European Commission

ERA Country Report 2024
Hungary

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Report

Research and Innovation

ERA Country Report 2024: Hungary

European Commission
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EUROPEAN COMMISSION

ERA Country Report 2024

Hungary

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2025 Directorate-General for Research and Innovation EN

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Key takeaways

- Hungary has committed to 14 out of 20 ERA Actions, covering four out of the four Priority Areas.
- Hungary is classified as a moderate innovator with performance at 70.5 percent of the EU average in 2024 according to the 2024 European Innovation Scoreboard.
- Hungary does not have a dedicated ERA Action Plan; however, its ERA objectives are addressed through a broad array of national research and innovation strategies, policies, and programs.
- In summer 2023, Hungary launched the John von Neumann Program (NJP) as its new research and innovation strategy focused on linking universities, research institutes, and the economy.
- The NJP aims to elevate Hungary from 21st position to the EU's top 10 and globally from the 34th position to the top 25 in innovation by 2030. It outlines structural reforms to address barriers and enhance research and innovation capacity.

1. National context

Hungary is among the medium-sized EU-member states. Hungary's key institutions for research and innovation include the Ministry of Culture and Innovation, which establishes the nation's R&I strategy and policy direction, and the National Research, Development and Innovation Office (NRDI Office), which is the managing body of the National Research, Development and Innovation Fund. The NRDI Office operates research, development and innovation funding programmes, participates in the preparation of the Government's decision on its research, development and innovation strategy and contributes to its implementation. The NRDI Office is supported by the Hungarian Innovation Agency (NIÜ), which aims at strengthening Hungary's innovative capacity by addressing the changing needs of the innovation ecosystem, connecting the actors within and spreading the culture of innovation in Hungary.

Table 1 summarises key research and development (R&D) macro-indicators for Hungary and the EU27 in 2023, as well as historical averages for Hungary. Hungary's gross domestic expenditure on R&D (GERD) as a share of GDP in 2023 (1.39 percent) is below the EU27 average of 2.27 percent, indicating a relatively lower investment in R&D activities. Government budget allocations for R&D (GBARD) in Hungary accounted for 0.23 percent of GDP in 2023, compared to 0.73 percent for the EU27, while business enterprise expenditure on R&D (BERD) was 1.00 percent of GDP, also below the EU27 average of 1.52 percent. Despite this, Hungary shows competitive numbers in researchers per million inhabitants (4,762 in 2023), above the EU27 average (4,681), suggesting relatively strong human resources in R&D. However, the share of female researchers in Hungary (29 percent in 2021) lags somewhat behind the EU27 average of 34 percent, indicating room for improvement in gender diversity in research fields.

Hungary is classified as a *moderate innovator* with performance at 70.5 percent of the EU average in 2024 according to the 2024 European Innovation Scoreboard (EIS)[1]. According to the EIS, Hungary demonstrates relative strengths in the areas of government support of business R&D (both direct and indirect), the percentage of foreign doctorate students among all doctorate students, and public-private co-publications. However, it faces challenges in areas such as design applications, population with tertiary education and SMEs introducing business process innovations.

In comparison to 2023, Hungary has strengthened its position in several areas, including individuals with above basic overall digital skills (+29 percentage points), broadband penetration (+19 percentage points) and population involved in lifelong learning (+17 percentage points). Conversely, a strong decrease was identified in environment-related technologies (-20 percentage points), R&D expenditure in the business sector (-18 percentage points) and population with tertiary education (-15 percentage points).

In summer 2023, Hungary launched the John von Neumann Program (NJP) as its new research and innovation strategy. Focused on linking universities, research institutes, and the economy with the aim of strengthening the innovation ecosystem and maximise the societal and economic impact of research and innovation, the NJP aims to elevate Hungary from the 21st position to the EU's top 10 and globally from 34th position to the top 25 in innovation by

[1] Country profiles: Hungary, accessed on 24 March, 2025: https://research-and-innovation.ec.europa.eu/statistics/performance-indicators/european-innovation-scoreboard_en

2030. It outlines structural reforms to address barriers and enhance research and innovation capacity, which is described later in this report.

Table 1 Structural Key Indicators

Indicator	EU27	Hungary		
	2023	2023	Average 2018-2020	Average 2021-2023
GDP in euro per capita, current prices	35 790.00	17 410.00	13 966.67	15 806.67
Gross Domestic Expenditure on R&D (GERD) as a share of GDP	2.27	1.39	1.52	1.47
Government Budget Allocations for R&D (GBARD) as share of GDP	0.73	0.23	0.37	0.33
Business Enterprise expenditure on R&D (BERD) as a share of GDP	1.52	1.00	1.16	1.08
Expenditure on R&D procurement as a percentage of GDP	0.06	0.02	/	0.02
Size of the population (million)	448.80	9.60	9.70	9.62
Researchers (in FTE) per million inhabitants	4 681.34	4 762.03	4 089.08	4 670.97
Share of female researchers, all sectors of performance (%)	33.71	/	28.82	/

Source: Annex 1

2. Status of the Implementation of the ERA Policy Agenda

Chapter 2 briefly summarises **new developments in Hungary since the publication of the ERA Country Report 2023**, based on the commitments to ERA Actions (Table 2). The findings are based on qualitative desk research and interviews. Hungary has committed to 14 out of 20 ERA Actions, covering four out of the four Priority Areas (see Table 2). The national implementation of ERA Actions is coordinated through various program strategies, most importantly the John von Neumann program, which covers the period from 2023 until 2030. Focus areas of the national ERA implementation are interventions under ERA Action 1 (especially knowledge valorisation) and ERA Action 3. The progress is monitored by National Research, Development and Innovation Office ("NRDI Office").

Table 2 Commitment to ERA Actions

1: Deepening a truly functioning internal market for knowledge								
1. Enable Open Science, including through 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					3: Amplifying access R&I excellence across the Union		4: Advancing concerted research and innovation investments and reforms	
10. Make EU R&I 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	14. Bring Science closer to citizens	16. Improve EU-wide access to excellence	17. Enhance public research institutions' strategic capacity	19. Establish an ERA monitoring system	

Source: European Commission (Note: Actions 15, 18 and 20 were not implemented)

ERA Priority 1: Deepening a truly functioning internal market for knowledge

ERA 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)

Concerning ERA Action 1, an important development since the 2023 country report is the launch of the **HUN-REN Data Repository Platform**, which is a new service supporting long-term research data management across the Hungarian Research Network (HUN-REN). It ensures secure storage, use, reuse, and sharing of research data, promoting FAIR (findable, accessible, interoperable, reusable) principles. The **HUN-REN Cloud**, the **cloud-based e-infrastructure platform** designed to serve the Hungarian scientific community, has been actively working towards integration with the European Open Science Cloud (EOSC). In the second half of 2024, the establishment of an **EOSC national node** in Hungary was initiated with the involvement of several organisations, research centres and universities. HUN-REN headquarters oversees and coordinates the initiative, which is expected to conclude in the beginning of 2025.[2] Under the Hungarian Presidency of the EU (second half of 2024), Hungary hosted the EOSC Steering Board meeting and an EOSC European Tripartite Event.

