EU Eco-Innovation Index 2017

EIO Brief

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In order to evaluate the eco-innovation performance across all EU Member States, a composite index has been developed by the Eco-Innovation Observatory. This Brief summarises the main results from the 2017 version of the Eco-Innovation Index.

The Eco-Innovation Index aims at capturing the different aspects of eco-innovation by applying 16 indicators grouped into five thematic areas.

(1) *Eco-innovation inputs* comprising investments (financial or human resources), which aim at triggering eco-innovation activities,

(2) *Eco-innovation activities*, illustrating to what extent companies in a specific country are active in eco-innovation,

(3) *Eco-innovation outputs*, quantifying the outputs of eco-innovation activities in terms of patents, academic literature and media contributions,

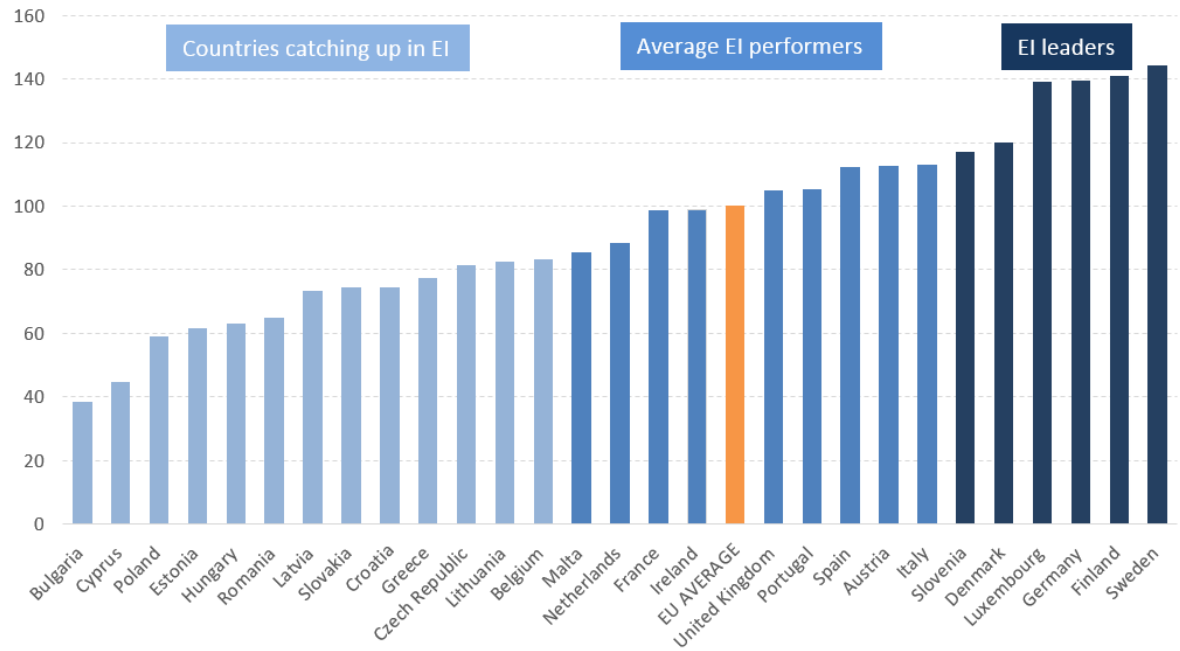
(4) *Resource efficiency outcomes*, putting eco-innovation performance in the context of a country's resource (material, energy, water) efficiency and GHG emission intensity,

(5) *Socio-economic outcomes*, illustrating to what extent eco-innovation performance generates positive outcomes for social aspects (employment) and economic aspects (turnover, exports).

More information and detailed results and data related to the Eco-Innovation Index can be found on the webpage https://ec.europa.eu/environment/ecoap/scoreboard.

Figure 1 shows the results from the aggregated index in its 2017 version.

Figure 1: Eco-Innovation Index 2017



For illustrative purposes, countries were clustered into three groups:

1. 'Eco-innovation (EI) leaders', scoring significantly higher than the EU average (i.e. a score of >115);
2. 'Average eco-innovation (EI) performers' with scores around the EU average (i.e. between 85 and 115); and
3. 'Countries catching up in eco-innovation (EI)', with around 85% or less performance compared to the EU average (i.e. scores <85).

