



**Patents and clean energy:
bridging the gap
between evidence and policy**
Summary of the report



Copies of the full report are available from
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The report can also be downloaded from
www.epo.org/clean-energy

Technology development and its rapid diffusion are considered crucial for tackling the climate change challenge. In particular, enhancing technology transfer towards developing countries has been an integral part of the global climate change regime since the inception of the United Nations Framework Convention on Climate Change (UNFCCC). The Bali Action Plan reaffirmed its centrality, and the Copenhagen final documents call among other things for the establishment of a mechanism to accelerate technology development and transfer.

The role of intellectual property rights (IPRs) in the transfer of climate change technologies has emerged as a particularly contentious issue in the past two years. Against this background, the United Nations Environment Programme (UNEP), the European Patent Office (EPO) and the International Centre for Trade and Sustainable Development (ICTSD) joined forces to undertake an empirical study on the role of patents in the transfer of clean energy technologies (CETs).

The project consisted of three main parts: a technology-mapping study of key CETs, a patent landscape based on the identified CETs and a survey of licensing practices. For the purposes of this study, CETs are energy generation technologies which have the potential for reducing greenhouse gas emissions.

The patent landscape

Based on the technology mapping study, a new taxonomy for CETs was established in order to derive the patent data. A statistical analysis was then carried out with this data. According to this analysis, patenting rates (patent applications and granted patents) in the selected CETs have increased at roughly 20 per cent per annum since 1997. In that period, patenting in CETs has outpaced the traditional energy sources of fossil fuels and nuclear energy. The surge of patenting activity in CETs coincided with the adoption of the Kyoto Protocol in 1997, which provides a strong signal that political decisions setting adequate frameworks are important for stimulating the development of CETs. The fields experiencing the most intensive growth include solar PV, wind, carbon capture, hydro/marine and biofuels.

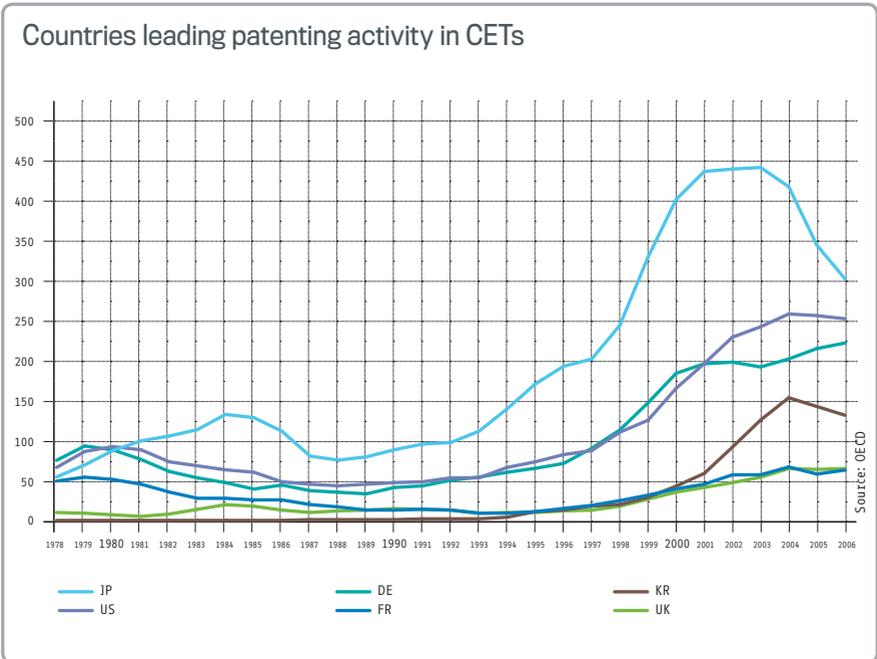
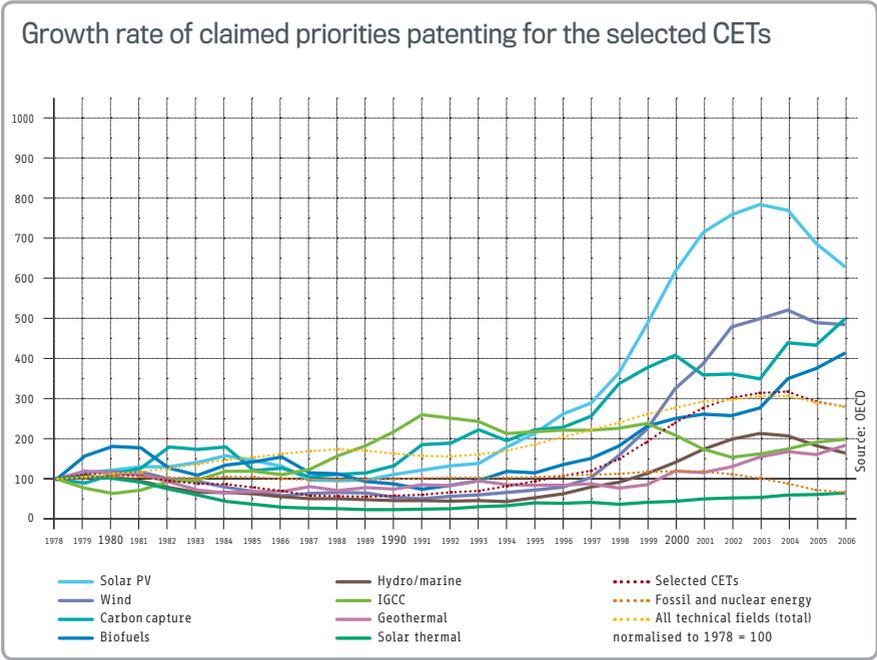
Patenting in the selected CET fields is currently dominated by OECD countries. However, a number of emerging economies are showing specialisation in individual sectors, providing further competition in the field and potentially changing the future of the CET patent landscape.

