European Environment Agency

8th Environment Action Programme

Eco-innovation index

8TH EAP HEADLINE INDICATOR, 2023

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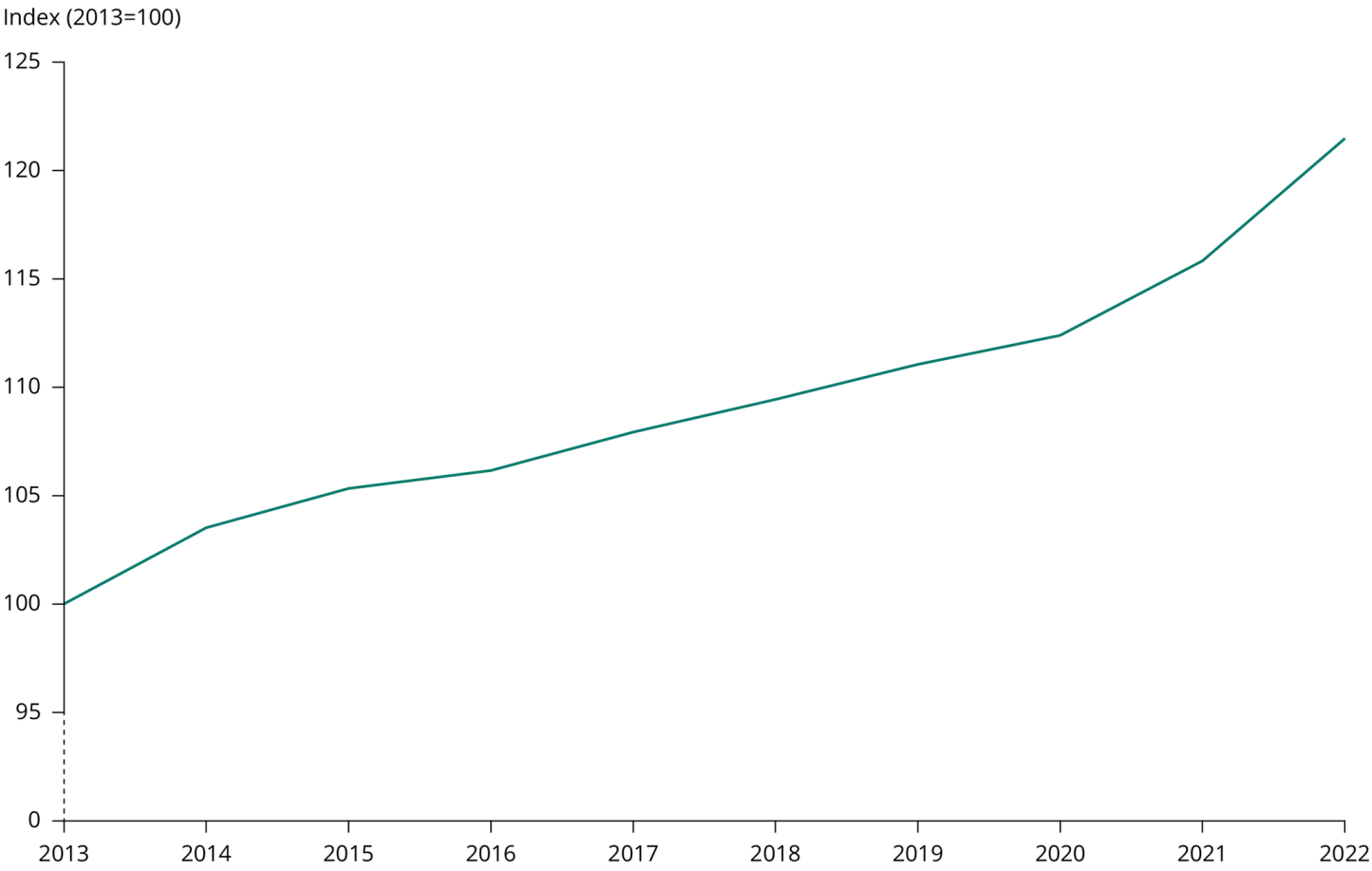
Eco-innovation is crucial for achieving the European Green Deal objective of transitioning to a carbon-neutral and sustainable economy. The European Commission's eco-innovation index shows that from 2013 to 2022 eco-innovation increased in the EU. This was mainly driven by improvements in resource efficiency. This steady increase in recent years is expected to continue, as the European Green Deal has set ambitious environment- and climate-related objectives, and its associated initiatives are very likely to create favourable conditions for more eco-innovation.

