European Commission

# ERA Country Report 2024
# Luxembourg

Independent
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Report

Research and Innovation

**ERA Country Report 2024: Luxembourg**

European Commission
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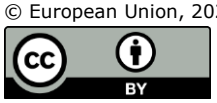

EUROPEAN COMMISSION

# ERA Country Report 2024
# Luxembourg

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)

2025 Directorate-General for Research and Innovation EN

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## Key takeaways

- As a small country, Luxembourg has committed to six ERA Actions. Due to high performance in many ERA priorities, these commitments reflect topics that require further effort and selected national priority areas (e.g., gender equality, open science).
- The implementation of ERA Actions 1, 5, 7, and 9 is progressing at high pace, linked to national priorities in strengthening the R&I system. In addition, commitment to Actions 10 showcases interest in strengthening mission-orientation in national R&I policy.
- Luxembourg also performs well in other areas compared to the EU average, such as attractive research careers or scientific leadership.
- The selection to specific areas showcases the potential of synergies between national priorities and ERA actions, despite challenges in attributing positive effects to the ERA Actions over the reporting period.

# 1. National context

Luxembourg is one of the smallest EU Member States with a population of 672.050 inhabitants in 2024[1]. The University of Luxembourg and other Luxembourgish public research institutes are key player in its research and innovation system. The country is categorised as a *strong innovator* in the latest 2024 European Innovation Scoreboard (EIS). Although its performance (112.1 percent) was described as decreasing in comparison to the EU growth, Luxembourg is still ranked above the average of strong innovators (111.3 percent). As relative strengths the EIS highlights the public-private co-publications, international scientific co-publications, and foreign doctorate students as a percentage of all doctorate students.[2] Compared to the performance in 2023 the report highlights a strong increase of environment-related technologies, new doctorate graduates, and PCT patent applications. Gender participation in research is also noteworthy: women make up 33.71 percent of all researchers across sectors (2023) and represent 38 percent (2024) of full-time positions in Luxembourgish research institutions, indicating a relatively strong presence of female researchers.

**Table 1 Structural Key Indicators**

| Indicator | EU27 | Luxembourg | | |
|---|---|---|---|---|
| | 2023 | 2023 | Average 2018-2020 | Average 2021-2023 |
| GDP in euro per capita, current prices | 35 790.00 | 118 310.00 | 98 880.00 | 111 133.33 |
| Gross Domestic Expenditure on R&D (GERD) as a share of GDP | 2.27 | 1.05 | 1.15 | 1.05 |
| Government Budget Allocations for R&D (GBARD) as share of GDP | 0.73 | 0.54 | 0.60 | 0.56 |
| Business Enterprise expenditure on R&D (BERD) as a share of GDP | 1.52 | 0.51 | 0.60 | 0.52 |
| Expenditure on R&D procurement as a percentage of GDP | 0.06 | 0.03 | / | 0.03 |
| Size of the population (million) | 448.80 | 0.66 | 0.61 | 0.65 |
| Researchers (in FTE) per million inhabitants | 4 681.34 | 5 313.47 | 4 923.18 | 5 189.16 |
| Share of female researchers, all sectors of performance (%) | 33.71 | / | / | / |

*Source: Annex 1*

The Ministry of Higher Education and Research (MESR) and the Luxembourg National Research Fund (FNR) are the central and closely operating institutions to set the political agenda, strategy and invest in research and innovation. In 2019, Luxembourg established a National Research and Innovation Strategy (2020-2030).[3] It aims to address challenges described in a 2016 OECD study that identified the need to consolidate the progress and advance to become a widely recognise R&I location in Europe, a need to strategically link and orient promising R&I initiatives, and to improve the governance and steering of the innovation system to enhance coordination across Luxembourgish R&I stakeholders. The strategy further identifies a number of interdisciplinary research priority areas to prepare Luxembourg for the future, namely the industrial and service transformation, personalised healthcare, sustainable and responsible development, and 21st century education. While there is no explicit

[1] https://statistiques.public.lu/en/actualites/2024/stn16-population-2024.html
[2] https://ec.europa.eu/assets/rtd/eis/2024/ec_rtd_eis-country-profile-lu.pdf
[3] https://www.researchluxembourg.org/en/research-landscape/national-research-innovation-strategy/

ERA Action plan, many of the R&I initiatives align with ERA Actions that Luxembourg has committed to as well as to some which it has not explicitly endorsed.

## 2. Status of the Implementation of the ERA Policy Agenda

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

Luxembourg has committed to six out of twenty ERA Actions, covering two out of the four Priority Areas (see Table 2). Focus areas of the national ERA implementation are open science, gender equality, knowledge valorisation, Luxembourg's global approach, Missions and Partnerships and bringing science closer to citizens. The national implementation of ERA Actions is coordinated by the Ministry of Higher Education and Research (MESR). For each of the ERA Action stakeholders of the national R&I system (University of Luxembourg, Luxembourg national Research Fund (FNR), Ministry of Higher Education and Research) are nominated to coordinate respective actions.

**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)

Luxembourg is committed to enabling an open sharing of knowledge. In 2015, Luxembourg first adopted a National Policy on Open Access.[4] Since 2017, FNR requires all publications that build on FNR funding to be open access. The new government programme foresees a revision of the national Open Science Strategy through a participatory process, involving all Luxembourgish R&I stakeholders. Luxembourg continues to be an active contributor to the development of the Open Science Cloud (EOSC), contributing to the provisioning of services, tools, data on the usage, quality and impact of research output. For the reporting period, Luxembourg was involved in four EOSC related projects.[5] To enable a more efficient value creation from secondary use of public sector data for research and commercial purposes the government created the

[4] https://rosie-project.eu/knowledge_hub_post/country-by-country-responsible-open-science-policies
[5] https://eosc.eu/tripartite-collaboration/luxembourg

Luxembourgish National Data Service (LNDS)[6]. Its aim is to support the interoperable and FAIR data in a clear legal, ethical, and societal framework.

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

In several of the indicators measuring gender equality and inclusion, Luxembourg performs below EU average (see Figure 3-1). There is a high level of awareness for the challenges and in the reporting period existing initiatives have been continued and extended. On the EU level Luxembourg actively contributed to policy dialogues, mutual learning experiences and advancing gender equality policies (e.g., EU zero tolerance code of conduct to counteract gender-based violence and R&I[7]). In 2024 the High Commissioner for National Protection adopted its first Gender Equality Plan. It proved an overview over initiatives and developments in the fields of gender equality and equity.[8] The FNR issues a new action plan on gender, equality, diversity and inclusion for the period of 2022-2024.[9] It highlights the ongoing activities at the FNR, as well as the concrete initiatives and measures for the Period of 2022-2024. The University of Luxembourg continues its commitment to gender equality policies in the areas of awareness, teaching and research, work-life balance, workplace climate, communication. To monitor the success of gender equality policies and support evidence-based policies the University collects detailed gender disaggregated statistics. To increase the share of female full professors, the University will in the future be able to tender professorships for female applicants only, in areas where women are underrepresented.

