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Country Snapshot
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Country profile: Belgium

COUNTRY SNAPSHOT

Progress of Belgium towards ERA Roadmap

	Indicator	Performance					Growth					
	Name	Reference year	Score	Cluster	Lead/Gap (Δ %)	EU-28	Reference Period	CAGR	Trend (2005–2015)	Lead/Gap (Δ % pt)	EU-28	
Across Priorities	1 – Adjusted Research Excellence	2013	57.2	1	29	44.4	2010–2013	9.5%		3.2	6.4%	
	2A – GBARD to transnatl coop (EUR/researcher)	2014	9,251	1	269	2,507	2010–2014	1.0%		-6.8	7.8%	
	2B – Roadmap for ESFRI projects	No national roadmap in place										
	3 – EURAXESS job ads per 1 000 researchers	2014	51.9	2	10	47.0	2012–2014	0.8%		-7.0	7.8%	
	4 – Share of women among Grade A HES	2014	15.6%	4	-34	23.5%	2007–2014	6.4%		3.1	3.4%	
	5A – Research institute–private collaboration	2012	13.3%	1	84	7.3%	2008–2012	0.4%		-3.1	3.5%	
	5A – Higher education–private collaboration	2012	18.1%	1	50	12.0%	2008–2012	-1.2%		-2.5	1.3%	
	5B – Share of papers in Open Access (Total)	2014	57.9%	2	11	52.2%	Not computed					
	6 – Collab papers w/non-ERA per 1 000 researchers	2014	62.8	2	24	50.7	2005–2014	3.0%		-1.1	4.1%	
	Headline Composite	2016	64	1	28	50	Not computed					
Priority 1	Adjusted Research Excellence ^(c)	2013	57.2	1	29	44.4	2010–2013	9.5%		3.2	6.4%	
	GBARD as share of GDP ^(c)	2014	0.681%	2	1	0.671%	2008–2014	0.5%		1.0	-0.5%	
	European Innovation Scoreboard	2015	0.602	2	15	0.521	2008–2015	0.9%		0.2	0.7%	
	GBARD as share of government expenditures	2014	1.24%	3	-11	1.39%	2005–2014	1.1%		1.9	-0.8%	
	R&D tax incentives as share of GBARD	2013	31.1%	1	174	11.4%	Not computed					
	Share of GBARD allocated on project basis	2014	:	Not computed			2009–2014	:	Not computed			
	Patent applications per 1 000 researchers	2013	26.6	2	-11	29.8	2005–2013	-3.2%		-2.0	-1.2%	
	Researchers per 1 000 active population ^(c)	2014	9.53	2	29	7.40	2005–2014	3%		0.8	2.4%	
	Publications per 1 000 researchers ^(c)	2014	548	2	14	481	2005–2014	0.0%		-1.7	1.6%	
	Priority 1 Composite	2016	60	2	20	50	Not computed					
Priority 2	A – GBARD to transnatl coop (EUR/researcher) ^(c)	2014	9,251	1	269	2,507	2010–2014	1.0%		-6.8	7.8%	
	A – Collab papers w/ERA per 1 000 researchers ^(c)	2014	113.3	2	73	65.7	2005–2014	1.8%		-1.8	3.6%	
	A – Public-to-public partnerships (EUR/researcher) ^(c)	2014	1,064	2	108	512	2012–2014	55.5%		13.4	42.1%	
	A – Co-invention rate w/ERA partners ^(c)	2011–13 ^(R)	31.0%	1	139	13.0%	2007–2013 ^(R)	-2.1%		-1.6	-0.5%	
	B – Roadmap for ESFRI projects	No national roadmap in place										
	B – Participation in developing ESFRI projects	2016	33.3%	2	61	20.7%	Not computed					
	B – Participation in operational ESFRI landmarks ^(c)	2016	48.3%	1	60	30.2%	Not computed					
	Priority 2 Composite	2016	70	1	40	50	Not computed					

