



Patents and climate change mitigation technologies in Latin America and the Caribbean

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Cover

Itaipu Dam, near the Iguassu Falls on the border of Brazil and Paraguay, is the world's most powerful hydroelectric facility. It generated 98,6 TWh in 2013, supplying 90% of Paraguay's and 20% of Brazil's electricity needs.

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TABLE OF CONTENTS

	FOREWORD	06
	EXECUTIVE SUMMARY	07
1	INTRODUCTION	10
2	OVERVIEW OF THE LATIN AMERICAN AND CARIBBEAN CLEAN ENERGY POTENTIAL AND EXPLOITATION LEVELS	14
2.1	Potential for clean energy by source	17
2.2	Sub-regional distribution of clean energy	24
3	THE ROLE OF THE GLOBAL PATENT SYSTEM AND OF PATENT INFORMATION	28
3.1	Transparency in the global patent information system	31
3.2	Overview of patent policies in Latin America and the Caribbean	35
4	PATENTING TRENDS FOR CLIMATE CHANGE MITIGATION TECHNOLOGIES IN LATIN AMERICA AND THE CARIBBEAN: A STATISTICAL ANALYSIS	36
4.1	Patent statistics to provide evidence	38
4.2	Patents and climate change-related technologies	40
4.3	Patents and climate change mitigation technologies (CCMTs) in Latin America	40
4.3.1	Inventiveness and innovation around CCMTs in Latin America	40
4.3.2	Latin America as a market for CCMTs	51
4.4	Patents and adaptation technologies in Latin America	56
5	KEY FINDINGS AND RECOMMENDATIONS	58
5.1	Key findings	60
5.2	Key recommendations	61

	ANNEXES	62
Annex 1	Overview of patent offices in Latin America and the Caribbean	64
Annex 2	Simple patent statistics using Espacenet	66
Annex 3	Brief summary of "Other use" allowable under Art. 31 of TRIPS	67
Annex 4	Global patent family filing trends for Y0 classifications	68
Annex 5	LAC distribution of CCMT filings across Y02B/C/E/T and Y04S: global patent family filings	68
Annex 6A	Global patent family trends for Y02E classifications	69
Annex 6B	Patent families of Y02 and Y02 Energy classifications: globally and in LAC	70
Annex 6C		
Annex 7A	Y02 Transport classification: global filings and trends.	71
Annex 7B		
Annex 8	Y02B classification patent applications: global patent family filings	72
Annex 9	Origin of inventors for Transport (Y02T) and Buildings in LAC countries	73
Annex 9 (contd.)	Origin of inventors for Renewables. Bio-fuels and Energy storage in LAC countries	74
Annex 9 (contd.)	Priority documents listing LAC inventors by inventor country	76
Annex 10	Countries of interest as a market for Latin American inventors	77
Annex 11	International co-invention between LAC countries and the rest of the world	78
Annex 12	International co-applicants between LAC countries and the rest of the world	80
Annex 13	Patent applicants in LAC: Y0 classifications	82
Annex 14	Proportion of CCMT patent applications filed in each Latin American country	83
	ACRONYMS	87
	REFERENCES	88
	DISCLAIMER	90
	IMPRINT	91

FOREWORD

The Parties to the United Nations Framework Convention on Climate Change have long viewed technology and innovation as key in mitigating climate change in a developing global economy, and adapting to climate change where essential. To this end, the Parties agreed at the 16th Conference of Parties in 2010 in Cancun that “the objective of enhanced action on technology development and transfer is to support action on mitigation and adaptation in order to achieve the full implementation of the Convention”, and agreed to establish the Technology Mechanism, including (i) the Technology Executive Committee (TEC) to provide an overview of technology needs and analysis of policy, and (ii) the Climate Technology Centre and Network (CTCN) as its “operating arm”.

The full implementation of the Convention requires action on mitigation, to restrict global warming within certain limits, and support for adaptation to cope with new situations and events. A much-cited goal has been to maintain global warming below a 2°C worldwide average increase over pre-industrial levels, which may already include much greater local changes. This is despite a world population expected to increase from 7 billion to 9 billion people by 2050, and an “emerging global middle class” which could increase from approximately 2 billion to 4 billion in the same period, with greatly increased demands on energy, food and water supplies.

Within this context, the global patent system is expected to serve as a pillar of the modern knowledge economy, supporting worldwide technology development and transfer.

This report is the third in a series of joint UNEP-EPO studies focusing on the role of intellectual property rights and more specifically patent rights in the innovation and transfer of climate change-related technologies. It follows on from the publication of a first global study on clean energy technologies¹, and a second more geographically focused study covering Africa². This current study covers the Latin American and Caribbean countries (LAC), including not just clean energy, but also climate change mitigation technologies across a wide range of fields including buildings, transport and smart grids. Once again this has been a coordinated approach by both the United Nations Environment Programme's Division of Environmental Law and Conventions and the European Patent Office.

The potential for renewable energy and use of other climate change mitigation technologies in this region is captured in this study, and once again the disparity between potential and actual implementation is highlighted. With the publication of this report it is hoped that relevant stakeholders, including policy makers, private sector enterprises and those who engage in national legal systems relating to patents, will be able to utilise these findings to give further impetus to the uptake of renewable energy and climate change mitigation options through the harnessing of appropriate technologies. This aligns well with UNEP's position

of science-based policy formulation, and utilises the EPO's wide expertise on patents, and its repository of patent information and related knowledge.

The international community has geared itself towards the finalisation of a landmark global agreement on climate change defining legal limits on greenhouse gas emissions at CoP 21 in Paris in 2015. This study, together with the previous ones relating to clean energy worldwide and clean energy in Africa, should serve as a guide to the UNFCCC-related initiatives bodies including the Technology Executive Committee and the Climate Technology Centre and Network. More specifically, these reports may inform the TEC in its analysis of policy concerning IPRs and patent rights, in particular within its thematic dialogues on barriers and enhancing factors for technology development and transfer, while the CTCN may be supported in its operational role by patent information services in assessments of technology options and any associated IPRs.

The exact relevance and impact of patent rights in any particular area of innovation and technology transfer must eventually be determined on a case-by-case basis. As technology requirements evolve in the future, requiring solutions not only to climate change-related issues but also contributing to solving a plurality of global challenges, this will inevitably be associated with increasing use of the global patent system. This system should play an enhancing role for all stakeholders, including both donor and recipient nations, and for innovators and those with technology needs.

While supporting international patent filing via the Paris Convention and the Patent Cooperation Treaty (PCT), and supporting international trade in conjunction with the Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPs), the patent system should continue to encourage global innovation through the maintenance of high quality in patent search and examination, thereby granting temporary exclusive rights only to genuine inventions that further the state of the art. This maintains the balance in the inherent “social contract” of the patent system, exchanging temporary exclusive rights for the disclosure of the invention, and thereby the system's optimum support for innovation and technology transfer in climate change-related technologies and other development areas.

The European Patent Office (EPO) is Europe's second largest international organisation (after the European Commission) and grants European patents for up to 41 European countries (including its Extension States). The EPO has tagged those of its 88 million patent documents that relate to climate change mitigation and made this collection available to the public in a searchable way via its online tools and services.

¹ www.epo.org/clean-energy: in conjunction with ICTSD, and with statistical analyses from OECD
² www.epo.org/clean-energy-africa

EXECUTIVE SUMMARY

Latin America and the Caribbean (LAC) is a very diverse region, both geographically and socio-economically. It hosts some of the world's most rapidly developing economies and much of the world's emerging middle class. Its energy consumption increased by 76% over the period 1995-2010, as opposed to 28% in OECD countries (International Energy Agency statistics), and is expected to continue to increase into the future as energy is essential for development. This inevitably leads to a growing potential for carbon emissions.

The UNFCCC and the role of technology

UNFCCC policy and initiatives often revolve around efforts to encourage developing countries to leapfrog carbon-rich fossil fuels, and rely in future on renewable energy sources for future development requirements. Renewable energy is already extensively used in LAC, and is estimated to supply some 29% of energy requirements, an already high proportion. However, the potential is much greater, including wind power over its extensive coast and islands, solar power throughout the tropical regions, geothermal energy through areas of volcanic activity, and further hydro-electricity developments within its major river systems.

The UNFCCC "Technology Mechanism" recognises the need for innovation of new technologies to meet new requirements, as well as technology transfer to developing countries. The patent system, designed to support innovation and technology transfer, has often been the subject of much debate in the context of technology development and transfer.

Dissemination of technical knowledge through the patent information system

The patent system is highly developed in the LAC region, with all LAC states acting as signatories to the Paris Convention and a clear majority as signatories to the PCT. Patent information systems are also well developed, including patent information services from most national intellectual property offices (IPOs), as well as international collections such as the Espacenet database, WIPO's Patentscope and the EPO/WIPO/Spanish IPO's Latipat service, a Spanish/Portuguese adaptation of the EPO's Espacenet.

Patent information services such as the EPO's Espacenet enable readily accessible, free-of-charge access via the internet to some 88 million patent documents, including over 1.9 million related to climate change mitigation technologies. These worldwide patent documentation collections are readily searchable using keywords and the Cooperative Patent Classification (CPC), with its 250 000 classes; and for CCMTs, the dedicated Y02/4 classification scheme.

Patent filings for CCMTs in Latin America and the Caribbean

At the same time, less than 3% of worldwide CCMT patent applications were filed in LAC from 1995 to 2011, indicating that the patent system may have an important but largely under-utilised role to play in fastening technology transfer to LAC, as there is little protection of CCMTs in this region³.

Brazil dominates the CCMT inventive activity of the region, with 73% of the region's first filings stemming from Brazilian inventors, mirroring Brazil's leading position in R&D in LAC. Mexico and Argentina provide 11% and 9% respectively, totalling 93% between these three countries.

Most filings are in the energy area (Y02E), primarily renewable energy sources, biofuels and energy storage. In terms of use of renewable energy, recent data from the International Energy Agency (IEA) show that almost 29% of the total primary energy supply in LAC comes from renewable sources (compared to only approximately 6% in OECD countries). This implies a strong incentive for investment. LAC inventors' applications are also filed overseas, particularly in the USA and Europe.

Patent filings from overseas indicate interest in the LAC region as a market for CCMT inventions. Brazil again dominates with 55% of LAC CCMT filings, while Mexican filings comprise 28% and Argentinian filings 11%. The main CCMT patent applicants from overseas include General Electric, Gillette, Wobben Alloys, Bosch and Siemens. Most overseas filings originate from the USA and Germany, then France, Japan, and from first filings at the European Patent Office.

Overall, total LAC CCMT filings represent less than 3% of all CCMT patent filings worldwide. Consequently, many CCMTs developed abroad and disclosed in patent documents available on the internet could be of significant use in various jurisdictions of the LAC region for further innovation and development of locally adapted solutions. Greater awareness of the untapped potential of patent information, and related tools such as the Y02 classification, could be highly beneficial in supporting use and innovation in CCMTs in LAC, as well as CCMT technology transfer to LAC.

Co-invention, indicating R&D co-operation, is most common between Brazil, Mexico and Argentina and the USA. This is followed by co-invention between the big three LAC countries and Germany, France, UK and other European states.

³ For absolute numbers, see Figure 21 in section 4.3.2.

Optimising support for technology development, innovation and global transfer

As LAC patent filings continue to increase above global rates (16% versus 12% respectively), support for innovation can be optimised by maintaining a high quality of patent search and examination, thereby granting temporary exclusive rights to genuine inventions. For patent filings originating from outside of LAC, this may be supported by high quality searches and opinions on patentability from PCT International Searching Authorities (ISAs); the EPO currently acts as ISA for 40% of all PCT applications, and searches a further 20% in the European Patent regional phase. Global patent quality may also be enhanced through the sharing of search results through initiatives such as the IP5 Common Citation Document (CCD), which enable all IPOs worldwide to benefit from the search work of the IP5 Offices (EPO, JPO, KIPO, SIPO, USPTO). The CCD is also publicly available via the internet.

In addition, awareness of the wealth of technical knowledge made readily available worldwide over the internet through patent information services (including the Y02/4 classification scheme) should be enhanced at all levels, while continuing to ensure the widest possible national, regional and international patent documentation coverage including, where possible, legal status data and supported by machine translation services such as PatentTranslate.

Through these means, the contribution of the global patent system to incremental and follow-up innovation and global transfer of technology may be optimised, to support climate change mitigation and adaptation and, potentially, a more geographically balanced development of technologies with solutions adapted to local needs. This is strongly supported by the wealth of technical knowledge published within patent documents, and freely available over the internet.

01 Number of CCMT patent filings with LAC inventors 1995-2010



Lake Titicaca, Peru: Uru swimming island, almost completely fabricated from Totora reeds. The photovoltaic solar panels on the house roof are a practical source of electricity in remote rural areas.

1 INTRODUCTION



Opportunities for climate change mitigation technologies (CCMT) in Latin America

An overall rising demand for energy

Latin America and the Caribbean (LAC) represent one of the fastest-developing regions of the world, including some of the most important emerging economies. With a rapidly growing population – 460 million people in 2011, 24% more than in 1995 – and comprising a large share of the global “emerging middle class”, this region has markedly increasing energy demands to support its rising standards of living.

A unique ecosystem and a high relevance of CCMTs

LAC is also a highly heterogeneous area, both geographically and from the socio-economic point of view. It includes some of the world’s largest cities, vast rural and sometimes remote areas, some of the least populated mountain regions of the world, and many island states. It also includes the Amazon rainforest region, with its global significance in naturally capturing greenhouse gases (GHG).

As a result, LAC has a diverse set of requirements relating to development and energy needs, which pose a broad set of challenges, both for limiting future GHG emissions (climate change mitigation) and for adapting to climate changes.

An opportunity exists for LAC to meet increasing energy requirements with low-carbon, renewable energy sources, and “leapfrog” the developed world’s current dependency on fossil fuels. At the same time, it will be essential to reduce energy demands by embracing further developments of CCMTs such as in the areas of transport and new buildings. LAC’s population increased by 22% over the 1995-2010 period, double the OECD and world average increase. This implies a rapid growth in the energy demand, as also the per capita energy consumption grew by 43% in LAC, compared to only 15% for the OECD area (IEA statistics).

Many LAC countries are particularly vulnerable to the effects of climate change. The fragility of certain ecosystems and their inherent biodiversity, such as the Amazon region, must be carefully considered when assessing the impact of any future climate change scenarios which will affect larger land-locked regions more severely as well as ocean areas. Any negative effects on the Amazon region are likely to have global repercussions, also due to its current importance as a sink for carbon emissions.

New technologies are necessary to help future populations adapt to inevitable climate changes, especially in highly exposed areas such as small island states which are threatened by continued rising sea levels and changing weather patterns.

The objectives defined in global policies

In the global discussions surrounding climate change and its future impact, the Parties to the UNFCCC have recognised the vital role of innovation in achieving sustainable development. The Parties are working to establish legally binding emission levels for all states in a new agreement to be signed at the 2015 UNFCCC Conference of Parties (CoP) in Paris, to replace the Kyoto Protocol. To meet these emission ceilings, future energy needs must be met to a large extent by renewable energy sources.

The future energy requirements of Latin America and the Caribbean (LAC) and the potential for generation of renewable energy and deployment of climate change mitigation technologies are discussed in Chapter 2.

The Parties to the UNFCCC agreed at the Conference of Parties in 2010 in Cancún to establish the Technology Mechanism, to support innovation in new “green” technologies, and their global technology transfer.

The role of the patent system and the related debate

The patent system is an important component in this scenario. It is designed to encourage invention and innovation, favouring investment in R&D by rewarding inventors with temporary exclusive rights, while requiring disclosure of the invention. Many millions of patent documents containing detailed descriptions of technologies are today freely accessible to the public. Patents also provide a framework for technology transfer, defining the scope of the “intellectual property” as patent rights, and forming the basis for licensing agreements.

However, innovation and technology transfer are complex mechanisms, and the role and impact of patent rights has been frequently debated over many years at international level, and again at the Conference of Parties in Warsaw in 2013. This role is discussed in more detail in Chapter 3.

To better understand the role and impact of the patent system on this global scenario however, including the overall impact of the disclosure of inventions versus the granting of temporary exclusive rights, more evidence is required concerning patent trends in Climate Change Mitigation Technologies (CCMTs) worldwide, the countries in which they originate, and the countries in which patent protection is sought. One of the key roles of this study is to provide such evidence to support policy-making in Latin America and the Caribbean region.

The scope and objectives of this study

The European Patent Office's (EPO) public databases (accessible over the internet via Espacenet) contain over 88 million patent documents and are the largest repository of patent information in the world. The EPO has also developed a dedicated classification system for climate change mitigation technologies (referred to as the Y02 and Y04S classification schemes), enabling interested parties to find these technologies more efficiently in Espacenet. Additionally, using this Y02/4 classification scheme in conjunction with the EPO's Worldwide Patent Statistical Database (PATSTAT), patent statistics may be produced to indicate trends in the technology market and provide evidence to support policy-making.

Patenting of CCMTs in Latin American has been analysed (Chapter 4), to indicate where Latin American CCMT research and development strengths lie (Section 4.2.1). Furthermore, CCMT patent applications filed in Latin America but originating from overseas (Section 4.2.2) have been analysed, indicating global interest in Latin America as a market for CCMTs.

In section 4.3, patent filings for selected adaptation technologies are identified, both for Latin American inventors and for as well as filings in Latin America from overseas.

Finally, key findings and recommendations are summarised (Section 5).



Wind farm in Argentina.

2 OVERVIEW OF THE LATIN AMERICAN AND CARIBBEAN CLEAN ENERGY POTENTIAL AND EXPLOITATION LEVELS



The region of Latin America and Caribbean (LAC) holds a significant potential of renewable energy, especially for hydro and biomass. A quantification of the significance of the potential is provided in the IPCC Special Report on Renewable Energy Sources (see [Figure 02](#)). It shows that Latin America is the second biggest holder of bioenergy potential, after Africa, with 1.075 million toe (tons of oil equivalent) representing 26% of the total world potential in biomass⁴, and is also in second place in hydropower potential, this time after Asia, with a potential of 608 GW in capacity and 2.856 TWh/yr in generation (16% and 19% of the total world hydro potential). The global potential of wind technology in Latin America is around 10%, according for instance to Krewitt et al. (2009), as with an estimated potential of 10.890 TWh/year (6 570 TWh/yr onshore and 2.880 TWh/yr offshore). The potential solar energy is about 7% of the total potential in the world, but estimates vary widely in a range from a minimum of 38.000 million toe to a maximum of 1.2 million toe. The potential for geothermal resources presents a similar situation to solar energy; it reaches 13% of the global potential, but with a wide variation between the minimum and maximum estimates (IPCC, SRREN 2011).

02 Renewable energy worldpotential and share of LAC

Renewable source	World total	Share within LAC
Hydro	14576 TWh/year	19,5%
Biomass	171 EJ/year	26,3%
Wind	–	10%
Solar	1575 (min) – 49837 (max) EJ/year	7%
Geothermal	9,5 (min) – 312,2 (max) EJ/year	13%

Source: IPCC-SRREN (2011)

In terms of use of renewable energy, recent data from the International Energy Agency (IEA) show almost 29% of the total primary energy supply in LAC today is from renewable sources, which is already impressive in comparison to the 6% share in the member states of the Organization for Economic Co-operation and Development (OECD). However, the situation involves many challenges. The Latin American renewable energy sector is currently dominated by hydro-power and biofuels. These two sources may have in some cases a number of limitations. The current dependency on hydro energy may prove problematic in case of droughts, which could be an impact of climate change in some regions. Biofuels are also under criticism for a number of reasons. Regarding their impact on climate change mitigation, the main concern is that industrial biofuels may not contribute to reducing greenhouse gases, in cases where they also lead to deforestation (GENI 2009).

Besides these two dominant renewable energy sources, there is still enormous potential to expand the use of other renewable sources in Latin America. All countries in the region are endowed with abundant renewable energy sources. Solar, wind, biomass, small hydro and other energy resources (e.g. from the ocean) are available in the region in larger or smaller quantities, depending on the geographical location and topography of the individual countries (Poole, 2009).

The prospective scenarios for the use of renewable energy in LAC are optimistic. Due to the implementation of adequate policies to promote renewable energy technologies, a significant increase of renewable energy (RE) markets is expected in the short run (five years). In the longer run (10-15 years) — as research groups become stronger, national and international businesses emerge and grow, and renewable energy (RE) technologies are developed in LAC — the use of RE should be massive and comprise a significant proportion of the total primary energy consumption.

Renewable energy, without hydro, will in most LAC countries have to cover between 10% and 20% of electricity production by 2020. This implies a strong incentive for investment in these energy sources in LAC (see [Figure 03](#)).

⁴ 1 toe = 41,85 Gjoule = 11.622 kWh

2.1 Potential for clean energy by source

Hydropower

Most countries in the region already use a portion of their hydraulic potential to generate electricity. Most operations are in the multi-megawatt range, seeking economies of scale characteristic of large hydroelectric technologies. This practice has left most of the small opportunities for hydroelectric generation yet to be exploited. Given the high rainfall indices and the rough topography of many countries, small hydropower offers a good alternative for supplying electricity, especially in remote sites.

The challenge of renewable energy resource development in the region is the reason why little has been done to properly measure and characterize these resources. In the case of project development, available information on local renewable resources is often limited, if not unreliable. In most cases, information is non-existent, which represents a major barrier to the incorporation of this alternative as part of the national energy inventories and planning exercises (Poole, 2009).

The estimate for hydropower technical potential in Latin America is the second largest in the world, about 26% of the total potential, or 2 850 TWh/year (IPCC, SRREN 2011).

Brazil is an important case, not only because it has about 40% of the region's hydro potential and generates more than half the region's hydropower today. The total remaining potential of hydro resources in Brazil is 159 GW (Poole, 2009).

Colombia and Peru, the countries with the second and third largest potential in the region, seem to be less advanced in the assessment of their hydro resources. Colombia has a remaining potential of 87 GW. In Peru, out of a remaining total of 56 GW, only 35% appears to have been defined at the level of individual plants. Colombia has developed only 9% of its potential; Peru only 5% (Poole, 2009).

Substantial opportunities exist to exploit hydrological diversity in Latin America. As Brazil develops its potential in the Amazon and new capacity is developed in the Andean countries, the possibilities for an inter-hemispheric interconnection become more realistic.

Hydropower produces almost 57% of the total electricity generated in LAC. This is by far the largest share of supply by hydropower in any major region of the world (IRENA, 2012).

The share of hydro varies from country to country and between sub-regions. In the Caribbean Islands generally, the contribution of hydro is quite small, but at the other extreme, 100% of Paraguay's generation for the grid is from hydropower (especially from the Itaipu dam), and the share of hydro in Brazil's system is higher than 80%.

In some Central American countries such as Costa Rica and Panama, and in the Andean countries, hydropower accounts for more than 50% of electricity supply, as shown in [Figure 03](#).

03 Share of hydro and other renewables in supply of electricity in LAC (2013)

Country	Total production (TWh)	Hydroelectricity (%)	Other renewables (%)
Argentina	129.6	24.4	1.7
Bolivia	7.2	32.5	3.4
Brazil	532.0	80.6	6.6
Chile	65.7	32.0	7.6
Colombia	61.8	79.1	3.3
Costa Rica	9.8	72.6	18.7
Cuba	17.8	0.6	2.6
Dominican Republic	13.0	11.8	0.2
Ecuador	20.3	54.9	2.8
El Salvador	5.8	34.6	31.3
Guatemala	8.1	39.8	27.1
Haiti	0.7	16.7	4.3
Honduras	7.1	39.5	4.0
Jamaica	5.1	2.0	6.2
Mexico	295.8	12.3	3.6
Nicaragua	3.8	11.6	22.4
Panama	7.9	55.2	0.3
Paraguay	57.6	100.0	0.0
Peru	39.2	55.0	1.9
Trinidad and Tobago	8.0	0.0	0.0
Uruguay	10.3	62.6	9.3
Venezuela	122.1	68.5	0.0
Total LAC	1428.7	54.0	4.6

Source: World Development Indicators (3.7); Electricity Production, Sources and Access, World Bank, 2013

Biomass

Biomass is the second largest renewable source for generation in Latin America today, after hydroelectricity. Within the category of biomass, sugarcane residues are by far the most important resource for electricity generation in the region. The potential weight of sugarcane cogeneration varies widely between countries; the potential in Brazil and Central America would be 17-18% of total generation, in Colombia and Cuba 12-13%, while in the Caribbean and most other countries it would be around 5%. Brazil's story of success in biofuel production and use has sparked considerable interest across LAC. Several countries have launched important regulatory and legal initiatives to lay the groundwork for future expansion and investment. A few countries have begun attracting international investors, and others have announced plans for major expansion in their biofuel industry. Argentina has developed a high manufacturing capacity for biofuels from soybean oil and was the third major producer and exporter of biodiesel in 2012.

