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ERA Country Report 2024
Estonia

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Report

Research and Innovation

ERA Country Report 2024: Estonia

European Commission
Directorate-General for Research and Innovation
Directorate A — ERA & Innovation
Unit A2 — ERA, Spreading Excellence and Research Careers
Contact Magda De Carli, Head of Unit A.2
Heiko Prange-Gstoehl
Email RTD-ERA-FORUM@ec.europa.eu
RTD-PUBLICATIONS@ec.europa.eu
European Commission
B-1049 Brussels

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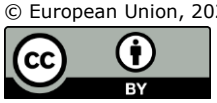

EUROPEAN COMMISSION

ERA Country Report 2024

Estonia

This report was prepared by

Katrin Männik, EFIS

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)

2025 Directorate-General for Research and Innovation EN

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Key takeaways

- Estonia has committed to 17 out of 20 ERA Actions. Estonia’s Research, Development, Innovation, and Entrepreneurship Strategy (RDIE) 2021-2035 focuses on strengthening the research system, fostering knowledge transfer, improving the business environment, and concentrating resources on five priority areas, including smart specialisation.

- Considering Estonia's strong research base, particularly its competitive human resources and international success in securing research funding, prioritising knowledge application is essential.

- While business innovation activity in Estonia is relatively high and investments in business R&D are on the rise, significantly more joint public-private efforts are needed to achieve the ERA priorities on knowledge valorisation and the practical application of research outcomes.

- Key 2023-2024 developments include the Research Infrastructure Roadmap 2024, emphasising excellence, impact, and sustainability; the launch of the Applied Research Centre at Metrosert; a new researcher career system; and thematic R&D programmes in smart specialisation. Sectoral mobility support has been updated, and integration with international research infrastructures is progressing. The twin transition (green & digital) remains a coordinated effort across ministries and agencies.

1. National context

Estonia as a *small* country, is categorised among *Strong Innovators* in the European Innovation Scoreboard 2024[1]. The framework conditions such as human resources, attractive research systems and digitalisation are on a long-term positive trend. Estonia also ranks at the top of the United Nations e-government ranking.[2] In terms of Gross Domestic Expenditure on R&D (GERD) and Business Enterprise expenditure on R&D, Estonia remains below the EU average but exceeds it for Government Budget Allocations for R&D. GERD is on the rise, reaching 1.84 percent of GDP) in 2023[3] (see also Table 1).

The country's strengths lie in a robust research base within the public sector. The number of researchers (full time equivalent, FTE) per million inhabitants is at the same level as the EU average. Estonia's share of female researchers exceeds the EU average, with women accounting for 43 percent of researchers across all sectors.

Table 1 Structural Key Indicators

Indicator	EU27	Estonia		
	2023	2023	Average 2018-2020	Average 2021-2023
GDP in current prices, per capita	35 790.00	27 360.00	20 003.33	23 990.00
Gross Domestic Expenditure on R&D (GERD) as a share of GDP	2.27	1.78 (2022)	1.59	1.78
Government Budget Allocations for R&D (GBARD) as share of GDP	0.73	0.88	0.67	0.76
Business Enterprise expenditure on R&D (BERD) as a share of GDP	1.52	1.00	0.81	1.00
Expenditure on R&D procurement as a percentage of GDP	0.06	0.10	/	0.10
Size of the population (million)	448.80	1.37	1.32	1.34
Researchers (in FTE) per million inhabitants	4 681.34	4 659.12	3 790.80	4 451.88
Share of female researchers, all sectors of performance (%)	33.71	/	42.96	/

Source: see Annex 1

Estonia follows the Research, Development, Innovation and Entrepreneurship (RDIE) Strategy for 2021-2035 with the overarching objective of increasing the well-being of Estonian society and the productivity of its economy. The strategy aims to provide competitive and sustainable solutions for the development needs of both Estonia and the world. It is built on three pillars: the research system, knowledge transfer and the business environment. These are supported by five focus areas: 1) digital solutions across all areas of life, 2) health technologies and services, 3) valorisation of local resources, 4) smart and sustainable energy resources, 5) viable Estonian society, language and cultural space. Field-specific roadmaps have been developed with the first four focus areas aligned with smart specialisation. The draft Organisation of Research, Development, and Innovation Act (currently the Organisation

[1] European Commission (2024), European Innovation Scoreboard 2024. Country profile Estonia, available at https://ec.europa.eu/assets/rtd/eis/2024/ec_rtd_eis-country-profile-ee.pdf, p. 2
[2] https://e-estonia.com/estonia-is-at-the-top-of-the-un-e-government-ranking
[3] Estonian Research Council website, available at https://etag.ee/eesti-teadus-ja-arendustegevus-jatkab-kasvu-uued-andmed-naitavad-olulisi-trende

of Research and Development Act[4]) was approved by the government and submitted to the Parliament in December 2024. For the first time, the governance of R&D and innovation will be unified under a single law. The change aims to promote the broader application of research results to enhance the quality of life in Estonia while streamlining research funding[5]. Additionally, the Higher Education Act[6] was amended and came into force in August 2024.

2. Status of the Implementation of the ERA Policy Agenda

Chapter 2 briefly summarises **new developments in Estonia since the publication of the 2023 ERA Country Report**, based on the commitments to ERA Actions. The findings are based on qualitative desk research and interviews.[7]

Estonia has committed to 17 out of 20 ERA Actions, covering all four ERA Priority Areas (see Table 2). The national implementation of these ERA Actions is coordinated through the RDIE Strategy, which extends until 2035. The strategy's operative progress is monitored by two key ministries, namely the Ministry of Education and Research (MoER) and the Ministry of Economic Affairs and Communication (MoEC). The highest advisory body for strategy is the Research and Development Council ('*Teadus- ja Arendusnõukogu*'). The draft Organisation of Research, Development, and Innovation Act will establish a clearer innovation policy task force for the Research and Development Council. Additionally, instead of maintaining two separate committees on research and innovation, a cross-ministerial R&D and innovation steering committee will be formed. Significant changes occurred in ERA Actions 3, 4 and 8 during 2023-2024. These activities focus on improving research assessment, implementing a new researcher career system, and developing university curricula. Additionally, this period marked an important milestone with the completion of the fourth Estonian Research Infrastructure Roadmap.[8] A former President of the Estonian Academy of Sciences described it as a strategic support for fostering excellent science and impactful innovation.[9] ERA Actions 7 and 12 were also strengthened with several new or updated public measures to promote collaboration between research institutions and industry.