Country profile: Belgium

	Indicator	Performance				Growth					
		Name	Reference year	Score	Cluster	Lead/Gap (Δ %)	EU-28	Reference Period	CAGR	Trend (2005-2015)	Lead/Gap (Δ % pt)
Priority 3	EURAXESS job ads per 1 000 researchers ^(c)	2014	51.9	2	10	47.0	2012-2014	0.8%		-7.0	7.8%
	Open, transparent, merit-based hiring process ^(c)	2012	47.1%	2	-4	49.0%			<i>Not computed</i>		
	Share of doctoral students from EU countries ^(c)	2013	11.8%	2	60	7.4%			<i>Not computed</i>		
	Priority 3 Composite	2016	66	2	5	63			<i>Not computed</i>		
Priority 4	Share of women among Grade A in HES ^(c)	2014	15.6%	4	-34	23.5%	2007-2014	6.4%		3.1	3.4%
	Gender dimension in research content ^(c)	2011-15 (R)	1.12	3	15	0.97	2005-2015 (R)	2.4%		2.9	-0.5%
	Share of women among heads of HES institutions ^(c)	2014	23.8%	2	18	20.1%			<i>Not computed</i>		
	Share of women researchers ^(c)	2013	33.4%	3	1	33.2%	2005-2013	1.5%		0.8	0.8%
	Share of women among PhD graduates ^(c)	2012	43.8%	4	-8	47.3%	2005-2012	2.5%		1.3	1.2%
Priority 4 Composite	2016	42	3	-9	46			<i>Not computed</i>			
Priority 5	A - Research institute-private collaboration ^(c)	2012	13.3%	1	84	7.3%	2008-2012	0.4%		-3.1	3.5%
	A - Higher education-private collaboration ^(c)	2012	18.1%	1	50	12.0%	2008-2012	-1.2%		-2.5	1.3%
	A - Share of public R&D funded privately ^(c)	2013	18.6%	1	129	8.1%	2009-2013	0.3%		-0.7	0.9%
	A - Public-private collab papers per capita ^(c)	2014	68.5	2	102	33.9	2008-2014	-0.1%		0.0	-0.1%
	B - Share of papers in Open Access (Total) ^(c)	2014	57.9%	2	11	52.2%			<i>Not computed</i>		
	B - Share of papers in Open Access (Green)	2014	51.3%	1	15	44.7%			<i>Not computed</i>		
	B - Share of papers in Open Access (Gold)	2014	22.5%	3	7	21.0%			<i>Not computed</i>		
	B - National Open Access policies adopted	Yes, OA policies for research data [Unknown]; Yes, OA policies for scientific publications [Unknown (2); 2007]									
Priority 5 Composite	2016	81	1	98	41			<i>Not computed</i>			
Priority 6	Collab papers w/ non-ERA per 1 000 researchers ^(c)	2014	62.8	2	24	50.7	2005-2014	3.0%		-1.1	4.1%
	Share of doctoral students from outside EU ^(c)	2012	22.0%	2	-14	25.5%	2005-2012	2.4%		-1.1	3.5%
	Licence & patent rev. from abroad, share of GDP ^(c)	2013	0.64%	2	0	0.64%	2006-2013	8%		-1.5	9.6%
	Co-invention rate w/non-ERA partners ^(c)	2011-13 (R)	18.0%	1	83	9.8%	2007-2013 (R)	3.5%		1.2	2.3%
Priority 6 Composite	2016	71	1	29	55			<i>Not computed</i>			

COUNTRY NARRATIVE

Falling into Cluster 1 on the headline composite indicator and exhibiting a lead of 28 % relative to the EU-28 average, Belgium is among the top performers in terms of progress towards achieving the European Research Area (ERA). Note that this composite score relies on the core high level indicators that were selected as being the most relevant in monitoring progress in achieving the ERA by the European Research Area and Innovation Committee (ERAC Secretariat, 2015). As such, it provides only a partial view of all the relevant and complementary dimensions captured by the indicators listed in the above table. The reader should be careful in extracting conclusions on overall performance, acknowledging the presence of variability across all the dimensions within and between priorities.

1. More effective national research systems

Belgium's performance in Priority 1 is generally very strong, with almost all performance scores falling into clusters 1 and 2, and a Cluster 2 classification on the priority composite.

The lowest performing indicator in this priority is government budget appropriations or outlays for research and development (GBARD) as a share of government expenditures, for which Belgium falls into Cluster 3 and trails behind the EU-28 average by 11 %. However, Belgium is a leader in research and development (R&D) tax incentives as a share of GBARD, which at 31.1 % exceeded the EU-28 average by 174 %.

Belgium's R&D governance system is highly decentralised, which makes it very difficult to make broad statements about funding attribution at the project and institutional level (Kelchtermans & Zacharewicz, 2016). Despite variability between regions, in the past 10-20 years, there has been a shift from 'block funding' towards competitive institutional or project-based funding. The focus of this shift has been on institutional funding with the aim of increasing competition while also ensuring a certain degree of stability in smaller institutions. The allocation of competitive project funding follows international and European standards for peer review and the process is regularly assessed (Kelchtermans & Zacharewicz, 2016).