Brazil accounted for 35% of global bioethanol production in 2009, and was the second producer in the world after the United States. Persistent and stable policy support has been a key factor in building biomass production capacity and markets, requiring infrastructure and conversion capacity that gets more competitive over time. These conditions have led to the success of the Brazilian programme to the point that ethanol production costs are now lower than those for gasoline. Sugarcane fiber bagasse generates heat and electricity, giving Brazil an energy portfolio mix that is substantially based on RE and that minimizes foreign oil imports. Several important bioenergy options, like sugarcane ethanol production in Brazil, are competitive today and can provide important synergies with longer-term options. Lignocellulosic biofuels to replace gasoline, diesel and jet fuels, advanced bioelectricity options, and biorefinery concepts can offer competitive deployment of bioenergy for the 2020 to 2030 timeframe in LAC (IPCC, SRREN 2011).

Brazil leads R&D in LAC. A broad range of research activity exists in Colombia, including public/private partnerships and research sponsored by Ecopetrol, the state-owned oil company. There is also ongoing academic research on palm oil-based biodiesel, and studies performed by sugar and palm oil producers' associations to improve crop yields and to identify optimum cultivars for raw material production. In Costa Rica, a promising ethanol initiative between Petrobras and RECOPE⁵ is underway. In Argentina, with its long history of interest in biofuels, private-sector investors have established a biofuel research center. Several universities are promoting biofuels – particularly biodiesel – through research and involvement in initiatives like the Mesoamerican Network for Biofuel Research and Development (Red Mesoamericana de Investigación y Desarrollo en Biocombustibles). Brazil has launched a long-term joint research initiative, which includes the public and private sectors, on the ethanol production chain (agronomic and industrial innovations), and more recently on biodiesel and other energy carriers.

As a natural consequence of the solar radiation available, photosynthetic activity in most of the region is rather high, and hence the high production of biomass fuels. Many countries in the region have an economy based on agriculture, so that agricultural waste, forest residues and other residues from raising animals (e.g. manure or methane from decomposing waste) are also abundant. These resources are difficult to evaluate, so that information in a compiled and analysed form is difficult to find.

⁵ RECOPE (Refinadora Costarricense de Petróleo) is the national oil company of Costa Rica

Wind energy

The inherent wind power capacity in LAC can be used to produce mechanical power and electricity by means of commercially available and cost-competitive technologies. Southeast Mexico and most Central American and Caribbean countries are subject to the influence of the trade winds, while Southern Mexico and Central America are exposed to strong and almost constant thermally driven winds, which in the case of Mexico are produced by the temperature difference between the waters of the Atlantic and Pacific oceans. Windy places can also be found in the southern hemisphere, especially in the south of Argentina.

Figure 04 shows the distribution of wind speeds in LAC at a height of 10 meters, according to information provided by the International Renewable Energy Agency (IRENA).

A few LAC countries (basically Brazil and Argentina) have developed wind maps to guide project developers. However, the general lack of information in the region results in a significant barrier for the development of this type of project. This does not mean that there is no interest in those countries without wind maps. Peru for example does not have an estimate of potential, but has registered a relatively large portfolio of possible plants. Similarly, Chile has no overall estimate of potential but has surveys indicating promising sites in parts of the country (Poole 2009).

There is no doubt that Latin America does have some excellent areas for the development of wind energy. Given the limited and very uneven information about the distribution of wind energy resources throughout Latin America it is impossible to quantify the regional potential even approximately. What can be noted is (Poole 2009):

- The gross potential from high-quality resources in the region is much larger than current electricity generation (1 400 TWh in 2011⁶);
- Only a relatively small fraction of the gross potential (perhaps 10-15% in most countries) can effectively be developed.
- This potential is unevenly distributed, both within and between countries. Argentina, as well as parts of Chile, have an enormous gross potential in its southern region;
- While there are large differences between countries, there appears to be enough high potential to make a significant contribution to electricity supply expansion over the next 20-25 years (more than 10%).

Complementation strategies (hydro and wind) which take advantage of the diversity of wind regimes as well as the diversity of hydrology would facilitate the reliable absorption of a relatively large share of wind energy into the region's electric systems. Such strategies imply a wider exchange between countries. A more robust network of bulk transmission interconnecting the countries has already been recommended for optimizing the regional development of renewable resources⁷.

In 2006, the first encouraging developments were noticed in LAC with the installation of 296 MW. The markets took off during the 2007-2010 period with Brazil leading the way, and closely followed by Mexico. Smaller developments are also taking place in some Central American countries, as well as in Argentina and Chile. In recent years, Uruguay has undertaken an aggressive strategy of incorporating wind generation, with surprising results. Overall, the region accumulated 3 505 MW of wind power plants in 2012, compared to only 6 MW in 2005, reflecting the rapid growth of this technology in the last five years.

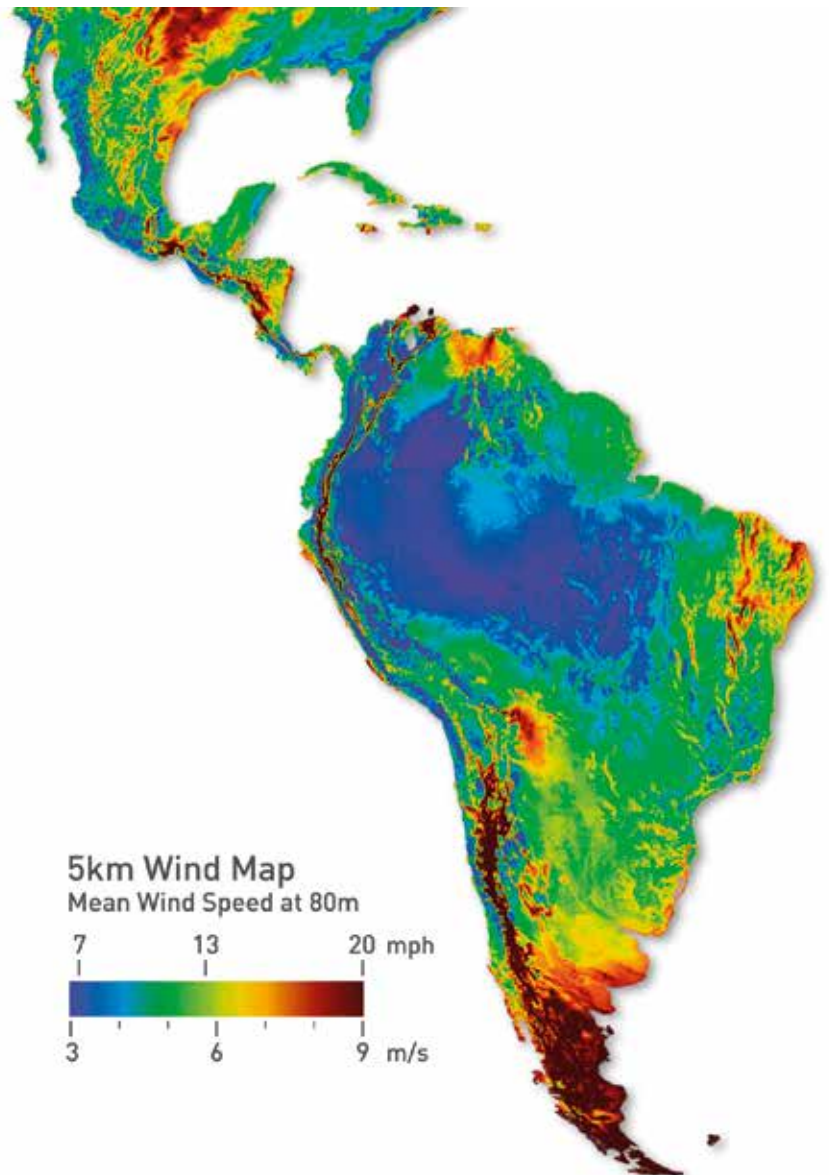
In Brazil, the governmental program is showing signs of success with a growth of 1 077 MW in 2012, which brings Brazil's total wind capacity to 2 508 MW. Besides, Brazil's federal government is expected to announce a 5 000 MW wind energy program that will be completed in 2015. In Mexico, which has also great potential for wind energy, the total capacity at the end of 2012 was 1215 MW⁸. According to the Mexican Wind Energy Association (Asociación Mexicana de Energía Eólica, AMDEE) a minimum capacity of 3 000 MW will be reached in 2014.

6 World Bank; World Development Indicators, Electricity production, sources and access

7 Alan Douglas Poole: The Potential of Renewable Energy Resources for Electricity Generation in Latin America, November 2009

8 Global Wind Energy Council (GWEC)

04 Wind energy potential in LAC—winds speeds at a height of 10 meters



Source: 3TIER Global Mean Wind Speed at 80m

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Solar energy

Solar energy is more evenly distributed, as good portions of the region lie within the Sun Belt Region of highest solar radiation. Thus, except for site-specific adverse microclimates, solar energy is a predictable and reliable resource, capable of being transformed to heat and electricity by means of several technologies in different stages of development and commercial availability. Solar irradiance maps are available for Mexico, Colombia, Brazil, Argentina and a few other countries. On [Figure 05](#) we can see the distribution of solar irradiation in LAC according to information provided by IRENA, based on information from the Global NASA SSE, reporting production in kWh/m² per day.

LAC is very rich in solar resources. In most of the territory, average solar radiation exceeds 4 kWh/m²/day. Besides, there are special areas with even higher radiation indexes, like the northwestern part of Mexico, with values of 6 kWh/m²/day, as well as Honduras and some parts of Cuba, the Dominican Republic, Peru, Bolivia, Chile, Argentina and Brazil, where solar radiation indexes reach 5 kWh/m²/day or more. Solar radiation is the renewable energy source with the highest potential in LAC countries. Therefore, the region in general is considered especially suitable for the use of solar energy technologies (ICSU-LAC 2010).

However, although solar resources and their potential applications are abundant, the use of solar energy technologies in LAC has been quite limited, being restricted mostly to solar water-heating and photovoltaic power generation. For example, in Mexico some local companies produce flat-plate solar water-heating collectors for the local market, while others import them, generally from China, for distribution in the country. The cumulative area of flat-plate solar collectors installed in Mexico neared 840 000 m² in 2006, but this figure is small in comparison to the installed capacity of countries like Turkey or Israel. Other nations in the region lack data on the total area of flat-plate solar collectors installed, but it could be estimated the the figure is quite low (Poole 2009).

Regarding the use of photovoltaic systems (PVS) in LAC countries, several national and international programs have been implemented to install PVS for lighting and water pumping in small villages. One of those initiatives was the Mexican Renewable-Energy Program, conducted by Sandia National Laboratories and sponsored by the US Department of Energy and the US Agency for International Development. This program has been a successful model for the implementation of pumping and power generation systems based on renewable energy sources; therefore, the model has been implemented in other Latin American countries as well. Under this program, more than 200 water-pumping systems were installed in rural communities, and intensive professional training was provided to more than 30 local engineers, who became experts in renewable energy.

Estimates suggest that by 2012, 33 000 kWe⁹ of PVS were installed in Mexico. Besides, training was provided to dozens of Mexican professionals from the public and private sectors. Nowadays, Mexico has a national program for the productive use of PVS in rural areas, which is supported by the Shared-Risk Trust Fund (Fideicomiso de Riesgo Compartido, FIRCO), a federal financing agency. There are few examples of such programs elsewhere in LAC¹⁰.

Other isolated applications – like food drying, solar refrigeration for food or vaccine preservation, and solar liquor stills – have been implemented in the region, but with no duplication efforts, and scarce information.

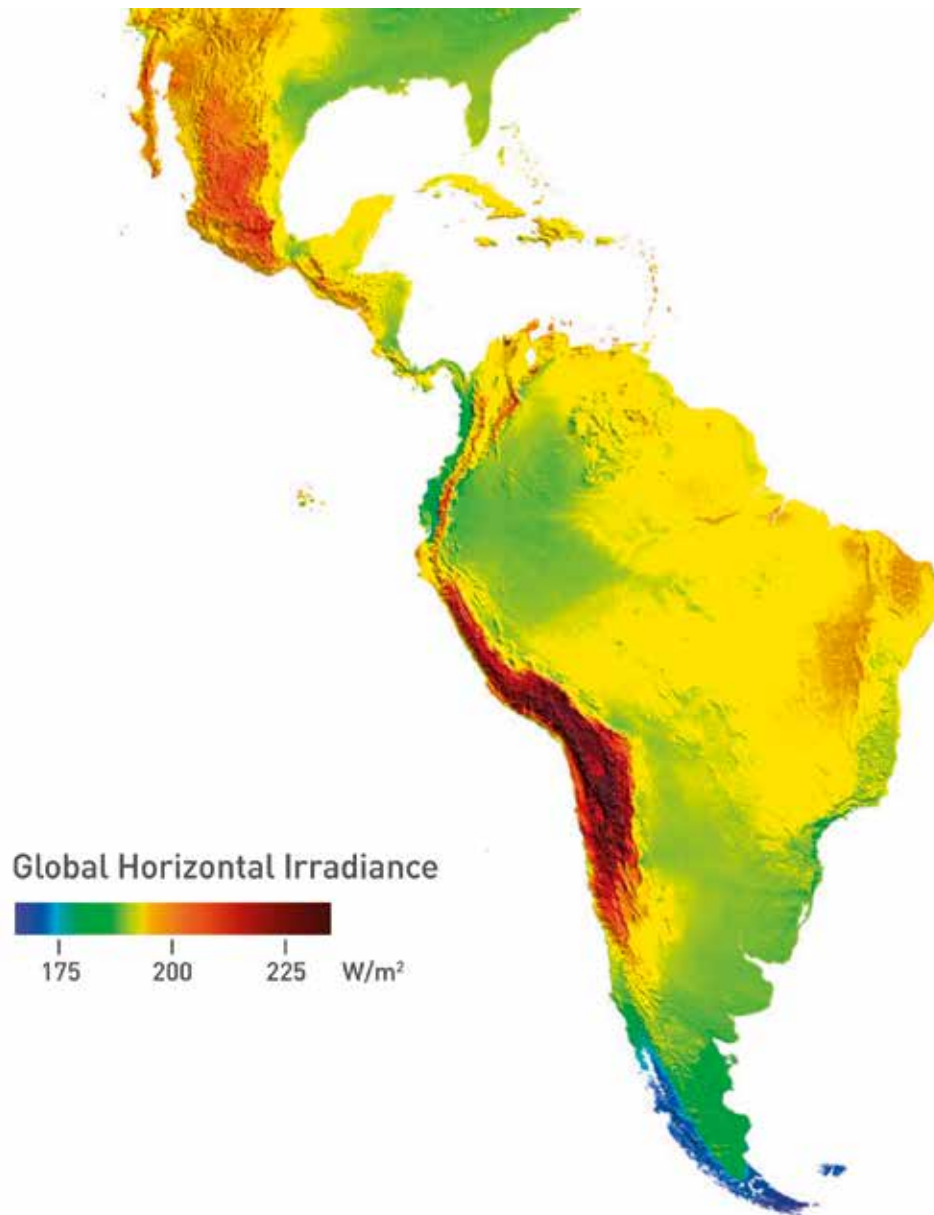
Renewable energy technologies, particularly solar energy, have characteristics that facilitate their use in the building sector. The design of green buildings could integrate these technologies in cities. In rural areas, renewable technologies could provide access to modern energy services. In some cases, when properly designed, houses or buildings could become net suppliers of energy (electricity and heat). Many technologies have already penetrated the building sector: biomass heating systems, photovoltaic solar panels and solar water heaters. According to IEA, at global level the penetration of renewable technologies in buildings (measured as the ratio of energy supplied from renewables over total energy consumed) could be increased from the present level of 13% up to more than 30% in a mitigation scenario if relevant policies are implemented. This increase in penetration could be particularly relevant in Latin America due to the widespread availability of renewable sources in this region (IPCC, SRREN 2011).

Some countries have begun to develop operating rules for the development of smart grids, concerning distribution systems in large urban centres. This will help the integration of renewable energy in power systems.

⁹ kWe indicates the kilowatts of electricity that may be produced.

¹⁰ We could find the PERMER program of the World Bank in Argentina, the Rural Solar Electrification Project in Bolivia, and a few other projects.

05 Solar energy potential in LAC (kWh/m².day)



Source: 3TIER Global Mean Solar Irradiance

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by Vaisala

Geothermal

Available estimates by Latin American planning agencies of the potential for electricity generation from geothermal resources have a large degree of uncertainty. There are countries with clear potential but requiring further investigation like Colombia and Peru. Dimensioning the reserves requires exploratory drilling, which is expensive and high-risk. Not much drilling has been done, which means there is considerable uncertainty in the estimates of the potential. Mexico is a relevant producer, but there has been no published review of the potential of high-temperature resources in the last 30 years (Poole, 2009).

Geothermal is the third-largest source of generation of electricity from renewable energy in LAC. Capacity is concentrated in Mexico and Central America: Mexico is the third larger geothermal producer in the world (capacity 958 MW, generation 7.4 TWh in 2012). Central America's capacity of 426 MW is large relative to the installed capacity in this sub-region.

With existing technology the ability to contribute to the expansion of future supply is regarded as limited, even in the regions with the clearest potential along the Andes, in Central America, Mexico and the Eastern Caribbean.

2.2

Sub-regional distribution of clean energy

South Cone

Argentina has probably by far the largest potential from wind resources of any country in Latin America. Unfortunately there has not been the kind of systematic review of potential as for other countries in the region, like Brazil. This is consistent with the to-date very low investment in wind power in the country. However, the information that is available suggests that Argentina could be a big producer of wind energy. There are relatively large areas in Patagonia with average wind speeds of more than 9 m/s at 50 m height. Below 8 m/s the already large area doubles. Argentina also has an important hydropower potential located mainly in the Andes Mountains, and in the Plata basin, where large bi-national projects between Argentina and Brazil (Garabí) and Argentina and Paraguay (Corpus) are located, with a capacity of about 5 000 MW.

The potential of renewable energy, without large hydro, in Chile is strong. Today there are 618 MW of renewable capacity installed in operation, but the long term potential is approximately 351 GW. About half of this will come from wave ocean energy, one third from concentrated solar power (CSP), and the rest from wind, mini hydro, geothermal and biomass¹¹.

There are also abundant solar resources in Argentina, concentrated in the north of the country, Chile in the Atacama Desert and Bolivia in the Altiplano of the Andes. Currently, the greatest barriers to the present development of these resources are the cost of electricity produced and the distance from the production centres to markets.

¹¹ Renewable Energy in Chile; Factsheet. Renewable Energy Center, Ministry of Energy. Chile (2011).

Brazil

Among South American countries, Brazil has undertaken the most systematic mapping of its renewable energy resources, in particular wind and solar sources. The seasonal variations in average wind output appear to be complementary to average variations in the flow of Brazil's large hydroelectric system. That is, average winds are higher in winter (June – September), which is the dry season. Quantitative estimates of the gross potential in areas with speeds of 7.5 m/s, at 50 m, or higher might be of 670 TWh/year. If we take into account areas with wind speeds of 7 m/s or higher, this would substantially increase the gross potential to about 1 900 TWh. Wind power could make a very significant contribution to the expansion of Brazil's generation over the next two decades with appropriate policies (Poole, 2009).

Brazil has abundant geothermal hot spots which increase the potential of geothermal energy, especially along the north-east coast and in the south.

The potential of solar power in this country is also very high. In almost every part of the country, it would be possible to develop new solar plants, especially on the east coast where the solar radiation is ideal for matching production with load demand. It is estimated that water heating is responsible for 25% of the total electric power consumed in Brazilian households (electricity consumption around 20 billion kWh in 2012). Such demand for electric energy occurs primarily in the late afternoon causing a demand peak that could be greatly reduced with the exploitation of solar energy, with economic and environmental advantages. The electric showerhead is the equipment mostly used for water heating, as it has a very low cost for installation but may consume up to 6kWh¹². The potential for using photovoltaic systems (PVS) is huge and can be estimated in tens to hundreds of MWp¹³ in the Amazon region alone.

As indicated in the first part, Brazil is the largest producer of biomass and hydropower in LAC and still has significant potential to be developed with these renewable sources.

Andean countries and Venezuela

The Andean countries are characterized by a significant hydro potential, currently getting more than half of electricity produced from this renewable source, as noted above.

In Colombia, the most promising region for wind energy is the north coast, on the La Guajira peninsula in the extreme northeast of the country. Wind speeds average 10 m/s at 60 m height and are quite steady during the day. The Colombian Academy of Sciences estimates a potential of 14 GW (49 TWh at 40% load factor) in this area¹⁴. There are also good wind resources, over 7.5 m/s at 50 m height in areas of the Santander Andes in north-east Colombia. Complementarity with hydro is important in Colombia, since hydro is dominant in the electricity mix. The same ocean winds that make the north coast of Colombia an area of high quality wind potential, are also effective in Venezuela. There is not good information available for Venezuela, but rudimentary wind maps show that high quality resources, with speeds of more than 7 m/s, could be located around Lake Maracaibo, and the lake itself might be a good area for shallow off-shore plants.

Peru has published maps showing higher-quality sites for the development of wind energy projects along the Pacific Coast. However the information available does not allow the potential geographic areas to be shown. Although wind does not figure in the power's sector expansion plan, there have been temporary concessions at 34 sites with a total of 5500 MW¹⁵. The Catholic University of Lima estimates that the exploitable potential of wind energy is about 65 000 MW, equivalent to 170-200 TWh, at 30-35% factor capacity (Poole, 2009).

There are many geothermal areas in Colombia and Peru. The greatest potential is concentrated along the northern coast and the western part of Colombia, and in the south of Peru.

The northern region of Colombia offers the highest solar potential in the country, which could meet peak energy demands of the most populated centres. A sustained, all-year-around potential for solar power is provided by the western region of Peru, Venezuela also has great solar power potential, especially in the north of the country where the solar radiation is very high.

¹² Atlas Brasileiro de Energia Solar, 2010

¹³ MW peak, or peak performance in Megawatts.

¹⁴ ESMAP, 2009; Review of Policy Framework for Increased Reliance on Wind Energy in Colombia – Option for Markey Entry of Wind Power in Colombia's Energy Mix; Energy Sector Management Assistance Program, World Bank, Washington DC., in Alan D. Poole (2009).

¹⁵ PERU MEM 2008: Portafolio de proyectos de Generación y Transmisión en el Sistema Eléctrico Interconectado Nacional, Dirección General de Electricidad, Ministerio de Energía y Minas, Lima, Perú.

Central America

Located in the “Ring of Fire” that encircles the Pacific Ocean, geothermal resources are abundant in Central America. The regional potential for power generation is estimated to be between 3 000 and 13-000 MW. The wide gap in the potential estimates underlines the uncertainty of the resource in the absence of drilling information and indicates the need to fill the information gap through increased exploration (see 1.4).

Approximately 50 sites in the six countries of the region have been identified for potential geothermal development, distributed as follows: Costa Rica (10 sites), El Salvador (4-13), Guatemala (8-13), Honduras (6-7), Nicaragua (10) and Panama (5). Despite the uncertainty associated with the region’s geothermal resource estimate, it is widely acknowledged that it has been underexplored and underdeveloped.

The countries with meaningful development in wind power in Central America are Costa Rica, Honduras and Nicaragua, all developed in the last four years. An aggregate estimate of wind potential in Central America is 8 400 MW, without detailed information about the basis of the overall estimate¹⁶. There are good-quality wind resources all along the coast of the Caribbean Sea and in the border between Nicaragua and Costa Rica over the Pacific shores.

Mexico

Mexico’s outstanding solar energy resource offers the prospect of large-scale future development of solar PV energy in the country, and the northern Border States appear to be the ideal geographic location to drive such development. The projects that already exist highlight the potential for generating not only clean electricity, but also employment and economic growth for local communities.

