

OECD Business Innovation Indicators 2023 edition

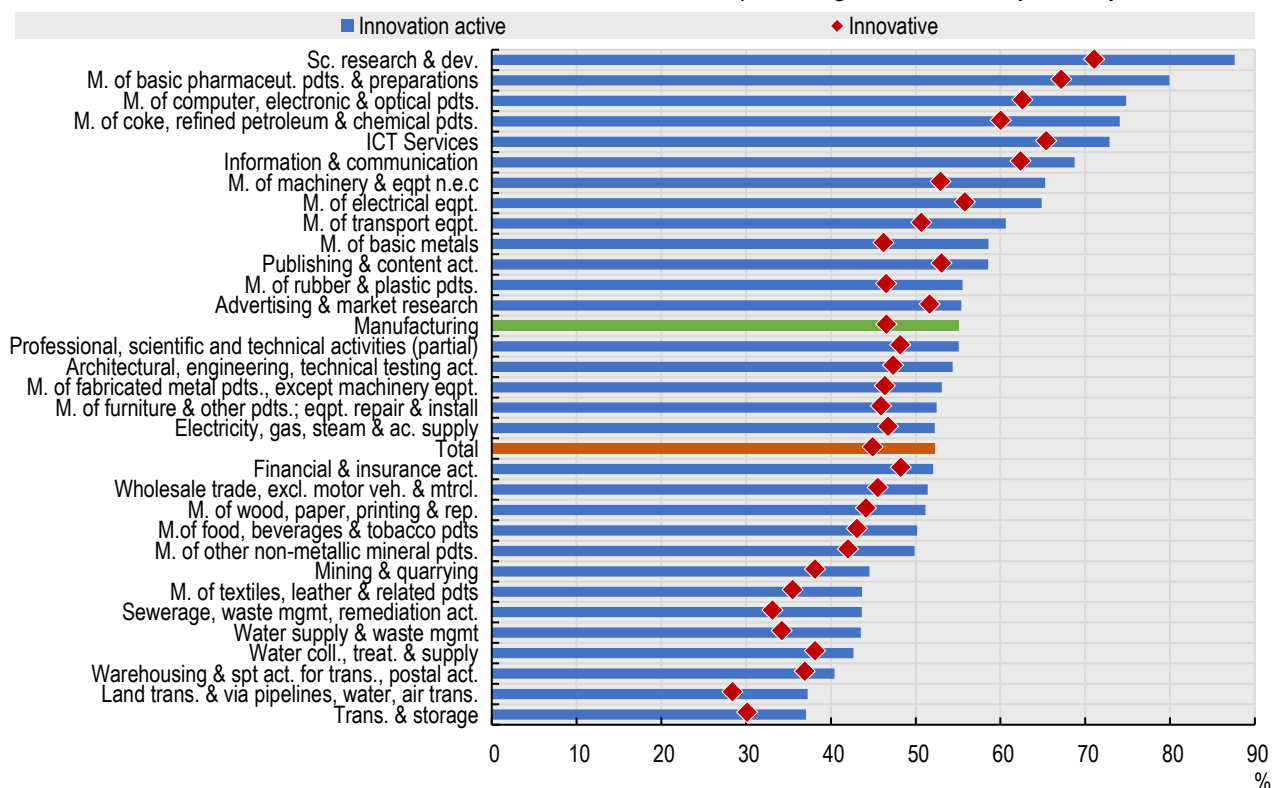
Statistical highlights – November 2023

The **OECD Innovation Indicators** provide a comprehensive collection of statistics describing innovation efforts by businesses within OECD member countries and other economies (Box 1). Published every two years, the *Innovation Indicators* offer insights on the adoption of new or improved products (goods and services) and business processes, as well as the activities supporting such outcomes. They also document the relationship between innovation and business characteristics, its drivers and impacts. The 2023 release focuses on **business innovation activities spanning from 2018 to 2020 across 42 economies including most OECD and EU countries**. This edition provides for the first-time indicators of innovations with environmental benefits and documents the apparent resilience of business innovation at the outset of the COVID-19 crisis.

