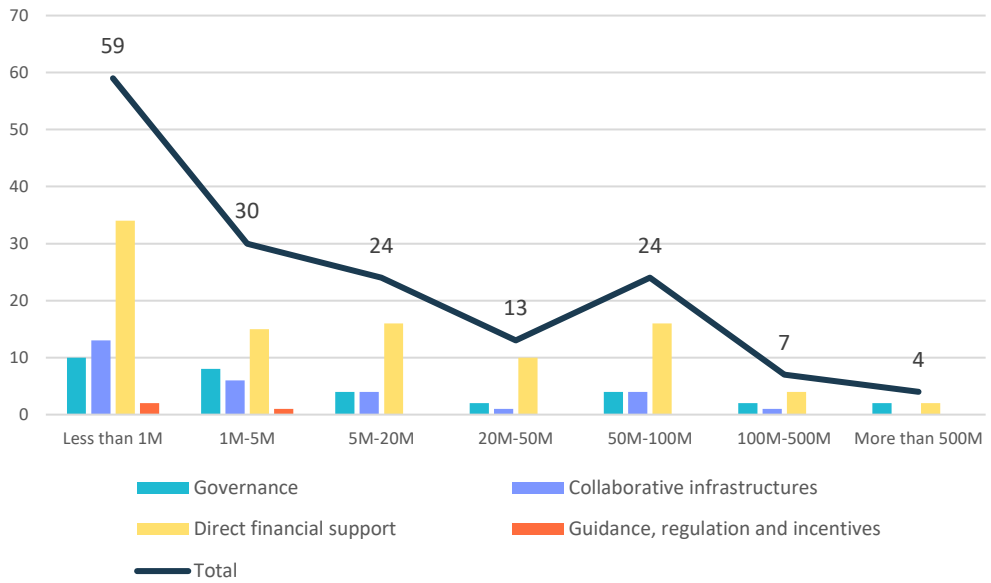


Figure 19: Action 9: Distribution of budget per policy instrument

KEY FINDINGS ERA PRIORITY 2: TAKING UP TOGETHER THE CHALLENGES POSED BY THE TWIN GREEN AND DIGITAL TRANSITION, AND INCREASING SOCIETY'S PARTICIPATION IN THE ERA

SUMMARY BOX: KEY FINDINGS ERA PRIORITY 2

This priority focuses on addressing the challenges posed by the twin green and digital transition. There have been mixed trends across the indicators under ERA Priority 2. Over the last decade, there has been a slight increase of the values for the indicators on synergies with sectoral policies and industrial policy, in order to boost the innovation ecosystem and an active citizen and societal engagement in research and innovation.

The indicators related to challenge-based ERA actions show stagnation over time except for government budget allocations for R&D (GBARD), which show a considerable increase since 2019. The indicators in the area of synergies with Education and the EU Skills Agenda have been experiencing a slight decrease.

Overall, data shows the need for further support to make progress towards the defined priority. Nonetheless, the EU has developed powerful policy instruments to ensure the accomplishment of the twin transitions. As highlighted in the report *Towards a green and digital future*,¹⁶¹ both transitions are interlinked, and the EU can play a major role in advancing these areas. Not only the EU is a powerful actor to address this priority, but also the HEIs area. To fully accomplish this role these institutions therefore need empowerment and support.

The evidence available shows that HEIs are highly committed to this priority and crucial initiatives are bolstering this process, supported, for example, through the ERA Forum subgroup on Universities for ERA. Finally, this priority also aims at increasing societal engagement in research. Indicators show a positive trend in relation to research of societal topics and a good baseline situation with regards to trust in science.

Key findings by action

ERA Action 10 focuses on creating awareness and building ownership of EU R&I Missions at national level, regional and community level, on the one side, and monitoring the performance of Partnerships and how they contribute to the new ERA and its set of values and principles, on the other side.

Five EU R&I Missions have been launched under the Horizon Europe Framework Programme, with Mission Climate, Mission Cancer, and Mission Soil explicitly being incorporated in key EU policies, thus offering major opportunities for the advancement of this Action. Further, the European Mission Network bringing together key players from the private sector, academia, civil society organisations, and government, has been established. In June 2023 it had over 100 members.

As part of the implementation of this action, the Partnership Knowledge Hub published the first biannual monitoring report. An annual European Partnership Stakeholder Forum helps to provide the partnership community with an opportunity to connect and share knowledge and insights.

ERA Action 11 aims at setting and implementing strategic priorities within the ERA by prioritising investments in R&I towards the green transition. Activities around green hydrogen have been launched in the framework of the ERA pilot on Green Hydrogen. The Implementation Working Group on hydrogen was set up in 2023. Its tasks are to implement the Strategic Research and Innovation Agenda (SRIA) of the European Research Area pilot on green hydrogen and to coordinate the work on hydrogen. Another ongoing activity on the EU-level is the review of the SET Plan, aligning it with current EU policies. A Commission

¹⁶¹ <https://publications.jrc.ec.europa.eu/repository/handle/JRC129319>

Communication on the SET Plan and a SET Plan Conference¹⁶² are envisaged for autumn 2023 to communicate the changes to the public.

One key achievement of **ERA Action 12** focusing on the advancement of the green and digital transitions, is the adoption of Industrial Technology Roadmaps that have been developed by the Commission. These become crucial tools to accelerate the transfer of research and innovation outcomes to the green and digital transformation industry market across the EU.

The roadmaps chart the way forward for research and innovation in key areas of industry at European and national level, with a focus on bridging the innovation gap between EU countries and better exploiting research and innovation results. The first two roadmaps have been published in April 2022 and January 2023 focussing on circular and low-carbon technologies.

ERA Action 13 aims at empowering Higher Education institutions to become key players in driving green and digital transitions. The action is implemented through the ERA Forum Subgroup 'Universities for ERA' and in close correlation with the work on promoting attractive and sustainable research careers (Action 4) in order to tackle, e.g., challenges in relation to intersectoral mobility.

Finally, **ERA Action 14** highlights the importance of citizen engagement in research. The action is implemented through initiatives such as the Plastic Pirates – Go Europe! Aiming to measure and reduce plastic waste in water across Europe. Furthermore, greater attention is being placed on citizen engagement in research at the EU level, also at the policy level. This is recognised as an important area on national level across the different EU Member States, with policies and initiatives being implemented.

PROGRESS TOWARDS THE OBJECTIVES FOR ERA PRIORITY 2

ERA Priority 2 focuses on the challenge-based actions, aiming to increase cooperation in the areas of education, research and innovation, while fostering the green and digital transition. Collaboration between universities and non-academic institutions well as the engagement of citizens and local communities with the scientific process are perceived as facilitators to boost the green transition and innovation processes.

This priority reaffirms the EU commitment to climate neutrality, underlining the critical role of R&I for achieving it, in accordance with the EU Skills Agenda ERA Priority 2 covers 4 sub-priorities with currently 10 associated indicators to monitor the progress.

Similar to the above, there have been mixed trends across the indicators linked to ERA Priority 2. There has been a slight increase with a view to **synergies with sectoral policies and industrial policy, in order to boost innovation ecosystem and active citizen and societal engagement in research and innovation**. However, for some indicators under this sub-priority available data is not sufficient to observe overall trends. The indicators related to **challenge-based ERA actions** show stagnation over time with the exception of government budget allocations for R&D (GBARD), which shows considerable increase since 2019. The indicators in the area of **synergies with Education and EU skills Agenda** show a slight decrease.

¹⁶² setplanevent.presidency.eu

Sub-priority 2.1: Challenge-based ERA actions

Figure 21 illustrates the **government budget allocations for R&D (GBARD)** according to the nomenclature for the analysis and comparison of scientific programmes and budgets (NABS) as share of the total GBARD. The GBARD includes all allocations for R&I for the public, private, non-profit, higher education, and external development sectors across federal, regional and local levels. However, they refer to budget provisions, rather than actual expenditures. The GBARD is broken down according to the NABS 2007 classification system.

Figure 21 shows the average GBARD across EU-27 in million Euros, broken down by investment in environment, energy and transport, telecoms and other infrastructure. The highest growth was in the energy sector, where GBARD grew from an average of EUR 133.03 million in 2010 to an average of EUR 188.04 million in 2021. Environment investment has also increased over the past decade, although at a smaller rate, from EUR 79.91 million in 2010 to EUR 106.71 million in 2021. Finally, transport, telecommunication and other infrastructure investments declined from 2010 to 2015, followed by stagnation, but increased during the recent years from 2019 to 2021.

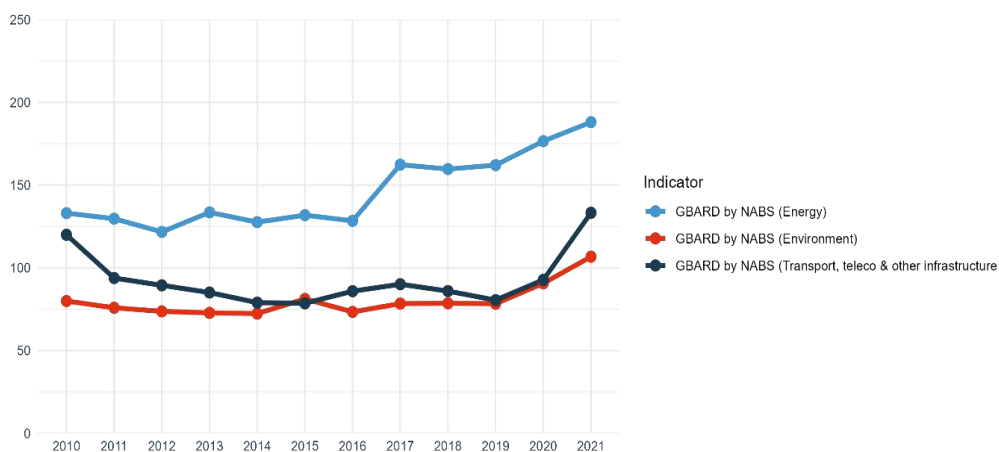


Figure 20. Government budget allocation for R&D (GBARD) by NABS: environment; energy; transport, telecommunication and other infrastructure.

The following indicator shows the **government budget allocations for R&D (GBARD) allocated to European transnational, bilateral or multilateral, public R&D programmes per FTE researcher in the public sector**. Figure 22 shows that the level of funding allocated at the EU level has remained largely consistent since 2012, reaching its highest level in 2015.

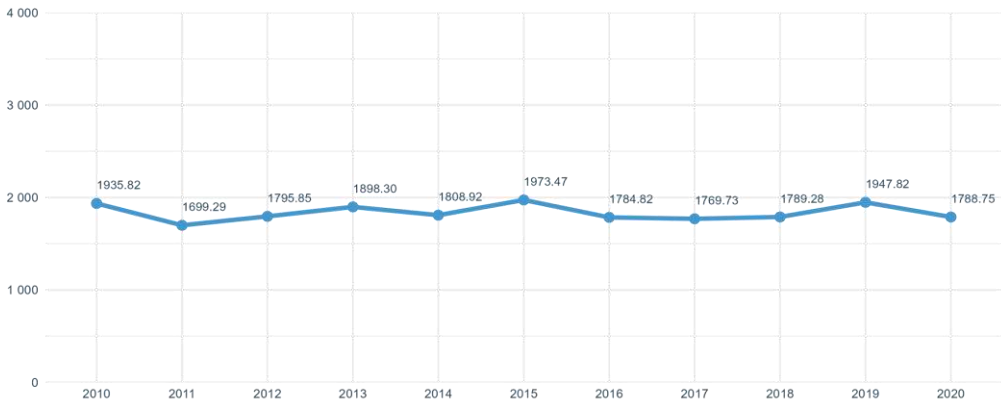


Figure 21. Government budget allocations for R&D (GBARD) allocated to Europe-wide transnational, as well as bilateral or multilateral, public R&D programmes per FTE researcher.

With a view to the situation in the Member States (shown in Figure 8, Annex 3) substantial variation across countries as well as within countries can be observed over time. For example, **Belgium** stands out as a country with a largely consistent, high level of funding for R&I. **Austria** had the highest level of funding amongst Member States from 2012-2015. Although this has decreased since, Austrian investments remain above the EU average. The situation is similar in **Cyprus** where the level of funding was close to the EU average in 2012 and then grew to become one of the countries with highest R&I funding in 2018, 2019 and 2020. **Sweden** has also consistently had one of the highest levels of funding per FTE in the public research sector.

Figure 23 illustrates an indicator related to the green transformation. The indicator **environmentally related government R&D budget as percentage of total government R&D budget (EU-average)** shows that the budget share has peaked in 2015 and reached its low in 2021, when the latest data is available.

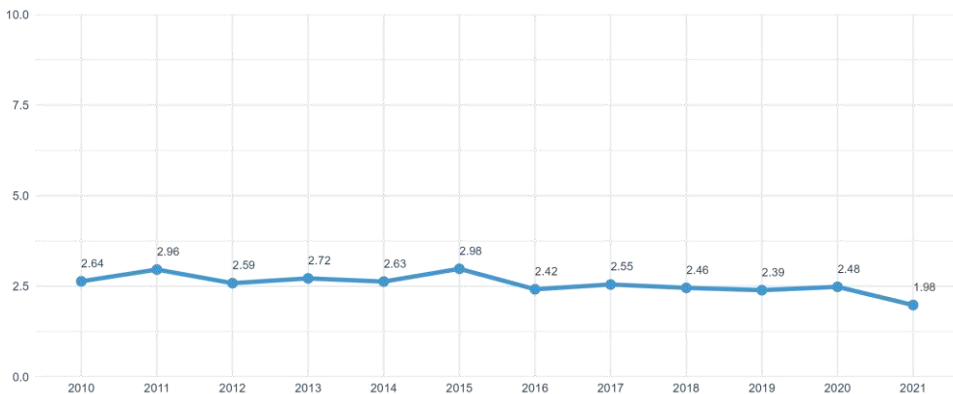


Figure 22. Environmentally related government R&D budget as percentage of total government R&D (EU-average).

Regarding the indicator shown in Figure 24, **OECD Patents on environment technologies as percentage of total technology patents**, there has been a decline since

2011 with reaching its low in 2016. Between 2016 and 2018 the number of patents has slightly increased but is still significantly below the 2018 levels.

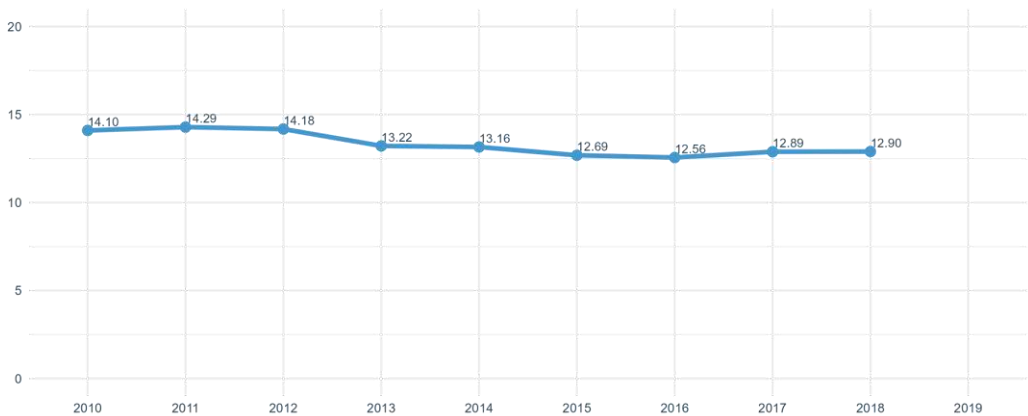


Figure 23. OECD Patents on environment technologies as percentage of total technology patents.

Sub-priority 2.2: Synergies with education and the European Skills Agenda

A sub-priority within ERA Priority 2 relates to the enhancement of synergies with education and the EU Skills Agenda. The indicator on the **Share of researchers receiving transferable skills training** provides valuable insights about the promotion of relevant skills across researchers from Higher Education Institutions. Figure 25 shows that at the EU level there has been a slight decrease of 3 percentage points from 49.5% to 46.3% during 2016 to 2019¹⁶³.

The figure illustrates national trends in comparison to the EU level. Nonetheless, there is no overall trend applying to the majority of countries. There are rather some countries, such as **Austria** or **Romania**, which show an increase of more than 40 percentage points from 2016 to 2019. Other countries, including **Lithuania**, **Portugal** or **Belgium**, have stagnated over the period, while a third group of countries, **Bulgaria** or **Slovenia** amongst others, has experienced a decline. Therefore, national differences clearly persist in relation to the share of researchers receiving transferable skills training.

¹⁶³ Data only available for these years. Retrieved from <https://www.more-4.eu>.

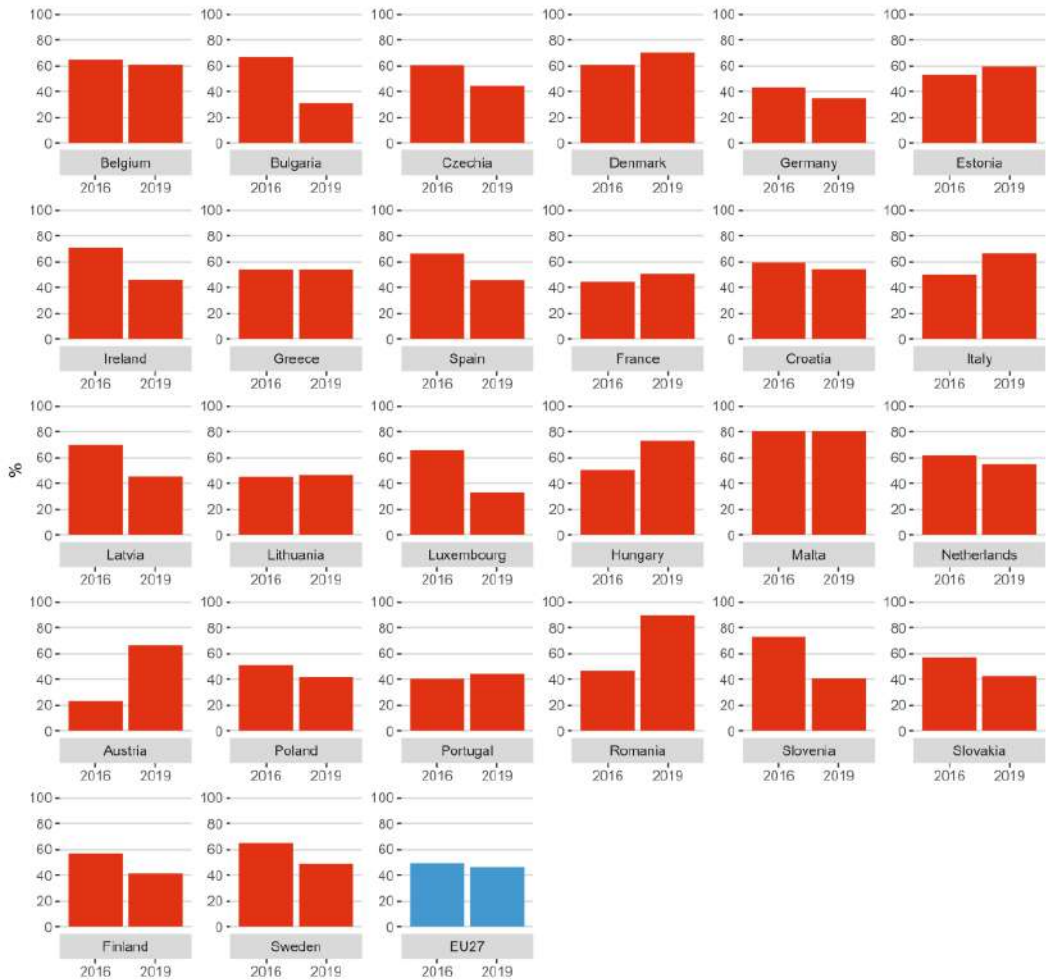


Figure 24. Share of researchers receiving transferable skills training.

One indicator which helps to deepen the understanding of the empowerment of HEIs is the **number of innovative enterprises that co-operated on R&D+I with universities and HEIs**. This indicator captures the level of cooperation and collaboration between HEIs and the private sector, a key actor within the R&I ecosystem. Collaboration across actors helps to ensure a more competitive R&I ecosystem. Figure 26 shows that the EU average of innovative firms cooperating with the education sector was at around 1,500 in 2020.

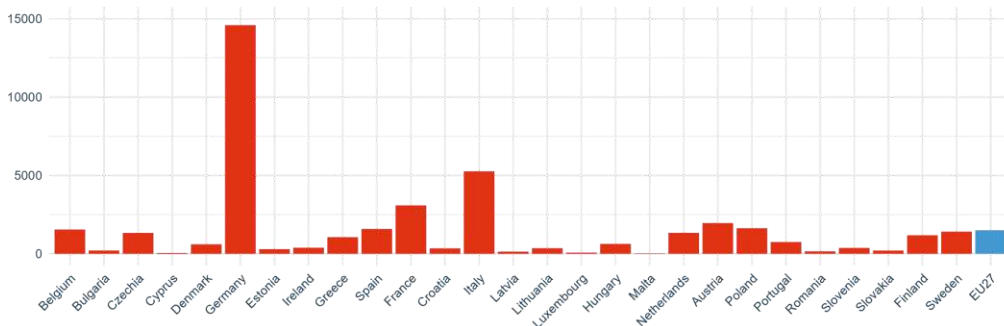


Figure 25. Innovative enterprises that co-operated on R&D+I with universities and HEIs.

Sub-priority 2.3: Synergies with sectoral policies and industrial policy, in order to boost innovation ecosystem

The following indicator on **Direct government support plus Indirect government support through R&D tax incentives as a percentage of GDP** allows to gain insights into key synergies with sectoral policies and industrial policy. Figure 27 shows that this indicator has experienced a slight increase from 0.15 in 2010 to 0.18 in 2020. At the country level (see Figure 2 in Annex 3) **Austria, Belgium, and France** have consistently higher shares than the EU-27 average.

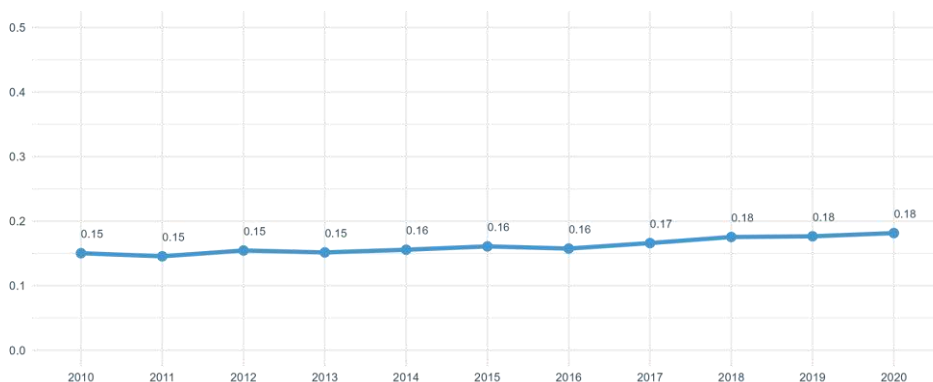


Figure 26. Direct government support and Indirect government support through R&D tax incentives as a percentage of GDP (EU-average).

Sub-priority 2.4: An active citizen and societal engagement in R&I in all its dimensions

In order to measure how science is incorporating the societal aspect within R&I, one indicator measures the **number of publications on ‘social innovation’ or ‘social entrepreneurship’ per million population**. This indicator captures insights into research

contents over the past decade. The EU trend experienced a slight decrease from 10.1 in 2010 to 9.8 in 2020.

Figure 63 in Annex 3 illustrates the EU average as well as Member States trends. Overall, it shows that some countries, such as **Croatia**, have a better performance, reaching a peak of 10 publication per million population.

A key dimension within this Priority is citizens' trust in science. As such, indicator 48 in the ERA Dashboard refers to **citizen's trust in science** based on Eurobarometer data in 2021. Survey respondents were asked several questions regarding:

- The overall influence of science and technology on society;
- Whether science and technology can sort out any problem;
- Whether science prepares the younger generation to act as well-informed citizens;
- Whether thanks to science and technology, there will be more opportunities for future generations.

At the EU level, slightly less than half of the individuals (43.2%) do trust in science. As illustrated, in 10 Member States, more than a half of the population shows trust in science, with some countries evidencing higher levels of trust.

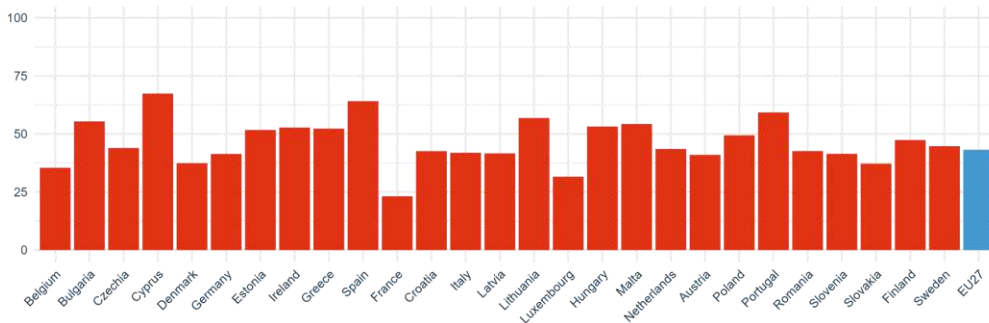


Figure 27. Trust in science.

IMPLEMENTATION OF THE ACTIONS RELATED TO ERA PRIORITY 2

10. Action 10: Make EU R&I missions and partnerships key contributors to the ERA

10.1. Purpose of the Action and expected outcomes

Action 10 focuses on the EU Missions and European Partnerships connected with Horizon Europe. It aims to implement these initiatives in a way that maximises their impact, establishes them as key contributors to the ERA, and ensures that they support the twin green and digital transition.¹⁶⁴

EU Missions have been introduced to the Horizon Europe research and innovation programme for the 2021-2027 programming period. They support Commission priorities, such as the **European Green Deal**, **Beating Cancer** and **Europe fit for the Digital Age** by setting targets with clear timelines and deliverables to achieve concrete solutions to these challenges.¹⁶⁵ The Missions incorporate governance, collaboration, and citizen engagement into R&I.¹⁶⁶ The main outcome for EU Missions outlined in Action 10 is to share information, raise awareness and develop ownership of EU R&I Missions at national, regional and community levels.

European Partnerships are a key implementation tool of Horizon Europe that brings public and/or private partners together with the European Commission to address societal challenges through R&I initiatives. The Partnerships primarily aim to deliver on the **European Green Deal** and **Europe's Digital Decade** by supporting partnerships in finding creative solutions to tackling emissions in energy-intensive industries and developing innovative data technologies. They allow for the pooling of resources, the creation of a critical mass and the alignment of R&I agendas to avoid duplication of investments and reduce the fragmentation of the R&I sector.¹⁶⁷ Within Action 10, the Partnership Knowledge Hub contributes to monitoring Partnerships' performance and how they contribute to the values and principles of the new ERA.

10.2. Implementation of the Action

Five **EU Missions** were launched in September 2021 on cancer, climate resilience, oceans and waters, smart cities, and soil. The Mission Climate is incorporated in the **EU's Climate Adaptation Strategy** as a means to 'accelerate the rollout of adaptation solutions'.¹⁶⁸

¹⁶⁴ European Commission (2021), European Research Area Policy Agenda – Overview of actions for the period 2022-2024, p.13

¹⁶⁵ European Commission (2021), EU missions: Concrete solutions for our greatest challenges, available at: <https://op.europa.eu/en/publication-detail/-/publication/a48e0115-2658-11ec-bd8e-01aa75ed71a1>.

¹⁶⁶ European Commission (accessed 8 June 2023), EU Missions in Horizon Europe, available at: https://research-and-innovation.ec.europa.eu/funding/funding-opportunities/funding-programmes-and-open-calls/horizon-europe/eu-missions-horizon-europe_en.

¹⁶⁷ European Commission (accessed 8 June 2023), European Partnerships in Horizon Europe, available at: https://research-and-innovation.ec.europa.eu/funding/funding-opportunities/funding-programmes-and-open-calls/horizon-europe/european-partnerships-horizon-europe_en.

¹⁶⁸ European Commission (2021), Forging a climate-resilient Europe - the new EU Strategy on Adaptation to Climate Change, COM(2021) 82 final, available at: <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=COM:2021:82:FIN>.

Mission Cancer is cited as a key component of **Europe's Beating Cancer Plan** as part of the EU's investment in R&I to drive change.¹⁶⁹ Mission Soil is an initiative of the Commission's **long-term vision for rural areas**, supporting research and innovation to tackle soil challenges in both rural and urban areas.¹⁷⁰ The Mission Restore Our Ocean and Waters supports key EU legislation and policies in **marine, maritime and freshwater domains** as well as related fields.¹⁷¹ Lastly, the Cities Mission significantly contributes to reaching the **carbon neutrality target** set in the European Green Deal by addressing the CO2 emissions of cities, which account for more than 70% of global emissions.¹⁷²

In April 2022 the **Transnational cooperation on the Missions approach (TRAMI)** project was launched to support the EU Missions by creating communities of practice, exchanging knowledge and offering mutual learning.¹⁷³ The EU-funded TRAMI project hosts the **European Mission Network (EMiN)**, which has 102 registered members working on the EU Missions, and serves as a platform for exchange of information and best practice.

The assessment of the implementation of EU Missions of July 2023 highlighted the potential of EU Missions and the many achievements they have made in their respective fields thus far. The assessment considered Missions to be **'timely and inspirational initiatives'** that stimulate efforts in key EU priority areas and help align local, regional and national efforts towards these shared goals.¹⁷⁴

Horizon Europe has built upon the public-private and public-public partnerships that existed under Horizon 2020 to establish an overarching umbrella of **European Partnerships**. Under Horizon Europe, three types of partnerships have been established: Co-programmed European Partnerships, Co-funded European Partnerships and Institutionalised European Partnerships.¹⁷⁵ In June 2021, the Commission approved the memoranda of understanding for 11 Co-programmed Partnerships between the Commission and industry, aligned with priorities of the green and digital transitions.¹⁷⁶

¹⁶⁹ European Commission (2022), Europe's Beating Cancer Plan Communication from the commission to the European Parliament and the Council, available at: https://health.ec.europa.eu/system/files/2022-02/eu_cancer-plan_en_0.pdf.