Growth was highest for the headline 'adjusted research excellence' indicator, which showed a mean annual increase of 9.5 % over the 2010-2013 period (3.2 percentage points over the EU-28 average). By contrast, patent applications per 1 000 researchers declined over time and at a rate greater than that of the EU-28 average, with a mean annual reduction of 3.2 % over 2005-2013.

2. Optimal transnational co-operation and competition

Overall, Belgium performs very well in Priority 2, falling into Cluster 1 on the priority composite indicator and leading the EU-28 average by 40 %.

a. Jointly addressing grand challenges

Belgium's performance in Sub-priority 2a is very strong, falling into Cluster 1 or 2 for all indicators. Performance was particularly strong in the share of GBARD allocated to transnational cooperation public-to-public partnerships, and the co-invention rate with ERA partners, which all fell into Cluster 1 and exhibited large, positive scores relative to the EU-28 average. Indeed, Belgium participates in many joint initiatives at EU level, including four article 169/185 initiatives, 8 of 10 joint programming initiatives and many ERA-NET, ERA-NET+ and ERA-NET Co-funds (Kelchtermans & Zacharewicz, 2016).

The rate of growth across these indicators, however, generally fell behind the EU-28's, suggesting that other countries are catching up. The exception is for public-to-public partnerships, which had a mean annual increase of 55.5 % over the 2012-2015 period and exceeded the EU-28's average annual growth rate by 13.4 percentage points.

b. Make optimal use of public investments in research infrastructures

Belgium's performance in Sub-priority 2b is also very strong, with a Cluster 1 placement in ESFRI participation in operational landmark projects, and a Cluster 2 placement in developing projects (relative to the ERA average). Belgium also comes out ahead of the EU-28 average on both of

these dimensions. This apparent strength comes despite the fact that Belgium does not have a national research infrastructure roadmap in place.

In Flanders, the Hercules Foundation allocates subsidies to medium- and large-scale research infrastructure projects at universities and Strategic Research Centres. Belgium also has 14 research infrastructures listed in the Mapping of the European Research Infrastructure Landscape (MERIL) inventory (Kelchtermans & Zacharewicz, 2016).

3. An open labour market for researchers

Belgium performs relatively well in Priority 3, falling into Cluster 2 across all of the indicators including the priority composite.

Variability in performance exists across the indicators, however, with the share of doctoral students from other EU countries exceeding the EU-28 average by 60 %. On the other hand, despite having a lead relative to the EU-28 average in performance on the headline indicator of EURAXESS job ads per 1 000 researchers in 2014, as well as modest annual growth of 0.8 % over the 2012-2014 period, Belgium's growth rate lagged behind the EU-28's by 7.0 percentage points. This lower score may be attributable to the propensity for job advertisements to be posted on domain-specific websites as opposed to EURAXESS or other platforms aimed at a more generalist audience (Kelchtermans & Zacharewicz, 2016).

As a result of increased investment in R&D over recent years, Belgium's highly autonomous universities have further emphasised human resource policies (Kelchtermans & Zacharewicz, 2016). In 2012, however, performance in open, transparent and merit-based hiring lagged slightly below the EU-28 average. It would be useful to have more up-to-date data to determine whether this has improved in recent years.

Portability of grants differs by community, with the Flemish Community allowing researchers to use grants for short to medium-long stays abroad provided they remain linked to a Flemish university (Kelchtermans & Zacharewicz, 2016). Grants provided through the 'Back to Belgium' Federal initiative are portable for a period of up to three months, while grants under the Wallonia-Brussels Federation are not portable (Kelchtermans & Zacharewicz, 2016).

4. Gender equality and gender mainstreaming in research

Belgium has put in place a number of laws and procedures aimed at improving gender equality in the higher education sector. In the Flemish Community, for example, all universities began implementing gender equality action plans in 2014 (Kelchtermans & Zacharewicz, 2016). Also in 2014, universities in the Wallonia-Brussels Federation began allocating a 'gender contact person' who will be responsible for reporting and acting on other issues related to improving the gender balance.

Despite these efforts, Priority 4 is one of Belgium's weaker areas overall, falling into Cluster 3 on the priority composite indicator and trailing the EU-28 average. Performance was particularly low for the headline indicator of the share of women in Grade A in the higher education sector, which lags 34 % behind the EU-28 average. However, Belgium performed relatively well in the share of women among heads of higher education institutions, falling into Cluster 2 and exceeding the EU-28 average by 18 %. Belgium's weakest performance relative to the ERA average is in the share of women among PhD graduates, which fell into Cluster 4.