The development of a mature industry in the solar sector needs to be approached from different angles. On one side there is the availability of solar radiation, both direct and indirect. The nature of this radiation will have a strong geographical component, allowing for some zones where photovoltaic solutions are suitable and others where solar collectors (solar thermal and concentrated solar power) are more suitable¹⁷.

The country has the potential to derive 6 500 MW from solar energy. The photovoltaic electricity and solar thermal will comprise up to 5% of the Mexican energy matrix by 2030 and up to 10% in 2050. There are several projects in progress. The Federal Electric Commission (CFE) plans to build a 30 MW photovoltaic plant in Baja California Sur. In March 2012, an American-based company formed a joint venture with Mexican developers to build a 450 MW concentrated photovoltaic solar power plant (CPV) near Tecate¹⁸.

Mexico has substantial potential for wind energy. The Mexican government made an earlier estimate of 5 000 MW, but recent reports suggest a larger potential of 10 000 MW, and this value is considered conservative. The most promising area is in the Isthmus of Tehuantepec in the State of Oaxaca, in the extreme south of the country. Although there are areas with good potential in Baja California, these areas are quite small.

¹⁶ OLADE, Organización Latinoamericana de Energía, *Prospectiva Energética de América Latina y el Caribe*, 2005.

¹⁷ Sergio Romero Hernandez y alii, *Solar Energy Potential in Mexico's Northern Border States*, Woodrow Wilson International Center for Scholars, July 2012.

¹⁸ US Embassy, Mexico City. *Renewable Energy Factsheet*, January 2013

The Caribbean Islands

South The Caribbean Islands as a group have a very distinct profile of energy resources and opportunities relative to the mainland. Several of the smaller islands, such as Guadeloupe and Curaçao, were pioneers in the installation of wind power. However, there has been little development in recent years. There are reasonable quality wind regimes on some of the islands, but the inability to interconnect geographically dispersed sites to mitigate variations in output is a barrier. The major islands like the Dominican Republic or Cuba present good opportunities to develop wind energy facilities, with high-quality resources in small areas.

For the Caribbean, a key factor that needs to be analysed is the cost of supply of traditional fuels. Although the theoretical renewable energy potential may be lower than in continental areas, the cost of fossil fuels (supply and transport) affects the relative competitive/cost advantage of renewable energy in some cases.



3 THE ROLE OF THE GLOBAL PATENT SYSTEM AND OF PATENT INFORMATION



Chile: solar energy cookers

Within the framework of the United Nations Framework Convention on Climate Change, a Technology Mechanism was established by the Parties at the 16th Conference of the Parties (COP) in Cancún in 2010. The objective of the Technology Mechanism is to promote development and dissemination of technologies which support action on mitigation and adaptation to climate change.

The role of technology transfer to developing countries in combatting the effect of climate change has gained in resonance in the international arena, where discussions have revolved around enabling factors and barriers. The scope of this study is to provide evidence on the patterns and trends of patent protection in climate change mitigation (CCMTs) and adaptation technologies in Latin America and the Caribbean (LAC), in order to cast light on the role of patents in the development and transfer of these technologies. Analysis and evaluation of the current patenting practices based on objective data are essential to support the policy. Informed decision-making is the most effective way to view the role of the patent system in furthering development of climate change-related technologies in response to the threats of changing weather patterns, rising sea levels and new natural catastrophes.

Access to CCMTs can be improved by strategic use of patent information. Patent applications are normally published whether granted or not, and continue to be available once any patent rights have terminated. Moreover, not everything that is described in a patent document is protected by exclusive rights. Although patent rights are also territorial, the information they contain is in the public domain, supporting incremental and follow-up innovation, potentially generating local innovation and solutions adapted to local needs.

There appears to be a vast untapped potential of technical information in patent documents available for supporting innovation in CCMTs, including the 1.9 million documents tagged within the Y02 scheme, which is freely available worldwide via the internet; only a small part of this is protected in any one country.

A second purpose of this work is also to make the relevant public aware of some freely available tools (e.g. Y02, PATSTAT) which can help non-patent-experts to transform large quantities of technical information in patent documentation into useful structured knowledge, to serve business strategy and provide evidence in support of policy-making. This report serves as a general example of what can be achieved using such tools. It is however possible for a suitable expert to conduct a much more detailed analysis in a specific area of interest, using more specific areas of the classification system.

Patents as an incentive to invest in innovation

The *raison d'être* of the patent system is to incentivise R&D, invention and innovation in society which, in a competitive market, is otherwise likely to remain at a sub-optimal level. A patent is a social contract between the inventor and the public which stipulates that certain temporary exclusive rights can be granted to the inventor in exchange for the disclosure of the invention to the public. Investing in R&D and innovation often involves high levels of uncertainty with high sunk costs and, especially in some industries, is endangered by low costs of reproduction by competitors. Patents give an incentive to invest by providing inventors with the potential (temporary) right to exclude others from making, using, selling or importing their invention without the consent of the inventor. In return, inventors must disclose the content of their inventions in a manner sufficiently clear as to enable a person skilled in the art to carry out the invention. From this perspective, the patent system is a mechanism to make technological advances more available to the public. The sharing of technical information and know-how triggers further innovation, as every new invention is usually built upon the foundation of existing knowledge and in its turn stimulates further invention.

The territorial nature of patent rights

Patent rights are territorial; a national patent office typically serves one country. A patent granted can provide temporary exclusive rights for the invention valid only in the jurisdictions in which the protection was granted, in return for the disclosure of the invention. If an inventor requires protection in more than one country, then a patent application must be filed at the patent office for each individual country.

Patent rights are also limited in time, generally expiring at the latest 20 years¹⁹ from the date of filing or priority, at the end of which the invention falls into the public domain, free to be exploited.

¹⁹ One notable exception is in the pharmaceutical area, in which the life of a patent may be extended for a limited period, if approval to market a medical compound was obtained very late in the life of the patent. Agro-chemicals provide another example of a technology field where patent protection may be extended in certain jurisdictions when patent prosecution is subject to administrative delays not attributable to the patent holder.

3.1

Transparency in the global patent information system

Disclosure of patent information plays a fundamental role in maintaining the balance in the patent system between the interests of society and those of the inventor. It supports dissemination of technical knowledge which otherwise is likely to remain undisclosed. Today, most of the vast store of technical knowledge available in patent documentation is readily accessible, free-of-charge over the internet. The rising number of internet users worldwide and the spread of information and communication technologies

(ICTs) has also improved accessibility of patent information and increased transparency in the global patent system.

Many Latin American patent offices have online patent databases and provide a number of useful services related to patent information. An overview of the services available in each country is given in Annex 1. Large multinational databases, such as the EPO's Espacenet and WIPO's Patentscope, are highly comprehensive international collections, containing millions of patent documents from many countries. Regional databases such as LATIPAT, a version of Espacenet including enhanced bibliographic data from many Latin American countries, also support patent documentation searches in Spanish and Portuguese.

The impact of the internet on the global patent information system

Traditionally, a patent granted a temporary exclusive right to an invention in any one country, in return for the disclosure of that invention. However, disclosure and dissemination were limited by the tools available, including paper-based libraries and dedicated commercial systems.

Today, the internet makes millions of patent documents readily available, free of charge. They may be viewed by any interested party from any internet connection on the globe, and with the further development of machine translation systems such as PatentTranslate, even language barriers are diminishing.

What information is contained in patent documents?

Patents typically contain information related to industrially applicable technology, as opposed to scientific papers which primarily contain scientific knowledge. For instance, in the chemicals area including pharmaceuticals, it is estimated that some 80% of all worldwide technical knowledge is available only within patent documentation, while only 10% of this is still under patent protection. This information can be searched to find existing solutions to a technical problem, compare different potential solutions and assess the overall state of the art in a given technical domain.

Finally, patents may contain valuable strategic and commercial information. A search of a classification area may reveal key competitors and their filing trends, and an analysis of their IP portfolios may indicate their overall strengths in R&D. Applicant and inventor details may also point to potential suppliers, or customers.

Finding relevant information on climate change mitigation technologies

Mitigation of and adaptation to climate change is one of the greatest challenges of the 21st century. Consequently, an increasing amount of patenting is taking place in the

area of sustainable technologies, and significant quantities of relevant documentation are being disseminated via the patent system. Over 1.9 million of the 88 million documents contained in the EPO's Espacenet database are related to technologies which aim to reduce greenhouse gas emissions and mitigate the effects of climate change. In order to help engineers, scientists, institutions and policy-makers use this wealth of knowledge in their work and decision-making, the EPO has developed a dedicated classification scheme, termed the Y02/4 scheme, which enables users to find the relevant technologies more easily in Espacenet as well as in patent information expert services such as PATSTAT. The scheme was conceived in close cooperation with expert partners, following technological guidelines produced by the UNFCCC and the IPCC. The Y02 and Y04S schemes are fully incorporated into the new Cooperative Patent Classification (CPC) established jointly by the EPO and the USPTO. The CPC is the most detailed patent classification system, with 250 000 classification entries related to nearly all fields of technology. Along with the EPO and the USPTO, other patent offices from countries including Brazil, China, Korea and Russia have started classifying patent documents using the CPC system; the CPC is de facto becoming a world standard in patent classification. In that sense, the system facilitates a user-friendly disclosure of detailed technology information by patent offices at international level.

Y02/Y04 classification scheme dedicated to climate change mitigation technologies (CCMTs), and "A tags" for adaptation technologies.

In response to the requirements of external organisations, the EPO has developed a dedicated classification scheme for CCMTs, termed the Y02/4 scheme. This scheme, set up in parallel to the IPC and CPC and available for public use within the EPO's Espacenet and PATSTAT services, presents an overview of key CCMT areas, increasing the transparency of patenting activity and accessibility of these technologies, while also allowing trends and statistics to be derived.

The Y02 scheme covers:

- Y02C – Greenhouse gas capture and storage
- Y02E – Energy generation, storage and distribution
- Y02B – CCMTs relating to buildings
- Y02T – CCMTs relating to transport
- Y04S – Smart grids. Smart grids integrate renewable energy sources better into traditional electricity grids and increase efficiency due to better overall control.

In addition, a selected range of adaptation technologies have been captured in so-called "A tags" to support this PATSTAT analysis for LAC. These are not yet publicly available.

Latipat: one stop portal to access patent information from Latin America, Spain and Portugal.

Latipat is a regional version of the Espacenet platform which resulted from close cooperation between the EPO, WIPO, the Spanish Patent and Trademark Office (OEPM) and patent offices in Latin America. The platform makes available to the public more than two million bibliographic data items and one million complete patent documents published in Spanish and Portuguese, in addition to the Espacenet database content. Latipat is the most comprehensive platform for searching documents published by patent offices in Latin America and the Caribbean (see [Annex 2](#) for a table of coverage).

Overcoming the language barrier in patent information

In order to facilitate access to patent information published in a variety of foreign languages, the EPO has joined hands with Google and implemented an advanced machine translation (MT) service, named PatentTranslate. Translation of patent documents to and from 28 official languages including Spanish and Portuguese and, for English, from and into Chinese, Japanese, Korean and Russian is now supported.

WIPO's Cross-Lingual Information Retrieval Tool (CLIR) also facilitates retrieval of patent documents in Patentscope by automatically translating search queries into several languages. The languages currently available for CLIR are English, French, German, Spanish, Japanese, Chinese, Korean, Russian and Portuguese.

Making informed policy decisions using patent statistics

Statistical analysis of patent data as an indicator of innovation is also used in policy analysis in various areas of interest. Both the technical and legal aspects of patent information are relevant for policy-makers, as their decisions are concerned not only with the emergence of new technologies but also with patterns of production, distribution and ownership of such technology. Industry has long made use of patent landscapes to support strategic decisions on R&D investments, competitors' behaviour and freedom-to-operate analysis before introducing new products. Today, the development of advanced free patent information tools, coupled with greater IP awareness, has put patent data in reach of the public sector as well.

Patent statistics support the formulation of informed decisions at policy level. One of the possibilities offered is landscaping. The results of queries may be analysed to answer specific policy questions concerning patterns of innovation, diversity of solutions, and patenting activity. In simple terms: "Who is patenting what and where, and what are the trends?"

PATSTAT

PATSTAT, also known as the EPO Worldwide Patent Statistical Database, is the patent statistics tool most widely used by experts worldwide. PATSTAT is a snapshot of the EPO master documentation database (DOCDB) with worldwide coverage. It contains more than 60 million patent applications and 30 million granted patents, utility models and PCT applications from more than 100 countries. There are two versions of PATSTAT which users can choose from according to their needs.

With "PATSTAT raw data", a DVD with raw data and a suggested database structure are provided to subscribers for an annual fee. Users have full control over this data to retrieve or manipulate it using a special-purpose programming language (SQL).

The online version of PATSTAT can be browsed just by registering and logging in on the EPO website. Results can be displayed, printed and downloaded on users' PCs to process them further.

Basic patent statistics may also be produced using Espacenet, as shown in [Annex 2](#). Although complex queries are not supported, the results require relatively little expertise, and may be adequate for a number of purposes.

Patent quality for a well-functioning patent system

In economies with a well-functioning patent system, inventors are encouraged to come up with inventions that can be transformed into successful innovations in the marketplace. These inventions are made known to the public at an early stage of development. Within the legal framework established by the patent system, technology transfer takes place e.g. through licensing, both nationally and internationally, ensuring access to the innovation is maximised. These objectives can best be achieved if the patents granted are of high quality, and thus of value.

A high-quality patent is likely to withstand invalidity proceedings in court or before any other administrative body, as well as defining clearly the scope of the intellectual property of its owner, in order to bring more legal certainty to the market. High novelty and inventive step standards help curb abusive use of the patent system,

by granting exclusive patent rights only to genuine inventions. High-quality patents offer legal certainty to the inventor too, since they are more likely to survive post-grant invalidation procedure and they encourage licensing.

By protecting the rights of inventors, the patent system establishes a framework for technology transfer across borders. Innovators are more likely to license out their intellectual assets when these are protected against free-riding in the recipient country. The TRIPS agreement, to which all members of the WTO are signatories, is an important element of the global patent system.

Plurilateral patent application filings are supported via the system established by the Paris Convention for the Protection of Industrial Property of 1883 (also known as the Paris route) or through the Patent Cooperation Treaty system (1978) (the so-called PCT international route).

Filing a patent application abroad

Paris Convention for the Protection of Industrial Property (1883)

The Paris Convention supports the filing of patents in more than one country. Within 12 months of the first filing, "Convention priority right" enables an applicant to file a patent application in further countries, claiming the first filing date. This gives the applicant time to find a patent attorney in each subsequent country, to carry out any necessary translations, and also to estimate the potential market value of the invention while maintaining the priority date of his application.

Regional patent systems: the European route and others

The European patent system provides the opportunity to file a European patent application in a centralised manner for up to 38 European countries, as well as in Bosnia and Montenegro via "extension agreements". After the EPO's single binding search and examination procedure, the granted patent may be converted into a national patent in the member states designated. A European patent application may be filed directly, or via the Paris Convention or the PCT.

Other regional patent offices include organisations such as the Nordic Patent Institute, the Organisation africaine de la propriété intellectuelle (OAPI) or the African Regional Intellectual Property Organization (ARIPO).

Applying for a patent abroad via the PCT system

Patent Cooperation Treaty (1970)

The Patent Cooperation Treaty (PCT) came into force in 1978. It provides a unified procedure with which to file a patent application in up to 148 contracting states. There is first an initial "international phase" of 30 months, in which a non-binding opinion on the patentability of the subject-matter may be made by a PCT International Searching Authority (ISA).

After this initial 30-month period, the PCT application must be followed up with the step of entering into national or regional phases, which essentially leads to a standard national or regional patent application in each jurisdiction in which a patent is desired; similar to further filings under the Paris Convention.

3.2

Overview of patent policies in Latin America and the Caribbean

Over the past two decades, considerable efforts have been made in Latin American countries to reform their innovation policies, notably by enhancing and modernising the patent system. The increasing value of intellectual assets for the economic growth and development of the region has triggered a substantial increase in the number of patents being filed. Most interestingly, the continent has been gradually converting from being a technology receiver to playing an active role in the further development of certain technologies such as biofuels, where Brazil, for instance, occupies a leading position worldwide.

Currently, a large proportion of Latin American innovation is produced in universities²⁰, which often require external investors or developers to bring their new ideas to market. One of the goals of patent policy reforms in Latin America is strengthening the link between public research and industrial application to increase the local innovation output (mainly via creation of innovation agencies in universities).

The adoption of the TRIPS Agreement has speeded up patent policy revision. In 1994, the IP regulations of the Andean Community composed of Bolivia, Colombia, Ecuador and Peru became mostly compliant with WTO requirements. Legislative reforms at the regional level were coupled with institutional reforms at the national level. In the 1990s, Bolivia, Colombia, Ecuador, Peru and Venezuela restructured their national IP offices. In 1992, Peru created the National Institute for the Defence of Competition and the Protection of Industrial Property (INDECOPI), and Colombia reorganised and improved the Superintendent for Industry and Commerce (SIC).

Beyond the national reforms, the patent authorities in Latin America have been further integrated into the global patent system. The situation as regards both legislation and membership may be summarised as follows:

- All 33 LAC countries are members of the WTO and thus obliged to respect the minimum standards of protection established by the Agreement on Trade-Related Aspects of Intellectual Property Rights (TRIPS). By 2000, all LAC countries except for Haiti had reformed their legislation to comply with TRIPS.
- Of the 33 WTO members, only Haiti is classified as a least-developed country (LDC) and, as such, has right to a transitional period for TRIPS compliance (until 1 July 2021 as extended by a TRIPS Council decision on 11 June 2013).
- All 33 LAC countries are party to the Paris Convention of 1883 for the Protection of Industrial Property.

- 24 out of 33 countries are signatories to WIPO's Patent Cooperation Treaty (PCT)²¹. The IPOs of Brazil and Chile have been designated as International Searching Authority (ISA) in the PCT system; INPI Brazil is an acting ISA, and Chile is due to start in October 2014.
- Nine South American countries (Argentina, Brazil, Chile, Colombia, Ecuador, Paraguay, Peru, Suriname and Uruguay) have agreed to a regional cooperation called "PROSUR". With the support of WIPO, PROSUR²² countries are developing a common platform for exchange of information relating to search and examination of patent applications. The cooperation is not to be limited to data exchange, but also includes other cooperation projects such as training of patent examiners and other IP professionals. PROSUR's final goal is to further improve the services offered to local and international users of the patent system.
- 19 out of 33 countries participate in the LATIPAT project and 16 provide patent information which is made available online on an EPO-hosted platform. The LATIPAT²³ system, based on the EPO's Espacenet, contains bibliographic, image and legal data.
- Seven countries – Costa Rica, Cuba, Dominican Republic, Guatemala, Honduras, Panama and Uruguay – host WIPO's Technology and Innovation Support Centres (TISC) on their territory, which provide innovators with access to locally based, high-quality technology information, as well as training on how to exploit the potential offered by patent and non-patent literature.

Exceptions to rights conferred

In certain cases, including national emergencies, cases of public non-commercial use and also where a specific patent owner has not been willing to authorise licensing on reasonable commercial terms and conditions within a reasonable length of time, some legal options are allowable under the international system authorising the use of the subject-matter of a patent without the authorization of the right holder, subject to the requirements stipulated in TRIPS (Art. 31).

A review of the relevant patent legislation also reveals that most Latin American countries have incorporated basic flexibilities such as compulsory licensing, government use and ex-officio licenses and research exemptions into their patent laws. These countries also have regimes for voluntary licensing, including prohibitions on certain anti-competitive licensing practices.

Of course, the specific application and scope of these flexibilities vary across the countries. A brief summary of these exceptions is given in Annex 3. In practice, the number of cases where compulsory licences have been used is extremely small.

²⁰ See Figure 18 "Top 20 applicants" in section 4.3.1.

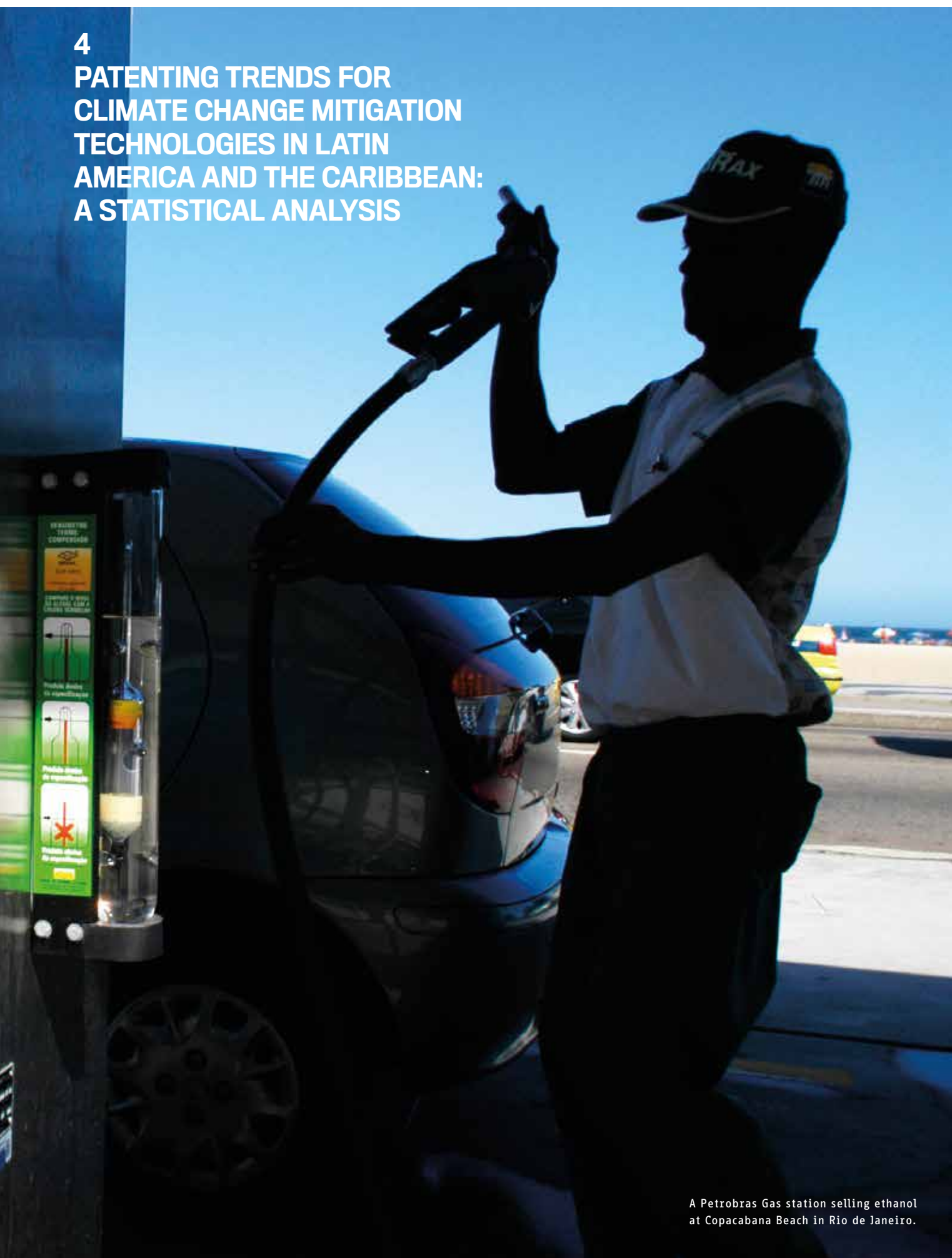
²¹ See Annex 1

²² <http://www.prosur.org.ar>

²³ <http://lp.espacenet.com>



4 PATENTING TRENDS FOR CLIMATE CHANGE MITIGATION TECHNOLOGIES IN LATIN AMERICA AND THE CARIBBEAN: A STATISTICAL ANALYSIS



A Petrobras Gas station selling ethanol
at Copacabana Beach in Rio de Janeiro.

4.1

Patent statistics to provide evidence

A key aim of the UNFCCC Technology Mechanism is to promote innovation and global technology transfer for climate change-related technologies to meet the increasing requirements of mankind to mitigate and adapt to the effects of climate change, including coping with unavoidable changes and impacts of rising sea levels, changing weather patterns and new natural catastrophes. IP rights, and in particular patent rights, are often mentioned in the context of innovation and transfer in climate change mitigation technologies (CCMTs), where much discussion has revolved around enabling factors and barriers.