Innovation intensity across industries show large differences in product and process innovation

The gap between the most and least innovation-intensive sectors defined by what proportion of companies reported an innovation or innovation activities in 2018-20 is large, between 40 and 50% depending on the indicator selected (Fig.1). Across countries, the R&D services industry reports the highest innovation intensity, followed by the pharmaceutical sector and specialised equipment manufacturing. ICT service providers and manufacturers are also among those reporting a high innovation incidence. Despite a significant correlation, the data show that innovation is not at all concentrated within manufacturing or industries traditionally recognised for their high levels of R&D intensity. The gap between the two innovation intensity indicators (innovation-active and innovative firms) reveals the extent to which business in those industries are working to implement innovations under development, have decided to put those on hold or abandon them.

Figure 1. Average innovation intensity by industry, 2018-2020
Numbers of innovation active or innovative firms, as a percentage of total firms by industry



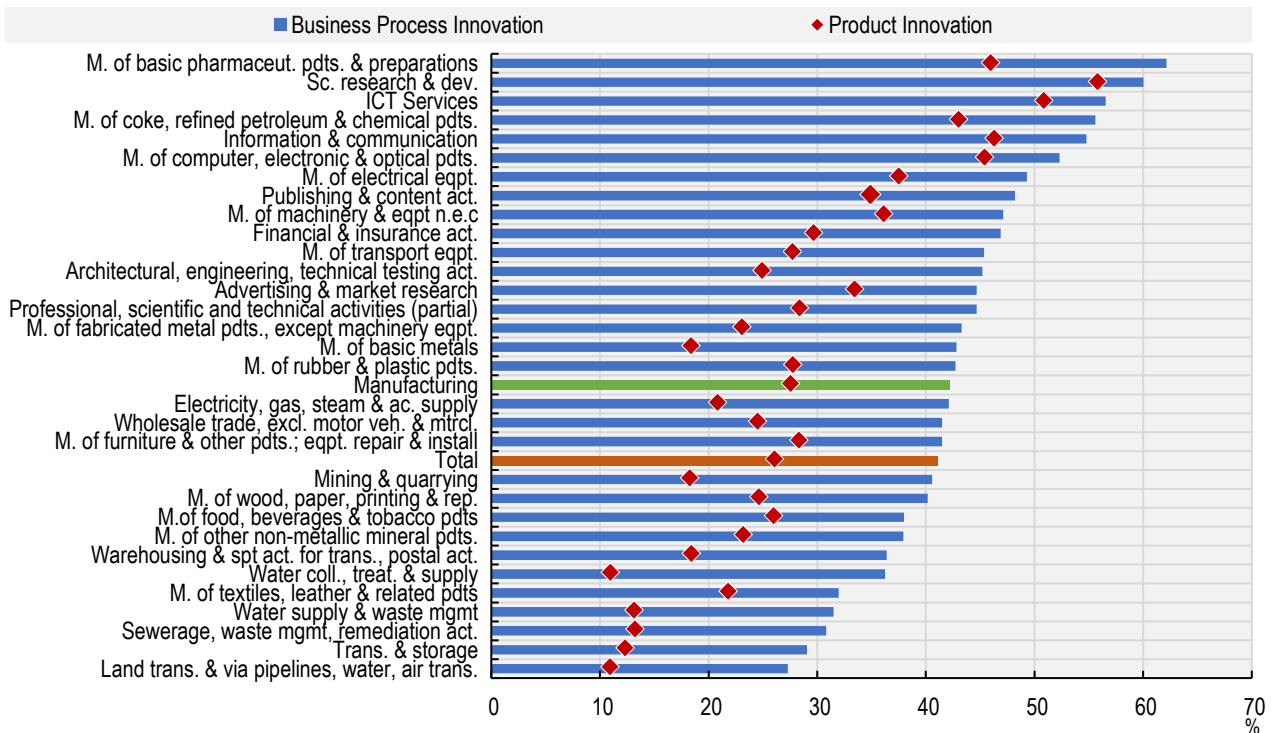
Note: *Innovative firms* are those reporting at least one product or business process innovation in the reference period (2018-2020). *Innovation active firms* comprise all companies engaged in innovation-oriented activities over the reference period, not only those who introduced an innovation. *M.* stands as abbreviation for Manufacturing. *Unweighted average* across countries participating in the data collection. Personal services and primary industries fall outside the scope of innovation surveys.

Source: OECD, based on the 2023 OECD survey of Business Innovation Statistics and the Eurostat's Community Innovation Survey (CIS-2020), <https://www.oecd.org/sti/inno-stats.htm>, November 2023.