Despite weaker performance on some indicators, Belgium's mean annual growth rates were positive and exceeded the EU-28's in all cases. This was the most pronounced in the share of women in Grade A positions in the higher education sector, which grew by 6.4 % annually, between 2007-2014 — a rate 3.1 percentage points above the EU-28's.

5. Optimal circulation, access to and transfer of scientific knowledge including via digital ERA

Overall, Belgium performs very well in Priority 5, falling into Cluster 1 and exceeding the EU-28 average on the priority composite indicator by 98 %.

a. Knowledge transfer

Belgium performs very well in Sub-priority 5a, falling into Cluster 1 on average and exhibiting large, positive leads over the EU-28 average performance scores. This is particularly pronounced for the share of public R&D funded through private sources, which at 18.6 % in 2013, exceeded the EU-28 average by 129 %.

Indeed, a large number of varied initiatives exist in Belgium aimed at promoting knowledge transfer between the higher education and private sectors. The Walloon and Flemish knowledge transfer policies are tied into the country's smart specialisation strategies, with both aiming to increase cooperation (Kelchtermans & Zacharewicz, 2016). In Wallonia, the FIRST Programmes provide avenues through which specialists in the private sector can be temporarily assigned to higher education institutions and vice versa. In Flanders, exchange schemes are incorporated into broader R&D subsidies and specific grants, and in 2013 the TETRA programme was implemented to promote the transfer of knowledge between university colleges and private or social organisations. There are also a number of programmes that foster industry experience during PhD studies — for example, the Doctiris programme run by Innoviris in the Brussels Capital Region (Kelchtermans & Zacharewicz, 2016).

Despite strong performance across all indicators in this priority, growth in recent years was consistently lower than the EU-28 average, suggesting that other countries are closing the gap. For example, while the EU-28 saw an increase in the rate of collaboration between the higher education institutions and the private sector, mean annual collaboration decreased by 1.2 % in Belgium over 2008-2012.

b. Open access

Belgium has a number of policies related to open access research data and scientific publications, which were spurred by the 2007 signing of the Berlin Declaration on open access by research and funding organisations in the country (Kelchtermans & Zacharewicz, 2016). However, there is no direct link between open access initiatives and national policy, despite the fact that joint consultations that have taken place in recent years between different stakeholders in academia. Talks have also taken place at both the Flemish and federal government levels regarding the opening access to government data, suggesting that the move towards open access is distributed across multiple sectors.

Of particular note is that Belgium is home to an internationally renowned model of open access within universities, known as the 'Liege Model' (Kelchtermans & Zacharewicz, 2016). Having originated at Liege University around 2007, researchers' performance assessment and evaluations are based entirely on the research products they have deposited into the university's repository. Belgium also has three repositories listed in the World Ranking of Repositories' top 100 repository list (Kelchtermans & Zacharewicz, 2016).

Belgium's performance in the share of papers in green open access is among the strongest of all ERA countries, falling into Cluster 1. Performance in the share of papers in gold open access is not remarkably different from the EU-28 average, with a small, positive lead of 7 % despite a Cluster 3 categorisation relative to the ERA as a whole (due to the fact that some non-EU countries are performing very well in this regard).

6. International cooperation

Belgium's performance in Priority 6 is relatively strong, falling into Cluster 2 across all indicators and into Cluster 1 for the priority composite. Belgium's advantage was particularly pronounced for the co-invention rate with non-ERA partners, which exceeded the EU-28 average by 83 %.

Bilateral agreements at the Community or Federal level are the primary instrument through which international cooperation takes place in the Belgian R&I system (Kelchtermans & Zacharewicz, 2016). Within the Flemish Community, international cooperation also includes researcher exchanges. At the Federal level, agreements are in place with a variety of third countries, including some in Asia (e.g. China, Vietnam) as well as Russia.

As with several other priorities, modest growth was observed for some indicators in Priority 6, but the negative lead/gap values relative to the EU-28 averages would suggest that other countries

are catching up in some aspects. In Priority 6, the exception is for licence and patent revenues from abroad as a share of GDP where Belgium performed above the EU-28 average in 2013 and also experienced a higher growth rate (mean annual increase of 8 % over 2006-2013).

Summary

Belgium is a strong performer and overall is among the highest ranked countries in overall progress towards achieving the ERA. With the exception of Priority 4 (gender equality and gender mainstreaming in research), Belgium's priority composites fall into the first or second cluster. Within Priority 4, however, Belgium showed improvements across all indicators in recent years, suggesting that they are closing one of the country's only performance gaps.

