Climate change mitigation technologies in Europe – evidence from patent and economic data

Short Summary

UNEP
United Nations Environment Programme

Europäisches Patentamt
European Patent Office
Office européen des brevets

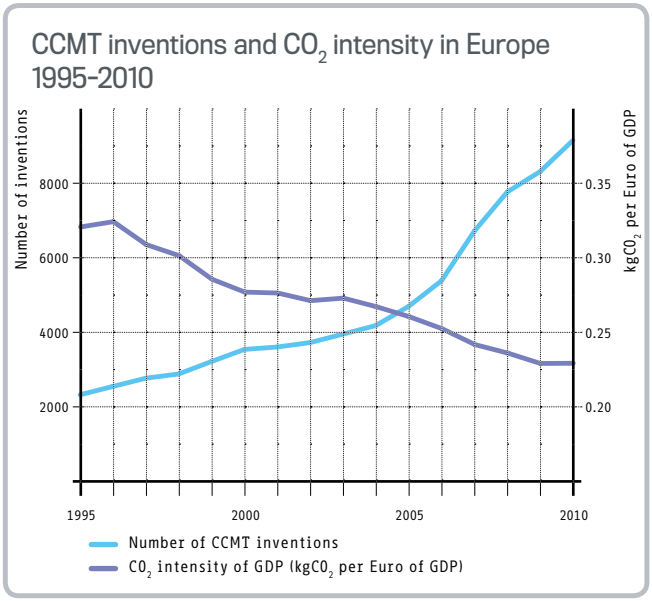
Five facts about climate change, innovation and the role of patents

The development and deployment of new technologies is crucial to tackling climate change. Whether it involves developing new breakthrough inventions or decarbonising existing technologies, solutions are urgently needed to cut greenhouse gas emissions while meeting the world's growing energy demands. The role of patents in this context – and in particular in technology transfer – has been the subject of much debate.

That is why the United Nations Environment Programme (UNEP) and the European Patent Office (EPO) joined forces in 2009 to undertake a series of studies on the role of patents in the development and dissemination of climate change mitigation technologies (CCMTs). Our reports, produced together with partners such as the International Centre for Trade and Sustainable Development (ICTSD), the Organisation for Economic Co-operation and Development (OECD) and the London School of Economics, aim to shed light on the debate and support informed policy-making. The results have been used at UN Framework Convention on Climate Change discussions, WTO TRIPS discussions, by the World Intellectual Property Organization (WIPO) and the European Commission, to name only a few. Here are some of the findings from the reports.

1. Climate-friendly policies encourage green tech innovation

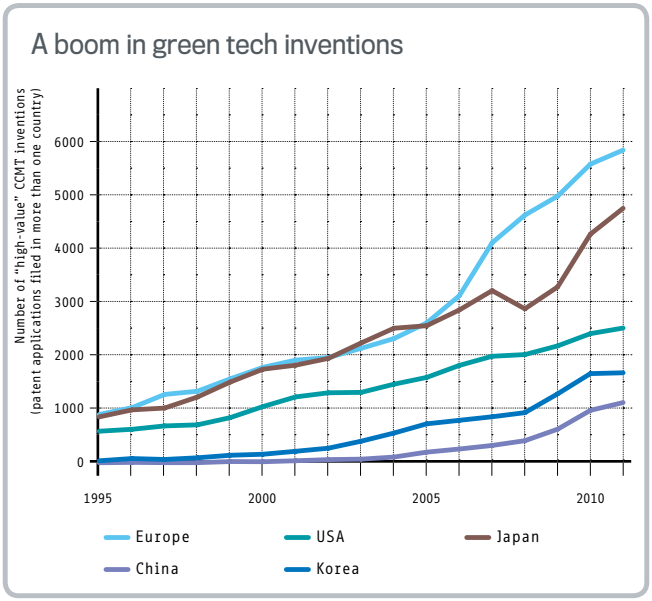
The number of inventions in climate change mitigation technologies worldwide has gone up steadily since the Kyoto Protocol was signed in 1997. This suggests that the implementation of climate change policies has been essential for stimulating their development. The growth in low-carbon inventions has been much faster than in other technologies: Today they represent nearly 6% of all inventions across the world, up from less than 2% before 1997. Public policies put in place after Kyoto appear to have been particularly successful in encouraging the development of CCMTs in Europe. As a result, rapid technological advances in green technologies have contributed to reducing Europe's carbon emission intensity by 30% in the past decades (see graph), and since 2000 it has remained the world's lowest.



