



Patents and clean energy technologies in Africa

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Cover
Installation of solar panels
to supply energy for
irrigation system pumps

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TABLE OF CONTENTS

FOREWORD	06	ANNEXES	64
EXECUTIVE SUMMARY	07	Annex 1 Patent legislation in African countries	66
REPORT SUMMARY	08	Annex 2 Patent search strategy for selected mitigation technologies	68
1		Annex 3 Summary of statistics for selected mitigation technologies	70
INTRODUCTION	16	Annex 4 Patent search strategy for selected adaptation technologies	71
2		Annex 5 Summary of statistics for selected adaptation technologies	72
MAPPING AFRICA'S CLEAN ENERGY POTENTIAL	20	Annex 6 Number of patent applications registered with African authorities (mitigation technologies) (1980 – 2009)	72
2.1 An overview of Africa's clean energy potential and levels of exploitation	22	Annex 7 Number of priorities invented in African countries (mitigation technologies) (1980 – 2009)	74
2.2 Sub-regional distribution of clean energy resources	26	Annex 8 Number of patent applications registered with African authorities (adaptation technologies) (1980 – 2009)	76
3		Annex 9 Number of priorities invented in African countries (adaptation technologies) (1980 – 2009)	78
POLICIES AND LEGAL FRAMEWORKS FOR PATENT PROTECTION IN AFRICA	28	Annex 10 African inventions patented worldwide (mitigation technologies) (1980 – 2009)	80
3.1 Patent policies and strategies relevant to CET in Africa	30	Annex 11 African inventions patented worldwide (adaptation technologies) (1980 – 2009)	82
3.2 Patent-related legal framework and policy options for technology diffusion and transfer	32	Annex 12 Brief summary of "Other use" allowable under Art. 31 of TRIPS	84
4		ACRONYMS	86
CET PATENTING PATTERNS IN AFRICA – A STATISTICAL ANALYSIS	36	REFERENCES	87
4.1 Methodology	38	DISCLAIMER	88
4.2 The place of Africa in CET development	40	IMPRINT	89
4.3 Africa as a market for CETs	48		
4.4 Africa's participation in international collaborations for CET development	55		
5			
UNDERSTANDING AND LEVERAGING THE PATENT SYSTEM TO PROMOTE ACCESS TO CETs IN AFRICA – FINDINGS AND RECOMMENDATIONS	58		
5.1 Key findings	60		
5.2 Recommendations	62		

FOREWORD

Measures to address climate change under the aegis of the United Nations Framework Convention on Climate Change have identified the development and transfer of technologies as one of the key pillars in both mitigating the causes of climate change and adapting to its effects. Several policy challenges to technology transfer have emerged over the years, a crucial one being patent rights.

The Division of Environmental Law and Conventions (DELIC) of the United Nations Environment Programme (UNEP) is charged with the development and facilitation of international environmental law, governance and policy. In this way, DELIC assists the international community in the progressive development of environmental law and supports governments in the development and implementation of legal and policy measures that address emerging environmental challenges.

In this perspective, the role of patent rights in connection with climate change is obscured by a lack of accurate and relevant information, and the difficulty of accessing and interpreting the data available. Repeated exchanges with negotiators engaged in the climate change mitigation process, as well as with policy makers within governments and the private sector, identified this as a crucial issue where UNEP and partners such as the European Patent Office (EPO) could add value to the existing global repository of information relating to patent rights for renewable energy technologies. UNEP therefore undertook a basic analysis and mapping of potential sources of renewable energy around Africa, which led us to determine the types of technology on which the study could focus.

The prevailing consensus was that technologies relating to solar energy, hydro-electric power, geothermal, ocean energy, biomass and biofuels and wind energy are of primary importance in addressing issues of clean energy technologies (CETs), their innovation and transfer, and related patent rights.

Comparative advantages and its strategy of building upon existing initiatives led UNEP to pursue an established partnership with the EPO, which contributes to technological innovation and plays a leading role in developing an effective global patent system. The EPO's patent information tools, such as the global patent database Espacenet and the machine translation service Patent Translate, as well as the refined Cooperative Patent Classification (CPC) allow free of charge access to all relevant technical information on the internet. Moreover, these tools have been complemented by a specialised classification scheme, Y02, dedicated to retrieving patents related to clean technologies. In combination with the EPO's statistical database for analysing and visualising patent data, PATSTAT, the Y02 scheme enables statistical information on patenting trends to be generated for climate change related fields.