Product and process innovations are complementary, but patterns vary across industries

Innovation data show that firms often introduce different types of innovation at once. Industries exhibit distinct innovation profiles as firms across sectors place relatively more emphasis on product innovations or implementing novel or enhanced business processes. The *Innovation indicators* show that *business process innovation* is more pervasive than *product innovation* (Fig 2). The most innovative industries in terms of product innovations also display the highest rates of business process innovations, while there is a bigger gap between process and product innovation rates within the middle-to-least innovation intensive industries.

Figure 2. Average business process and product innovation intensity by industry, 2018-2020
As a percentage of total firms by industry



Note: Unweighted average across countries participating in the data collection. The [2018 edition of the Oslo Manual](#), defines *business process innovation* as “a new or improved business process for one or more business functions that differs significantly from the firm’s previous business processes and that has been brought into use in the firm”; and *product innovation* as “a new or improved good or service that differs significantly from the firm’s previous goods or services and that has been introduced on the market”. *M.* stands as abbreviation for Manufacturing.

Source: OECD, based on the 2023 OECD survey of Business Innovation Statistics and the Eurostat’s Community Innovation Survey (CIS-2020), <https://www.oecd.org/sti/inno-stats.htm>, November 2023.

Box 1. Methods and international comparability of innovation statistics

The OECD *Innovation Indicators* report on statistical indicators of business innovation based on data collected by National Statistical Organisations and related bodies through business surveys under the guidelines of the [OECD/Eurostat Oslo Manual 2018](#). National estimates are reported by countries to the OECD as part of an initiative of the OECD Working Party of National Experts on Science and Technology Indicators (NESTI). Most countries restrict data collection to business with more than 10 persons employed, and to and business services.

The *Indicators* adopt as main practical reporting reference the harmonised items in Eurostat’s *Community Innovation Survey CIS2020*. The indicators are available as aggregates at the level of countries and industries within countries, with breakdowns for groups of firms defined by features such as employment size, sector of activity, and research and development (R&D) status. The indicators represent the incidence of specific business innovation or related activities, as a percentage of all companies in the reference groups, or report a quantitative measure expressed as total or as a percentage of another quantitative measure.

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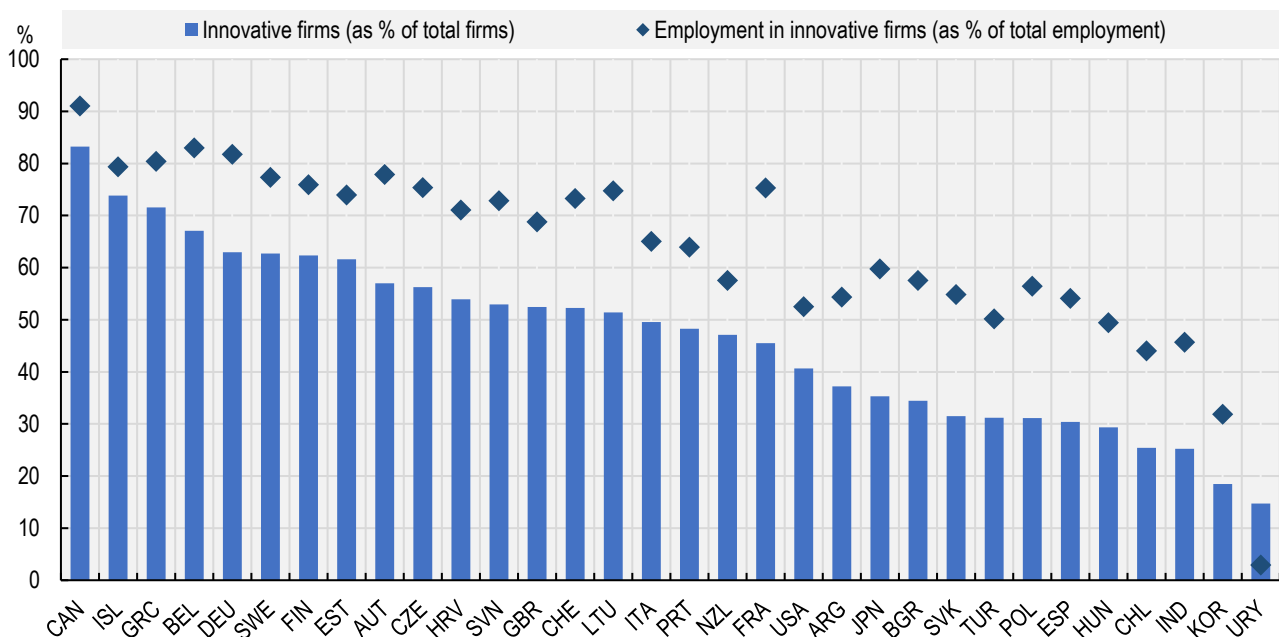
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Despite a gradual process of harmonisation with the Oslo Manual as reference and the availability of the CIS as a practical guide to questionnaire design, national innovation surveys still exhibit some significant differences in design and implementation methodology. Responses from businesses can be influenced by national idiosyncratic choices such as the sequencing and wording of questions, the filtering of firms throughout the questionnaire as well as aspects such as, the choice of the target population, the length of the reference period or data collection and processing methods. Cultural factors can also play a significant role when shaping business interpretation of novelty in products or processes.