Performance was particularly strong for Sub-priority 2a (jointly addressing grand challenges) and 5a (knowledge transfer). With some exceptions (e.g. public-to-public partnerships), Belgium's growth trends are positive but small, suggesting continuous improvements in performance, although not always to the same extent as the EU-28. Indeed, across several indicators, Belgium's mean annual growth rate was eclipsed by the EU-28's, suggesting that other countries are catching up.

Belgium published a complete and detailed 2016 National Action Plan (also called an ERA national roadmap), which includes, for all priorities, 'Strategic policy aims and actions points' with implementation horizons for the federal and regional governments. For instance, in regard to Priority 4 (in which Belgium has more room for improvement), the following 'Priority actions' for the federal government have been outlined: (a) 'To implement the Law of 12 January 2007 (law on "gender mainstreaming")', (b) 'To provide training on the gender dimension in research for R&D managers and for researchers of the FRIs [Federal Research Institutions]', (c) 'To develop an action plan for all new R&I programmes', and (d) 'To develop and distribute an awareness-raising document' (BELSPO, 2016).

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ANNEX: METHODOLOGICAL NOTES

	Indicator	Data availability	Flag								
			Exception to ref. year	Exception to ref. period	Break in time series	Definition differs	Estimated	Provisional	Potential outlier	Revised	Eurostat estimate
Priority 1	Adjusted Research Excellence	Available									
	GBARD as share of GDP	Available									
	European Innovation Scoreboard	Available									
	<i>GBARD as share of government expenditures</i>	Available									
	<i>R&D tax incentives as share of GBARD</i>	Available	2012								
	<i>Share of GBARD allocated on project basis</i>	Unavailable									
	<i>Patent applications per 1 000 researchers</i>	Available									
	Researchers per 1 000 active population	Available					2014	2014			
Publications per 1 000 researchers	Available			2012		2014	2014				
Priority 2	A - GBARD to transnatl coop (EUR/researcher)	Available			2012		2007-2014	2014			
	A - Collab papers w/ERA per 1 000 researchers	Available			2012		2014	2014			
	A - Public-to-public partnerships (EUR/researcher)	Available			2012		2014	2014			
	A - Co-invention rate w/ERA partners	Available									
	B - Roadmap for ESFRI projects	Available									
	B - Participation in developing ESFRI projects	Available									
B - Participation in operational ESFRI landmarks	Available										
Priority 3	EURAXESS job ads per 1 000 researchers	Available			2012		2014	2014			
	Open, transparent, merit-based hiring process	Available									
	Share of doctoral students from EU countries	Available									
Priority 4	Share of women among Grade A HES	Available	2013	2007-2013							
	Gender dimension in research content	Available									
	Share of women among PhD graduates	Available									
	Share of women among heads of HEI	Available	2013 (FR)								
Share of women researchers	Available										
Priority 5	A - Research institute-private collaboration	Available				2012					2012
	A - Higher education-private collaboration	Available									
	A - Share of public R&D funded privately	Available			2012						
	A - Public-private collab papers per capita	Available		2009-2013	2012						
	B - Share of papers in Open Access (Total)	Available									
	B - Share of papers in Open Access (Green)	Available									
	B - Share of papers in Open Access (Gold)	Available									
B - National Open Access policies adopted	Available										
Priority 6	Collab papers w/non-ERA per 1 000 researchers	Available			2012		2014	2014			
	Share of doctoral students from outside EU	Available									
	Licence & patent rev. from abroad, share of GDP	Available						2013			
	Co-invention rate w/non-ERA partners	Available									

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The European Research Area (ERA) Progress Report 2016 shows the state of play in ERA. A lot has happened in the European research landscape since the last edition in 2014. The ERA Roadmap at EU level was endorsed by the Council in early 2015. This called for top action priorities that will have the biggest impact on Europe's science and innovation systems. Member States were invited to draw up national action plans based on this approach. Last year almost all Member States and a number of Associated Countries have published their National Action Plans on ERA showing clear political ownership of ERA.

This analysis carried out in 2016 shows strong progress in all ERA priorities across the EU. This was possible because of a true partnership among the Member States and Associated Countries, the Commission and research stakeholder organisations. But we cannot be complacent. European strength in the field of Research and Innovation is needed more than ever to reinforce competitiveness but is also increasingly challenged to deliver on impacts. The Commission's policy agenda on Open Science, Open Innovation and Open to the World will open up ERA to future challenges, like digitalisation and global networks. There are new barriers to break down to create more wealth and security for our citizens.

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