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ERA Country Report 2024 North Macedonia

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Report

Research and
Innovation

ERA Country Report 2024: North Macedonia

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ERA Country Report 2024

North Macedonia

This report was prepared by

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as part of the project 'Implementation of the ERA Monitoring Mechanism' for the European Commission, Directorate-General for Research and Innovation (RTD/2023/OP/0017)

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Key takeaways

- In 2024, North Macedonia made progress through the adoption of key strategic policies and secured investments in innovation ecosystem and renewable energy adoption.
- Strategic frameworks like the Smart Specialisation Strategy (S3) 2024-2027, the National Development Strategy (2024-2044), and the Human Capital Strategy (2024-2030) focus on fostering innovation, developing skills, and advancing sectoral priorities such as ICT, clean energy, and smart agriculture.
- Key initiatives, such as the National Open Science Cloud Initiative (NOSCI.mk) and the Open Science and Research Data Competence Centre (OSC@MK), aim to integrate national research infrastructures with the European Open Science Cloud (EOSC) and promote open science practices.
- Investments in green and digital transitions are highlighted through programs like the "Green Business Facility" which support industrial innovation and renewable energy adoption.
- Despite progress, challenges remain, including still low R&D funding and limited private sector involvement.

1. National context

North Macedonia is a country fully associated to Horizon Europe. Its researcher base is concentrated in the public sector, in particular in universities. North Macedonia is categorised as an *Emerging Innovator* in the latest 2024 European Innovation Scoreboard.¹ North Macedonia's R&I policy context is characterised by ongoing efforts to align with European Research Area (ERA) priorities while addressing national challenges in governance, funding, and innovation. North Macedonia has developed a Smart Specialisation Strategy (S3)², highlighting sectoral priorities such as smart agriculture, ICT, and energy for the future and aiming to foster green and digital transformation, bridge the gap between academia and industry, and improve the country's innovation ecosystem. The adoption of the National Development Strategy (2024-2044) reflects a long-term vision for sustainable growth, with emphasis on R&I as a driver for economic and social development.³

Table 1 Structural Key Indicators

Indicator	EU27	North Macedonia		
	2023	2023	Average 2018-2020	Average 2021-2023
GDP in euro per capita, current prices	35 790.00	7 230.00	5 660.00	6 506.67
Gross Domestic Expenditure on R&D (GERD) as a share of GDP	2.27	0.38	0.37	0.38
Size of the population (million)	448.80	1.83	2.08	1.91
Researchers (in FTE) per million inhabitants	4 681.34	733.81	793.62	743.07

Source: See Annex 1

The governance structure of North Macedonia's R&I system is centralised, with the Ministry of Education and Science and the Ministry of Economy overseeing policy implementation. Efforts are underway to improve strategic coordination and address long-standing weaknesses, such as limited business R&D expenditure. Finally, the Fund for Innovation and Technological Development (FITD) plays a central role in implementing R&I initiatives, supporting over 1,000 projects with a combined investment exceeding EUR 123 million over the past 13 years since its establishment in 2011⁴. This initiative is not new, but it has been continuously evolving to strengthen North Macedonia's innovation ecosystem.

2. Status of the Implementation of the ERA Policy Agenda

Chapter 2 briefly summarises **new developments in North Macedonia since the publication of the ERA Country Report 2023**. North Macedonia has not identified specific commitments to actions from the ERA Policy Agenda 2022-2024. Despite this, this chapter briefly

¹ See <https://projects.research-and-innovation.ec.europa.eu/en/statistics/performance-indicators/european-innovation-scoreboard/eis-2024#/eis/countries/MK>

² Smart Specialization Strategy (2024-2027). Eurydice - European Commission. Retrieved from <https://eur-yl-dice.eacea.ec.europa.eu/national-education-systems/republic-north-macedonia/national-reforms-related-transversal-skills-and>

³ National Development Strategy (2024-2044). National Development Strategy Portal. Retrieved from <https://www.nrs.mk/content/downloads/documents/thematic/NDS%20Easy%20read.pdf>

⁴ ERA Country Report 2023: North Macedonia. European Commission – DG Research & Innovation. Retrieved from [https://westernbalkans-infohub.eu/wp-content/uploads/2024/05/ERA-Country-Report-2023-North-Macedonia_FINAL.pdf#:~:text=FITD%20is%20a%20leading%20governmental,and%202023%2C%20the%20financial%20support;Bloomberg%20Adria%20North%20Macedonia%20\(news%20article\).Mirjana%20Joveska,Apr.%2014%202025.](https://westernbalkans-infohub.eu/wp-content/uploads/2024/05/ERA-Country-Report-2023-North-Macedonia_FINAL.pdf#:~:text=FITD%20is%20a%20leading%20governmental,and%202023%2C%20the%20financial%20support;Bloomberg%20Adria%20North%20Macedonia%20(news%20article).Mirjana%20Joveska,Apr.%2014%202025.)

presents developments in North Macedonia towards the overarching ERA Priorities, which cover most ERA Actions. The findings are based on qualitative desk research and interviews.