**ERA Action 7)** Upgrade EU guidance for better knowledge valorisation

Luxembourg introduced a number of funding and policy initiatives to increase knowledge valorisation. The FNR offers funding programmes to incentivise the collaboration of research and industry partners and has also established a dedicated Knowledge and Innovation Transfer Support program, to broaden and enhance knowledge and technology transfer.[10] By now, Luxembourgish stakeholders contributed three best practice examples and methodologies to the European Knowledge Valorisation Platform.[11] In the coalition agreement of 2023 the Government outlined its plans to support the introduction of a coherent policy of transfer and access to intellectual property by universities, research institutes or companies, regardless of their size.[12] To fully exploit the potential of intellectual property in the context of the ecological and digital transition, the government will create the Luxembourg Intellectual Property Agency (ALPI). It will consist of the Office for Intellectual Property (OPI) and the Luxembourg Institute for Intellectual Property (IPIL). The main goal is to improve the valorisation of knowledge, creating jobs, and added value in Luxembourg.

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[6] https://www.lnds.lu
[7] https://op.europa.eu/en/publication-detail/-/publication/6ce8aef5-70b3-11ef-a8ba-01aa75ed71a1/language-en
[8] https://hcpn.gouvernement.lu/dam-assets/fr/publications/hcpn-gender-equality-plan.pdf
[9] https://www.fnr.lu/fnr-gender-equality-plan/#fnr-action-plan
[10] https://www.fnr.lu/funding-instruments/kits
[11] https://projects.research-and-innovation.ec.europa.eu/en/research-area/industrial-research-and-innovation/eu-valorisation-policy/knowledge-valorisation-platform/repository
[12] https://gouvernement.lu/lb/actualites/toutes_actualites/articles/2023/11-novembre/16-signature-accord-coalition.html

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

Luxembourg actively participates in the ERA Subgroup on a Global Approach as well as in the Multilateral Dialogue on Principles and Values in International R&I cooperation. In line with the EU Council Recommendations there is an increasing attention on enhancing research security.[13] In 2024, Luxinnovation and the Ministry of Foreign and European Affairs, Defense, Development Cooperation and Foreign trade issued a dedicated catalogue for "Luxembourg Industry and Research Capabilities for Security and Defense".[14] The Luxembourg Development Agency funds programmes that support research and innovation activities in developing countries.[15]

## 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

Luxembourg demonstrated its commitment to Action 10 by participating in total in 31 collaborative projects. Nine projects for the R&I Missions (covering Mission Cancer, Mission Climate-Neutral and Smart Cities, Mission Ocean and Waters, and one project Coordination of complementary actions for missions) received a funding of EUR 2,8 million. Luxinnovation acts as National Contact Point for the EU Missions programme and contributed actively to the TRAMI consortium mapping the state of play of mission driven projects across 16 participating countries. A key output was the TRAMI Missions Playbook[16] showcasing use cases, guidelines and recommendations on how to adapt mission-oriented R&I policies. Currently, Luxinnovation plans to build upon the identified keys for boosting Missions' implementation and tailor an action plan aimed at increasing the attractiveness of the Mission-oriented projects to strengthen the participation of public actors and local/regional authorities, and fostering citizens' engagement. An FNR funding instrument providing a structured framework to bundle the research excellence around a mission of societal relevance and encouraging a high level of transdisciplinary research and intersectoral collaboration is NCER.[17] The projects align with the National Research priorities and should be integrated into the Luxembourg research landscape as flagships. The 22 projects funder under European Partnerships (11 projects Smart Networks and Services Joint Undertaking, 7 projects Innovative Health Initiative Joint Undertaking, 3 projects Circular Bio-based Europe Joint Undertaking, and 1 project Global Health EDCTP3 Joint Undertaking) received in total EUR 14.6 million. Additionally, Luxembourg also participated in co-programmed partnerships that focus on strategic collaborations between the EC and stakeholders.[18]

[13] https://data.consilium.europa.eu/doc/document/ST-9097-2024-REV-1/en/pdf
[14] https://gouvernement.lu/dam-assets/documents/actualites/2024/06/19-backes-catalogue/lu-industry-research-capabilities-security-defence-2024.pdf
[15] https://luxdev.lu/en/activities/projects
[16] https://www.trami5missions.eu/sites/default/files/2024-05/TRAMI_Playbook.pdf
[17] https://www.fnr.lu/funding-instruments/ncer-initiate
[18] https://op.europa.eu/en/publication-detail/-/publication/8f71dfd0-76fe-11ef-bbbe-01aa75ed71a1

**ERA Action 14) Bring Science closer to citizens**

Luxembourg is highly engaged in ERA Action 14. It is an explicit aim of the National Research and Innovation Strategy, as well as expressed in the institutional strategy of the University and the Luxembourgish research institutions. The FNR develops (social) media formats (e.g., Mr. Science, Take Off Show) to reach broad audiences, offers training for science communication and education, funds projects targeted at the public engagement of science and organises a series of events, in collaboration with research institutions, schools, associations, and private individuals (e.g., Researchers' days, science festival, researchers at school, politics meets research, researcher's night).[19]

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

Luxembourg has not committed to an ERA Action under this priority area.

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

Luxembourg has not committed to the ERA Action under this priority area.

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

**ERA Priority 1** is addressed through a range of initiatives focusing on **ERA Actions 1, 5, 7 and 9** which aim to create structural reforms and other interventions. The implementation of these activities are largely on track and supported by dedicated investments. Luxembourg shows a high commitment to open science and data (**ERA Action 1**), which is reflected in a high performance of ERA Dashboard Indicators 6-9. For ERA Dashboard Indicator 6, a slight decrease can be observed. A revision of the open science strategy is planned. ERA Dashboard Indicator 7 is expected to increase once the Luxembourgish National Data Service (LNDS) is fully implemented. ERA Dashboard Indicators 8 and 9 showcase Luxembourg's contribution to EOSC in terms of investments and public repositories.

For the indicators relating to gender equality and equal opportunities in science (**ERA Action 5**), Luxembourg is proceeding at slow pace. The country remains below EU average for the ERA Dashboard Indicators 12,13, and 14. ERA Dashboard Indicators 16 (female STEM graduates) has been steadily increasing over the last years and is stable on an EU average level. Only ERA Dashboard Indicator 15 (woman in digital index) is above average and shows a decrease in the last years. Overall, there is a high awareness by policy makers and in research institutions that the achievement of gender equality and equal opportunities in science requires careful attention.