ERA Action 2) Propose an EU copyright and data legislative and regulatory framework fit for research

The **Hungarian Intellectual Property Office** (HIPO) is Hungary's central authority for managing and protecting intellectual property rights. HIPO contributed to drafting the legislative proposal for amending certain laws necessary to facilitate the economic utilisation of innovation and scientific results. One group of actions of the John von Neumann Program specifically targets strengthening the industrial property rights activity in Hungary**.** The program's objective include: 1) reducing the cost of patent applications, 2) simplifying the design application procedure and to reducing lead times and 3) streamlining the HIPO's scope of work with NRDI Office and Hungarian Innovation Agency (NIÜ). Furthermore, in 2023 HIPO strengthened its collaboration with universities and SMEs (e.g. renewed free IP Scan service) [3]

ERA Action 3) Advance towards the reform of the Assessment System for research, researchers and institutions to improve their quality, performance and impact

The **Hungarian National Chapter** of the **Coalition for Advancing Research Assessment** (CoARA) was established at the initiative of HUN-REN Secretariat. This Chapter includes representatives from among others major universities, the Hungarian Accreditation Committee, the Hungarian Rectors' Conference and the Hungarian Academy of Sciences.[4]

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[2] Open Science at HUN REN: Past – present – future, presentation by Dr. Istvan Szabo, accessed on 2 January 2025 at https://science-cloud.hu/eloadasok/open-science-hun-ren-ben-mult-jelen-jovo; A HUN-REN Cloud stratégiai szerepe a hazai és nemzetközi kutatási életben, presentation by Dr. Róbert Lovas, accessed on 2 January 2025 at https://science-cloud.hu/eloadasok/hun-ren-cloud-strategiai-szerepe-hazai-es-nemzetkozi-kutatasi-eletben; Hungary's Second National Tripartite Event, accessed on 2 January 2025 at https://eosc.eu/news/2024/11/hungarys-second-national-tripartite-event

[3] Tények és Adatok 2023, Hungarian Intellectual Property Office (2024).

[4] See Presentation of the Hungarian National Chapter at the CoARA National Chapters Exchange Forum 2024, accessed at: https://zenodo.org/records/10803980; "The CoARA Hungarian National Chapter was launched, - accessed on 27 December, 2024, at: https://hun-ren.hu/en/news/the-coara-hungarian-national-chapter-was-launched

ERA Action 4) Promote attractive and sustainable research careers, balanced talent circulation and international, transdisciplinary and inter-sectoral mobility across the ERA

In early 2024 the Ministry of Culture and Innovation and the NRDI Office published the **2024 Program Strategy for the NRDI Fund**, one of the main public instruments for funding research, development and innovation in Hungary. The 2024 budget is more than double of the previous year's allocation. The strategy focuses on key areas highly relevant for this ERA action, namely support across the researcher career path: the Fund offers support from early education through to senior researchers, aiming to nurture talents across all stages of academic and professional development. The distribution of these funds will be decided by the **Research Excellence Council of Hungary** newly established with the participation of top Hungarian researchers including European Research Council grantees. Several proposed measures under the John von Neumann Program aim to support doctoral students and encourage more individuals to pursue doctoral studies, such as tax reliefs.[5]

ERA Action 6) Deepening the ERA through protecting academic freedom in Europe

In 2024, a key result of the Hungarian Presidency of the Council of the European Union was the Council Conclusion on strengthening the competitiveness of the EU. This reinforces the ERA and the commitments towards its underlying values, including academic freedom. The activities of HUN-REN is in accordance with the common principles stated in the Bonn Declaration.

ERA Action 7) Upgrade EU guidance for better knowledge valorisation

Knowledge valorisation sits in the centre of the John von Neumann Program, under which the **Hungarian Innovation Agency (NIÜ)** was established in 2023 to complement the NRDI Office. Under the coordination of the Hungarian Innovation Agency, university-owned **technology transfer companies (TTCs)** are being established and operated at five universities. The John von Neumann Program also put forward the revision of development approach of **Science and Innovation Parks** to accelerate innovation and enhance the economic utilisation of scientific results by collocating universities and businesses. Among other relevant funding programs, it is especially noteworthy that end-2024 the NRDI Office has launched a new **Proof of Concept (PoC) program** to assist universities in bringing their research outcomes to market. In November 2024, **Kooper**, a **new digital platform**[6] initiated by the NRDI Office, was launched to enhance collaboration between universities and businesses in Hungary.[7]

ERA Action 8) Strengthen sustainability, accessibility and resilience of research infrastructures in the ERA

As of 2024, 111 certified research infrastructures operate in Hungary, among which laboratories established under the **National Laboratories 2020** program. The most recent certification of research infrastructures was concluded in 2024 under the guidance of the National Research Infrastructure Committee. To enhance the accessibility of research infrastructures, the NRDI Office is launching a **new voucher**

[5] A Nemzeti Kutatási, Fejlesztési és Innovációs Alap 2024-évi Progrtamstratégiája, Ministry of Culture and Innovation (2024).
[6] Platform for innovation collaboration, accessed on 24 March, 2025: https://evop.hu/kooper
[7] "Az egyetemi kutatási eredmények piacra vitelét segíti az NKFI Hivatal legújabb, Proof of Concept pályázata", NRDI Office, accessed on 27 December, 2024, at https://nkfih.gov.hu/hivatalrol/sajtokozlemenyek/proof-of-concept-egyetemi-kutatasi-eredmenyek-piacra-vitelet-segiti; Science Park projekt, Nemzeti Innovációs Ügynökség, https://niu.hu/project/science-park-projekt; Technology Transfer Company (TTC) projekt, Nemzeti Innovációs Ügynökség, accessed on 2 January at https://niu.hu/project/technology-transfer-company-ttc-projekt; Bódis László: az egyetemeknek kiemelt szerepük van az ország versenyképességének megerősítésében, Nemzeti Kutatási, Fejlesztési és Innovációs Hivatal, https://nkfih.gov.hu/hivatalrol/sajtokozlemenyek/egyetemeknek-kiemelt-szerepuk-van

scheme to support Hungarian SMEs in their innovation efforts. In addition, the 2024 Program Strategy of the NRDI Office includes a program for the support for the use of international and national research infrastructures.[8] In addition, Hungary has been actively contributing to European research infrastructures: 2023 membership fees exceeded EUR 35 million.