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

In relation to **ERA Priority 1 Deepening a truly functioning internal market for knowledge**, North Macedonia implemented several initiatives with relevance to specific ERA Actions. Closely linked to **ERA Action 1**, North Macedonia has demonstrated commitment to open access principles, with over 59 percent of its published academic research freely available online.⁵ Since 2021, the National Open Science Cloud Initiative (NOSCI.mk) promotes Open Science at the national level.⁶ Initiated in 2024 under the Ss. Cyril and Methodius University in Skopje, Open Science and Research Data Competence Centre (OSC@MK) focuses on implementing OS practices, and research data management.⁷ The Faculty of Computer Science and Engineering (FCSE) at the Ss. Cyril and Methodius University became a full member of the EOSC Association.⁸ Current efforts include establishing monitoring mechanisms to collect data, benchmark investments, and assess infrastructure capacities related to EOSC.⁹

Activities also concerned **ERA Action 2**. Here, North Macedonia's primary legislation is the Law on Copyright and Related Rights, initially enacted in 2006 and subsequently amended to address emerging challenges in the digital era. In 2024, the government initiated further amendments to enhance the legal framework for digital copyright. These reforms are part of a broader effort to harmonise national legislation with EU directives, thereby facilitating the free flow of research knowledge and data across borders.¹⁰ Despite these advancements, challenges remain in fully aligning North Macedonia's copyright and data legislation with EU standards. The European Commission's 2024 Rule of Law Report highlights ongoing efforts to update laws related to digitalisation and data management, which are crucial for supporting research activities. The report emphasises the need for continued reforms to ensure that data services and infrastructures are managed effectively for the benefit of research stakeholders.¹¹ Furthermore, the National Development Strategy for the period 2024-2044 outlines a long-term vision for the country's development, including the enhancement of legal and regulatory frameworks to support research and innovation.¹² The implementation of this strategy is expected to further align national policies with EU standards, facilitating better access to and reuse of research data.

In relation to **ERA Action 3**, the Ministry of Education and Science has conducted assessments to identify obstacles hindering the modernisation of research evaluation. Findings show that existing evaluation methods often emphasise quantitative over qualitative

⁵ Open COKI. "Country Data for North Macedonia." <https://open.coki.ac/country/MKD>

⁶ National Open Science Cloud Initiative (NOSCI.mk), https://www.nosci.mk/?page_id=349

⁷ Open Science and Research Data Competence Centre (OSC@MK): <https://www.skills4eosc.eu/network/competence-centres/open-science-and-research-data-competence-centre-osc-mk>

⁸ See <https://eosc.eu/tripartite-collaboration/republic-of-north-macedonia>

⁹ The high percentage of open access publishing in North Macedonia and other Western Balkan countries has historical and financial causes. After the breakup of Yugoslavia in the 1990s, many universities and researchers turned to open-access repositories, university-run journals, and platforms.

¹⁰ Generis Online. "Understanding Digital Copyright Standards in North Macedonia: Protections, Licensing, and Enforcement." <https://generisonline.com/understanding-digital-copyright-standards-in-north-macedonia-protections-licensing-and-enforcement>

¹¹ European Commission. "Rule of Law Report 2024: North Macedonia." https://commission.europa.eu/document/download/e7197a43-7f00-4eac-b02d-818ac71345f0_en

¹² National Development Strategy (NDS) for North Macedonia 2024–2044. "Thematic Document." <https://www.nrs.mk/content/downloads/documents/thematic/NDS%20Easy%20read.pdf>

measures. Additionally, bureaucratic procedures have been found to impede the adoption of innovative assessment practices. The national FITD is expected to support the implementation of the North Macedonia's ERA policies, including reforms of research evaluation.¹³

To support research careers (**ERA Action 4**), the government adopted the Human Capital Strategy (2024-2030) which aims to create a conducive environment for researchers by improving educational infrastructure and aligning national policies with European standards.¹⁴ The National Development Strategy (2024-2044), adopted in February 2024, outlines a comprehensive roadmap for the country's progress and includes plans to establish a National Development Council as a permanent advisory body, which will play a crucial role in coordinating efforts to support research careers and infrastructure.¹⁵ Additionally, the Smart Specialisation Strategy (2024-2027), adopted in December 2023, focuses on enhancing the quality assurance of education and training, supporting the implementation of the National Qualifications Framework, and improving operational capacities. This strategy aims to strengthen the skills and competencies of researchers, aligning them with the needs of the labour market and fostering intersectoral mobility.¹⁶

Further initiatives relate to **ERA Action 5**, such as North Macedonia's National Action Plan for Gender Equality (2022-2024), which obliges research organisations to implement Gender Equality Plans (GEPs).¹⁷ In October 2024, the State Statistical Office (SSO) of North Macedonia and UN Women signed a Memorandum of Understanding to enhance the collection and analysis of gender-specific, contributing to the development of informed policies that ensure gender-equal and inclusive working environments.¹⁸

Concerning the state of academic freedom (**ERA Action 6**), the Freedom in the World 2024 notes that while academic freedom is respected in North Macedonia, corruption within universities remains a significant issue.¹⁹ The government of North Macedonia has acknowledged the issue and has initiated measures to address it. One notable initiative is the "Corruption Free Universities" project, which aims to strengthen the capacities of universities and student organizations to prevent corruption. This project focuses on promoting integrity and transparency within higher education institutions.²⁰ Additionally, in July 2024, the Assembly of the Republic of North Macedonia re-established the Inter-party Parliamentary Group Against Corruption, also known as the Anti-Corruption Caucus. This group comprises 55

¹³ Fund for Innovation and Technological Development (FITD) and Ministry of Education and Science (MES). "Planned ERA Actions and Budget Allocations for 2024." <https://european-research-area.ec.europa.eu/country-report-north-macedonia>

¹⁴ Human Capital Strategy (2024-2030): International Labour Organization NATLEX. https://natlex.ilo.org/dyn/natlex2/r/natlex/fe/details?p3_isn=117008

¹⁵ National Development Strategy (2024-2044). National Development Strategy Portal. <https://www.nrs.mk/content/downloads/documents/thematic/NDS%20Easy%20read.pdf>

¹⁶ Smart Specialisation Strategy (2024-2027). Eurydice - European Commission. <https://eurydice.eacea.ec.europa.eu/national-education-systems/republic-north-macedonia/national-reforms-related-transversal-skills-and>