The inherent balance in the patent “social contract”, the granting of temporary exclusive rights versus disclosure of inventions, is often scrutinised in a national, regional and international context. It is however important to view the patent system in context in each domain since meaningful conclusions can only be drawn when based on facts and evidence.

This study provides an example of how evidence and facts may be developed using the tools currently available. Bringing together climate change mitigation technologies into a specialised classification scheme, combined with patent statistical analysis tools such as PATSTAT, the EPO’s Worldwide Patent Statistics Database, enables the statistical analysis of patenting in these areas.

Customised patent statistics for strategic business decisions and policy-making

This study mostly provides evidence of broader trends, based on the highest level of Y02 B, C, E, T and Y04S classifications for Buildings, Carbon Capture, Energy, Transport and Smart Grids. Some examples in Y02E are further analysed at second and third (Y02E 10/00) levels, representing broad energy areas and “Renewable” energy sources respectively; however these again only serve as examples. It is highly recommended that analysts requiring more detailed statistics and evidence for policy-making acquaint themselves with the tools available, such as PATSTAT, together with the CPC and Y02/4. The latter will enable them to produce their own evidence to support their specific needs.

There is considerable scientific literature available around using patent statistics, which may also be of use; and the annual Patent Statistics for Decision Makers Conference²⁴ indicates current trends in this field and provides many further examples of how patent statistics may be used.

Methodology and overview of analyses

This study initially analyses inventive activity in Latin America, primarily on the basis of the inventor’s residence. Trends of patenting activity over time are shown. The level of potential inventions is analysed at country level, and also split by technologies. In addition, an analysis is made of where Latin American inventors and applicants file on a global level.

Secondly, an analysis of overseas CCMT filings in Latin America from overseas countries is analysed, which indicates interest in the LAC region as a market for exploitation of potential inventions from abroad. Again, this is broken down by target country, source country and technological field.

Finally, there is an analysis of international co-invention, which indicates international cooperation in R&D, and of international co-application, which is one indication of technology transfer.

Sample areas of patenting in certain climate change adaptation technologies are also analysed, both for inventive activity in LAC and also as a market for filings from abroad. These limited areas are based on internal “A-Tags” which are not currently available externally.

Much of the analysis uses the concept of simple patent families, based on the primary priority document; a patent family is assumed to be related to one claimed invention, which may be filed in one or many countries around the world. The analysis is based throughout on patent applications; a study on granted patents would also deliver valuable data, but would be more complex due to the widely varying time taken to grant individual patents.

Scope of study and coverage of LAC patent data

The study is based on patent filings over the period 1995–2010; this is a period where the PATSTAT coverage for LAC is particularly comprehensive. This period also includes most patent applications relevant today, assuming a maximum life of 20 years.

The study is of course limited to the patent data available to the EPO and in PATSTAT, and not all CCMTs are included yet in the Y02/4 classification scheme.

For some LAC patent data, the EPO may have basic bibliographic data and the documents, but may lack data in certain fields, such as in the country of residence of the inventor. In this case, the definition proposed by van Pottelsberghe²⁵ is used. Where the country of residence of inventors is available, this information is used to count the number of patents filed by inventors from LAC; where not, the inventor is retrieved from patent family members; and where no data concerning the identity of the inventor is available, the office of first filing is used as a proxy.

²⁴ <http://www.epo.org/learning-events/events/conferences/2013/patent-statistics.html>

²⁵ “The worldwide count of priority patents: A new indicator of inventive activity”; Gaétan de Rassenfosse, Hélène Dernis, Dominique Guellec, Lucio Picci, Bruno van Pottelsberghe de la Potterie

06 The EPO PATSTAT coverage of LAC patent office data

Country code	Year coverage (EPO)	Total number of kind code type A published	% of total EPO LAC data	Total number of documents published	WIPO statistics year coverage	WIPO statistics number of applications	WIPO statistics % of total LAC filings 1990-2011
AR (Argentina)	1965-2013	125.141	15,7%	127.107	1990-2011	100.976	12,4%
BR (Brazil)	1972-2013	399.508	50,3%	562.137	1990-2011	320.417	39,3%
CL (Chile)	2005-2008	3.320	0,4%	3.826	1990-2011	50.955	6,3%
CO (Colombia)	1995-2012	17.649	2,2%	17.650	1990-2011	29.819	3,7%
CR (Costa Rica)	1988-2013	4.687	0,6%	5.533	1990-2011	2.050	0,3%
CU (Cuba)	1968-2012	3.860	0,5%	4.110	1990-2011	2.434	0,3%
DO (Dominican Republic)	2001-2013	2.317	0,3%	2.656	1990-2011	2.232	0,3%
EC (Ecuador)	1990-2012	8.111	1,0%	10.053	1990-2011	8.774	1,1%
SV (El Salvador)	1970-2013	1.586	0,2%	1.586	1990-2011	436	0,1%
GT (Guatemala)	1961-2012	5.299	0,7%	6.202	1990-2011	5.532	0,7%
HN (Honduras)	2005-2012	745	0,1%	783	1990-2011	1.146	0,1%
MX (Mexico)	1980-2013	198.800	25,0%	216.401	1990-2011	239.073	29,3%
NI (Nicaragua)	2003-2009	197	0,0%	197	1990-2011	416	0,1%
PA (Panama)	1996-2010	2.386	0,3%	2.386	1990-2011	4.637	0,6%
PE (Peru)	1992-2013	12.951	1,6%	13.699	1990-2011	15.948	2,0%
UY (Uruguay)	2000-2013	8.264	1,0%	9.599	1990-2011	10.548	1,3%
BO (Bolivia)	no information				1990-2011	328	0,0%
HT (Haiti)	no information				1990-2011	23	0,0%
JM (Jamaica)	no information					0	0,0%
PY (Paraguay)	no information				1990-2011	3.162	0,4%
TT (Trinidad and Tobago)	no information					0	0,0%
VE (Venezuela)	no information				1990-2011	16.131	2,0%
Total		794.821				815.037	100,0%

This table shows the EPO PATSTAT coverage of LAC patent office data. The WIPO statistics on patent filings are also included, to show the proportion that each patent office contributes to the total filings in the region, and to show what impact this can have on overall results.

The patent data coverage from some countries is either limited or not available. For instance, patent data for Chile, a country with not insignificant filing numbers, is limited to three years. Although this impacts on the results for Chile itself, it does not affect the overall statistics too significantly, as according to WIPO statistics Chile accounts for some 6% of patent filings in the region. Venezuelan data is also not available, accounting for some 2% of all filings in LAC.

4.2 Patents and climate change-related technologies

Summary of statistical findings

Patenting of climate change mitigation technologies was analysed in LAC, based on filings of patent applications, complemented by an analysis of patenting of a small sample of adaptation technologies. Firstly, inventive activity was studied in LAC based on filings with LAC-based inventors. Secondly, interest in LAC as a market was analysed, based on patent application filings in LAC originating from overseas countries. Patent filings were analysed by technical area, and by country of filing.

A notable growth in inventive activity is observed over the 1995-2010 period, whereas patent family filings with LAC inventors have seen an increase of 16%, the equivalent filings globally increased around 12%²⁶. Over much of this period, the proportion of CCMT inventive activity in LAC was only around 1% of all technologies; however, the proportion of LAC inventive activity rose to meet global averages in 2008 at 4%. LAC inventive activity is responsible for some 0.5% of the world's patent filings²⁷.

Brazil dominates inventive activity, at over 73% of the region's total, mirroring Brazil's leading role in R&D in LAC. Argentina and Mexico are the next largest, bringing the total of the three biggest countries to 93%. All other countries are each less than 1% of the total. Most filings are in Y02E (Energy), primarily renewable energy sources, biofuels and storage. Patent applications in CCMTs are filed in Brazil, Mexico and Argentina, but also in the USA and Europe.

Brazil again dominates as primary destination of CCMT patent filings in LAC, indicating its potential strength as a market. Mexico is the second major destination for filings for CCMTs coming from abroad, well before Argentina. The main patent applicants from within LAC, and abroad, are also listed.

Co-invention, indicating R&D co-operation, is most common between the USA and LAC countries (especially Brazil, Mexico and Argentina), but between LAC and Germany, France, UK and other European countries it is also common.

Overall, less than 3% of worldwide CCMT patent applications were filed in LAC from 1995 to 2011, indicating that patent rights are unlikely to be a deterring factor in technology transfer of CCMTs to LAC.

4.3 Patents and climate change mitigation technologies (CCMTs) in Latin America

4.3.1

Inventiveness and innovation around CCMTs in Latin America

General Latin American trends

There has been consistent growth in the number of patent applications in climate change mitigation technologies worldwide since 1995. The greatest growth has been in the area of Y02E, energy generation, distribution and storage, but the trend for filings of CCMTs in the areas of Y02T Transport, and Y02B Buildings also clearly shows continuously rising numbers of filings.

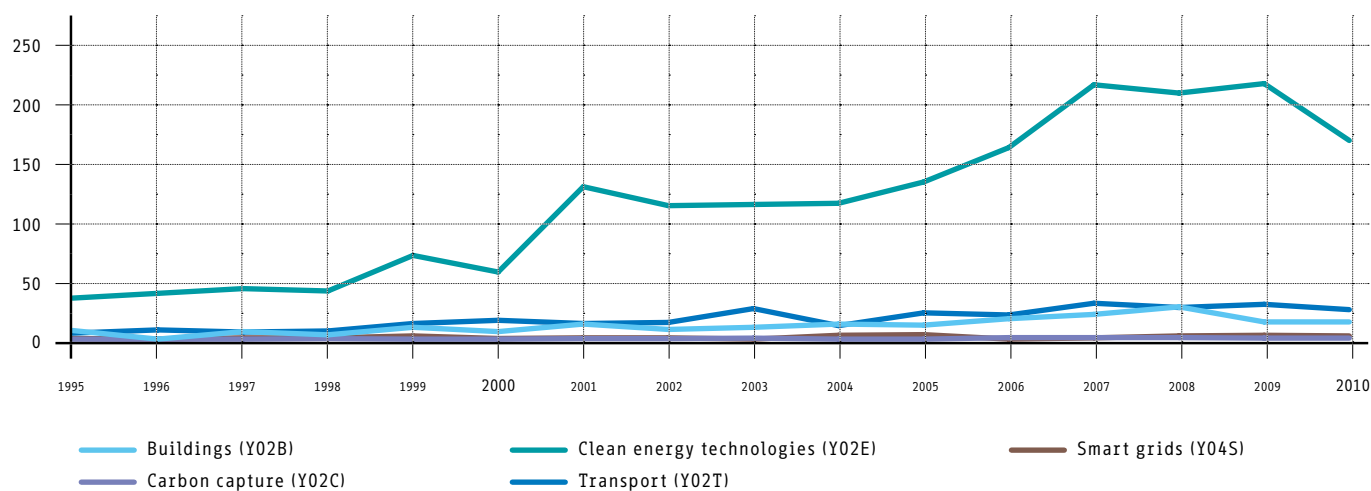
The country of residence of the inventor of patent applications is considered a useful indicator of inventive activity in general within a country. The figure below gives an overview of the number of Latin American first filings per year filed in each major Y02/04 technology area with Latin American inventors. As clearly shown in [Figure 07](#), it is dominated by clean energy technologies at 75% (Y02E), even more than at the global level (see [Annex 4](#)).

Also clearly shown is the rapidly growing interest in R&D in general in CCMTs in Latin America since 1995, on average by 16% per annum, compared to a global yearly average increase of 12% (see [Figure 08](#)).

²⁶ The figures on the global level of inventive activity in CCMTs are available in the Annex.

²⁷ See Figure 21 in section 4.3.2.

07 LAC patent family filing trends for Y0 classifications: 1995-2010



08 Annual growth rates for CCMT patent families globally, and for those with Latin American inventors for the period 1995-2010

Y0 Classification	Global average annual growth rate (1995-2010)	LAC average annual growth rate (1995-2010)
All Y0 classifications	12%	16%

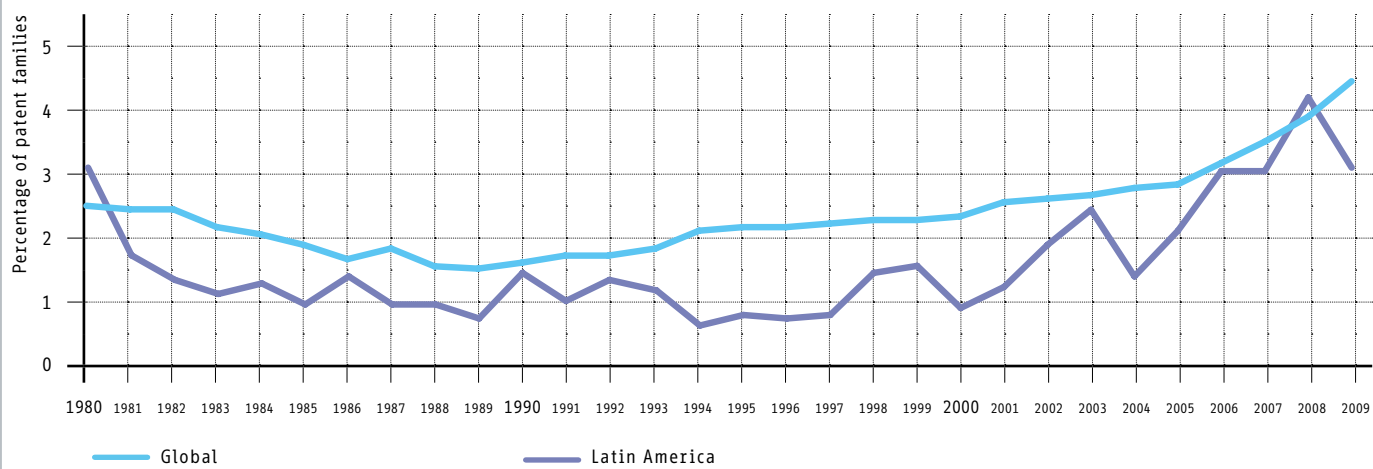
Proportion of world CCMT potential inventions originating in LAC countries

For most of the period 1995-2010, the average proportion of CCMT patent applications originating from LAC with Latin American inventors was around 1%, well below global averages. However, Latin American CCMT filings increased

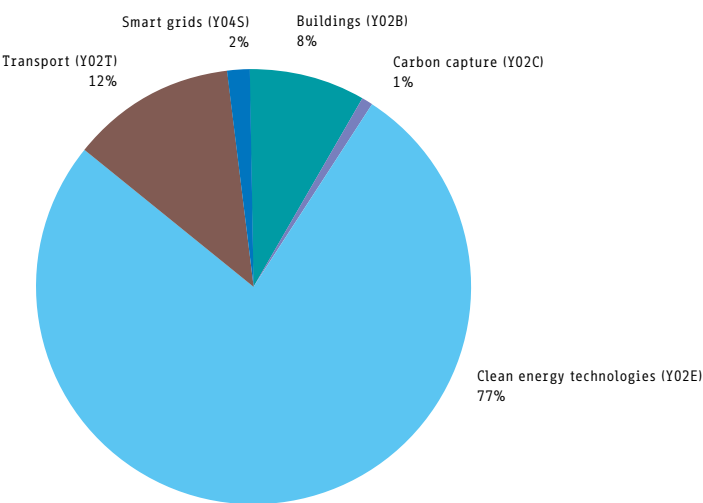
in proportion and in 2008 also reached the global average proportion at around 4% of all technologies.

Of 503 000 potential CCMT inventions (e.g. CCMT patent families) worldwide over 1995-2010, 2 400 originated from Latin American inventors, or approximately 0.5%. (not shown).

09 Proportion in percentage of total patent filings which are CCMTs for Latin America and globally



10 YO classification patent family filings from LAC countries (1995-2010)



Which CCMT technical fields drive innovation?

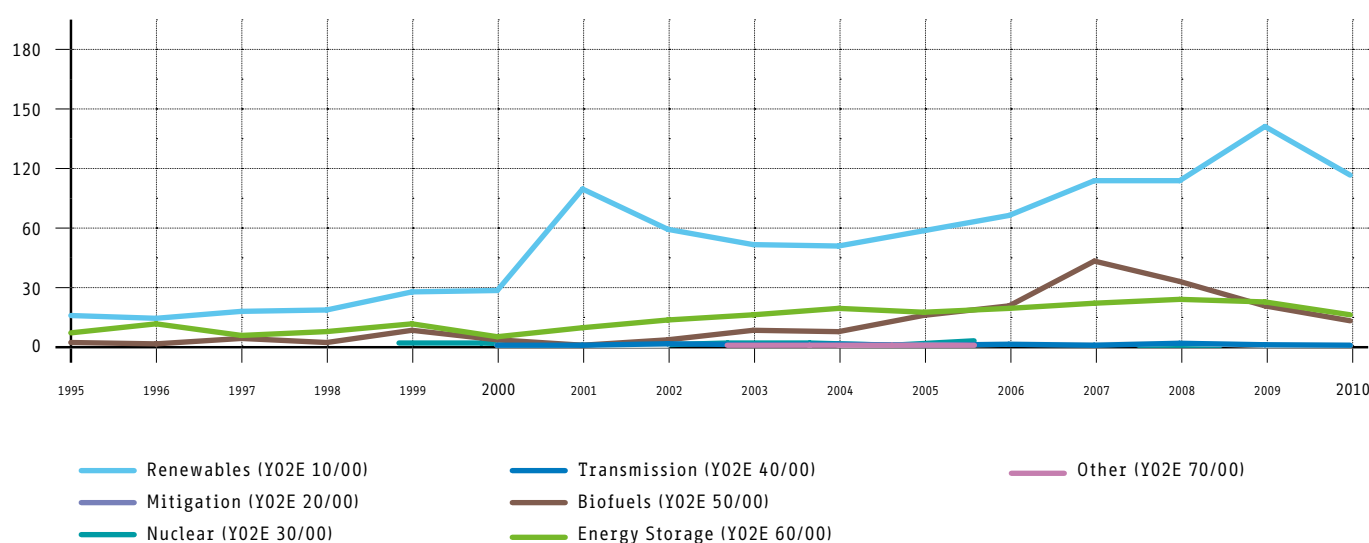
As shown in more detail in [Figure 10](#), CCMT patent filings with Latin American inventors are clearly dominated by the energy sector, which accounts for 77% of all Latin American CCMT filings. The next most prominent areas are transport (Y02T 12%) and buildings (Y02B 8%). Patent filings relating to smart grids and greenhouse gases capture, although important, make up only 2% and 1% respectively of the total filings.

The Latin American distribution of CCMT filings across the Y02B/C/E/T and Y04S technology areas is very similar to the global distribution that we can observe in [Annex 5](#).

Within the dominant energy sector (Y02E), we see on [Figure 11](#) that renewable energy sources are dominant in Latin America, followed by biofuels and energy storage. In terms of use of renewable energy, recent data from the International Energy Agency (IEA) show that almost 29% of the total primary energy supply in LAC comes from renewable sources (compared to only 5.7% in OECD countries). A stronger prevalence of biofuels can also be noted compared to the global levels ([Annex 6 A and C](#)) which is a distinctive sign of LAC's innovative activity in this field of technology.

Biomass, from which biofuels are produced, is the second largest source for clean energy generation in LAC today, after hydroelectricity. Brazil accounted for 35% of global bioethanol production in 2009, and was the second largest producer in the world after the United States. Consistent policy support has been a key factor in building biomass production capacity and markets, requiring increasingly innovative infrastructure and conversion capacity to maintain competitiveness. Brazil's success story has sparked great interest in biofuels across LAC. Argentina, for instance, has developed a high manufacturing capacity from soybean oil and was the third major producer and exporter of biodiesel in 2012. A broad range of research activities on biomass and biofuels currently exists in Colombia, Costa Rica and Argentina, including public/private partnerships. Innovation will be crucial to enable companies to meet the challenges of conversion to future biofuel technologies. These include new methods, enzymes and microorganisms to produce biofuels, notably by processing lignin, a component of many plants. According to Barton (2007), biofuels production will continue to be decentralised, allowing for a healthy competition between manufacturers. The key barriers which developing and emerging countries may encounter in the future are unlikely to be IP-related; rather they will be connected to use of tariffs against the international sugar and ethanol markets.

11 LAC Patent family filing trends for Y02E classifications: 1995-2010



A more detailed breakdown of filing trends for Y02E10/00 (Renewable energy sources) shows that solar thermal, hydroelectricity and wind energy technologies are the dominant areas of invention in Latin America ([Figure 12](#)). There is a huge untapped potential for wind energy technologies in LAC. This potential is unevenly distributed, both within and between countries. Argentina, for instance, has the gross potential to supply the entirety of Latin America several times over. Solar photovoltaic technologies, an area which is highly significant globally, is less prominent in Latin America.

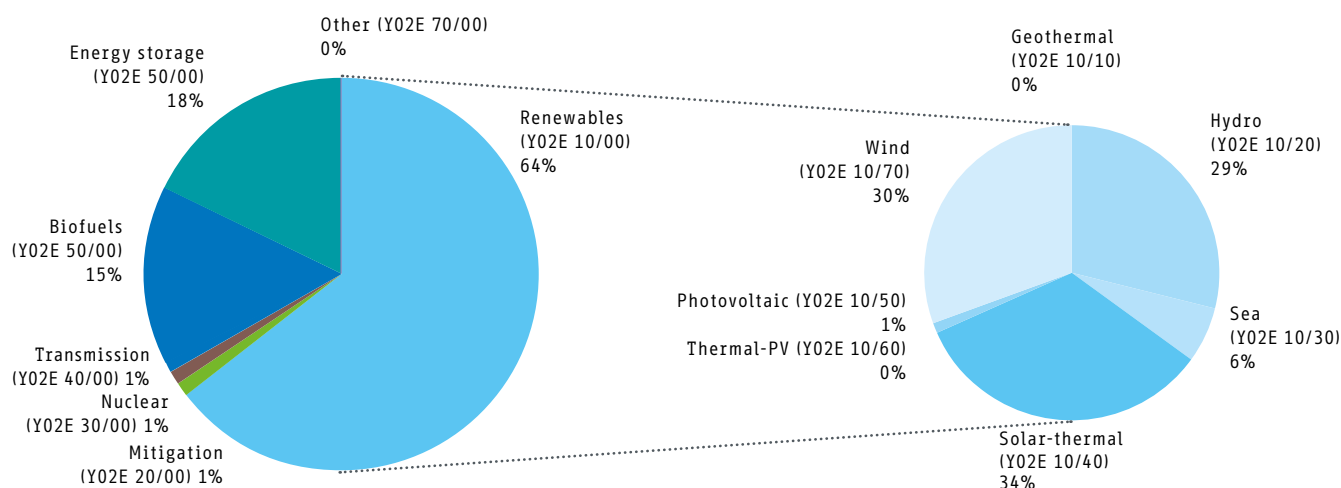
This still partly untapped potential could support emerging economies in satisfying their increasing energy requirements with “clean energy” and thereby leapfrogging the high carbon emissions of fossil fuels. Whereas solar panels and wind turbines primarily serve local communities, hydroelectric power can meet the energy needs of nations, with the Itaipu dam system (see cover photograph) supplying 90% of Paraguay electricity needs and 20% of Brazil’s in 2008. Overall, hydropower produces almost 57% of the total electricity generated in LAC. This is by far the largest share of supply by hydropower in any major region of the world (IRENA 2012).