¹⁷⁰ European Commission (2021), A long-term Vision for the EU's Rural Areas: Towards stronger, connected, resilient and prosperous rural areas by 2040, COM/2021/345 final, available at: <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A52021DC0345>.

¹⁷¹ These include the EU Biodiversity Strategy, the EU Zero Pollution Action Plan, the Sustainable Blue Economy Strategy, the Nature Restoration Law proposal, the Outermost Regions Strategy, the Arctic strategy, the Algae Strategy, the EU Action Plan to protect and restore marine ecosystems for sustainable and resilient fisheries.

¹⁷² European Commission (accessed 5 September 2023), EU Mission: Climate-Neutral and Smart Cities, available at: https://research-and-innovation.ec.europa.eu/funding/funding-opportunities/funding-programmes-and-open-calls/horizon-europe/eu-missions-horizon-europe/climate-neutral-and-smart-cities_en.

¹⁷³ <https://www.trami5missions.eu>

¹⁷⁴ European Commission (2023), EU Missions two years on: assessment of progress and way forward, COM(2023) 457 final, available at: <https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX:52023DC0457&qid=1690022676423>.

¹⁷⁵ European Commission (2019), Orientations towards the first Strategic Plan for Horizon Europe, available at: https://research-and-innovation.ec.europa.eu/system/files/2019-12/ec_rtd_orientations-he-strategic-plan_122019.pdf.

¹⁷⁶ European Commission (2021), Commission and industry invest €22 billion in new European Partnerships to deliver solutions to major societal challenges, available at: https://ec.europa.eu/commission/presscorner/detail/en/IP_21_2943.

Co-funded partnerships involve Member States, research funders and public authorities. Institutionalised partnerships involve the EU, Member States, and/or industry and are implemented where objectives cannot be met through other areas of Horizon Europe. The European Institute of Innovation and Technology (EIT) Knowledge and Innovation Communities are examples of Institutionalised Partnerships.¹⁷⁷

European Partnerships play a central role in delivering the ERA, pooling research and innovation investments from the EU, Member States, third countries, regions and other public and/or private sources. The **Sustainable Blue Economy Partnership (SBEP)** is a particularly successful example, bringing together 60 partners from 25 countries, aligning national programmes at pan-European scale, and mobilising EUR 450 million planned investments over seven years.

The **Partnership Knowledge Hub (PKH)** was established in 2021 to aid the Commission in the implementation and coordination of European Partnerships.¹⁷⁸ The PKH is in charge of conducting biennial monitoring of European Partnerships. The first monitoring report has been completed in April 2022.¹⁷⁹ Further, an annual **European Partnership Stakeholder Forum** is held to provide a platform for the entire partnership community with the aim to connect and share knowledge as well as experience.¹⁸⁰

Data from the 2023 OECD STIP Survey indicates the estimated **level of funding** attributed to each policy action. As shown in the figure below, there is a relatively similar distribution of policies across funding levels, with the largest number falling into the bracket of 5M-20M (46). On the lower end of budget ranges, 32 policies fall into the budget range of < EUR 1M and 30 policies have a budget between EUR 1M-5M. Less policies fall in the upper mid-range, as 24 policies have a budget between 20M-50M and 22 have a budget between EUR 50M-100M. On the higher end of budget ranges, 32 policies have a budget of EUR 100M-500M and 30 have a budget larger than EUR 500M. The majority of direct financial support instruments were attributed a budget of 20M or less, whereas there was a more even distribution of budget attributed to governance and collaborative infrastructure policy instruments.

¹⁷⁷ <https://eit.europa.eu/our-communities/eit-innovation-communities>

¹⁷⁸ <https://ec.europa.eu/transparency/expert-groups-register/screen/expert-groups/consult?lang=en&do=groupDetail.groupDetail&groupID=3738&news=1>

¹⁷⁹ European Commission (2022), Performance of European Partnerships: Biennial Monitoring Report (BMR) 2022 on partnerships in Horizon Europe, available at: <https://op.europa.eu/en/publication-detail/-/publication/a6cbe152-d19e-11ec-a95f-01aa75ed71a1>.

¹⁸⁰ ERA-LEARN (2022), European Partnership Stakeholder Forum: 'One-year review of European Partnership Initiatives in Horizon Europe', available at: era-learn.eu/documents/era-learn_european-partnership-stakeholder-forum_summary-results.pdf.

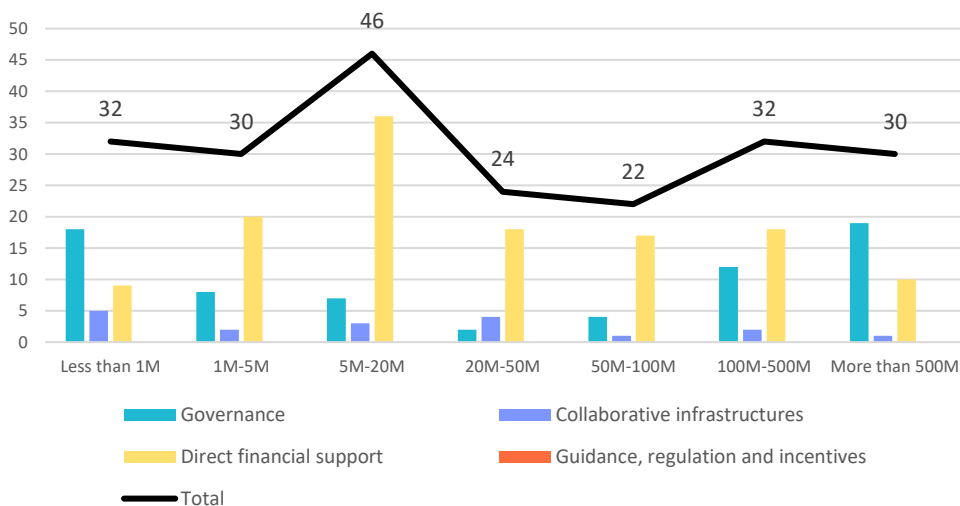


Figure 28: Action 10: Distribution of budget per policy instrument

An example of a policy that has a budget of over EUR 500M includes the European Union's Horizon Europe Missions and European Partnerships initiatives themselves, as well as the **European Green Deal Investment Plan**.

National policy examples (reported via the OECD STIP Survey)

An example is **Austria's** RTI Pact for 2021-2023,¹⁸¹ which operationalised the goals of the country's RTI Strategy 2030, linking the strategy with funding and implementing institutions. One of the main objectives of the RTI Pact is to particularly increase Austria's participation in EU Missions and European Partnerships.

Other countries have established policies especially dedicated to Action 10. For example, **Slovenia** established a dedicated policy for the national coordination of European Partnerships, providing structures for discussion and operational modalities for specific partnerships.¹⁸²

Greece created a national initiative dedicated to Action 10 that coordinates and facilitates cooperation on EU Missions and European Partnerships.¹⁸³

The 2023 OECD STIP Survey also collects information on the **type of policy instruments**. The majority of policy instruments related to Action 10 across the EU Member States are **governance measures** (52%), which includes the creation of strategies or standards, changes to governance structures or regulation, policy intelligence and consultation

¹⁸¹ Bundeskanzleramt, FTI-Strategie 2030 – Strategie der Bundesregierung für Forschung, Technologie und Innovation, available at: https://www.bundeskanzleramt.gv.at/themen/forschungskoordination_fti.html (accessed 8 June 2023).

¹⁸² <https://www.gov.si/en/state-authorities/ministries/ministry-of-higher-education-science-and-innovation>

¹⁸³ <https://gsri.gov.gr>

activities, and public awareness campaigns or other outreach activities. This is then followed by **direct financial support initiatives** (34%), which include institutional funding, grants, procurement programmes and other forms of financial support. 10% of the policy instruments are related to **collaborative infrastructures** (10%), or networking platforms, technical infrastructure, or access to data and information.

The main three **types of policy instruments** follow the needs of Action 10 for Member States to align their R&I strategies with the ERA, provide financial support to relevant projects, and to establish infrastructure to support the work of partnerships.

11. Action 11: An ERA for green energy transformation

11.1. Purpose of the Action and expected outcomes

This Action aims at setting and implementing strategic priorities that deliver on the ERA agenda, by prioritising investments in R&I towards the green transition, improving access to excellence, translating R&I results into the economy and deepening policies that promote the free circulation of knowledge.

Accelerating research and innovation and improving collaboration between private and public R&I in the Member States with a view to early market introduction of clean technology solutions is crucial to achieving the ambitious targets set by the European Commission to become climate neutral by 2050 and to reduce greenhouse gas emissions by at least 55% by 2030 compared to 1990.

Part of Action 11 is foreseen to contribute to the achievement of three key outcomes, as outlined in the European Research Area Policy Agenda 2022-2024:¹⁸⁴

- Policy approach for a cooperation framework on R&I driven safe and sustainable low-carbon energy technologies;
- Development of a green hydrogen R&I ERA pilot action, while ensuring consistency with other related initiatives and without prejudice to the relevance of a broader hydrogen R&I policy approach;
- ERA4FutureWork: a policy approach (at local, regional, national and EU levels) to address research and development (R&D) funding for the Future of Work.

Action 11 is part of the priority area 'Taking up together the challenges posed by the twin green and digital transition and increasing society's participation in the ERA' and linked with Actions 10-14 focussing on the twin green and digital transition and the challenges for society and R&I linked to them. The action is particularly closely linked to Action 12 of accelerating the green/digital transition of Europe's key industrial ecosystem.

¹⁸⁴ European Commission (2021), European Research Area Policy Agenda – Overview of actions for the period 2022-2024.

11.2. Implementation of the Action

Based on the Council Conclusions of 1 December 2020, the Commission and interested Member States kicked off the process for a green hydrogen R&I ERA pilot action. The **'Agenda Process on the ERA pilot on Green Hydrogen'** was built around three thematic workshops on transport and infrastructure, market stimulation and production throughout 2021 to identify urgent research and innovation questions for Green Hydrogen competitiveness. The results of the agenda process were summarised in a strategic research and innovation agenda (SRIA) on green hydrogen – the major outcome of the R&I initiative within the ERA – and were published on 18 March 2022.

In the Commission Staff Working Document (2022) **'Building a European Research Area for clean hydrogen – the role of EU research and innovation investments to deliver on the EU's Hydrogen Strategy'**¹⁸⁵ the European Commission details how it will jointly with the Clean Hydrogen Joint Undertaking actively promote and support activities to ensure implementing the ERA Pilot on green hydrogen.

The Temporary Working Group (TWG) on hydrogen was set up in 2023 to implement the Strategic Research and Innovation Agenda (SRIA) of the European Research Area (ERA) pilot on green hydrogen and coordinate the work on hydrogen. It will be supported by a Horizon Europe Coordination and Support Action.

The **European Strategic Energy Technology Plan (SET Plan)** aims at accelerating the deployment of clean energy-technologies. It provides a common vision, goals and coordination for accelerating the development and deployment of efficient and cost-competitive low-carbon energy technologies. The SET Plan was established in 2007 and since the creation of the Energy Union, it became one of the main instruments of the Energy Union's 5th pillar on research, innovation, and competitiveness. However, since the last SET Plan update in 2015, the EU energy policy agenda has considerably changed and ERA Action 11 underlines the need for a revision, which is ongoing at the time this report is written. A Commission Communication on the SET Plan and a SET Plan Conference¹⁸⁶ are envisaged for autumn 2023 to communicate the changes to the public.

The revision of the SET-Plan aims at redirecting the SET Plan' scope and objectives to have R&I on energy together with the Member States. Furthermore, it aims at better supporting the European Green Deal, REPowerEU, ERA policy and the Green Deal Industrial Plan, and thus accelerating the deployment of renewable energy, including clean energy. Connecting the activities of Member States and the Commission will be essential to make the EU less dependent on energy imports and to improve the sustainable energy value chain, through research and deployment activities, This includes the Fit for 55 packages, the 2050 decarbonization target, the REPowerEU initiative, as well as the ERA Policy Agenda. Continued support for long-term research on new clean energy sources will be ensured.

One sub-activity of Action 11 proposes a pathway for future collaboration between policy makers, researchers, and stakeholders through a new action (**ERA4FutureWork**), addressing current technological, political and societal changes that impact the future of work. R&I attention should be directed towards these changes to facilitate citizen-friendly outcomes. Within this sub-action, workshops are being organised, of which two have been

¹⁸⁵ https://research-and-innovation.ec.europa.eu/system/files/2022-01/ec_rtd_swd-era-clean-hydrogen.pdf

¹⁸⁶ <https://setplanevent.presidency.eu.es>

held already in 2023 on the green transition and working life and on the digital transition and working life.

National policy examples

In various EU Member States there are policies or programmes within which governments support the clean energy start-up policy area in order to contribute to the EU's long-term strategy of achieving net-zero emissions by 2050 and to increase renewable energy sources in the EU's energy mix. For instance, in **Germany**, the Start Up Energy Transition programme provides a cash prize, global publicity and stakeholder dialogues for clean energy start-ups from around the world, which have created at least one prototype.

In **Sweden**, the Swedish Energy Agency runs programmes which provide funding for projects to guide energy innovators to the next level of maturity.¹⁸⁷ According to Eurostat, in 2021, Sweden was the Member State with the highest share of energy from renewable sources.¹⁸⁸ There are various R&D schemes and programmes¹⁸⁹ in place that aim at contributing to the ambitious goal to generate 100% of its electricity from renewable energy sources by 2040:

- The Sustainable Wind Energy Expansion program is a small R&D grant scheme to support the technological advancement of the wind energy sector;
- Bio+ program is a broad interdisciplinary R&D program for activities related to the use of biomass and biofuels that was launched in 2021;
- Climate leap is a broad R&D funding program for local and regional emission reduction measures in different sectors, including energy. The program prioritizes the diffusion of new technologies, improved public health and employment. The program includes the improvement of electric vehicle charging infrastructure.

The 2023 OECD STIP Survey provides additional insightful information on the **policy instruments** related to Action 11, which fall mostly into two categories: governance and direct financial support. Collaborative infrastructures account for the remaining policy instrument. The **budget** of the policies related to Action 11 are well spread between smaller and larger budgets, as shown in the figure below. The initiatives with budgets of over EUR 500 million include national strategies such as the German National Hydrogen Strategy¹⁹⁰ or key priorities within the Spanish Strategic Project for Economic Recovery and Transformation, which includes actions focusing on green energy transformations¹⁹¹.

¹⁸⁷ <https://iea.blob.core.windows.net/assets/c0efd465-a914-4fe6-b3cf-cbbf96a9d8c6/Howgovernmentsupportcleanenergystart-ups.pdf>

¹⁸⁸ https://ec.europa.eu/eurostat/databrowser/view/NRG_IND_REN/default/table?lang=en&category=nrg.nrg_quant.nrg_quanta.nrg_ind_share

¹⁸⁹ <https://clean-energy-islands.ec.europa.eu/countries/sweden/legal>

¹⁹⁰ 'Update of the National Hydrogen Strategy: Turbo for the H2 economy', Ministry website, available at: <https://www.bmbf.de/bmbf/de/forschung/energiewende-und-nachhaltiges-wirtschaften/nationale-wasserstoffstrategie/nationale-wasserstoffstrategie.html>

¹⁹¹ 'PERTE of industrial decarbonization', Spanish MRR website, available at:

<https://planderecuperacion.gob.es/como-acceder-a-los-fondos/pertes/perte-de-descarbonizacion-industrial>

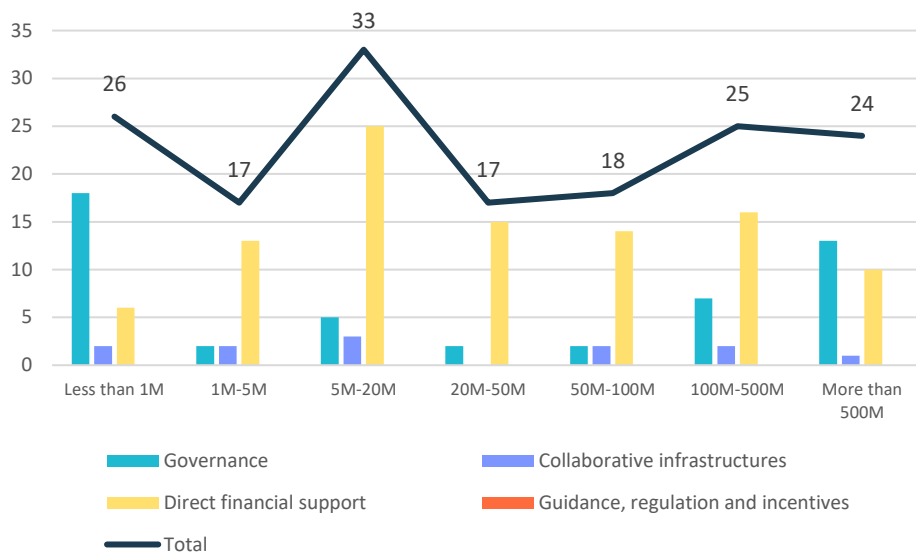


Figure 29: Action 11: Distribution of budget per policy instrument

12. Action 12: Accelerate the green/digital transition of Europe's key industrial ecosystems

12.1. Purpose of the Action and expected outcomes

The green and digital transitions call for increased R&I investments as well as timely scale-up and deployment of results, notably by industry, including SMEs and start-ups. The European Green Deal is a long-term vision for a greener, fairer, more resilient society with the ambition for significant greenhouse gas emissions reduction by 2030 and achieving climate neutrality by 2050. Implementing this ambition requires the mobilisation of all available R&I investment programmes, but also strategic and joint engagement by policy-makers, industry and R&I stakeholders at EU and national levels.

The outcomes of Action 12 are to create stronger links between research & innovation and industrial policies, encourage systematic transfer of R&I results into EU industrial ecosystems and mobilise private and public R&I investments for a faster development and deployment of key green and digital technologies through the following activities:¹⁹²:

- Facilitate a consultation process on R&I-related needs of industries, including skilling needs, digitalisation, R&I driven standardisation, technology roadmaps, and research infrastructures;

¹⁹² European Commission (2021), European Research Area Policy Agenda – Overview of actions for the period 2022-2024.

- Develop a policy framework to support industrial R&I from fundamental research to breakthrough knowledge and innovation;
- Develop a policy approach to link industrial and R&I policies, on how to speed up the industrial absorption of R&I results for decarbonisation of energy-intensive industries;
- Develop industrial technology roadmaps for low-carbon technologies in energy-intensive industries and for circular technologies and business models at EU and national levels;
- Develop a coordination mechanism to provide industry with the Technology Infrastructures needed to test, validate and scale up innovations;
- Address the social adaptation driven by the green (and digital) transitions.

Action 12 is part of the priority area 'Taking up together the challenges posed by the twin green and digital transition and increasing society's participation in the ERA' and linked with actions 10 and 14, focussing on the green and digital transitions and the challenges for society and R&I linked to them. The action is also particularly closely linked to action 11, the ERA For Green Energy Transformation.

12.2. Implementation of the Action

The two **ERA Industrial Technology Roadmaps** low-carbon technologies in energy-intensive industries (published in April 2022)¹⁹³ and circular technologies in textiles, construction and energy-intensive industries (published in January 2023).¹⁹⁴ collected evidence about the current status and the future outlook for R&I development of new green technologies. They mapped the way forward for research and innovation in industry with a focus on bridging the innovation gap between EU countries and better exploiting research and innovation results.¹⁹⁵ The Roadmaps assess the participation of the industry in R&I to increase market introduction of relevant technologies. The insights from the roadmaps facilitate the identification of common action areas to enable faster progress along the research stages. They provide a solid basis for a consultation process on the broader R&I needs of industry.¹⁹⁶

The roadmaps were prepared by the Commission in consultation with Member States, Associated Countries, as well as with representatives of industry and research and innovation stakeholders across the EU. This co-creative action aimed at ensuring the alignment of research and innovation investment plans at EU and national levels.¹⁹⁷

As a follow-up to the roadmap for low-carbon technologies in energy-intensive industries, the Commission published the report '**Scaling up innovative technologies for climate**

¹⁹³ https://research-and-innovation.ec.europa.eu/document/download/addb797d-f670-4ac6-9591-17283f0c3ff9_en

¹⁹⁴ https://research-and-innovation.ec.europa.eu/document/download/77e27852-4431-491b-8e9a-1eb73ae90d30_en

¹⁹⁵ https://research-and-innovation.ec.europa.eu/research-area/industrial-research-and-innovation/era-industrial-technologies-roadmaps_en

¹⁹⁶ https://research-and-innovation.ec.europa.eu/system/files/2021-11/ec_rtd_era-policy-agenda-2021.pdf

¹⁹⁷ Ibid.

neutrality' mapping close to 200 EU-funded demonstration projects in these industries¹⁹⁸ and developed an interactive tool publicly available displaying these demonstrators on a map.¹⁹⁹ A **Mutual Learning Exercise on Industrial Decarbonisation** was also launched in April 2023, with involvement of 10 Member States and 2 Associated Countries. The MLE will run until March 2024 facilitating exchange of experience and knowledge in the following fields: (i) overview of industrial technology roadmaps and national strategies; (ii) policies, design and financing for R&I investments in development, uptake and deployment of low-carbon technologies; (iii) actors' engagement; and (iv) framework conditions (regulatory framework, permits for demonstrators and 'first-of-a-kind' pilots, IPR, technology infrastructures, knowledge and data'.²⁰⁰ In addition, the **MLE on a Whole-of-government approach (WGA) in research and innovation**, which started in November 2022 and will run until March 2024, includes topic 4 on 'Green Transition: Implementation of Industrial Technology Roadmaps through WGA', which complements the work on industrial decarbonisation and circular strategies by facilitating knowledge and experience on the institutional set-up across five Member States.²⁰¹

Technology Infrastructures are understood as facilities, equipment, capabilities and support services required to develop, test and upscale technology to advance from validation in a laboratory up to higher TRLs prior to competitive market entry. They include, for example, pilot lines, test facilities, digital innovation centres, open innovation testbeds, demonstration sites or living labs. Technology infrastructures are critical for the development of new technology-based innovative products and services.²⁰²

With a view to develop a European coordination mechanism for Technology Infrastructures, the Commission has launched **a study that will provide mapping of strategies, programmes and initiatives, targeting Technology Infrastructures, at European, national and regional level**. The final report will be published in spring 2024. The Commission is also setting up an informal expert group to provide advice on the industrial needs, improving accessibility of Technology Infrastructures, investment programmes and strategic pilot areas.

Regarding the steps taken on to develop a policy framework to support industrial support fundamental research at national and EU levels to generate pioneering knowledge and innovation (Activity 12.3), a hybrid workshop with the participation of about 450 representatives of government, business, research and academia, was organised on 27 March 2023 by the European Commission, Technical University in Munich, and DEEP Ecosystems in Munich (Germany) on '**Leveraging the deep tech green transition and digital solutions to transform EU industrial ecosystems**'. The workshop report highlights the importance of stimulating finance/investment for deep-tech, improving the availability of relevant infrastructures, creating robust exit opportunities, and strengthening the role of the ecosystem in bringing together the stakeholders.²⁰³

¹⁹⁸ Scaling up innovative technologies for climate neutrality | Research and innovation (europa.eu)

¹⁹⁹ Demonstrators scaling up innovative technologies for climate-neutral industries around Europe | Research and Innovation (europa.eu)

²⁰⁰ Mutual Learning Exercise on Industrial decarbonisation | Research and Innovation (europa.eu)

²⁰¹ Mutual Learning Exercise on The Whole of Government Approach in Research and Innovation | Research and Innovation (europa.eu)

²⁰² <https://data.consilium.europa.eu/doc/document/ST-8411-2019-INIT/en/pdf>

²⁰³ https://research-and-innovation.ec.europa.eu/events/upcoming-events/leveraging-deep-tech-green-transition-and-digital-solutions-transform-eu-industrial-ecosystems-2023-03-27_en

Activities aimed at addressing social adaptation of the green and digital transitions (Activity 12.4) have been limited so far. However, a workshop is planned at the end of 2023 under Action 12 to discuss the role of Industry 5.0 as an emerging paradigm of a future-proof industry that aims beyond efficiency and productivity and reinforces the role and the contribution of industry to society focusing on three pillars: sustainability, human-centricity and resilience.

The 2023 OECD STIP Survey identifies four types of policy instruments in EU Member States related to Action 12: governance, direct financial support, collaborative infrastructures as well as guidance, regulation and incentives. The distribution of such policies according to their budget demonstrates a significant diversity of the levels of funding (Figure 31). Smaller budgets are typically made available for collaborative infrastructures and guidance, while larger budgets are more common in the area of direct financial support. Policies targeting governance have typically smaller budgets (up to 5M EUR), but there are also individual policy initiatives in this area with budgets over 500M EUR. Examples of initiatives with budgets exceeding EUR 500 million include the Polish National Centre for Research and Development (NCBR) Strategy focusing on supporting the development of innovations in Poland²⁰⁴ and the Research for Sustainability (FONA) Strategy in Germany²⁰⁵.

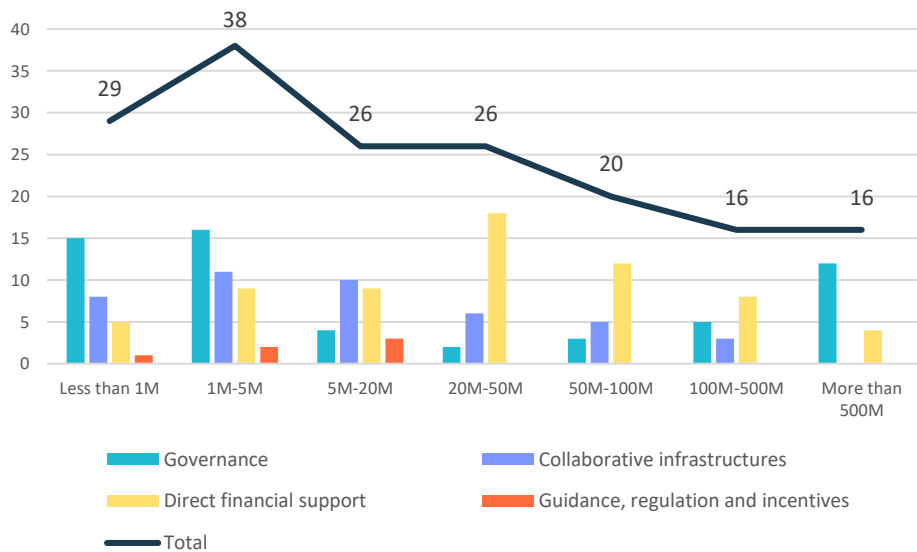


Figure 30: Action 12: Distribution of budget per policy instrument

²⁰⁴ <https://www.gov.pl/web/ncbr/ncbr>

²⁰⁵ <https://www.fona.de/en/about-fona/research-for-sustainable-development.php>

13. Action 13: Empower Higher Education Institutions

13.1. Purpose of the Action and expected outcomes

Action 13 acknowledges the role of European universities in driving the green and digital transition and aims at empowering them to take an active role on this front. Through its focus on higher education, Action 13 is strongly interrelated with the achievement of the European Education Area by 2025. The action seeks to offer new ways for universities and researchers to work, cooperate and innovate across borders, and aims at ensuring Europe's role and competitiveness on the global stage in research and innovation.

As outlined in the ERA Policy Agenda 2022-2024, Action 13 revolves around three core outcomes:²⁰⁶

- Supporting universities in their digital transition.
- Developing a policy approach to equip researchers with the skills needed for an interoperable career in academia and beyond.
- Developing a policy approach on future EU level support for the further development of Horizon Europe institutions, including through a European Excellence Initiative and the consolidation of the European Universities Initiative.

The ERA Forum subgroup decided to focus on the third objective given that the first and second objectives are largely tackled by other ERA Actions (in particular Actions 1 and 4).

13.2. Implementation of the Action

For the implementation of ERA Action 13 the ERA Forum Subgroup 'Universities for ERA' has been established. This subgroup met twice between March and May 2023. The second meeting discussed avenues for a better coordination between the Member States and the EU level to raise excellence in (networks of) universities and support trailblazer (networks of) institutions. Additionally, a break-out session was devoted to discussing an action plan. The most feasible and relevant actions, on the short (2025), medium (2026-2027), and long term (>2027), as well as fostering synergies with education and alignment with EU, national and regional policies were reviewed.

In its **2022 Communication on a European strategy for universities**, the European Commission sets out its plans to support and enable universities to adapt to changing conditions, to thrive and to contribute to Europe's resilience and recovery.²⁰⁷ In order to equip researchers with the skills needed for a career within and outside of academia, in 2023 the European Commission tabled a Council Recommendation on a 'European framework to attract and retain research, innovation and entrepreneurial talents in Europe'.

²⁰⁶ European Commission (2021), European Research Area Policy Agenda – Overview of actions for the period 2022-2024, p. 6.

²⁰⁷ <https://education.ec.europa.eu/document/commission-communication-on-a-european-strategy-for-universities?>

The Commission has identified universities as actors of change in the twin green and digital transitions. The Commission has set up a structured dialogue with Member States on digital education and skills to agree jointly on the key enabling factors to make digital education and training effective and inclusive. The **Digital Europe Programme** and the **Erasmus+ Jean Monnet activities** provide support to enhance and recognise the efforts of universities driving the digital transformation.

One of the initiatives of the Communication is the **Erasmus+ European Universities Initiative**. Horizon Europe, Digital Europe and other EU and national instruments will join efforts to support transnational alliances of higher education institutions to develop and share a common long-term structural, sustainable and systemic cooperation on education, research and innovation, creating European campuses involving various universities where students, staff and researchers from all parts of Europe can enjoy seamless mobility and create new knowledge together, across countries and disciplines.²⁰⁸

Within the Horizon Europe programme, the EU supports selected universities in the framework of the **European Excellence Initiative** to raise excellence in science and in value creation through deeper and geographically inclusive cooperation within alliances of higher education institutions. The European Excellence Initiative also aims at improving global competitiveness and visibility of Europe's higher education institutions, creating critical mass in key areas such as the green transition and Horizon Europe mission areas. Within calls published in 2022 and 2023, about EUR 70 million have been attributed to Higher Education Institutions under the Horizon WIDERA call.