¹⁷ National Action Plan for Gender Equality (2022-2024). International Labour Organization NATLEX. https://natlex.ilo.org/dyn/natlex2/r/natlex/fe/details?p3_isn=116975

¹⁸ State Statistical Office and UN Women Memorandum of Understanding: UN Women Europe and Central Asia. <https://eca.unwomen.org/en/stories/press-release/2024/10/state-statistical-office-and-un-women-sign-memorandum-of-understanding-to-strengthen-gender-statistics-in-north-macedonia>

¹⁹ Freedom in the World 2024 Report - North Macedonia. Freedom House. <https://freedomhouse.org/country/north-macedonia/freedom-world/2024>

²⁰ UNESCO International Institute for Educational Planning (IIEP). Brain Drain in North Macedonia: Is Corruption in Higher Education to Blame? Retrieved from <https://etico.iiep.unesco.org/en/brain-drain-north-macedonia-corruption-higher-education-blame>

members of parliament and is dedicated to combating corruption across various sectors, including education.²¹

ERA Action 7 on knowledge valorisation relates to the National Development Strategy (2024-2044), adopted in February 2024 and the Smart Specialisation Strategy (2024-2027). The Co-funded Grants for Technological Development and Accelerated Economic Growth is a financial instrument implemented by FITD with a combined investment exceeding EUR 123 million over the past 13 years since its establishment in 2011. It provides direct grants to businesses – ranging from micro-enterprises to large firms – aiming to foster technological development and spur economic growth. With grant amounts ranging between EUR 100,000 and EUR 500,000 and durations of 13-24 months, the programme emphasises the adoption of green and digital technologies to increase competitiveness and resilience in international markets, particularly against economic, pandemic, and climate crises. In June 2023, the European Institute of Innovation and Technology (EIT) also launched its first Innovation Hub in North Macedonia at the Centre for Technology Transfer and Innovation in Skopje (CTTIS). This hub aims to strengthen the innovation ecosystem by facilitating collaboration between academia, industry, and government.²²

North Macedonia's commitment to integrating with European research infrastructures (**ERA Action 8**) is visible through its association with the European Strategy Forum on Research Infrastructures (ESFRI). The country has developed an ESFRI Roadmap which seeks to enhance North Macedonia's participation in European research projects and collaborations. It focuses on expanding and upgrading the country's research facilities to meet international standards, fostering innovation, and supporting high-quality scientific research. The roadmap identifies key areas for investment to ensure sustainable development of research infrastructures. In the Action Plan of the National Development Strategy 2024-2044, specific measures and investments to strengthen the research infrastructure landscape will be identified.²³ Currently, North Macedonia participates in the METROFOOD-RI project, which is an infrastructure for promoting metrology in food and nutrition.²⁴

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

Various initiatives within North Macedonia also promote the objectives of **ERA Priority 2**. This concerns notably the adoption of the Smart Specialisation Strategy for 2024-2027 and the establishment of the European Institute of Innovation and Technology Regional Innovation Scheme (EIT RIS) in North Macedonia (**ERA Action 10**). These initiatives are expected to increase efficiency in state resources for science and research and to promote participation in EU projects. Since 2004, North Macedonia actively participated in nine EU research and innovation partnerships. The country has been involved in four joint calls²⁵, resulting in two funded projects. Additionally, nine organisations from North Macedonia are recorded as

²¹ National Democratic Institute (NDI). North Macedonia: Newly Established Parliamentary Group Committed to Curbing Corruption. Retrieved from <https://www.ndi.org/our-stories/north-macedonia-newly-established-parliamentary-group-committed-curbing-corruption>

²² "2024 Enlargement Package: Key Findings on North Macedonia Related to the Knowledge Economy." Western Balkans Info Hub. <https://westernbalkans-infohub.eu/documents/2024-enlargement-package-key-findings-on-north-macedonia-related-to-the-knowledge-economy>

²³ Research Infrastructure Roadmap of North Macedonia: Regional Cooperation Council (RCC). <https://www.rcc.int/download/docs/RI%20Roadmap%20NMKD%20digital.pdf>

²⁴ <https://www.metrofood.eu/about-us/national-nodes.html>

²⁵ GeoERA Cofund Call, ERA-NET Cofund, EMPIR Call 2017, and SEE-ERA.NET PLUS Joint Call for European Research Projects.

participants in the partnership database, highlighting its engagement in collaborative research efforts within the EU framework. Currently, a North Macedonian institution is part of the European Partnership for Safe and Sustainable Food Systems (FutureFoodS).²⁶

North Macedonia has introduced a Just Transition Investment Platform to facilitate the complete replacement of coal-based power plants with renewable energy sources by 2030 (**ERA Action 11**), backed by the Climate Investment Funds. Additionally, the country has joined the LIFE programme for environment and climate action. Furthermore, the Instrument for Pre-Accession Assistance (IPA) project, "Green Business Facility", set to launch in 2024, aims to promote green business initiatives. North Macedonia is also advancing sustainable waste management efforts through public-private partnerships.²⁷

Trough public participation processes, North Macedonia identified priority domains such as Smart Agriculture, Information and Communication Technologies (ICT), Electro-Mechanical Industry, and Sustainable Materials, as key areas for its industries (**ERA Action 12**), aiming to create high value-added products and services.²⁸ In November 2023, North Macedonia adopted its Digital Transformation Roadmap 2024-2030 highlighting digitalisation as a key driver for societal development. The roadmap outlines plans to implement policies that provide incentives, subsidies, and support for adopting modern technologies. In November 2023, the government adopted the Roadmap for Digital Transformation (2024-2030). This roadmap emphasises the integration of digital technologies across sectors, such as education, to enhance digital literacy and support the digital transition of HEIs (**ERA Action 13**).²⁹ One of the central actions related to research, innovation, and education is the promotion of research and development in digital transformation and artificial intelligence (AI), supported by incentives, subsidies, and tax exemptions, with a budget allocation of 2 percent of GDP by 2025.