Dominance of “Road Transport” technologies in Y02T – Transport

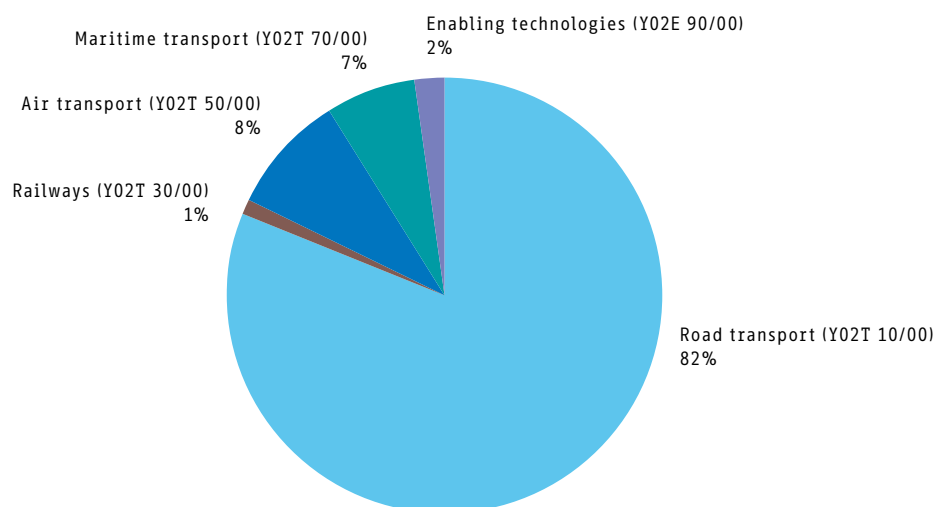
After “Energy”, the most prevalent sections of CCMT technologies relate to Transport (12%) and Buildings (8%). The Y02 classification scheme supports a further breakdown in each area, allowing more detailed analysis also in these technology sections. In fact, an analysis can be made at any level classified in Y02 or any other CPC classification. An example in the Transport area is given in [Figure 13](#).

Road transport filings dominate both globally (see [Annex 7A](#)) and in LAC (see [Figure 13](#)). These include not only transport using new, renewable forms of energy, but also more efficient internal combustion engines and components, and hybrid engine types. [Figure 14](#) also shows clearly that CCMT filings in the transport area are growing rapidly.

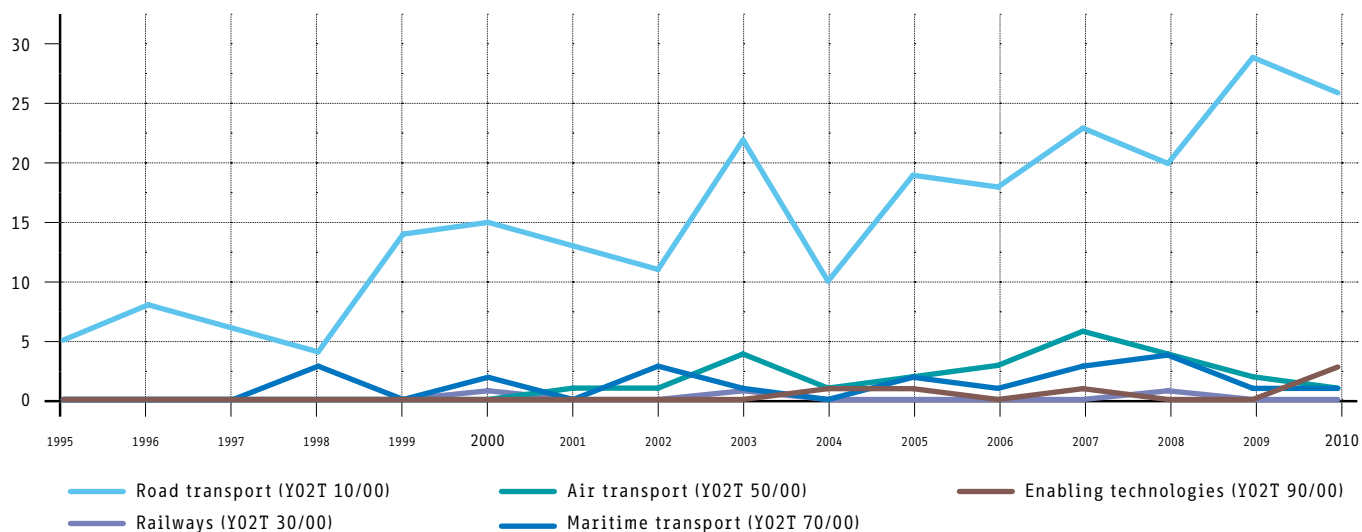
12 Latin American inventors CCMT filings are dominated by renewable energy, in particular solar thermal, wind and hydro-electric



13 Y02T classification patent applications: patent family filings from LAC countries 1995-2010



14 LAC patent family filings trends for Y02T classifications: 1995-2010

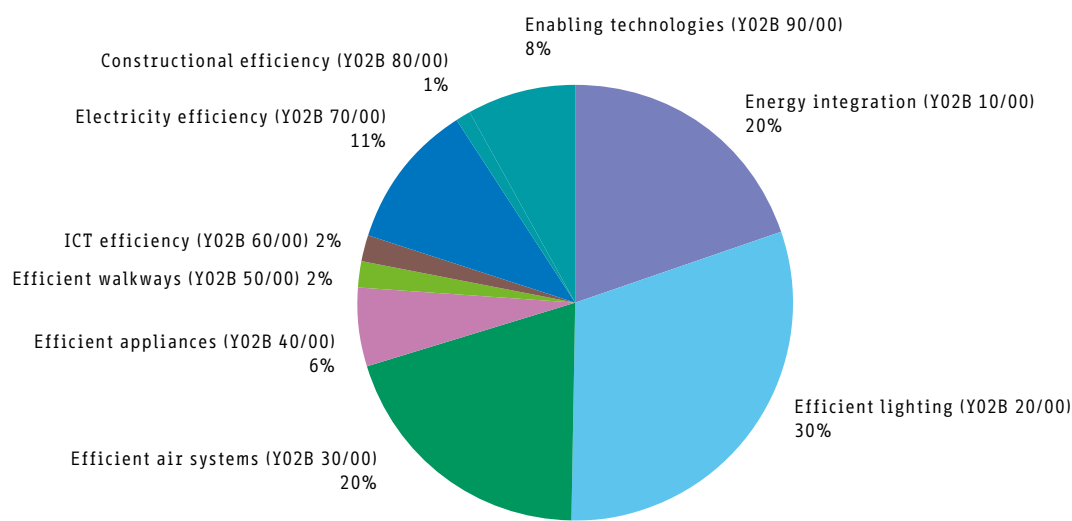


Comparing Y02B “Buildings” CCMT technology filings, the proportions within each technical area are similar between global (see Annex 7B) and Latin American filings, one notable point being that ICT related filings are relatively fewer (see Figure 15 and Annex 8 for global breakdowns). Considering LAC’s dominance in renewables, there is a high potential for a wide penetration of these resources in the building sector, and also in rural areas.

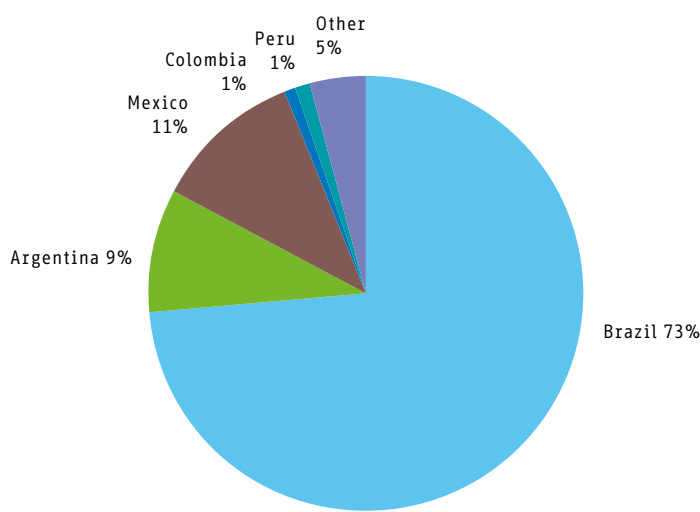
Which countries drive innovation?

Figure 16 shows the origin of inventors for Latin American CCMT first filings, the highest filings occurring in Brazil, followed by Mexico and Argentina. These three countries together make up approximately 93% of CCMT first filings with local inventors.

15 Y02B classifications patent application: patent family filings from LAC countries 1995-2010

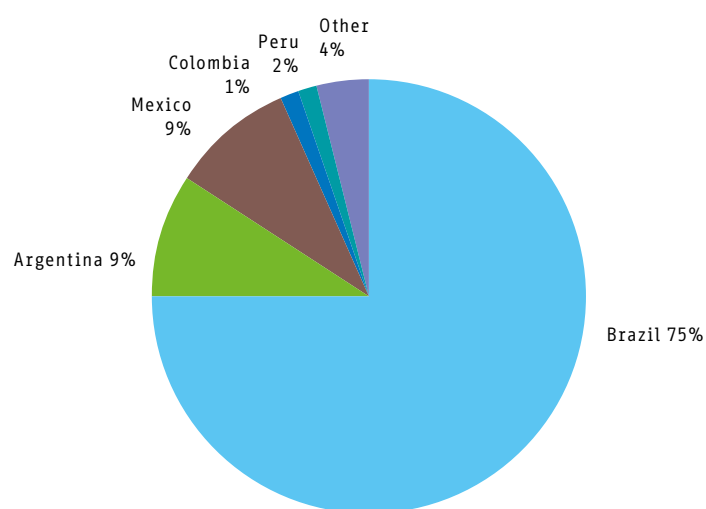


16 Origin of inventors for LAC CCMT first filings: 1995-2010



A similar trend is observed in the Y02E, Y02T and Y02B areas, the first of which is shown below (see [Annex 9](#) for T and B and Energy breakdowns).

17 Origin of inventors for clean energy (Y02E) in LAC countries: 1995-2010



Key applicants for LAC patent family filings from the LAC region

From a total of 9 854 patent families in LAC countries, the following table shows that universities are very prominent applicants for LAC potential inventions (e.g. Universidade Federal de Campina Grande), as are enterprises such as Petroleo Brasileiro, and Energia Nuclear. None of the LAC applicants dominate the filings however; no individual enterprise has as much as 1% of the filings, and the total for the top 20 LAC applicants is only 2% of all LAC CCMT filings.

18 Total number of patent families (proposed inventions) in CCMTs with LAC inventors (Top 20 applicants)

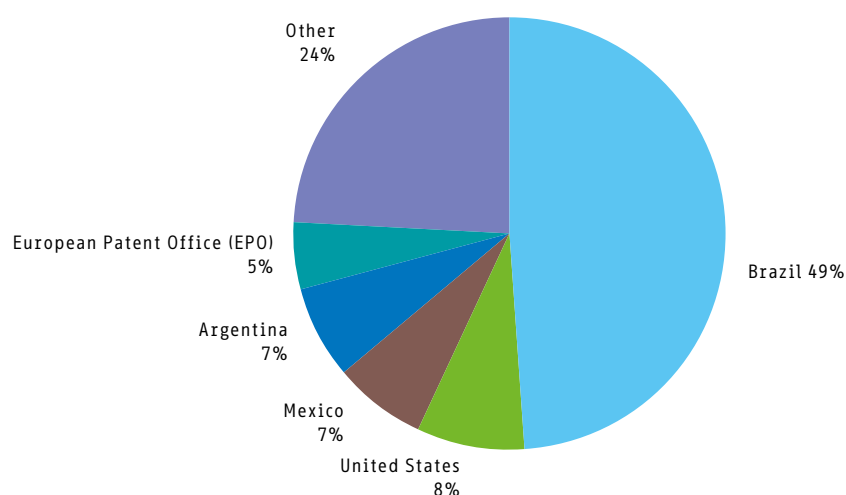
Rank (1995-2010)	Patent applicant	Country of company HQ	Number of patents	Percentage Ownership
1	Maglia Joao Batista	BR – private person	32	0,3%
2	Unicamp	BR – university	18	0,2%
3	Petroleo Brasileiro Sa	BR – private company	17	0,2%
4	Comissao Nac Energia Nuclear	BR – public company	15	0,2%
5	Univ Sao Paulo	BR – university	11	0,1%
6	Lima Paulo Cesar Ribeiro	BR – private person	11	0,1%
7	Braga Aloisio Jeronimo	BR – private person	10	0,1%
8	Whirlpool SA	BR – private company	9	0,1%
9	Itesm	MX – university	9	0,1%
10	Univ Rio De Janeiro	BR – university	8	0,1%
11	Hoffmann Johann	BR – private person	6	0,1%
12	Univ Fed Do Rio Grande Do Sul	BR – university	6	0,1%
13	Univ Fed De Santa Catarina	BR – university	6	0,1%
14	Freitas Luiz Fernando Pimentel	BR – private person	6	0,1%
15	Acumuladores Moura S A	BR – private company	6	0,1%
16	Plajax Ind E Com De Plasticos	BR – private company	5	0,1%
17	Siemens Ltda	BR – private company	5	0,1%
18	Companhia Energetica De Minas	BR – private company	5	0,1%
19	Cavalheiro Mario Teixeira	BR – private person	5	0,1%
20	Inst De Tecnologia Para O Dese	BR – university	5	0,1%
	Total number patent families in Y0 classification with a LAC filing		9.854	2,5%

Other countries of interest as a market for Latin American inventors

An analysis of Latin American inventors' filings world-wide indicates which countries are of interest to these inventors and their applicants as a market.

As well as the Latin American countries of Brazil, Argentina and Mexico, the USA is clearly of high interest (8%) as a market, with European countries as a whole (represented by EPO filings) following closely (5%). China, Germany, Spain and Canada all feature prominently (other 24%). The United Kingdom, France, Denmark, Sweden, and Italy are other significant European countries. For the actual filing figures, see [Annex 10](#).

19 Market protection of LAC inventions (1995-2010)



International co-invention between LAC countries and the rest of the world

The nomination of two or more inventors from more than one country on a patent application is strong evidence of cooperation in R&D between these countries. Once again, Brazil, Mexico and Argentina are the most prominent co-invention countries, but it is surprising to note that the rate of co-invention for Mexico (225 co-inventor filings) is similar to that for Brazil (237).

Brazil's key partners appear to be the USA, Canada, Germany and France; Mexico's are similar, but also include Switzerland as a partner, and the key partners for Argentina are the USA, Germany and the UK. Chile's rate of co-invention is notable, considering that only three years of data are available in PATSTAT, and Norway is included amongst its main partners. Evidence is present of significant co-inven-

tion for some smaller island countries, which have typically few patent filings, including the Bahamas, and Trinidad and Tobago with the USA. The link between Peru and Germany also appears significant.

International co-applicants between LAC countries and others

International co-applicants, that is the nomination of applicants from more than one country on a patent document, may also provide evidence of technology transfer. Once again, the USA is prominent as a partner to LAC countries, but so are Germany, Canada, the UK, Spain and France. There is also a surprisingly high number of filings with co-applicants from both Panama and Italy. Likewise, co-applicants are significant in some smaller countries, such as Barbados, Bahamas, and St. Kitts and Nevis. See the table in [Annex 12](#) for more detailed results.

20 Key co-invention network between LAC countries and the rest of the world²⁸



²⁸ See Annex 11

4.3.2

Latin America as a market for CCMTs

The number of CCMT patent applications filed in Latin American countries by overseas applicants is an indicator of overseas interest in Latin America as a market. The prospective scenarios for the use of renewable energy in LAC are optimistic. Due to the implementation of adequate policies to promote renewable energy technologies, a significant increase in the renewables market is expected in the short run (five years) (UNEP), as well as in the long run with the consolidation of research activities. Renewable energy, without hydro, will, in most of the LAC region have to cover between 10% and 20% of electricity production by 2020. This creates a strong incentive for local and foreign investment.

As Table 21 shows, the number of global patent filings in CCMT for 1995-2010 totalled 1.1 million. This represents approximately 503 000 patent families (potential inventions globally), of which approximately 14 400 family members have filings in Latin America.

The Latin American CCMT patent filings therefore show that approximately 2.8% of global CCMT patent families have patent family members filed in Latin America. This implies firstly that the global interest in Latin America as a market for CCMTs is relatively low, and that there is very little patent protection for CCMTs in Latin America. There appears to be a potential unexploited market for CCMTs in Latin America.

In addition, the average number of patent applications in a patent family may be estimated; if the total number of global patent families (the number of claimed inventions as priority filings) in Y02 has been 503 000 over 1995-2010, compared to total global filings in Y02 of 1.1 million, each family therefore has only 2.2 family members on average; in other words, protection for a Y02 potential invention is only filed for in two countries on average. This is further evidence that patent filings for CCMTs are generally not widely patented across many countries.

21 Global patent filings in CCMT 1995-2010

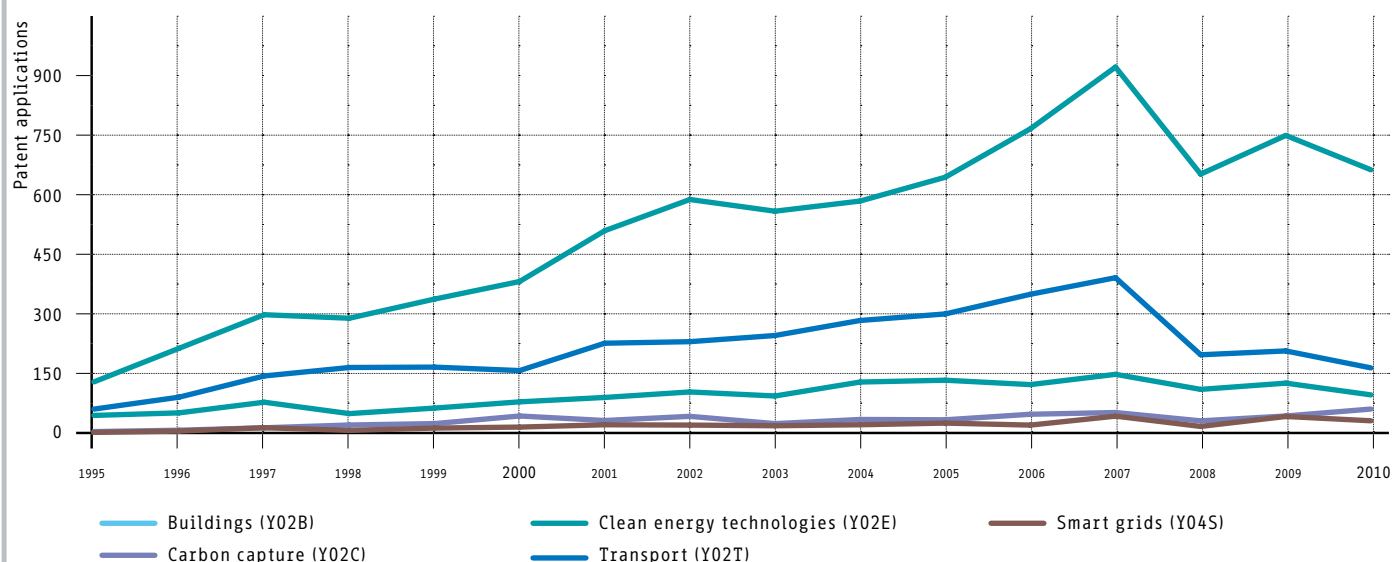
Category	Number	Comments
Global Y02/4 filings (1995-2010)	1 020 493	
Global Y02/4 patent families (proposed inventions) 1995-2010	471 268	
LAC Y02/4 filings 1995-2010	13 340	
Proportion of global inventions filed in LAC (maximum)	2.8%	LAC filings/families x 100%
Average number of patent family members per proposed invention 1995-2010	2.2	Patent filings/families

Trends in CCMT filings 1995-2010

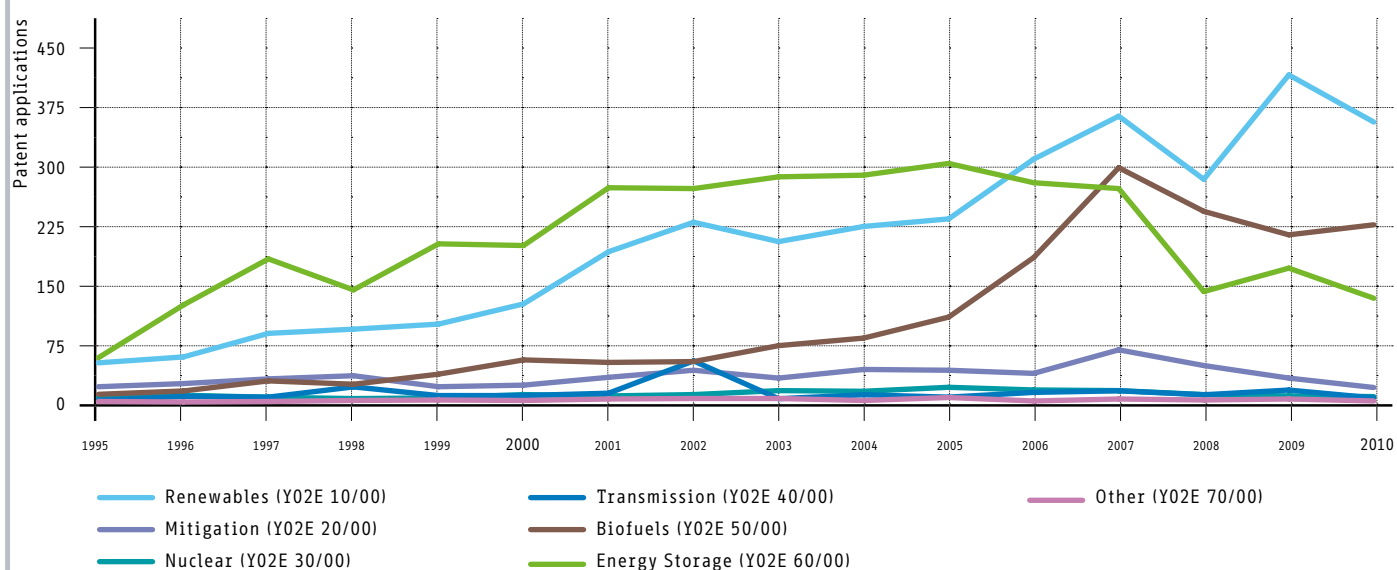
The following graphs present the filing trends for CCMT patent applications in Latin America. Some impact of the financial crisis appears to be evident in LAC in 2008, but filings recovered thereafter.

It is interesting to note that filings for biofuels also increased sharply from 2003-2007. This is known to be an important area in Latin America, for instance in Brazil, where ethanol is used widely as a fuel in cars.

22 LAC patent family applications trends for Y0 classifications: 1995-2010



23 LAC patent family filings trends for Y02E classifications: 1995-2010



Main applicants in LAC for CCMT patent families

The most prominent applicants for CCMT patent filings in LAC are mostly well-known international enterprises from the USA and Europe. No single applicant appears to dominate (more detailed results in [Annex 13](#)).

24 Top 20 applicants, with total LAC CCMT patent families

Rank (1995-2010)	Patent applicant	Country of company HQ	Number of patents	Percentage Ownership
1	Gen Electric	USA	207	2,1%
2	Wobben Aloys	DE	198	2,0%
3	Gillette Co	USA	152	1,5%
4	Honda Motor Co Ltd	JP	112	1,1%
5	Praxair Technology Inc	USA	110	1,1%
6	Bosch Gmbh Robert	DE	94	1,0%
7	Airbus Gmbh	FR	79	0,8%
8	Toyota Motor Co Ltd	JP	75	0,8%
9	Lg Chemical Ltd	KR	73	0,7%
10	Int Engine Intellectual Prop	USA	56	0,6%
11	Sony Corp	JP	52	0,5%
12	Siemens Ag	DE	49	0,5%
13	Airbus France	FR	45	0,5%
14	Duracell Inc	USA	42	0,4%
15	Vestas Wind Sys As	DK	41	0,4%
16	Volvo Lastvagnar Ab	SE	40	0,4%
17	Matsushita Electric Ind Co Ltd	JP	40	0,4%
18	Deere & Co	USA	39	0,4%
19	Bic Soc	FR	35	0,4%
20	Shell Int Research	GB/NL	35	0,4%
	Total number patent families in Y0 classification with a LAC filing		9.854	17%

Proportion of CCMT patent applications filed globally and in each Latin American country

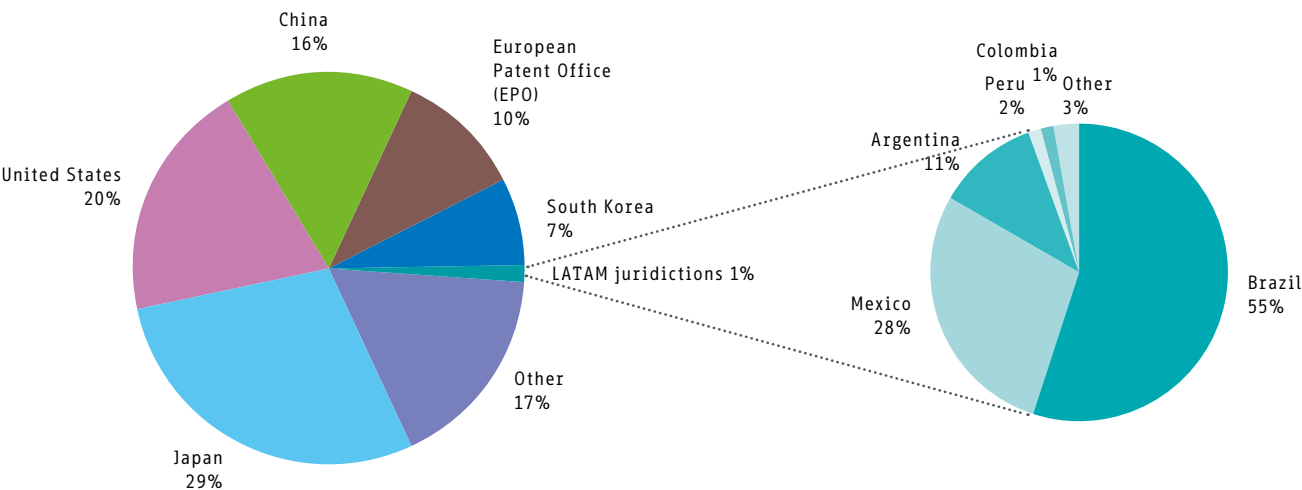
Analysing global filings in the Y02/4 areas, Japan, the USA, the 38 EPC contracting states, China and South Korea are most prominent, comprising some 82% of the global total. LAC countries are responsible for about 1% of all global filings (counting all members of all patent families), see [Figure 25](#).