The European Excellence Initiative is also connected to the **European Universities Alliances** selected under Erasmus+. As part of the 2022 Communication on a European strategy for universities, the European Universities Initiative is an initiative linking universities across the EU and the Neighbourhood to increase the quality of higher education. Following the 2022 Erasmus+ call for proposals, there are 44 European alliances which include approximately 340 higher education institutions in 31 countries.

This includes the EU Member States, as well as Iceland, Norway, Serbia, and Turkey. There are also approximately 1,300 associated partners from non-governmental organisations, enterprises, cities, local and regional authorities. One of the alliances focuses on the digital transition of universities (European Digital UniverCity), which is one of the main objectives of Action 13.²⁰⁹

The **Digital Education Action Plan** (2021-2027) is a renewed EU policy initiative that was published in September 2020. It proposes a way forward to achieve a high-quality, inclusive and accessible digital education in Europe. Its key objectives are to support the digital transformation of the education and training systems in the Member States. Action 5 of the plan is particularly relevant for the ERA Action 13, as it concerns developing digital transformation plans for education and training institutions, including universities. The ERASMUS+ programme provides funding for cooperation projects that support the digital transformation planning of education and training institutions.²¹⁰

EURAXESS - Researchers in Motion supports researchers and innovators in their careers through a range of job offers, funding opportunities and free assistance in situations such

²⁰⁸ Ibid.

²⁰⁹ <https://educalliance.eu>

²¹⁰ <https://education.ec.europa.eu/focus-topics/digital-education/action-plan>

as moving to other countries for work opportunities. It includes information, tools, and resources aimed to support career planning. National, regional, and local bodies act as EURAXESS centres that provide advice to researchers about their professional development.²¹¹

In the context of policies related to Action 13, the 2023 OECD STIP Survey provides information on **budget**. Figure 32 shows that the funds allocated to policies strengthening ERA Action 13 are relatively high, but most policies are in the range between EUR 1M and 5M EUR, with the fewest policies receiving a high volume of funding (over EUR 500M). An example of the latter is the University Performance Agreements²¹² in Austria.

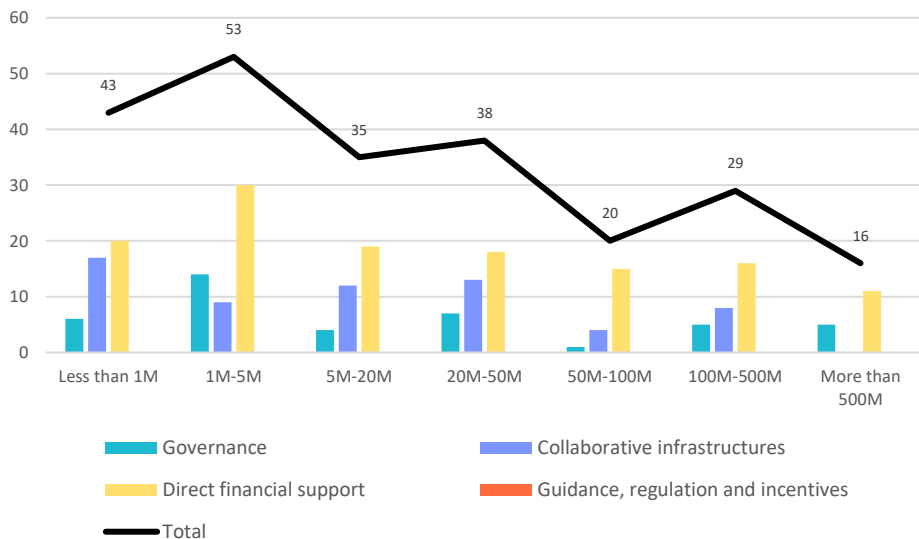


Figure 31: Action 13: Distribution of budget per policy instrument

The **policy instruments** related to Action 13 which are implemented across the Member States and at EU level fall mostly into three categories: direct financial support (49%), governance (24%) and collaborative infrastructures (26%), while guidance, regulation and incentives only account for 1% of the policies.

²¹¹ <https://euraxess.ec.europa.eu/career-development>

²¹² 'Performance agreements', Austria Federal Ministry of Education, Science and Research website, available at: <https://www.bmbwf.gv.at/Themen/HS-Uni/Hochschulgovernance/Steuerungsinstrumente/Leistungsvereinbarungen.html>

14. Action 14: Bring science closer to citizens

14.1. Purpose of the Action and expected outcomes

The role of citizens has been evidenced as crucial to ensure broader impact of R&I as well as higher alignment with societal needs and challenges. As a result of its relevance, citizen engagement has been embedded into the EU Missions.²¹³ Missions have the potential to mobilize EU citizens around common goals and to offer meaningful opportunities to participate in change. They are instrumental to building a deliberative democracy in the EU.

Consequently, the ERA aims to empower citizens and local communities to promote their engagement, trust and interest in science. Education, training activities and regular citizen science campaigns are some of the key instruments implemented to achieve this objective. Additionally, this action also promotes co-creation and collaboration with citizens in view of ensuring the societal uptake of the developed solutions and results.

The ERA Policy Agenda 2022-2024 defines the following expected outcomes within Action 14:

- Scale-up of the Plastic Pirates – Go Europe! Initiative;
- Launch the European City for Science, during the European Year for Youth;
- Feasibility analysis for a federated 'EU Science Media Network' to ensure more factual journalistic reporting on science;
- Propose a policy coordination mechanism on public engagement practices, including citizen involvement in scientific processes.

14.2. Implementation of the Action

Increasing the engagement of citizens across the EU within the research ecosystem has been a priority in the EU in the past years, placing higher attention on citizen science initiatives. In 2015, former Commissioner Moedas identified three strategic priorities, described in **Open innovation, Open science, Open to the world** (the three O's strategy). One important dimension of open science is citizen science and in 2016, the Council²¹⁴ recognised citizen science as an open science priority.²¹⁵

Following this line of action, the EU developed the EU citizen science initiative through Horizon 2020,²¹⁶ an online platform for sharing knowledge, tools, training and resources for citizen science. As part of Marie Skłodowska-Curie Actions (MSCA) (under Horizon Europe), the European Researchers' Night continues to be organised under the **MSCA and**

²¹³ https://research-and-innovation.ec.europa.eu/funding/funding-opportunities/funding-programmes-and-open-calls/horizon-europe/eu-missions-horizon-europe/eu-missions-citizen-engagement-activities_en

²¹⁴ <https://europa.eu/ITg94Pn>

²¹⁵ <https://op.europa.eu/en/publication-detail/-/publication/c30ddc24-cbc6-11ea-adf7-01aa75ed71a1>

²¹⁶ <https://eu-citizen.science>

Citizens action.²¹⁷ It aims to bring research and researchers closer to the public at large, with a focus notably on families, pupils and students.

In 2022, the European Commission launched its new flagship initiative Researchers at Schools as part of the European Year of Youth. It fosters direct interaction between researchers, primary and secondary school teachers and pupils. In this context, under the **Horizon Europe WIDERA** programme calls have been launched to support citizen science and the connection to society²¹⁸.

Recently, key initiatives and policies have been implemented to achieve the above-mentioned outcomes. Under the Policy Support Facility the **Mutual Learning Exercise (MLE) on 'Citizen Science initiatives – Policy and Practice** was developed.²¹⁹ It aimed at facilitating the exchange of information, experiences and lessons learned, as well as at supporting and expanding citizen science through identifying good practices, policies and programmes at local, regional and national level, towards supporting and scaling up citizen science.

Similarly, the **European City of Science** was launched in 2022 during the European Year of Youth. This label is awarded to cities with a rich and diverse scientific landscape. It allows citizens, adults and children, as well as scientists, researchers, and research professionals, to exchange ideas and increase their knowledge on science and technology²²⁰. The awarded city is also in charge of the organisation of the **European Science in the City Festival**, key initiatives in bringing citizen closer to citizens.

The last awarded city, Leiden, organised the **EU TalentOn**, an initiative aimed at bridging the gap between young talent, science and industry²²¹. Another crucial initiative is the **European Union Contest for Young Scientists (EUCYS)**, the most important student science fair in the EU, showcasing the best of student scientific achievement in the EU and beyond²²².

National policy examples

There have been increasing efforts in the form of policies and initiatives at the EU level and at the country level. In **Austria** the Federal Ministry of Education, Science and Research (BMBWF) has included Citizen Science as one of 12 Actions in the Austrian ERA National Action Plan, showing increasing commitment towards this action.

In **Germany**, citizen science has been systematically funded and embedded into national policies. Citizen science has been included both in the 2016 Green Paper and 2022 White Paper and a national platform 'Bürger schaffen Wissen' has been established.

²¹⁷ <https://marie-sklodowska-curie-actions.ec.europa.eu/actions/msca-citizens>

²¹⁸ <https://ec.europa.eu/info/funding-tenders/opportunities/portal/screen/opportunities/topic-search;callCode=null;freeTextSearchKeyword=citizen;matchWholeText=true;typeCodes=0,1,2,8;statusCodes=31094501,31094502,31094503;programmePeriod=null;programCcm2Id=43108390;programDivisionCode=43121702,43121707,43121757;focusAreaCode=null;destinationGroup=null;missionGroup=null;geographicalZonesCode=null;programmeDivisionProspect=null;startDateLte=null;startDateGte=null;crossCuttingPriorityCode=null;cpvCode=null;performanceOfDelivery=null;sortQuery=sortStatus;orderBy=asc;onlyTenders=false;topicListKey=topicSearchTablePageState>

²¹⁹ <https://ec.europa.eu/research-and-innovation/en/statistics/policy-support-facility/psf-challenge/mutual-learning-exercise-citizen-science-initiatives-policy-and-practice>

²²⁰ <https://www.euroscience.org/european-city-of-science>

²²¹ https://research-and-innovation.ec.europa.eu/funding/funding-opportunities/eucys_en

²²² https://research-and-innovation.ec.europa.eu/funding/funding-opportunities/eucys_en

In relation to the outcomes above-mentioned, there have been key achievements regarding **Plastic Pirates – Go Europe! citizen science initiative**, one of the main outcomes of this Action. This initiative was launched by the Trio Presidency of Germany, Portugal and Slovenia in 2020 and, since 2022 it incorporated 8 additional EU countries (Austria, Spain, Italy, Lithuania, Hungary, Belgium, Greece, Bulgaria) showing an increasing commitment across the EU.²²³ In each of these 11 countries, successful pilot phases with a minimum of 15 citizen samples have been carried out **involving more than 5000 young citizens as active participants** and adding up to a collection of over 300 data sets that are currently being verified by local research partners.

The initiative has led to wide press coverage across Europe with 196 media reports (online, print, radio, podcasts) and 295 posts in social media (Facebook and Instagram). In addition, didactically elaborated education material on plastic pollution has been made available to teachers and beyond in 10 European languages: English, Portuguese, Slovenian, Greek, Italian, Lithuanian, Dutch, Bulgarian, German and Spanish.

In the context of policies related to Action 14, the 2023 OECD STIP Survey provides key information on **policy initiatives and instruments** being implemented both at the EU level but also across the different EU Member States.

Figure 33 illustrates that **policies promoting Action 14** tend to fall under the smallest budget ranges, with 85 policy initiatives with less than EUR 1M of funding and only five with more than EUR 5M allocated to. This phenomenon is explained by the larger presence of governance and guidance policy instruments (implying lower budgets), which are among the above-mentioned expected outcomes.

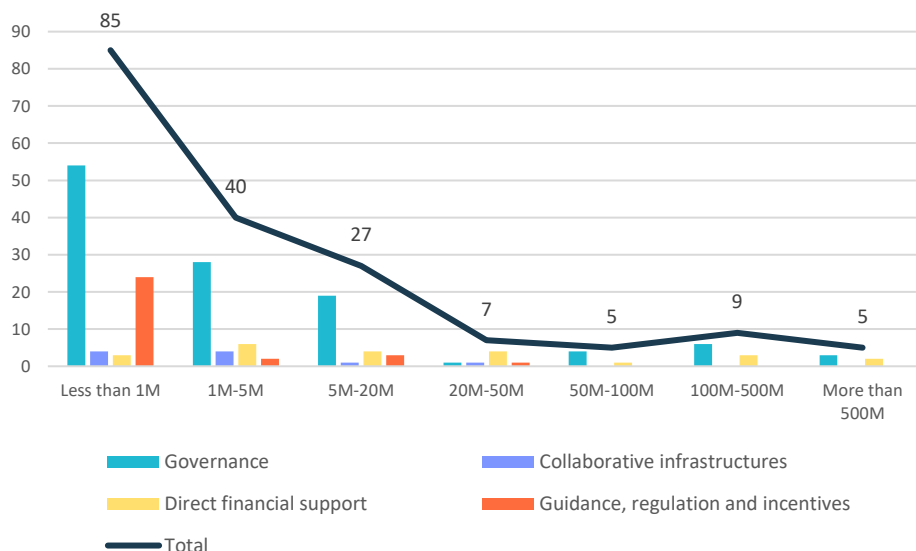


Figure 33: Action 14: Distribution of budget per policy instrument

²²³ <https://www.plastic-pirates.eu/en>

KEY FINDINGS ERA PRIORITY 3: AMPLIFYING ACCESS TO RESEARCH AND INNOVATION EXCELLENCE ACROSS THE UNION

SUMMARY BOX: KEY FINDINGS ERA PRIORITY 3

In terms of the increase in total R&D expenditure, Widening Countries generally pursued the same trend as the EU overall, with a deceleration period between 2012 and 2016 followed by an upward trend until 2020.

Overall, the expenditure in R&D has increased throughout the period 2010-2021. Despite limited quantitative assessment, evidence shows powerful and increasing policy efforts to improve access to R&I excellence across the EU. For example, the Horizon Europe programme is enhancing collaboration with Widening Countries.

Similarly, to other ERA Priorities, there is a disparity between countries and regions in the EU in terms of R&I performance. Therefore, a more inclusive approach supporting all EU Member States towards improving their R&I systems and performance is recommended.²²⁴

In order to further support the reduction of regional disparities and the inclusion of Widening Countries, a core enabling factor relies in strengthening HEIs through the promotion of capacity building, upskilling and reskilling of researchers. As already mentioned, in order to achieve this ERA Priority Horizon Europe is playing a crucial role by supporting various projects through the WIDERA work programme²²⁵ and COST actions²²⁶.

Key findings by action

ERA Action 16 aims at improving access to excellence across the EU's R&I system particularly supporting low R&I performing countries through increased coordination between Cohesion policy instruments and the Horizon Europe programme. As part of this action, the ERA Forum sub-group 'Access to excellence' – 'R&I and Cohesion Managing Authorities' Network (RIMA) has been set up. The activities implemented under this action are relatively new with most of them being implemented since 2023.

Horizon Europe, particularly the WIDERA programme (providing support for activities such as Teaming, Twinning, Excellence hubs or the European Excellence Initiative) plays a central role in supporting EU-wide access to excellence for Widening Countries and to contribute to the achievement of objectives under Action 16.

In relation to the promotion of excellence in R&I, Horizon Europe demonstrates a strong commitment to research management initiatives. This commitment aligns with **ERA Action 17** and includes efforts to promote best practices in research management, open science, and innovation. Among these initiatives, the Research Management Roadmap was launched. It is a pan-European community of research management excellence, coming together over three years to define a roadmap for research managers.

Notable initiatives such as RITrainPlus, Horizon Europe's SwafS and RRI programs, and the EIT's HEI Initiative provide support and funding to enhance the strategic capacity of research management.

²²⁴ It can be expected that the establishment of the ERA Forum sub-group 'Access to excellence' – 'R&I and Cohesion Managing Authorities' Network (RIMA) will enhance and support the implementation of actions within this ERA Priority (<https://ec.europa.eu/transparency/expert-groups-register/core/api/front/document/95343/download>).

²²⁵ HORIZON EUROPE: Widening participation and spreading excellence (https://rea.ec.europa.eu/funding-and-grants/horizon-europe-widening-participation-and-spreading-excellence_en)

²²⁶ <https://www.cost.eu>

PROGRESS TOWARDS THE OBJECTIVES FOR ERA PRIORITY 3

The third Priority of the European Research Area focuses on amplifying access to research and innovation excellence in Europe and enhancing interconnections between innovation ecosystems across the Union. The core objective of this priority relies in the promotion of an inclusive approach in R&I, engaging all relevant stakeholders, particularly those located in R&I systems with lower performance as well as promotion of synergies across funding schemes to enhance R&I across the ERA. The priority has three associated sub-priorities, however, there is currently a lack of data availability for several indicators that should track progress in this area.²²⁷

There is one indicator used to monitor progress against **sub-priority 3.1 more investments and reforms in countries and regions with lower research and innovation performance**. It tracks the **increase in total R&D expenditure for widening and non-Widening Countries (as percentage of GDP)**. The available data over 10 years (from 2011 to 2021) shows that R&D expenditure increase throughout the whole period. Nonetheless, the increase in R&D expenditure across the EU decelerated between 2012 and 2016, followed by an upward trend until 2020.

Figure 64 in Annex 3 shows divergence across Widening Countries²²⁸. Countries like Croatia, Greece or Poland constantly lie above the EU average, evidencing a larger increase in R&D expenditure than at the EU level. Other countries like Estonia, Slovenia or Slovakia display volatile trends over the period, with large up and downs. Overall, both widening and non-Widening Countries follow similar trends to the EU average.

²²⁷ For more details, please refer to the methodology report for the ERA Scoreboard and the ERA Dashboard published in the context of the ERA Monitoring Mechanism.

²²⁸ Bulgaria, Croatia, Cyprus, Czechia, Estonia, Greece, Hungary, Latvia, Lithuania, Malta, Poland, Portugal, Romania, Slovakia, Slovenia and all Associated Countries with equivalent characteristics in terms of R&I performance and the Outermost Regions.

IMPLEMENTATION OF THE ACTIONS RELATED TO ERA PRIORITY 3

15. Action 16: Improve EU-wide access to excellence

15.1. Purpose of the Action and expected outcomes

By acknowledging the necessity for increasing excellence in order to make use of the full potential of scientific resources in Europe, Action 16 aims at improving access to excellence across the EU's R&I system and specifically support low R&I performing countries. Reaching this very ambitious objective will require the combination of many different existing tools and potentially new or reinforced ones, at both EU and Member State level. In this regard, Cohesion Policy, the Widening Programme under Horizon Europe, the R&I investments in the Recovery and Resilience Framework as well as the use of the Horizon Policy Support Facility or the Technical Support Instrument will play a fundamental, albeit insufficient role. In addition, concerned Member States will also need to prioritise R&I investments and reforms when needed in order to improve their R&I performance.

Against this backdrop, Action 16 will contribute to first, securing better coordination of R&I and Cohesion policy, creating a link between the two communities, including the setting up and strengthening of synergies between EU and national/regional funding programmes to raise impact and thus R&I performance; and second, identifying persistent bottlenecks to raise excellence and propose possible solutions that will also contribute to the closing of the existing innovation divide.

In order to meet these objectives, and following discussions in the ERA Forum, the Commission established the 'Access to excellence' – 'R&I and Cohesion Managing Authorities' Network (RIMA) subgroup to the ERA Forum to conduct the implementation of ERA Action 16 - EU-wide Access to Excellence.

In order to foster the interaction between the two communities, the Commission asked Member States for the nomination of two main representatives and two alternative representatives in this subgroup of the ERA Forum. Out of the four representatives per Member State, two (main and alternate) should be appointed from the national authorities responsible for research and innovation and two (main and alternate) from the national authorities responsible for cohesion policy in the area of research and innovation investments.

These representatives should maintain close links to national and regional authorities in charge of Cohesion policy and authorities in charge of the implementation of Horizon Europe in terms of collecting input and disseminating results. Associated Countries as well as other public entities and ERA stakeholder organisations were invited to the group as observers. The group is jointly chaired by DG Research and Innovation, DG Regional and Urban Policy and a Member States' representative (namely from the Czech Republic).

The first meeting took place on 7 June 2023. It focused on key novelties in synergies, and some indications on the future work resulting from the recent European Court of Auditors synergies' audit²²⁹, as well as other relevant initiatives for joining forces to improve the

²²⁹ https://www.eca.europa.eu/Lists/ECADocuments/SR22_23/SR_H2020_and_ESI_Funds_EN.pdf

overall impact of EU R&I investment, such as Regional Innovation Valleys²³⁰, the latest developments on Widening actions²³¹ as well as the new Community of Practice on Smart Specialisation.

Member States' presentations and discussions focussed on how to improve R&I performance across Europe by better interacting between the two key R&I supporting EU programmes, Horizon Europe and Cohesion Policy. Member State R&I authorities and Cohesion policy bodies presented and exchanged experiences on a broad range of synergies. This included discussions on governance, such as existing cooperation between R&I actors at national level, and the exchanges on more operational aspects, such as first concrete cases of implementing the new toolbox for synergies as outlined in the published guidance notice on Horizon Europe – ERDF synergies²³².

15.2. Implementation of the Action

The activities of Action 16 started officially in 2023 with the setting up of the Expert Sub-group and the organization of the first kick-off meeting.

Early achievements from these activities include the initial identification of synergies actions between Cohesion funding and Horizon Europe in terms of designing and implementing new synergies tools, such as possibilities of transfers from ERDF programmes to Horizon Europe, mobilization of ERDF to be used as national contribution for Horizon Europe Co-funded and Institutionalised Partnerships. This also encompasses the identification of data needs and existing gaps to better create and monitor the creation of synergies between both funding programmes, including the upstream and downstream synergies.

In addition, the initial identification of different governance modalities as a starting point for possible future improvements are also part of the initial achievements of this action.

A policy survey to better understand the use of synergies at Member State level as well as the identification of bottlenecks to do so is ongoing and will provide ground for future actions under the Expert sub-group.

Action 16 is in line with the **2021 Council of the European Union Recommendation** on 'Deepening the European Research Area: Providing researchers with attractive and sustainable careers and working conditions and making brain circulation a reality'. The latter explicitly welcomed widening actions, helping '*to design and implement reforms of the R&I systems*'.²³³

Action 16 was developed to complement and strengthen national R&I strategies and interdependent cohesion policy programmes and national, regional, and private

²³⁰ https://research-and-innovation.ec.europa.eu/strategy/support-policy-making/shaping-eu-research-and-innovation-policy/new-european-innovation-agenda/new-european-innovation-agenda-roadmap/flagship-3-accelerating-and-strengthening-innovation-european-innovation-ecosystems-across-eu-and_en

²³¹ https://rea.ec.europa.eu/funding-and-grants/horizon-europe-widening-participation-and-spreading-excellence_en

²³² https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=uriserv:OJ.C_.2022.421.01.0007.01.ENG&toc=OJ:C:2022:421:FULL

²³³ Council of the European Union (2021), Deepening the European Research Area: Providing researchers with attractive and sustainable careers and working conditions and making brain circulation a reality - Council conclusions (adopted on 28/05/2021), p.7, available at: <https://data.consilium.europa.eu/doc/document/ST-9138-2021-INIT/en/pdf>.

investments. Several **instruments** are included in Action 16's package under Horizon Europe and aim at improving excellence, such as:

- **Teaming, Twinning, Excellence hubs:** Teaming actions aim to either create or modernise centres of excellence in Widening Countries. This is to be achieved by the establishment of strategic partnerships with leading institutions abroad.²³⁴ Twinning activities aim at enhancing networking opportunities between research institutions of the Widening Countries (acting as coordinators), and their leading counterparts,²³⁵ at least two research institutions from two different EU countries or Associated Countries, to facilitate the exchange of best practices. Excellence Hubs aim to strengthen place-based innovation and excellence through the establishment of cross-boarder partnerships of 'innovation ecosystems' in Widening Countries.²³⁶
- **The European Excellence Initiative:** This action aims at empowering universities as drivers of change in relation to R&D and create opportunities for cooperation between HEIs.²³⁷
- **For empowering brain circulation,** the action **ERA talents** aims for cross-sectoral talent circulation and academia-business collaboration, and the action ERA fellowships gives specific support for excellent researchers from Widening Countries not funded through the Marie Skłodowska-Curie Actions
- **Hop-on facility:** This action aims at providing opportunities to research institutions from Widening countries to join ongoing R&I actions under Horizon Europe Pillar 2 and the EIC Pathfinder.²³⁸
- **COST** is funding scientific networking that pools resources and results of nationally funded research activities. It serves also as an incubator for successful research proposals under Horizon Europe. 80% of COST's budget is devoted to widening actions and 50% of its budget is invested in Inclusiveness Target Countries (ITCs).²³⁹
- **ERA Chairs:** This action shall attract high-level researchers to a university or research centre located in a Widening country and establish a research team fully integrated in the coordinator's institution, thereby increasing its research capacity

²³⁴ European Commission (2023), 'Widening participation and spreading excellence', available at: https://research-and-innovation.ec.europa.eu/funding/funding-opportunities/funding-programmes-and-open-calls/horizon-europe/widening-participation-and-spreading-excellence_en

²³⁵ Ibid.

²³⁶ Ibid.

²³⁷ European Research Executive Agency, European Commission (2023), 'European Excellence Initiative', available at: https://rea.ec.europa.eu/funding-and-grants/horizon-europe-widening-participation-and-spreading-excellence/european-excellence-initiative_en.

²³⁸ European Research Executive Agency, European Commission (2023), 'Hop-on facility', available at: https://rea.ec.europa.eu/funding-and-grants/horizon-europe-widening-participation-and-spreading-excellence/hop-facility_en

²³⁹ <https://www.cost.eu/strategicplan>

and considerably improving its research performance in a scientific domain of choice.²⁴⁰

- **For improving the quality and quantity of proposals** from widening countries – a special action is dedicated to the **strengthening of the National Contact Point network** by developing its services in pre-proposal checks, match making activities, consultation, etc.
- A new call **Pathways to synergies** has been introduced in 2023 as a dedicated action fostering upstream or downstream synergies (applicants may choose). This will provide support for additional efforts required for setting up the interfaces between two different funding systems where major barriers still occur due to the mismatches of regional versus European approach, consortium vs single beneficiary funding and Horizon thematic priorities vs national/regional smart specialization.
- Another new call in 2023 - **Dissemination and Exploitation Support Facility** is focusing on activities to strengthen or build D&E capacities in widening countries and will provide beneficiaries of the ongoing portfolio of widening projects with further opportunities for scaling up their research results and improve the sustainability of their actions.

Additional instruments may be included in the future calls of the upcoming Work Programmes.²⁴¹

The 2023 OECD STIP Survey offers some relevant insights on key themes related to Action 16.²⁴²

²⁴⁰ https://rea.ec.europa.eu/funding-and-grants/horizon-europe-widening-participation-and-spreading-excellence/era-chairs_en

²⁴¹ DG RTD (2022), Action 16: Improve EU-wide access to excellence, available at: https://era.gv.at/public/documents/4605/16_-_Improve_EU-wide_access_to_excellence_explanatory_document_revised_xMUA1Go.pdf

²⁴² OECD STIP Survey themes related to Action 16 are the following: Theme 16 'Public Research debates', Theme 24 'Research and technology infrastructures', Theme 26 'Cross disciplinary research', Theme 28 'Business innovation policy debates', and Theme 41 'Knowledge exchange and co-creation strategies'.

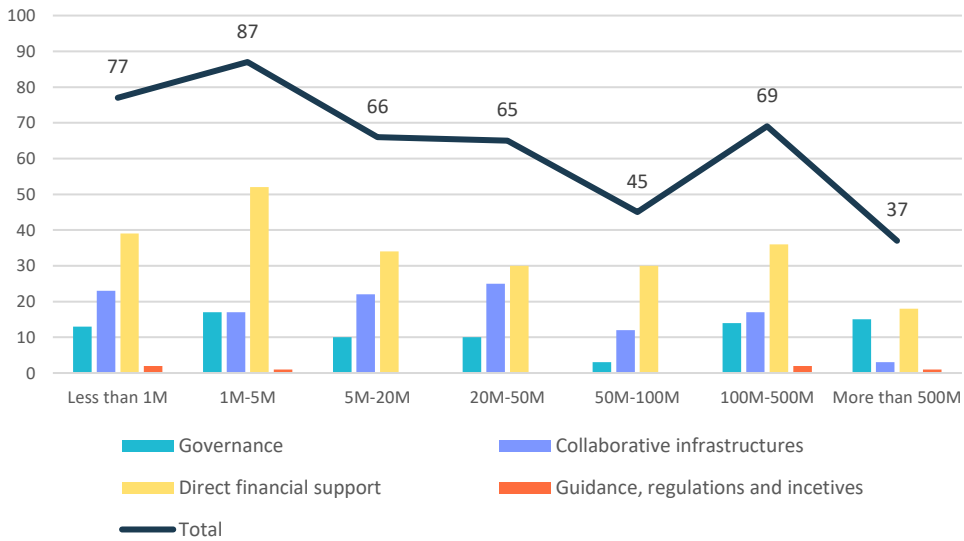


Figure 34: Action 16: Distribution of budget per policy instrument

Figure 47 shows the distribution of **budget allocation** for policies related to Action 16 at EU level (27 Member States). It indicates that the majority of Action 16-related policies are being funded within a yearly budget between EUR 1M and EUR 5M or of less than EUR 1M. Thirty-seven policies benefit from large amounts of funding, with more than EUR 500 M. An example of an initiative with more than EUR 500 million is the Spanish State Plan for Scientific and Technological Research and Innovation 2021-2023²⁴³.

Lastly, the graph above shows that the key **policy instruments** related to Action 16 include direct financial support²⁴⁴ (42%), followed by governance instruments²⁴⁵ (32%). Collaborative infrastructures²⁴⁶ also represent an important policy instrument to implement policies related to Action 16 (24%). Guidance, regulation and incentives are the policy instrument used in a minority of cases (2%).

²⁴³ Spanish Ministry of Science and Innovation (2021) 'PEICTI State Plan for Scientific, Technical and Innovative Research 2021-2023' (PEICTI Plan Estatal de Investigaci Científica, Técnica y de Innovaci 2021-2023), available at: <https://www.ciencia.gob.es/InfoGeneralPortal/documento/e1f1deb1-7321-4dd9-b8ca-f97ece358d1c>

²⁴⁴ Direct financial support can include institutional funding, various types of grants, procurement programmes dedicated to R&D and innovation, loans, credit and scholarships, equity financing or innovation vouchers.

