

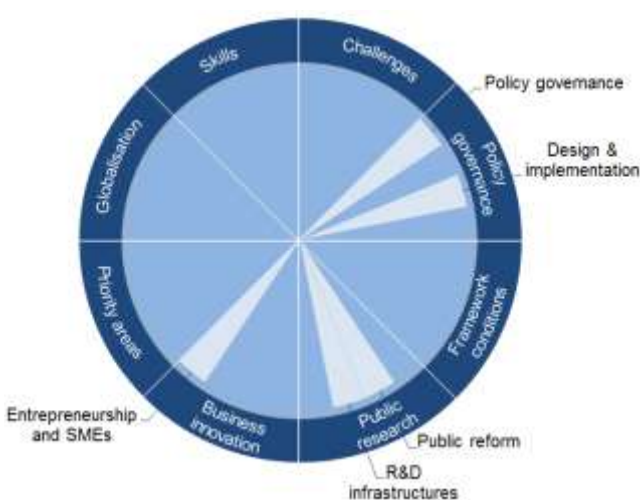
POLAND

Poland proved to be remarkably resilient in the face of the 2009 financial crisis and has continued to grow strongly and catch up with other OECD countries in terms of GDP per capita. The annual growth rate of the country's GDP averaged 3.1% from 2007 to 2014. GERD increased from 0.56% to 0.94% of GDP between 2004 and 2014, but it is still below the OECD average (2.38%). The government aims to attain GERD of 1.7% of GDP by 2020. To continue its convergence with the most affluent OECD countries, Poland needs to strengthen its public research system, enhance business innovation and improve the innovation skills of the workforce. The main catalysers for the country's strategic direction and policy action are the Strategy for Innovation and Efficiency of the Economy – Dynamic Poland 2020 (2013-20), the Entrepreneurship Development Programme (EDP) and the National Research Programme (NRP). Furthermore, the Smart Growth Operational Programme (2014-20) has been launched to boost the innovativeness and competitiveness of the economy by funding investment in research, development and innovation, with the support of the European structural funds.

Table 1. Gross domestic expenditure on R&D (GERD)

	POL	OECD
GERD		
USD million PPP, 2014	9 031	1 181 495
As a % of total OECD, 2014	0.8	100
GERD intensity and growth		
As a % of GDP, 2014	0.94	2.38
(annual growth rate, 2009-14)	(+10.3)	(+2.3)
GERD publicly financed		
As a % of GDP, 2014	0.45	0.61
(annual growth rate, 2009-14)	(+3.8)	(+2.5)

Figure 1. Major STI policy priorities, 2016





Hot issues

Promoting structural adjustment and new approaches to growth

Productivity has been rising quickly in Poland (figure 2). On the other hand, only 62.0% of the working-age population were employed in 2014, compared to the OECD average of 65.7%. Indicators on skills for innovation are below the OECD median (figure 5^{s,t,u,w}). The new government is focusing on raising the workforce's skills to boost productivity and the economy's ability to absorb modern technologies. Given the scale of Poland's demographic problems, a better integration of immigrants into the domestic labour market would offer potential fiscal and productivity benefits to the economy. The OECD has also noted the potential productivity increases that could come from aligning product market regulations in network industries, retail distribution and professional services with the average of the three best-performing OECD countries. In addition to labour and product market reforms, Poland needs more investment in innovation to maintain growth. In line with the priorities of Horizon 2020, the National Research Programme makes innovation one of the main objectives for the Polish economy. Measures will therefore be taken to improve the legal and institutional environment for growth, to increase access to finance, and to promote intellectual capital investments and innovation and closer links between science and the economy.

Improving the design and implementation of STI policy

In 2016, a national council for innovation was launched to co-ordinate the many research and innovation policies that Poland has implemented over the years. This inter-ministerial co-ordination is welcome, as research and innovation policies have evolved in a piecemeal and overlapping manner in recent years.

