

An aerial photograph of a coastal region, likely the Baja California Peninsula in Mexico. The image shows a large, dark green lagoon system with several smaller inlets and channels. The surrounding land is a mix of light brown and tan colors, indicating a semi-arid or desert environment. The ocean is visible in the bottom left corner, showing a dark blue color. The text 'LATIN AMERICA & THE CARIBBEAN REGIONAL SUMMARY' is overlaid in large, white, bold, sans-serif font across the top half of the image.

# LATIN AMERICA & THE CARIBBEAN REGIONAL SUMMARY

Mexico - Midway down the Baja California Peninsula lies a land- and seascape that the UNESCO has declared a World Heritage site and a Biosphere Reserve. Encompassing two lagoons and a large stretch of land between them, El Vizcaino Biosphere Reserve provides a winter home for gray whales and other marine mammals, and habitat for thousands of migratory waterfowl.

## OVERVIEW

Climatescope assessed 26 Latin America and Caribbean (LAC) nations, from Mexico in North America, to Trinidad and Tobago in the Caribbean, to Chile in South America.

This is a highly heterogeneous group, ranging from the Bahamas with a national GDP of just \$11.5bn to the seventh largest economy on earth, Brazil, with its \$2.4tr GDP. These nations also feature massive geographic diversity – from extensive hydro basins in South America, to mountainous and desert regions along the Andes, to sunny islands in the Caribbean and volcanic areas in Central America. Given such unique natural resources, clean energy has a strong potential across the whole region yielding high capacity factors and cost-competitive alternatives for electricity generation.

This potential has not gone unnoticed and LAC is today regarded as one of the great frontiers for clean energy investment. From 2006 to 2013, the region attracted a cumulative \$132bn for biofuels, biomass, geothermal, solar, small hydro (up to 50MW) and wind. Of this, \$93.4bn went to build new projects. The remaining \$38.6bn went to finance acquisition projects.

Most importantly, this investment has produced operating assets providing approximately 92.7TWh in 2013 to the Latin American and Caribbean's 600m population, representing 6.4% of total generation. Adding large hydro generation, which is not included in the *Climatescope* survey, the LAC region met 54.4% of its power demand through zero-CO2 emitting power sources.

The region's reliance on large hydro is a double-edged sword. On the one hand, such facilities produce no new CO2 emissions and can be low-cost power resources. On the other, they can be fickle sources of generation. Recent droughts in Central and South America highlighted this by causing intense stress on power supplies in Brazil and Panama. Both had to turn to expen-

sive emergency thermal generation to meet short-term electricity needs. Thus non-large hydro clean energy can play a vital role in making the power matrices of LAC more resilient, both for base and peak load electricity.

Against this backdrop, *Climatescope* assesses and ranks the LAC nations, highlighting those that have made the most progress to date and their attractiveness to future clean energy investment.

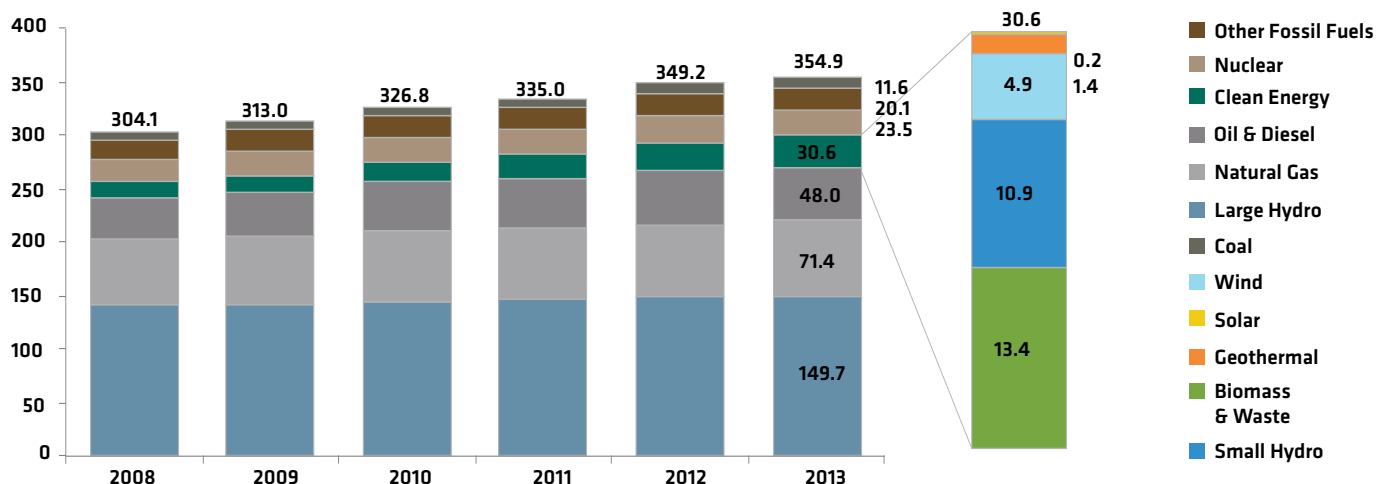
On an overall *Climatescope* score basis, Brazil finished first among the LAC countries, followed by Chile, Uruguay, Mexico and Peru. Between them, these five countries attracted \$13bn, or an impressive 94% of the \$14bn in total LAC 2013 clean energy investment in the 26 countries in the region.