ERA Action 9) Promote a positive environment and level playing field for international cooperation based on reciprocity

To foster international collaboration**,** Hungary's bilateral research collaborations allocate funds for researcher mobility and joint innovation projects with over 15 partner countries. Additionally, the **Research Grant Hungary** program supports the work of outstanding international researchers in Hungary. Furthermore, the **HU-rizon Programme**, a new international research excellence initiative for joint projects led by Hungarian research teams and international research teams was launched by the NRDI Office in May 2024. The first 2024 HU-rizon call awarded HUF 11.8 billion (EUR 29 million) in funding to 30 projects – ffocused on health, digitalization, and green transition – involving 12 Hungarian universities and over 70 global partners, including at least one top 100 university in each.[9]

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

ERA Action 10) Make EU R&I missions (10.1) and partnerships (10.2) key contributors to the ERA

Hungary participates in 12 European Partnerships and expressed its commitment to four partnerships to be launched in 2025. Hungary through the National Research, Development and Innovation Fund allocates EUR 10.5 million for supporting Hungarian participants in European co-fund schemes of which EUR 7.5 million is allocated yearly for partnership participation.

ERA Action 13) Empower Higher Education Institutions to develop in line with the ERA, and in synergy with the European Education Area

Universities are beneficiaries of several programs and initiatives reported under other ERA actions in this report, most notably actions related to knowledge valorisation. The 2023 country report gave account of the **Thematic Excellence Program** (2021) of the NRDI Office, which provides funding for university knowledge centres and research centres for development and innovation activities until the end of 2025. Important elements are furthermore the research scholarships: starting in 2024, the **New National Excellence Program** (ÚNKP) and **Cooperative Doctoral Program** (KDP) continued under the new name, **University Research Scholarship Program (EKÖP)**. A significant change is that the calls for applications are announced by the universities themselves, and decisions on awarding scholarships will also be made at the institutional level.[10]

[8] "New innovation voucher scheme supports Hungarian SMEs to boost their innovation performance", NRDI Office, https://nkfih.gov.hu/english-2017/press-releases-press/new-innovation-voucher; Lezárult a Nemzeti Kutatási Infrastruktúra 2023-2024 felmérés értékelése, Nemzeti Kutatási, Fejlesztési és Innovációs Hivatal, https://nkfih.gov.hu/hivatalrol/hivatal-hirei/nemzeti-kutatasi-infrastruktura-2023-2024

[9] https://nkfih.gov.hu/english/hurizon-programme/hu-rizon-international-research-excellence-programme

[10] Átalakult az ÚNKP: itt az Egyetemi Kutatói Ösztöndíj Program!, accessed on 2 January 2025 at https://www.unkp.gov.hu/unkp-rol

ERA Action 14) Bring Science closer to citizens

The 2023 ERA Country Report noted the launch of the Hungarian Citizen Science open mailing list. Several citizen science projects and collaborations are in operation, especially in nature conservation-related subjects. For example, in January 2024, the Centre for Ecological Research launched a network for community science projects focused on nature conservation and ecological topics in Hungary.[11]

ERA Priority 3: Enhancing access to research and innovation excellence across the Union and enhancing interconnections between innovation ecosystems across the Union

ERA Action 16) Improve EU-wide access to excellence

Several significant funding initiatives are designed to bolster research and innovation excellence at both national and international levels. The **Horizon Europe Participation Support** aims to assist Hungarian researchers and companies in engaging with the EU's most prominent research framework program. The **HU-rizon Program**, a new national initiative focuses on launching international research projects led by Hungarian researchers (see also ERA Action 9). Furthermore, funds have been dedicated to the **Science Patronage Programme**, which promotes Hungarian research results on the international stage. The government provides funding for several mobility schemes with European countries, the national co-fund for participating in partnerships and ERA-NETs and the Horizon Europe Guarantee Fund.

ERA Action 17) Enhance the strategic capacity of Europe's public research-performing organisations

By the end of 2023, research management in Hungary had seen some notable advancements, marked by the establishment of Hungarian research management community on the initiative of the NRDI office**.** The NRDI Office also appointed **of research management liaison officer** and set up the **Hungarian Research Management Operative Group**, comprising of 25 members from a diverse set of stakeholders**.** Research management meetups**,** first held in September 2023, now foster dialogue and collaboration among professionals in the field. To support the dissemination of knowledge and best practices, a newsletter for research managers was launched in the country and research management professional events were organised twice in 2024.[12]

ERA Priority 4: Advancing concerted research and innovation investments and reforms

ERA Action 19) Establish an efficient and effective ERA monitoring mechanism

Hungary has a formal monitoring system in place for the implementation of its Smart Specialisation Strategy (S3), which offers some synergies with the monitoring of ERA actions.

[11] Citizen Science for Nature Conservation in Hungary: A Three-Dimensional Approach, (Johanna Maribel Soria Aguirreet al.), Citizen Science: Theory and Practice, Volume 9 - Issue 1 – 2024; Beszámoló a SEEN 2024 Közösségi Tudományos konferenciáról, Centre for Ecological Research, at https://ecolres.hun-ren.hu/beszamolo-a-seen-2024-kozossegi-tudomanyos-konferenciarol

[12] Sources: Professzionális támogatás a magyar kutatási kiválóságért, Conference organized by NRDI Office on 28 November 2023, accessed at https://www.youtube.com/watch?v=cpgfpFJDC2k