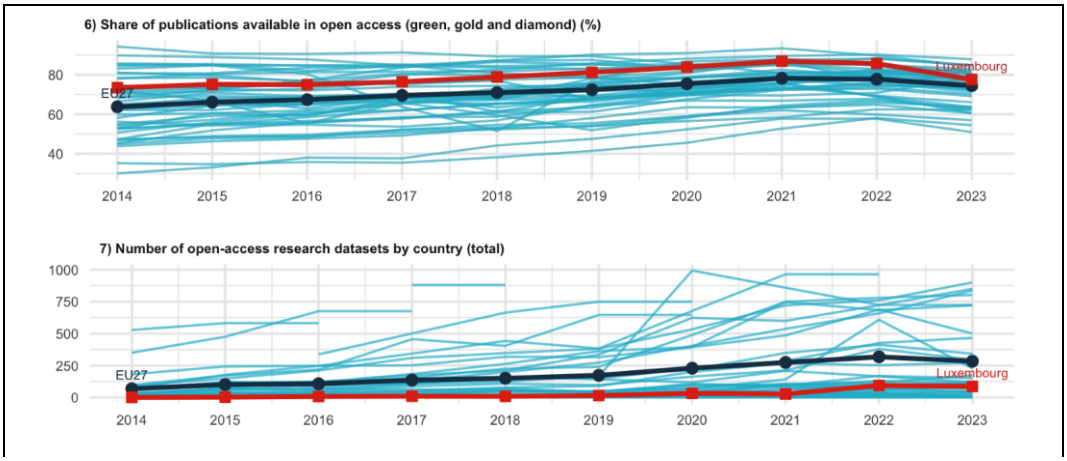
[19] https://www.fnr.lu/science-in-society-2

Luxembourg committed the **ERA Action 7** of fostering knowledge valorisation. The ERA Dashboard shows a high share of public-private co-publications (ERA Dashboard Indicator 19) and three best-practice examples and methodologies for knowledge valorisation (ERA Dashboard Indicator 20). There is a high number of patents registered in Luxembourg, supported through dedicated tax incentives. Yet, ERA Dashboard Indicator 21 shows the number of patent applications per GDP in million Euros. As a large share of Luxembourg's GDP is generated by cross-border commuters, Indicator 21 shows below EU average performance. ERA Dashboard Indicator 25 shows the number of patents by universities and public research organisations in absolute numbers, which reflects the smalls size of the R&I system rather than the patent activity. ERA Dashboard Indicator 22 (share of innovating firms) is below average. The number of business enterprise researchers is above average (ERA Dashboard Indicator 24). The share of business enterprise research in the total number of researchers has been steadily decreasing, which must be seen in the light of a steady increase of researchers at the University of Luxembourg.

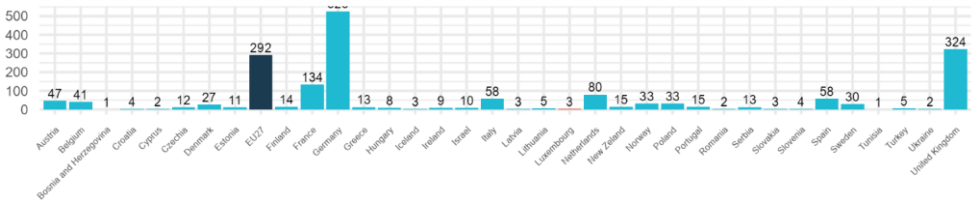
The indicators highlighting Luxembourg's effort to the global approach (**ERA Action 9**) show an above average performance, with a high share of international co-publications (ERA Dashboard Indicator 30) and patents with foreign co-inventors (ERA Dashboard Indicator 21).

The Dashboard also shows indicators for ERA Actions that Luxembourg has not committed to. Interestingly, Luxembourg performs very well in these: For **ERA Actions 3** and **4**, the respective indicators show a high performance in the ERA Dashboard Indicators 17 (share of foreign doctoral students) and 18 (new doctorate graduates). The high performance shows that the University of Luxembourg, as the only university in the country, is a research-intensive university, with a high share of foreign doctoral students. The majority of Luxembourgish citizens complete their PhDs abroad. In general, Luxembourg has a long-standing tradition of handling research careers and assessment as a high priority (e.g. during its past EU presidencies). Luxembourg performs particularly well on Indicators measuring **Scientific Leadership**. ERA Dashboard Indicators 26 (top-10 cited publications world-wide) and 27 (Academic Freedom Index) show above average performance. ERA Dashboard Indicator 28 describes the University of Luxembourg in average position in University rankings. Indicator 29 shows the total number of twenty-four ERC grants (20 University of Luxembourg, 5 to the Luxembourgish research institutes).

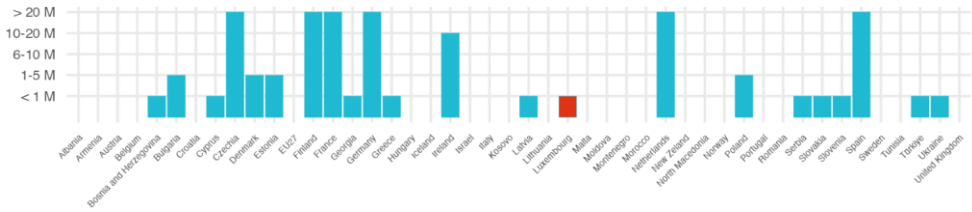
**Figure 3-1 Indicators for ERA Priority 1**



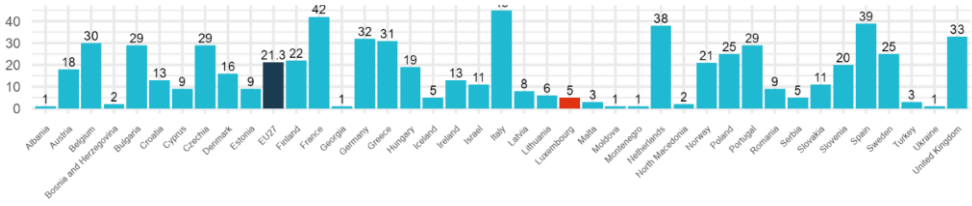
8) Number of repositories by country (total) - 2023



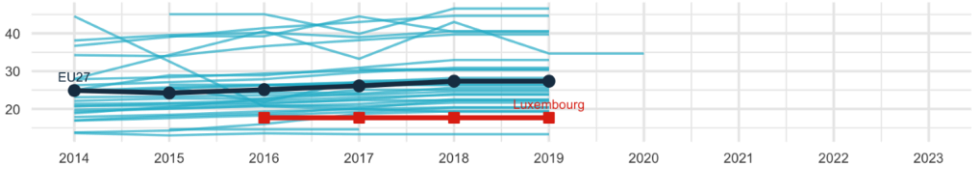

9) Country investments in EOSC and Open Science (in ranges of investment)



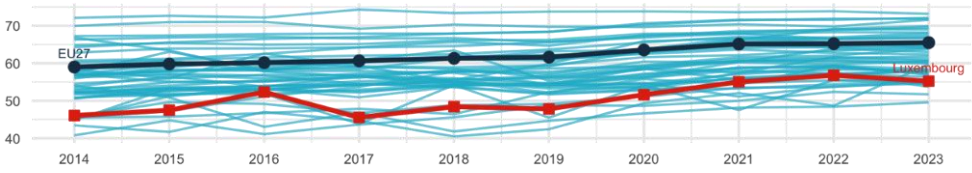

11) Number of European RIs in which a Member State or an Associated Country participates (total) - 2023



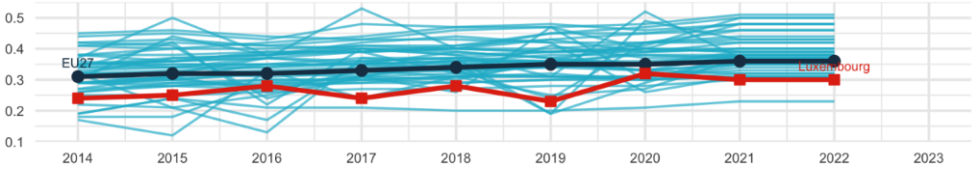

12) Proportion of women of Grade A among academic staff/researchers (%)