In the 2017 version of the Eco-Innovation Index, Sweden leads the ranking of all EU countries, with an aggregated score of 144. Finland (141), Germany and Luxembourg (139 each) follow very closely. Also Denmark and Slovenia have been grouped to the "eco-innovation leading" countries. Nine Member States obtained scores around the EU average of 100 and were therefore labelled as 'average eco-innovation performers'. The aggregated eco-innovation scores in this group range from 113 (Italy and Austria) to 86 (Malta). Except for Belgium, all countries found in the group of 'countries catching up in eco-innovation' were Member States that joined the European Union in or after 2005. Aggregated scores in this country group range from 83 (Belgium) to 38 (Bulgaria).

Compared to the 2016 edition of the Eco-Innovation Index, most countries remained in the respective country cluster. For example, all five top-performing countries in 2017 also ranked highest in the index 2016. However, some changes in positions took place among the EI leaders. Sweden moved up from 5th rank in 2016 to the leading position in 2017, while Luxembourg dropped from 1st rank in 2016 to 4th in 2017. Also in the other two groups of average EI performers and countries catching up in EI, generally minor changes in positions can be observed. Most notably, Malta moved upwards from the group of countries catching up in EI into the average EI performers (from rank 23rd in 2016 to 15th in 2017), while Latvia ranked only 22nd in 2017, down from 15th in 2016.

While this aggregated index provides a general overview of the overall eco-innovation performance and the geographical structure across the EU, it does not allow identifying strong or weak areas for the various Member States. Therefore, Figure 2 illustrates the scores of the five sub-indices in the Eco-Innovation Index. The colours cover a range from light to dark green (high scores) and from light to dark red (low scores). In order to illustrate the diversity across the EU countries, the minimum and maximum scores as well as the overall score range is illustrated for each of the five components, and also for the aggregated index.

The performance regarding ***eco-innovation inputs***[1] was above the EU average for all top-performing countries. As in previous versions of the index, the indicator of 'green early stage investments', calculated as the total of the time period 2014 to 2017, diverged widely between the EU Member States. For five EU Member countries (Bulgaria, Cyprus, Malta, Slovakia, and Slovenia), no investment at all was reported by the primary data source (Cleantech). Denmark was by far the leading country in the observed period, with 350 US$ per capita. With 2.2% of total employment, Denmark was also leading the share regarding the indicator 'R&D personnel and researchers', while Finland, Germany and Portugal had the highest governmental R&D appropriations and outlays in

[1] Indicators in the sub-index of eco-innovation inputs: 1.1. Governments environmental and energy R&D appropriations and outlays; 1.2. Total R&D personnel and researchers; 1.3. Total value of green early stage investments.

the areas of environment and energy (0.07% of GDP). Finally, regarding 'eco-innovation inputs', all countries at the lower end of the performance spectrum had scores below the EU average.

Figure 2: Scores in the five components of the Eco-Innovation Index 2017, by country

		Eco-innovation inputs	Eco-innovation activities	Eco-innovation outputs	Resource efficiency outcomes	Socio-economic outcomes	Eco-Innovation Index
EI leaders	Sweden	166	148	182	154	77	144
	Finland	200	155	202	49	102	141
	Germany	178	151	130	121	113	139
	Luxembourg	104	124	220	183	72	139
	Denmark	178	58	154	139	70	120
	Slovenia	141	124	153	66	130	117
Average EI performers	Italy	66	111	112	180	101	113
	Austria	91	142	115	128	89	113
	Spain	75	106	139	162	72	112
	Portugal	104	134	100	107	81	105
	United Kingdom	102	87	65	160	82	105
	Ireland	113	58	69	174	55	99
	France	118	10	107	110	89	99
	Netherlands	88	38	91	111	77	88
	Malta	23	116	77	163	7	86
Countries catching up in EI	Belgium	94	11	93	95	75	83
	Lithuania	29	94	93	91	106	82
	Czech Republic	81	126	49	44	111	82
	Greece	57	96	142	50	63	77
	Croatia	25	93	61	85	105	75
	Slovakia	27	90	33	87	124	74
	Latvia	41	41	105	75	110	73
	Romania	53	37	55	60	113	65
	Hungary	39	47	13	76	125	63
	Estonia	50	76	90	2	109	62
	Poland	43	17	53	38	145	59
	Cyprus	4	39	113	62	6	45
	Bulgaria	30	37	33	4	92	38
Minimum		*4*	*10*	*13*	*2*	*6*	*38*
Maximum		*200*	*155*	*220*	*183*	*145*	*144*
Range		*197*	*145*	*207*	*181*	*139*	*106*

Also in the second component ***eco-innovation activities***[2], leading countries (except for Denmark) had scores above the EU average. Compared to the other top-performing countries, Denmark had comparatively low scores in all three indicators of this component. With a sub-index score of 155, Finland was ranked 1st in this index component, scoring highest in indicator that illustrates end-user-related environmental innovations. France (10), the Netherlands (38) and Belgium (11) had remarkably low scores in this sub-index. This results from the fact that data from the 'Community

[2] Indicators in the sub-index of eco-innovation activities: 2.1. Enterprises that introduced an innovation with environmental benefits obtained within the enterprise; 2.2. Enterprises that introduced an innovation with environmental benefits obtained by the end user; 2.3. ISO 14001 registered organisations.