Previous studies undertaken jointly by UNEP, the EPO and the International Centre for Trade and Sustainable Development (ICTSD) proved an apt model for the basic structure of this study. For selected patent data delivered by the new EPO information platform for mitigation and adaptation technologies, the Organization for Economic Co-operation and Development (OECD) joined the project and again built a statistical analysis methodology similar to that used for the previous UNEP-EPO-ICTSD study (<http://www.epo.org/clean-energy>).

The analysis was aimed at identifying the relevant patented technologies covering alternative energy generation potential and climate-change mitigation solutions in Africa. It also examined patent filing and cross-filing trends, including co-invention and co-ownership of patent rights, as indicators of innovation in Africa, as well as technology transfer both between African states and from overseas.

A survey of the status of the patent system in all African states has also been completed, including the current developments expected due to implementation of the WTO TRIPS agreement, and their relative position within the global patent system. This has allowed conclusions to be drawn on how the global and African patent systems can best be used to support innovation and transfer of clean energy technology in Africa.

The present report therefore gives insights into the legal and technological side of CETs and into patent landscapes with respect to Africa. We hope that effective dissemination and utilisation of this innovative study will contribute positively to the uptake of technology diffusion across the continent and to the leverage of the African and global patent systems to support it. It is also intended that the report act as a catalyst to successfully addressing the three broad objectives that sit within the energy paradigm, namely climate change mitigation and adaptation, energy security and poverty alleviation.

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EXECUTIVE SUMMARY

Africa has a huge untapped potential for generating clean energy, including enough hydroelectric power from its seven major river systems to serve the whole of the continent's needs, as well as enormous potential for solar energy, wind energy, geothermal energy etc. Although major hurdles exist also in the distribution of energy there is potential for Africa to leapfrog existing fossil fuel energy sources and exploit clean energy from the outset to meet its developing needs.

At the original UN Conference on Environment and Development (UNCED, or the "Earth Summit") in Rio de Janeiro, June 1992, intellectual property and patenting in particular was highlighted by some participants as a significant factor limiting the transfer of new clean technologies to developing countries, and identified as a barrier to these countries meeting new emission limits for CO₂ and other Greenhouse Gases. The issue was also raised in the Rio +20 United Nations Conference on Sustainable Development in June 2012.

The present study aims at providing facts and evidence to evaluate the actual situation concerning patenting of Clean Energy Technology (CET) in Africa. It builds on an earlier study in this field carried out jointly by the EPO, UNEP and the ICTSD using methodologies and tools developed¹.

The actual patenting landscape of CET is analysed 1980 – 2009 in Africa and its sub-regions. The landscape is divided by technology area, and includes solar heat and PV, hydroelectric, wind and biofuels and other sources. Both Climate Change Mitigation Technology and Climate Change Adaptation Technology (CCMT/CCAT) are analysed. The origins of the patent applications are analysed, as well as the levels of co-patenting with and between African states.

The "Patent Information" system, available worldwide via the internet and using dedicated tools such as the EPO's free Espacenet database, has with the EPO's specially developed Y02 classification scheme tagged and indexed some 1,5 million documents relevant to most climate change related technologies by end 2012. The Y02 scheme is fully incorporated within the Cooperative Patent Classification (CPC). Together with the EPO's "PATSTAT" patent data statistical tool, patent information data relating to CETs and tagged with the Y02 scheme may be analysed and used to inform policy makers.

The results show that less than 1% of all patent applications relating to CET have been filed in Africa.

The results also show however that there is a relatively high level of inventive activity in Africa in the field of mitigation technologies. This activity is mostly focused on energy storage/hydrogen/fuel cell technologies (37%) and renewable energy (25%), in particular solar PV and solar thermal, followed by nuclear energy (20%) and biomass/waste/com-bustion/CCS technologies (17%), especially biofuels. While the global growth rate on overall inventive activity is 5%, in Africa the growth rate overall is 9% and is a staggering 59% for mitigation technologies. However, the overall African share of inventive activity in CCMT is still low at 0,24%, and 84% of this is in South Africa.

In the field of adaptation technologies, the African share in worldwide inventive activity is very low (0,26%), but the level of patent protection sought in African countries is increasing rapidly at an average of 17% p.a. over this period.