[Figure 25](#) also shows that, for CCMT patent filings with overseas applicants in LAC, filings in Brazil represent the largest proportion, indicating that it is the most inter-

esting market for overseas enterprises; the second most frequent CCMT filing destination country is Mexico, with Argentina third. The same three countries that dominate inventiveness in LAC therefore also clearly dominate CCMT filings as a whole.

This pattern is more or less similar when the Y02 B, E and T areas are analysed individually (see [Annex 14](#)). Numbers of filings in the Y02C and Y04S areas are small in volume, and fluctuate too highly to give meaningful results; numbers are included in a table in the [Annex 14](#).

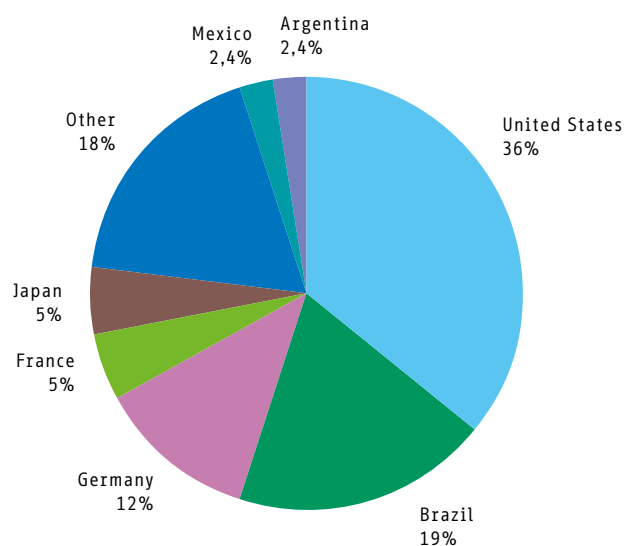
25 Market protection: global CCMT patent filings (1995–2010)



Where do applicants of LAC CCMT filings first file their patent applications?

The analysis of first filings of Latin American CCMT applications indicates which countries are most interested in Latin America as a market. The following analysis shows that in fact the USPTO is the most common office of first filing, followed by Brazil in second place. The next most common first filings are made at the DPMA (Germany), INPI France, the JPO and then the EPO. The remainder then includes Argentina, Mexico, Italy and then a rich mixture of further countries.

26 Priority countries of LAC filed applications (1995–2010)



4.4

Patents and adaption technologies in Latin America

Adaptation technology, technologies developed to support mankind's adaptation to actual climate change, will be of increasing importance to many countries, as the effects of climate change become more noticeable. The most recent Intergovernmental Panel on Climate Change (IPCC) report indicates a global average temperature rise of 1.5°C to 4.5°C above pre-industrial levels by the end of the century (currently approximately 0.85°C above). Meanwhile, sea levels are currently rising at 3mm/year, and accelerating.

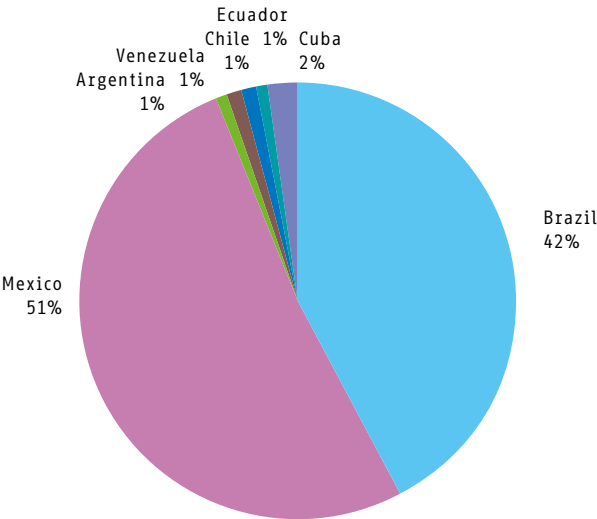
A selection of adaptation technologies was examined, including desalination, off-grid water supply, remote energy services and weather-related technologies.

First filings in adaptation technologies in Latin America

Figure 27 shows a dominance of Mexico, then Brazil in the origin of Latin American first filings for this selection of adaptation patent filings.

Co-invention, namely multiple inventors from Latin America and one other country, was also very high at 19% (globally 5%), indicating a relatively high level of international cooperation (not shown).

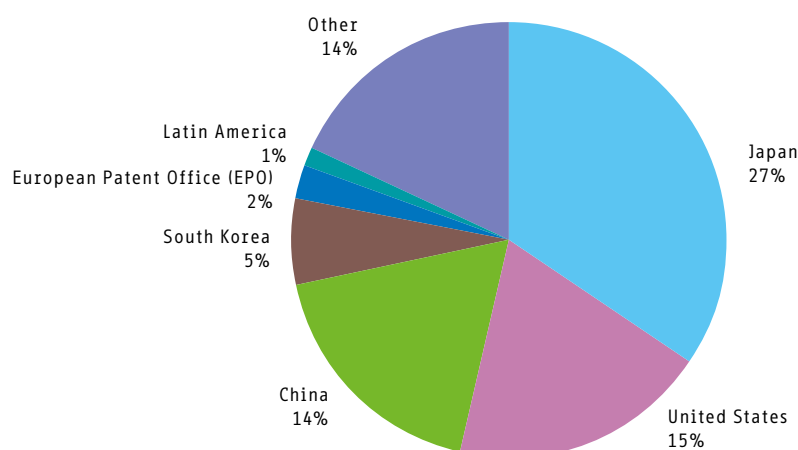
27 Origin of first filings for Latin American adaptation patent filings



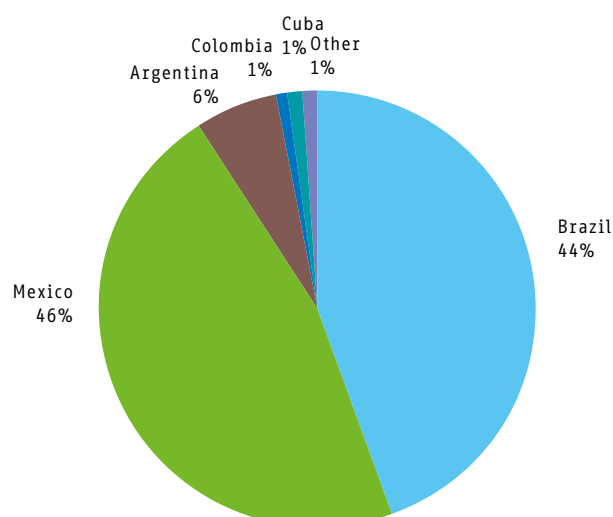
Latin America as a market for adaptation technologies

Latin American filings account for approximately 1% of all adaptation filings worldwide (Figure 28). Patent applications for adaptation in Latin America are however increasing fast, averaging a notable 51% yearly increase since 2000 (16% globally) (not shown). Figure 29 shows that Brazil and Mexico again dominate overall patent filings for adaptation technologies in Latin America.

28 Global distribution of adaptation patent filings of which Latin America countries account for approximately 1%



29 Patent filings for adaptation technologies in Latin America





5 KEY FINDINGS AND RECOMMENDATIONS



Open Watergates at Itaipu Dam,
Foz do Iguazu, Brazil, South America.

5.1 Key findings

Considerable potential for climate change mitigation technologies in LAC

Latin America and the Caribbean (LAC) is a very diverse region, both geographically and socio-economically. It hosts some rapidly developing economies and much of the world's emerging middle class. Its energy needs are growing, and are essential for its development, leading to a growing potential for carbon emissions. A much proposed strategy is to leapfrog carbon-rich fossil fuels and rely in future on renewable energy sources.

Renewable energy is already extensively used in LAC, and is estimated to supply some 29% of energy requirements. This is mainly achieved through large hydro-electricity initiatives, but is also due to biofuels developments, largely in Brazil. Although already high compared to the 6% average to OECD countries, the potential is much greater and, as energy demand increases with development of the region in the future, the proportion should preferably be maintained or even improved further. Potential resources include geothermal resources throughout the volcano-rich Central American region, and good average wind speeds in the Caribbean and in southern South America. Solar potential is also high in the tropical and sub-tropical regions. Diversification is also important, to reduce risks associated with any one source, such as drought's potential impact on hydro power.

Patent filings for climate change mitigation technologies in LAC

While the LAC region includes some 460 million of the world's 7 billion population, the patent system shows that there is potential for development, with only 0.5% of potential inventions (indicated through patent first filings) originating in Latin America.

At the same time, less than 3% of worldwide CCMT patent applications were filed in LAC from 1995 to 2011, indicating that the patent system may have an important but largely under-utilised role to play in fastening technology transfer to LAC, as there is little protection of CCMTs in this region. Brazil dominates the inventive activity, with 73% of the region's first filings. Argentina and Mexico provide 11% and 9% respectively, totalling 93% between

these three countries. Most filings are in Y02E (Energy), primarily renewable energy sources, biofuels and storage. Patent applications from LAC are also filed particularly in the USA and Europe. Considering patent filings from both LAC and overseas, Brazil again dominates at 55% of LAC filings, indicating its potential strength as a market, while Mexico's filings at 28% indicate its larger interest as a world-wide market for CCMTs compared to Argentina (11%). The main CCMT patent applicants from overseas include General Electric, Gillette, Wobben Alloys and Bosch-Siemens. Most overseas filings originate from the USA and Germany in that order, followed by France, Japan and first filings from the EPO. The total number of LAC CCMT filings accounts for slightly less than 3% of all CCMT filings worldwide.

Co-invention, indicating R&D co-operation, is most common between the USA and LAC countries, especially Brazil, Mexico and Argentina, but also with Germany, France, the UK and other European countries.

Support for innovation from patent information services

While the level of exclusive CCMT rights in LAC is low, world wide patent information systems such as the EPO's Espacenet, WIPO's Patentscope and Latipat, a Spanish/Portuguese adaptation of EPO's Espacenet system, give readily available access to some 88 million patent documents from over 80 countries and the technical information that they contain. In combination with the dedicated Y02/4 classification scheme for CCMTs, over 1.9 million CCMT patent documents are available in Espacenet. Readily available and free of charge via the internet, the patent information services support further innovation and technology transfer on a worldwide basis, providing the world's richest source of technical information, allowing for instance future R&D to be based on innovations already published in patent documents.

While patenting levels are still low, filing rates for CCMTs in LAC are increasing much faster than the global average (16% vs 12%). Originally at around 1%, the proportion of CCMTs in LAC patent filings has also now reached global average proportions at around 4%. Brazil dominates both the first filings of potential inventions in the region, as well as overall patent filings from local and foreign sources, with Mexican and Argentinian filings being the other major contributors.

5.2 Key Recommendations

1) Although the level of renewable energy implementation in LAC is already considerable at 29%, the energy needs of the region will continue to grow rapidly due to the growing population and the increasing emerging middle class. Low-carbon and renewable energy solutions need to be considered at all levels to mitigate further carbon emissions and the resultant climate impact. Investigations into adaptation technologies will also be necessary to promote resilience to inevitable climate changes and to respond to exceptional climatic conditions.

2) Many of the technical solutions required will be disclosed in patent documentation, made transparent through patent information services and the Y02/4 classification scheme, as well as the inventors and owners of this technology. In some areas of the LAC region these tools are already exploited at a technical level, however, awareness of this wealth of knowledge should be enhanced at all levels. On the supply side, patent offices in LAC already offer a rather extensive range of Patent Information services, but could be further enhanced to achieve the fullest possible coverage of Latin American patent data, both to support innovation, but also to give the maximum possible transparency surrounding current and future patent rights in the region. This can also be carried out using international services such as LATIPAT, Espacenet and Patentscope if the patent data is exchanged.

3) At the same time, as less than 3% of CCMT patent applications have been filed in LAC, patent rights may have an important but under-utilised role in fastening technology transfer to LAC.

4) The use of patent information services should be promoted to increase access and transparency around CCMT solutions. These should include the use of dedicated classification schemes such as CPC and Y02, enhanced patent family information including the widest possible national and regional patent coverage, legal status data and machine translation services. All LAC IPOs should ensure that patent documentation is available on-line, preferably through services such as Espacenet and LATIPAT which reveal families of patent filings.

5) As the patent system and its use develop further in the LAC region, it is essential to maintain a high quality of patent search and examination, granting exclusive rights only to genuine inventions. For patent filings originating overseas, this may be supported by high quality PCT International Searching Authorities (PCT ISAs) such as the EPO.

6) Maintaining high-quality standards may become a challenge when the number of patent filings increases over time. However this is necessary to ensure that only genuine inventions are granted temporary exclusive rights. A high-quality substantive examination by all IPOs may also be enhanced through the use of shared search results via initiatives such as the IP5 Common Citation Document (CCD), which enables all IPOs worldwide to benefit from IP5 IPOs' search endeavours. The CCD is also publicly available via the internet.

7) Finally, further analysis could be conducted to establish best practices concerning the use of patent information in the region. Country case studies can provide a more detailed overview of the actual level of awareness of the potential of patent information and how it has been used to date, which could help improve the management of patent information, and ultimately contribute to the transparency and quality of the patent system worldwide for the benefit of all users of the patent system.

Peru, Titicaca lake, floating islands of Uros, lying on a bed of reeds, 80 cm high above the surface of water. Hut of reeds and its solar panel.



ANNEXES



Annex 1

Overview of patent offices in Latin America and the Caribbean

Country	Office	Paris Convention Protection Industrial Property	TRIPS	PCT Contracting state	PCT Receiving state	PCT ISA (number too)
Argentina (AR)	Instituto Nacional de la Propiedad intelectual (INPI)	Yes (entry into force 1967)	Yes (1995)			
Bolivia (BO)	Servicio Nacional de Propiedad Intelectual (SENAPI)	Yes (1993)	Yes (1995)			
Brazil (BR)	Instituto Nacional da Propriedade Industrial (INPI), founded in 1970	Yes (1995)	Yes (1995)	Yes (1978)	Yes	Yes 21 267 (2011)
Chile (CI)	Instituto Nacional de Propiedad Industrial (INAPI) Foundation 2009	Yes (1991)	Yes (1995)	Yes (2009)	Yes	Not yet operational (expected in October 2014)
Colombia (CO)	Superintendencia Industria y Comercio SIC	Yes (1996)	Yes (1996)	Yes (2001)	Yes	
Costa Rica (CR)	Registro Nacional República Costa Rica – Propiedad Industrial	Yes (1995)	Yes (1995)	Yes (1999)	Yes	
Cuba (CU)	Oficina Cubana de la Propiedad industrial (OCPI)	Yes (1994)	Yes (1995)	Yes (1996)	Yes	
Dominican Republic (DO)	Oficina Nacional de Propiedad Industrial (ONAPI)	Yes (1890)	Yes (1995)	Yes (2007)	Yes	
Ecuador (EC)	Instituto Ecuatoriano de la Propiedad Intelectual (IEPI) Foundation 1998	Yes (1999)	Yes (1996)	Yes (2001)	Yes	
El Salvador (SV)	Centro Nacional de Registros - Gobierno de El Salvador	Yes (1994)	Yes (1995)	Yes (2006)	Yes	
Guatemala (GT)	Registro de la Propiedad Intelectual de Guatemala	Yes (1998)	Yes (1995)	Yes (2006)	Yes	
Honduras (HN)	Dirección General de Propiedad Intelectual de Honduras (DIGEPIH)	Yes (1994)	Yes (1995)	Yes (2006)	Yes	
Mexico (MX)	Instituto Mexicano de la Propiedad Industrial (IMPI), founded in 1993	Yes (1903)	Yes (1995)	Yes (1995)	Yes	
Nicaragua (NI)	Registro de la Propiedad Intelectual de Nicaragua - Ministerio de Fomento, Industria y Comercio	Yes (1996)	Yes (1995)	Yes (2003)	Yes	
Panama (PA)	Dirección General del Registro de la Propiedad Industrial (DIGERPI) Foundation 1982	Yes (1996)	Yes (1997)	Yes (2012)	Yes	
Paraguay (PY)	Dirección General de la Propiedad Intelectual (DGPI)	Yes (1994)	Yes (1995)			
Peru (PE)	Instituto Nacional de Defensa de la Competencia de la Protección de la Propiedad Intelectual (INDECOPI) [1992]	Yes (1995)	Yes (1995)	Yes (2009)	Yes	
Suriname (SR)	Bureau of Intellectual Property (Ministry of Justice and Police)	Yes (1975)	Yes (1995)			
Uruguay (UR)	Dirección Nacional de la Propiedad Industrial, Ministerio de Industria, Energía y Minería (MIEMDNPI)	Yes (1967)	Yes (1995)			
Venezuela (VE)	SAPI Servicio Autónomo de la Propiedad Intelectual	Yes (1995)	Yes (1995)			

	PCT IPEA	PROSUR	LATIPAT Espacenet No. of documents and last update	Technology and innovation support cen- tres (TISC) WIPO	Patent appli- cations 2010 WIPO statis- tics	Patent applications 2011 WIPO statistics	Website
			135 005 (2014)		4 717	no data	http://www.inpi.gov.ar/ templates/index.asp
			316 (2008)		no data	no data	http://www.senapi.gob.bo/index. asp?lang=ES
	Yes	Yes	403 894 (2014)		24 999	28 649	http://www.inpi.gov.br/portal/
	Not yet operational (expected in Oct. 2014)	Yes	47 716 (2008)		1 076	2 792	http://www.inapi.cl/portal/ institucional/ 600/w3-channel.html
		Yes	22 417 (2014)		1 872	1 953	http://www.sic.gov.co/inicio
			6 719 (2014)	Yes	1 220	644	http://www.mpdigital.com/propiedad industrial/
			4 111 (2012)	Yes	no data	246	http://www.ocpi.cu
			2.807 (2014)	Yes	no data	282 (only data for year 2012 available)	http://onapi.gob.do/
		Yes	19.731 (2012)		694 (2010)	no data	http://www.propiedadintelectual. gob.ec/
			1.691 (2014)		No data	no data	http://www.cnr.gob.sv/
			11.357 (2012)	Yes	381	331	https://www.rpi.gob.gt/
			1.009 (2013)	Yes	No data	255	http://www.digepih.webs.com/
			220.656 (2014)		14'576	14.055	http://www.impi.gob.mx/wb/IMPI/ inicio
			490 (2009)		210	no data	http://www.mific.gob.ni/ REGISTRODELAPROPIEDADINTELECTUAL/ tabid/110/language/es-NI/Default.aspx
			2.465 (2010)	Yes	468	441	https://www.digerpi.gob.pa/
		Yes	1.550 (1995)		365	no data	http://www.mic.gov.py/v1/node/43
		Yes	24.108 (2014)		300	1.168	http://www.indecopi.gob.pe/0/home. aspx?PFL=0&ARE=0
		Yes	No data		No data	no data	no internet webpage
		Yes	10.530 (2013)	Yes	784	687	http://www.dnpi.gub.uy/
			27.159 (1997)		No data	1.598	http://www.sapi.gob.ve/

Annex 2

Simple patent statistics using Espacenet

Espacenet, the EPO's flagship patent information service, may be used for producing some simple patent statistics. Although the EPO's PATSTAT supports comprehensive analysis, with complex queries, it requires a certain level of expertise and competence with database query tools such as SQL.

Enter numbers with or without country code

Publication number:

Application number:

Priority number:

Enter one or more dates or date ranges

Publication date:

Enter name of one or more persons/organisations

Applicant(s):

Inventor(s):

Enter one or more classification symbols

CPC

If the country code BR (for Brazil) is entered in Espacenet, and the publication date of 2002, the resulting query will deliver the number of patent applications published in that year and taking legal effect in Brazil. Combined with any classification symbol, such as Y02 (and all fields below), this will deliver the result of the number of Y02 BR patent applications in 2002 – 421 patents, in this result.

Result list

☐ Select all (0/25)
☐ Compact

Approximately **421** results found in the Worldwide database for:
BR as the application number AND **2002** as the publication date AND **Y02/low** as the Cooperative Patent Classification

Sort by
Sort order

☐ 1. **Stable salts of novel derivatives of 3,3-diphenylpropylamines**

★ Inventor: MEESE CLAUD	Applicant: SANOL ARZNEI SCHWARZ GMBH (DE)	CPC: C07B2200/07 C07C215/54 C07C219/28 (+3)	IPC: A61K31/24 A61P13/00 A61P13/06 (+7)	Publication info: BR0015610 (A) 2002-07-30	Priority date: 1999-11-16
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☐ 2. **INTERNAL COMBUSTION ROTARY TURBOMOTOR**

If this process is repeated for a number of years (e.g. 2001 - 2010), the resulting number of documents published every year can be used to produce a trend graph. This is a valuable alternative for producing more basic patent statistics, which may still prove adequate for many purposes.

Annex 3

Brief summary of "Other use" allowable under Art. 31 of TRIPS

Compulsory licenses

Compulsory (or non-voluntary) licenses are issued by an administrative or judicial body and allow third parties to exploit a patented invention without the consent of the patent owner. Article 31 of the TRIPS Agreement allows such licences, in recognition of the fact that in certain circumstances, if the patent owner is unwilling to grant voluntary licences in critical technologies on reasonable terms, the relevant body of a Country can intervene and grant them in the public interest. In order to put such a mechanism into practice, some specific conditions have to be met. As well as a refusal by the patent owner to license reasonably, these are; public interest (which is defined differently depending on the country and the situation); national emergency and situations of extreme urgency; combating anti-competitive practices in a particular sector or industry; and the failure of the patent owner to exploit or work the patent in the country concerned. The scope and duration of such use must be limited to the purpose for which it is authorized, it is non-exclusive and non-assignable, it shall predominantly be for the supply of the domestic market, and the right holder shall be paid adequate remuneration in the circumstances of each case, taking into account the economic value of the authorization.

Government use

Where licenses are typically issued to competitor companies on commercial terms, the right of the state to exploit patented technology, either itself or through its agencies or agents, is also an alternative possibility in case of blockage. These licenses are commonly known as government use or ex officio licenses. The TRIPS Agreement recognizes them as a way to permit public, non-commercial use of the patented technology.

Limitation to the patent right

It is also sometimes possible to depart from the exclusive rights conferred to the patent owner under very specific and restrictive conditions (Article 30 TRIPS agreement) "provided that such exceptions do not unreasonably conflict with a normal exploitation of the patent and do not unreasonably prejudice the legitimate interests of the patent owner, taking account of the legitimate interests of third parties."

Research exemption

The research exception is critical for technology transfer and diffusion, as it allows third parties to experiment and undertake further research on a particular invention, and thus advance learning. It can therefore permit work but no commercialization, including by commercial entities, to invent around or improve on a protected invention.

Exhaustion of IP rights

(Article 6 of the TRIPS Agreement) refers to the point at which the holder loses legal control over the protected product by releasing it into the channels of commerce. With patents, the rules on exhaustion determine whether the patent holder and/or his licensees can prevent third parties from importing an invention or product from abroad where he or his licensee may have sold the product (termed "parallel importation"). Under Article 6 of the TRIPS Agreement, each WTO member is free to determine whether or not to permit parallel importation.