²⁴⁵ Governance tools refer as elements such as strategies, plans, reforms, regulatory tools, consultations of relevant stakeholders, the development of standards and certification, or public awareness campaigns.

²⁴⁶ Related instruments facilitate networking and collaborative platforms, provide dedicated support to research and technical infrastructures, information service and access to datasets.

16. Action 17: Enhance public research institutions' strategic capacity

16.1. Purpose of the Action and expected outcomes

Action 17 aims at enhancing the training and skills development of research management staff, foster the management competences of researchers and innovators, increase networking of research managers and promote the recognition of the R&I management profession at institutional and government levels.²⁴⁷

A strong community of R&I managers plays a crucial role in supporting high-performing research entities, local ecosystems, and regions. It is essential to provide support to this community and bridge the gaps that exist in regions lagging behind. By ensuring excellence across the entire ERA, the flow of talent and investments can be facilitated.

The European Commission aims to establish robust management capacity and guidance for the stakeholders involved through the Research Management Initiative. This initiative, under Horizon Europe, will support research management by facilitating the European network for research and innovation managers, exploring certification and training programs, and providing policy support for Member States through mutual learning platforms on research management.²⁴⁸

The primary outcome expected from Action 17 is the implementation of a Research Management Initiative, which will involve at least 100 public research performing and research funding organisations and their research management staff in networking programs.

16.2. Implementation of the Action

Horizon Europe's approach to supporting research management initiatives is consistent with Action 17 of the ERA Policy Agenda. This commitment to promoting best practices in research management, open science, and innovation is reflected in various projects and initiatives implemented under Horizon Europe. The EOSC has emerged as a significant catalyst for actions and policies on research management under the Horizon Europe program.

The **Strategic Research and Innovation Agenda (SRIA)**, published in 2022 by ESOC, provides a comprehensive roadmap for the next seven years. It outlines a vision to establish an operational 'Web of FAIR data and services' for science. It aims to transform research management by creating an open and trusted environment for accessing and managing publicly funded research data and digital outputs. This transformative approach seeks to change how researchers access and share digital knowledge throughout the research lifecycle, leading to advancements in research data management and scientific progress. The SRIA represents the collaborative efforts of research-performing

²⁴⁷ ERA Portal Austria, 17 Enhance public research institutions' strategic capacity, available at: <https://era.gv.at/era/era-policy-agenda/explanatory-documents>

²⁴⁸ https://research-and-innovation.ec.europa.eu/system/files/2021-11/ec_rtd_era-policy-agenda-2021.pdf, p.19.

organisations, research-funding organisations, research infrastructures, research libraries, and research associations which have actively participated in the co-creation process.²⁴⁹

One notable project is **RITrainPlus**, which builds upon the previous Rltrain project (2015-2020). RITrainPlus focuses on developing the skills and competences of research infrastructure managers through the implementation of Continuous Professional Development courses (CPDs), the creation of a foundation for the long-term provision of highly qualified personnel for managing research infrastructures and the establishment of a European School for the Management of Research Infrastructures.²⁵⁰ Additionally, Horizon Europe's **Science with and for Society** (SwafS) and its **Responsible Research and Innovation** (RRI) program support the development of best practices and promote the integration of responsible research and innovation principles into research management.²⁵¹

Horizon Europe contributes to through the **EIT's (European Institute of Innovation and Technology) HEI Initiative**, which supports higher education institutions by providing expertise, coaching, access to the EIT innovation ecosystem and funding. The goal is to assist these institutions in developing innovation action plans that align with their specific needs, further enhancing their strategic capacity in research management.²⁵²

Moreover, under the specific call '*HORIZON-WIDERA-2021-ERA-01-20: Towards a Europe-wide training and networking scheme for research managers*'²⁵³, two Coordination and Support Actions (CSA) projects were initiated in 2022. The first project, **CARDEA**, coordinated by the University College Cork, aims to professionalise research management as a valued career choice within the European Research Area²⁵⁴. CARDEA is developing a careers and competences framework for research managers at European level.

The second project, **RM ROADMAP**, led by EARMA (European Association of Research Managers and Administrators), seeks to connect existing European networks through an innovative community platform for research management.²⁵⁵ RM ROADMAP developed a network of 'RM Ambassadors' in over 40 countries, who will support the establishment or maintenance of national communities of research managers, structurally liaise with national policy makers, collect the needs and develop actions to improve upskilling.

Twinning actions prioritise establishing Research Support Offices, enhancing the research management capacities and administrative skills of the technical and administrative staff working in institutions from Widening countries, with more than 100 projects funded per Twinning Call²⁵⁶. This programme strengthens networking among research institutions in

²⁴⁹ Strategic Research and Innovation Agenda (SRIA) of the European Open Science Cloud (EOSC), 2022, available at: <https://op.europa.eu/en/publication-detail/-/publication/f9b12d1d-74ea-11ec-9136-01aa75ed71a1>

²⁵⁰ <https://ritrainplus.eu/ritrainplus-project>

²⁵¹ <https://www.sfi.ie/funding/international/european-research-area/horizon-2020/swafs>

²⁵² <https://eit-hei.eu>

²⁵³ <https://ec.europa.eu/info/funding-tenders/opportunities/portal/screen/opportunities/topic-details/horizon-widera-2021-era-01-20>

²⁵⁴ <https://www.ucc.ie/en/cardea/aboutus>

²⁵⁵ <https://www.astp4kt.eu/about-us/kt-news/mapping-the-future-of-research-management.html>

²⁵⁶ https://rea.ec.europa.eu/funding-and-grants/horizon-europe-widening-participation-and-spreading-excellence/twinning_en

Widening countries, serving as coordinators, and their top-tier European Union counterparts by connecting institutions from different Member States or Associated Countries.²⁵⁷

Information from the 2023 OECD STIP Survey suggests that **policy instruments related to Action 17** predominantly fall under direct financial support, as illustrated in Figure 32. Governance instruments constitute the second most common type, followed by collaborative infrastructures and policies relying on guidance, regulation, and incentives. No policies utilising indirect financial support were identified across the 27 Member States.

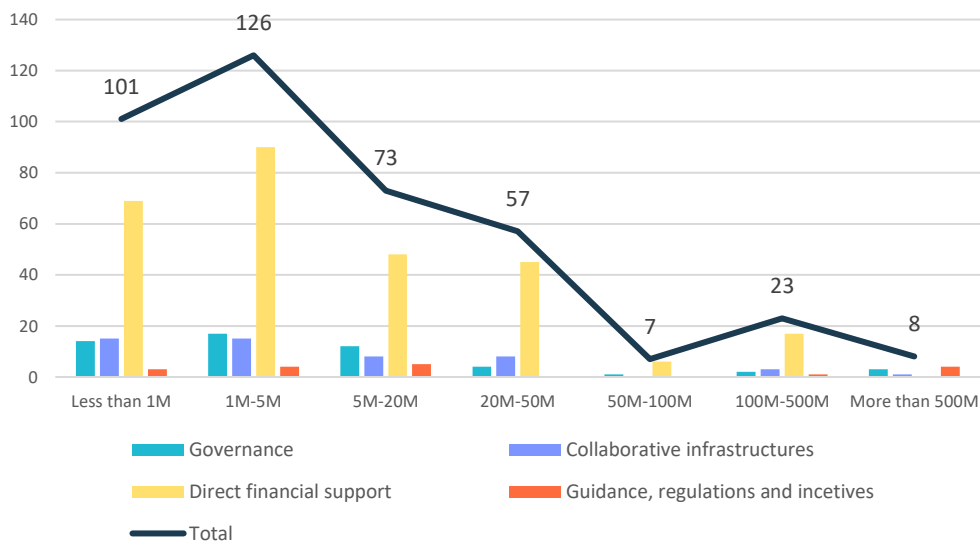


Figure 32: Action 17: Distribution of budget per policy instrument

National policy example

As illustrated in the STIP survey, current policy debates related to Action 17 indicate that **Latvia**, for example, is making significant efforts in enhancing research management. The establishment of the Innovation and Research Management Council in 2022 fostered closer cooperation among key institutions, overseeing the implementation and management of research, development, and innovation policies, including RIS3.258 The involvement of the Latvian Investment and Development Agency (LIAA) has been strengthened, with additional tasks focusing on the systematic engagement of LIAA in developing RIS3 value chain ecosystems and playing a leading role in future scenario development and strategic research.

Similarly, in **Czechia**, the Government programme statement in 2022 aims at enhancing research management and prioritise science, research, and innovation. The government

²⁵⁷ <https://ec.europa.eu/info/funding-tenders/opportunities/portal/screen/opportunities/topic-details/horizon-widera-2023-access-02-01>

²⁵⁸ <https://s3platform.jrc.ec.europa.eu/ris3-guide>

will focus its efforts on improving the research management system, human resources, funding, technology transfer, and publicity.

The “sponsors” of ERA Action 17 (Germany, Hungary, and the university sector), together with experts in the ERA Forum, developed a set of recommendations for target action at country level and European level to increase the recognition of the profession and develop research managers’ training activities as well as improve accessibility to these. Further activities within ERA Action 17 will focus on capacity building, especially in less R&I intensive regions of Europe, and on further rolling out the networking, upskilling and recognition activities.

KEY FINDINGS ERA PRIORITY 4: ADVANCING CONCERTED RESEARCH AND INNOVATION INVESTMENTS AND REFORMS

SUMMARY BOX: KEY FINDINGS ERA PRIORITY 4

The ERA Priority 4 aims to promote investment on innovation and research, in order to guarantee long-term development in this regard. This priority entails three different actions related to the process of identification, observation, and implementation of ERA. Nonetheless, the minimum number of commitments required was not reached in two of the actions, and therefore, ERA Priority 4 currently involves only Action 19: *Establish an efficient and effective ERA monitoring mechanism*. The quantitative indicator available for this priority, share of public R&D expenditures financed by the private sector has experienced a slight decrease over the period 2010-2020.

Key findings by action

ERA Action 19 has the target to establish a new ERA Monitoring Mechanism. This involves developing an ERA Scoreboard, an ERA Dashboard, regular EU level and national reports as well as an online ERA Policy Platform. Within the ERA Forum, EU Member States, Associated Countries, R&I stakeholders and the European Commission worked in co-creation to set up the new monitoring mechanism. All elements of the monitoring mechanism will be available by the end of 2023.

PROGRESS TOWARDS THE OBJECTIVES FOR ERA PRIORITY 4

ERA Priority 4 aims to promote investment in innovation and research, in order to guarantee long-term development in this regard. The original ERA Policy Agenda entails three different actions under this Priority. However, ERA Priority 4 currently covers only Action 19: *Establish an efficient and effective ERA monitoring mechanism*.²⁵⁹

Among the core aspirations of this priority, is the creation of a monitoring mechanism to evaluate the progress and the performance of the Member States in relation to them, to inform about the evolution of ERA. Such system consists of four elements: ERA Scoreboard, ERA Dashboard, country reports and the present EU level report.

The quantitative indicator available for this priority, share of public R&D expenditures financed by the private sector has experienced a slight decrease over the period 2010-2020. A more detailed analysis is provided below.

Sub-priority 4.1: Coordination of R&I investments

In view of setting the baseline with regard to this priority, it becomes crucial to understand the financial collaboration between the public and private sector in view of enhancing investments in R&I. As such, the analysed indicator entails **the share of public R&D expenditures financed by the private sector**. As illustrated in Figure 36, the indicator has experienced a slight decrease at the EU level from 8.54% in 2010 to 7.87% in 2020.

²⁵⁹ Action 18 was subsumed under other actions, including Actions 16 and 20; Action 20 was partly put on hold, as it did not fulfil the necessary requirement to “secure the commitment of at least half of Union Member States” as requested in the Council Conclusions of November 2021.

At the country level, values show great divergence across the Member States with countries such as Cyprus or Malta below EU average while others, including Belgium or Germany, show values constantly above the EU average. More than half of the EU Member States have experienced a decreasing trend, following the EU tendency, evidencing an overall reduction in the share of public R&D expenditures financed by the private sector.

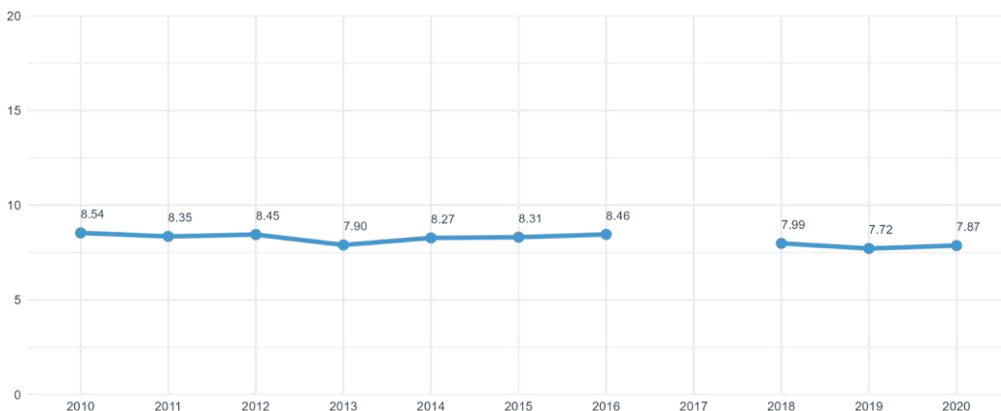


Figure 36: Share of public R&D expenditures financed by the private sector

IMPLEMENTATION OF THE ACTIONS RELATED TO ERA PRIORITY 4

17. Action 19: Establish an efficient and effective ERA monitoring system

17.1. Purpose of the Action and expected outcomes

The Council Recommendation on a Pact for Research and Innovation in Europe states that “the Member States and the Commission should implement an enhanced monitoring mechanism, to ensure a proper basis for evidence informed policy making in the ERA and to provide evidence and analysis in the context of the European Semester”.

The new ERA monitoring mechanism shall be designed to assess the implementation of the ERA Actions and to measure progress towards the ERA priorities both at EU- and national levels.

In detail, this Action was defined to achieve the following outcomes:

- An online ERA Policy Platform to serve as an umbrella tool for sharing information on the implementation of Actions and allowing exchanges between all actors.;
- An ERA Scoreboard to show the overall progress at EU level for a limited number of indicators in view of realising the ERA priorities (as defined in the Pact for R&I);

- An ERA Dashboard to provide a more detailed monitoring of the overall progress at national level in view of realising the ERA priority areas (as defined in the Pact for R&I);
- A report on the state of play of the implementation of the ERA Policy Agenda and the progress made towards the ERA objectives (as set out in the Pact for R&I) at EU-level every 18 months (“EU-level Report”);
- Annual reports on each Member State’s progress in the implementation of the ERA (“ERA Country Reports”).

With the support of these different tools, the aim is to identify barriers and challenges in the achievement of the ERA Actions and priorities, outperforming and less performing actions as well as good practices which should feed and reshape EU and national policies to effectively accomplish the defined milestones and objectives.

17.2. Implementation of the Action

The Council conclusions on the future governance of the ERA of November 2021²⁶⁰ invited the Commission “to present to the Council by mid-2022 a monitoring and evaluation framework for the implementation of the ERA”. **The Commission presented the framework for a future ERA Monitoring Mechanism to the Council on 10 June 2022.**²⁶¹

The development and **implementation of this Action followed a thorough co-creation process within the ERA Forum.** To prepare the various elements of the monitoring mechanism, including the selection of relevant indicators for the Scoreboard and the Dashboard, the ERA Forum held two dedicated workshops in November 2021 and April 2022. The ERA Forum meetings in October 2021, May 2022, September 2022, February 2023, and July 2023 put a specific focus on the monitoring mechanism. The discussions were supported by two independent expert reports.²⁶²

Additionally, **key monitoring tools and mechanisms have been developed as part of the implementation of other actions.** In the context of ERA Action 1 on Open Science the monitoring framework of the EOSC observatory has been initiated. Similarly, as part of Action 4, the Research and Innovation Careers Observatory (RICO) will be developed and will enable to provide a more comprehensive analysis and monitoring of progress towards this action. In relation to this action the ERA Talent Platform will be developed which will be a key portal providing links to EURAXESS, HRS4R, RESAVER and the Research Careers Observatory.

The EU put great attention to the development of monitoring frameworks and/or reports in the field of R&I, therefore a great variety of policies and initiatives can be found. Since 2004, the EU develops the **EU Industrial R&D Scoreboard** with the objective of measuring performance of EU innovation-driven industries against major global counterparts.²⁶³ This

²⁶⁰ <https://data.consilium.europa.eu/doc/document/ST-14308-2021-INIT/en/pdf>.

²⁶¹ <https://data.consilium.europa.eu/doc/document/ST-9578-2022-INIT/en/pdf>.

²⁶² “Data gathering and analysis of policy developments and reforms: Study to evaluate the ERA policy framework/ERA monitoring mechanism” (<https://op.europa.eu/en/publication-detail/-/publication/98a8edb4-c763-11ec-b6f4-01aa75ed71a1/language-en/format-PDF/source-256243590>); Analytical report of independent experts on “Design of the new ERA Monitoring System” (not published).

²⁶³ <https://iri.jrc.ec.europa.eu/scoreboard/2022-eu-industrial-rd-investment-scoreboard>

monitoring framework provides key insights into the economic and financial information of the world's top 2500 R&D investors and EU 1000 R&D investors, identifying challenges and opportunities for the EU.

Over a decade ago, the **European Innovation Scoreboard** (EIS) was established.²⁶⁴ This annual monitoring framework provides a comparative analysis of innovation performance in EU countries, other European countries, and regional neighbours. Based on the assigned scores, EU countries are categorised in four performance groups: innovation leaders, strong innovators, moderate innovators and emerging innovators. This monitoring tool helps to identify the relative strengths and weaknesses of the countries' national innovation systems and to identify challenges they need to address.

Additionally, due to the growing importance and efforts devoted to gender equality globally but particularly in the EU, several initiatives have been developed in view of monitoring gender equality in R&I across the EU and its MS, enhancing ERA Action 5. The most relevant initiative is the **She Figures report** which is released every three years since 2003.²⁶⁵ It collects data through different available indicators (88 in the 2021 edition) and is presented throughout six chapters, following the 'chronological journey' of women from graduating from doctoral studies to participating in the labour market and acquiring decision-making roles, while exploring differences in women's and men's working conditions and research outputs. EU funded projects enhancing monitoring frameworks on gender equality in R&I institutions such as UNISAFE have conducted key surveys and or developed monitoring tools²⁶⁶.

²⁶⁴ https://research-and-innovation.ec.europa.eu/statistics/performance-indicators/european-innovation-scoreboard_en

²⁶⁵ <https://ec.europa.eu/research-and-innovation/en/knowledge-publications-tools-and-data/interactive-reports/she-figures-2021>

²⁶⁶ <https://unisafe-gbv.eu/project-news/results-from-the-largest-european-survey-on-gender-based-violence-in-academia>

EU-LEVEL FINANCIAL SUPPORT TO ERA ACTIONS

This chapter provides information on how two EU-level programmes supported the ERA Policy Agenda and its Actions: a) Horizon Europe, ‘Widening participation and strengthening the ERA’ (WIDERA) with focus on the actions under Destination 3 ‘Reforming and enhancing the EU research and innovation system’; the Recovery and Resilience Facility.

HORIZON EUROPE, ‘WIDENING PARTICIPATION AND STRENGTHENING THE ERA’²⁶⁷

Figure 37 presents the distribution of the budget in the work programme 2021-2022 and the planned budget in the work programme 2023-2024 according to the ERA objectives that they address.

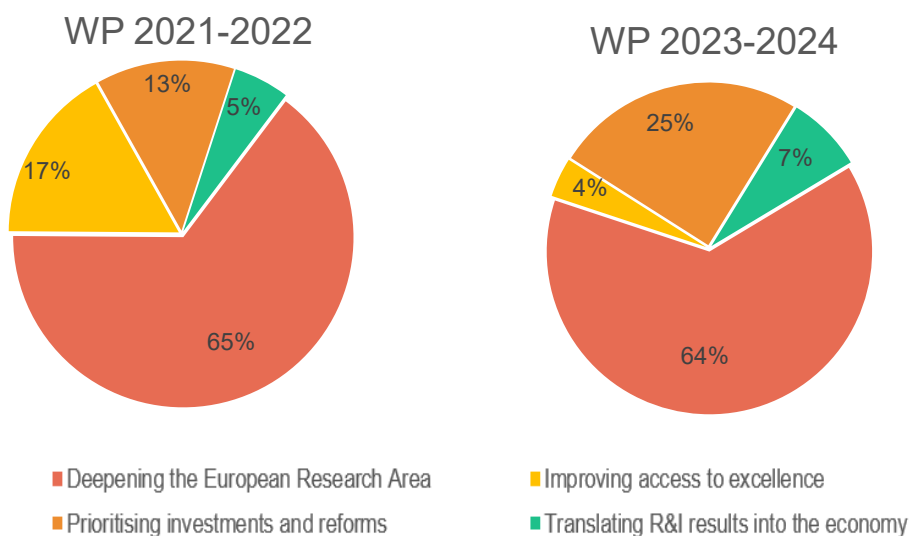


Figure 37: Budget distribution by ERA objective in WP 2021-2022 and WP 2023-2024

Figure 38 presents the budget distribution of work programme actions 2021-2022 and 2023-2024 according to their support to the ERA Policy Agenda 2022-2024 actions.²⁶⁸

²⁶⁷ The presented data reflects the state of play in April 2023. The calculations have been done by DG RTD. The aggregated data on the implementation of work programme 2021-2022 was mainly obtained from the Horizon Dashboard (<https://ec.europa.eu/info/funding-tenders/opportunities/portal/screen/opportunities/horizon-dashboard>). All data on the planned implementation of 2023-2024 derives from the adopted work programme, with the exception of data on proposals submitted to the call HORIZON-WIDERA-2023-ERA-01. Please note that the work programme 2021-2022 predates the adoption of the ERA Policy Agenda.

Although adopted before the ERA Policy Agenda 2022-2024, the work programme 2021-2022 addressed several priority areas of the policy agenda, particularly citizen engagement (Action 14), research careers (Action 4) and open science (Action 1). Work programme 2022-2024 was shaped by the ERA Policy Agenda 2022-2024, with topics explicitly referring to the relevant ERA actions that they address, also apparent in the more balanced distribution of the budget across ERA actions.

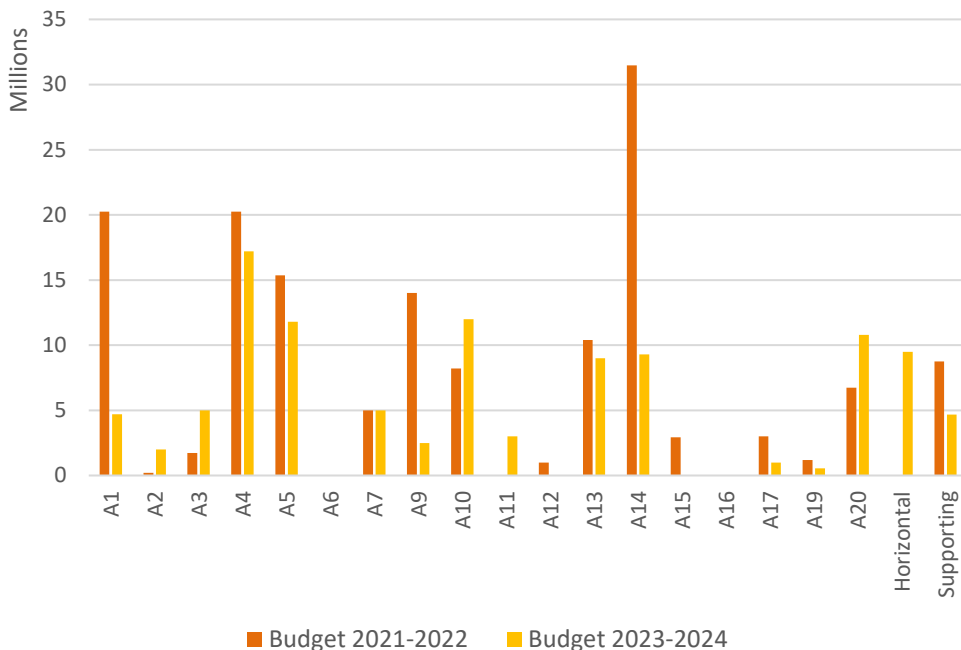


Figure 38: Budget distribution by ERA action in WP 2021-2022 and WP 2023-2024²⁶⁹

RECOVERY AND RESILIENCE FACILITY²⁷⁰

Research and innovation (R&I) has been acknowledged as an essential ingredient of the Recovery and Resilience Facility (RRF). According to estimates, the total amount of R&I investments across the national Recovery and Resilience Plans (RRPs) represent EUR

²⁶⁸ Please note that Action 8 (Strengthen sustainability, accessibility and resilience of research infrastructures in the ERA) is supported by the Work Programme for Research Infrastructures.

²⁶⁹ Please note that some work programme actions address more than one ERA Action, in which case, to avoid double counting, the work programme budget is only attributed to one ERA Action considered to be primary. In the figure, 'horizontal' refers to work programme actions that support directly the development of the ERA Policy Agenda whereas 'supporting' actions include activities such as monitoring, studies and communication.

²⁷⁰ This section builds on DG RTD, Analysis of the contribution of the RRFs to key EU policy priorities and a new EU R&I Policy landscape, ERAC Input Paper, 2023.

47.4 bn, representing 9.6% of the RRF funding envelope and nearly half of the Horizon Europe budget.²⁷¹

This section illustrates the linkages between the respective measures from the RRF and the ERA Policy Agenda.

In terms of reform efforts in the Member States, the analysis shows that the R&I-relevant reforms in the RRF will contribute significantly to the implementation of the ERA Actions. While for most Actions at least one relevant reform was identified, the number of relevant measures per Actions varies strongly, overall. This rather strong divide between highly covered and less covered Actions may, in part, be explained by the different nature and scope of the policy actions. The distribution of reforms is illustrated in the following figure.

Member States	ERA-1: EOSC	ERA-3: Research Assessment	ERA-4: Researchers & Careers	ERA-5: Gender Equality	ERA-7: Knowledge Valorisation	ERA-8: Research Infrastructure	ERA-10: Missions & Partnerships	ERA-11: Energy	ERA-12: Green & Digital	ERA-13: Universities	ERA-14: Citizens Engagement	ERA-16: Access to Excellence
Bulgaria	○	●	●	○	●	○	○	○	○	●	○	●
Czech Republic	○	○	○	○	○	●	○	○	●	○	○	●
Germany	○	○	○	○	○	●	○	○	○	○	○	○
Greece	○	○	●	○	●	○	○	○	○	●	○	●
Spain	○	●	●	●	●	○	●	●	●	●	○	○
France	○	●	●	○	●	○	○	○	○	○	●	○
Croatia	●	○	●	○	●	○	○	○	●	●	○	●
Italy	○	○	●	○	●	○	○	○	○	○	○	○
Cyprus	○	○	○	○	○	●	○	○	○	○	○	●
Latvia	○	○	●	○	○	○	○	○	○	●	○	●
Lithuania	○	○	●	○	●	●	○	○	●	○	○	●
Luxembourg	○	○	●	○	○	○	○	○	●	○	○	○
Malta	○	○	○	○	○	○	○	○	○	○	○	●
Austria	○	○	○	●	●	●	○	○	○	○	○	○
Poland	○	○	○	○	●	●	○	○	●	○	○	●
Portugal	○	○	○	●	●	○	○	○	●	○	○	●
Romania	○	●	●	○	●	○	○	○	○	○	○	●
Slovenia	○	●	●	○	●	○	○	○	○	○	○	●
Slovakia	○	●	○	○	●	○	○	○	○	●	○	●

Source: European Commission, DG R&I Unit A1 European Semester & Country Intelligence, using FENIX Database. Methodological Note: The table only contains ERA Actions to which R&I reforms from the RRFs could be linked.

Figure 39: Reforms in the RRFs linked to the ERA Policy Agenda

The largest number of the reforms (45) can be linked to Action 16 (Access to Excellence). For this analysis all measures aiming at strengthening the R&I system of Widening Countries and thereby contributing to bridging the innovation divide were considered. Therefore, a relatively large number of reforms can be connected to this Action. The analysis shows that all Widening Countries include reforms with a linkage to this Action. Reforms that were identified as relevant for this Action are very diverse, covering a wide array of themes. For instance, the RRF drafted by Slovakia includes the measure ‘Reform of governance, evaluation and support in science, research and innovation’. This includes an amendment of the RDI relevant legislation, which shall enhance the RDI governance structure and strengthen inter-ministerial coordination of RDI policies. In the case of Lithuania, one relevant reform has the objective of establishing a policy implementing agency which is expected to promote more active participation of Lithuanian applicants in European and international R&D&I programs.

²⁷¹ See DG RTD, Analysis of the contribution of the RRFs to key EU policy priorities and a new EU R&I Policy landscape, ERAC Input Paper, 2023.

Many RRP reforms are contributing to the implementation of Action 7 (Knowledge Valorisation). Improving knowledge and technology transfer activities is a key priority across Member States. A total of 21 relevant reforms across 14 Member States were identified as relevant to the topic. For example, in its RRP, Poland includes a reform to strengthen cooperation mechanisms between science and industry. The reform will address information flows between academia and businesses and increase the update of research results and improve valorisation. In the case of Slovakia, one measure attempts to transform the Slovak Academy of Science (SAS) into a public organisation to stimulate multi-source funding and cooperation with the private sector.

Many reforms included in the RRP can be linked to ERA Action 4, targeting researchers and careers. In their RRP, 12 Member States are adopting reforms (13 in total) promoting attractive and sustainable research careers as well as geographic, transdisciplinary and intersectoral mobility across the ERA. For instance, in its RRP, Croatia includes the creation of a framework for attracting students and researchers to STEM and ICT fields. The concerned reform aims at making research careers more attractive through transparent and merit-based recruitment and by addressing burdensome administrative processes. Similarly, in France it is attempted to strengthen the attractiveness of research careers through better remuneration and new recruitment channels, including 'tenure tracks'.