3. Contribution of ERA Actions to national performance in reaching ERA objectives

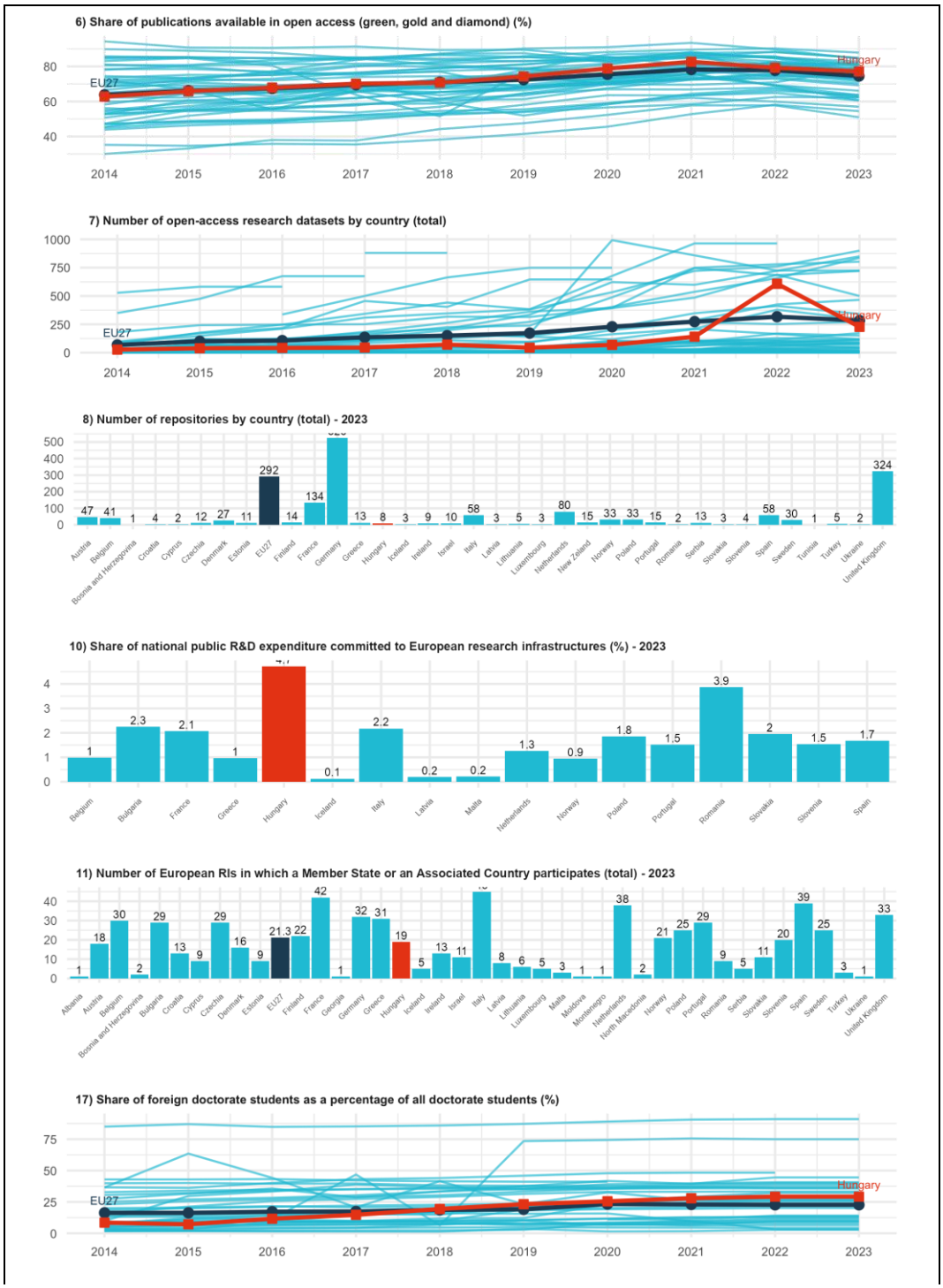
This chapter provides a qualitative assessment of how the joint ERA Actions contributed to Hungary's performance in achieving the ERA objectives as defined in the Pact for R&I during the period 2022-2024.

ERA Priority 1 is addressed through a wide range of initiatives corresponding to **ERA Actions 1 to 4 and 6 to 9.** In general, as of the end of 2024, Hungary has undertaken or is implementing some important structural reforms in accordance with the John von Neumann Program, the country's new research and innovation strategy enacted mid-2023. Central to these are the efforts on knowledge valorisation and technology transfer (**ERA Action 7**). Certain indicators suggest Hungary's performance being on par with or slightly above EU average. For example, the share of public-private co-publications (ERA Dashboard Indicator 19, 2023 HU: 13.2 percent vs EU27: 12.4 percent), the share of innovative firms cooperating with HEIs (ERA Dashboard Indicator 22, 2021 HU: 13.3 percent vs EU27: 12.9 percent) and the share of business enterprise researchers (ERA Dashboard Indicator 23, 2023 HU: 60.4 percent vs 56.4 percent) attest to this. On the other hand, more progress is needed in boosting patent applications (ERA Dashboard Indicators 21, 25), where Hungary's performance was in 2021 below EU average, with some positive developments reported by the Hungarian Intellectual Property Office since then. In 2024, patent applications in Hungary rose by 35% to 593, with university filings more than doubling since 2022 and HUN-REN increasing its patent activity fivefold since 2020.

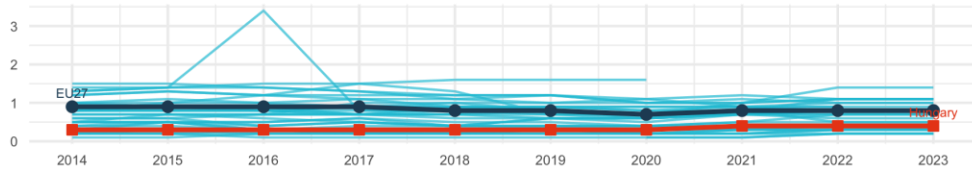
Progress is maintained in open science (**ERA Action 1**), for example with the commencement of data depository service and continuous development of e-infrastructure supporting research and innovation. In this domain, Hungary's performance has been over the EU average as illustrated by ERA Dashboard Indicator 6: in 2023 more than 77 percent of publications were available in open access (EU27 average: 74.5 percent), although this figure is somewhat lower than in previous years. Hungary still needs to catch up with most of the EU in making research careers more attractive (**ERA Action 4**): ERA Dashboard Indicator 18 shows a considerable gap in new doctorate graduate per 1,000 inhabitants (2023 HU: 0,4 vs EU27: 0,8). On the other hand, Hungary attracts foreign doctorate students: the share of foreign doctorate students (indicator 17) is markedly higher than EU average (2023 HU: 29.2 percent vs. EU27: 22.7 percent). For Hungary, point of attention is academic freedom (**ERA Action 6**). The Academic Freedom index (ERA Dashboard Indicator 27) is the second lowest among the ERA countries and has been following a decreasing trendline.

Concerning **ERA Action 8**, ERA Dashboard Indicators 10 and 11, that is the share of national public R&D expenditure committed to European research infrastructures and the number of European RI the country participates, demonstrate Hungary's good performance in comparison to countries of similar size. Indicators for international cooperation (**ERA Action 9**) provide a mixed picture, the share of patents with foreign co-inventors (ERA Dashboard Indicator 31) exhibited a relatively high value in 2021 (HU: 41 percent vs EU: 10 percent), and international co-publications with non-EU partners per 1,000 researchers (ERA Dashboard Indicator 30) is close to EU average (2023 HU: 309 vs EU27: 339).