[4] Law 9/2019 of 1 September, amending Law 05/1997 of 02 May on Organisation of Research and Development Act (*Teadus- ja arendustegevuse korralduse seadus*), Riigi Teataja 3/6/2019, available at https://www.riigiteataja.ee/en/eli/503062019008/consolide.
[5] Ministry of Education and Research website, available at https://www.hm.ee
[6] Law 8/2024 of 1 August, amending Law 03/2019, of 19 March, on Higher Education Act (*Kõrgharidusseadus),* Riigi Teataja 14/9/2023, available at https://www.riigiteataja.ee/en/eli/ee/529082019022/consolide/current.
[7] Documents consulted during the desk research include European Semester reports, the European Innovation Scoreboard, and reports from national ministries, such as the RDIE Strategy for 2021-2035.
[8] Estonian Research Council website, available at https://etag.ee/rahastamine/infrastruktuuritoetused/teadustaristu-teekaart/riikliku-tahtsusega-teadustaristu-toetamine-2025-2029
[9] Eesti Teadustaristu teekaart 2024. Roadmap for Estonian Research Infrastructurer. The Estonian Research Council website, available at https://etag.ee/wp-content/uploads/2024/01/Teadustaristu_teekaart_kogumik-2024.pdf

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)

The Public Information Act[10] (amended in May 2023) establishes rules for the management of scientific data created with public funds. The RDIE Strategy emphasizes the development of policies to promote open science. As part of this effort, considerations regarding EOSC were included in the Research Infrastructure Roadmap procedure (2023-2024).

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

The Draft Organisation of Research, Development, and Innovation Act updates R&D principles including research ethics, academic freedom, data disclosure; and the Research Information System ('*Eesti Teadusinfosüsteem´*).

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

The Estonian Research Council joined the Coalition for Advancing Research assessment (CoARA) working group on "Improving practices in the assessment of research proposals"[11] (2023) and developed its own CoARA action plan for 2024-2027. The Draft Organisation of Research, Development, and Innovation Act reorganises public research funding.

[10] Law 1/2025 of 1 January, amending Law 01/2001, of 1 January, on Public Information Act (*Avaliku teabe seadus*), Riigi Teaja 30/12/2024, available at https://www.riigiteataja.ee/en/eli/ee/514112013001/consolide/current.

[11] Estonian Research Council website, available at https://etag.ee/teadusagentuur/dokumendid/estonian-research-council_coara-action-plan-2

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

The Higher Education Act (amended in 2024) defines the positions of academic staff and provides grounds for creating the tenure systems. In 2024, new (five-year) doctoral school programme started, supporting all Estonian doctoral students and supervisors with enhanced collaboration opportunities and wide skills development.[12] A new round of the Cross-Sectoral Mobility Measure, SekMo[13], introduced doctoral student placements in companies to support knowledge transfer (2023-2024). The Adaptation Support[14] for researchers from abroad was introduced to facilitate their relocation to Estonia (2024). Additionally, eco-system services have been enhanced through the established collaboration of International House of Estonia[15] with the Euraxess Estonia Network.

ERA Action 5) Promote gender equality and foster inclusiveness, taking note of the Ljubljana declaration

R&D organisations in Estonia have developed individual Gender Equality Plans and appointed commissioners[16]. For the first time, the draft Organisation of Research, Development, and Innovation Act defines the general principles and obligations of research ethics, as well as the tasks of the Estonian Research Council.

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

Academic freedom is defined as one of the core principles of research and development in the Organisation of Research and Development Act. The purpose of academic freedom is the acquisition and dissemination of knowledge (article 38 of the Constitution of the Republic of Estonia).

ERA Action 7) Upgrade EU guidance for better knowledge valorisation

TemTA (thematic R&D programmes in smart specialisation areas)[17] projects were selected for 2024-2029 (October 2023), involving 12 R&D organisations, one school of applied science, and 70 companies. High-level global investors were invited to Estonia for the Tech Tour (October 2024) by Startup Estonia[18]. The Open Innovation Toolbox[19] was introduced by the Estonian Business and Innovation Agency (EIS,2024). Additionally, the Applied Research Centre (ARC) was launched (May 2024) to support companies in exploiting research results. [20]

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

The 2024 Estonian Research Infrastructure Roadmap was completed, featuring an updated approach focused on scientific excellence, societal impact, and sustainability. It includes a new evaluation commission and an updated list of infrastructure objects, such as databases, membership fees of international organisations, new investments, and the maintenance of existing infrastructure). The Applied Research Centre (ARC)

[12] Available at https://www.doktorikool.ee/en
[13] Estonian Research Council website, available at https://etag.ee/en/funding/mobility-funding/sekmo-cross-sectoral-mobility-measure
[14] Estonian Research Council website, available at https://etag.ee/en/funding/mobility-funding/adaption-support
[15] Available at https://workinestonia.com/internationalhouse
[16] Tallinn University website, available at https://www.tlu.ee/en/equal-treatment
[17] Estonian Research Council website, available at https://etag.ee/rahastamine/programmid/temta
[18] Available at https://startupestonia.ee/estonias-growing-deeptech-and-defence-expertise-draws-high-level-global-investors-to-tallinn-for-tech-tour
[19] A collection of freely available, IP and technology-transfer related and document bases and guidance materials for businesses to support the development of science and technology-intensive business in Estonia. Estonian Business and Innovation Agency website, available at https://eis.ee/en/io/toolbox
[20] Metrosert website, available at https://metrosert.ee/en/applied-research-center

infrastructures in the ERA

continues to develop technological infrastructure in areas such as biorefining, drone technologies, autonomous vehicles, hydrogen technologies, and use of health data.

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

The Research Infrastructure Roadmap 2024 supported participation in international research consortia, such as the European Organisations for Nuclear Research (CERN), the European Social Survey or the Generations and Gender Survey 2020.Estonia officially joined CERN (March 2024). New ESFRI applications were submitted by the Estonian organisations. A representative from Estonia was nominated to lead the ESFRI working group on Data Computing and Digital Research Infrastructures, as well as the Nordic e-Infrastructure Collaboration (NeIC). Through the Estonian Scientific Computing Infrastructure (ETAIS), researchers and companies now have access to the pan-European supercomputer LUMI.