Other ERA Actions, for instance the one on EOSC (ERA Action 1/Croatia), the one on Missions and Partnerships (ERA Action 10/Spain) and the one on Citizen Engagement (ERA Action 14/France) could solely be linked to the RRP reforms of a single Member State.

In terms of relevant investments in Member States, the RRP contribute significantly to achieving the ERA Policy Agenda. The investments per ERA Action are illustrated in Figure 40.

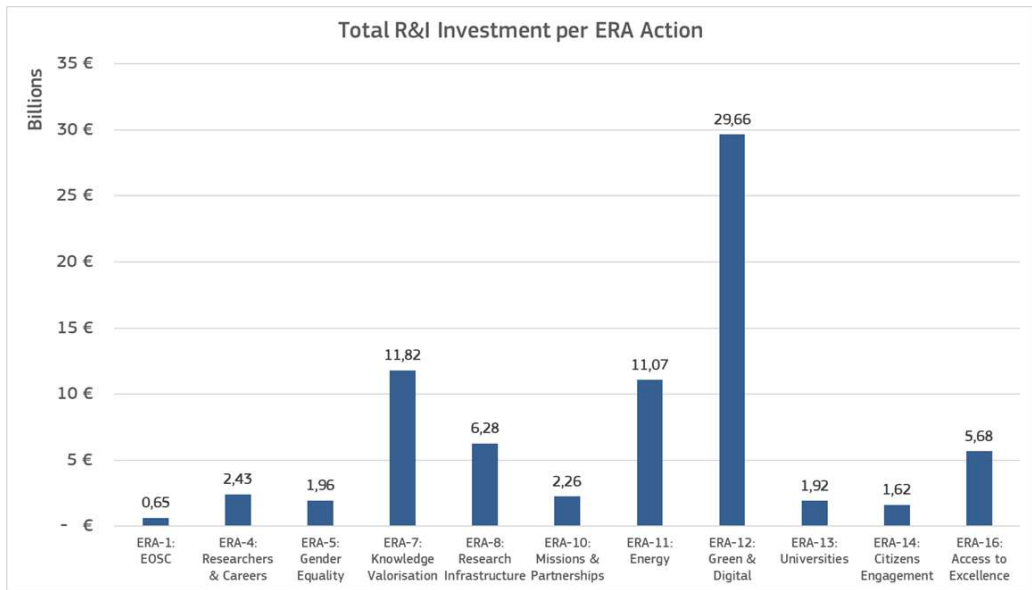
The largest share of the RRP R&I expenditure planned by Member States contributes to ERA Action 12 for green and digital. Through the Recovery and Resilience Plans, national governments are investing about EUR 29 bn²⁷² in Green and Digital R&I, specifically in measures supporting the development of low-carbon technologies for energy-intensive industries and/or circular technologies or technology infrastructures. This is in line with the specific expenditure target set out in the RRF Regulation on both of these topics. In addition, national governments are substantially contributing to ERA Action 11 by investing about EUR 11 bn specifically for research and innovation in the field of Green Energy.

The RRP also include substantial investments supporting ERA Action 7. The investment that Member States are making to promote knowledge valorisation are approximately EUR 12 bn²⁷³. Frequent links to this topic can also be connected back to the intervention logic of the Recovery and Resilience Facility, insofar as science-business linkages is a challenge which was relatively frequently covered in previous European Semester Country Reports and Country Specific Recommendations, which the RRP were meant to address.

Limited RRP R&I expenditure can be linked to ERA Actions 1 (EOSC) and 14 (Citizen Engagement).

²⁷² This measure includes double-counting as multiple ERA Actions can be linked to certain measures in the RRP.

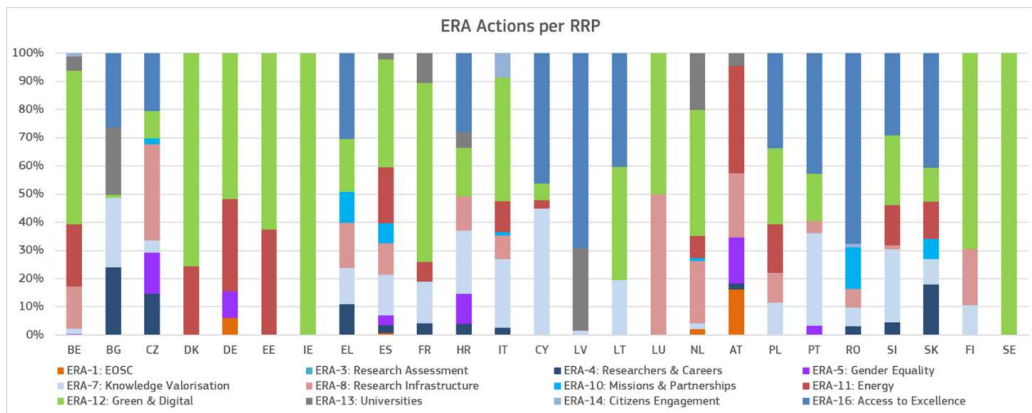
²⁷³ Ibid.



Source: European Commission, DG R&I Unit A1 European Semester & Country Intelligence, using FENIX Database. Methodological Note: The data were obtained based on DG RTD own analysis and they imply some degree of double counting due to the fact that the same investment may contribute to the achievement of multiple ERA Actions.

Figure 40: Reforms in the RRP's linked to the ERA Policy Agenda

Some RRP's foresee investments related to multiple ERA Actions while, in other cases, the RRP measures can be linked to a smaller set of Actions.



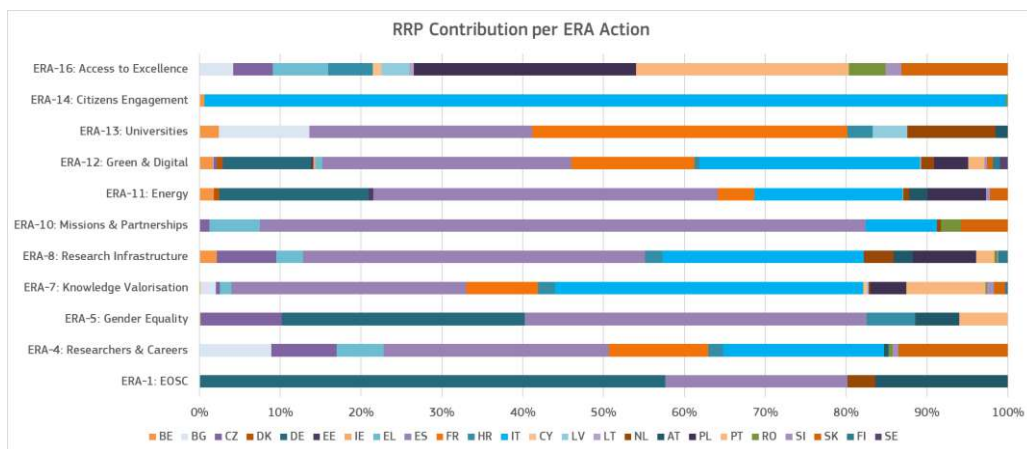
Source: European Commission, DG R&I Unit A1 European Semester & Country Intelligence, using FENIX Database. Methodological Note: the data were obtained based on DG RTD own analysis and they imply some degree of double counting due to the fact that the same investment may contribute to the achievement of multiple ERA actions.

Figure 41: ERA Actions per RRP

As can be seen in Figure 41, Spain is significantly mobilising RRF funds linked to the ERA Policy Agenda, with investments that can be connected to nine different ERA Actions. This can be attributed to the overall importance of R&I expenditure in the Spanish RRP. Czechia, Croatia, Italy, Greece and the Netherlands have included in their RRP's

investments that contribute to seven ERA Actions. In their RRP, Belgium, Austria, Romania, Slovenia and Slovakia invested in six ERA Actions, while Bulgaria, France, Poland and Portugal made investments that can be linked to five ERA Actions. The investments included in the RRP of Germany, Estonia, Cyprus, Latvia, Denmark and Lithuania can be associated to less than five ERA actions. Ireland and Sweden made RRP investments connected to a single ERA action, namely ERA Action 12 for Green & Digital R&I.

Figure 42 shows how many Members States engaged in which ERA Action through the RRP. ERA Action 12 on Green & Digital R&I in their RRP managed to mobilise most (22) Member States, followed by Action 7 on knowledge valorization (18), and Action 8 on research infrastructures (14).



Source: European Commission, DG R&I Unit A1 European Semester & Country Intelligence, using FENIX Database. Methodological Note: the data were obtained based on DG RTD own analysis and they imply some degree of double counting due to the fact that the same investment may contribute to the achievement of multiple ERA actions.

Figure 42: RRP Contribution per ERA Action

CONCLUSIONS

THIS 'BASELINE' REPORT WILL ALLOW FOR EVIDENCE-INFORMED POLICY-MAKING

This EU-level report is the first 18-months review of the progress towards the priority areas for joint action in the ERA, as laid down in the Pact for Research and Innovation in Europe, and of the implementation of the ERA Policy Agenda. The present report serves as a baseline for the future assessment of progress on EU-level. In the context of the renewal of the ERA governance since 2021, such **monitoring will allow for evidence-informed policy-making**.

Since the ERA Policy Agenda as well as the quantitative indicator framework are new elements of the revamped ERA, a longer assessment period will be needed before more robust statements can be made about Europe's progress in achieving the ERA priorities. The same is valid for measuring the impact of the ERA Actions on this process.

THE REVAMPED ERA ALREADY YIELDS MAJOR ACHIEVEMENTS

The assessment shows that the EU together with the Member States, Associated Countries and R&I stakeholders has already made significant advancements within the different ERA Policy Agenda Actions. **Examples of such achievements** include:

- the establishment of the Coalition for Advancing Research Assessment (CoARA) (ERA Action 3);
- the preparation of a Council Recommendation on a 'European framework to attract and retain research, innovation and entrepreneurial talents in Europe' in 2023 (ERA Action 4);
- the adoption of a Council Recommendation on the guiding principles for knowledge valorisation in 2022 (ERA Action 7);
- the adoption of Industrial Technology Roadmaps (ERA Action 12);
- the development of a new ERA monitoring and evaluation framework (ERA Action 19).

CO-CREATION AS PART OF THE SUCCESS

The **new co-creation approach**, in which EU Member States, Associated Countries, R&I stakeholders and the European Commission, work jointly to discuss, develop and implement new actions and initiatives has turned out as **the driver of the new ERA**. The ERA Forum (building on the work of its predecessor, the ERA Forum for Transition in 2021) is the "platform" bringing these actors together. Creating ownership at all levels is key in a process that builds on deliberation and coercion rather than on regulation. In this context, R&I stakeholders are playing a key role in progressing the ERA Policy Agenda by having taken up responsible roles (including as so-called "sponsors") in implementing a lot of the ERA Actions.

VARIANCE AND CONVERGENCE: TWO SIDES OF THE SAME MEDAL

There is still some **variance in achieving the ERA objectives across Member States**. Data derived from key indicators shows that values vary substantially both at the EU and at country level. Great variance has been encountered in indicators measuring progress towards sub-priorities such as knowledge valorisation, challenge-based ERA actions or synergies with education.

Moreover, evidence also shows **some divergence at the national level**, with differences in the scope of the implemented policies. However, some similarities across Member States have been identified in relation to open science and academic freedom.

These results suggest the **need for further concerted efforts at European and Member State levels**, involving also Associated Countries and R&I stakeholders, to drive sustainable commitment and activities towards the achievement of the ERA priorities' and the Actions' objectives.²⁷⁴

²⁷⁴ For further insights on trends, barriers and enabling factors at national level, please refer to the ERA Country Reports.

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ANNEX 1: METHODOLOGICAL NOTE

The quantitative and qualitative information included within this report comes from different sources of information. Quantitative information has been derived from two core sources of information and are included in the form of graphs throughout the report. This entails:

- **ERA Scoreboard.** It monitors – through relevant selected indicators – the ERA priorities at the EU-level. The ERA Scoreboard entails 15 indicators collected at the EU level. For further information on the indicators please see Annex 2 which contains the analysed indicators and sources of information.
- **ERA Dashboard.** This monitoring tool collects key indicators at the country level for the different ERA priorities. The ERA Dashboard entails 37 indicators collected at the EU level using different sources of information including Eurostat, WiS database, the OECD or DG RTD. 13 indicators were common to the ERA Scoreboard. Despite the EU focus of the ERA Scoreboard, these 13 indicators were also collected at the country level to feed the ERA Dashboard. For further information on the indicators please see Annex 2 which contains the analysed indicators and sources of information.

The cut-off date for both the indicators from the ERA Scoreboard and the ERA Dashboard was 30 September 2023. A comprehensive overview of the indicators included in the report as well as their sources of information is provided in Annex 1.

The qualitative information that has complemented the above-mentioned quantitative information comes from two core sources:

- **EC-OECD STIP Survey**²⁷⁵. The Survey collects qualitative and quantitative data on national STI policies. It addresses all areas of STI policy, including initiatives spread across different ministries and national agencies, with competence over domains as broad as research, innovation, education, industry, environment, labour, finance/budget, among others.
- **Desk research.** The research team has conducted additional desk research focusing mainly on EU level initiatives related to the different ERA Actions as well as selected good practices at the national level.

The **OECD STIP Survey** is run on a biannual basis since 2015. Each information from the previous version of the Survey is always updated. Therefore, the 2023 edition of the EC-OECD STIP Survey contains not only additional information to the 2021 edition but also updated information on the reported initiatives from previous editions. A definition and description of these key concepts is provided below:

- *Policy initiatives:* involve national and European STI policy initiatives self-reported by government ministries and funding agencies. The reported information covers policy initiatives on six core policy areas: Governance; Public research system; Innovation in firms and innovative entrepreneurship; Knowledge exchange and co-creation; Human resources for innovation and research and innovation for society.

²⁷⁵ <https://stip.oecd.org/stip>

- *Policy instruments*: for each reported policy initiative, Survey respondents are asked to assign one or more of the policy instruments employed. An overview of the classification of policy instruments and a brief description is provided in Annex 4.
- *Policy debates*: for each of the six above-mentioned policy areas, survey respondents are asked to provide information on the main foci of national debates around each policy area. This information becomes crucial to understand key challenges and progress made in each area and has been included within the narrative of each ERA Action.

The analysis of the OECD STIP Survey has been conducted in relation to the different ERA Actions, which are aligned with corresponding STIP themes (Annex 4 contains further detail, including an outline of missing STIP theme data). The OECD STIP Survey includes different policy instruments related to initiatives implementing specific ERA Actions. This includes broader initiatives which address more than one ERA Action, so some initiatives might be reflected under figures presented under multiple ERA Actions. Because of this, the analysis of the OECD STIP Survey should be carefully interpreted.

The information included in the report derived from the EC-OECD STIP Survey is not only related to the number of initiatives per policy area and theme, but also covers the types of instruments employed or the target groups addressed through the different policy initiatives. Additionally, information regarding the budget is also included as it enables to understand the extent to which investment and support is provided across the different priorities at the EU-level but also national level.

In particular, the survey was used to produce two types of graphs which show the distribution of STI policies according to A) *budget range* and B) *policy instrument* for each ERA Action. While the total number of *policy instruments* are counted for the corresponding graphs (as some policies contain multiple instruments), those for *budget range (yearly)* are only counted for each policy (to avoid double counting). The graphs are drawn based on the number of policies at both the national and the European level and do not include any restrictions on start date although the vast majority commenced after 2010. Finally, more detail on the subtypes of *beneficiary* and *instrument* can be found in Annex 4. This Annex also includes the relation between the different ERA Actions and the EC-OECD STIP Survey policy themes.

Finally, **additional desk research** was conducted in order to complement the previous sources of information and provide exhaustive qualitative assessment of the implementation of the different ERA Priorities and associated actions. This desk research has focused on key reports at the EU but also national level with regard to the different ERA Priorities. The desk research has enabled to identify key policies and initiatives at the EU level that enhance the implementation of the ERA Actions. A further overview of the key sources of information consulted as part of the desk research can be found in the bibliography section.

LIMITATIONS OF THE REPORT

The indicators for the ERA Scoreboard and the ERA Dashboard have been subject to data limitations reducing the final number of available indicators and, hence, the scope of their analysis.

In addition, the 2023 OECD STIP Survey has some data limitations:

- The data consists of self-reported descriptions of (mostly) national STI policy initiatives, collected through the survey of (mostly) government ministries and funding agencies
- Policy initiatives vary in scope and scale. Therefore, aggregating them in groups could translate into inaccurate conclusions. Consequently, the analysis and interpretation of this information has taken into account not only the number of policy initiatives but also other attributes that help to characterise the diverse policy initiatives.
- A few participants have filled the survey only partially.

ANNEX 2: OVERVIEW OF INDICATORS

ERA PRIORITY	INDICATOR	SB / DB	SUMMARY	SOURCE
ERA Priority 1 - Deepening a truly functional internal market for knowledge	3. Share of publications available in open access	ERA Scoreboard	Open access scientific publications with digital object identified (DOI) as a % of total scientific publications with DOI.	DG RTD – SRIP 2022
	9. Number of European research infrastructures in which a Member State or an Associated Country participates	ERA Dashboard	Absolute number of European research infrastructures in which a Member State or an Associated Country participates (which financially contributes to operations).	DG RTD
	5. Share of women in grade A positions in higher education institutions	ERA Scoreboard	Share of women in the single highest grade/post at which research is normally conducted within the institutional or corporate system out of all women in HEIs.	Women in Science (WiS) database
	12. Proportion of papers with mixed gender authorship, 2000-2020	ERA Dashboard	Proportion of papers in the Scopus database and NamSor with co-authorship between 2000-2020 out of all available papers.	Science-Metrix using the Scopus database (Elsevier) and NamSor
	13. Proportion of women in authorships of the top 10% most cited publications, 2000-2018	ERA Dashboard	Proportion of women in highly cited publications (top 10% most cited publications) in the Scopus database and NamSor between 2000-2018 out of all available papers.	Science-Metrix using the Scopus database (Elsevier) and NamSor
	14. Women in Digital Index	ERA Dashboard	The Woman in Digital (WiD) index is an aggregate indicator ranging from 0 to 100 that brings together 13 subindicators that assess the performance of Member States in three main areas: (1) Internet use, (2) Internet user skills, and (3) specialist skills and employment.	Eurostat

ERA PRIORITY	INDICATOR	SB / DB	SUMMARY	SOURCE
	15. Proportion of women among doctoral graduates in Science, Technology, Engineering and Mathematics (STEM) fields	ERA Dashboard	Graduates (people who, during the reference school or academic year, have successfully completed an education programme) and first-time graduates (people who, during the reference school or academic year, have successfully completed an education programme at the given level for the first time) holding a PhD or equivalent in one STEM field out of all doctoral graduates.	Eurostat
	16. Share of foreign doctorate students as a percentage of all doctorate students	ERA Dashboard	This indicator measures the proportion of foreign doctorate students as percentage of all doctorate students.	Eurostat
	17. New doctorate graduates per 1,000 inhabitants aged 25-34	ERA Dashboard	Graduates (people who, during the reference school or academic year, have successfully completed an education programme) and first-time graduates (people who, during the reference school or academic year, have successfully completed an education programme at the given level for the first time) holding a PhD or equivalent between 25-34 years, per 1,000 population.	Eurostat
	6. Job-to-job mobility of Human Resources in Science and Technology	ERA Scoreboard	Movement from an employee to a job from another, from one year to the next in the field of HRST.	Eurostat
	19. Share of public-private co-publications per million population	ERA Dashboard	Number of public-private co-authored publications per million population. Each co-publication is counted as one publication for each country, irrespective of the number of co-authors and (parent) organizations listed in the author affiliate address(es).	Bibliometrics and Eurostat

ERA PRIORITY	INDICATOR	SB / DB	SUMMARY	SOURCE
	22. Number of PCT patent applications divided by GDP in million euros	ERA Dashboard	Number of patent applications requested to the PCT -the International Patent System- during every year divided by GDP in million euros.	OECD
	7. Share of innovating firms collaborating with HEI/PRO out of all innovative firms	ERA Scoreboard	Proportion of innovating firms collaborating with HEIs/PROs out of all innovating firms.	Eurostat
	25. Business enterprise researchers as percentage of national, total	ERA Dashboard	Human resources devoted to research and experimental development (R&D) as defined in the OECD Frascati Manual, per total researchers.	OECD
	26. Business enterprise researchers in full-time equivalent per thousand employments in industry	ERA Dashboard	Research and development (R&D) personnel in the business enterprise sector. Measured in full-time equivalent are the number of total R&D personnel and researchers in the business enterprise sector by industry according to the International Standard Industrial Classification (ISIC) revision 4.	OECD
	8. Number of scientific publications among the top 10% most cited publications worldwide as a percentage of all publications	ERA Scoreboard	Proportion of highly cited publications (top 10% most cited publications) out of all publications.	DG RTD
	28. Academic Freedom Index	ERA Dashboard	The indicator assesses de facto levels of academic freedom across the world based on five indicators: freedom to research and teach, freedom of academic exchange and dissemination, institutional autonomy, campus integrity, and freedom of academic and cultural expression. The V-dem project implements and adapts this indicator by making use of 2,197 country experts worldwide, standardized	V-Dem

ERA PRIORITY	INDICATOR	SB / DB	SUMMARY	SOURCE
			questionnaire and a statistical model.	
	9. International co-publications with non-EU partners per 1,000 researchers in the public sector	ERA Scoreboard	Proportion of international co-publications with non-EU partners per 1,000 researchers.	DG RTD
	31. European and international co-patenting in EPO applications at national and EU level	ERA Dashboard	Number of requests for patent protection of an invention filed with the European Patent Office (EPO) regardless of whether they are granted or not. The number of applications include direct European applications filed in the reference year (Direct) and international (PCT) applications for which the applicant(s) opted to protect their invention in Europe by selecting the EPO during the reporting period (PCT regional)	Eurostat
ERA Priority 2 - Taking up together the green transition and digital transformation and other challenges with impact on society, and increasing society's participation in the ERA	33. Government budget allocation for R&D (GBARD) by NABS: environment; energy; transport, telecommunication and other infrastructure	ERA Dashboard	Allocations distributed to R&D in central (federal) government, regional (state) and local (municipal) government. They refer to provisions, not to actual expenditure. Local government budget funds may not be included if their contribution is not significant or if the data could not be collected.	Eurostat
			GBARD data are covering all public budget spending related to R&D and are linked to policy issues by means of a classification by 'objectives' or 'goals' (NABS 2007). Only NABS related to ERA action 10 have been selected: environment, energy, and transport, teleco and other	

ERA PRIORITY	INDICATOR	SB / DB	SUMMARY	SOURCE
			infrastructure	
	18. Government budget allocations for R&D (GBARD) allocated to Europe-wide transnational, as well as bilateral or multilateral, public R&D programmes per FTE researcher	ERA Scoreboard	The indicator measures the share of government budget allocations for R&D allocated to Europe-wide transnational, as well as bilateral or multilateral, public R&D programmes per million researchers.	Eurostat
	10. Environmentally related government R&D budget as percentage of total government R&D	ERA Scoreboard	Budget destined to R&D green transition, growth, and environment.	OECD
	37. National public and private investments as suggested in the SET Plan progress report 2021	ERA Dashboard	Sum of public and private investments on R&I in a country based both on financial information from publicly available company statements and patent data from PATSTAT, and IEA statistics.	SETIS research and innovation data
	38. OECD Patents on environment technologies as percentage of total technology patents	ERA Dashboard	Patents in environment-related technology according to OECD classification as percentage of technology patents.	OECD
	11. Share of researchers receiving transferable skills training	ERA Scoreboard	Proportion of researches trained in transferable skills, according to the MORE survey, out of all researchers in the country.	MORE survey
	40. Innovative enterprises that co-operated on R&D+I with universities and HEIs	ERA Dashboard	Absolute innovative enterprises, according to Eurostat criteria, that co-operated on R&D+I with universities and HEIs	Eurostat

ERA PRIORITY	INDICATOR	SB / DB	SUMMARY	SOURCE
	12. Direct government support and Indirect government support through R&D tax incentives as a percentage of GDP	ERA Scoreboard	Measures the sum of direct funding for R&D through instruments such as grants and public procurement and the indirect support through the tax system, as a percentage share of GDP.	European Innovation Scoreboard 2023
	48. Trust in Science	ERA Dashboard	Indicator based on several questions of the Eurobarometer 516 that measure the trust in science of Europeans.	Eurobarometer 516 on 'European citizens' knowledge and attitudes towards science and technology'
	13. Research on social innovation per million population	ERA Scoreboard	Number of publications (articles, papers, book reviews and all research available) in OpenAIRE related to the categories 'social innovation' or 'social entrepreneurship'	OpenAIRE
ERA Priority 3 - Enhancing access to research and innovation excellence across the Union and enhancing interconnections between innovation ecosystems across the Union	14. Increase in total R&D expenditure, expressed as a percentage of GDP	ERA Scoreboard	Increase in total R&D expenditure, as a percentage of the sum of GDP	Eurostat
ERA Priority 4 - Advancing concerted research and innovation investments and reforms	17. Share of public R&D expenditures financed by the private sector	ERA Scoreboard	The indicator measures the share of the share of R&D expenditures by the higher education and government sector that are financed by the business sector.	Eurostat

ANNEX 3: GRAPHS FROM ERA SCOREBOARD AND ERA DASHBOARD²⁷⁶

PRIORITY 1: DEEPENING A TRULY FUNCTIONING INTERNAL MARKET FOR KNOWLEDGE

Gender equality, equal opportunities for all and inclusiveness

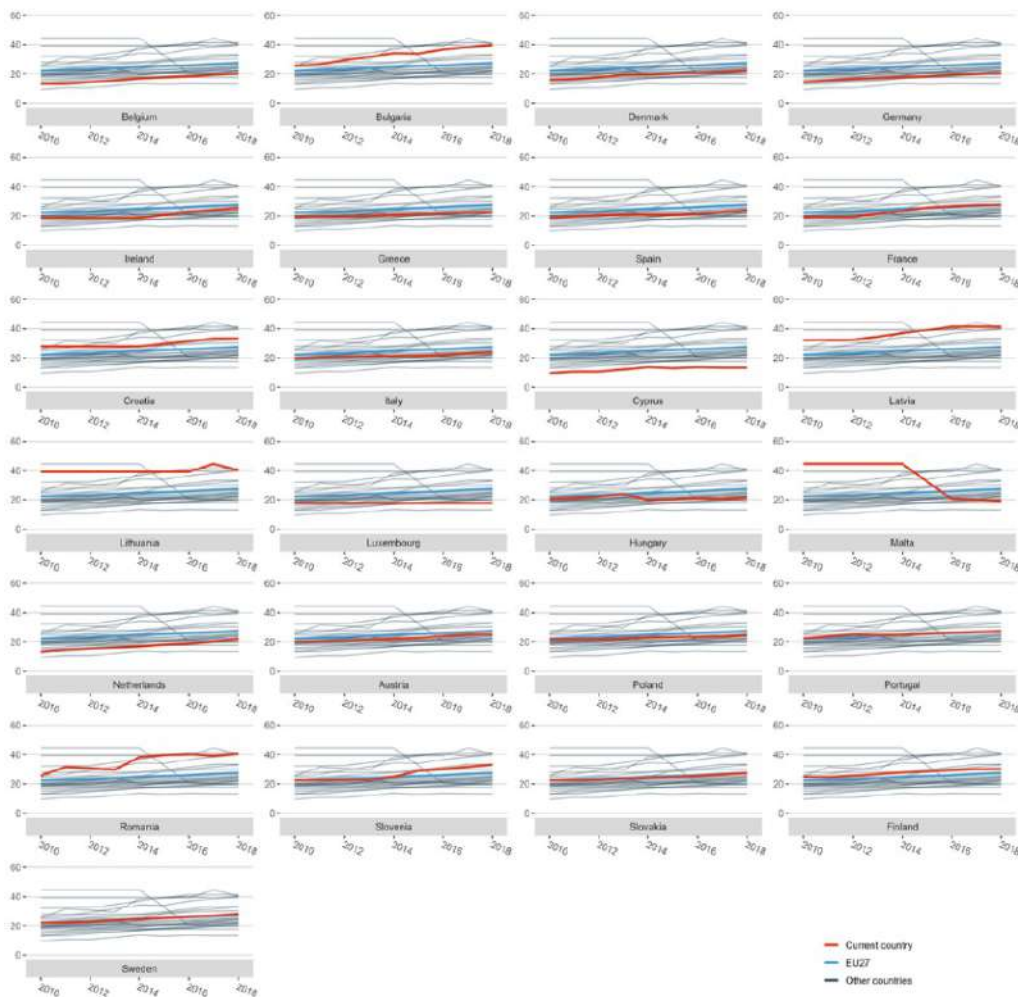


Figure 43. Share of women in grade A positions in higher education institutions.

²⁷⁶ PLEASE NOTE THAT FOR BETTER READABILITY ALL GRAPHS WILL BE AVAILABLE ON THE ERA POLICY PLATFORM (when online at <https://european-research-area.ec.europa.eu>).