The leading six countries with actors innovating and patenting CETs are Japan, the United States, Germany, the Republic of Korea, the United Kingdom and France. Concentration of patenting activity in these countries reflects patenting trends in other technology sectors. Aside from geothermal, concentration in all CETs is relatively high. Notably, the top six countries account for almost 80 per cent of all patent applications in the CETs reviewed, each showing leadership in different sectors.

However, a number of other countries emerge as significant actors in selected fields when CET patent data is benchmarked against total patenting activity (all technology sectors) in a given country. For instance, such an analysis reveals that India features within the top five countries for solar PV, while Brazil and Mexico share the top two positions in hydro/marine.

In terms of patent filing trends between countries (structure of patent families), unsurprisingly, the majority of activity is currently taking place in the patent offices of the top six patenting countries. However, China is the next most important filing destination for actors in the top six countries.

Finally, the patent landscape also identified which technologies, including their sub-groups, have peaked in maturity and where future activity might be concentrated.



The licensing survey

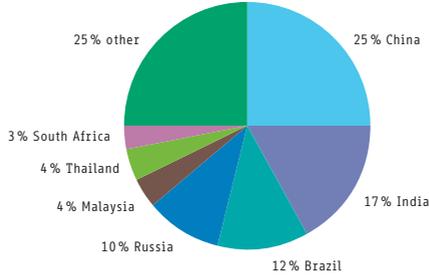
Structured in three parts, the licensing survey first addressed different elements of the respondents' licensing practices and activities. Second, it addressed participation in collaborative intellectual property (IP) mechanisms and R&D activities. Third, it looked at licensing practices in CETs in relation to developing countries (non-OECD countries). The survey was carried out with the assistance of industry and business associations representing technology owners. The response rate amounted to 30 per cent of the organisations which were approached (160 key organisations responded).

Whereas overall there is little CET out-licensing activity towards developing countries among the survey participants, the general level of such activity is no lower than in other industries. Moreover, findings from other industries indicate that there are a number of hurdles to overcome in out-licensing due to factors such as the transaction costs involved, identifying a suitable partner and the right licensing conditions (i.e. pricing and the geographical or exclusive scope of the agreement). Indeed, the willingness to out-license is often much higher than the actual level of licensing. As the results of the present survey show, this trend seems to be even greater for CETs.