While citizen science (**ERA Action 14**) is still in its nascent stages in North Macedonia, it shows promise, particularly in the domains of environmental monitoring, conservation, and sustainability. Local organisations, academic institutions, and environmental NGOs collaborate to nurture citizen science in North Macedonia. A recent research report identified several projects in citizen science implemented in the country.³⁰

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

Concerning **ERA Priority 3**, as a fully associated member since January 2021, North Macedonia has been actively participating in Horizon Europe (**ERA Action 16**). In 2023, 17 projects received EUR 3.4 million in funding, representing a 30 percent decrease compared to 2022. In addition, the FITD has been instrumental in supporting over 800 innovative projects, with a total value exceeding EUR 100 million. Approximately 40 percent of this funding has been co-invested by beneficiary companies, fostering a collaborative approach to

²⁶ ERA-LEARN. "North Macedonia – Country Profile." <https://www.era-learn.eu/network-information/countries/mk>.

²⁷ Djatkov, D., et al. (2024). Policy Brief: Green Transformation in the Western Balkans. Horizon Europe project "R&I POLICY making, implementation and support in the Western Balkans," Grant Agreement N°101058873. Retrieved from <https://www.westernbalkans-infohub.eu>.

²⁸ Green Transition Framework - North Macedonia. <https://eprints.ugd.edu.mk/33797/1/Green%20transition%20framework%20-%20North%20Macedonia%20FINAL.pdf>

²⁹ Roadmap for Digital Transformation 2024-2030. Government of North Macedonia. https://vlada.mk/sites/default/files/dokumenti/roadmap_2024_-_2030_final_en.pdf

³⁰ Citizen Science in North Macedonia. GEA. <https://report.geaeducation.eu/citizen-science-in-north-macedonia/>

innovation.³¹ North Macedonia has also been working to enhance the capacity of its research performing organisations (**ERA Action 17**). With 21 higher education institutions, including seven public universities, the country is focusing on developing training and consulting services that align with the priority areas identified under the Smart Specialisation Strategy, aiming to improve the strategic capacity of research institutions by equipping them with the necessary skills to manage and transfer technology effectively.³²

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

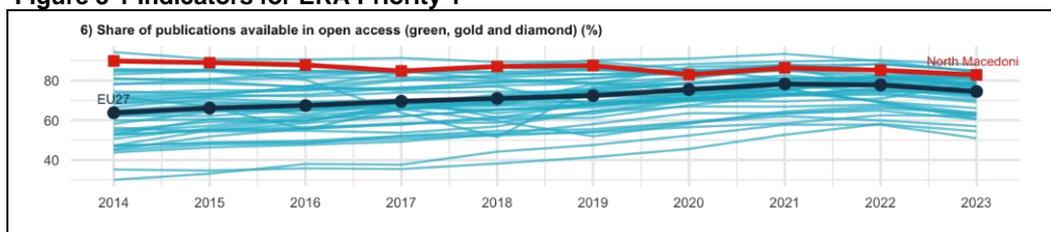
In relation to **ERA Priority 4**, the government has been conducting regular monitoring of policy implementation based on input indicators, while it has been noted that there is a lack of evaluation regarding the impact and effectiveness of these policies (**ERA Action 19**). To address this, the government is encouraged to establish procedures for systematic ex-post evaluation of laws and policies to ensure their effectiveness and alignment with the intended goals.³³

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 North Macedonia's performance in achieving the ERA objectives as defined in the Pact for R&I during the period 2022-2024.

In terms of **ERA Priority 1** and the actions it entails, North Macedonia scores above the EU average in terms of open access of publications, while it scores below the EU average for number of open-access research datasets. North Macedonia's share of female researchers remains high with 54 percent. Although the percentage of women as graduates in STEM is high, engagement of women in science in North Macedonia is lower than of men. National data indicate lower female participation in mixed teams and authorship in top journals when compared to other EU countries. Academic freedom is decreasing due to corruption and higher incidence of reporting in this area.

