WORLD CORPORATE TOP R&D INVESTORS: PAVING THE WAY FOR CLIMATE NEUTRALITY
World corporate top R&D investors: 7 years of collaboration with the EC Joint Research Centre
Innovation & IP bundle of the world’s top R&D investors

EU R&D Scoreboard
2000 companies that invested the largest sums into R&D worldwide in 2018

STI Micro-data Lab
MNEs – Headquarters and affiliates matched to IP data (Patents & Trademarks)

2021 focus:
• Climate change mitigation & adaptation
• Gender composition of boards and inventor teams
The world’s top R&D investors account for most global R&D activities, but not commercialisation

Share of R&D, patents and trademarks of the world’s top R&D investors, 2016-18

Source: JRC-OECD, COR&DIP© database v.3., 2021.
Only 250 top investors account for the bulk of R&D spending, patents and trademarks

R&D investments and the IP bundle of the world’s top R&D investors, 2016-18

Source: JRC-OECD, COR&DIP© database v.3., 2021.
R&D is highly concentrated geographically

R&D investment of the world’s top R&D investors, by headquarters' location, 2018

Source: JRC-OECD, COR&DIP© database v.3., 2021.
The US, Japan and the EU are losing ground to China

Changes in the geographical distribution of world's top R&D investors, 2012-18
Number of companies by location of headquarters

A few sectors account for most R&D, but with heterogeneity across countries

Share of firms and R&D by sector and headquarters’ location, top 3 sectors, 2018

Source: JRC-OECD, COR&DIP© database v.3., 2021.
Pharmaceutical firms have gained in importance

Changes in the sectoral distribution of the world's top R&D investors, 2012-2018
Number of companies, top 15 sectors, ISIC Rev. 4

Innovation is a globalised activity

Total patents invented in economies and location of the owner’s headquarters, 2016-2018

Source: JRC-OECD, COR&DIP© database v.3., 2021.
There is a large gender gap in the composition of boards...

Gender leadership of the world's top R&D investors, by headquarter’s location, 2018

Average share of women on the board of directors

...and in inventor teams

Female inventorship of the world’s top R&D investors in all technologies and climate, 2016-18
Share of IP5 patent families involving female inventors, by location of inventor

Source: JRC-OECD, COR&DIP© database v.3., 2021.
R&D intensity is low in most energy-intensive sectors

R&D intensity by sector, 2018
R&D investments of firms over net sales

Source: JRC-OECD, COR&DIP© database v.3., 2021.
Identifying climate-related IP

Established patent classification for climate related patents

- Y02A: Technologies for adaptation to climate change
- Y02B: Climate change mitigation technologies related to buildings
- Y02C: Capture, storage, sequestration or disposal of greenhouse gases (GHG)
- Y02D: Climate change mitigation technologies in information and communication technologies (ICT)
- Y02E: Reduction of greenhouse gas (GHG) emissions, related to energy generation, transmission or distribution
- Y02P: Climate change mitigation technologies in the production or processing of goods
- Y02T: Climate change mitigation technologies related to transportation
- Y02W: Climate change technologies related to wastewater treatment or waste management

New method for climate-related trademarks: text analysis in TM description

- Description of potential climate related trademarks (i.e. 100% patenting in Y02)
- EUIPO terms from the Green EU trademarks study
- Academic Literature
- Elsevier list of SDG terms
- Topic model analysis on the description of activity of climate related startups

Patent CPC Y02 Classification
Climate-related IP of the world’s top R&D investors

Top R&D investors = 70% of global climate-related patents; 11% of trademarks

Source: JRC-OECD, COR&DIP© database v.3., 2021.
Climate-related patents filed by top R&D investors are less original and less radically new

Originality and radicalness of patents in climate change mitigation or adaptation technologies, 2016-18

Source: JRC-OECD, COR&DIP© database v.3., 2021.
70% of climate-related patents are invented in Japan, the EU27 and the US

Location of inventors of climate change mitigation or adaptation technologies, 2016-18

Source: JRC-OECD, COR&DIP© database v.3., 2021.
Countries’ specialisation in climate innovation and commercialisation differs

Patent and trademark specialisation of economies towards climate change mitigation or adaptation, 2016-18

Source: JRC-OECD, COR&DIP© database v.3., 2021.
Electricity, transport & heavy manufacturing innovate more in low-carbon than services & IT

Share of climate-related patents by sector, 2016-18

Share of climate-related trademarks by sector, 2016-18

Source: JRC-OECD, COR&DIP© database v.3., 2021.
Digital technologies are heavily embedded in climate goods & services; less so for new innovations.

**ICT-embedded in CCMA patents, by sector, 2016-18**

- IT services
- Computers & electronics
- Other manufactures
- All sectors
- Pharmaceuticals
- Electrical equipment
- Machinery
- Electricity, gas & steam
- Chemicals
- Basic metals
- Rubber, plastics, minerals
- Law, accountancy & engineering
- Transport equipment
- Food products

**Trademarks combining ICT with CCMA, by sector, 2016-18**

- Telecommunications
- Other manufactures
- IT services
- Finance & insurance
- Publishing & broadcasting
- Electricity, gas & steam
- Electrical equipment
- Computers & electronics
- Law, accountancy & engineering
- All industries
- Machinery
- Basic metals
- Mining
- Food products
- Wholesale, retail, repairs
- Transport equipment
- Rubber, plastics, minerals
- Pharmaceuticals
- Chemicals

Source: JRC-OECD, COR&DIP© database v.3., 2021.
Geographical specialisation in climate technologies

Revealed technological advantage of regions, by specific technology areas, 2016-18

Index based on IP5 patent families in climate change mitigation or adaptation (CCMA), by location of inventors
Source: JRC-OECD, COR&DIP© database v.3., 2021.
Take-home messages for policy

- Global R&D and patenting activities are highly concentrated among the world’s top 2,000 R&D investors;
- The world’s top R&D investors are key contributors to global climate-related innovation and associated goods and services;
- Other innovators (e.g. young firms) are more likely to generate the breakthrough discoveries needed to achieve net-zero emissions;
- Some sectors with growing impacts on global emissions, such as IT, still invest little in low-carbon innovation;
- The use of digital solutions to address climate-related issues is widespread at the commercialisation stage, but digital technologies are not much embedded into climate-related technologies.
For more detail

• On-line report
  http://oe.cd/ipstats

• Underlying data available
  EC-JRC/OECD COR&DIP© v.3, 2021
WITH THANKS TO THE TEAM!

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