Targeting innovative entrepreneurship and SMEs

Polish enterprises, especially SMEs, show relatively little interest in investing in R&D. BERD was only 0.44% of GDP in 2014, far below the OECD median (figure 5^d). The ease of entrepreneurship has improved, and is now around the OECD median (figure 5^j), but venture capital for innovation is still below the OECD median (figure 5ⁿ), and innovation output, as measured by the number of patents and trademarks registered (figure 5^{f,g}), is weak. To boost business innovation and to support entrepreneurship and SMEs, new instruments have been introduced and existing ones revised. The Development Projects (2012-15) under the Operational Programme Innovative Economy promote industrial R&D. The Technological Credit initiative provides financial support for SMEs to adopt and integrate new technologies into the production line. The Smart Growth Operational Programme also provides financial support for R&D by SMEs through competitive grants, with allocation being decided approximately 60 days following the closure of the bidding.

Reforming public research

Although the patenting activity of Poland's universities and PRIs is around the OECD median (figure 5^p), in terms of public R&D expenditure and international publications (figure 5^{a,c}) it falls at the lower end of the mid-range of OECD countries. Industry-science relations are underdeveloped (figure 5^o). Major reforms to improve the efficiency and quality of the PRIs and universities were introduced in the early 2010s. The policy mix for public research has remained stable since then. In 2012, additional resources were allocated on a competitive basis to promote high-quality research and teaching. The PRIs and universities are encouraged to compete for the status of being a leading national research centre (KNOW), which gives access to additional funding in order to enhance scientific and research potential, develop R&D personnel, create attractive working conditions for research, build a strong and recognisable brand, and increase researchers' remuneration and scholarships for PhD and undergraduate students. The centres are chosen in selected fields of knowledge through evaluations carried out by independent commissions with the participation of international experts. Furthermore, the NRP addressed the importance of improving and modernising R&D infrastructures and made several sources of funding available for this purpose. The Polish S&T Fund and the EU Structural Funds have increased financing for investments in research infrastructure. The KNOW also receive priority when they apply for funds to upgrade infrastructure. In August 2013, the EDP introduced an obligation to prepare a draft law on corporate income tax to support R&D.

Some key STI performance indicators

Figure 2. Economic performance

Labour productivity, GDP per hour worked, index 2005=100

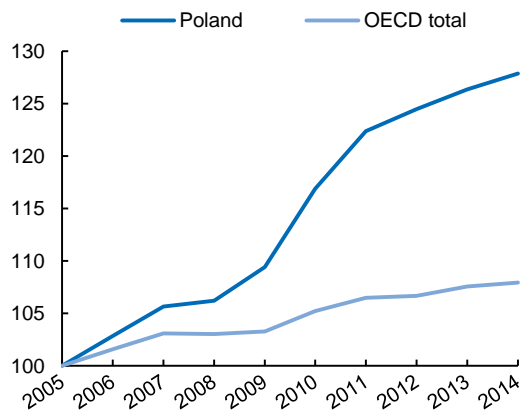


Figure 3. Environmental performance

Green productivity, GDP per unit of CO₂ emitted, index 2005=100

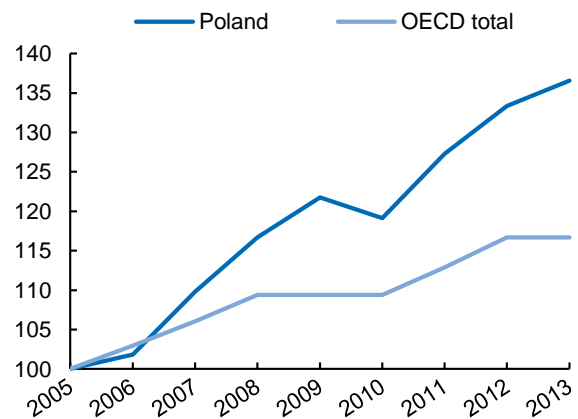
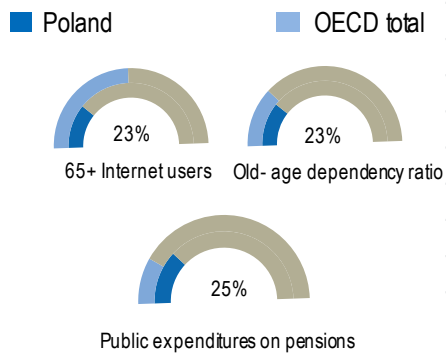