2. Europe leads in green technologies

The latest EPO/UNEP report shows that Europe is the world's leading region for innovation in the area of climate-change mitigation technologies. One out of five low-carbon inventions worldwide originate from Europe, and using the OECD's definition of "high-value" inventions (for which patent protection is sought in more than one country), European inventors are even in the lead with nearly two out of five (see graph). As a consequence, Europe has become the world's most specialised region in CCMTs among the leading innovation centres.

Europe is also a trade hub for low-carbon products: The region is now the biggest importer, and second-largest exporter of CCMT goods after China. Europe is a major source of Foreign Direct Investment (FDI) in CCMTs, too, with investment spanning all continents.



3. Technology transfer is supported by patents

The patent system has an important role to play in fostering technology transfer. Two EPO/UNEP studies looking at Africa (2013) and Latin America and the Caribbean (2014) found that only 1% and 3% respectively of existing CCMTs are currently patent-protected in these regions. This means that while the technical knowledge pertaining to these inventions is freely available to the public, only very few of them have legal restrictions on their use locally. In these regions, patents are thus not a significant hindrance to the local development of low-carbon technologies, which could stimulate economic growth and create job opportunities.

The patent system facilitates technology transfer by providing legal protection for inventions across multiple markets. It supports exports and foreign direct investment, and creates an efficient framework for technology licensing. The UNEP-EPO study on CCMTs in Europe provides evidence that cross-border patent filings indeed go hand in hand with global trade and FDI in CCMTs.

Installation of solar panels to supply energy for irrigation system pumps

4. A wealth of information about CCMT innovation can be found in patents

Most patent systems require full disclosure of the invention in exchange for exclusive legal protection. This ensures that patent applications become a part of the state of the art, even if no patent is granted. Patent applications for low-carbon inventions are rich in information about the latest technical developments in this field. Their availability prevents duplication of R&D efforts, and allows further research to build upon existing technologies. Patent trends and statistics also provide powerful and important early indications of technological and economic developments. They are an excellent source of business intelligence, enabling trend analysis and monitoring. The European Patent Office provides one of the largest free collections of technical information available, containing over 90 million patent documents from around the world.
See www.epo.org/search

Wind power, Bouches du Rhone, France

5. Finding a needle in a haystack: Patent databases help pinpoint sustainable technologies

To help companies, engineers, scientists and policy-makers involved in climate change issues to better access and use the wealth of knowledge available in patents, the EPO has created a dedicated tagging scheme for patent documents related to low-carbon technologies, making it possible for users to retrieve these technologies in its databases. In combination with patent statistics tools, the tagging makes it possible to map sustainable technologies, identify trends and produce facts and evidence for policy and business decisions. To date, the EPO's databases contain some 2.8 million documents related to CCMTs, covering energy, carbon capture, and low-carbon inventions in buildings, transport, production, waste and smart grids. This is the biggest single repository of low carbon technologies in the world and the joint EPO-UNEP studies are only examples of what can be achieved with this information.
See www.epo.org/y-classification

Searching for information about green tech in patents

The EPO's dedicated tagging scheme for climate change mitigation technologies ("Y02/Y04S") covers:

- Y02B – CCMTs relating to buildings
- Y02C – Greenhouse gas capture and storage
- Y02E – Energy generation, storage and distribution
- Y02P – CCMTs in production
- Y02T – CCMTs relating to transport
- Y02W – CCMTs in waste treatment
- Y04S – Smart Grids

For more information

Joint UNEP/EPO studies:

- Climate change mitigation technologies in Europe: evidence from patent and economic data (2015): www.epo.org/climate-europe
- Patents and climate change mitigation technologies in Latin America and the Caribbean (2014) www.epo.org/LAC
- Patents and clean energy technologies in Africa (2013): www.epo.org/clean-energy-africa
- Patents and clean energy: bridging the gap between evidence and policy (2010) www.epo.org/clean-energy

Search for sustainable technology patents:

- EPO's dedicated classification scheme for CCMTs: www.epo.org/y-classification

Find out more:

- UNEP: www.unep.org
- EPO: www.epo.org/clean-energy