All these factors may hamper international comparability of innovation indicators. Cross-country comparisons should therefore be interpreted with care and not as absolute rankings of national innovativeness. The indicators are most useful for the purpose of structural analysis of innovation, i.e. as pointers to areas of relatively higher and weaker innovation performance and as basis for ulterior in-depth analysis.

Reported innovation rates across show big differences, but less so in employment-weighted terms *The Innovation indicators* offer a broad picture of differences in innovation between countries which are shaped in part by patterns of industrial specialisation. As in the previous edition, the indicators reveal notable international variation in terms of firms participating in innovation activities. Canada has the highest share of companies (83%) reporting to have introduced an innovation between 2018 and 2020 (Fig 3). In all countries, the share of employment in innovative firms is consistently higher than the share of innovative firms among total enterprises. On average, close to 50% of firms introduced an innovation between 2018 and 2020, whereas innovative firms accounted for 73% of business sector employment. This reflects that firms with higher employment levels exhibit a higher propensity to innovate.

Figure 3. Innovative firms and employment in innovative firms, 2018-2020
As a percentage of total firms and total employment, respectively



Note: *Innovative firms* are those reporting one or more innovations in the reference period (2018-2020). *Employment in innovative firms* refers to the total number of persons employed in innovative firms in 2020 as a percentage of the total number of persons employed in 2020.

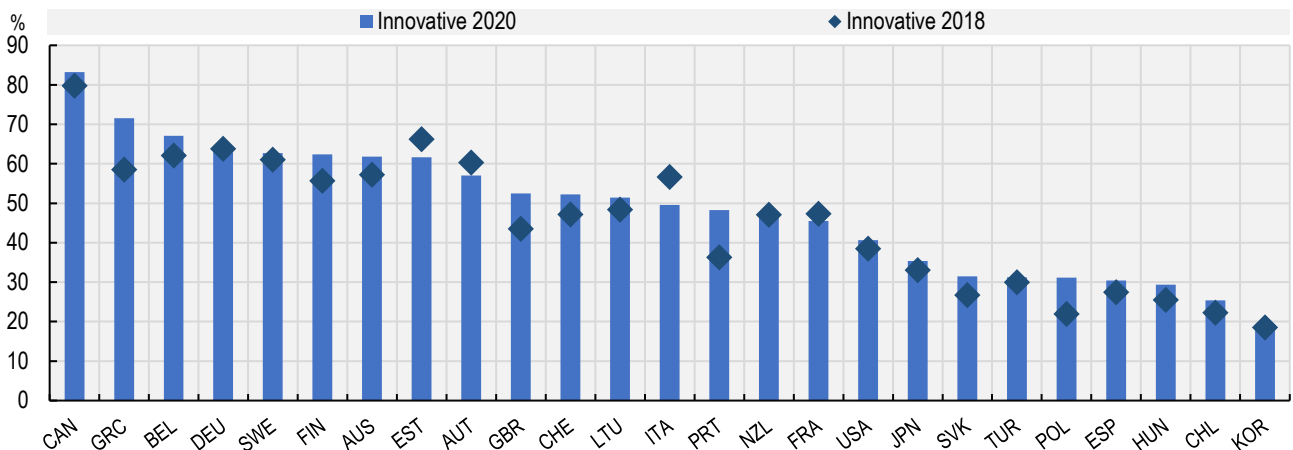
Source: OECD, based on the 2023 OECD survey of Business Innovation Statistics and the Eurostat's Community Innovation Survey (CIS-2020), <https://www.oecd.org/sti/inno-stats.htm>, November 2023.