Figure 4. Ageing

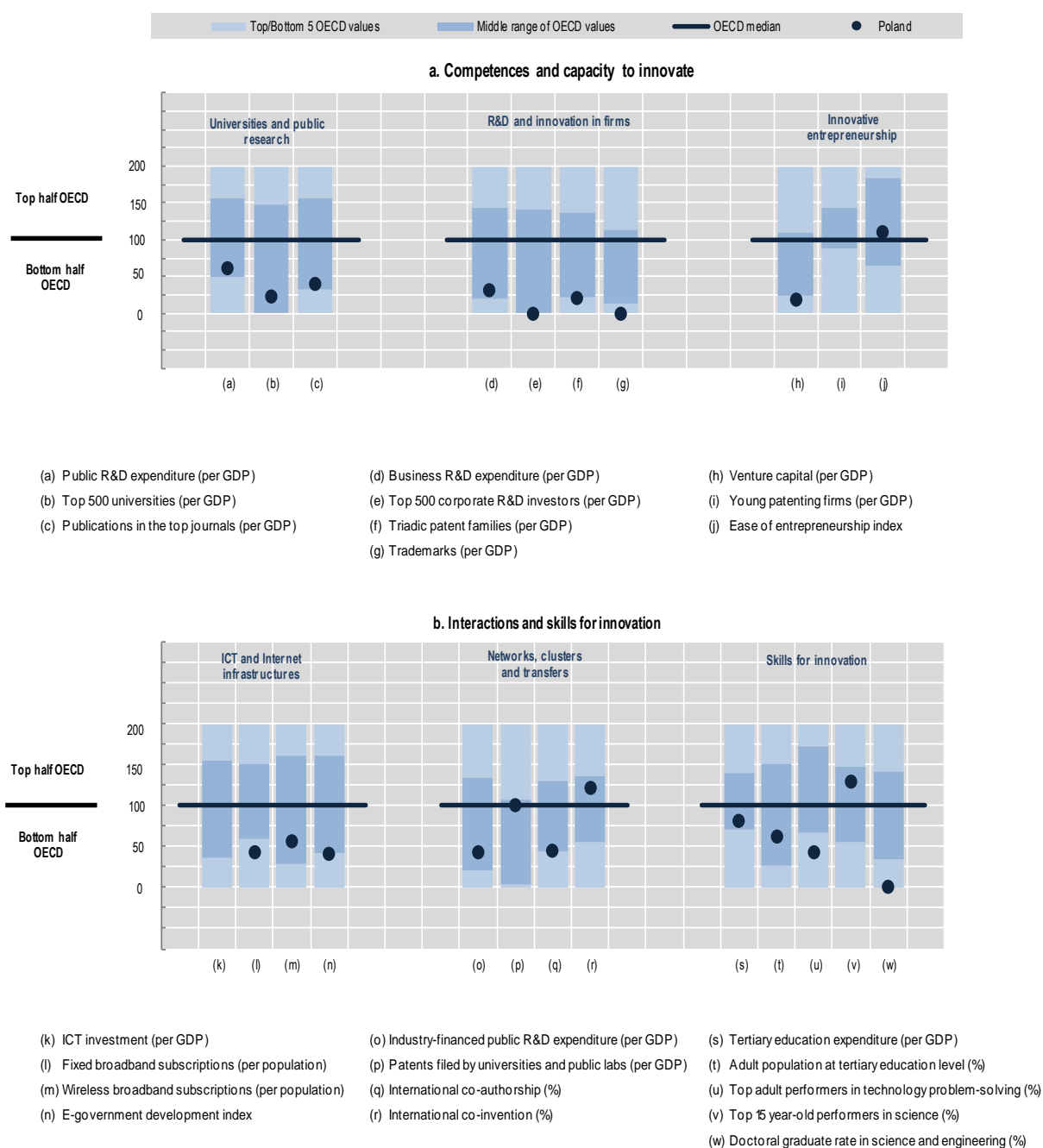
2015 or latest year available, percentages



Benchmarking national STI systems

Figure 5. Science and Innovation in Poland

Comparative performance of national science and innovation systems, 2016



Note: Normalised index of performance relative to the median values in the OECD area (Index median=100).