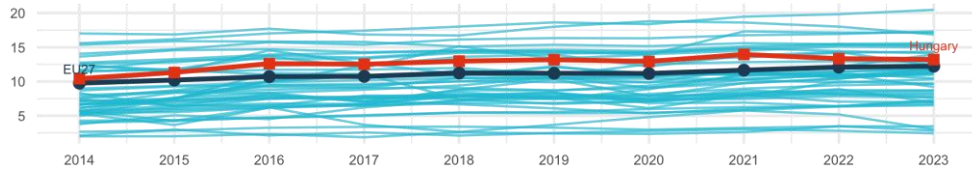
Figure 3-1 Indicators for ERA Priority 1



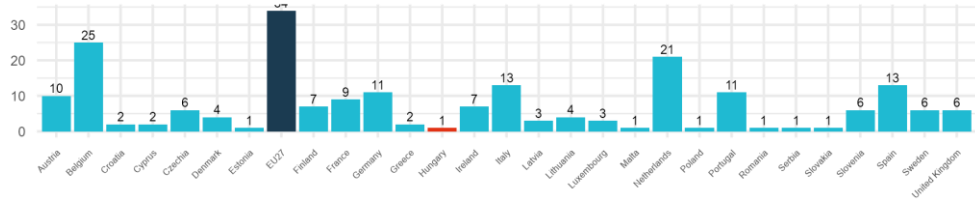
18) New doctorate graduates per 1,000 inhabitants aged 25-34



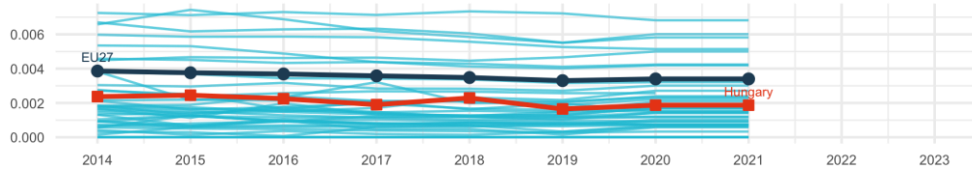
19) Share of public-private co-publications (%)



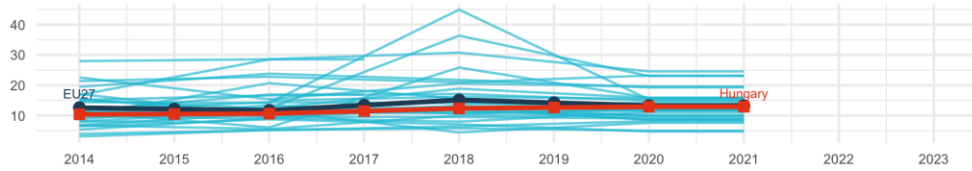
20) Best practice examples and methodologies for knowledge valorisation - 2023



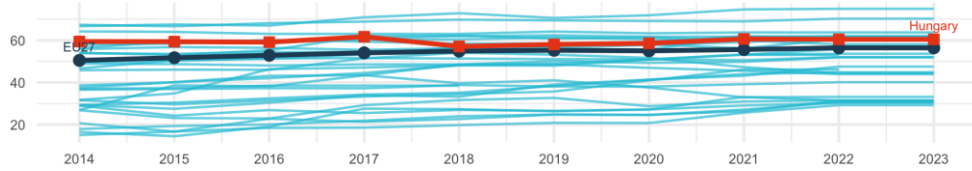
21) Number of PCT patent applications divided by GDP in million Euros/Dollars

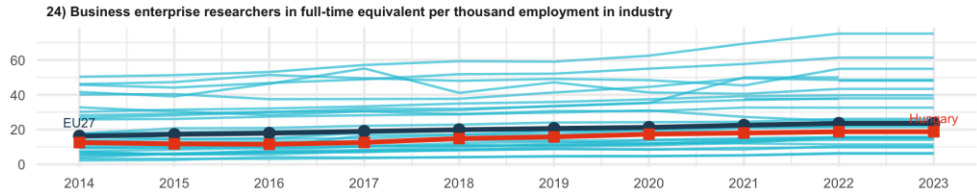


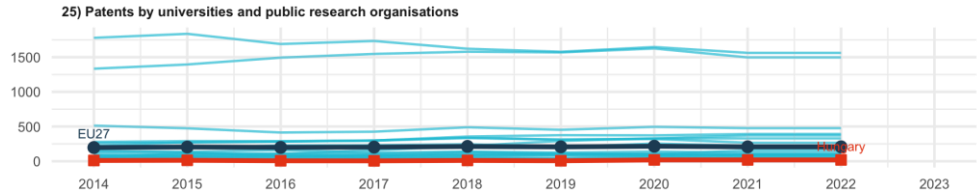
22) Share of innovating firms collaborating with HEI/PRO out of all innovative firms

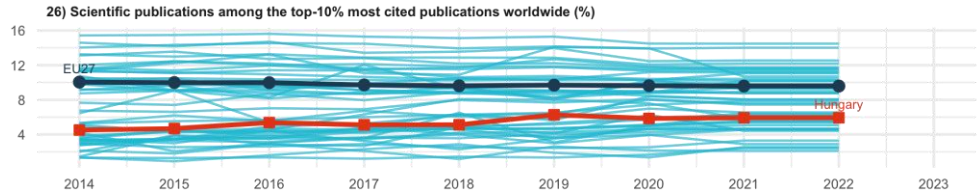


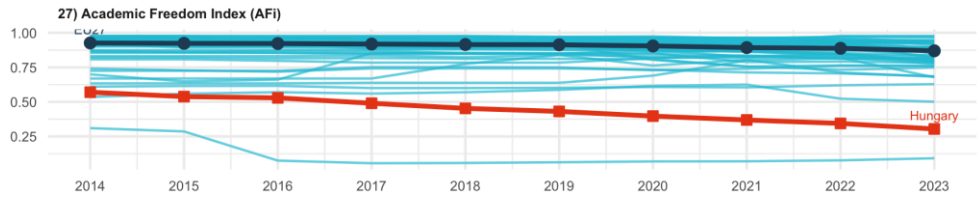
23) Business enterprise researchers as % of total researchers (%)

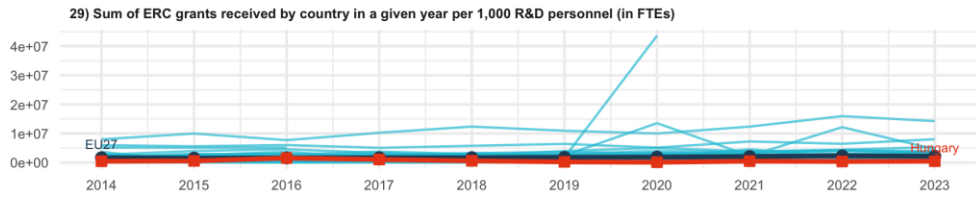


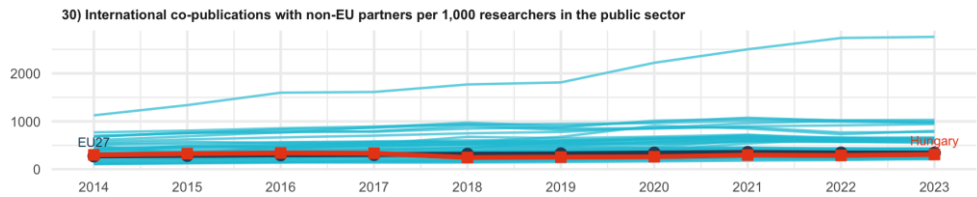

24) Business enterprise researchers in full-time equivalent per thousand employment in industry
60
40
20
0
EU27
Hungary
2014
2015
2016
2017
2018
2019
2020
2021
2022
2023