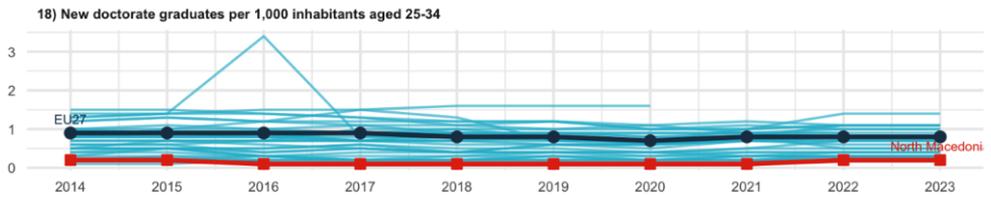
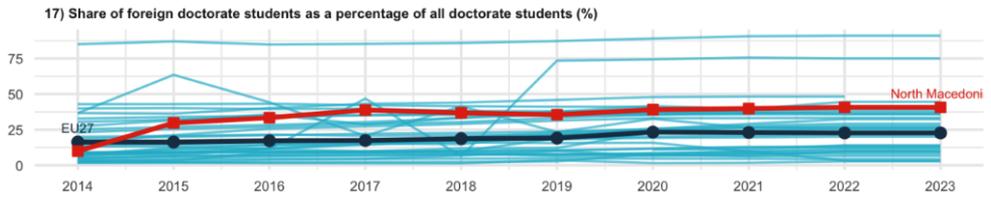
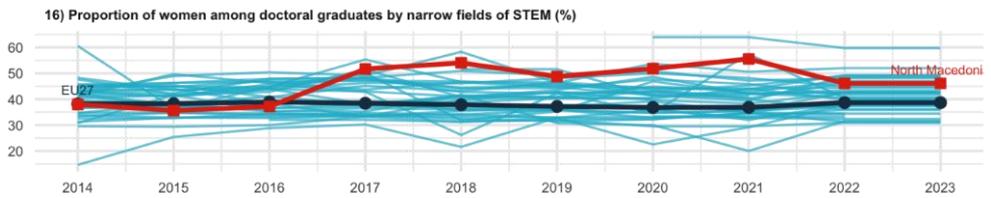
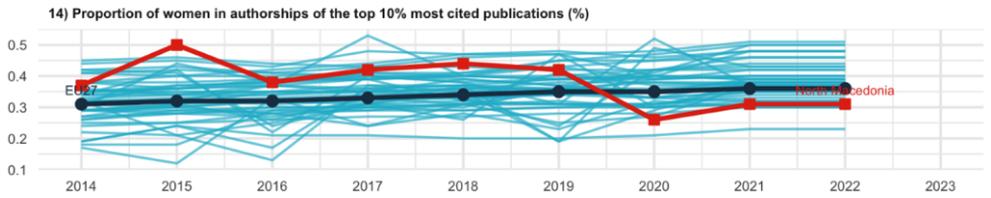
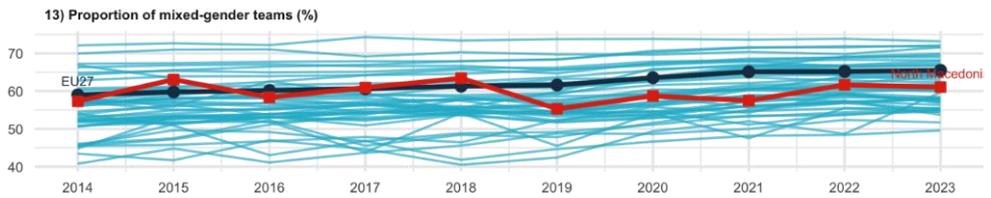
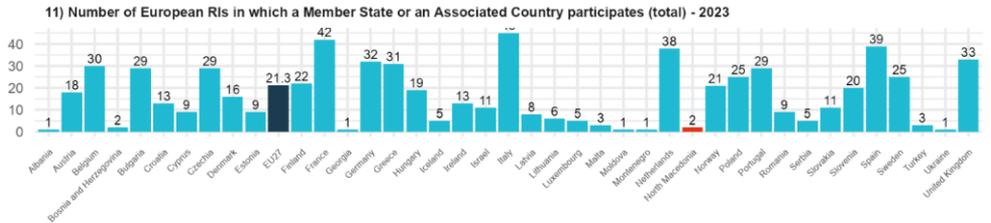
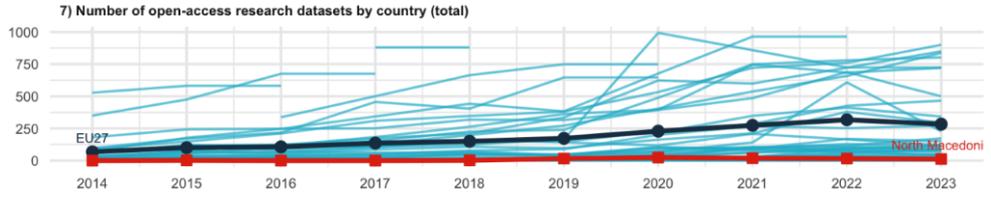
Figure 3-1 Indicators for ERA Priority 1



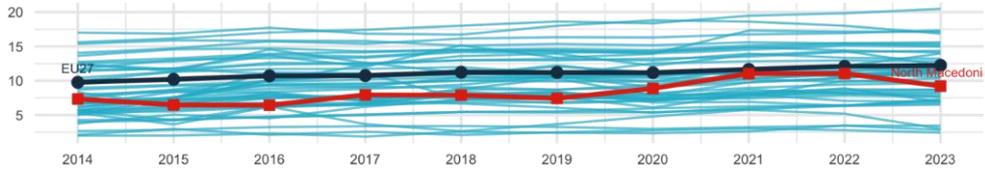
³¹ "Supporting the Start-Up Scene in North Macedonia Brings Foreign Investment and Creates Jobs." World Bank. <https://www.worldbank.org/en/news/feature/2023/01/25/supporting-the-start-up-scene-in-north-macedonia-brings-foreign-investment-and-creates-jobs>

³² European Training Foundation (ETF). "Skills for Technology Transfer in North Macedonia." ETF. https://www.etf.europa.eu/sites/default/files/2024-11/North%20Macedonia_finalized_in%20temp-late%20%281%29_0.pdf.

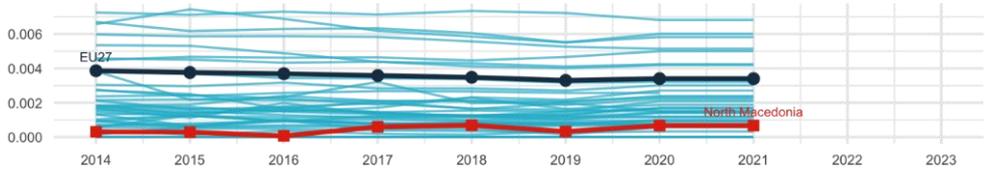
³³ European Commission. North Macedonia 2024 Report. Retrieved from https://neighbourhood-enlargement.ec.europa.eu/document/download/5f0c9185-ce46-46fc-bf44-82318ab47e88_en