This overall difficulty with markets for licensing may create particular challenges in the case of CETs, where rapid diffusion is needed. Thus there is a need for improving market conditions and encouraging licensing in the context of efforts to enhance technology transfer to developing countries. For the time being, where licensing agreements have been entered into, the main beneficiaries are actors in China, India, Brazil and Russia.

The survey results also provide some useful insights as to the perceptions of technology holders in undertaking out-licensing activity. Generally, IP protection in the country of the licensee was an important consideration when determining whether to enter into a licensing agreement. However, IP protection in

Developing countries with which responding organisations have been most involved with regard to licensing agreements or other IP-based commercialisation activities involving CETs



Importance of different macroeconomic factors in the decision to enter into licensing agreements (and other collaborative IP-based activities) with recipients that are based in developing countries (in percentage)

	Protection of IPRs	Scientific capabilities, infrastructure and human capital	Favourable market conditions	Favourable investment climate
Not a factor	18 (of total respondents)	13	16	15
A basic precondition for doing business, but not a driving factor	28	37	26	27
Significantly attractive condition, would encourage negotiation	29	37	44	42
Compelling reason toward an agreement	25	13	14	16

the recipient country was not found to be the only significant factor for licensing agreements in developing countries. Overall, respondents attached slightly more weight to factors such as scientific infrastructure, human capital, favourable market conditions and investment climates. However, licensing-intensive respondents attached somewhat greater importance to IP protection than to these other factors.

At the same time, 70 per cent of respondents said they were prepared to offer more flexible terms when licensing to developing countries with limited financial capacity. Notably, academic institutions and public bodies were slightly more willing than private enterprises to provide accommodating licensing terms to developing-country recipients. Small and medium-sized enterprises were slightly more likely than multinationals to offer more flexible terms. Another useful finding was that the majority of organisations favoured collaborative R&D activities, patent out-licensing and joint ventures over mechanisms such as patent pooling and cross-licensing.

Looking forward: a new patent classification for climate change mitigation technologies, and challenges ahead

In the context of establishing the patent landscape, the EPO developed and launched a new classification scheme for patents in climate change mitigation technologies, starting with CETs, which is now available on the EPO's public patent information service *esp@cenet*. The new scheme will provide continuous, accurate and user-friendly patent information and thus help to improve the transparency of the patent system in this critical technology sector.

While the report's findings are groundbreaking in many respects, there is a need to explore further areas of research in order to guide future action at the international level. In this respect, one area where more information is needed is the demand side of the debate. Most studies, including this report, have focused on the supply-side perspective. A survey capturing the views of entities in the developing world seeking access to CETs is considered essential for a broader understanding of the issues at stake.

Future work and refinements should also be done on landscapes which identify patented inventions that have been commercialised in the marketplace. This would give a better idea of which technologies are working and inducing technological change. Further, a study of patenting by publicly funded institutions and universities would be important in helping to understand the source of new technologies and the role of government funding in their development.

Finally, this report concludes by identifying lessons learned which could help bridge the gap between evidence and policy-making, the *raison d'être* of this project. In this context, the report focuses on three main lessons: policy processes and signals do matter; accurate and publicly available information is urgently needed on existing and emerging CETs, including IP and licensing; and finally, options to facilitate licensing of CETs to developing countries should be considered.

This brochure is published by

the United Nations Environment Programme (UNEP),
the European Patent Office (EPO) and
the International Centre for Trade and Sustainable Development
(ICTSD).

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Photo cover

Paul Langrock

Design and production

EPO Graphic Design, Munich

Printing

Mediengruppe Universal, Munich



**United Nations
Environment Programme (UNEP)
Economics and Trade Branch**
International Environment House
11-13, Chemin des Anémones
1219 Châtelaine – Geneva
Switzerland
www.unep.org

**European
Patent Office (EPO)**
Erhardtstr. 27
80469 Munich
Germany
www.epo.org

**International Centre for Trade
and Sustainable Development
(ICTSD)**
International Environment House
7, Chemin de Balexert
1219 Châtelaine – Geneva
Switzerland
www.ictsd.org