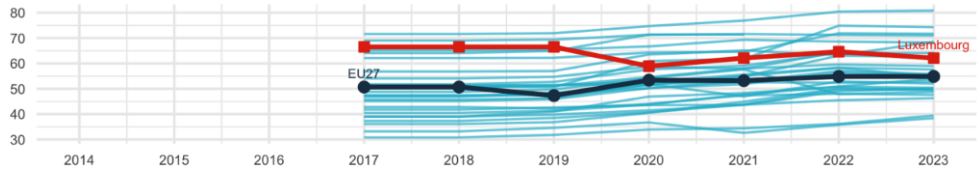

13) Proportion of mixed-gender teams (%)



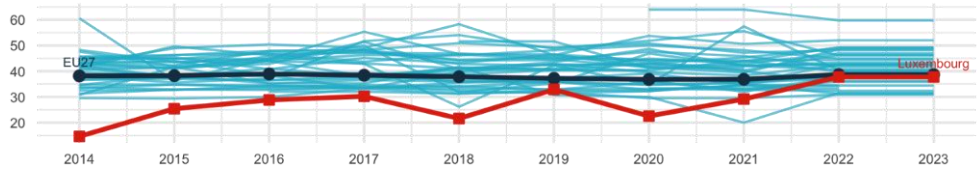

14) Proportion of women in authorships of the top 10% most cited publications (%)



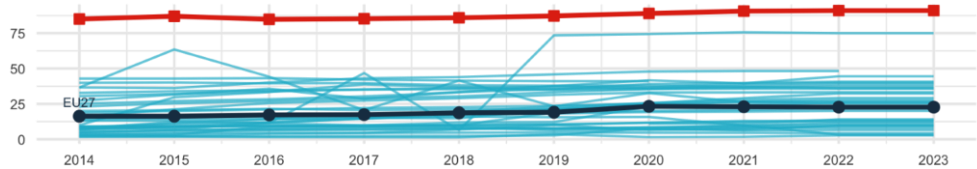
15) Women in Digital index (0-100)



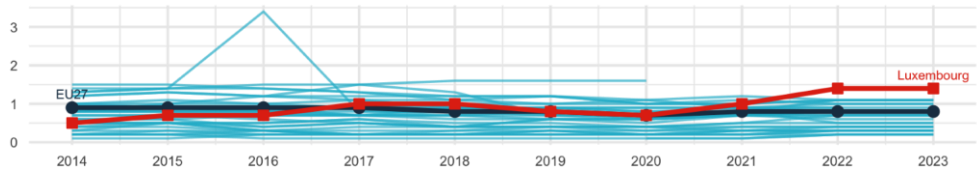

16) Proportion of women among doctoral graduates by narrow fields of STEM (%)



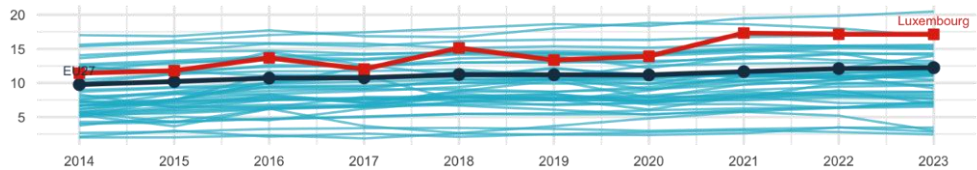

17) Share of foreign doctorate students as a percentage of all doctorate students (%)



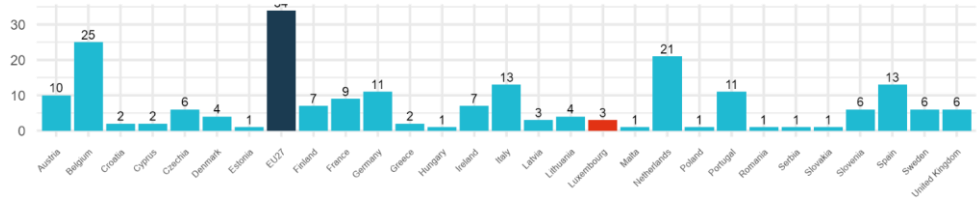

18) New doctorate graduates per 1,000 inhabitants aged 25-34

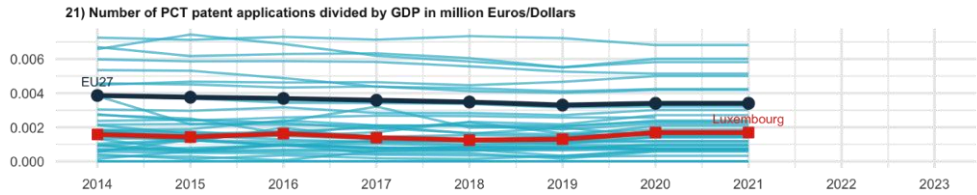


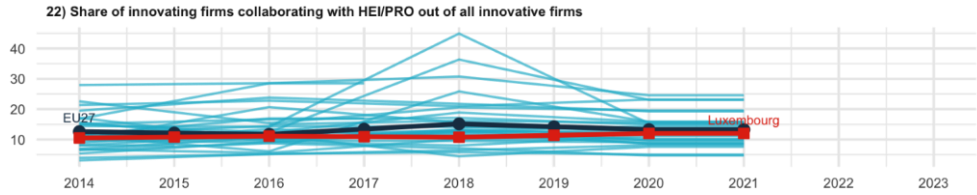

19) Share of public-private co-publications (%)

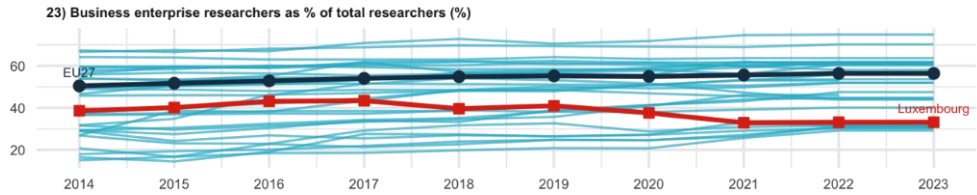


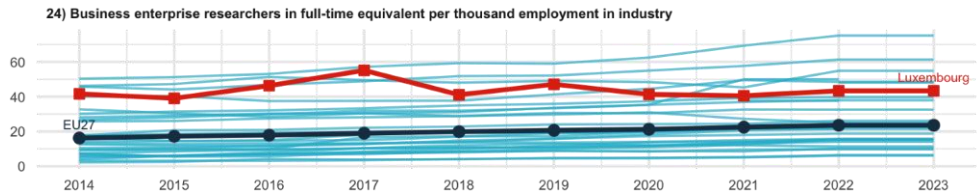

20) Best practice examples and methodologies for knowledge valorisation - 2023

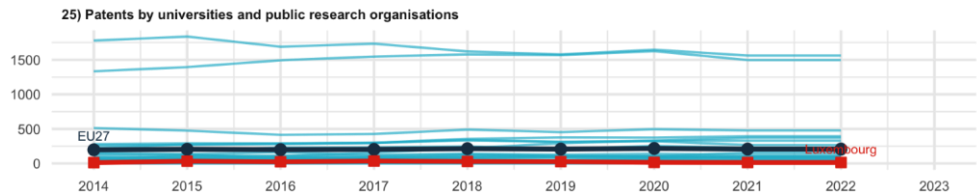


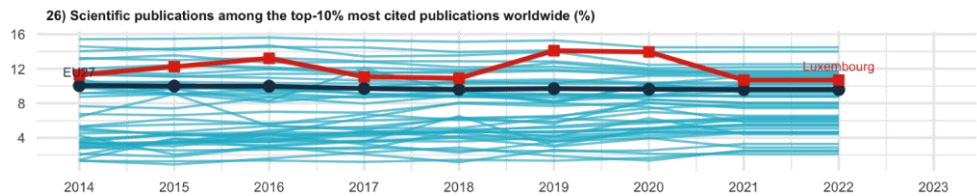

21) Number of PCT patent applications divided by GDP in million Euros/Dollars
0.006
0.004
0.002
0.000
EU27
Luxembourg
2014
2015
2016
2017
2018
2019
2020
2021
2022
2023