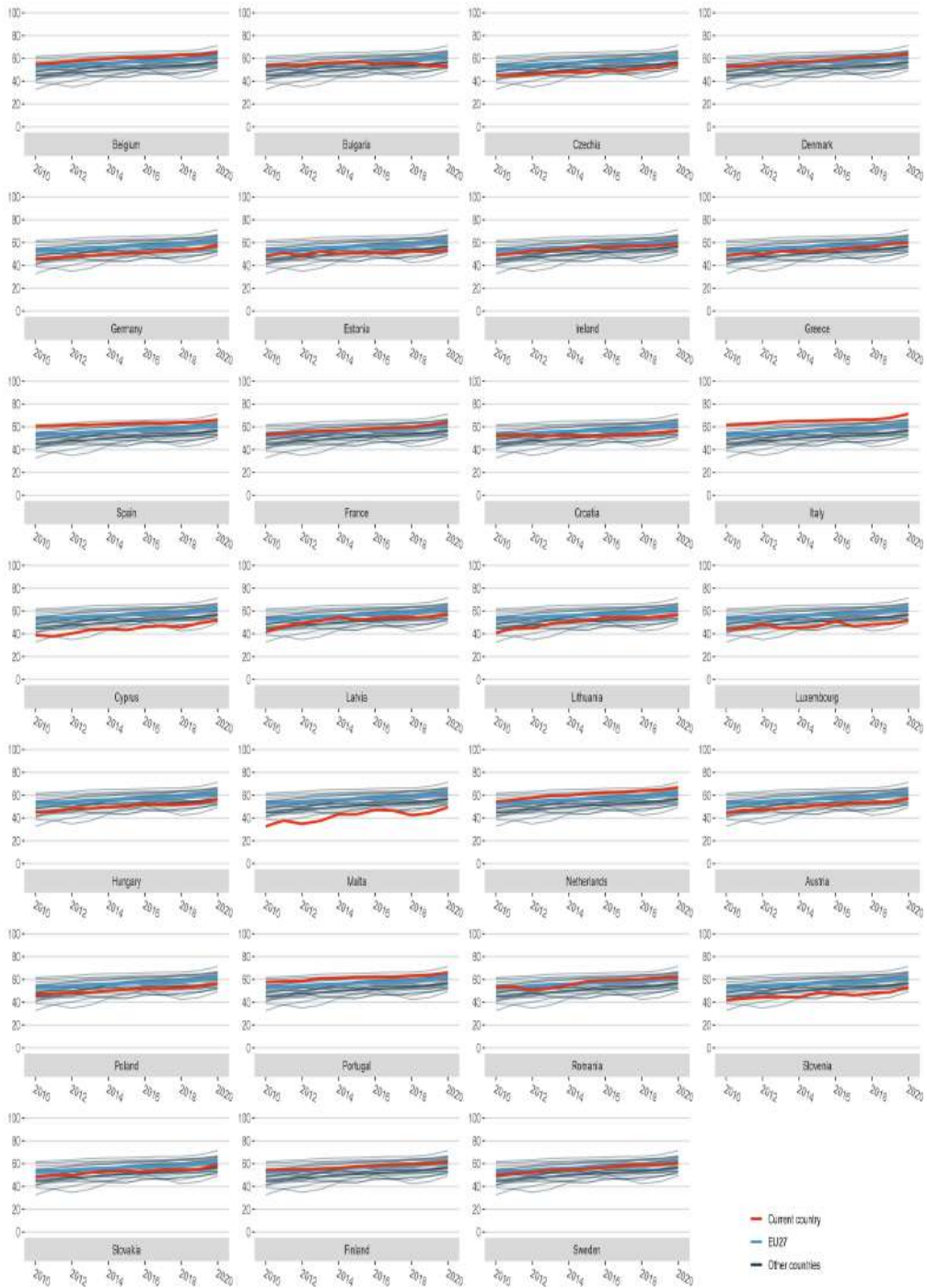


Figure 44. Proportion of papers with mixed gender authorship, 2000-2020.

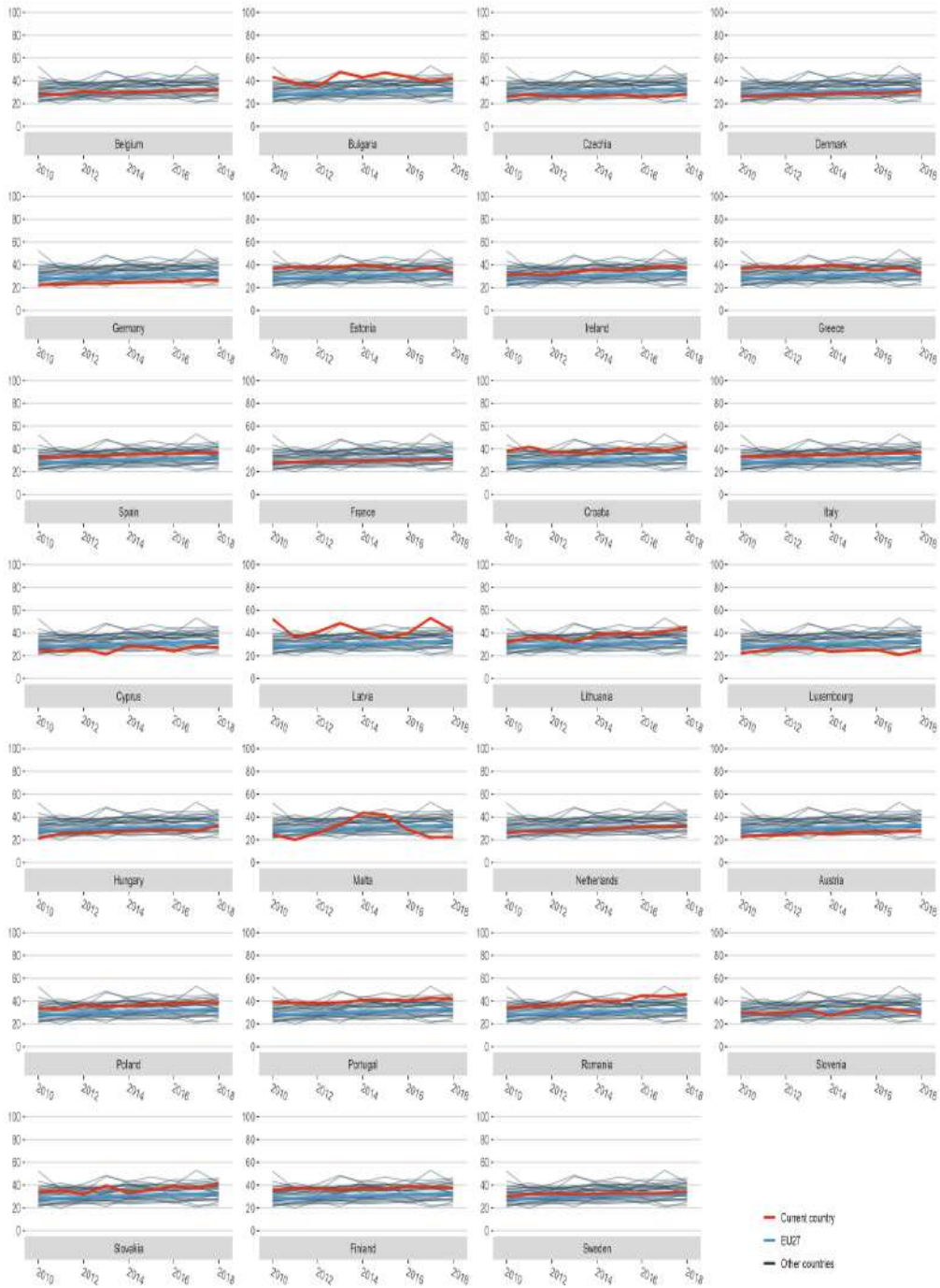


Figure 45. Proportion of women in authorships of the top 10% most cited publications, 2000-2018, by Member State

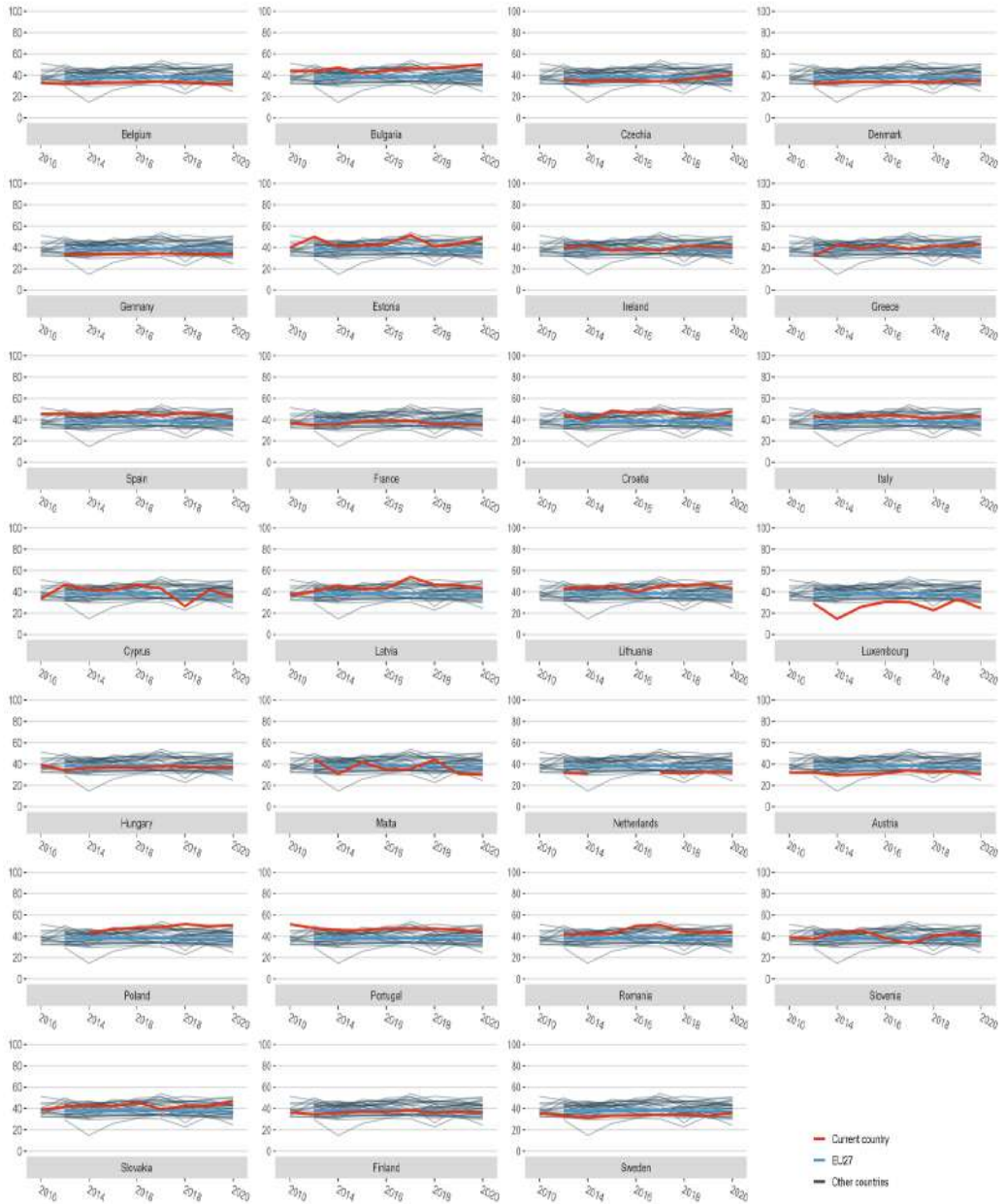


Figure 46. Proportion of women among doctoral graduates by fields of Science, Technology, Engineering and Mathematics (STEM).

Researchers' careers and mobility and research assessment and reward systems

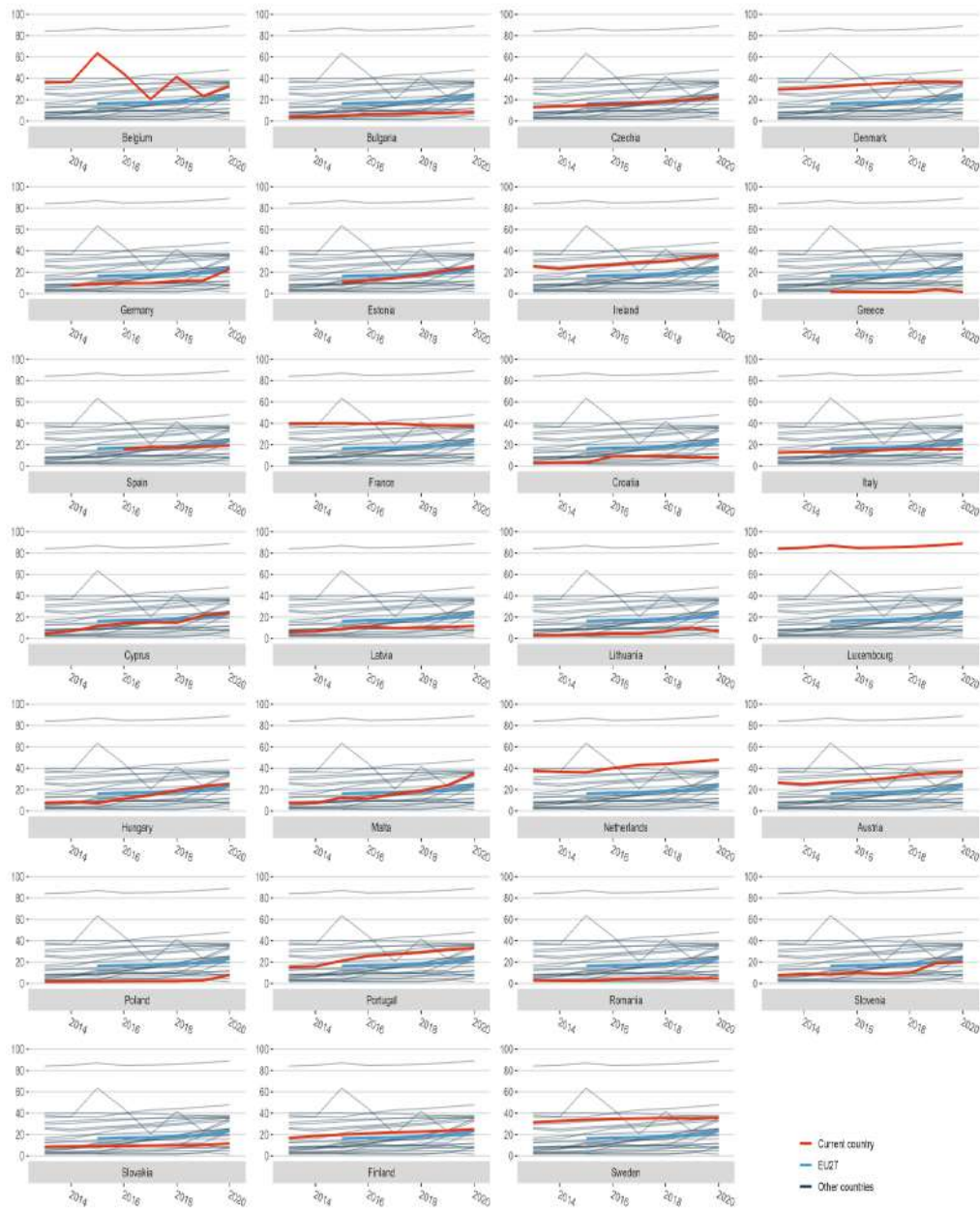


Figure 47. Share of foreign doctorate students as a percentage of all doctorate students.

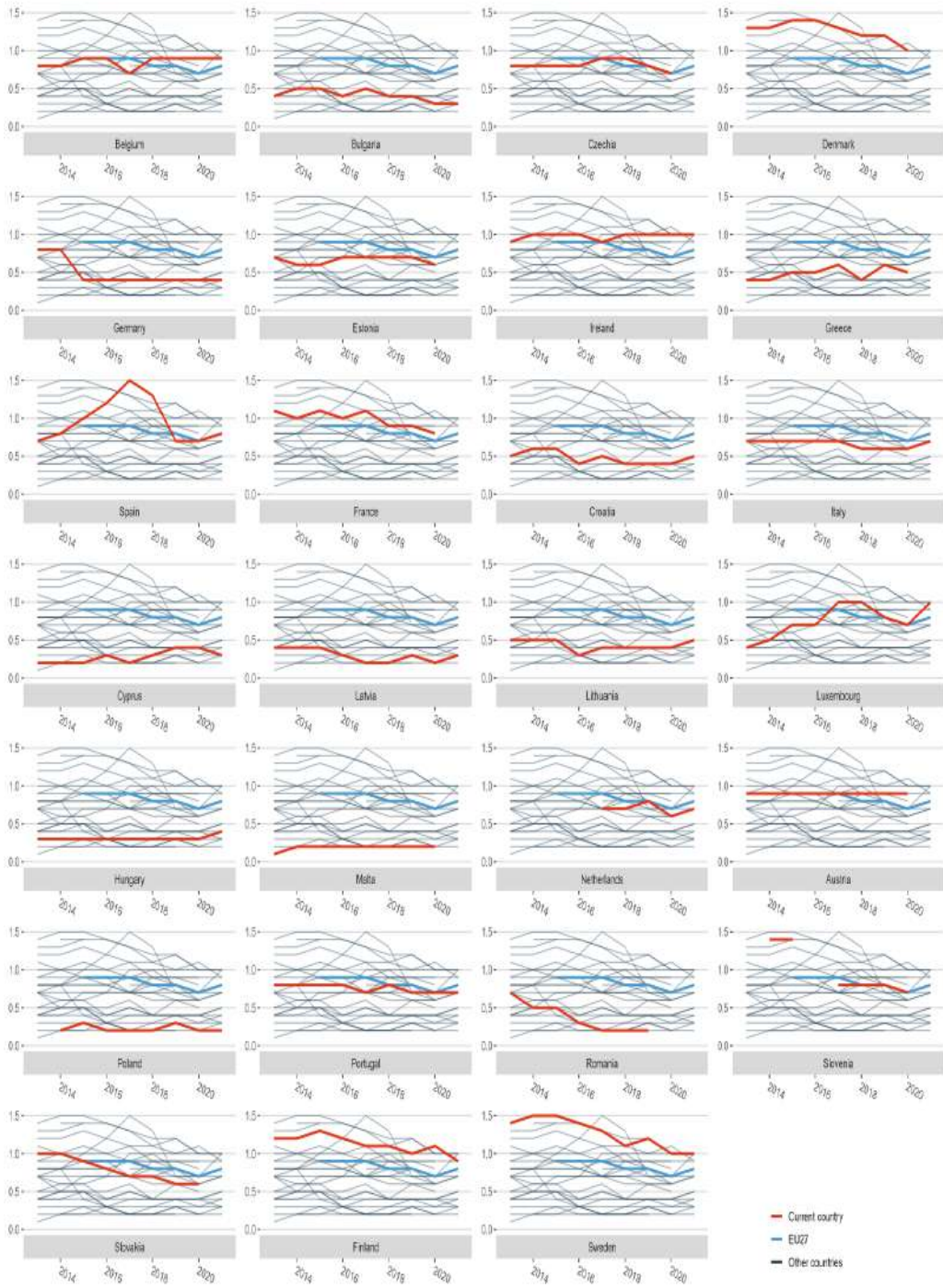


Figure 48. New doctorate graduates per 1,000 inhabitants aged 25-34 - Broken down by Member State.

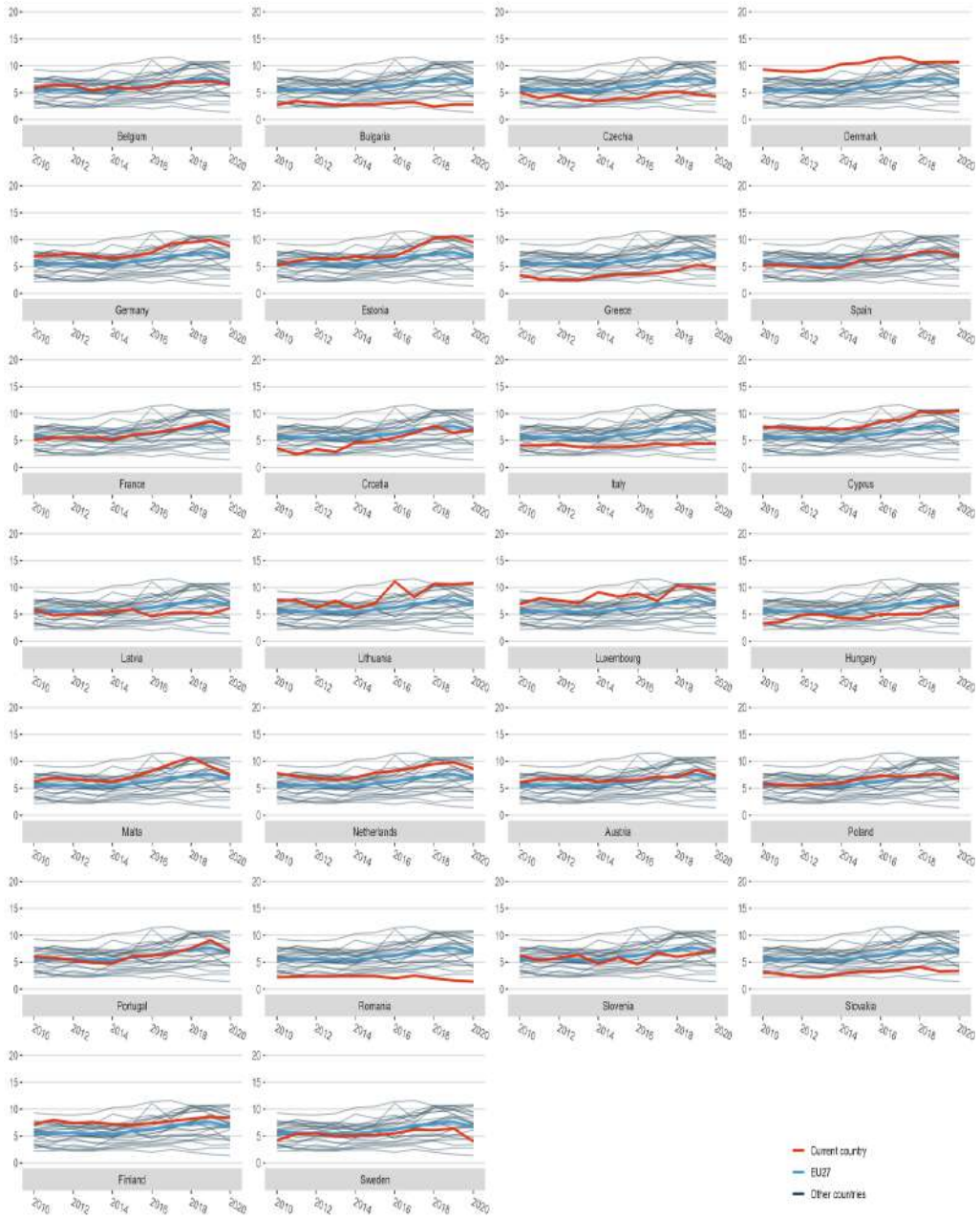


Figure 49. Job-to-job mobility of Human Resources in Science & Technology.

Knowledge valorisation

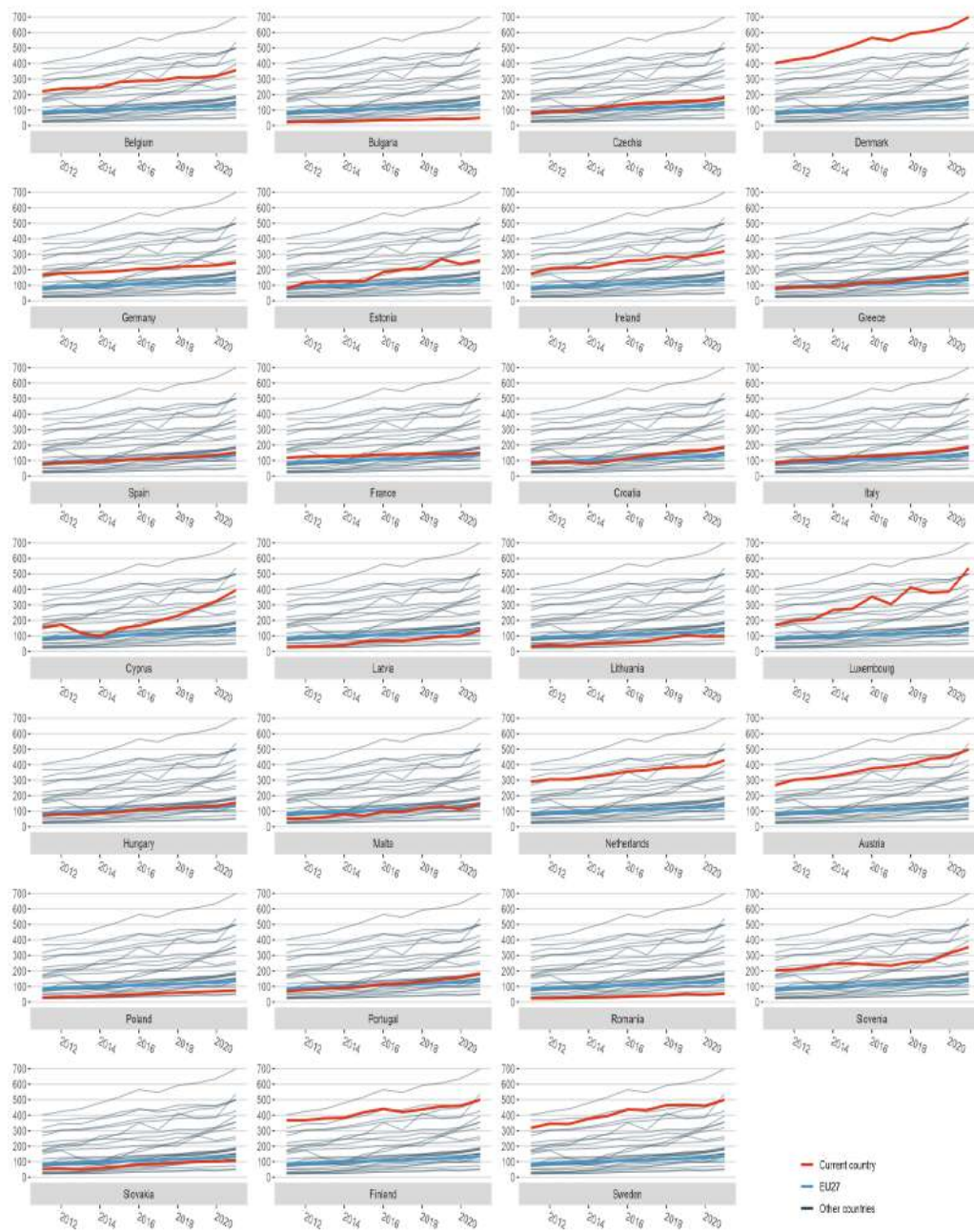


Figure 50. Share of public-private co-publication per million population.

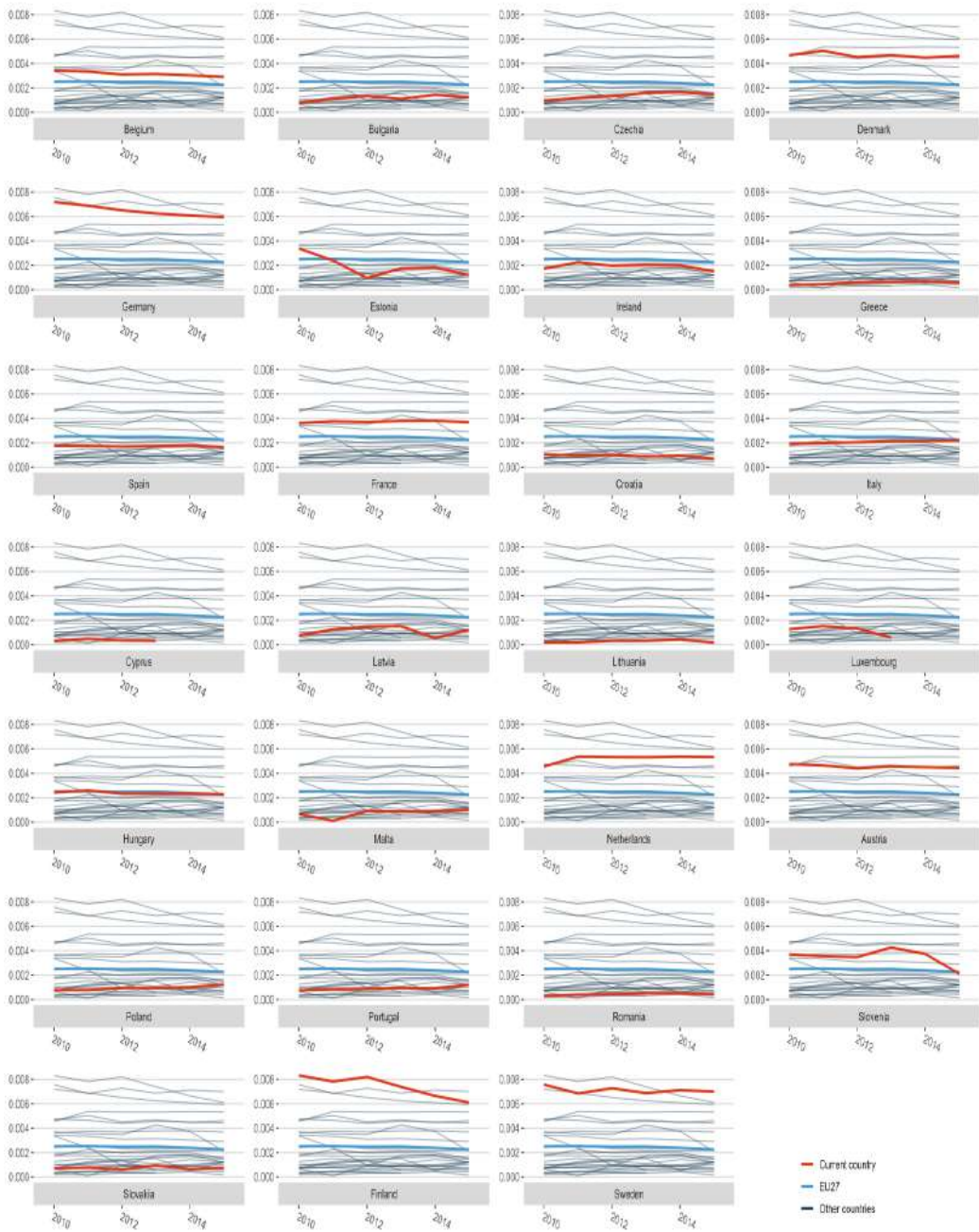


Figure 51. Number of PCT patent applications divided by GDP in million euros.