Figure 1. Eco-innovation index, EU-27, 2013-2022 (EU-27=100 in 2013)



Source: European Commission/Eco-Innovation Observatory.

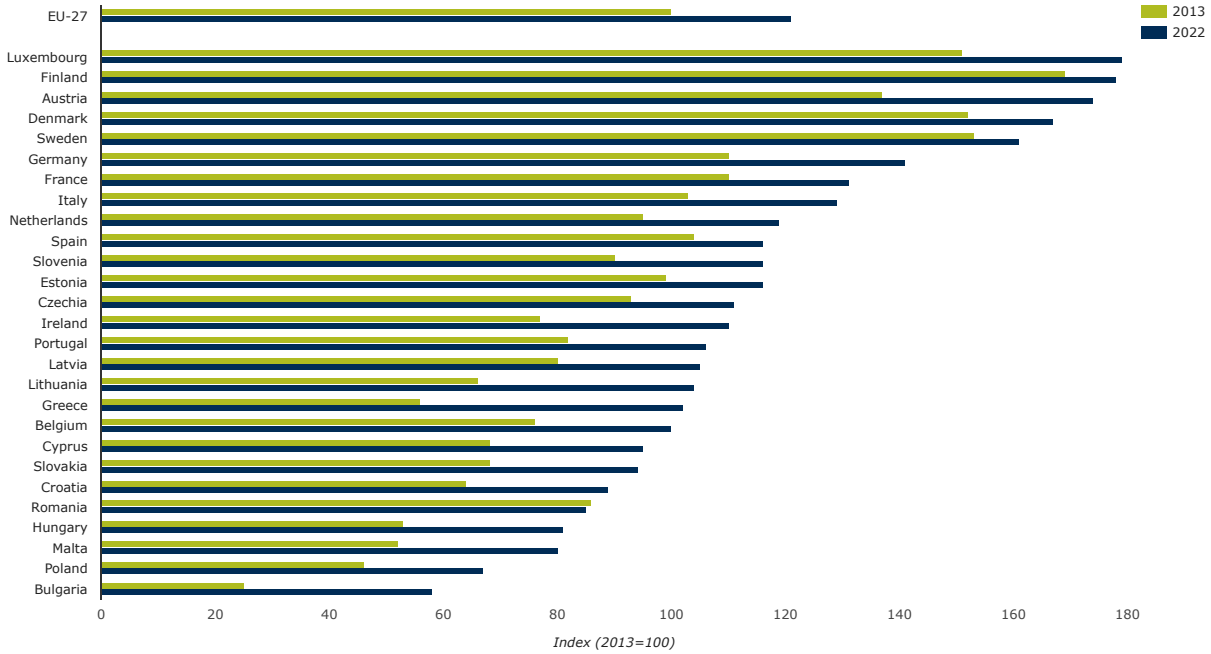
Eco-innovation refers to any innovation that reduces impacts on the environment, increases resilience to environmental pressures or uses natural resources more efficiently [1]. Eco-innovation is essential for achieving the objectives of the European Green Deal, such as the transition to a climate-neutral, circular economy [2].

The European Commission's eco-innovation index [4][3]is a composite indicator based on five dimensions: eco-innovation inputs, eco-innovation activities, eco-innovation outputs, resource efficiency outcomes and socio-economic outcomes. Performance in each of these dimensions is measured using relevant indicators, which are published by, for instance, Eurostat, the EEA and the Organisation for Economic Co-operation and Development (OECD).