Regulation of anti-competitive behavior

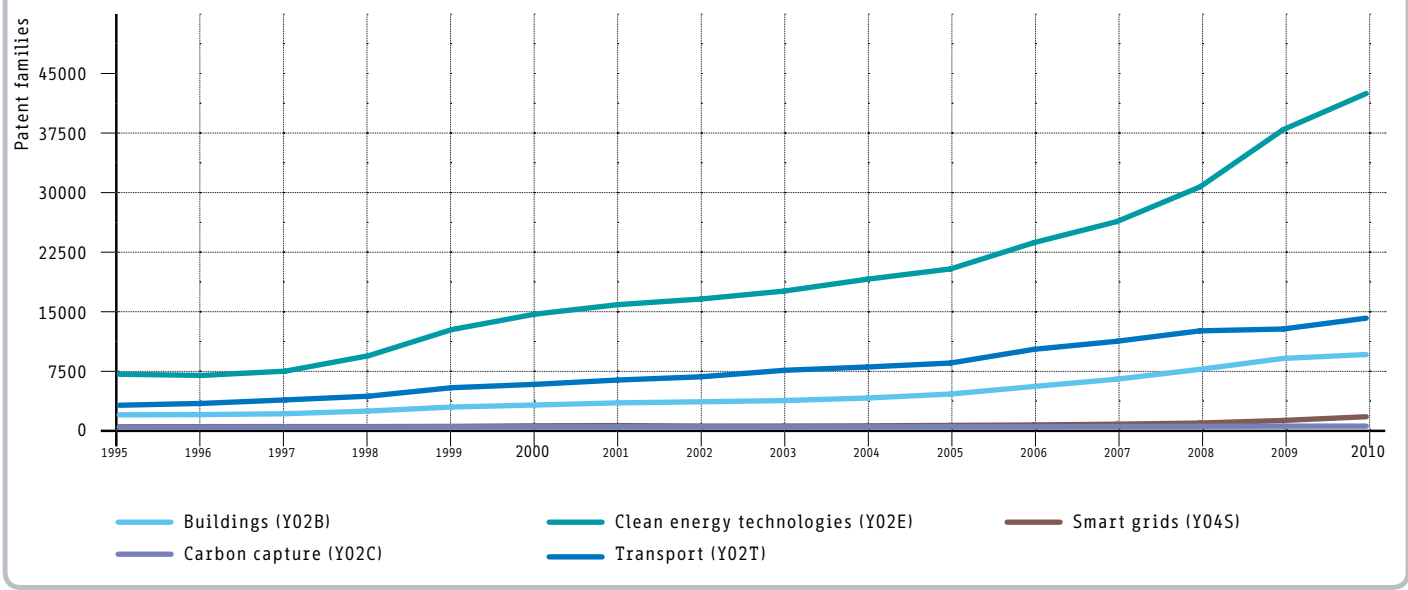
The TRIPS Agreement recognizes that there is a need to permit special conditions in exceptions where practices are determined to be anti-competitive.

Exploitation of a second patent

Under the TRIPS Agreement, "other use" may be authorized to permit the exploitation of a patent ("the second patent") which cannot be exploited without infringing another patent ("the first patent")

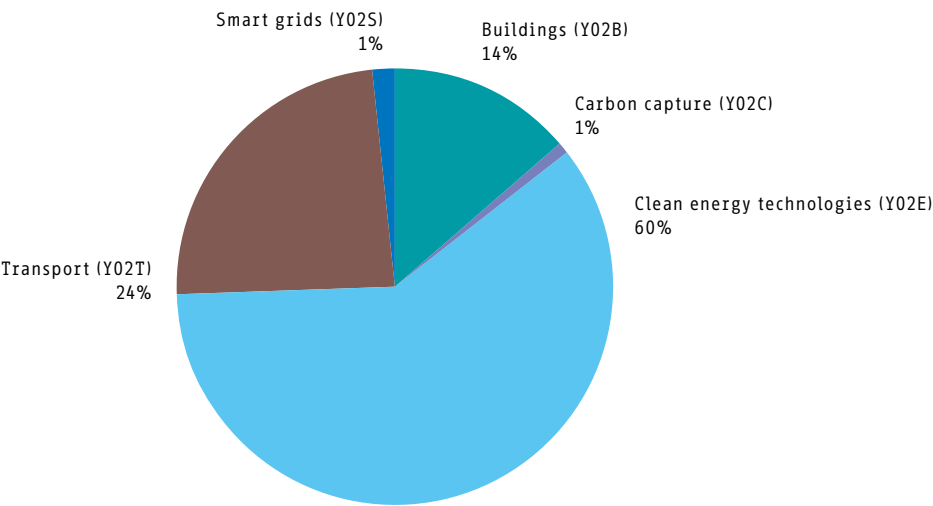
Annex 4

Global patent family filing trends for Y0 classifications: 1995-2010



Annex 5

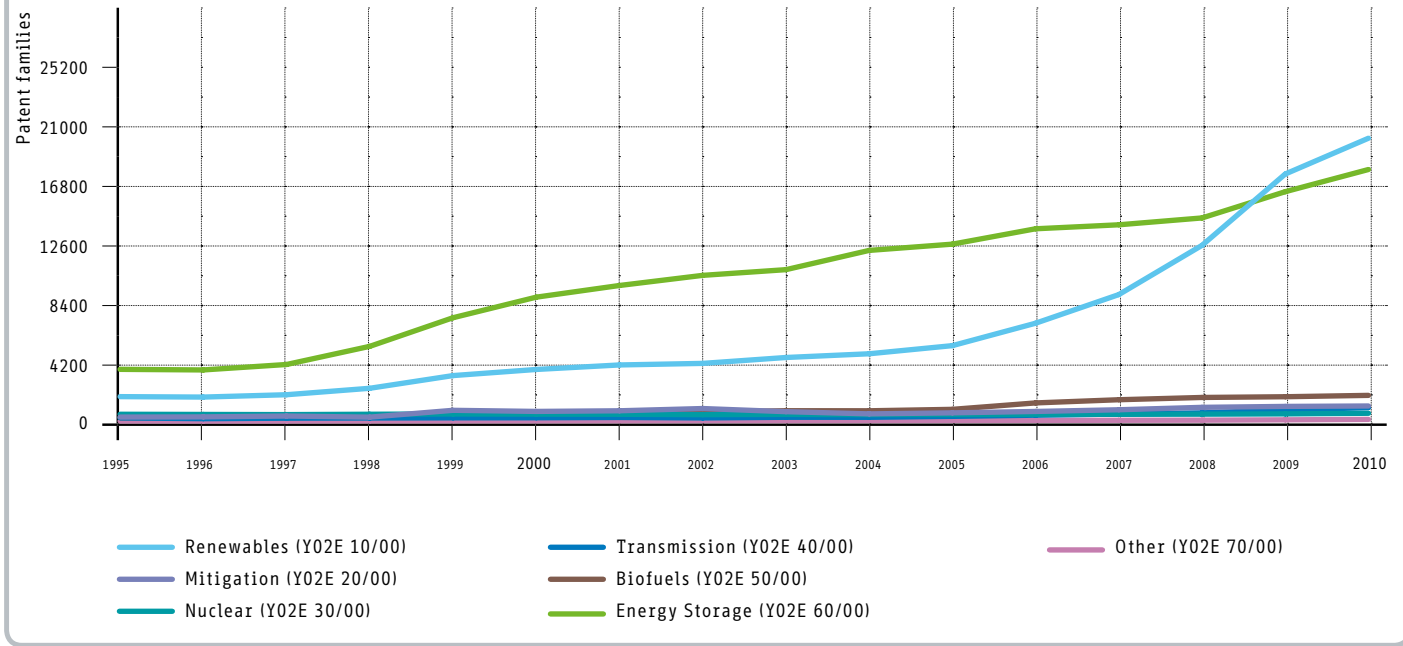
LAC distribution of CCMT filings across Y02B/C/E/T and Y04S: global patent family filings (1995-2010)



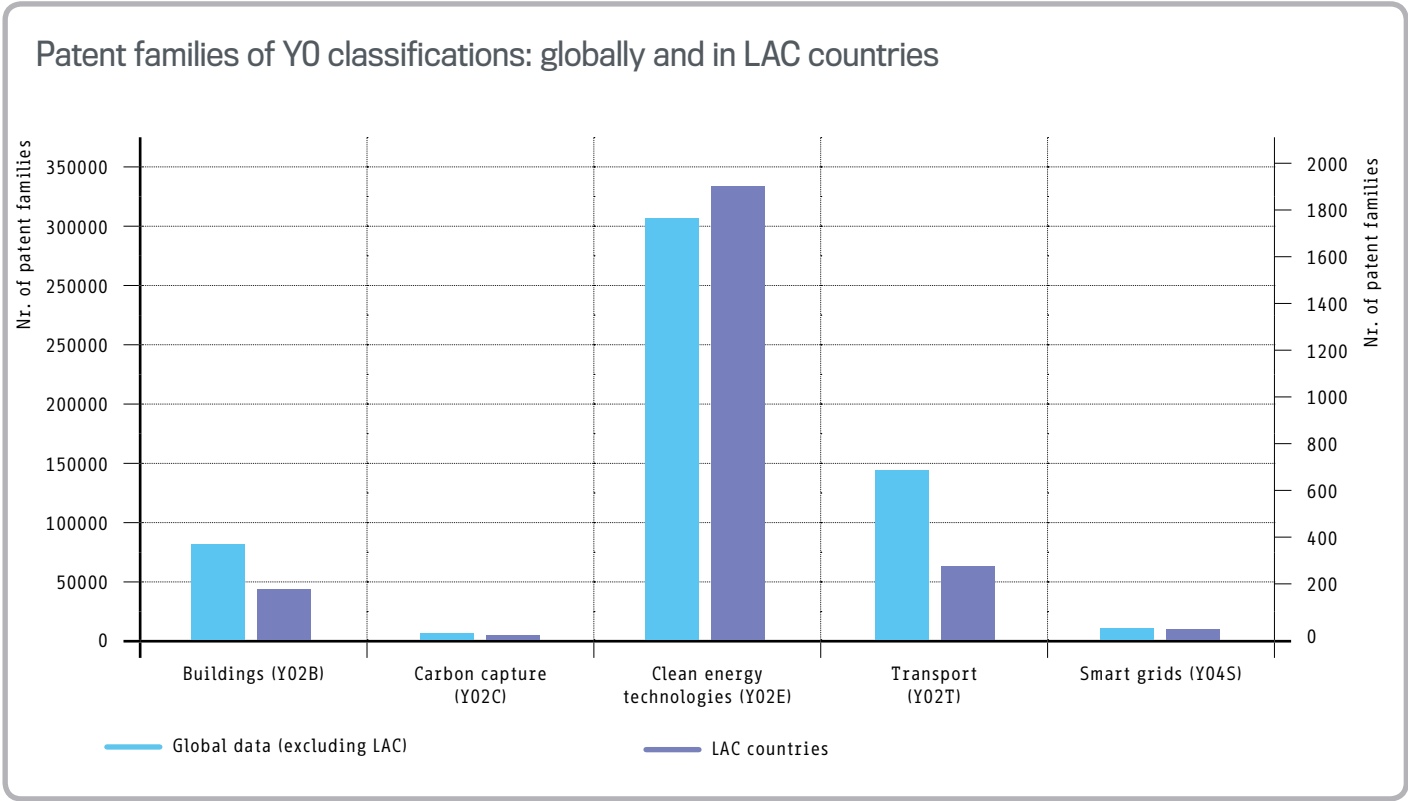
Annex 6A

Within the dominant Y02E Energy sector, the two main areas for global applications in Y02E are “Renewable energy sources” and “Energy storage”.

Global patent family filing trends for Y02E classifications: 1995-2010

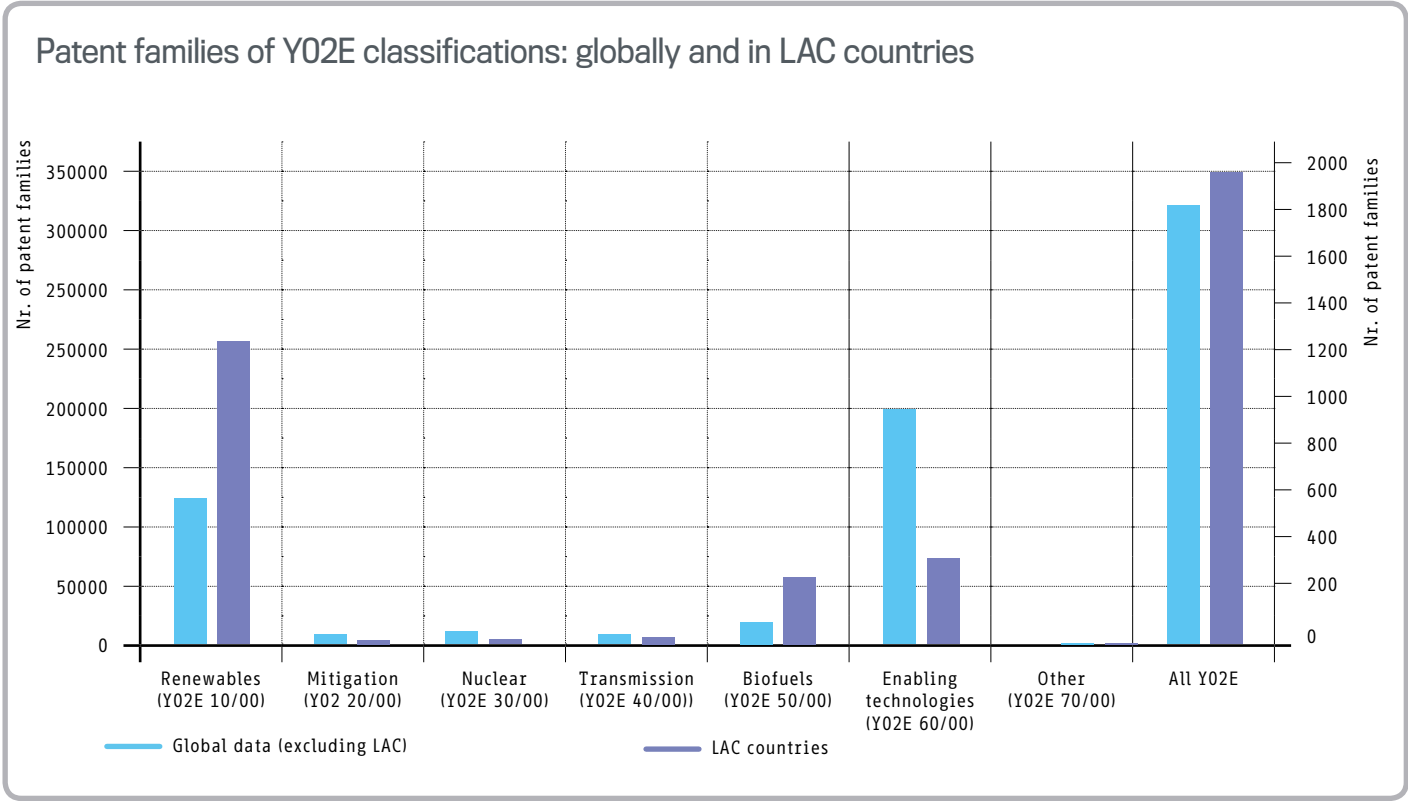


Annex 6B



The proportion of LAC patent filings in clean energy technologies is slightly higher than globally, the number of CCMTs in Buildings and Transport slightly lower. LAC filings are relatively stronger in “Renewables” and “Biofuels” compared to global levels.

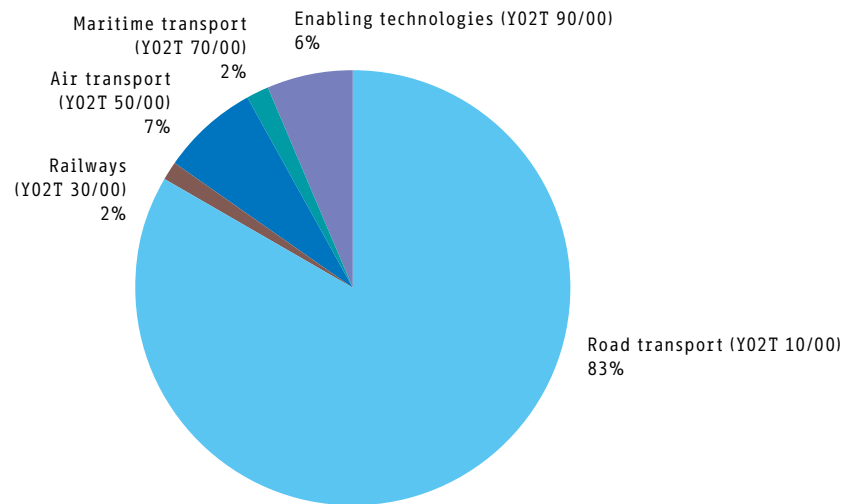
Annex 6C



Annex 7A

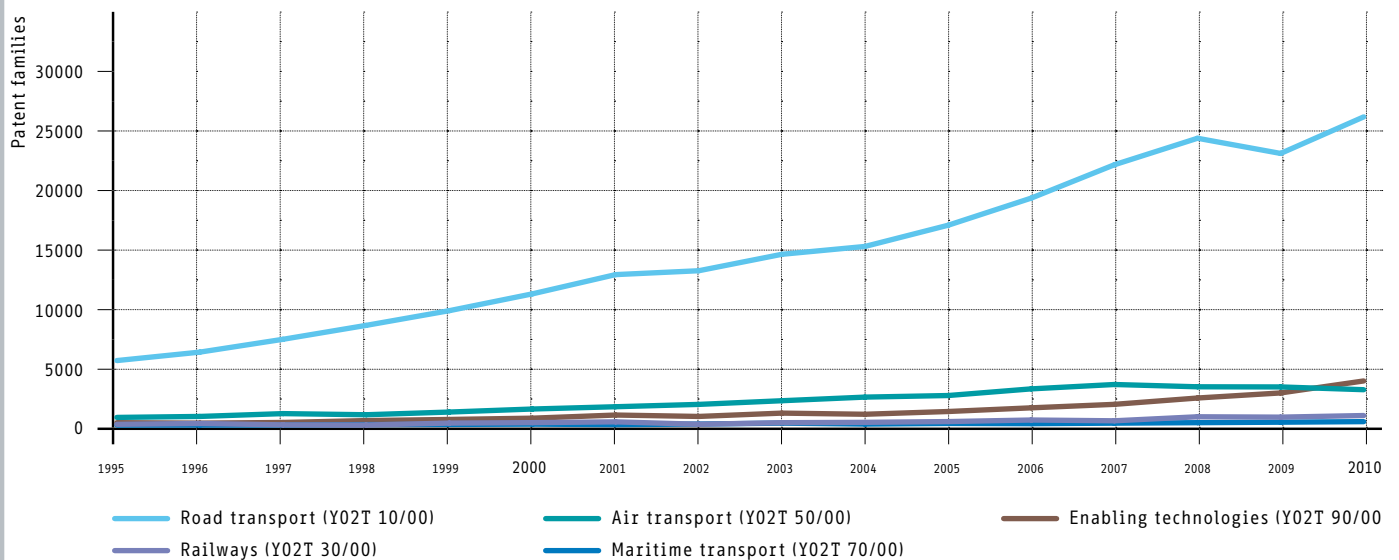
Road transport filings dominate globally, as in LAC.

Y02T classification patent applications: global patent family filings (1995-2010)



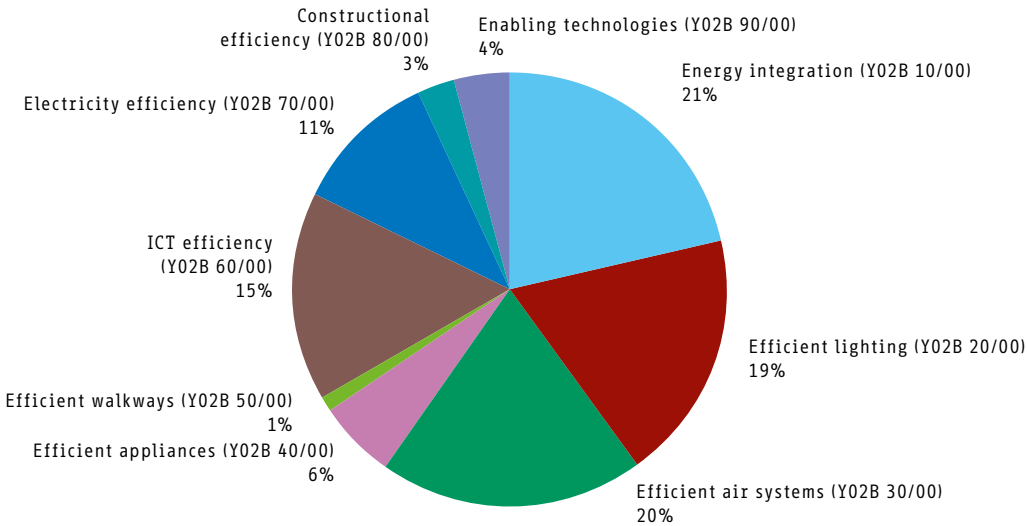
Annex 7B

Global patent family filing trends for Y02T classifications: 1995-2010



Annex 8

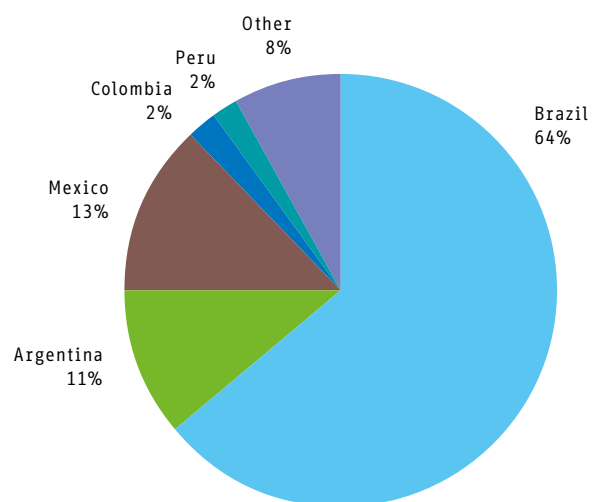
Y02B classification patent applications: global patent family filings (1995-2010)



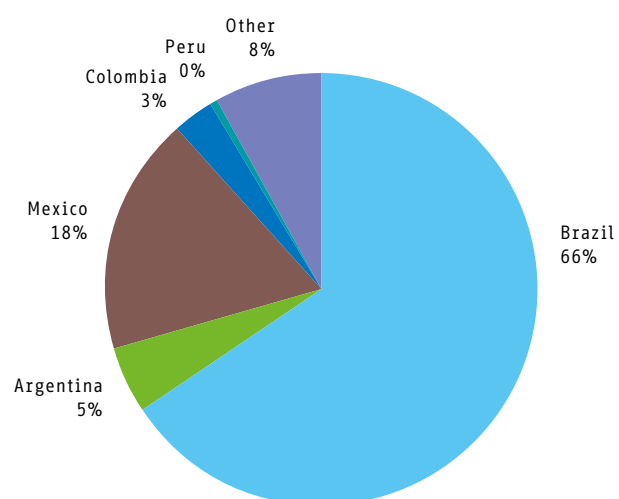
Annex 9

Origin of inventors for Transport (Y02T) and Buildings in LAC countries 1995-2010

Transport (Y02T): 1995-2010



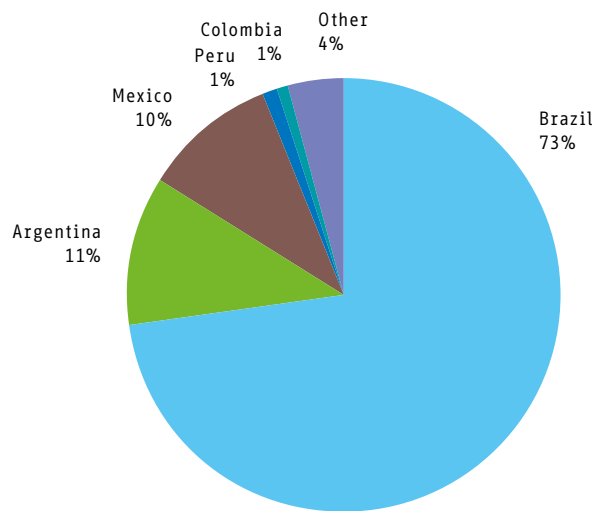
Buildings (Y02B): 1995-2010



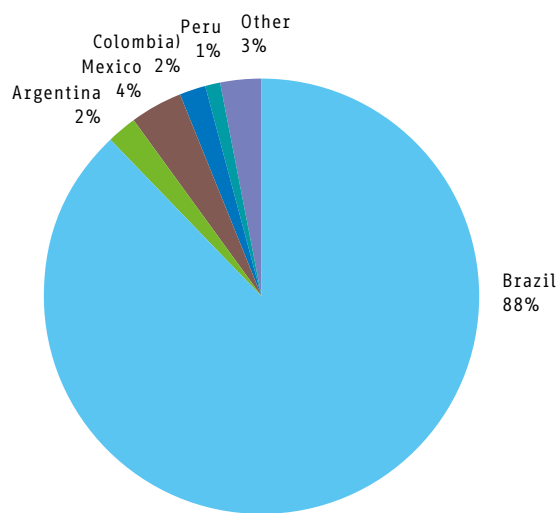
Annex 9 (contd.)