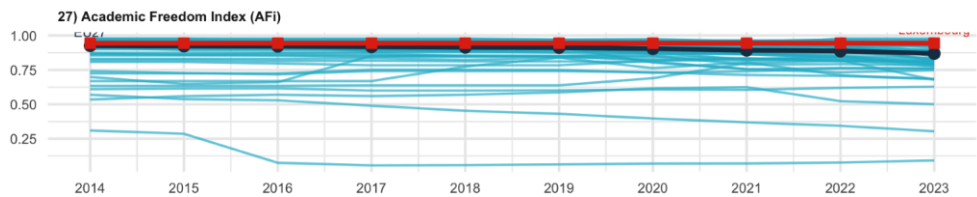

22) Share of innovating firms collaborating with HEI/PRO out of all innovative firms
40
30
20
10
EU27
Luxembourg
2014
2015
2016
2017
2018
2019
2020
2021
2022
2023

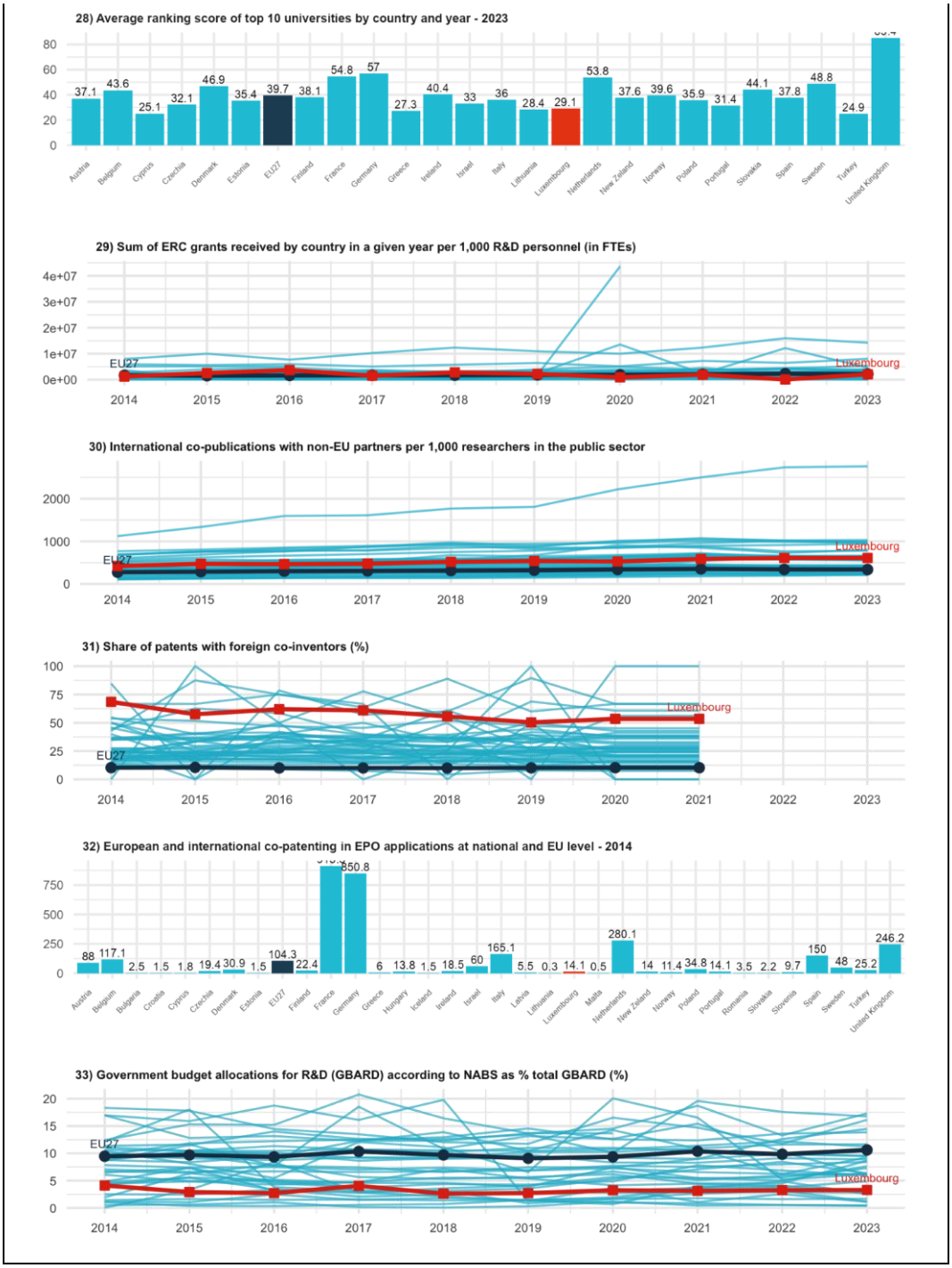

23) Business enterprise researchers as % of total researchers (%)
60
40
20
EU27
Luxembourg
2014
2015
2016
2017
2018
2019
2020
2021
2022
2023


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


25) Patents by universities and public research organisations
1500
1000
500
0
EU27
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
Luxembourg
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