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

Mission orientation is implemented through challenge-based projects across key ministries. Researchers are supported to participating in Framework programmes (e.g. energy, transport, climate). A good example of this Tartu's participation in NetZeroCities.[21] In 2024 the Estonian Cancer Centre was established in co-operation with the Ministry of Social Affairs. The centre is a part of a broader European network of cancer centres, making an important step forward for the development of cancer research and treatment in Estonia.[22]

ERA Action 11) An ERA for green transformation

The draft of the Climate Resilient Economic Act[23,] proposed by the Ministry of Climate (December 2024), designates the Climate Council as an advisory body of scientific expertise. The Recovery and Resilience Facility (RRF) and cohesion policy mutually reinforce Estonia's efforts to support the green transition, including the Green Fund[24] Additionally, seven projects from R&D institutions have been funded under the TemTA programme aimed at supporting the development of smart and sustainable energy solutions.[25] Almost 10 million euro was allocated from the state budget to R&D institutions and their supporting organisations for smart investments aimed at improving energy efficiency in buildings. It is worth adding that two Centres of Excellence - the Centre of Excellence for Sustainable Green Hydrogen and Energy Technology and the Centre of Excellence for Energy Efficiency - received state budget support, with each allocated Euro 7 million for the period 2024-2030.[26]

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[21] Available at https://netzerocities.eu/mission-cities
[22] University of Tartu website, available at https://ut.ee/et/sisu/eesti-vahikeskuse-koduks-saab-tartu-ulikool
[23] Ministry of Climate website, available at https://kliimaministeerium.ee/eesti-kliimaseadus
[24] European Commission (2024), 2024 Country Report – Estonia, available at https://economy-finance.ec.europa.eu/document/download/34698aa7-9514-41bc-9c64-e97fb70a741e_en?filename=SWD_2024_606_1_EN_Estonia.pdf, p. 7.
[25] Estonian Research Council website, available at https://etag.ee/rahastamine/programmid/temta/#projektid
[26] Ministry of Education and Research.

ERA Action 12) Accelerate the green/digital transition of Europe's key industrial ecosystems

The RRF and cohesion funds support the green and digital transitions, as well as skills development. The ERDF and Just Transition Fund invest in climate change mitigation and help municipalities address regional disparities. [27] The Programme for Applied Research[28] has integrated green transition into its calls. Several initiatives h support deep technology, including Investment Loans and Guarantees for Deep Technology Startups (Startup Estonia). ARC's priority investments focus on five deep technology fields. Lifelong learning measures support re-skilling and up-skilling by the MoER (VÕTI, ROHE and Just Transition Fund). [29]

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

Amendments in the Estonian Higher Education Act and the Higher Education Standard (June 2024) introduce enhanced requirements[30] for learning and curricula, with a stronger focus on generic skills -particularly digital and technological skills, digital security, green skills, sustainability, and actions that support environmental and social sustainability.

ERA Action 14) Bring Science closer to citizens

The Science Popularisation Contest[31] acknowledges and highlights individuals who promote science in Estonia, while also boosting science communication. The 2024 call results were published in November 2024. Rakett69 (Rocket69), the longest-running science competition TV show, is financed by the Estonian Research Council and has encouraged young talents to pursue natural sciences for 15 years.

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

The Research Infrastructure Roadmap considered scientific, societal and economic impacts in the assessment procedure for new infrastructure objects (2023-2024). The thematic R&D programmes (TemTA) were launched to support smart specialisation areas. New INNOFOND projects, aimed at encouraging innovation through public procurements, were selected in 2024.[32]

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

The new call for institutional development program of R&D organisations, ASTRA+ for 2024-2029, was launched in November 2024[33]. MoEC initiated a special call under the RITA programme to support a smart, digital, and responsible economy (September 2024), involving Estonian R&D organisations to support policymaking.[34]

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[27] Ibid.
[28] Estonian Business and Innovation Agency website, available at https://eis.ee/en/grants/programme-for-applied-research
[29] MoER website, available at https://hm.ee/kutse-ja-taiskasvanuharidus/taiskasvanuharidus/tasuta-koolitused
[30] See https://www.err.ee/1609364789/korgkoolid-hakkavad-opetama-uldoskusi
[31] Research Council website: https://etag.ee/tegevused/konkursid/eesti-teaduse-populariseerimise-auhind/
[32] State Chancellery website, available at https://www.riigikantselei.ee/avaliku-sektori-innovatsioon
[33] Ministry of Education and Research website:https://hm.ee/en
[34] Research Council Website: https://etag.ee/avanes-majandus-ja-kommunikatsiooniministeeriumi-taotlusvoor

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

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

The draft Organisation of Research, Development, and Innovation Act establishes a single supra-ministerial steering committee for R&D and innovation and reorganises the R&D funding system across key ministries. Ministerial research advisors are now supported by the Estonian Research Council, while development advisors at industrial associations are supported by EIS as initiated by the RITA programme.[35]