Highlights of the Polish STI system

New challenges

To address challenges such as health and the environment, the government has introduced strategic R&D programmes such as STRATEGMED (2013-18) and INNOMED (2013-2018) for health and BIOSTRATEG (2014-19) for the natural environment, agriculture and forestry. Polish industry relies heavily on coal as an energy source, and the government supports research on renewables and the low-emission economy through the Blue Gas – Polish Shale Gas Programme (2012-17) and on energy production technologies through the GEKON programme (2013-16). The GREEN-EVO Programme also promotes Polish environmental technologies. The National Action Plan on Sustainable Public Procurement (2013-16) aims to encourage contracting authorities to incorporate environmental and social issues into public tenders.

Technology transfer and commercialisation

To improve the commercialisation of research results, participants in the Development Projects (2012-15) must sign a consortium agreement between research organisations and enterprises. The BRIDGE VC (2013-17) programme supports the commercialisation of public R&D results. Since 2013, the pilot Innovation Voucher projects have supported experienced entrepreneurs who collaborate with the research sector. OCEAN, a new research data centre, is funded by the National Centre for Research and Development (NCBiR). It aims at providing an e-infrastructure for the storage of open data as well as facilities and expertise for big data analysis.

Clusters and smart specialisation

Poland has developed national and regional smart specialisation strategies through consultation with stakeholders and foresight exercises. Several strategies aim to promote the development of cluster policy, such as the Strategy for Innovation and the **National Economy's Effectiveness (SIEG)** and the Enterprises Development Programme (PRP). Seven clusters currently have the status of Key National Cluster. New sectoral innovation programmes include INNOLOT (2013-18), TECHMATSTRATEG for new material technology, and INNOSBZ for automated systems, while INNOTEXTILE provides innovation support for the textile industry and INNOCHEM for the chemical industry.

Globalisation

Polish innovative firms are better integrated in international innovation networks (figure 5ⁱ) than their academic counterparts (figure 5^g). The MOBILITY PLUS initiative supports academic researchers who work abroad for periods of 6 to 36 months. Support for the internationalisation of innovative firms has focused on the internationalisation of SMEs and improvements in competitiveness.

Skills for innovation

Expenditure on higher education as a share of GDP is just below the OECD median (figure 5^s), and Polish 15-year-olds perform above the OECD median in science (figure 5^v). However, adults with tertiary qualifications, adults' technical problem-solving skills, and the share of PhD graduates in science and engineering are all below the OECD median (figure 5^{l,u,w}). Programmes supporting skills development include the TOP 500 Innovators (2013-15) and the LIDER programme (2009-17), and education in entrepreneurship has been made compulsory in Polish universities. The Higher Education and Science Development Programme for 2015-2030 aims to increase the quality of education and research while orienting them towards social and economic needs.