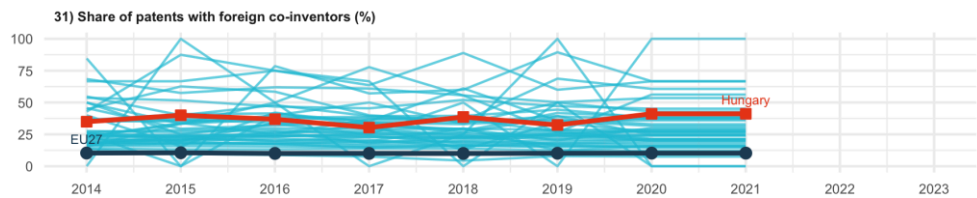

25) Patents by universities and public research organisations
1500
1000
500
0
EU27
Hungary
2014
2015
2016
2017
2018
2019
2020
2021
2022
2023

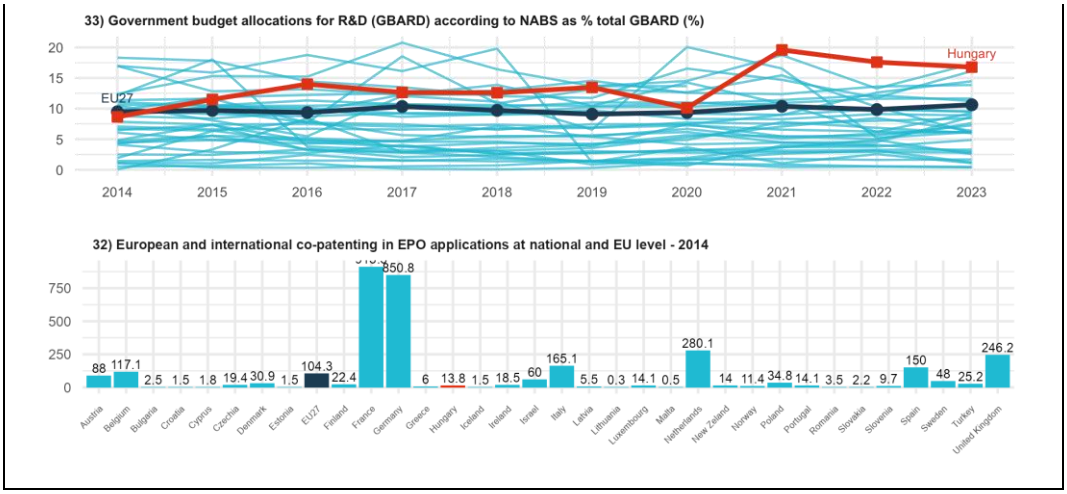

26) Scientific publications among the top-10% most cited publications worldwide (%)
16
12
8
4
EU27
Hungary
2014
2015
2016
2017
2018
2019
2020
2021
2022
2023


27) Academic Freedom Index (AFi)
1.00
0.75
0.50
0.25
Hungary
2014
2015
2016
2017
2018
2019
2020
2021
2022
2023


29) Sum of ERC grants received by country in a given year per 1,000 R&D personnel (in FTEs)
4e+07
3e+07
2e+07
1e+07
0e+00
EU27
Hungary
2014
2015
2016
2017
2018
2019
2020
2021
2022
2023


30) International co-publications with non-EU partners per 1,000 researchers in the public sector
2000
1000
0
EU27
Hungary
2014
2015
2016
2017
2018
2019
2020
2021
2022
2023

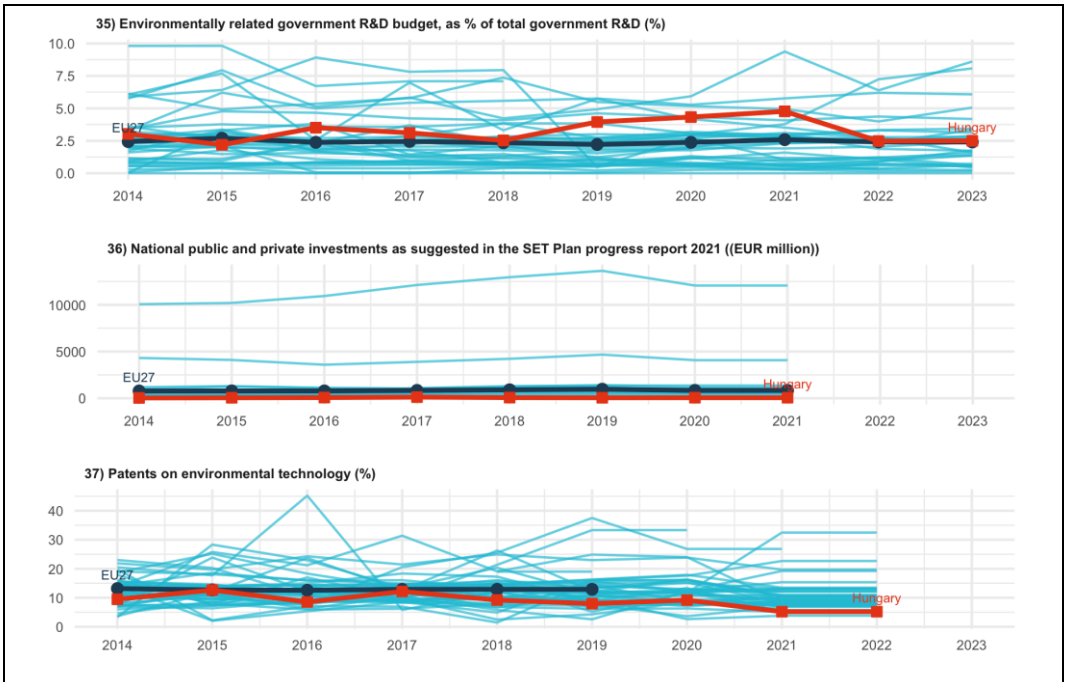

31) Share of patents with foreign co-inventors (%)
100
75
50
25
0
Hungary
EU27
2014
2015
2016
2017
2018
2019
2020
2021
2022
2023



Source: Annex 1

ERA Priority 2 is addressed through ERA Actions 10, 13 and 14. Concerning **ERA Action 10**, ERA Dashboard Indicator 34 reveals some room for improvement: government budget allocation to Europe-wide public R&D programs per FTE researcher was around one-sixth of EU average in 2023. ERA Dashboard Indicator 38 captures some aspects of **ERA Action 11** (empower higher education institutions). The share of innovative firms cooperating with higher education institutions or research institutions were in 2021 on par with EU average at 7.4 percent, although more recent data is not available. With regards to bringing science closer to citizens (**ERA Action 14**), ERA Dashboard Indicator 42 shows, that trust in science is considerably higher than the EU average.