Changes in reported innovation rates compared to the previous *Innovation Indicators*

Covering the period 2018-20, this edition of the *Innovation Indicators* is the first to document innovation in firms under the COVID-19 pandemic. With few exceptions, most countries saw reported innovation rates increase by a slight margin compared with 2016-18 (Fig 4). The same applies to the innovation intensity profile of industries. The increase is particularly marked within knowledge intensive services, especially for scientific R&D services (Fig 5). Innovation in firms in manufacturing of pharmaceutical products rose from 71% to 74% to attain and narrowly surpass the innovation rates of the computer manufacturing industry.

Figure 4. Innovative firms in 2018 and 2020

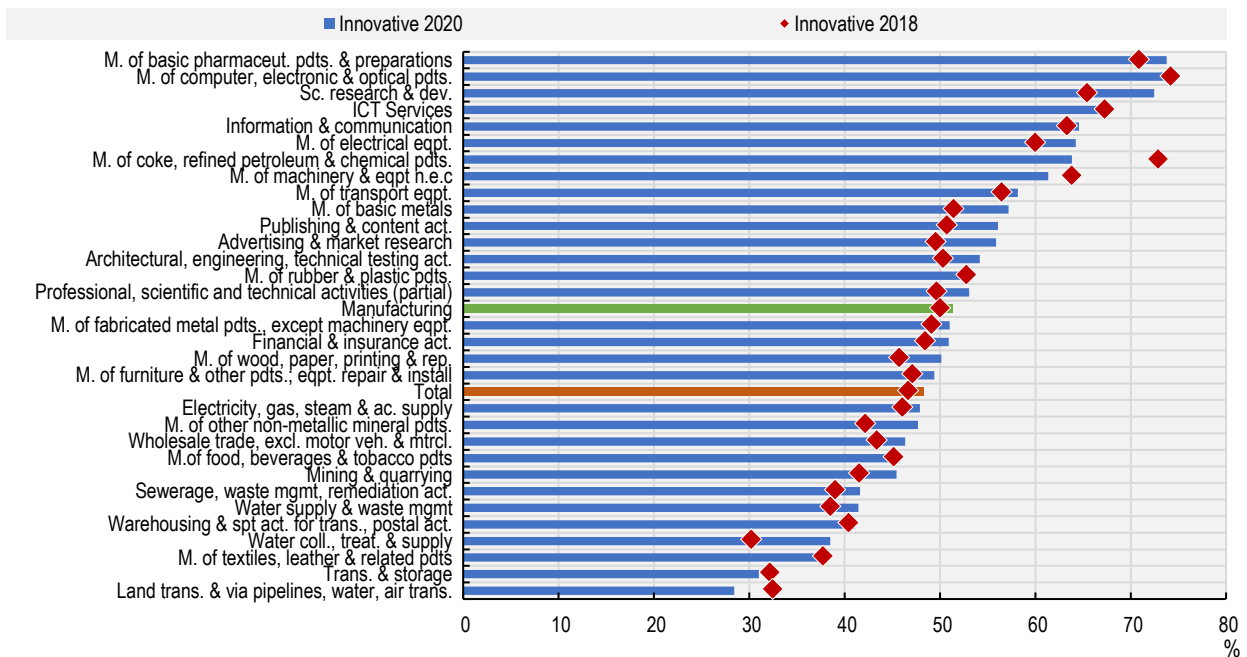
As a percentage of total firms



Note: Innovative firms are those reporting one or more innovations in the reference period. **Source:** OECD, 2020 data is based on the 2023 OECD survey of Business Innovation Statistics and the Eurostat's Community Innovation Survey (CIS-2020), <https://www.oecd.org/sti/inno-stats.htm>, November 2023. The 2018 data is based on the 2021 OECD survey of Business Innovation Statistics and the Eurostat's Community Innovation Survey (CIS-2018), April 2022.