Structural aspects and specialisation

Figure 6. Structural composition of BERD, 2013 or latest year available

As a % of total BERD or sub-parts of BERD

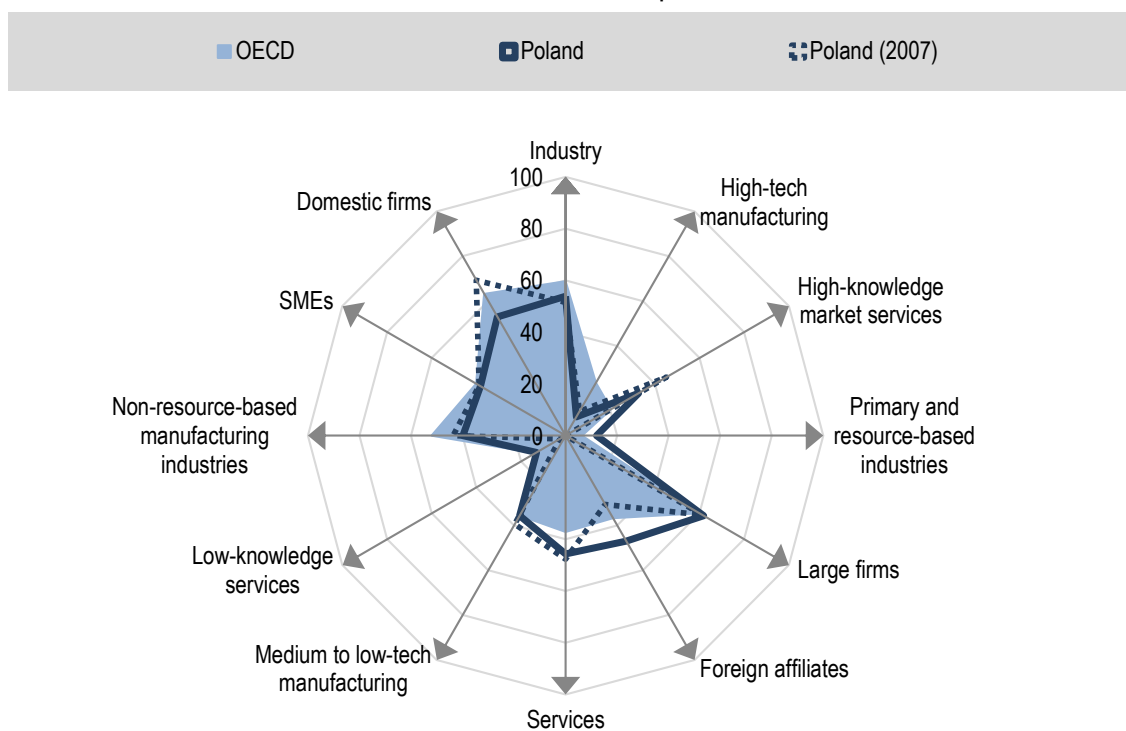
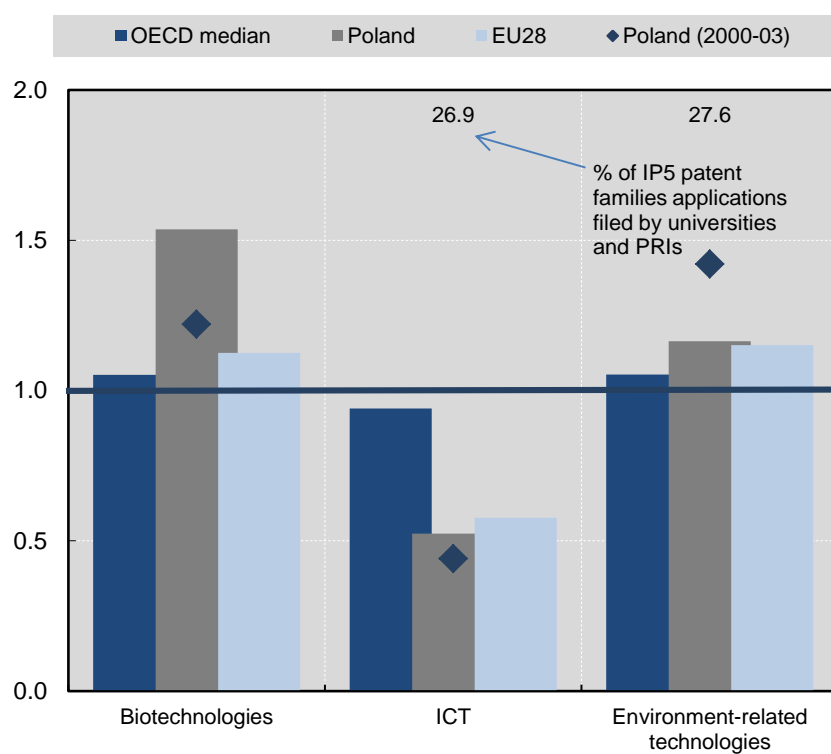