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

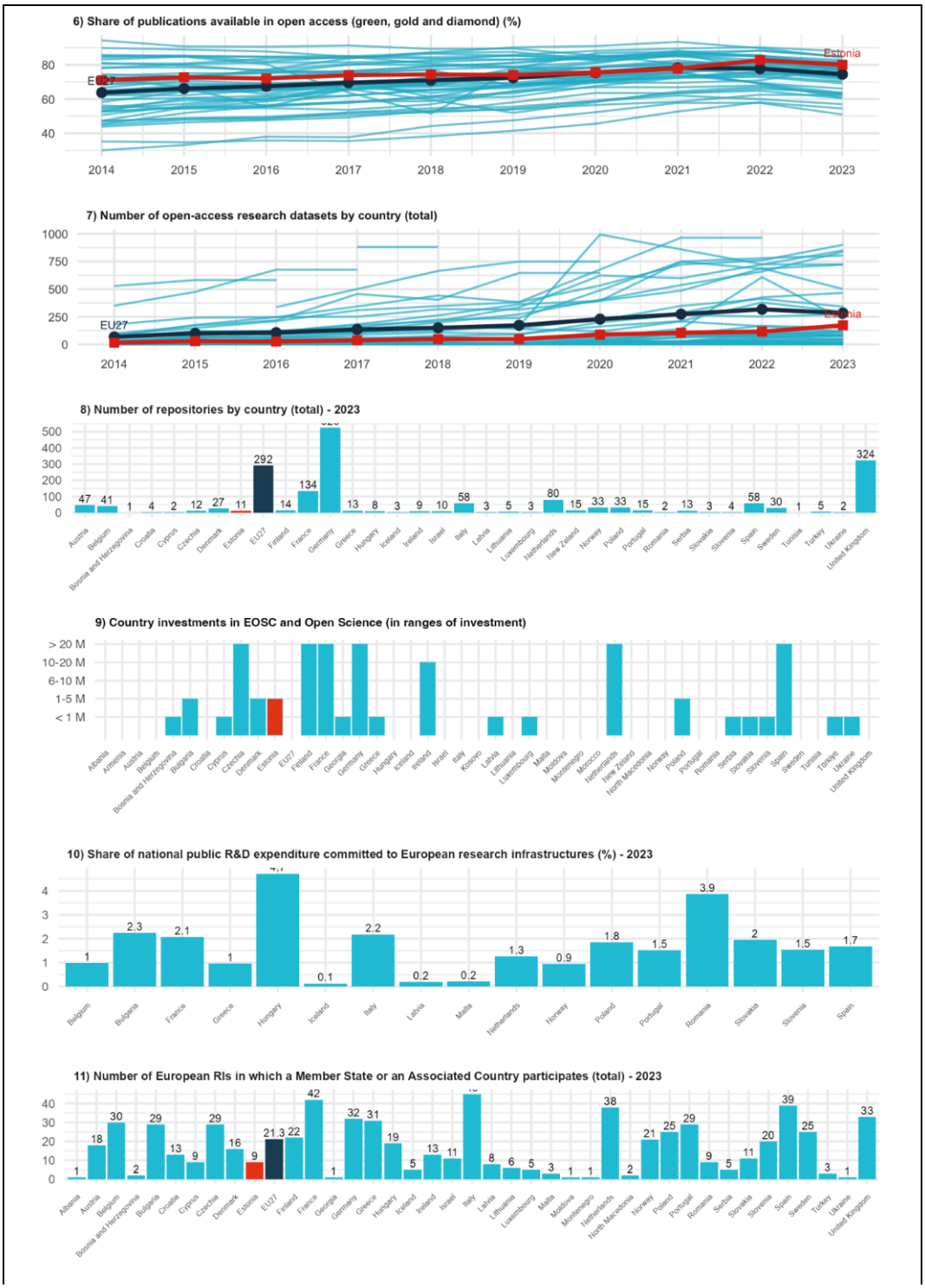
Concerning **ERA Priority 1**, Estonia has made significant efforts to strengthen the international competitiveness of its research base (particularly in human resources and research infrastructure but less in technology infrastructure). Simultaneously, joint activities and sectoral mobility of researchers and specialists between academia and other sectors have been promoted (through initiatives such as Applied Research Funding, TemTA, and SekMo). ERA Dashboard Indicators, such as the share of publications available in open access (ERA Dashboard Indicator 6), the share of foreign doctorate students (ERA Dashboard Indicator 17), the Academic Freedom Index (ERA Dashboard Indicator 27), and the proportion of women among doctoral graduates (ERA Dashboard Indicator 16) or women in the Digital Index (ERA Dashboard Indicator 15), exceed EU averages.

Notably, substantial progress has been observed in the number of ERC grants (ERA Dashboard Indicator 29) and international co-publications with non-EU partners (ERA Dashboard Indicator 30) over the years. However, research applications remain low, as reflected in indicators such as the number of PCT patent applications (ERA Dashboard Indicator 21), patents by universities and PROs (ERA Dashboard Indicator 25), and European and international co-patenting (ERA Dashboard Indicator 32).

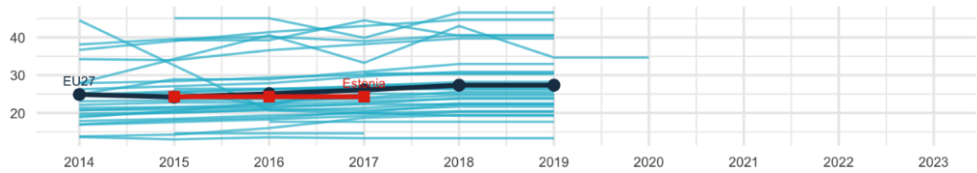
One contributing factor to these results may be the level of GBARD according to NABS (ERA Dashboard Indicator 33), where Estonia's earlier above-EU-average performance has declined. On the positive side, the role of business enterprise researchers (ERA Dashboard Indicator 23, 24) is gradually increasing, as is the share of innovating firms collaborating with HEIs and PROs (ERA Dashboard Indicator 22). The research and business environment in Estonia has demonstrated flexibility, with the country's small size offering distinct advantages for fostering collaboration and driving innovation.

[35] Estonian Business and Innovation Agency website: https://eis.ee/io/tehnoloogiasiire/arendusnounikud

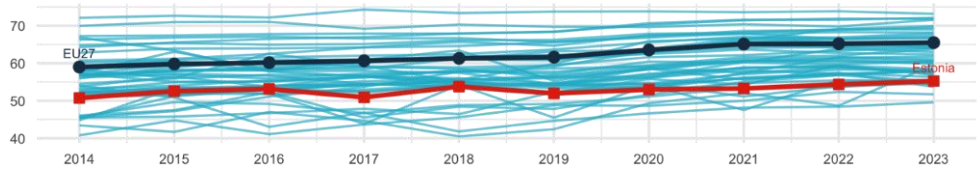
Figure 3-1 Indicators for ERA Priority 1



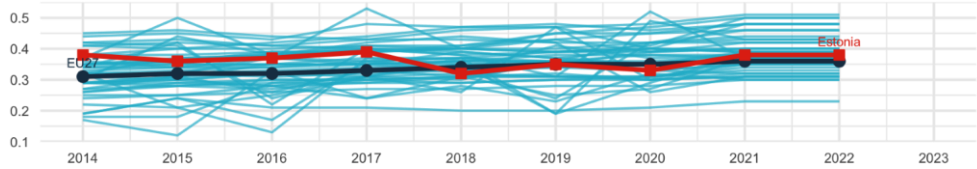
12) Proportion of women of Grade A among academic staff/researchers (%)



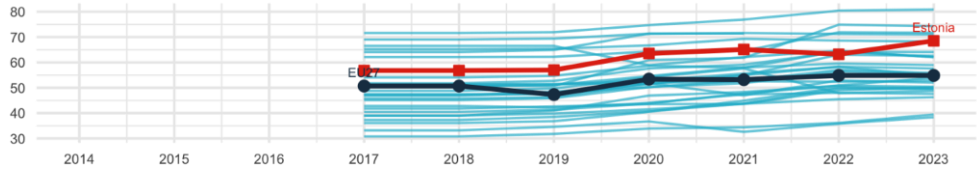
13) Proportion of mixed-gender teams (%)



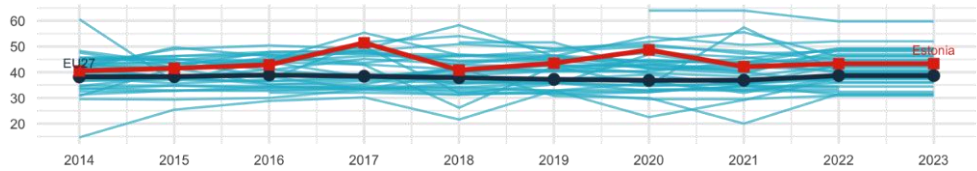
14) Proportion of women in authorships of the top 10% most cited publications (%)