Figure 5. Innovative firms in 2018 and 2020 by industry

As a percentage of total firms within industry, based on common set of countries in both periods



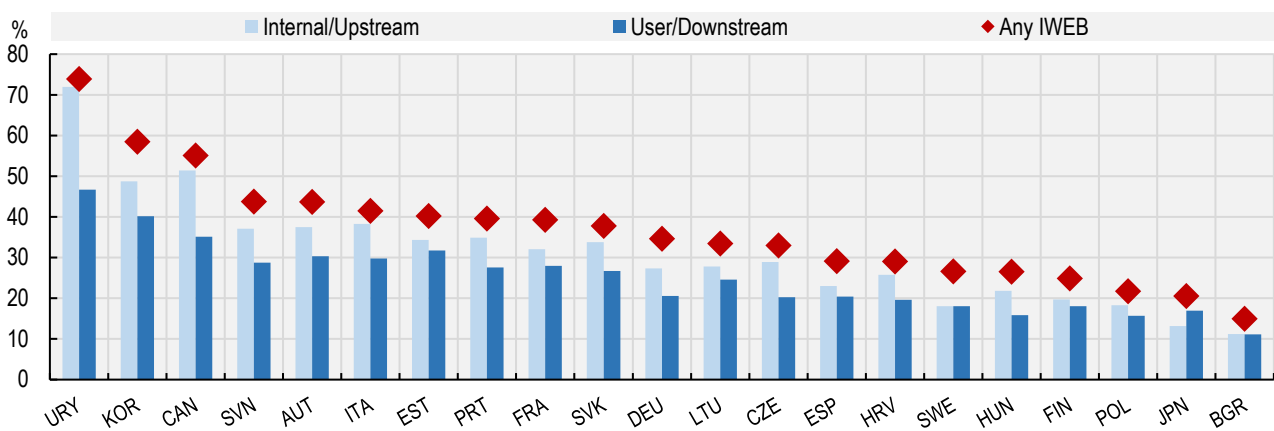
Note: Innovative firms are those reporting one or more innovations in the reference period (2018-2020). M. stands as abbreviation for Manufacturing. This indicator differs from Fig 1 because it uses a common set of countries for both periods to avoid changes caused by compositional differences.

Source: OECD, 2020 data is based on the 2023 OECD survey of Business Innovation Statistics and the Eurostat's Community Innovation Survey (CIS-2020), <https://www.oecd.org/sti/inno-stats.htm>, November 2023. The 2018 data is based on the 2021 OECD survey of Business Innovation Statistics and the Eurostat's Community Innovation Survey (CIS-2018), April 2022.

Innovations with environmental benefits have been introduced by one third of innovative firms

Reflecting the growing interest in environmental innovation, this edition offers, for the first time, an indicator on Innovation with Environmental Benefits (IWEB or 'environmental innovation' henceforth). Among countries responding to the OECD data call, slightly over one-third of innovative firms report having introduced at least one IWEB in 2018-20 (Fig 6). The incidence of environmental innovation varies depending on firm size and R&D activity. It rises to 54% for large companies and to 45% for innovative R&D active companies, compared to 31% for innovative non-R&D active firms. Information on IWEB has been collected according to various types of environmental benefits and where in the supply chain they occur (**Box 2**). Environmental innovation in firms appears to be slightly more oriented towards innovations that yield environmental benefits within the enterprise and its supply chain (31%) compared with innovations whose environmental benefits are realised in the downstream by consumers or end users (25%). Both types of environmental innovations appear to be complementary.

Figure 6. Innovative firms that introduced innovations with environmental benefits (IWEB), 2018-2020
By type of IWEB, as a percentage of innovative firms



Note: Innovative firms report one or more innovations in the reference period (2018-2020). Innovations with environmental benefits can be obtained either within the business processes and supply chain of the enterprise (*Internal/Upstream*) or they can be generated during the use of the enterprise's goods and services by consumers or end users (*User/Downstream*), or both. See Box 2 for further details.

Source: OECD, based on the 2023 OECD survey of Business Innovation Statistics, <https://www.oecd.org/sti/inno-stats.htm>, November 2023.

Box 2. Measuring innovations with environmental benefits (IWEB)