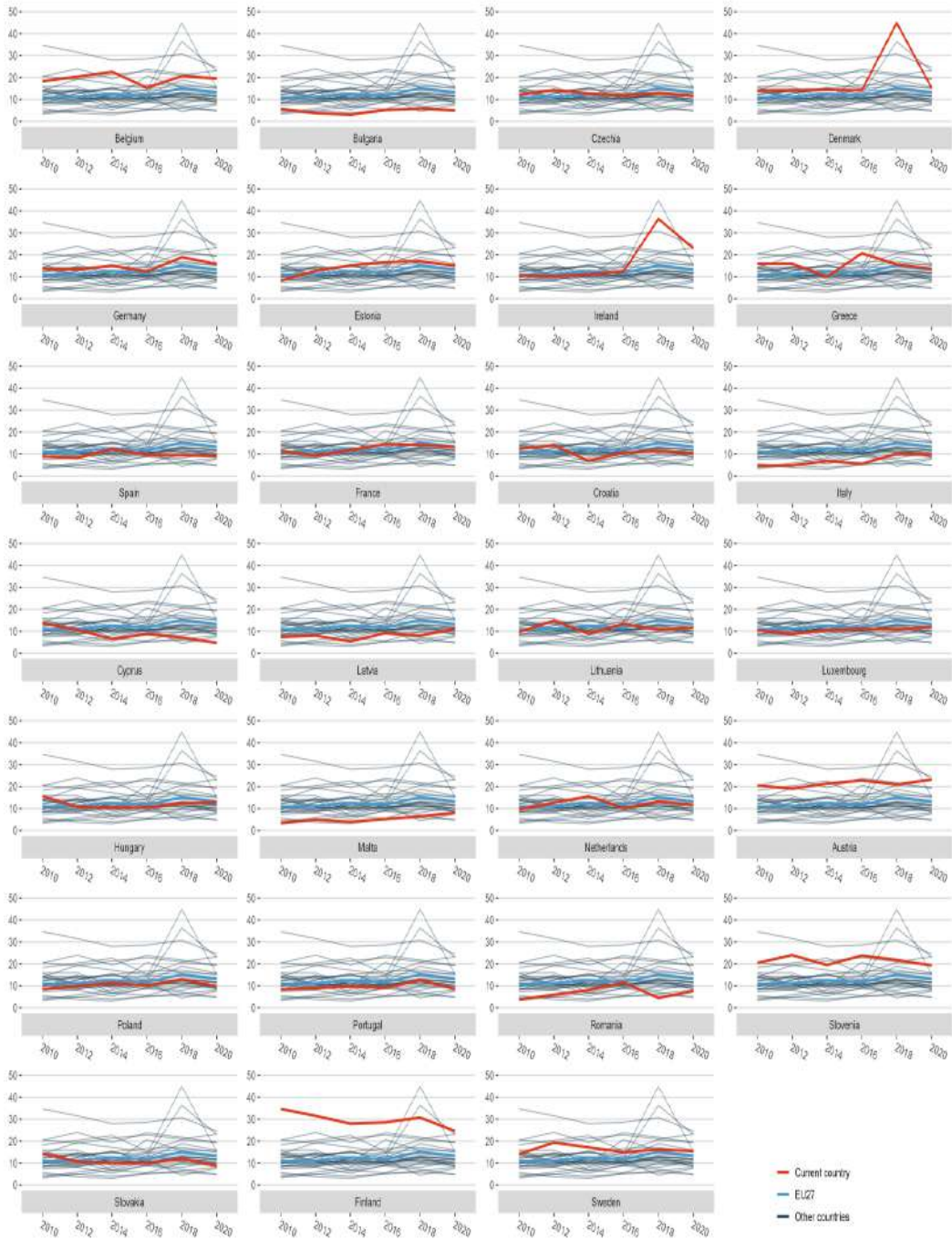


Figure 52. Share of innovating firms collaborating with HEI/PRO out of all innovative firms.

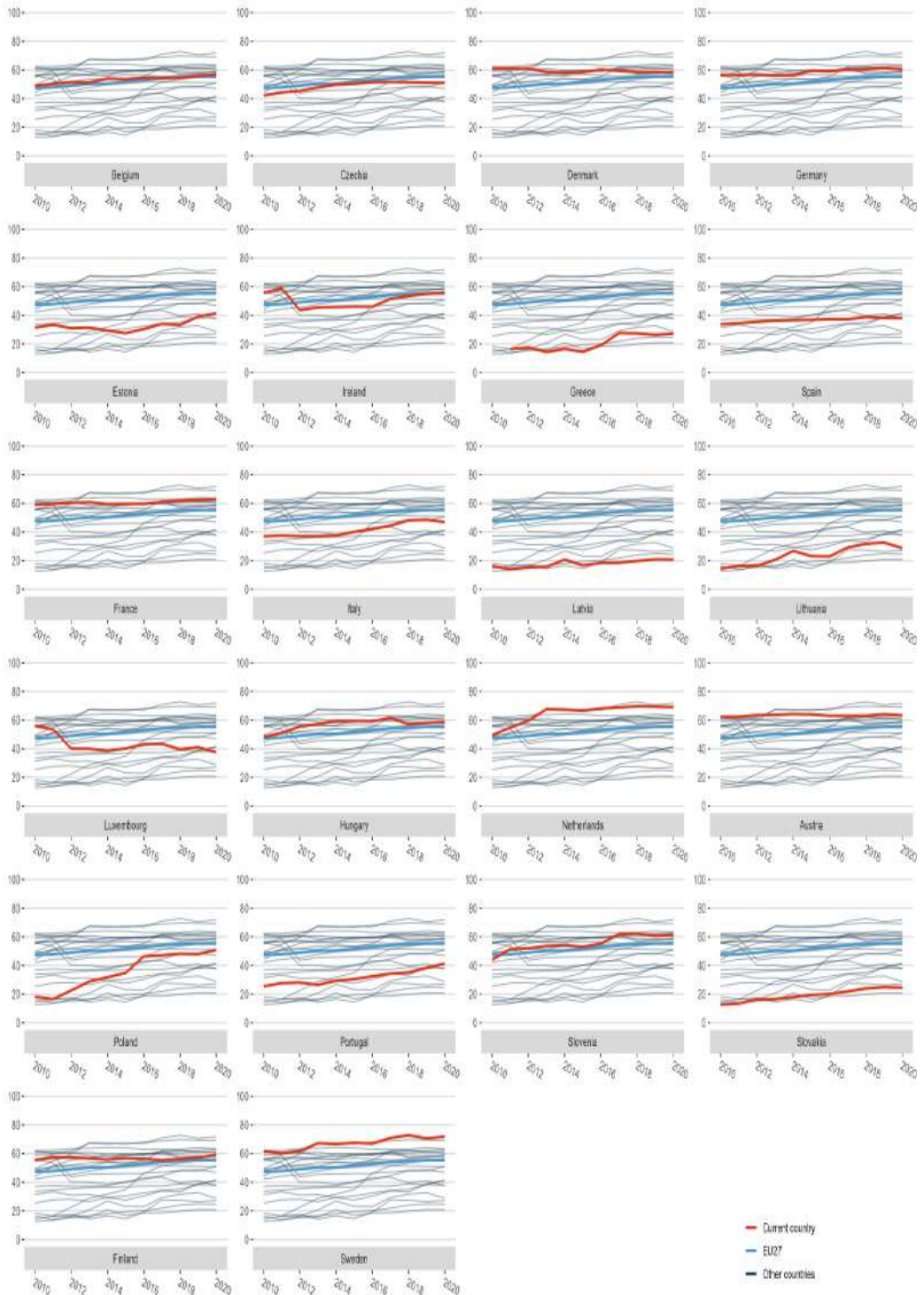


Figure 53. Business enterprise researchers as percentage of national, total.

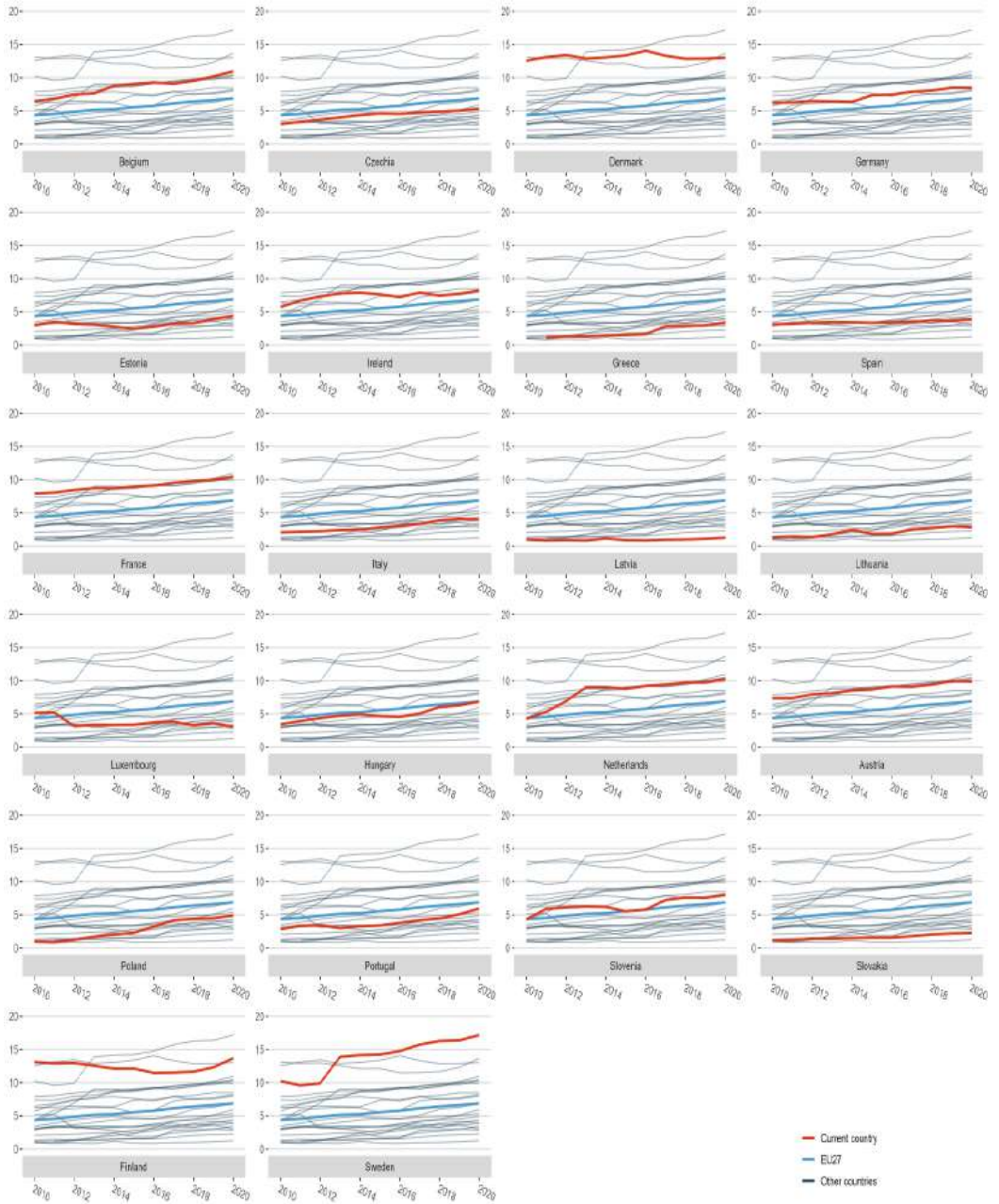


Figure 54. Business enterprise researchers in full-time equivalent per thousand employments in industry.

Scientific leadership

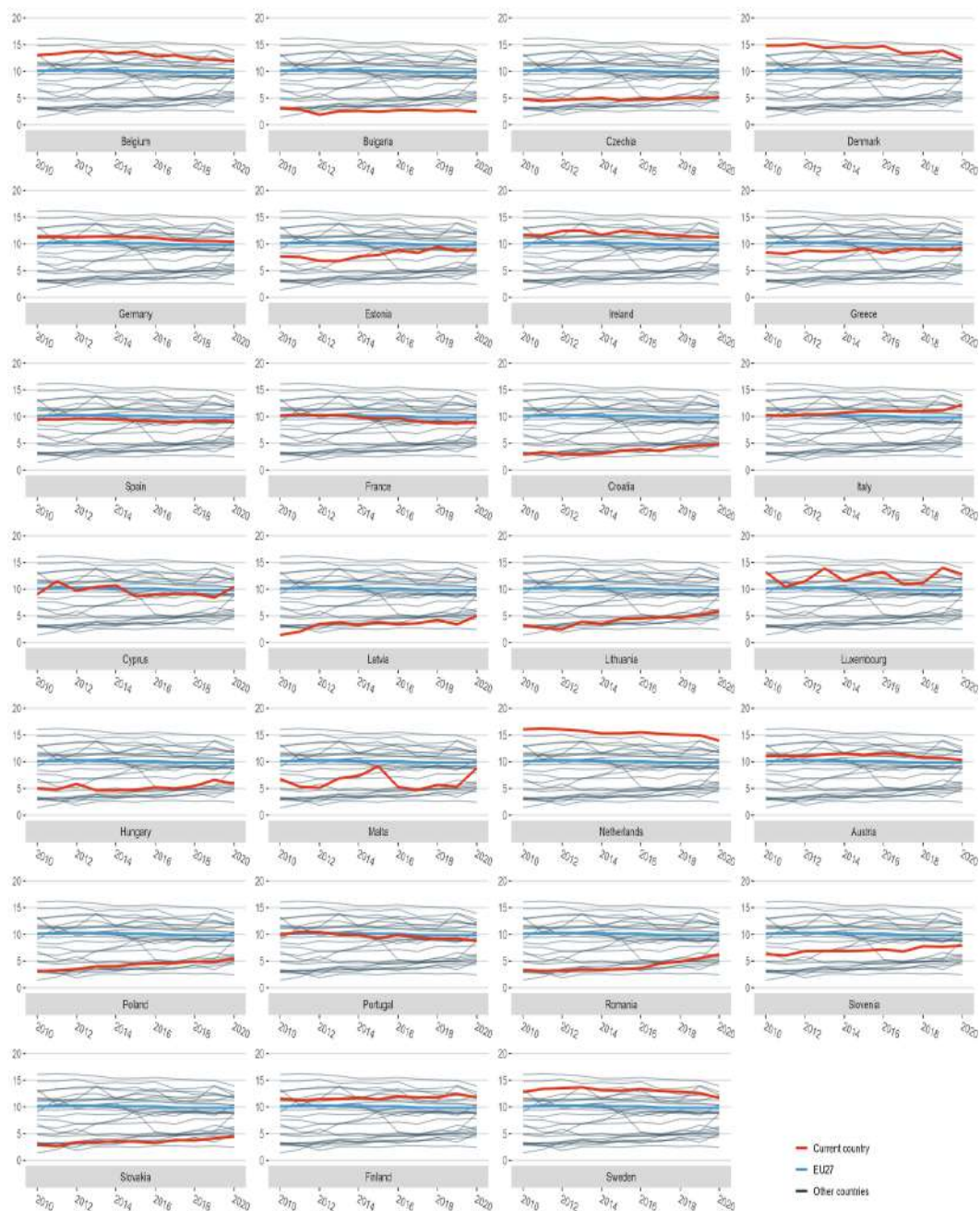


Figure 55. Number of scientific publications among the top- 10% most cited publications worldwide as a percentage of all publications.

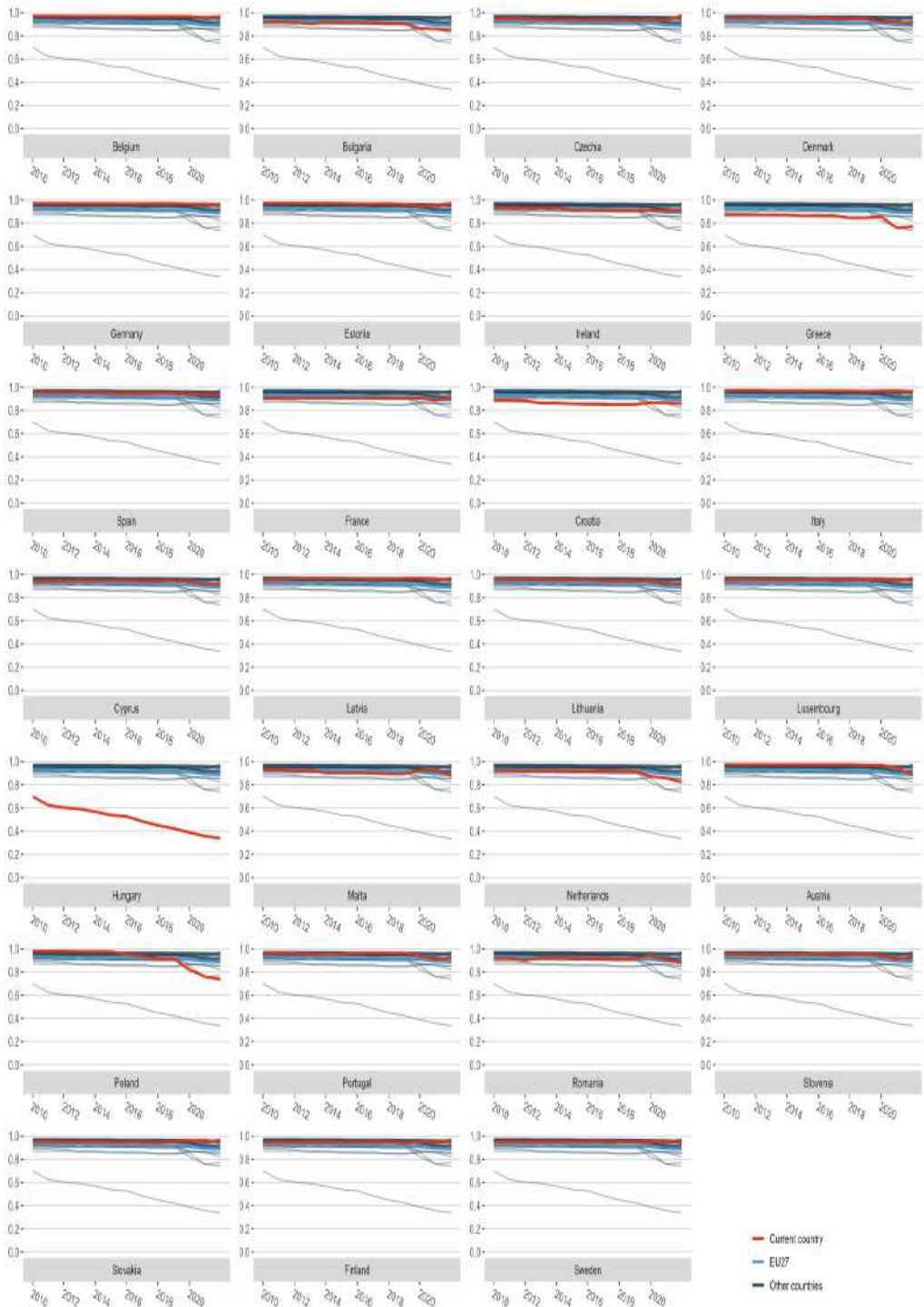


Figure 56. Academic Freedom Index (AFI)

Global engagement

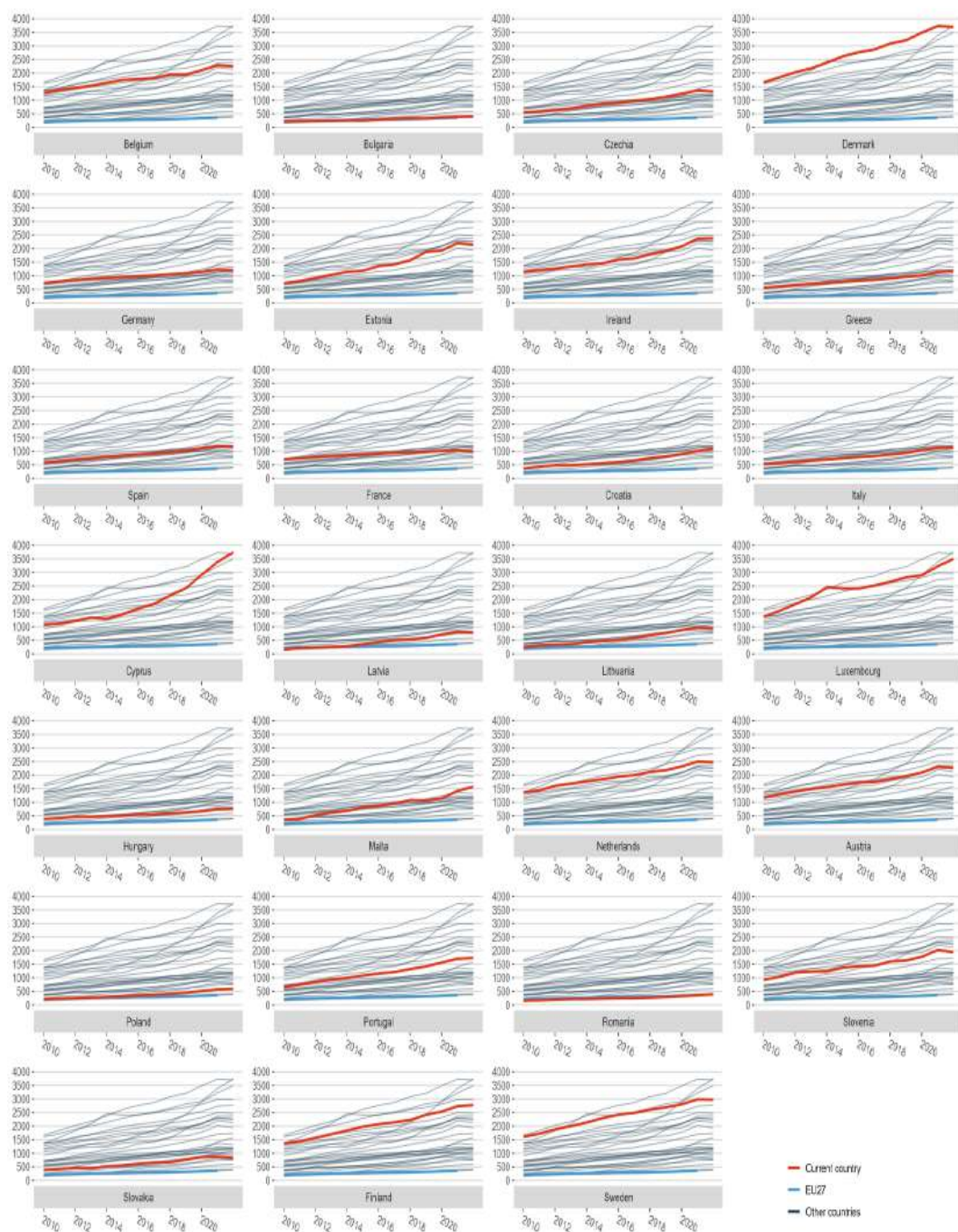


Figure 57. International co-publications with non-EU partners per 1,000 researchers in the public sector.

PRIORITY 2: TAKING UP TOGETHER THE CHALLENGES POSED BY THE TWIN GREEN AND DIGITAL TRANSITION, AND INCREASING SOCIETY’S PARTICIPATION IN THE ERA

Challenge-based ERA actions

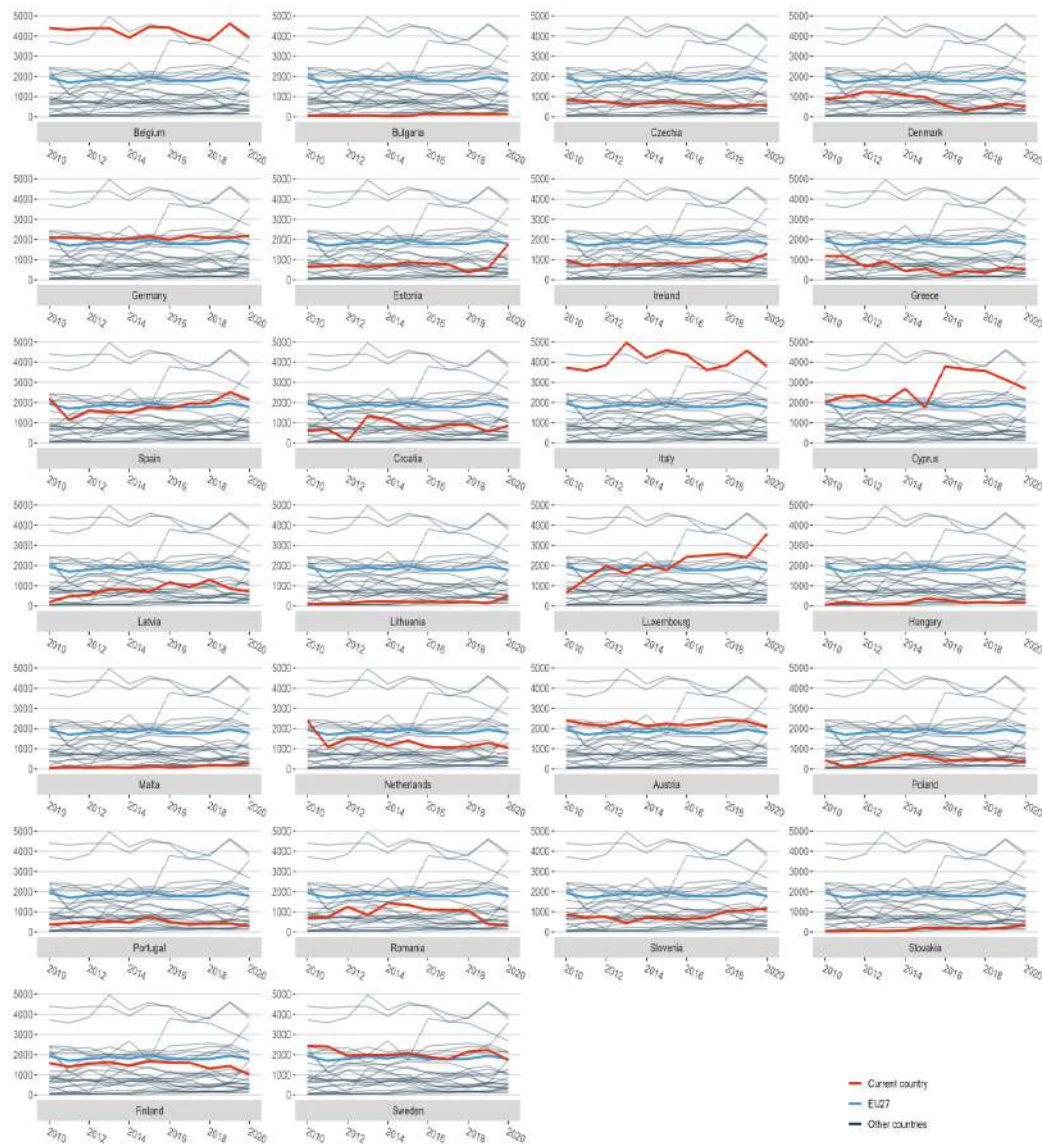


Figure 58. Government budget allocations for R&D (GBARD) allocated to Europe-wide transnational, as well as bilateral or multilateral, public R&D programmes per FTE researcher.

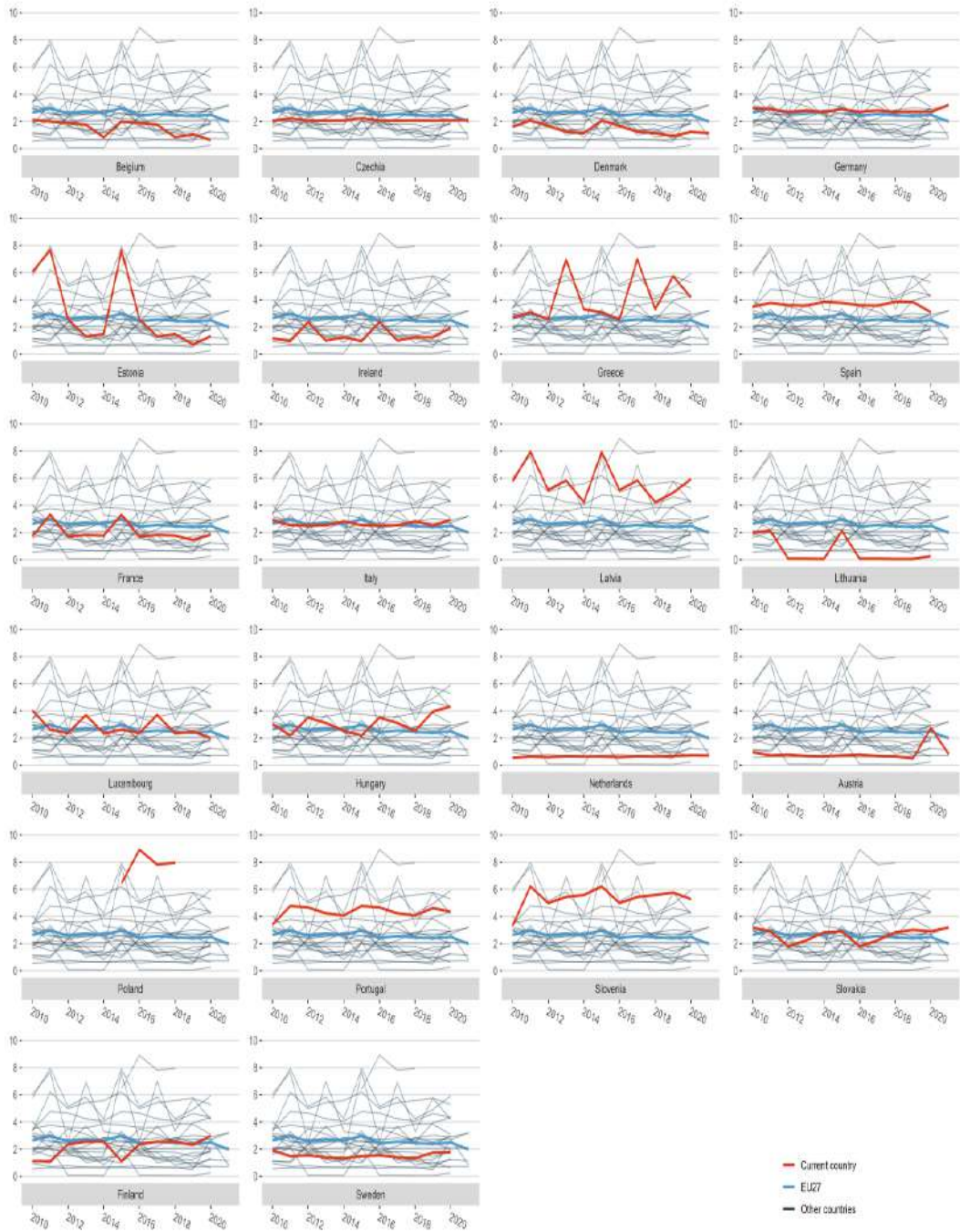


Figure 59: Environmentally related government R&D budget as percentage of total government R&D.