CCMT in particular is developed through international research collaboration; 23% for African CCMT, compared to 12% worldwide. While there is little intra-African co-invention, Africa's most frequent partners are US, UK, Belgium, Germany, Sweden, France and Canada. Overall, inventive activity and patenting is dominated by South Africa, which appears to play a leading role in co-invention, and in technology transfer of CCMT to Africa.

Although many relevant clean energy technologies already exist, they are not yet widely available in Africa for a range of reasons, including high costs. The development of the Technology Mechanism by the United Nations Framework Convention on Climate Change (UNFCCC) has focused attention on technology transfer as the key to approaching CETs in the climate change debate.

Various countries have also developed science and technology (S&T) or science, technology and innovation (STI) policies, as well as national programmes or white papers, which all place considerable emphasis on the transfer and diffusion of technology and explicitly include the energy sector.

Patents have an important role to play in technology transfer. As the previous report on patenting and climate change mitigation technology from EPO, UNEP and ICTSD showed, the main factors impeding technology transfer are access to the real know-how from the source companies (including access to trade secrets), access to suitably skilled staff, scientific infrastructure, and favourable market conditions. The patent system can therefore support technology transfer as without patents to protect their products and processes, the source companies may be reluctant to engage in technology transfer and associated investments.

¹ "Patents and Clean Energy: Bridging the gap between evidence and policy", EPO/UNEP/ICTSD 2010.

All African states except Somalia now have a patent system, and all states except for Somalia and Eritrea comply or will eventually be obliged to comply to the requirements of the TRIPS agreement as members of the WTO.

This report helps to understand how the global and African patent systems can best be used and further developed to support and facilitate the technology transfer of CETs in Africa.

To foster innovation and growth, one of the big challenges for all patent offices across the world, including African states, is to establish or maintain a high quality patent system to discourage low quality patents, ensuring that exclusive rights for CET are only granted for valid technical inventions. As an example, only approximately 50% of patent applications lead to a grant at the EPO, and the scope of protection of those granted is mostly reduced during the examination process.

High quality patents offering maximum legal security, and protecting the interests of both inventors and the public, are the cornerstone of a properly functioning patent system. They provide the optimum balance between private and public interests, disseminating technical information widely, while limiting granted exclusive rights to valid inventions.

The patent system makes a wealth of technical information readily available worldwide, free of charge via the internet. With less than 1% of patent applications relating to clean energy technology filed in Africa, patent rights are unlikely to be a major consideration in any decision to exploit CETs in the region. Longer term, all countries should investigate the possibilities around the development of a high quality patent system and facilitate effective cross-patenting to encourage both co-invention activities as well as technology transfer of more recent CET developments. The relationship between the patent system and successful technology transfer to regions such as Africa also needs to be further researched to inform and guide future policies towards development of clean energy technology for future African needs

REPORT SUMMARY

Introduction

Although Africa has invested in conventional power sources for decades, the situation remains problematic and is characterised by challenges such as unreliable power supply, low access levels, low capacity utilisation and availability, and high transmission and distribution losses. To tackle the current challenges of climate change and to meet the United Nation's Millennium Development Goals (MDGs), the United Nations Development Programme (UNDP) and the World Health Organization (WHO) estimate that two billion people require access to modern energy services by 2015. Since approximately 800 million of these people live in sub-Saharan Africa, they are among the most vulnerable to the effects of climate change despite having contributed the least to global warming.

As Africa's energy currently comes from fossil fuels (oil and coal) and traditional biomass, which have relatively high emissions and other negative consequences, including health problems, it has become a pressing matter to develop the continent's ability to exploit its clean energy potential as its energy demands grow. Research shows that Africa has vast clean energy resources and that these are largely unexploited. However, the ability of African countries to exploit their clean energy potential and join the globally developing clean energy markets will significantly depend on their ability to access and deploy the relevant technologies.

Although many relevant clean energy technologies (CET) already exist or are in development, they are not yet widely available in Africa for a range of reasons, including high costs. The development of the Technology Mechanism by the United Nations Framework Convention on Climate Change (UNFCCC) has focused attention on technology transfer as the key to wider use of CETs in the climate change debate. The discussions about the ownership and transfer of know-how in exploiting clean energy have heightened the interest in – and the misconceptions and controversy surrounding – the patent system. Technical innovation and hence the associated legal rights are key

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