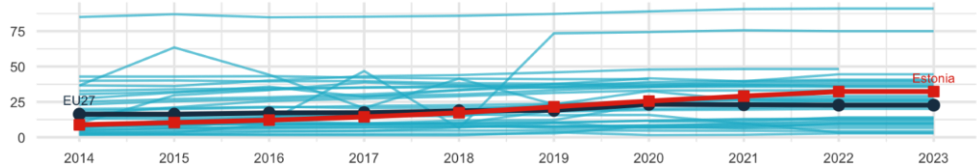
15) Women in Digital index (0-100)



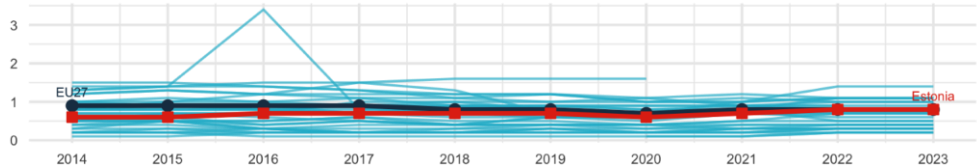
16) Proportion of women among doctoral graduates by narrow fields of STEM (%)



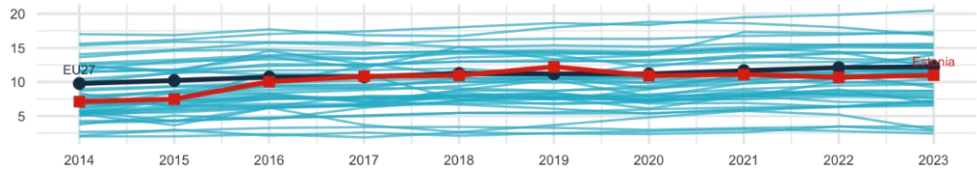
17) Share of foreign doctorate students as a percentage of all doctorate students (%)



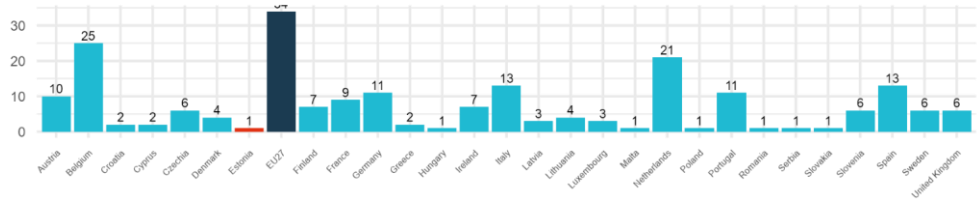
18) New doctorate graduates per 1,000 inhabitants aged 25-34



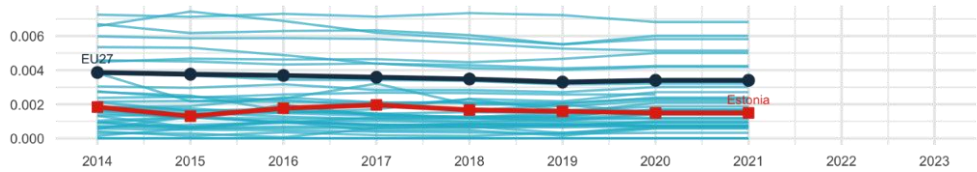
19) Share of public-private co-publications (%)



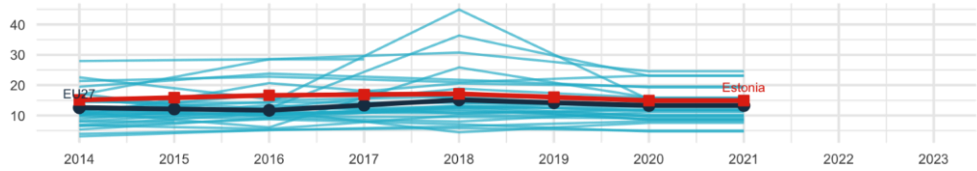
20) Best practice examples and methodologies for knowledge valorisation - 2023



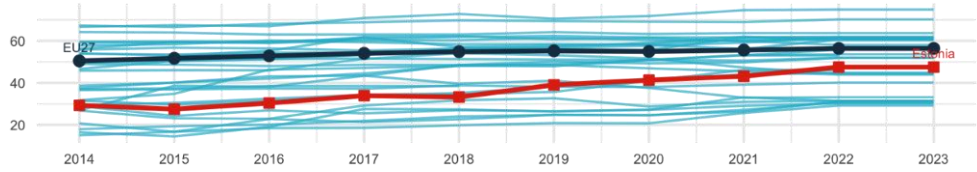
21) Number of PCT patent applications divided by GDP in million Euros/Dollars



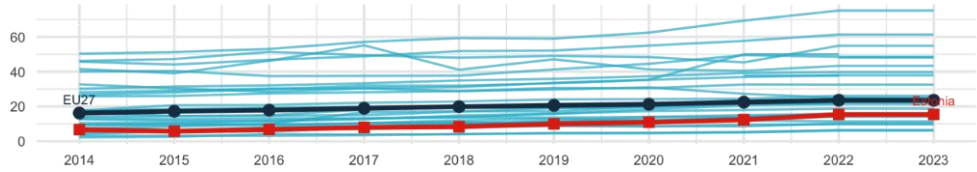
22) Share of innovating firms collaborating with HEI/PRO out of all innovative firms

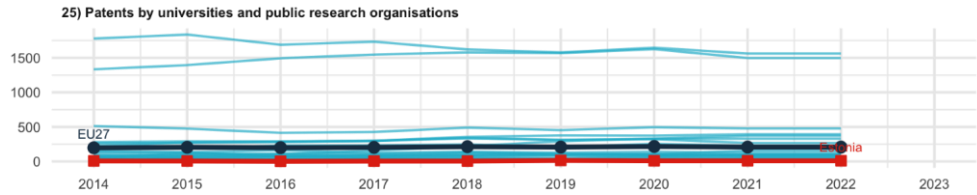


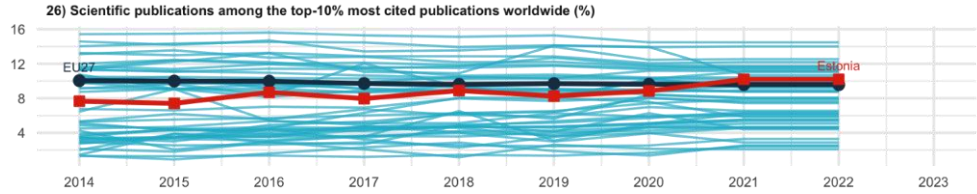
23) Business enterprise researchers as % of total researchers (%)