The EU's performance between 2013 and 2021 was positive, as shown by the steady increasing trend in the eco-innovation index score [5]. Increases were seen in all five dimensions [6]. Most of the increase was due to improvements in the resource efficiency outcomes dimension, particularly in greenhouse gas (GHG) emission productivity (i.e. decreases in GHG emissions generated per unit of gross domestic product (GDP)). However, the greatest improvement was seen in the number of eco-innovation publications, which is included in the eco-innovation outputs dimension [6].

The steady increase in the eco-innovation index score between 2013 and 2021 is expected to continue in the future. This is because the improvements in resource efficiency and other contributing indicators are likely to persist due to the highly ambitious environment- and climate-related objectives of the European Green Deal and its associated initiatives [7].

Figure 2. Eco-innovation index by EU Member State, 2013-2022 (relative to EU-27=100 in 2013)



Source: European Commission/Eco-Innovation Observatory.

Data used in the graph

Countries	2013	2022
Luxembourg	151	179
Finland	169	178
Austria	137	174
Denmark	152	167
Sweden	153	161
Germany	110	141
France	110	131
Italy	103	129
Netherlands	95	119
Spain	104	116
Slovenia	90	116
Estonia	99	116
Czechia	93	111
Ireland	77	110
Portugal	82	106
Latvia	80	105
Lithuania	66	104
Greece	56	102
Belgium	76	100
Cyprus	68	95
Slovakia	68	94
Croatia	64	89
Romania	86	85
Hungary	53	81

Countries	2013	2022
Malta	52	80
Poland	46	67
Bulgaria	25	58

In terms of the eco-innovation performance of the individual EU Member States in 2013 and 2022 [8], the Nordic countries, Luxembourg and Austria were the best performers. Except for Finland, all of these countries performed well in resource efficiency outcomes. Luxembourg, Finland and Austria scored particularly highly on socio-economic outcomes [6].

Index scores improved between 2013 and 2022 for all EU Member States except Romania. Moreover, 18 EU Member States achieved increases of above the EU-27 average, with Greece achieving the largest increase, followed by Lithuania, Austria, Ireland, Bulgaria and Germany. The main reason for Greece's improved performance was increases in government environmental and energy research and development (R&D) appropriations and outlays. Improvements in various resource efficiency-related indicators [6] account for the relatively large increases in Lithuania, Austria, Ireland, Bulgaria and Germany.

Supporting information

Definition

'Eco-innovation is any innovation that make progress towards a more green and sustainable economy by reducing environmental pressures, increasing resilience or using natural resources more efficiently' [9].

The eco-innovation index is based on the eco-innovation scoreboard, which has 12 indicators in five thematic areas:

1 'Eco-innovation inputs, which includes financial and human capital investment in eco-innovative activities;
2 Eco-innovation activities, which defines the extent to which companies in a given country are active in eco-innovation;
3 Eco-innovation outputs, which measures the output of eco-innovation activities concerning the number of patents and academic literature;
4 Resource efficiency outcomes, which pinpoint a country's efficiency of resources and GHG emission intensity; and

5 Socio-economic outcomes, which aims to measure the positive societal as well as economic outcomes of eco-innovation' [6].

Methodology

Eco-innovation index scores are currently calculated on the basis of 12 indicators belonging to the following five thematic areas:

1 Eco-innovation inputs: governments' environmental and energy R&D appropriations and outlays (governments' environmental and energy R&D appropriations and outlays as a proportion of GDP); total R&D personnel and researchers (total R&D personnel and researchers as a proportion of total employment).
2 Eco-innovation activities: number of ISO 14001 certificates (number of ISO 14001 certificates/population in millions).
3 Eco-innovation outputs: eco-innovation-related patents (number of patent applications filed under the Patent Cooperation Treaty (PCT) in the fields of environment-related technologies, climate change adaptation technologies and sustainable ocean economy inventions/population in millions); eco-innovation-related academic publications (number of publications with any the following list of English keywords in the title and/or abstract: eco-innovation, energy efficient/efficiency, material efficient/efficiency, resource efficient/efficiency, energy productivity, material productivity, resource productivity/population in millions);
4 Resource efficiency outcomes: material productivity (GDP/domestic material consumption (DMC)); water productivity (GDP/total fresh water abstraction); energy productivity (GDP/gross available energy for a given year); GHG emission productivity (GDP/GHGs (CO_2, N_2O in CO_2 equivalent, CH_4 in CO_2 equivalent, hydrofluorocarbons (HFCs) in CO_2 equivalent, perfluorocarbons (PFCs) in CO_2 equivalent, SF_6 in CO_2 equivalent, NF_3 in CO_2 equivalent)).
5 Socio-economic outcomes: exports of environmental goods and service sector (export of goods and services in the field of environmental protection and resource management activities/total exports); employment in environmental protection and resource management activities (employment in environmental protection and resource management activities/total employment); value added in environmental protection and resource management activities (value added in the environmental goods and service sector/GDP).