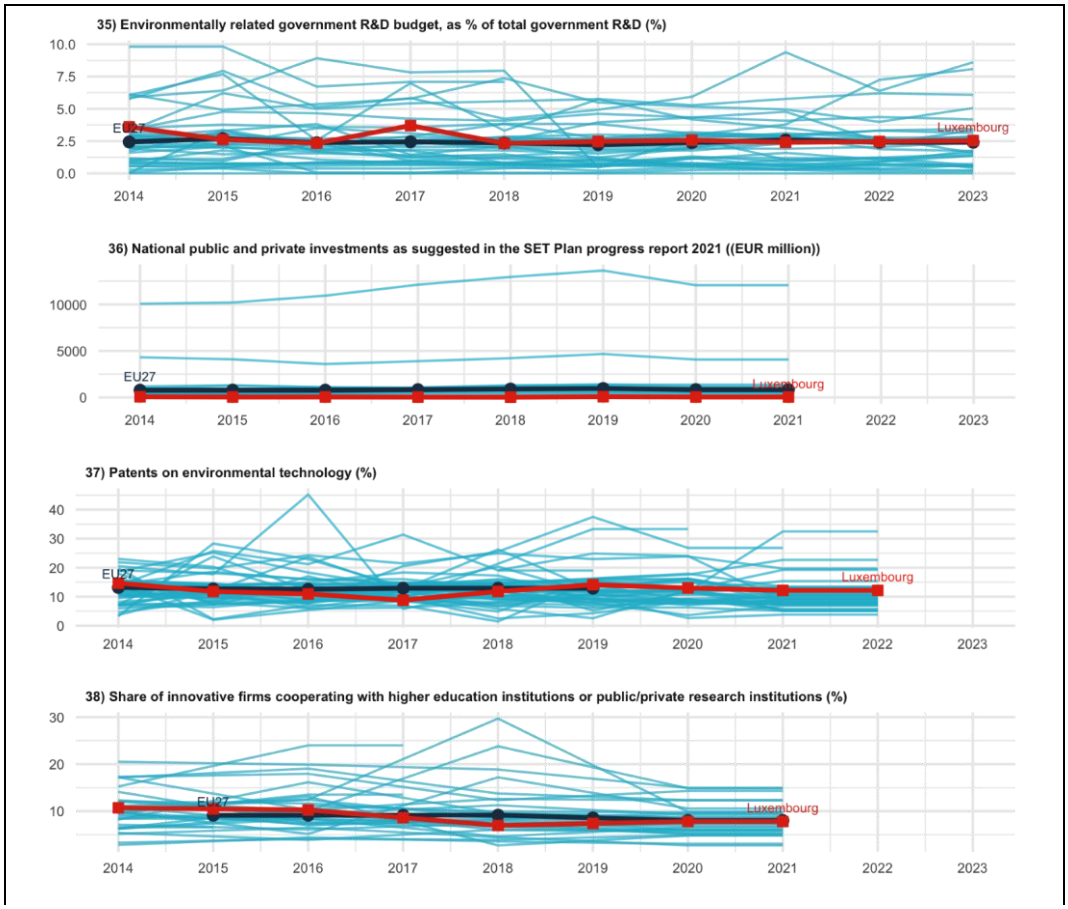

*Source: Annex 1*

**ERA Priority 2** is addressed through **ERA Action 10** on EU R&I Missions and Partnerships and **ERA Action 14** with the aim to bring science closer to citizens.

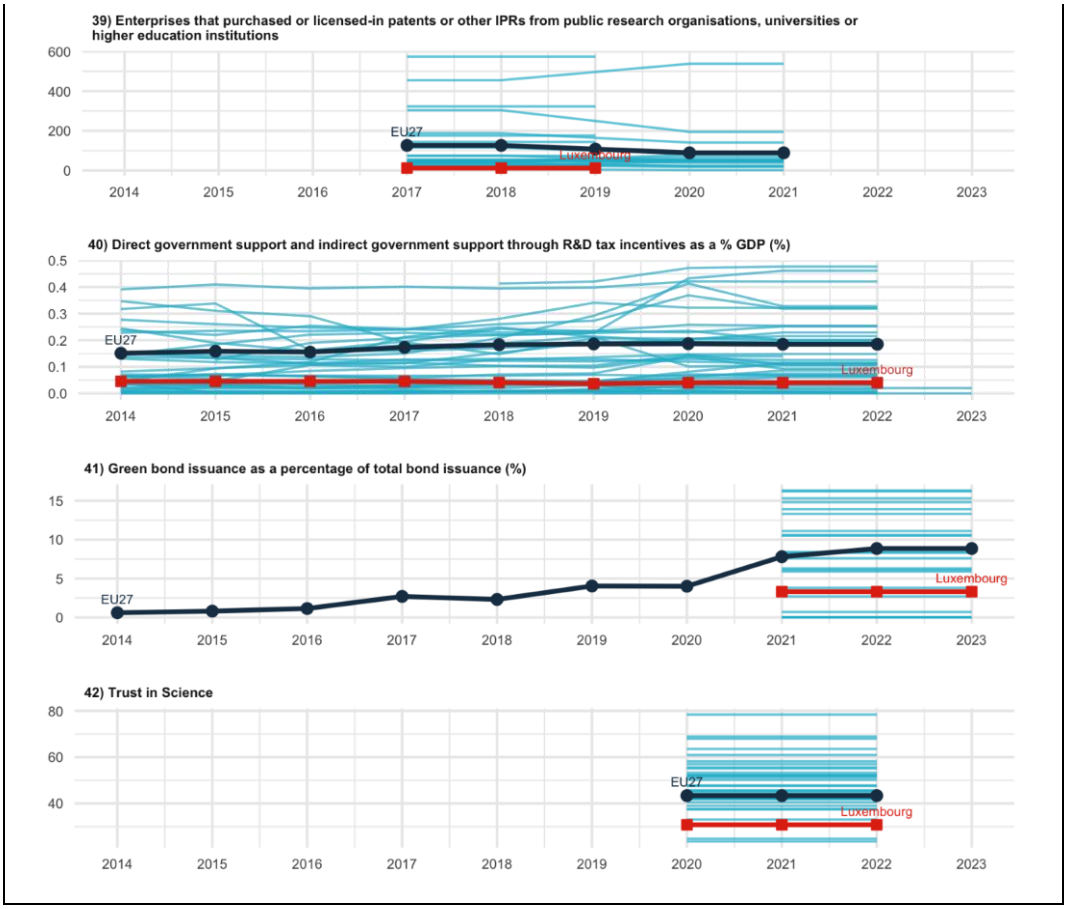
For all the ERA Dashboard Indicators (35-38) measuring the advancements in these challenge-based ERA Action, Luxembourg performs steadily in line with the EU average. Indicator 39, only available until 2019, gives the absolute number of enterprises that purchased or licensed-in patents or other IPRs from public research institutions, which reflects the small number of the R&I system. ERA Dashboard Indicator 40 shows that there is limited direct government support and indirect government support through R&D tax incentives. This indicator fails to consider that in Luxembourg research expenses are tax deductible and that research activities are considered during the negotiations about the company tax rate with the ministry of finance.

The indicators for **ERA Action 14** show that Luxembourg scores below EU average on the Eurobarometer of trust in science. Yet, the FNR commissioned survey[20], conducted in regular intervals since 2007 to understand the public perception of the Luxembourg research community, challenges this assessment, which may be related to the phrasing of the Eurobarometer question. The 2023 survey shows an increasing level of trust, a continued interest, need for information and support for investments and a good notoriety of research actors and initiatives.