Figure 3-2 Indicators for ERA Priority 2



Source: Annex 1

ERA Priority 3 is addressed through **Actions 16 and 17** (improve EU-wide access to excellence and enhance the strategic capacity of Europe's public research-performing organisations). The related indicators show a mixed picture as Hungary is registering lower than average values for example in the number of Horizon Europe participations (per 1,000 R&D

personnel)[13], the Summary Innovation Index and share of public R&D expenditure financed by the private sector. On the other hand, the country is leading in terms of the share of patents registered together with partners from other EU countries.

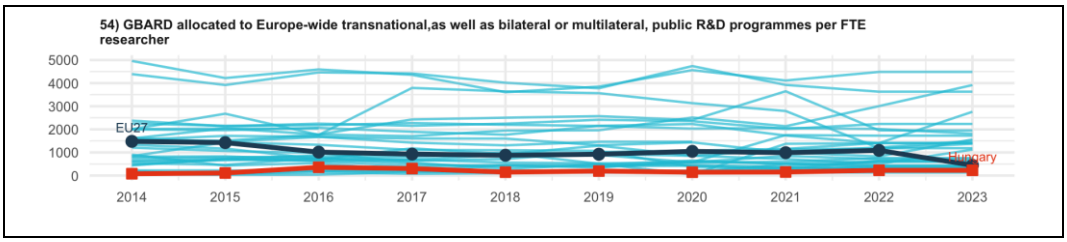
Figure 3-3 Indicators for ERA Priority 3

[13] This is partly due to the Council Implementing Decision 2022/2506 of 15 December 2022 limiting Hungary's participation in Horizon Europe. The decision affects 21 Hungarian universities managed by public interest asset management foundations, which are currently ineligible to receive funding from the Horizon Europe Programme and can only participate as associated members, funded from national sources.

Source: Annex 1

ERA Priority 4 is addressed through **Action 19**. ERA progress is monitored by the NRDI Office.

Figure 3-4 Indicators for ERA Priority 4



Source: Annex 1

4. Effects of ERA Action implementation on the national R&I system

This chapter presents a qualitative assessment of the ERA Action commitments of Hungary and their effects on identified national R&I systems, including the quantitative performance in the ERA Dashboard.

In the summer of 2023, the **John von Neumann Program (NJP)** was launched as Hungary's new research and innovation strategy. The NJP is structured around nine actions points, with strong focus on linking universities, research institutes, and the economy. Through the John von Neumann Program, the government has set an ambitious goal for Hungary to rise from its current 21st position in the European Union to the top 10 by 2030, and globally, from 34th to become one of the top 25 innovator countries. The NJP sets out **structural reforms** that underpin Hungary's future research and innovation capacity by addressing existing barriers and creating enabling conditions. The **NJP's nine strategic objectives** and group of interventions are highly related with ERA Priorities. The implementation of ERA actions contributes to the realisation of Hungary's ambitions in research, development and innovation. It is important to note that the full impact of NJP reforms is expected to bear fruit on a longer term.

ERA Actions 1, 3, 4, 9, 10, 16 and 17 help the NJP's group of intervention regarding the internationalisation of Hungarian research: positioning Hungarian research on the international stage to enhance global collaboration and recognition (**NJP Objective 1**). Dashboard indicators suggest that this area indeed warrants attention, for example the percentage of scientific publications that are among the most cited publications worldwide is well below EU average (ERA Dashboard Indicator 26).

ERA Action 4 advance actions addressing predictable career paths for researcher and ensuring stable and foreseeable career trajectories for Hungarian researchers to attract and retain talent (**NJP Objective 4**). Action is justified as in Chapter 3 reports that ERA Dashboard Indicator 18 shows a considerable gap in new doctorate graduate per 1 000 inhabitants. Yet, the number of researchers per million inhabitants (ERA Dashboard Indicator 3) is somewhat exceeding EU average and has been showing a continuous upward trend.

ERA Actions 2, 7 and 8 enable the NJP objective of market facilitation of innovative ideas that is assisting in bringing innovative concepts to market, thereby translating research into practical applications (**NJP Objective 2**). Dashboard statistics on patent application per GDP (ERA Dashboard Indicator 21) imply a sizable gap in 2021 as compared to EU average (more recent data is not available) although some fundaments for growth, such as the percentage of business enterprise researchers (ERA Dashboard Indicator 23) are in place. Easing patent applications can be associated with **ERA Action 2.** This maps to national actions related to patent procedures and provision of benefits to domestic inventors in patent processes (**NJP Objective 5**). Recent data evidence progress: in 2024, patent applications in Hungary rose by 35%.

ERA Actions 11 and 12, even though not committed to by Hungary, as well as **ERA Action 10** is aligned with Hungary's key investment areas - healthy living, green transition, digital transformation (**NJP Objective 3**).

ERA Actions 3, 7 promote innovation activities within scientific careers (**NJP Objective 6**). A related dashboard indicator concerns the number of patents by universities and public research organisations, which grew considerable in the past 3 years. ERA Action 7 further helps

efforts to enhance funding for businesses that utilise research outcomes in securing funding to promote commercialisation and growth (**NJP Objective 7**).

The implementation of **ERA Action 7 and 13** promote the cooperation between universities and the economy (**NJP Objective 8**) through collaborative spaces conducive to innovation. Dashboard Indicator 19, the share of public-private co-publication, which is slightly above the EU average indicate a good potential value added for further strengthening such cooperation. Finally, **ERA Actions 9 and 16** is related to **NJP Objective 9** by extending support for innovation activities throughout the Carpathian Basin to promote regional development and cooperation.

5. Conclusions

Hungary has undertaken significant reforms under its new research and innovation strategy, the John von Neumann Program (NJP), launched in 2023. These reforms align closely with ERA priorities and aim to elevate Hungary's innovation standing both within the EU and globally by 2030. To this effect, Chapter 2 gives an account of the large number of initiatives that have taken place in the past 1.5 years or earlier.

Key improvements include enhanced knowledge valorisation and technology transfer (ERA Action 7), where Hungary's performance exceeds the EU average in indicators like public-private co-publications and business enterprise researchers. Progress in open science (ERA Action 1) is evident, with 77 percent of publications available via open access in 2023. However, gaps persist in patent applications and research career attractiveness (ERA Action 4), with Hungary lagging in doctorate graduates per capita.