Policy/environmental relevance

The Eighth Environment Action Programme (8th EAP) should, among other things, accelerate the transition to a green economy in the context of a well-being economy through, inter alia, 'continuous… innovation' (EU, 2022). This indicator is a headline indicator for monitoring progress towards meeting one of the 8th EAP and contributes mainly to monitoring progress in relation to aspects of Article 3(w), which requires 'strengthening the environmental knowledge base… and its uptake…, including through… innovation' (EU, 2022). The European Commission communication on the 8th EAP monitoring framework specifies that this indicator should be used to monitor the increase in 'eco-innovation as a driver for the green transition' [10].

Accuracy and uncertainties

Data sources and providers

- Ecoinnovation index, European Commission

Metadata

DPSIR

Response

Topics

 # Sustainability solutions

Tags

 # impacts **# 8th EAP** **# Transition** **# Eco-innovation** **# environment** **# resource efficiency** **# SUSO001** **# environmental pressures**

Temporal coverage

2013-2022

Geographic coverage

Austria
Belgium
Bulgaria
Croatia
Cyprus
Czechia
Denmark
Estonia
Finland
France
Germany
Greece
Hungary
Ireland
Italy
Latvia
Lithuania
Luxembourg
Malta
Netherlands
Poland
Portugal
Romania
Slovakia
Slovenia
Spain
Sweden

Typology

Descriptive indicator (Type A - What is happening to the environment and to humans?)

UN SDGs

Sustainable cities and communities

Unit of measure

This is a composite indicator and therefore no units are used.

Frequency of dissemination

Once a year

Contact

info@eea.europa.eu

References and footnotes

1. EC, 2011, Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions 'Innovation for a sustainable future — the eco-innovation action plan (Eco-AP)', COM(2011) 899 final of 15 December 2011.
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2. EC, 2019, Communication from the Commission to the European Parliament, the European Council, the Council, the European Economic and Social Committee and the Committee of the Regions 'The European Green Deal', COM (2019) 640 final of 11 December 2019.
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3. For a discussion of these areas, see Al-Ajlani et al. (2022).
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4. EC, 2022, 'Eco-innovation at the heart of European policies', *European Commission, Directorate-General for Environment* (https://green-business.ec.europa.eu/eco-innovation_en) accessed March 27, 2023.
↲
5. The report Eco-innovation index 2022 — policy brief (Al-Ajlani et al., 2022) shows performance up to 2021. Furthermore, the indicators used in the analysis may be lagging 1 or 2 years behind the eco-innovation index reference years. For more information, see Al-Ajlani et al. (2022).
↲
6. Al-Ajlani, H., Cvijanović, V., Es-Sadki, N. and Müller, N., 2022, *EU eco-innovation index 2022 — policy brief*, European Commission.
a b c d e
7. Mohamedaly, Al-Ajlani, H., Kuuliala, V., McKinnon, D. and Johansen, M., 2022, *Eco-innovation for circular industrial transformation — a report on the best practices, drivers, and challenges in key sectors*, European Commission.
↲

8. The progress made by EU Member States over time is presented relative to an eco-innovation score for the EU-27 in 2013 of 100.
↲

9. EC, 2022, *Eco-index 2022 — indicators and methodology*, European Commission.
↲

10. EC, 2022, Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions on the monitoring framework for the 8th Environment Action Programme: measuring progress towards the attainment of the programme's 2030 and 2050 priority objectives, COM (2022) 357 final of 26 July 2022.
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