**Figure 3-2 Indicators for ERA Priority 2**



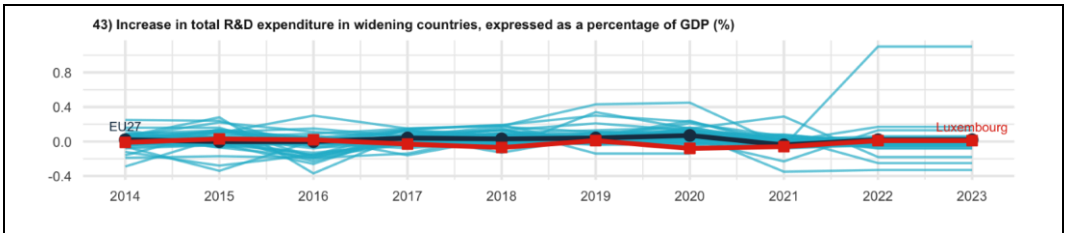

[20] https://www.fnr.lu/representative-fnr-survey-trust-in-science-and-research-increases-in-luxembourgs-population




*Source: Annex 1*

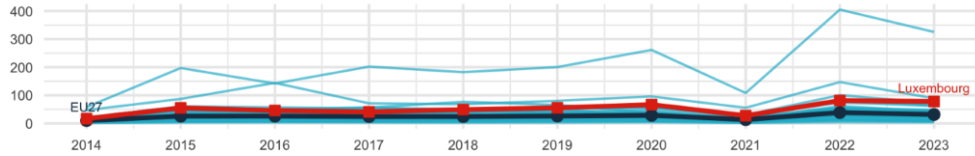
Luxembourg did not commit to any ERA Actions under **ERA Priority 3**. On metrics available for the group of widening countries, Luxembourg was performing above average (e.g., ERA Dashboard Indicators 43-46). [21] All the indicators covering the synergies between Union and national funding and the increased collaborative links (ERA Dashboard Indicators 47-52) are above average. ERA Dashboard Indicator 53 describing the share of public R&D expenditure financed by the private sector is likely below the EU27 average, although latest data was not yet available for all EU Member States at the time of writing this report.

**Figure 3-3 Indicators for ERA Priority 3**

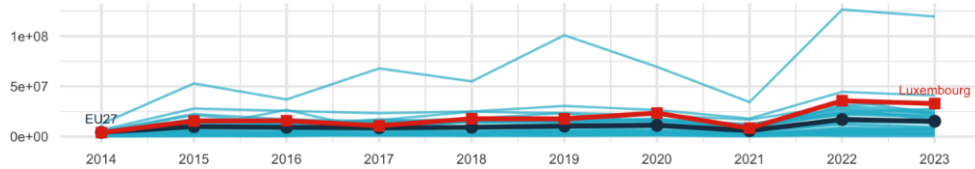



[21] Under Horizon 2020, Luxembourg was listed as a Widening country.

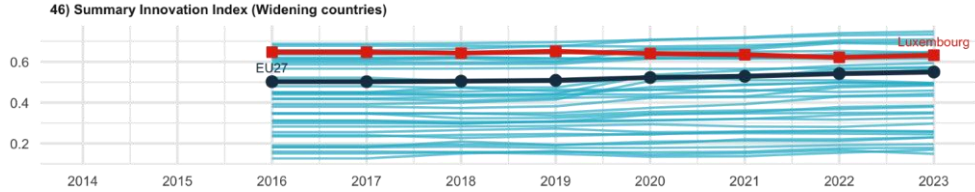
44) Number of participations in Horizon Europe (of Widening countries) measured in terms of 1,000 R&D personnel (in FTEs)



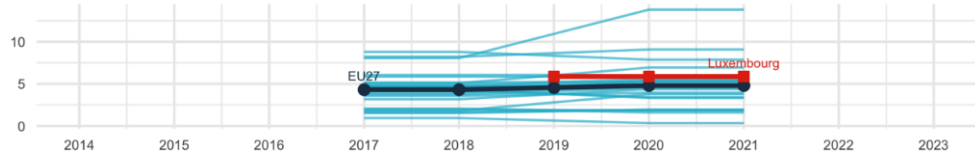

45) Sum of Horizon Europe grants (€) received by Widening countries in terms of 1,000 R&D personnel (in FTEs)



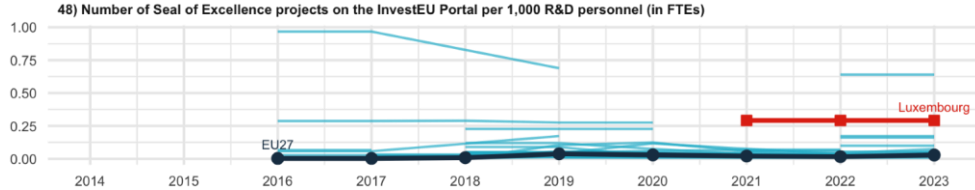

46) Summary Innovation Index (Widening countries)



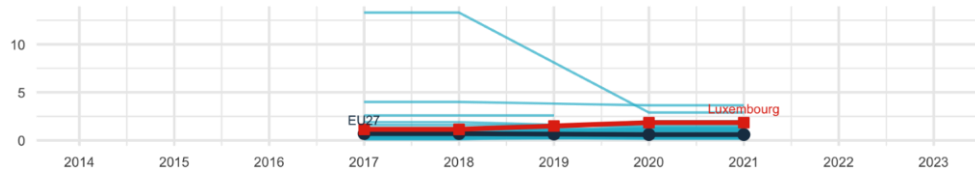

47) Share of enterprises using public funds from different governance levels (local or regional, national, and EU) for R&I activities (%)



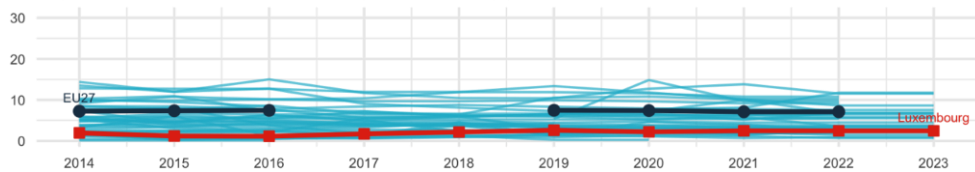

48) Number of Seal of Excellence projects on the InvestEU Portal per 1,000 R&D personnel (in FTEs)




52) Share of innovative enterprises that cooperated with RPOs located in other countries (%)



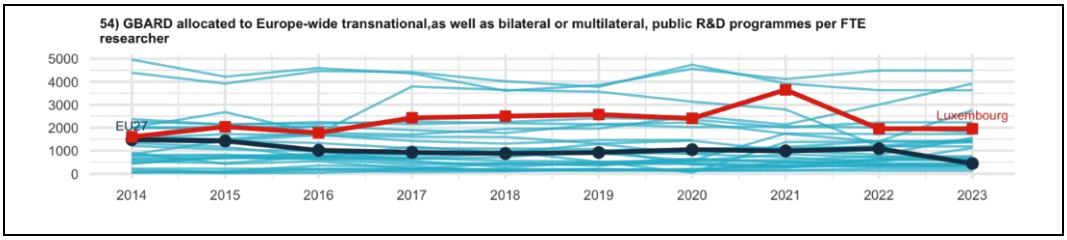

53) Share of public R&D expenditures financed by the private sector (%)



*Source: Annex 1*

Luxembourg did not commit to any ERA Action of **ERA Priority 4.** Despite this, ERA Dashboard Indicator 54, describing the GBARD allocated to EU-wide transnational, as well as bilateral or multilateral, public R&D programmes per FTE researcher, performs well above average.

**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 implementation of Luxembourg and their effects on the national R&I system, including the quantitative performance in the ERA Dashboard.