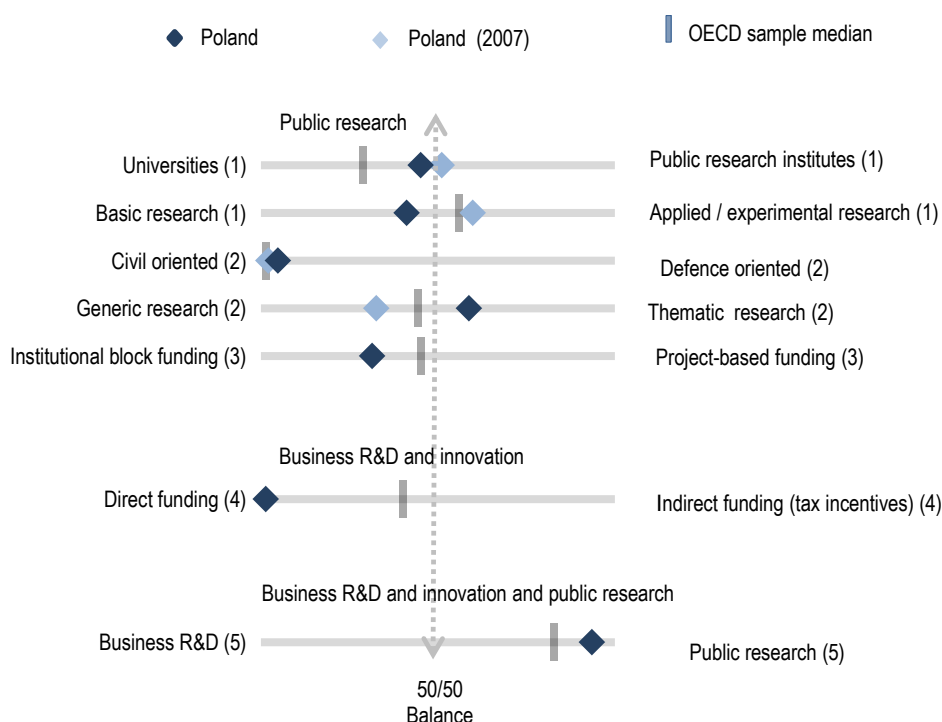
Figure 7. Revealed technology advantage in selected fields, 2011-13
Index based on IP5 patent families applications



National STI policy mix

Figure 8. Allocation of public funds to R&D, 2014 or latest year available

By sector, type of R&D and mode of funding



(1). Balance as a share of both higher education (HERD) and government (GOVERD) R&D expenditure.

(2). Balance as a share of total government budget appropriations and outlays for R&D (GBAORD).

(3). Balance as a share of total funding to national performers.

(4). Balance as a share of both indirect funding (through R&D tax incentives) and direct funding (through grants, procurement, loans, etc.).

(5). Balance as a share of publicly-funded HERD and GOVERD and components of (4).

Note: Policy information comes from country responses to the EC/OECD International Survey on STI Policies (STIP) 2016 and 2014. Poland's responses are available in the EC/OECD International Database on STI Policies, edition 2016 at http://qdd.oecd.org/DATA/STIPSurvey/POL...STIO_2016.

Source: See the reader's guide and methodological annex.

StatLink <http://dx.doi.org/10.1787/888933434016>



References

General references

- Dernis H., Dosso M., Hervás F., Millot V., Squicciarini M. and Vezzani A. (2015), World Corporate Top R&D Investors: Innovation and IP bundles, A JRC and OECD common report, Luxembourg, Publications Office of the European Union.
- EC (European Commission) (2015), EU R&D Scoreboard: The 2015 EU Industrial R&D Investment Scoreboard, European Commission, Luxembourg, <http://iri.jrc.ec.europa.eu/scoreboard.html>, accessed 4 October 2016.
- Flanagan, K., E. Uyarra and M. Laranja (2010), “The policy mix for innovation: rethinking innovation policy in a multilevel, multi-actor context”, Munich Personal RePEc Archive (MPRA) No. 23567, July.
- IEA (2015), CO2 Emissions from Fuel Combustion 2015, OECD Publishing, Paris, DOI: http://dx.doi.org/10.1787/co2_fuel-2015-en
- Kergroach, S. (2010), “Monitoring innovation and policies: developing indicators for analysing the innovation policy mix”, internal working document of the Directorate for Science, Technology and Industry (DSTI), OECD, Paris.