Origin of inventors for Renewables, Biofuels and Energy storage in LAC countries 1995-2010

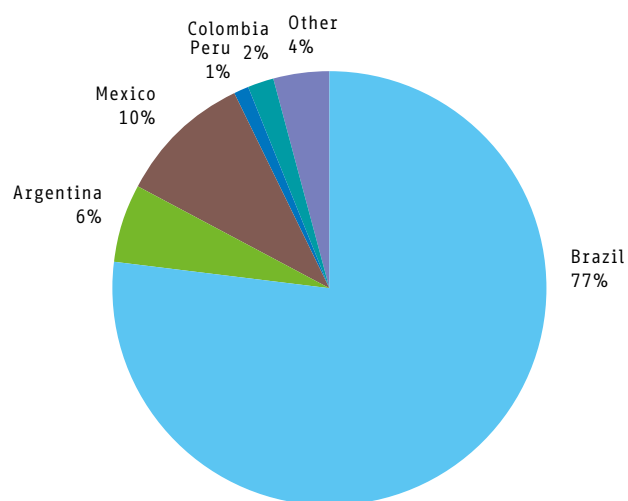
Renewable (Y02E 10/00): 1995-2010



Biofuels (Y02E 50/00): 1995-2010



Energy storage (Y02E 60/00): 1995-2010



Annex 9 (contd.)

Priority documents listing LAC inventors by inventor country (1995-2010)

Geographical distribution of LAC patent filings with LAC inventors

Country code	Juridictions	Y02B	Y02C	Y02E	Y02T	Y04S	TOTAL Y0
Grand Total		203	18	1848	294	46	2303
BR	Brazil	134	9	1386	188	31	1685
AR	Argentina	10	3	172	31	2	210
MX	Mexico	36	5	172	39	10	242
CO	Colombia	6	0	22	7	2	32
PE	Peru	1	0	26	6	0	31
OTHER		16	1	70	23	1	103
VE	Venezuela	0	1	8	7	0	16
CL	Chile	2	0	11	3	1	15
EC	Ecuador	2	0	11	0	0	11
UY	Uruguay	1	0	8	1	0	10
KN	Saint Kitts And Nevis	8	0	1	4	0	10
CR	Costa Rica	1	0	7	2	0	9
PA	Panama	2	0	6	1	0	9
CU	Cuba	0	0	6	0	0	6
GT	Guatemala	0	0	3	1	0	4
BS	The Bahamas	0	0	4	0	0	4
SV	El Salvador	0	0	1	2	0	3
TT	Trinidad/ Tobago	0	0	0	2	0	2
BB	Barbados	0	0	1	0	0	1
BZ	Belize	0	0	1	0	0	1
NI	Nicaragua	0	0	1	0	0	1
PY	Paraguay	0	0	1	0	0	1

Annex 10

Countries of interest as a market for Latin American inventors (1995-2010)

Global CCMT filings with LAC inventors

Country code	Juridictions	TOTAL Y0
Grand Total		3597
BR	Brazil	1780
US	United States	294
MX	Mexico	252
AR	Argentina	234
EP	European Patent Office (EPO)	189
	Other	848
CN	China	78
DE	Germany	73
ES	Spain	72
CA	Canada	71
AU	Australia	63
JP	Japan	54
IB	International Patent Institute	46
PE	Peru	33
GB	United Kingdom	31
KR	South Korea	26
CO	Colombia	26
AT	Austria	26
FR	France	20
UY	Uruguay	18
PT	Portugal	14
DK	Denmark	13
RU	Russian Federation	13
SE	Sweden	12
CR	Costa Rica	11
EC	Ecuador	11
NO	Norway	10
ZA	South Africa	10
EA	EAO/EA Eurasian Patent Organization	10
PA	Panama	10
IT	Italy	10

Annex 11

International co-invention between LAC countries and the rest of the world (Number of patent families 1995-2010)

LAC co-invention countries		Co-invention partner country																							
		YO LAC TOT	US	AR	AT	AU	BE	BG	BR	CA	CH	CM	CN	CO	CR	CU	DD	DE	DK	EC	ES	FI	FR		
AR	Argentina	95	35	0	3	0	0	0	5	1	0	0	2	0	0	0	0	20	0	0	2	0	3		
BR	Brazil	237	70	5	0	0	1	2	0	11	7	0	5	0	0	0	1	37	1	0	5	0	28		
BS	Bahamas	25	24	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
BZ	Belize	3	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
CL	Chile	57	21	0	8	0	0	0	0	0	2	0	0	0	0	0	0	10	0	0	3	0	0		
CO	Colombia	33	5	0	0	1	0	0	0	1	1	1	1	0	0	0	0	2	0	0	6	0	2		
CR	Costa Rica	6	2	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0	0	0	0		
CU	Cuba	7	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	3		
DM	Dominica	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
EC	Ecuador	12	2	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	0	0	1	0	0		
GT	Guatemala	7	4	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0		
MX	Mexico	225	46	3	0	1	1	0	4	5	9	0	3	1	0	3	1	24	0	5	4	2	11		
PA	Panama	4	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
PE	Peru	26	5	0	0	0	0	0	0	0	1	0	0	0	0	0	0	9	0	0	1	0	1		
SR	Suriname	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0		
SV	El Salvador	3	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0		
TT	Trinidad and Tobago	19	6	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5		
UY	Uruguay	6	3	0	0	0	0	0	0	0	1	0	1	0	0	0	0	0	0	0	1	0	0		
VE	Venezuela	29	17	0	0	0	0	0	0	0	2	0	0	0	0	0	0	5	0	0	3	0	0		

YO LAC Total = YO LAC co-invention Total
Unk = Unknown

	GB	GH	GR	HR	IL	IN	IT	JP	KR	MC	MX	MY	NL	NO	NZ	PE	PH	PL	RO	RU	SE	SK	SV	TH	TW	Unk
	14	0	0	0	0	1	2	1	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	1	0	2
	7	0	3	4	5	3	3	3	3	0	4	1	4	0	0	0	1	0	0	0	6	1	0	0	1	15
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	1	0	0	0	0	0	0	0	0	0	0	0	0	12	0	0	0	0	0	0	0	0	0	0	0	0
	5	0	0	0	0	1	0	0	3	0	1	0	1	0	0	0	0	0	1	0	0	0	0	0	0	1
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0
	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	1	0	0	0	0	0	0	0	0	5	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0
	2	0	0	0	0	6	6	6	0	1	0	0	3	0	0	6	0	0	0	1	3	0	0	3	1	64
	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	6	0	0	0	0	0	0	0	0	0	1	0	0	0	1	1
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	1	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	2	1	0	0	0	0	0	0	0	0	0	5	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	1

Annex 12

International co-applicants between LAC countries and the rest of the world (Number of patent families 1995-2010)

LAC co-applicant country		Co-applicant partner country																					
		YO LAC Total	US	AR	AT	BB	BE	BR	BS	CA	CH	CN	CO	CU	DE	DK	EC	ES	FR	GB	IE	IL	IT
AR	Argentina	43	9	0	2	0	0	3	0	4	0	0	2	0	4	0	6	3	2	2	0	0	2
BB	Barbados	32	16	0	0	0	0	0	2	7	0	0	0	0	0	0	0	0	0	0	4	0	
BR	Brazil	87	24	3	0	0	1	0	0	9	1	0	0	0	10	1	0	1	8	10	0	1	0
BS	Bahamas	27	9	0	0	2	0	0	0	3	0	0	0	0	0	0	0	0	0	5	3	0	0
BZ	Belize	2	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0
CL	Chile	26	8	0	2	0	0	0	0	0	0	0	0	0	2	0	0	6	0	0	0	0	0
CO	Colombia	10	1	2	1	0	0	0	0	0	0	1	0	0	0	0	0	0	1	1	0	0	0
CR	Costa Rica	5	2	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
CU	Cuba	5	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
DM	Dominica	4	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	2	0	1	0	0	0
DO	Dominican Republic	3	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	0	0	0
EC	Ecuador	10	0	6	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0
KN	Saint Kitts and Nevis	16	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
MX	Mexico	39	9	1	0	0	0	1	0	0	4	0	0	1	9	0	2	0	4	0	0	0	3
PA	Panama	24	1	0	0	0	0	0	0	1	2	0	1	0	0	0	0	0	1	0	0	1	9
PE	Peru	7	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0	0	0	0	0
TT	Trinidad and Tobago	4	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
UY	Uruguay	6	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
VC	Saint Vincent and the Grenadines	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0
VE	Venezuela	12	2	0	0	0	0	0	0	0	3	0	0	0	1	0	0	3	0	0	0	0	0
		383	84	12	5	2	1	4	2	26	11	1	3	1	31	1	8	15	17	21	3	6	14

YO LAC Total = YO LAC co-applicant Total
Unk = Unknown

	JP	KE	KR	LU	MC	MX	NL	NO	PA	PE	RU	SE	SG	TH	PE	PH	PL	RO	RU	SE	SK	SU	SV	TH	TW	Unk
	0	0	0	0	0	1	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	1	0	1
	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0
	2	0	0	0	0	1	1	0	0	0	0	2	0	0	0	1	0	0	0	5	1	0	0	0	1	4
	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	4
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	2	0	0	0	3	0	0	2	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0
	0	0	1	0	0	0	0	0	1	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	1	0
	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	3	0	0	0	0
	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
	0	0	0	0	0	2	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	6	0	0	0	1	4	0	0	0	3	1	0
	0	0	0	0	1	0	0	0	0	2	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	1
	0	0	0	3	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	1	2
	0	0	0	0	0	2	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1
	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	5	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	2
	2	1	2	5	1	7	2	5	1	2	3	3	1	1	6	1	1	1	2	12	1	4	1	4	10	16

Annex 13

Patent applicants in LAC: YO classifications (1995-2010)

Rank (1995-2010)	Patent applicant	Country of company HQ	Nr of patents	Percentage ownership
1	Gen Electric	USA	207	2,1%
2	Gillette Co	USA	152	1,5%
3	Wobben Aloys	DE	114	1,2%
4	Honda Motor Co Ltd	JP	112	1,1%
5	Praxair Technology Inc	USA	110	1,1%
6	Bosch Gmbh Robert	DE	94	1,0%
7	Aloys Wobben		84	0,9%
8	Airbus Gmbh	FR	79	0,8%
9	Toyota Motor Co Ltd	JP	75	0,8%
10	Lg Chemical Ltd	KR	73	0,7%
11	Int Engine Intellectual Prop	USA	56	0,6%
12	Sony Corp	JP	52	0,5%
13	Siemens Ag	DE	49	0,5%
14	Airbus France	FR	45	0,5%
15	Duracell Inc	USA	42	0,4%
16	Vestas Wind Sys As	DK	41	0,4%
17	Volvo Lastvagnar Ab	SE	40	0,4%
18	Matsushita Electric Ind Co Ltd	JP	40	0,4%
19	Deere & Co	USA	39	0,4%
20	Bic Soc	FR	35	0,4%
21	Shell Int Research	NL	35	0,4%
22	Qualcomm Inc	USA	34	0,3%
23	Maglia Joao Batista	BR	33	0,3%
24	Merck Patent Gmbh	DE	32	0,3%
25	Degussa	DE	31	0,3%
26	Motorola Inc	USA	31	0,3%
27	Air Liquide	FR	29	0,3%
28	Scania Cv Ab	SE	29	0,3%
29	Eaton Corp	IE	28	0,3%
30	Basf Catalysts Llc	USA	27	0,3%
31	Saint Gobain	FR	27	0,3%
32	Global Nuclear Fuel Americas	USA	27	0,3%
33	Ericsson Telefon Ab L M	SE	26	0,3%
34	Air Prod & Chem	USA	26	0,3%
35	Goodyear Tire & Rubber	USA	26	0,3%
36	Mann & Hummel Filter	DE	25	0,3%
37	Basf Ag	DE	25	0,3%
38	Magneti Marelli Powertrain Spa	IT	25	0,3%
39	Yamaha Motor Co Ltd	JP	25	0,3%
40	Modine Mfg Co	USA	25	0,3%

Total nr patent families in YO classification with a LAC filing

9.854

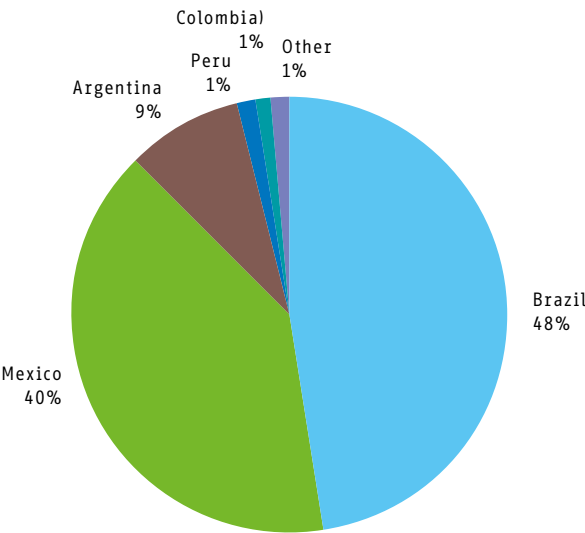
20%

Annex 14

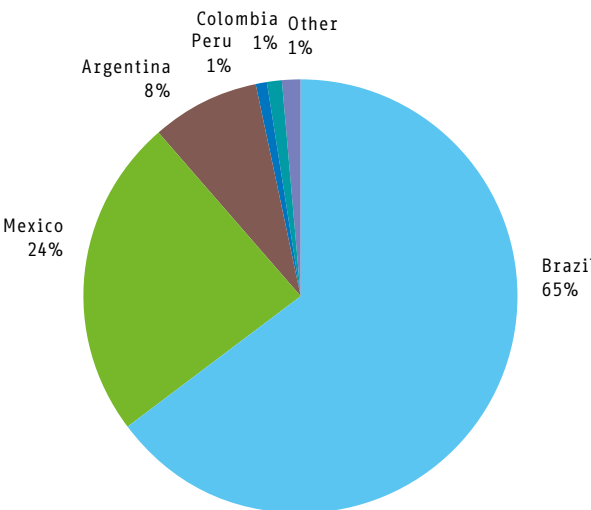
Proportion of CCMT patent applications filed in each Latin American country (Y02 B, E,T)

1. Buildings, transport and clean energy

Buildings (Y02B): Jurisdictional filings 1995-2010

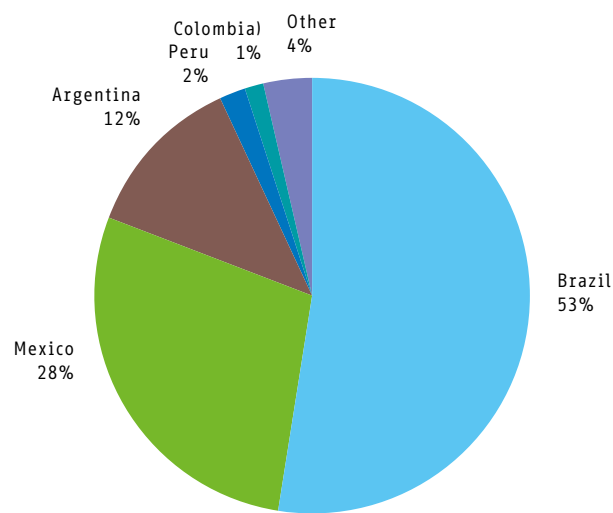


Transport (Y02T): Jurisdictional filings 1995-2010



Annex 14 (contd.)

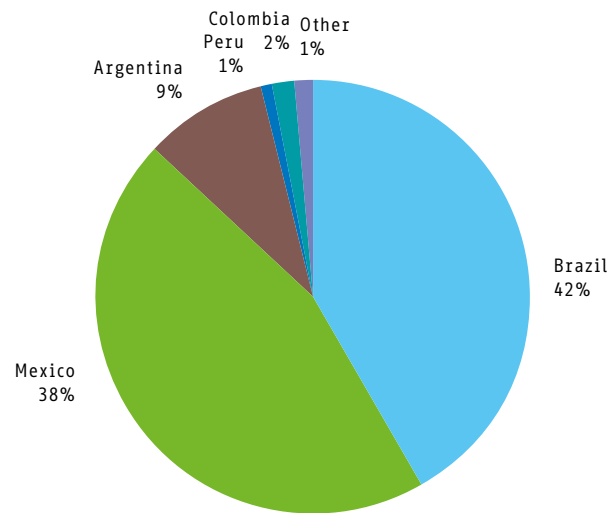
Clean energy (Y02E): Jurisdictional filings 1995-2010



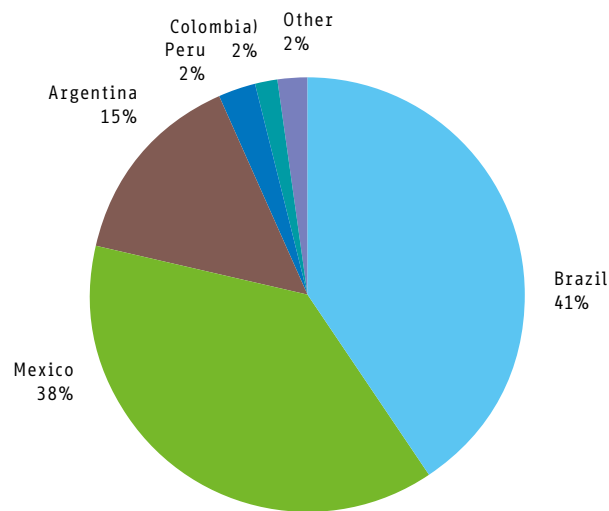
Annex 14 (contd.)

2. Smart grids and Carbon capture (Y02C and Y04C)

Smart grids (Y02S): Jurisdictional filings 1995-2010



Carbon capture (Y02C): Jurisdictional filings 1995-2010



Annex 14 (contd.)

3. Statistics of CCMT patent applications filed in each Latin American state.

Authority geographies: LAC

Rank	Country code	EPO classification						Percentage of total					
		Patent filings	Build-ings (Y02B)	Carbon capture (Y02C)	Clean energy tech-nologie (Y02E)	Trans- port (Y02T)	Smart grids (Y04S)	Total Y0	Y02B	Y02C	Y02E	Y02T	Y04S
	Grand Total		1589	580	8408	3462	373	13340	12%	4%	63%	26%	3%
1	BR	Brazil	758	236	4429	2243	156	7350	10%	3%	60%	31%	2%
2	MX	Mexico	634	221	2382	830	169	3801	17%	6%	63%	22%	4%
3	AR	Argentina	138	86	1023	282	34	1450	10%	6%	71%	19%	2%
4	PE	Peru	21	15	163	28	3	215	10%	7%	76%	13%	1%
5	CO	Colombia	19	10	114	33	6	170	11%	6%	67%	19%	4%
	OTHER		19	12	297	46	5	354	5%	3%	84%	13%	1%
6	EC	Ecuador	3	3	56	8	0	67	4%	4%	84%	12%	0%
7	CR	Costa Rica	6	0	53	8	2	64	9%	0%	83%	13%	3%
8	UY	Uruguay	4	2	48	10	2	58	7%	3%	83%	17%	3%
9	CL	Chile	2	5	41	3	0	49	4%	10%	84%	6%	0%
10	CU	Cuba	2	0	24	5	0	29	7%	0%	83%	17%	0%
11	GT	Guatemala	1	0	21	5	0	25	4%	0%	84%	20%	0%
12	PA	Panama	1	1	23	3	0	27	4%	4%	85%	11%	0%
13	DO	Dominican Republic	0	1	12	2	1	15	0%	7%	80%	13%	7%
14	SV	Salvador	0	0	11	1	0	12	0%	0%	92%	8%	0%
15	NI	Nicaragua	0	0	3	1	0	3	0%	0%	100%	33%	0%
16	HN	Honduras	0	0	5	0	0	5	0%	0%	100%	0%	0%
	AB	Antigua and Barbuda	0	0	0	0	0	0					
	BB	Barbados	0	0	0	0	0	0					
	BO	Bolivia	0	0	0	0	0	0					
	BS	Bahamas	0	0	0	0	0	0					
	BZ	Belize	0	0	0	0	0	0					
	DM	Dominica	0	0	0	0	0	0					
	GD	Grenada	0	0	0	0	0	0					
	KN	Saint Kitts and Nevis	0	0	0	0	0	0					
	LC	Saint Lucia	0	0	0	0	0	0					
	PY	Paraguay	0	0	0	0	0	0					
	SR	Suriname	0	0	0	0	0	0					
	TT	Trinidad and Tobago	0	0	0	0	0	0					
	VC	Saint Vincent and the Grenadines	0	0	0	0	0	0					
	VE	Venezuela (Bolivarian Republic of)	0	0	0	0	0	0					

ACRONYMS

Acronyms	
CCD	Common Citation Document
CCMT	Climate Change Mitigation Technology
CTEs	Clean Energy Technologies
CSP	Concentrated solar power
CFE	Federal Electric Commission
CoP	Conference of Parties
CPC	Cooperative Patent Classification
CTCN	Climate Technology Centre and Network
EC	European Commission
EPO	European Patent Office
GHG	greenhouse gases
GW	gigawatts
ICT	Information and communication technologies
ICTSD	International Centre for Trade and Sustainable Development
IEA	International Energy Agency
IP	International Property
IP5	5 Intellectual Property Offices: EPO, JPO, KIPO, SIPO, USPTO
IPCC	Intergovernmental Panel on Climate Change
IPO	Intellectual Property Offices
IPR	Intellectual Property Rights
IRENA	International Renewable Energy Agency
ISA	International Searching Authorities (PCT)
JPO	Japan Patent Office
KIPO	Korean Intellectual Property Office
MW	megawatts
LAC	Latin American and Caribbean countries
OECD	Organisation for Economic Co-operation and Development
PATSTAT	EPO Worldwide Patent Statistical Database
PCT	Patent Cooperation Treaty
PVS	photovoltaic systems
R&D	Research and Development
SIPO	State Intellectual Property Office of the People's Republic of China
TEC	Technology Executive Committee
TRIPS	Trade-related Aspects of Intellectual Property Rights
TWh / yr	terawatt-hours per year
UNFCCC	UN Framework Convention on Climate Change
USPTO	United States Patent and Trademark
WIPO	World Intellectual Property Organization
WTO	World Trade Organization

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World Bank; World Development Indicators, Electricity Production, Sources and Access

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IMPRINT

This report is published by

the United Nations Environment Programme (UNEP) and
the European Patent Office (EPO)

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Y02 and Y04S

The new tagging scheme for patent documents related
to adaptation technologies for developing countries
was developed by an EPO team of examiners, lead by
Javier Hurtado-Albir and Victor Veefkind.

Quentin Tannock, Sarah Helm, Ben Pellegrini and Harry
Miller of CambridgeIP Ltd. undertook the statistical analy-
sis of the patenting data using PATSTAT under the co-ordi-
nation of the EPO.

Photos

Cover, page 10/11, 14/15, 36/37, 62/63: laif;

page 28/29, 58/59: Okapia

Design and production

Graphic Design Munich (EPO)

The report can be downloaded from:

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