The National Research and Innovation Strategy (2020-2030)[22] is the central strategic document for Research and Innovation Policy in Luxembourg. The strategy describes three missions of research, which align well with ERA Actions that Luxembourg has committed to, but also with many actions it has not. While it is difficult to attribute positive effects solely to the implementation of ERA actions, progress under the national strategy's first mission "coordinate governance, infrastructures and policies" goes hand in hand activities under the umbrella **ERA Action 1** (Open Science) and **ERA Action 4** (Gender equality). Under the second mission, "promote a regulatory framework and funding instruments that allow research to act as a drive for innovation in industry services and the public sector", the implementation of reforms linked to **ERA Action 7** (Knowledge valorisation) promises beneficial synergies for Luxembourg's R&I system. The possible synergy with **ERA Action 10** (Missions, Partnerships) may also help further building on the underlying strengths in public and private R&I cooperation. The third mission of the national strategy, "anchorage of science in society", aligns with **ERA Action 14** (Citizens). The implementation supports ongoing efforts at national and institutional level in improving these linkages.

Finally, the National Research and Innovation Strategy further describes four interdisciplinary research priority areas, which in principle align with ERA Actions: Industrial and Service Transformation (e.g., **ERA Action 12**), Personalised Healthcare, 21st century education (e.g., **ERA Action 13 and 14**), and Sustainable and responsible development (e.g., **ERA Action 11**). Luxembourg has not committed to these actions, rendering the assessment of impacts on these national priorities difficult.

[22] https://www.researchluxembourg.org/en/research-landscape/national-research-innovation-strategy

# 5. Conclusions

As a small country Luxembourg, has committed to six ERA actions. The selection of priorities reflects the areas where Luxembourgish stakeholders pursue focused activities. Luxembourg performs particularly strong in ERA Dashboard Indicators for ERA Action 1, which corresponds to its long-standing commitment to further open access and open science.

Luxembourg performs below average for most of the indicators in ERA Action 5. The explicit aim to promote gender equality and foster inclusiveness in science is high on the agenda and covered through several explicit initiatives, showing one area in which ERA Action implementation can benefit the national R&I system.

Luxembourg advances well for ERA Action 7, although many of the indicators measuring the advancement fail to capture specificities of Luxembourg's R&I system. Also, for ERA Action 9 Luxembourg is well on-track, performing above average for the indicators capturing the global approach. ERA Action 10 aligns well with Luxembourg's initiatives towards mission-oriented policy making, especially for the four national priority areas, despite overall. Despite Luxembourg's strong efforts to bring science closer to citizens, Luxembourg performs below average for the indicator of ERA Action 14, i.e. the Eurobarometer for trust in science, which stands in contrast to the findings of a survey by FNR showing an increasing level of trust in science.

Luxembourg has committed to mainly in areas that require further effort and several other priority areas (e.g., Citizen Science, Open Science). Other areas with high performance compared to the EU average, such as attractive research careers or scientific leadership, have not been chosen. The commitment to specific areas showcases the potential of synergies between national priorities and ERA actions, despite challenges in attributing positive effects to the ERA Actions over the reporting period.

# 6. References


Coalition Agreement of the Luxembourgish Government https://gouvernement.lu/lb/actualites/toutes_actualites/articles/2023/11-novembre/16-signature-accord-coalition.html

EU council recommendation on enhancing research security: https://data.consilium.europa.eu/doc/document/ST-9097-2024-REV-1/en/pdf

EU Knowledge Valorisation Repository of Best practices: https://projects.research-and-innovation.ec.europa.eu/en/research-area/industrial-research-and-innovation/eu-valorisation-policy/knowledge-valorisation-platform/repository

European Innovation Scoreboard 2024 – Country Profile Luxembourg: Country https://ec.europa.eu/assets/rtd/eis/2024/ec_rtd_eis-country-profile-lu.pdf

FNR – NCER – Support for strategic research centre development: https://www.fnr.lu/funding-instruments/ncer-initiate/

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FNR Open Access Policy and National Policy for Open Access: https://fnrlu.sharepoint.com/sites/Website/General%20Guidelines%20%20Policies/Forms/AllItems.aspx?id=%2Fsites%2FWebsite%2FGeneral%20Guidelines%20%20Policies%2FOPEN%20ACCESS&p=true&ga=1FNR Survey on trust in science and research: https://www.fnr.lu/representative-fnr-survey-trust-in-science-and-research-increases-in-luxembourgs-population/

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National Research and Innovation Strategy: https://www.researchluxembourg.org/en/research-landscape/national-research-innovation-strategy/

Performance of European Partnerships: https://op.europa.eu/en/publication-detail/-/publication/8f71dfd0-76fe-11ef-bbbe-01aa75ed71a1

TRAMI – Missions Playbook: https://www.trami5missions.eu/sites/default/files/2024-05/TRAMI_Playbook.pdf

Zero-tolerance code of conduct: https://op.europa.eu/en/publication-detail/-/publication/6ce8aef5-70b3-11ef-a8ba-01aa75ed71a1/language-en

# 7. Annex 1 – List of ERA Dashbord Indicators

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

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

**Table 1 Structural Key Indicators:**

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

**Figure 3.1 Indicators for ERA Priority 1**

| Indicator number | Indicator | Source |
|---|---|---|
| 6 | Share of publications available in open access (green, gold, and diamond) | OpenAIRE |
| 7 | Number of open-access research datasets by country | OpenAIRE |
| 8 | Number of repositories by country | EOSC - Re3data |
| 9 | Country investments in EOSC and Open Science (in ranges of investment) | EOSC Observatory |
| 10 | Share of national public R&D expenditure committed to European research infrastructures | ESFRI |
| 11 | Number of European RIs in which a Member State or an Associated Country participates | ESFRI |
| 12 | Proportion of women of Grade A among academic staff/researchers | Women in Science - She Figures |
| 13 | (Corrected) Proportion of mixed-gender teams | EC_Scopus |
| 14 | (Corrected) Proportion of women in authorships of the top 10% most cited publications | EC_Scopus |
| 15 | Women in Digital index (0-100) | EC-Women in Digital Scoreboard |
| 16 | Proportion of women among doctoral graduates by narrow fields of STEM | Eurostat |

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

**Figure 3.2 Indicators for ERA Priority 2**

| Indicator number | Indicator | Source |
|---|---|---|
| 34 | Note: The ERA Dashboard Indicator 34 was removed from the Dashboard in January 2025. As a consequence, the indicator has also been omitted from the Country Report, while, however, keeping the original numbering of the indicators. | |
| 35 | Environmentally related government R&D budget, as % of total government R&D | Eurostat |
| 36 | National public and private investments as suggested in the SET Plan progress report 2021 (EUR million) | SETIS R&I data |
| 37 | % Patents on environmental technology | OECD |
| 38 | Share of innovative firms cooperating with higher education institutions or public/private research institutions | Eurostat CIS |
| 39 | Enterprises that purchased or licensed-in patents or other IPRs from public research organisations, universities or higher education institutions | Eurostat CIS |
| 40 | Direct government support and indirect government support through R&D tax incentives as a % GDP | OECD |
| 41 | Green bond issuance as a percentage of total bond issuance | Eurostat - EEA |

| | | |
|---|---|---|
| 42 | Trust in Science | Eurobarometer 95.2 |
| 43 | Increase in total R&D expenditure in widening countries, expressed as a percentage of GDP | Eurostat, OECD, UNESCO |

**Figure 3.3 Indicators for ERA Priority 3**

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

**Figure 3.4 Indicators for ERA Priority 4**

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

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ERA Monitoring 2024: ERA Country Report Luxembourg.

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