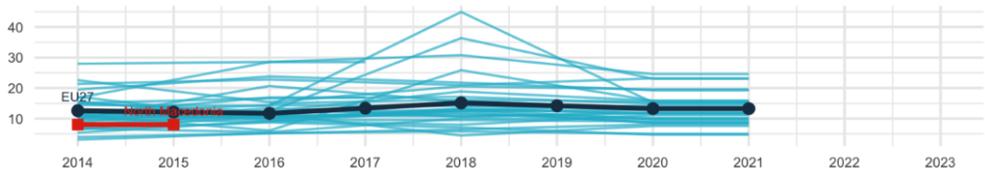
19) Share of public-private co-publications (%)



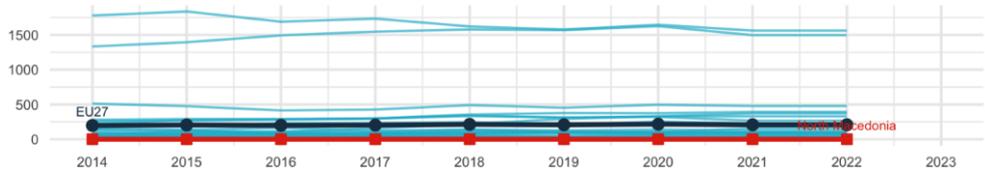
21) Number of PCT patent applications divided by GDP in million Euros/Dollars



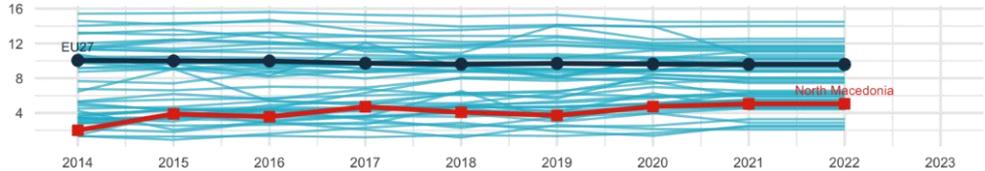
22) Share of innovating firms collaborating with HEI/PRO out of all innovative firms



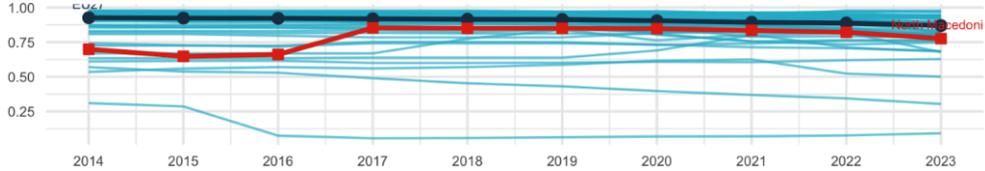
25) Patents by universities and public research organisations



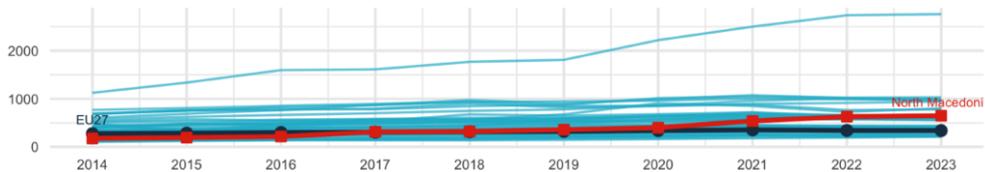
26) Scientific publications among the top-10% most cited publications worldwide (%)

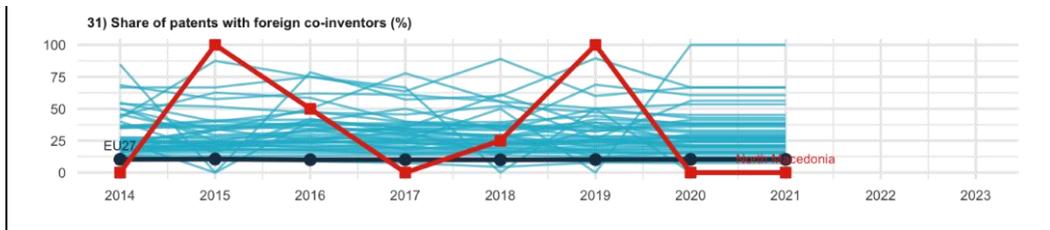


27) Academic Freedom Index (AFi)



30) International co-publications with non-EU partners per 1,000 researchers in the public sector