Innovation Survey (CIS)', which is the basis for two of the three indicators of eco-innovation activities, are not available for these countries. Thus, values of these three countries are determined by the third indicator 'ISO 14001 registrations' only, which is low in all three countries. Austria and Portugal from the group of average EI performers as well the Czech Republic from the catching-up countries performed well regarding eco-innovation activities. The former two due to high levels of innovation activities in enterprises, the latter due to high levels of ISO registrations. Also in this component, all countries catching up in eco-innovation (except from the Czech Republic) had a performance below the EU average.

High performance regarding ***eco-innovation outputs***[3] was found in most countries of the group of eco-innovation leaders. With a component score of 220, Luxembourg led the ranking, mainly determined by a very high performance regarding eco-innovation related publications (50 publications per one million inhabitants in 2016) and eco-innovation related media coverage (on average, each electronic media source published three stories on eco-innovation-related topics in 2017). Also Finland and Sweden had top-scores in this third component. On the other side of the spectrum, Greece had a relatively high performance, mainly determined by the media related indicator (almost four eco-innovation topics per electronic media source). Of all EU Member States, Hungary had the lowest performance regarding eco-innovation patents (0.5 patents per million inhabitants in 2014), resulting in a low sub-index score.

In the component of ***resource efficiency outcomes***[4], scores across all EU Member States were most similar. This relates to a fact already observed in evaluations of earlier versions of the index, i.e. that some high-performing eco-innovation countries are characterised by comparatively high values of per capita resource use as well as GHG emissions. For example, Finland, ranking 2nd in the overall index, has a remarkably low score of 49 in this component. This results from its high levels of material and energy use, caused by the comparatively high importance of resource-intensive industries (such as wood and paper industries). Top-performing country in this group is Luxembourg (scoring high regarding material and water productivity, but low in energy productivity and GHG emissions intensity), followed by Italy and Ireland. The lowest index scores are observed for Bulgaria (4) and Estonia (2).

Performance is very mixed across the three country groups with regard to the fifth component ***socio-economic outcomes***[5]. Both high and low performing countries are found in each of the groups. For example, with scores of 145, 125 and 124, respectively, Poland, Hungary and Slovakia had a better performance than many of the eco-innovation leaders. Poland was the best performing EU country regarding employment in eco-industries and circular economy sectors, while Slovakia was the top-scorer for the indicator of turnover (revenue) in eco-industries and circular economy sectors (as percentage of total revenue across all companies). On the other hand, Sweden, Luxembourg and Denmark received scores significantly below the EU average. With regard to exports of products from eco-industries, the performance of all the countries was around the EU average, while they had low scores in terms of employment and turnover in eco-industries and circular economy.

[3] Indicators in the sub-index of eco-innovation outputs: 3.1. Eco-innovation related patents; 3.2. Eco-innovation related academic publications; 3.3. Eco-innovation related media coverage.

[4] Indicators in the sub-index of resource efficiency outcomes: 4.1. Material productivity; 4.2. Water productivity; 4.3. Energy productivity; 4.4. GHG emissions intensity.

[5] Indicators in the sub-index of socio-economic outcomes: 5.1. Exports of products from eco-industries; 5.2. Employment in eco-industries and circular economy; 5.3. Revenue in eco-industries and circular economy.

About the Eco-Innovation Observatory (EIO).

The Eco-Innovation Observatory functions as a platform for the structured collection and analysis of an extensive range of eco-innovation information, gathered from across the European Union and key economic regions around the globe, providing a much-needed integrated information source on eco-innovation for companies and innovation service providers, as well as providing a solid decision-making basis for policy development.

The Observatory approaches eco-innovation as a persuasive phenomenon present in all economic sectors and therefore relevant for all types of innovation, defining eco-innovation as: *"Eco-innovation is any innovation that reduces the use of natural resources and decreases the release of harmful substances across the whole life-cycle"*

EIO is the initiative financed by the European Commission's Directorate-General for the Environment. The Observatory is developing an integrated information source and a series of analyses on eco-innovation trends and markets, targeting business, innovation service providers, policy makers as well as researchers and analysts.

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