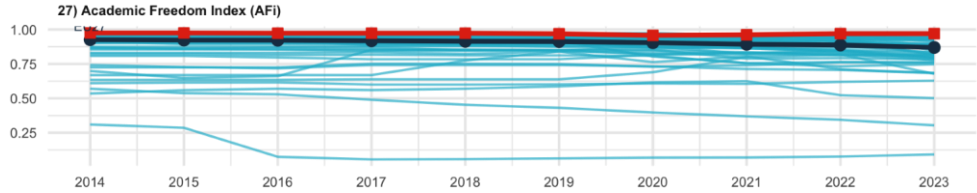


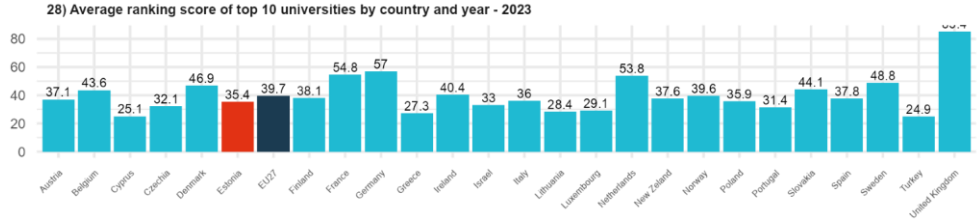
24) Business enterprise researchers in full-time equivalent per thousand employment in industry

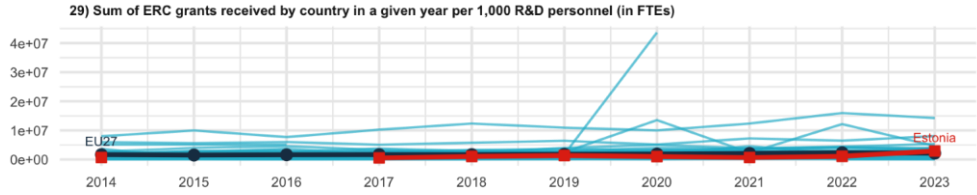


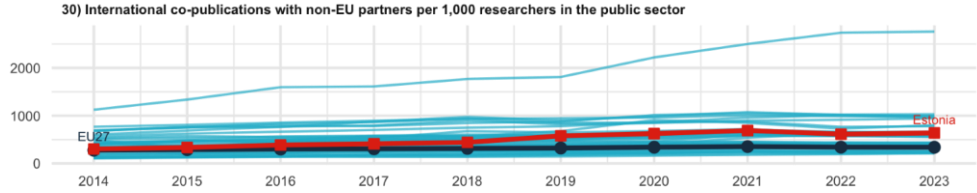

25) Patents by universities and public research organisations
1500
1000
500
0
EU27
Estonia
2014
2015
2016
2017
2018
2019
2020
2021
2022
2023

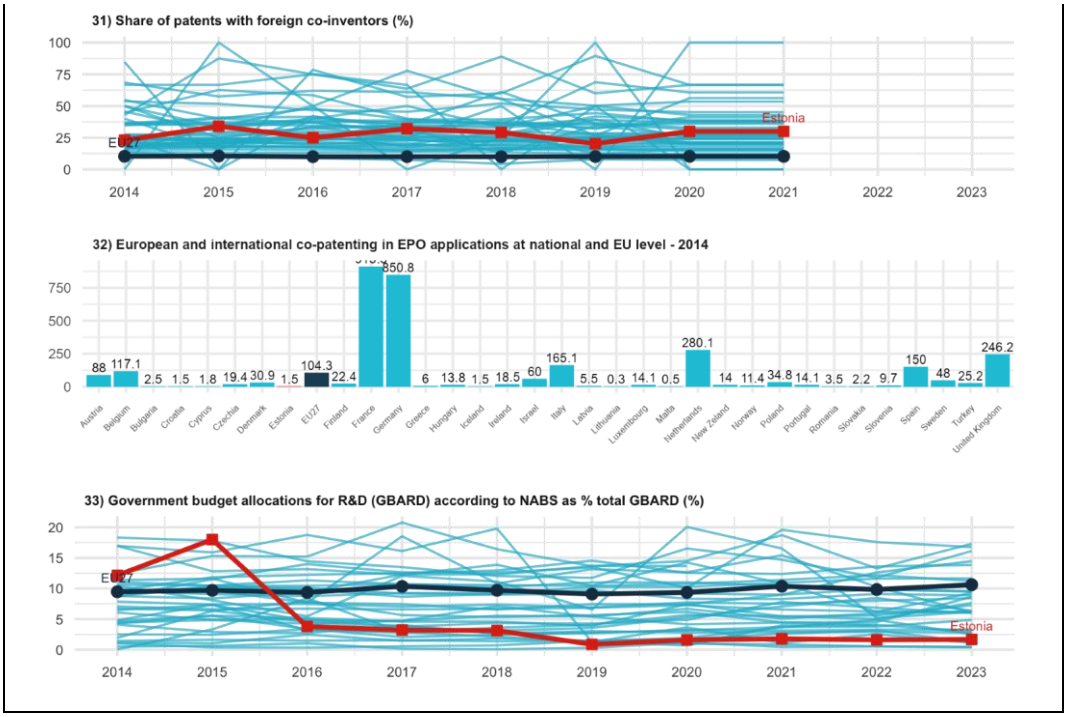

26) Scientific publications among the top-10% most cited publications worldwide (%)
16
12
8
4
EU27
Estonia
2014
2015
2016
2017
2018
2019
2020
2021
2022
2023


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


28) Average ranking score of top 10 universities by country and year - 2023
80
60
40
20
0
37.1
43.6
25.1
32.1
46.9
35.4
39.7
38.1
54.8
57
27.3
40.4
33
36
28.4
29.1
53.8
37.6
39.6
35.9
31.4
44.1
37.8
48.8
24.9
Austria
Belgium
Cyprus
Czechia
Denmark
Estonia
EU27
Finland
France
Germany
Greece
Ireland
Israel
Italy
Lithuania
Luxembourg
Netherlands
New Zealand
Norway
Poland
Portugal
Slovakia
Spain
Sweden
Turkey
United Kingdom


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
Estonia
2014
2015
2016
2017
2018
2019
2020
2021
2022
2023