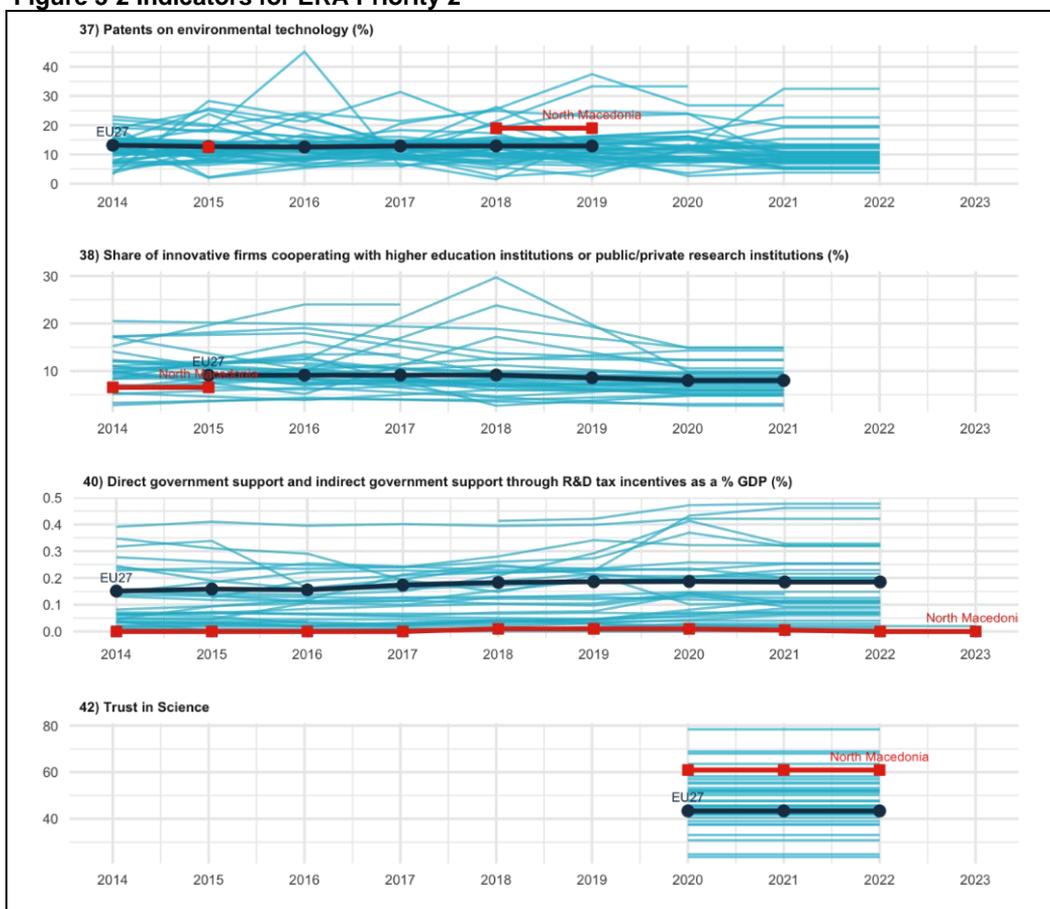


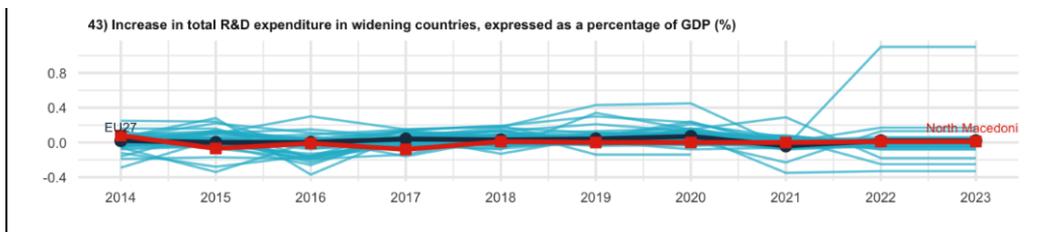


Source: see Annex 1

ERA Priority 2 is addressed through various activities and measures as outlined in Chapter 2. It is difficult to provide a detailed assessment for North Macedonia since data for many indicators are missing. Nevertheless, North Macedonia has significantly lower governmental investments in R&D when compared to other EU countries. Patents in area of environmental technology are above the EU average, while the increase in R&D expenditure as part of total GDP is high in North Macedonia as in other EU countries (ERA Dashboard Indicator 43). The trust in science in North Macedonia is above the EU average (ERA Dashboard Indicator 42).