Considering ERA Priority 2 and 3, Hungary shows mixed results. For example, relevant indicators show below-average government R&D allocations per researcher but above-average trust in science. Indicators furthermore reveal lower-than-average Horizon Europe participation (see also footnote 13), but strong patent collaboration within the EU.

The NJP aligns with Hungary's strategic goals with ERA Actions, including fostering global research collaboration, supporting market-ready innovations, and enhancing regional development. While significant progress has been made, the full impact of these reforms is expected over the long term.

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Annex 1 – List of ERA Dashboard Indicators

The indicators used in the report are taken from the ERA Dashboard 2024. The full ERA Dashboard Report and the supporting Data Replication Package can be downloaded at https://european-research-area.ec.europa.eu/era-monitoring-reports. However, *GDP (in million €)*, *Size of the population (million)*, and *Share of female researchers, all sectors of performance (%)* were added to provide additional context and directly retrieved from the Eurostat website.

Additionally, EU and country averages are for 2023, except *Share of female researchers, all sectors of performance (%)* (2021).

Table 1 Structural Key Indicators:

Indicator number	Indicator	Source
/	GDP in euro per capita, current prices	Eurostat https://doi.org/10.2908/TEC00001
1	Gross Domestic Expenditure on R&D (GERD) as a share of GDP	Eurostat
2	Government Budget Allocations for R&D (GBARD) as share of GDP	Eurostat
4	Business Enterprise Expenditure on R&D (BERD) as a share of GDP	Eurostat
5.2	Expenditure on R&D procurement as a percentage of GDP	EC/European Innovation Procurement Observatory
/	Size of the population (million)	Eurostat, https://doi.org/10.2908/TPS00001
3	Researchers (in FTE) per million inhabitants	Eurostat
/	Share of female researchers, all sectors of performance (%)	Eurostat, https://doi.org/10.2908/TSC00005

Figure 3.1 Indicators for ERA Priority 1

Indicator number	Indicator	Source
6	Share of publications available in open access (green, gold, and diamond)	OpenAIRE
7	Number of open-access research datasets by country	OpenAIRE
8	Number of repositories by country	EOSC - Re3data
9	Country investments in EOSC and Open Science (in ranges of investment)	EOSC Observatory
10	Share of national public R&D expenditure committed to European research infrastructures	ESFRI
11	Number of European RIs in which a Member State or an Associated Country participates	ESFRI
12	Proportion of women of Grade A among academic staff/researchers	Women in Science - She Figures
13	(Corrected) Proportion of mixed-gender teams	EC_Scopus
14	(Corrected) Proportion of women in authorships of the top 10% most cited publications	EC_Scopus
15	Women in Digital index (0-100)	EC-Women in Digital Scoreboard

16	Proportion of women among doctoral graduates by narrow fields of STEM	Eurostat
17	Share of foreign doctorate students as a percentage of all doctorate students	Eurostat
18	New doctorate graduates per 1,000 inhabitants aged 25-34	Eurostat
19	Share of public-private co-publications	EC_Scopus
20	(Cumulative number of) Best practice examples and methodologies for knowledge valorisation	Knowledge Valorisation Platform
21	Number of PCT patent applications divided by GDP in million Euros/Dollars	OECD, Eurostat & World Bank
22	Share of innovating firms collaborating with HEI/PRO out of all innovative firms	Eurostat CIS (own calculations)
23	Business enterprise researchers as % of total researchers	OECD
24	Business enterprise researchers in full-time equivalent per thousand employment in industry	OECD
25	Patents by universities and public research organisations	EPO PATSTAT - Fraunhofer ISI calculations
26	% of scientific publications among the top-10% most cited publications worldwide	EC_Scopus
27	Academic Freedom Index (AFi)	V-Dem Varieties of Democracy
28	Average ranking score of top 10 universities by country and year	QS World University Ranking
29	Sum of ERC grants received by country in a given year per 1,000 R&D personnel (in FTEs)	EC-ERC
30	International co-publications with non-EU partners per 1,000 researchers in the public sector	EC_ScienceMetrix and Eurostat/OECD
31	Share of patents with foreign co-inventors	OECD
32	European and international co-patenting in EPO applications at national and EU level	Eurostat
33	Government budget allocations for R&D (GBARD) according to NABS as % total GBARD	Eurostat

Figure 3.2 Indicators for ERA Priority 2

Indicator number	Indicator	Source
34	Note: The ERA Dashboard Indicator 34 was removed from the Dashboard in January 2025. As a consequence, the indicator has also been omitted from the Country Report, while, however, keeping the original numbering of the indicators.	
35	Environmentally related government R&D budget, as % of total government R&D	Eurostat
36	National public and private investments as suggested in the SET Plan progress report 2021 (EUR million)	SETIS R&I data
37	% Patents on environmental technology	OECD
38	Share of innovative firms cooperating with higher education institutions or public/private research institutions	Eurostat CIS
39	Enterprises that purchased or licensed-in patents or other IPRs from public research organisations, universities or higher education institutions	Eurostat CIS

40	Direct government support and indirect government support through R&D tax incentives as a % GDP	OECD
41	Green bond issuance as a percentage of total bond issuance	Eurostat - EEA
42	Trust in Science	Eurobarometer 95.2
43	Increase in total R&D expenditure in widening countries, expressed as a percentage of GDP	Eurostat, OECD, UNESCO

Figure 3.3 Indicators for ERA Priority 3

Indicator number	Indicator	Source
44	Number of participations in Horizon Europe (of Widening countries) measured in terms of 1,000 R&D personnel (in FTEs)	Cordis - Eurostat
45	Sum of Horizon Europe grants (€) received by Widening countries in terms of 1,000 R&D personnel (in FTEs)	Cordis - Eurostat
46	Summary Innovation Index (Widening countries)	EC_EIS
47	Share of enterprises using public funds from different governance levels (local or regional, national, and EU) for R&I activities	Eurostat CIS
48	Number of Seal of Excellence projects on the InvestEU Portal per 1,000 R&D personnel (in FTEs)	EC - Invest EU
49	Number of collaboration networks of RPOs in Widening countries with other EU countries	Cordis - Horizon Dashboard
50	Average number of partners from non-widening countries per institution from a Widening country participating in the Horizon programme each year	Cordis - Eurostat
51	Share of patents registered by a Widening country together with partners from other EU countries	OECD
52	Share of innovative enterprises that cooperated with RPOs located in other countries	Eurostat CIS
53	Share of public R&D expenditures financed by the private sector	Eurostat

Figure 3.4 Indicators for ERA Priority 4

Indicator number	Indicator	Source
54	GBARD allocated to Europe-wide transnational, as well as bilateral or multilateral, public R&D programmes per FTE researcher	Eurostat

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ERA Monitoring 2024: ERA Country Report Hungary.

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