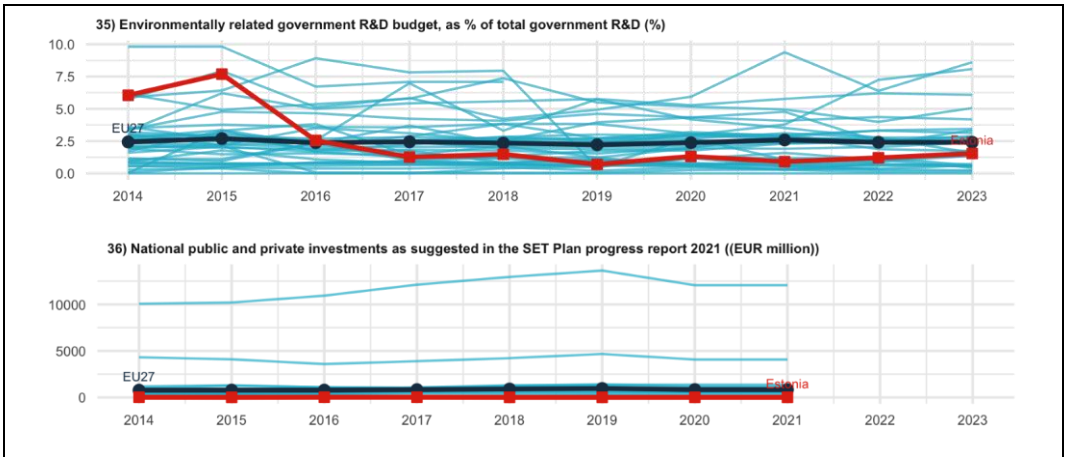

30) International co-publications with non-EU partners per 1,000 researchers in the public sector
2000
1000
0
EU27
Estonia
2014
2015
2016
2017
2018
2019
2020
2021
2022
2023

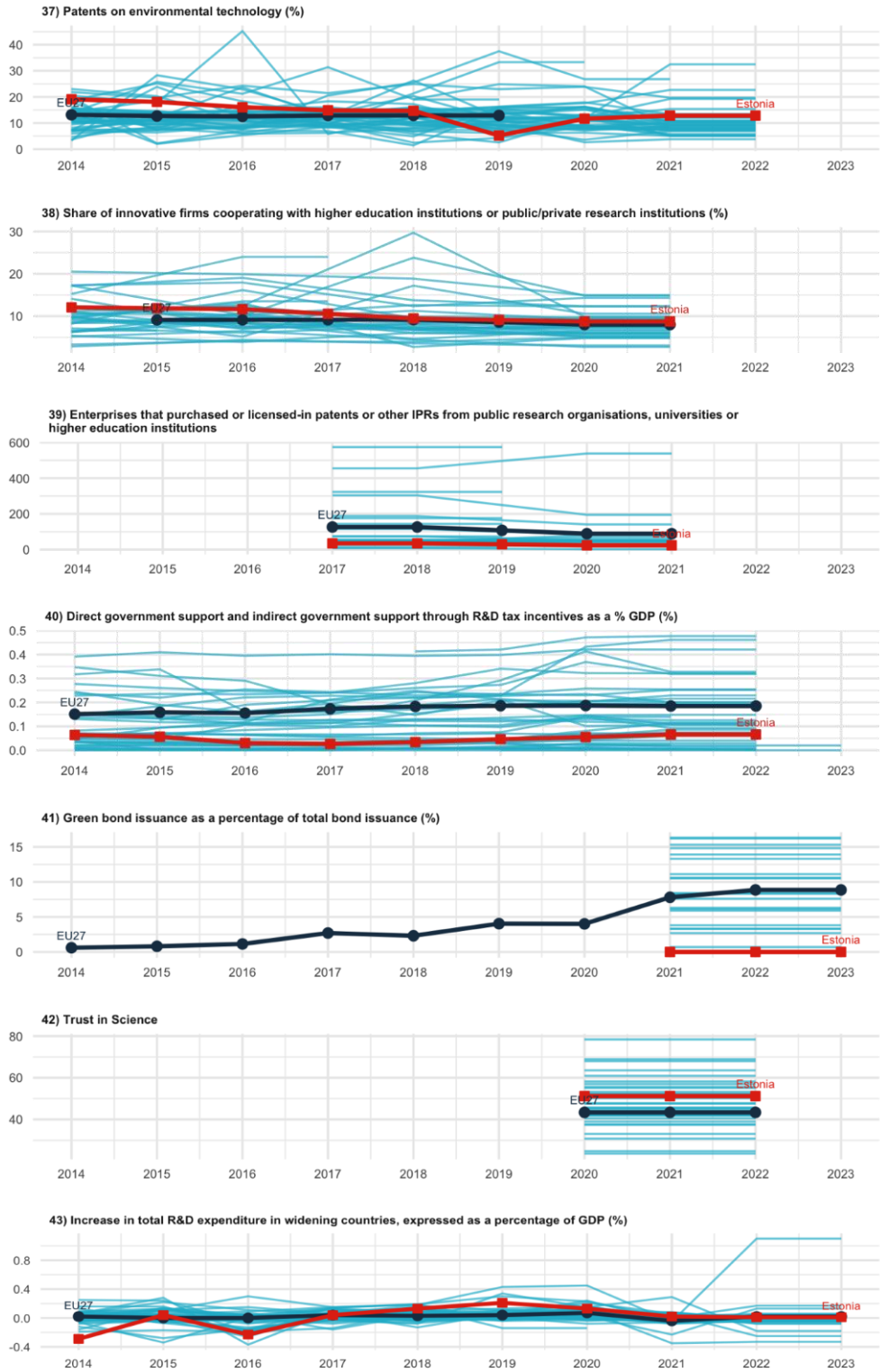


Source: Annex 1

Considering **ERA Priority 2**, progress can be observed in certain areas. Internationalisation and innovation collaboration (ERA Dashboard Indicator 38) have been strengthened by the national policy agenda. Conversely, challenges remain in the green transition. Dashboard Indicators such as the environmentally related government R&D budget (ERA Dashboard Indicator 35) and patents on environmental technology (ERA Dashboard Indicator 37) highlight areas of concern. While digitalisation is advancing, measures supporting green transformation have yet to demonstrate significant progress.