Figure 3-2 Indicators for ERA Priority 2

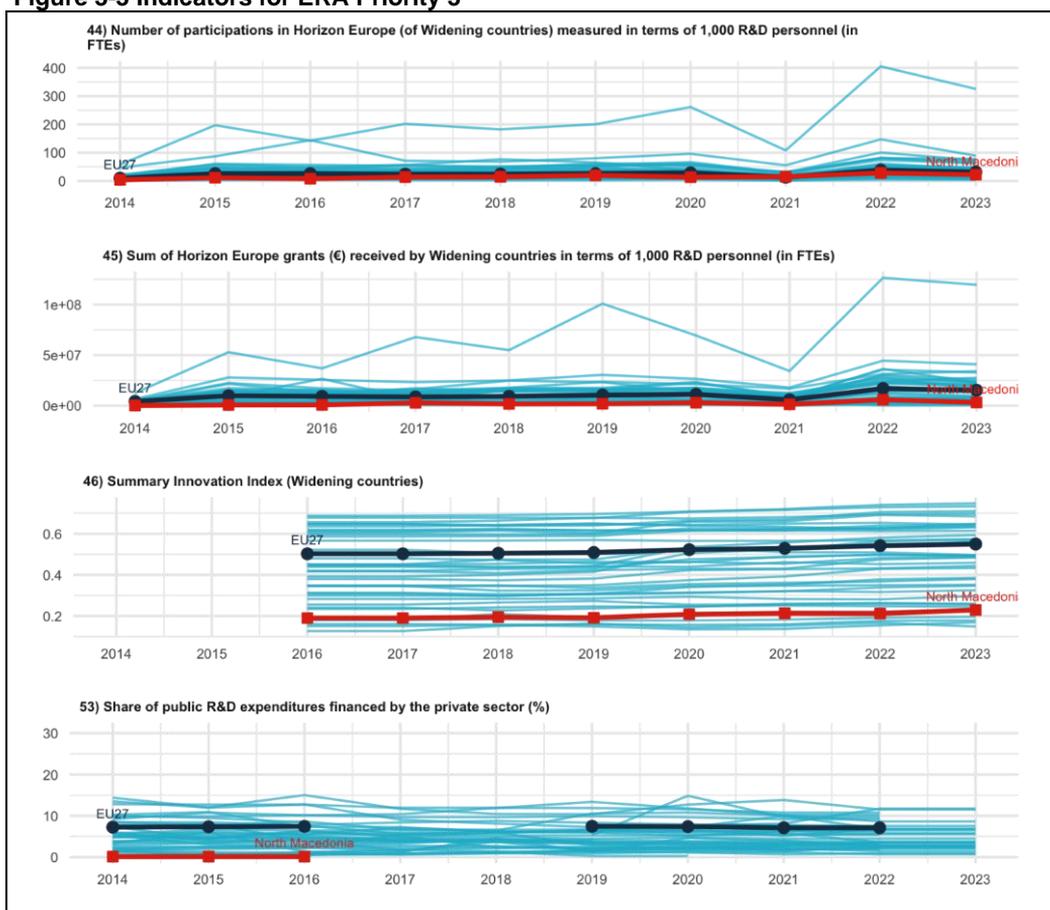




Source: see Annex 1

ERA Priority 3 revolves around a commitment to enhancing the strategic capacity of Europe’s public research-performing organisations. The relevant ERA Dashboard Indicators illustrate that North Macedonia is performing in many instances below the EU average, particularly for the Summary Innovation Index, although its performance is improving (ERA Dashboard Indicator 46).

Figure 3-3 Indicators for ERA Priority 3



Source: see Annex 1

Achieving **ERA Priority 4** is supported by ERA Action 19 on implementing an efficient and effective ERA monitoring mechanism. As of 2024, North Macedonia has not formally committed to specific ERA actions and data for the related ERA Dashboard Indicator is not available.

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

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

Barriers such as low R&I funding (0.38 percent of GDP in 2022) and limited private sector involvement (0.1 percent of GDP) continue to hinder full integration into ERA objectives. Despite these barriers, some progress has been noted in North Macedonia, particularly related to policy development.

The adoption of the Smart Specialisation Strategy 2024-2027³⁴ and its accompanying action plan for 2024-2025 reflects North Macedonia's focus on prioritising sector-specific R&I investments. While the implementation of S3 has been slow due to limited budget allocations, it serves as a critical framework for fostering innovation and aligning national R&I priorities with ERA objectives. Initiatives like the "Green Business Facility" project³⁵, supported by the Instrument for Pre-Accession Assistance (IPA), aim to boost green business initiatives and demonstrate the country's alignment with green and digital transition goals.

North Macedonia has also initiated projects like the Just Transition Investment Platform³⁶, which aims to phase out coal-based power plants by 2030 and replace them with renewable energy sources. Additionally, the Fund for Innovation and Technology Development (FITD)³⁷ continues to provide co-funded grants to support technological development and foster public-private partnerships. These efforts highlight the implementation of targeted investments aligned with ERA actions.

Progress in ERA actions is evident through increased participation in Horizon Europe projects and the alignment of national policies with the ERA agenda. North Macedonia's involvement in Horizon Europe resulted in 17 funded projects as of 2023, although there has been a slight decline compared to the previous year. The adoption of policies to support open science, green transition, and digital transformation, including the LIFE Programme³⁸ for environment and climate action, demonstrates improvements in the enabling conditions for research and innovation.

North Macedonia has also addressed several enabling conditions outlined in the Pact for R&I in Europe. The focus on developing skills for technology transfer and improving the capacity of research institutions demonstrates the country's efforts to build a robust R&I ecosystem.

³⁴ Smart Specialization Strategy (2024-2027). Eurydice - European Commission. Retrieved from <https://eurydice.eacea.ec.europa.eu/national-education-systems/republic-north-macedonia/national-reforms-related-transversal-skills-and>

³⁵ Djatkov, D., et al. (2024). Policy Brief: Green Transformation in the Western Balkans. Horizon Europe project "R&I POLICY making, implementation and support in the Western Balkans," Grant Agreement N°101058873. Retrieved from <https://www.westernbalkans-infohub.eu>.

³⁶ Ibid.

³⁷ Fund for Innovation and Technological Development (FITD) and Ministry of Education and Science (MES). Planned ERA Actions and Budget Allocations for 2024. Retrieved from <https://european-research-area.ec.europa.eu/country-report-north-macedonia>

³⁸ Djatkov, D., et al. (2024). Policy Brief: Green Transformation in the Western Balkans. Horizon Europe project "R&I POLICY making, implementation and support in the Western Balkans," Grant Agreement N°101058873. Retrieved from <https://www.westernbalkans-infohub.eu>.

The establishment of training programs and consulting services aligned with the Smart Specialisation Strategy has enhanced the strategic capacity of research institutions.

5. Conclusions

North Macedonia has not made specific commitments to ERA Policy Agenda actions for 2022-2024. However, as Chapter 2 illustrates, national policies and investments often reflect overarching ERA priorities. Notable initiatives include the establishment of the National Open Science Cloud Initiative (NOSCI.mk) and the Open Science and Research Data Competence Centre (OSC@MK). Legislative amendments, such as updates to the Law on Copyright and Related Rights, further emphasise the country's efforts to harmonise with ERA priorities. Likewise, the S3 and the National Development Strategy outline key priorities for fostering research careers, promoting gender equality, and strengthening institutional capacities. The Human Capital Strategy (2024-2030) focuses on improving education infrastructure and aligning policies with European standards, emphasising skills development and mobility for researchers. Additionally, the Just Transition Investment Platform and the Green Business Facility showcase North Macedonia's commitment to the green transition and sustainable economic growth, addressing critical ERA priorities related to climate and energy policies.

Despite these advancements, North Macedonia faces persistent barriers, such as low R&D funding and limited private sector involvement, as highlighted in Chapter 3. The country has made progress in participation in Horizon Europe, with 17 funded projects as of 2023, though further integration into the ERA requires enhanced public-private partnerships and increased investments in R&I. The development of skills for technology transfer and improvements in institutional capacities reflect the country's effort to address enabling conditions, while the implementation of policies supporting open science, digital transformation, and green initiatives highlights its alignment with ERA objectives.

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Annex 1 – Full 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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