- Kergroach, S., J. Chicot, C. Petroli, J. Pruess, C. van Ooijen, N. Ono, I. Perianez-Forte, T. Watanabe, S. Fraccola and B. Serve, (forthcoming-a), “Mapping the policy mix for innovation: the OECD STI Outlook and the EC/OECD International STIP Database”, *OECD Science, Technology and Industry Working Papers*.
- Kergroach, S., J. Pruess, S. Fraccola and B. Serve, (forthcoming-b), “Measuring some aspects of the policy mix: exploring the EC/OECD International STI Policy Database for policy indicators”, *OECD Science, Technology and Industry Working Papers*.
- OECD (Organisation for Economic Co-operation and Development) (2016), Education at a Glance 2016: OECD Indicators, OECD Publishing, Paris, <http://dx.doi.org/10.1787/eag-2016-en>.
- OECD (2016), OECD Economic Outlook, Volume 2016 Issue 1, OECD Publishing, Paris, http://dx.doi.org/10.1787/eco_outlook-v2016-1-en.
- OECD (2016), OECD Country Reviews of Innovation Policy, www.oecd.org/sti/inno/oecdreviewsofinnovationpolicy.htm.
- OECD (2015), Pensions at a Glance 2015: OECD and G20 indicators, OECD Publishing, Paris, http://dx.doi.org/10.1787/pension_glance-2015-en.
- OECD (2015), OECD Skills Outlook 2015: Youth, Skills and Employability, OECD Publishing, Paris, <http://dx.doi.org/10.1787/9789264234178-en>.
- OECD (2015), OECD Science, Technology and Industry Scoreboard 2015: Innovation for growth and society, OECD Publishing, Paris, http://dx.doi.org/10.1787/sti_scoreboard-2015-en.
- OECD (2015), OECD Digital Economy Outlook 2015, OECD Publishing, Paris, <http://dx.doi.org/10.1787/9789264232440-en>.
- OECD (2015), Entrepreneurship at a Glance 2015, OECD Publishing, Paris, http://dx.doi.org/10.1787/entrepreneur_aag-2015-en.
- OECD (2015), National Accounts at a Glance 2015, OECD Publishing, Paris, http://dx.doi.org/10.1787/na_glance-2015-en.
- OECD (2015), The Innovation Imperative: Contributing to Productivity, Growth and Well-Being, OECD Publishing, Paris, <http://dx.doi.org/10.1787/9789264239814-en>.
- OECD (2014), Measuring the Digital Economy: A New Perspective, OECD Publishing, Paris, <http://dx.doi.org/10.1787/9789264221796-en>.