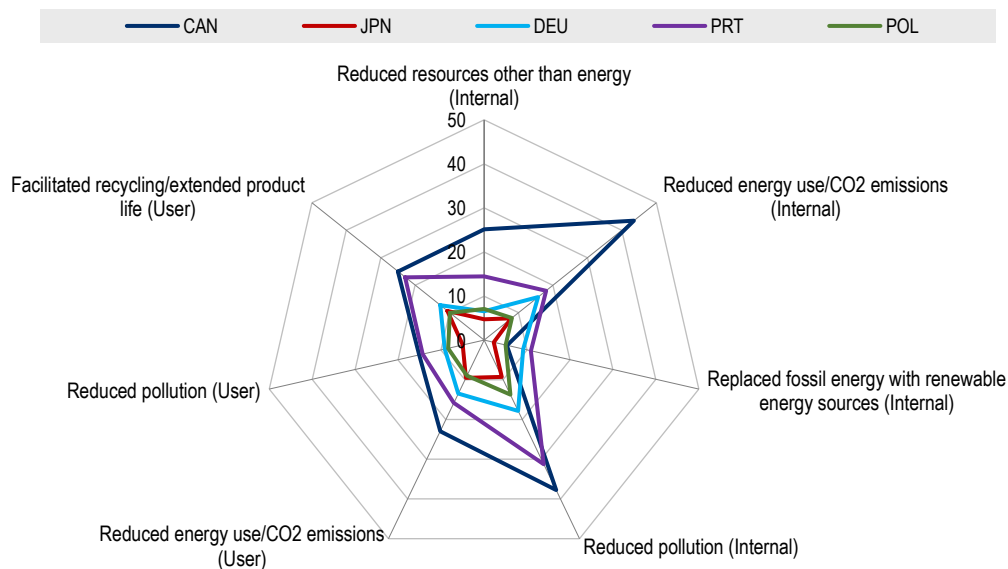
Paraphrasing the general **definition of an innovation**, an IWEB as defined by Eurostat and several countries refers to a new or enhanced product or business process of an enterprise that **produces favourable environmental outcomes or reduces adverse impacts** when contrasted with the firm's earlier products or business processes, and that is accessible to potential users or has been put into practice. Reporting on IWEB has been implemented in national surveys through several items covering **different types of environmental benefits**, from either the perspective of **where such benefits are realised** (upstream, internal to the firm, or downstream/user-generated) and the **nature of such benefits** (reduced greenhouse gas emissions, pollution avoidance, fossil fuel, energy and other material resource use). The items have been formulated in either **absolute levels or efficiency (per unit of output) terms**. Furthermore, the CIS provided a grid to assess the significance of environmental impacts. The OECD data collection applied **a common aggregation of IWEB subitems** to maximise reporting opportunities by countries.

There are **challenges when implementing IWEB questions and interpreting results**. Companies' responses are not always consistent with responses to general innovation questions, which may reflect processes such as the cognitive aid by a question on concrete understandable impacts, applying lower novelty thresholds in the presence of significant environmental benefits, or a perceived duty to appear to be "green". The OECD asked countries to remove from IWEB estimates firms a) not reporting any general innovation in the reference period and b) introducing IWEBs without significant contributions to environmental protection. Although this conservative approach helps allay potential concerns, comparability and interpretability challenges remain. Furthermore, it is important to recall that these indicators **only capture activity within a reference period, but not measure the extent to which a firm's capability allows it to operate in relation to its full potential to deliver environmental benefits**. Such capability may have been implemented before the reference period so **the indicators may capture catch-up**. All these issues call for further coordinated action on developing, testing and implementing environmental innovation indicators.

Countries differ in their profile of innovations with environmental benefits

The IWEB profile of five countries that reported more detailed information on the various types of IWEB provides further insights on observed international differences, helping to make the case for further internationally coordinated work in this area (Fig 7). For example, Canada reports high performance across all types of environmental benefits with the exception of internal use renewables, where Germany and Portugal attain higher IWEB rates. Across all countries, innovations resulting in pollution reduction are more common for internal and supply chain processes than in the downstream.

Figure 7. Profile of innovations with environmental benefits (IWEB) across countries, 2018-2020
By detailed type of IWEB, as a percentage of innovative firms within each country



Note: Innovative firms report one or more innovations in the reference period (2018-2020). The OECD data collection allows countries to report on the basis of seven distinct types of *Innovations with environmental benefits* can be obtained either within the business processes and supply chain of the enterprise (*Internal/Upstream*) or they can be generated during the use of the enterprise's good and services by consumers or end users (*User/Downstream*). The items are not mutually exclusive. See Box 2 for details.
Source: OECD, based on the 2023 OECD survey of Business Innovation Statistics and the Eurostat's Community Innovation Survey (CIS-2020), <https://www.oecd.org/sti/inno-stats.htm>, November 2023.

It is important to stress that these indicators provide rather crude measures of innovation outcomes only over the reference period, abstracting from past performance. They can pinpoint instances where firms have made a significant recent effort to attain higher environmental standards, potentially catching up with peers. International comparisons should be assisted by time series data as well as complementary indicators on the innovation capabilities and environmental performance of firms.

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