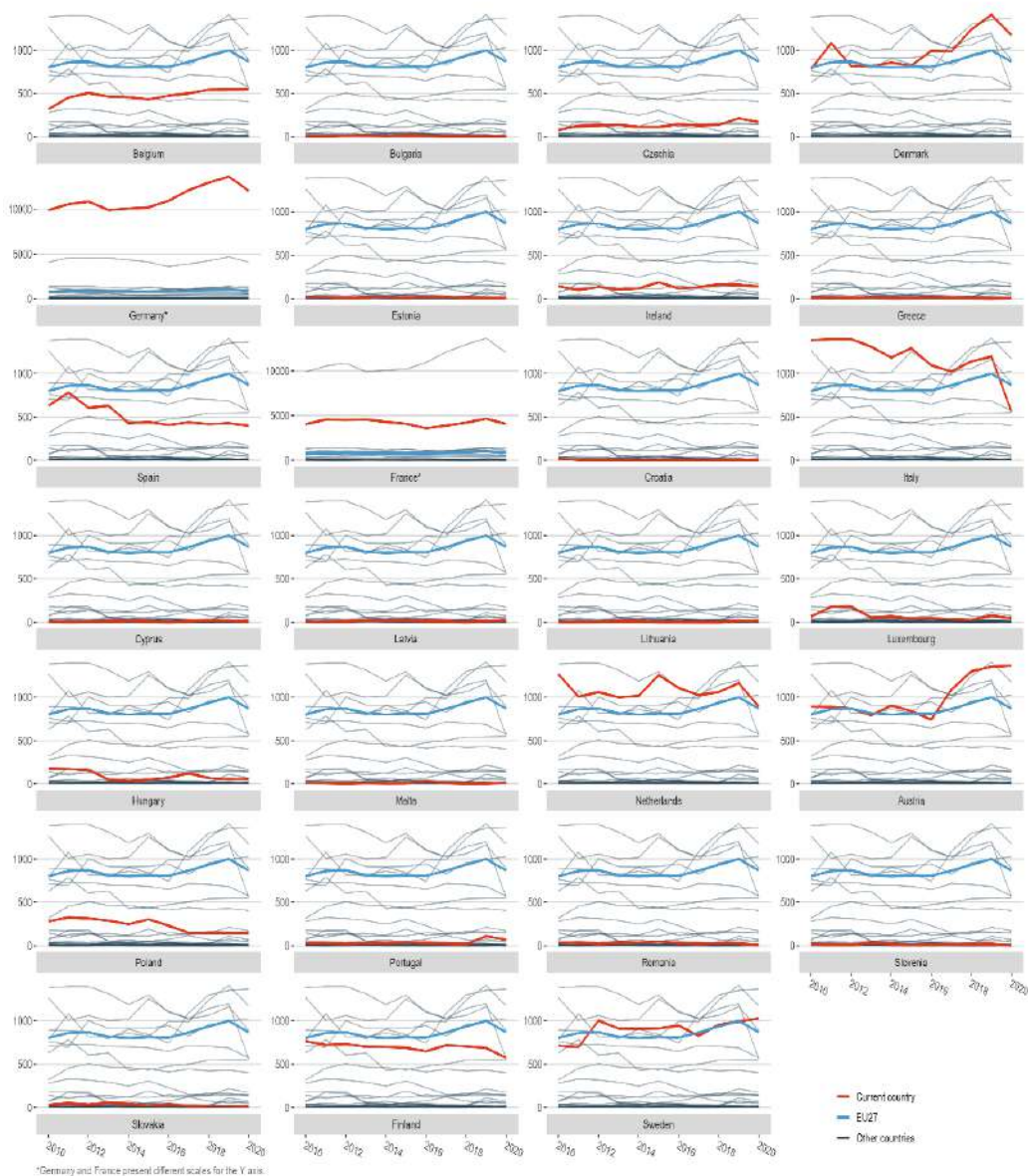


Figure 60. National public and private investments as suggested in the SET Plan progress report 2021.²⁷⁷

²⁷⁷ Please note that the scale for Germany and France is different (15000 compared to 1500 for the remaining graphs). This modification has been included to better illustrate the different values for these countries.

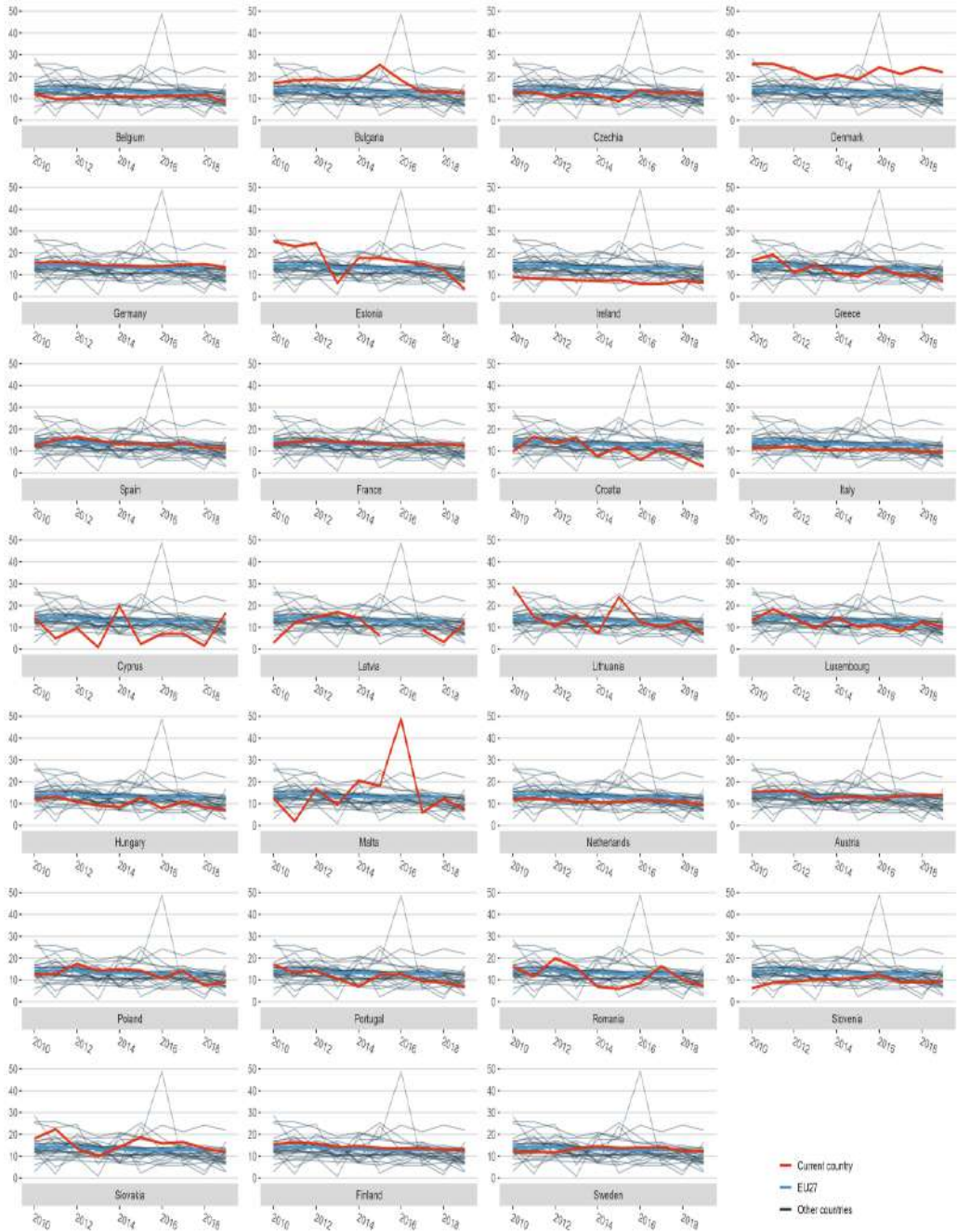


Figure 61. OECD Patents on environment technologies.

Synergies with sectoral policies and industrial policy, in order to boost innovation ecosystem

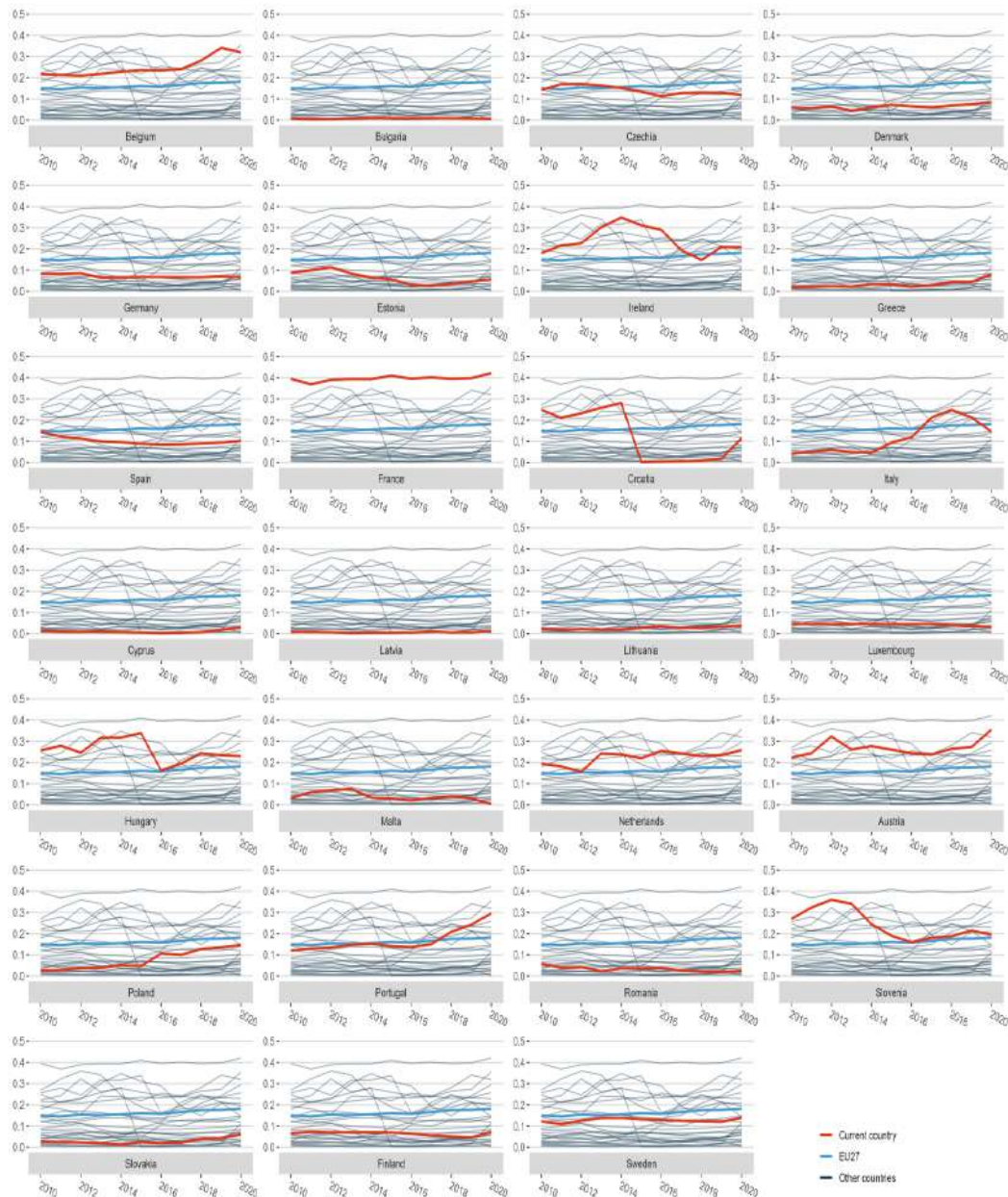


Figure 62. Direct government support and Indirect government support through R&D tax incentives as a percentage of GDP.

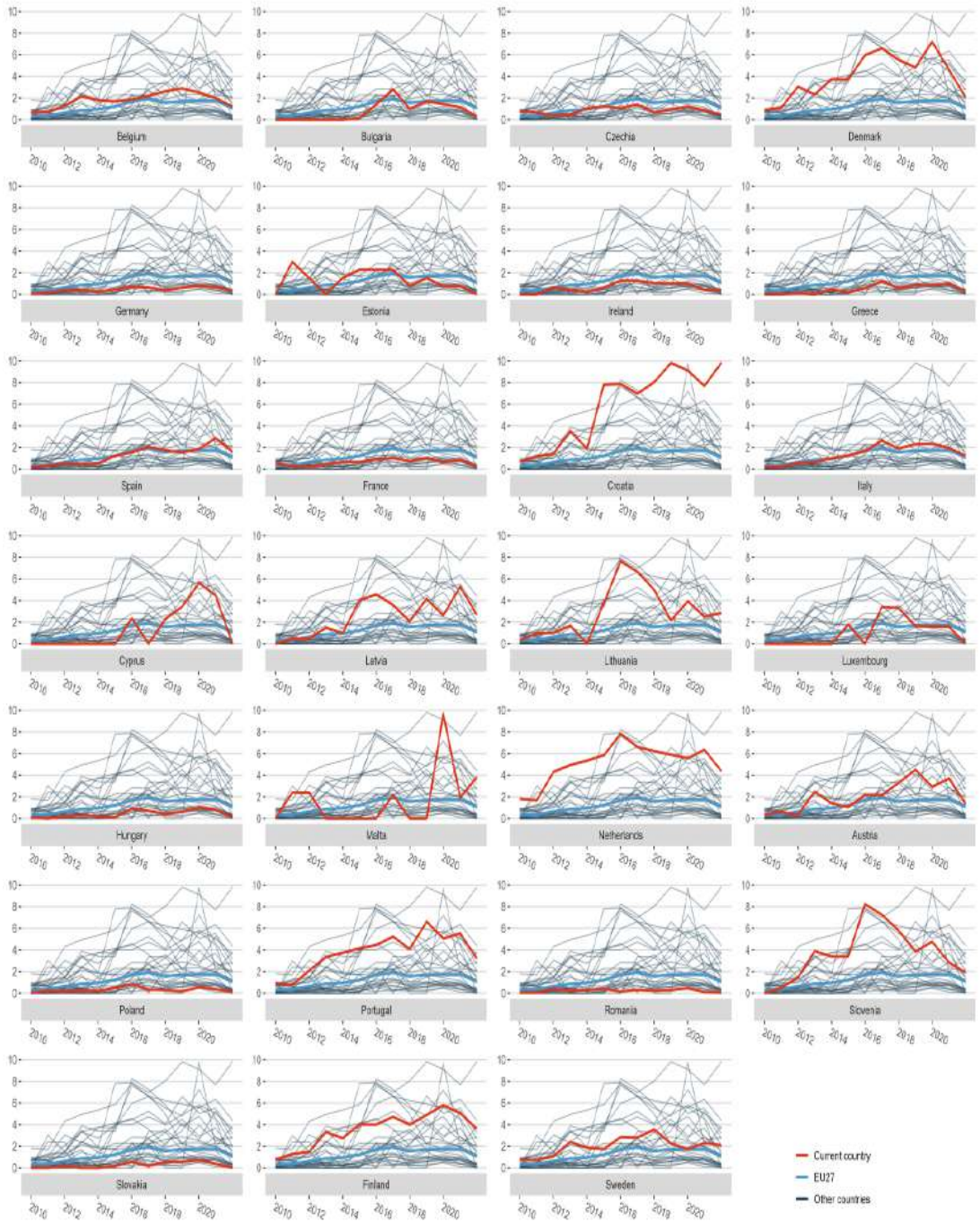


Figure 63. Research publications on social innovation per million population.

PRIORITY 3: ENHANCING ACCESS TO RESEARCH AND INNOVATION EXCELLENCE AND ENHANCING INTERCONNECTIONS BETWEEN INNOVATION ECOSYSTEMS ACROSS THE EU

More investments and reforms in countries and regions with lower research and innovation performance

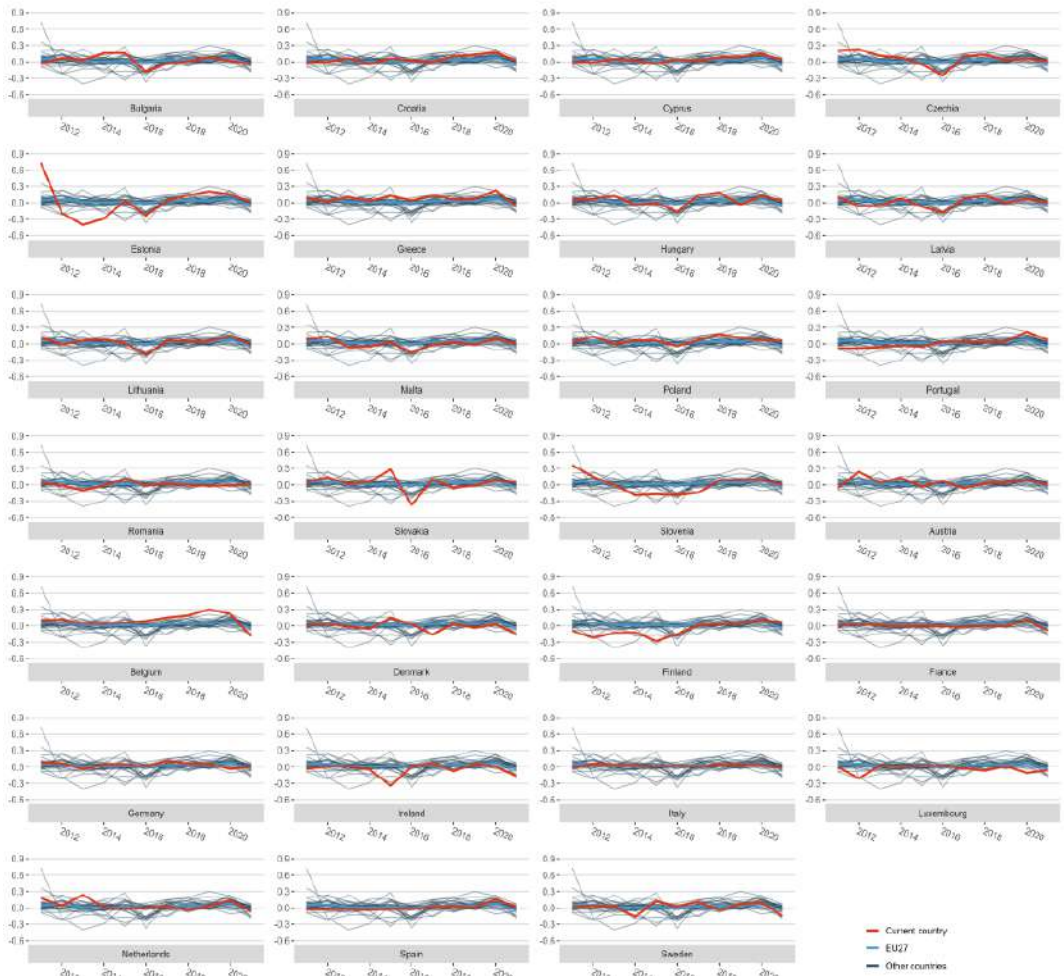


Figure 64: Increase in total R&D expenditure in EU27, expressed as a percentage of GDP per country

PRIORITY 4: ADVANCING CONCERTED RESEARCH AND INNOVATION INVESTMENTS AND REFORMS

Coordination of R&I investments

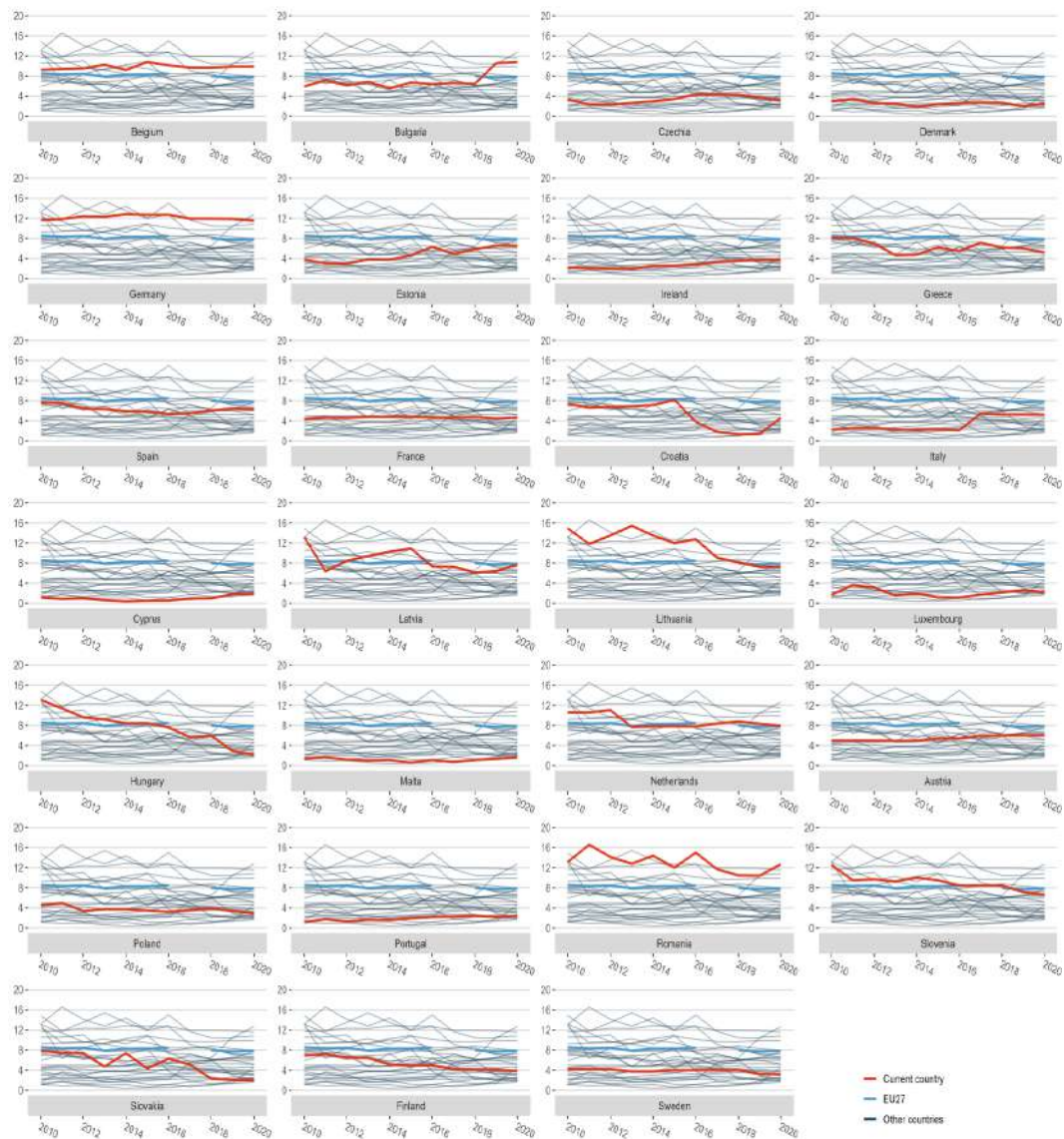


Figure 65: Share of public R&D expenditures financed by the private sector.

ANNEX 4: OECD STIP SURVEY CATEGORISATION

Target Groups	
Research and Education Organisations	Higher education institutes; Public research institutes; Private research and development lab
Research, students and teachers	Established researchers; Postdocs and other early career researchers Programme managers and other research support staff; Undergraduate and master students; Secondary education students; PhD students; Teachers
Firms	Firms of any size
Intermediaries	Incubators, accelerators, science parks or technoparks; Technology transfer offices; Industry associations, Academic societies/academies, NGOs
Governmental entities	International entity; National government; subnational government
Economic actors (individuals)	Entrepreneurs; Private investors; Labour force in general
Social groups especially emphasized	Women; Disadvantaged and excluded groups; Civil Society
Policy Instruments	
Governance	Strategies, agendas and plans; Creation or reform of governance structure or public body; Policy intelligence (e.g., evaluations, benchmarking and forecasts); Formal consultations of stakeholders or experts; Horizontal STI coordination bodies; Regulatory oversights and ethical advice bodies Standards and certifications for technology development; Public awareness bodies
Direct financial support	Institutional funding for public research; Project grants for public research Grants for business R&D and innovation; Centres of excellence grants Procurement programmes for R&D and innovation; Fellowships and postgraduate loans and scholarships; Loans and credits for innovation in firms; Equity financing; Innovation vouchers
Indirect financial support	Tax or social contributions relief for firms investing in R&D and innovation Tax relief for individuals supporting R&D and innovation; Debt guarantees and risk sharing schemes
Collaborative infrastructures	Networking collaborative platforms; Dedicated support to research and technical

(soft and physical)	infrastructures; Information services and access to datasets
Guidance, regulation and incentives	Technology extension and business advisory services; Science and technology regulation and soft law; Labour mobility regulation and incentives; Intellectual property regulation and incentives; Science and innovation challenges, prizes and awards

ERA Actions	ERA Action Title	STIP Theme number	STIP Theme Code	STIP Survey Theme area	STIP Survey Theme
Action 1	Enable Open Science, including through the EOSC	2.1	TH16 (NO DATA)	Public research systems	Public research debates
		2.7	TH106	Public research systems	Digital transformation of research performing organizations
		2.8	TH107	Public research systems	Open and enhanced access to publications
Action 2	Propose an EU copyright and data legislative framework for research	NA	NA	NA	NA
Action 3	Reform the assessment system for research, researchers	1.5	TH15	Governance	Evaluation and impact assessment
Action 4	Promote attractive research careers, talent circulation and mobility	2.10	TH24	Public research system	Research and technology infrastructures
		2.11	TH25	Public research system	Internationalization in public research
		3.6	TH34	Innovation in firms and innovative entrepreneurship	Entrepreneurship capabilities and culture
		4.6	TH44	Knowledge exchange and co-creation	Commercialization of public research results
		5.3	TH51	Human resources for research and innovation	STEM Skills

ERA Actions	ERA Action Title	STIP Theme number	STIP Theme Code	STIP Survey Theme area	STIP Survey Theme
		5.4	TH52	Human resources for research and innovation	Doctoral and postdoctoral researchers
		5.5	TH53	Human resources for research and innovation	Research careers
		5.6	TH55	Human resources for research and innovation	International mobility of human resources
Action 5	Promote gender equality and foster inclusiveness	5.7	TH54	Human resources for research and innovation	Equity, diversity and inclusion
Action 6	Protect academic freedom in Europe	1.6	TH63	Governance	STI governance
Action 7	Upgrade EU guidance for a better knowledge valorization	4.5	TH43	Knowledge exchange and cocreation	Commercialization of public research results
Action 8	Strengthen research infrastructures	2.9	TH108	Public research system	Open and enhanced Access to research data
Action 9	Promote international cooperation	1.6	TH63	Governance	STI Governance policy
Action 10	Make EU research and innovation missions and partnerships key contributors to the ERA	1.1	TH11 (*NO DATA)	Governance	Governance debates
		1.3	TH9	Governance	Horizontal policy coordination
		6.3	TH91	Research and innovation for society	Mission-orientated innovation policies
		M1.3	TH92	Net zero transitions	Net zero transitions in energy

ERA Actions	ERA Action Title	STIP Theme number	STIP Theme Code	STIP Survey Theme area	STIP Survey Theme
Action 11	An ERA for green transformation	1.1	TH11 (*NO DATA)	Governance	Governance debates
		1.3	TH9	Governance	Horizontal policy coordination
		M1.3	TH92	Net zero transitions	Net zero transitions in energy
Action 12	Accelerate the green/digital transition of Europe's key industrial ecosystems	1.1	TH11 (*NO DATA)	Governance	Governance debates
		1.3	TH9	Governance	Horizontal policy coordination
		4.4	TH47	Knowledge exchange and cocreation	Cluster policies
Action 13	Empower Higher Education Institutions	2.10	TH24	Public research system	Research and technology infrastructures
		2.12	TH26	Public research system	Cross-disciplinary research
Action 14	Bring Science closer to citizens	6.6	TH65	Research and innovation for society	Multi-stakeholder engagement
		6.7	TH66	Research and innovation for society	Science, technology and innovation culture
Action 15	Build-up research and innovation ecosystems to improve excellence and competitiveness	NA	NA	NA	NA
Action 16	Improve EU-wide access to excellence	2.1	TH16 (*NO DATA)	Public research system	Public research debates
		2.10	TH24	Public research system	Research and technology infrastructures

ERA Actions	ERA Action Title	STIP Theme number	STIP Theme Code	STIP Survey Theme area	STIP Survey Theme
		2.12	TH26	Public research system	Cross-disciplinary research
		3.1	TH28	Innovation in firms and innovative entrepreneurship	Business innovation policy debates NO TH28
		4.2	TH41	Knowledge exchange and cocreation	Knowledge exchange and co-creation strategies
Action 17	Enhance public research institutions' strategic capacity	2.11	TH25	Public research system	International in public research
Action 18	Support the development of EU countries national processes for the ERA implementation	NA	NA	NA	NA
Action 19	Establish an ERA monitoring system	1.4	TH14	Governance	Strategic policy intelligence
Action 20	Support research and innovation investments and reforms	2.6	TH22	Public research system	Structural change in the public research system

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This EU-level report is the first 18-months review of the progress towards the priority areas for joint action in the European Research Area (ERA), as laid down in the Pact for Research and Innovation in Europe, and of the implementation of the ERA Policy Agenda. It is part of the new ERA Monitoring Mechanism (EMM), which also includes the ERA Policy Platform with the ERA Dashboard and Scoreboard as well as country-level reports. In the context of the renewal of the ERA governance since 2021, the monitoring will allow for evidence-informed policy-making. The present report serves as a baseline against which future progress at EU-level can be assessed.

Research and Innovation policy