- OECD (2014), OECD Science, Technology and Industry Outlook 2014, OECD Publishing, Paris, http://dx.doi.org/10.1787/sti_outlook-2014-en.
- OECD (2011), Towards Green Growth: Monitoring Progress: OECD Indicators, OECD Green Growth Studies, OECD Publishing, Paris, <http://dx.doi.org/10.1787/9789264111356-en>.
- OECD (2010), "The Innovation Policy Mix", in OECD Science, Technology and Industry Outlook 2010, OECD Publishing, Paris, http://dx.doi.org/10.1787/sti_outlook-2010-48-en.
- OECD (2010), Measuring Innovation: A New Perspective, OECD Publishing, Paris, <http://dx.doi.org/10.1787/9789264059474-en>.
- OECD and SCImago Research Group (CSIC), (2014), Compendium of Bibliometric Science Indicators 2014, <http://oe.cd/scientometrics>.
- Van Steen, J. (2012), "Modes of public funding of R&D: Towards internationally comparable indicators", OECD Science, Technology and Industry Working Papers, No. 2012/4, OECD Publishing, Paris, <http://dx.doi.org/10.1787/5k98ssns1gzs-en>.

Databases and data sources

- Academic Ranking of World Universities (2016), "Shanghai ranking academic ranking of World universities", www.shanghairanking.com, accessed 4 October 2016.
- Bureau Van Dijk (2011), ORBIS Database, Bureau Van Dijk Electronic Publishing.
- EC/OECD (forthcoming), International Database on Science, Technology and Innovation Policies (STIP), edition 2016, www.innovationpolicyplatform.org/ecoecd-stip-database.
- Elsevier B.V. (2014), Elsevier Research Intelligence, www.elsevier.com/online-tools/research-intelligence/products-and-services/scival, accessed 4 October 2016.
- Eurostat (2016), Education and Training Databases, June, <http://ec.europa.eu/eurostat/web/education-and-training/data/database>, accessed 4 October 2016.
- Eurostat (2016), Total intramural R&D expenditure (GERD) by sectors of performance and source of funds, April, http://appsso.eurostat.ec.europa.eu/nui/show.do?dataset=rd_e_gerdfund&lang=en, accessed 4 October 2016.
- Graham, S., G. Hancock, A. Marco and A. Myers (2013), "The USPTO Trademark Case Files Dataset: Descriptions, Lessons, and Insights", SSRN Working Paper, <http://ssrn.com/abstract=2188621>.
- IEA (International Energy Agency) (2015), CO2 Emissions from Fuel Combustion Database, [/www.iea.org/publications/freepublications/publication/name.43840.en.html](http://www.iea.org/publications/freepublications/publication/name.43840.en.html).
- ILO (International Labour Organization) (2016), Key Indicators of the Labour Market database, www.ilo.org/global/statistics-and-databases/research-and-databases/kilm/lang--en/index.htm, accessed 4 October 2016.
- IMF (International Monetary Fund) (2016), World Economic Outlook (WEO) Databases, July, www.imf.org/external/pubs/ft/weo/2016/01/weodata/index.aspx, accessed 4 October 2016.
- ITU (International Telecommunication Union) (2016), World Telecommunication/ICT Indicators 2016, www.itu.int/en/ITU-D/Statistics/Pages/stat/default.aspx, accessed 4 October 2016.
- OECD (2016), Activity of Multinational Enterprises (AMNE) Database, August, www.oecd.org/industry/ind/amne.htm.
- OECD (2016), ANBERD Database, July, www.oecd.org/sti/anberd.
- OECD (2016), OECD Annual Labour Force Statistics Database, July, www.oecd.org/employment/labour-stats/.
- OECD (2016), Broadband Portal, August, www.oecd.org/sti/broadband/oecd-broadband-portal.htm.





- OECD (2016), OECD Education Databases, September, <http://gpseducation.oecd.org/>
- OECD (2016), Entrepreneurship Financing Database.
- OECD (2016), Educational Attainment and Labour Force Status Database, <https://data.oecd.org/education.htm>.
- OECD (2016), OECD Income Distribution Database, www.oecd.org/social/income-distribution-database.htm.
- OECD (2016), Main Science and Technology Indicators (MSTI) Database, June, www.oecd.org/sti/msti.
- OECD (2016), OECD National Accounts Databases, September, www.oecd.org/std/na/.
- OECD (2016), OECD/NESTI data collection on R&D tax incentives, July, www.oecd.org/sti/rd-tax-stats.htm.
- OECD (2016), Patent Database, June, www.oecd.org/sti/inno/oecdpatentdatabases.htm.
- OECD (2016), Productivity Database, September. www.oecd.org/std/productivity-stats.
- OECD (2016), Programme of International Students Assessment (PISA) Database, OECD Education Statistics, June, www.pisa.oecd.org.
- OECD (2016) Programme for the International Assessment of Adult Competencies (PIAAC) Database, OECD Education Statistics, June www.oecd.org/skills/piaac/surveyofadultskills.htm.
- OECD (2016), Research and Development Statistics (RDS) Database, April, www.oecd.org/sti/rds.
- OECD (2016), STI Micro-data Lab: Intellectual Property Database, June, <http://oe.cd/ipstats>.
- OECD (2014), Product Market Regulation (PMR) Database, March, www.oecd.org/economy/pmr.
- OECD (2013), “Modes of public funding of R&D: Interim results from the second round of data collection on GBAORD”, internal working document of the Working Party of National Experts on Science and Technology Indicators (NESTI), OECD, Paris.
- UIS (UNESCO Institute for Statistics) (2016), Education Database, June, http://data.uis.unesco.org/Index.aspx?DataSetCode=EDULIT_DS, accessed 4 October 2016.
- UIS (2016), Science, Technology and Innovation Database, July, http://data.uis.unesco.org/Index.aspx?DataSetCode=SCN_DS, accessed 4 October 2016.
- UN (United Nations) (2016), UN e-Government Survey, United Nations, NY. <https://publicadministration.un.org/egovkb/en-us/Reports/UN-E-Government-Survey-2016> (accessed 4 October 2016).
- World Bank (2016), World Development Indicators (WDI) Databank, <http://wdi.worldbank.org>

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From:

OECD Science, Technology and Innovation Outlook 2016

Access the complete publication at:

https://doi.org/10.1787/sti_in_outlook-2016-en

Please cite this chapter as:

OECD (2016), "Poland", in *OECD Science, Technology and Innovation Outlook 2016*, OECD Publishing, Paris.

DOI: https://doi.org/10.1787/sti_in_outlook-2016-81-en

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