Figure 3-2 Indicators for ERA Priority 2





Source: Annex 1

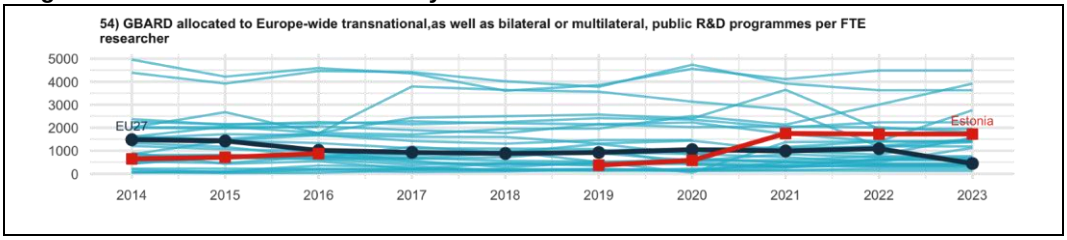
Focusing on **ERA Priority 3**, Estonia demonstrates strong performance and positive trends. Notable achievements include the Summary Innovation Index (see ERA Dashboard Indicator 46), the share of innovative enterprises cooperating with RPOs in other countries (ERA Dashboard Indicator 52), and the share of public R&D expenditures financed by the private sector (ERA Dashboard Indicator 53). These indicators highlight Estonia's progress in reaching ERA objectives. An upturn in business R&D and innovation activity is evident, particularly in smart specialisation areas, supported by the Applied Research Centre, Applied Research Funding of EIS, TemTA by the Estonian Research Council, and INNOFOND of the State Chancellery. Estonia's research sector remains competitive in securing international research funding through Horizon Europe (ERA Dashboard Indicators 44-45). However, the average number of partners from non-widening countries (ERA Dashboard Dashboard Indicator 50) has been in decline since 2020, highlighting an area for improvement.

Figure 3-3 Indicators for ERA Priority 3

Source: Annex 1

Considering **ERA Priority 4**, Estonia has made significant progress in the share of GBARD allocated to Europe-wide transnational, bilateral, and multilateral public R&D programmes since 2019 (see ERA Dashboard Indicator 54). This progress is supported by efforts to systematize the research and development funding and assessment system in Estonia, including the draft Organisation of Research, Development and Innovation Act.

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 Estonia and their effects on the national R&I system, including the quantitative performance in the ERA Dashboard.

The RDIE Strategy 2021-2035 integrate with the ERA Action commitments. Its strategic focus is based on three sub-objectives that related to the ERA aims:1) Estonia's development relies on knowledge-based and innovative solutions; 2) research in Estonia is high-level, effective, and diverse; 3) Estonia's business environment fosters an entrepreneurial spirit and supports the emergence and growth of knowledge-intensive enterprises, the creation and export of higher value-added products and services, and investments in all regions of Estonia. The ERA initiatives are viewed as a key research policy tool for Estonia, providing major guidelines, goals and opportunities to implement national policy. They are considered a capacity-building driver for Estonia. In return, Estonian public policy stakeholders are encouraged to share their good practices (e.g., doctoral reform, researcher sectoral mobility) in international networks.

ERA Priority 1: Estonia's implementation of **ERA Actions 1, 2, 5 and 6** aligns with the ambition to achieve high-level, open, and diverse research in Estonia, adhering to the highest research ethical principles. The implementation of the national RDIE strategy creates additional synergies with **ERA Action 3, 4 and 7**, which are expected to expand research beyond its boundaries and foster integrations with businesses and public sector procurements. Estonia is making significant efforts relating to research infrastructure, having committed to **ERA Action 8 and 9**. During 2023-2024 relevant steps were taken to establish direct linkages between research infrastructure and research and development services as well as sectoral collaboration. Budgetary limitations may cause delays. The sectoral mobility of researchers should be integrated into academic career path. The Dashboard shows moderate growth in these areas (ERA Dashboard Indicators 6, 14, 15, 16, 26, 27, 30 and 31).

ERA Priority 2: Estonia's implementation of **ERA Actions 13 and 14** addresses the challenge of empowering higher education systems and making education more research-based, through initiatives such as providing grounds for the tenure tracks, support for science popularisation, and citizen science). Digitalisation is Estonia's flagship initiative, encouraging integration across the full spectrum of industries and services (e.g. defence sector). The ERA initiatives with a mission orientation (**ERA Action 10**) and those focusing on green and digital transitions (**ERA Action 11**) are expected to significantly impact Estonia' s green transformation including green energy and valorisation of natural resources, in the coming years.

The Dashboard shows performance above the EU average level only in ERA Dashboard Indicator 42, which measures trust in science.

ERA Priority 3: The implementation of **ERA Actions 16 and 17** aligns with the EU's ambition to enhance research and innovation excellence across research-performing organisations and borders. Excellence is achieved through collaboration both locally and internationally (e.g. TemTA, INNOFOND, research infrastructure funding). The R&I capacity-building of research organisations, supported by ASTRA+, creates additional synergies with ERA initiatives. The Dashboard shows strong growth in these areas, particularly in ERA Dashboard Indicators 44, 45, 46, 48, and 52.

ERA Priority 4: Estonia's implementation of **ERA Actions 19** addresses challenges encountered during the amendment process of the Organisation of Research and, Development Act. Further developments will take place once the law comes into force (expected in 2025). The Dashboard shows a significantly higher result for indicator 54 (GBARD allocated to Europe-wide R&D programme per FTE researcher) compared to the EU average.

5. Conclusions

Estonia has committed to 17 out of 20 ERA Actions in the ERA Policy Agenda. As highlighted throughout this report, Estonia has incorporated the ERA Priorities into its national RDIE Strategy, effectively integrating the initiatives in both directions. The policy processes are reciprocal. From an effectiveness perspective, it is recommended to narrow the focus of priorities to better allocate resources among Estonia's main competence areas. The valorisation of natural resources and investment in business R&D are critical for the country's international competitiveness. An active start-up sector (in digital technologies, renewable energy, sustainable transport, defence, deep technologies) and a strong research base are seen as key advantages for Estonia.

The policy landscape remains fragmented and fragile due to a period of multiple crises. Despite this, Estonia has stayed committed to its strategic direction as outlined in the national strategy and adhered to the R&D and innovation budget set for 2024, with only minor cuts to R&D. Key legal acts were updated in 2023-2024 or are currently being amended to address labour market needs, including skill shortages in digital and green transitions, as well as the evolving geopolitical situation.

Mutual learning and collaboration between research and innovation stakeholders, both in Estonia and internationally, define the country's role in the European R&D and business landscape. Internationalisation through the pan-European research infrastructures (providing access to critical knowledge and best practices) and the country's focus on smart specialisation create opportunities for further collaboration and strengthen Estonia's position in specialised fields. Despite its significant progress in human resource competitiveness and research internationalisation, Estonia still lags behind the EU average in other R&D indicators. However, R&D intensity is showing a positive trend.

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Ministry of Education and Research (*Haridus- ja teadusministeerium*) website, available at

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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