Supportive policies in each nation have helped trigger the wave of financings. Three of these countries – Brazil, Peru, and Uruguay – have successfully held tenders for power supply contracts from clean energy projects, with Chile now poised to join them in 2016. These reverse auctions have directly resulted in project financings and commissions. Two of the top five finishers – Chile and Mexico – are implementing taxes on CO2 emissions, which mostly apply to power plants.

Economic viability for renewables (so-called “grid parity”) has begun to arrive in various parts of Latin America, including in parts of these five nations. For instance, Brazil has to date held 25 reverse tenders for power contracts in which multiple technologies, not just renewables, were invited to compete. Wind projects competed in 11 of these and won contracts in nine by pricing below proposed coal and natural gas projects.

In Chile, high electricity spot prices and a heavy reliance on imported fuels for generation have prompted a surge in renew-

## INSTALLED POWER CAPACITY AND CLEAN ENERGY CAPACITY BY SECTOR (GW)



Source: Bloomberg New Energy Finance

able energy investment, especially for solar projects. In Uruguay, the desire to diversify away from large hydro projects convinced regulators to hold competitive technology-specific tenders for power contracts. This, in turn, made South America's smallest nation a major destination for wind investment in 2013.

Mexico is the second largest clean energy market in the LAC region. Wind projects in Oaxaca are already price competitive with natural gas and have become a useful alternative for large consumers seeking secure electricity supply.

Peru was the first country in Latin America to hold a technology-specific auction for renewable capacity, contracting photovoltaic, wind and biomass projects to deliver electricity supply to the grid. It also auctioned photovoltaic capacity to supply its population that is not connected to the grid.

In Central America, policy-driven initiatives such as auctions and feed-in tariffs have helped boost clean energy capacity. In 2013, Costa Rica, El Salvador, Guatemala, Honduras, Nicaragua and Panama combined attracted \$673m for new projects, a significant sum as the region's installed capacity totals just 12.5GW. Integration through Central America's regional power market MER (Mercado Eléctrico Regional) means that clean energy installed in one country can benefit neighbors. In the end, these countries ranked within a relatively close range of each other on the 26-nation LAC list: Costa Rica (6<sup>th</sup>) and Nicaragua (8<sup>th</sup>) made the top 10, while Honduras (11<sup>th</sup>), El Salvador (12<sup>th</sup>), Panama (13<sup>th</sup>) and Guatemala (14<sup>th</sup>) followed not far behind.

## ENABLING FRAMEWORK PARAMETER I

The Enabling Framework Parameter I includes a total of 22 indicators, which assess a country's policy and power sector structure, levels of clean energy penetration, level of price attractiveness for clean energy deployment, and the expectations for how large the market for clean energy can become.

Among the 55 *ClimateScope* nations, Brazil topped the list with a 2.14 score. This was partly due to a particularly high mark on the clean energy policies indicator, along with a high and increasing rate of biofuels production (27.5bn liters in 2013, up 26.7% from 2012). Prolonged droughts in the country cut into generation from Brazil's massive hydro projects in 2013 and drove spot electricity prices to an average of \$260/MWh, the highest assessed in *ClimateScope* 2014. While this highlighted the need for additional capacity, last year was a challenging one for the renewables industry, partly due to the local economic slowdown.

The Dominican Republic finished second with a 1.54 score thanks primarily to several clean energy incentives on its books, high electricity prices that averaged \$0.20/kWh for retail consumers, and strong demand growth from the prior year of 10.5%. Uruguay landed third with a score of 1.43 thanks to its performance on the clean energy policies indicator, very strong growth of clean energy generation (up 21% from 2012)

Nations in the Caribbean should for the most part have a strong motivation to adopt renewables. Strong reliance on imported fuels often burdens power producers which, in turn, pass high prices on to consumers. Good insolation rates across these nations and strong wind speeds in certain locations make clean energy a viable potential solution. However, limited opportunities for new market entrants have been made available to date and the relatively small size of these markets have hindered development. As a result, most Caribbean nations ranked in the bottom half of the *ClimateScope* table. The one exception was the Dominican Republic, which has attracted more clean energy investment to date (\$232m, from 2007-2013) than any other Caribbean nation and finished in the top 10 among all LAC countries (24<sup>th</sup> among all nations). Jamaica was at 18<sup>th</sup>, followed by Barbados (19<sup>th</sup>), Haiti (20<sup>th</sup>), Guyana (21<sup>st</sup>) and the Bahamas (24<sup>th</sup>).

Of course, not all countries in the region have embraced clean energy comprehensively and some have little inherent motivation to do so. Countries that finished toward the bottom of the table for LAC tended to be those with ample local energy resources (typically in the form of large hydro projects, or substantial fossil fuel supplies) and associated low electricity prices. These make it challenging for non-large hydro clean energy technologies to compete. Examples where those technologies have gained little traction to date include: Paraguay, which ranked 22<sup>nd</sup> among *ClimateScope* nations, along with Trinidad & Tobago (23<sup>rd</sup>), Venezuela (25<sup>th</sup>) and Suriname (26<sup>th</sup>).

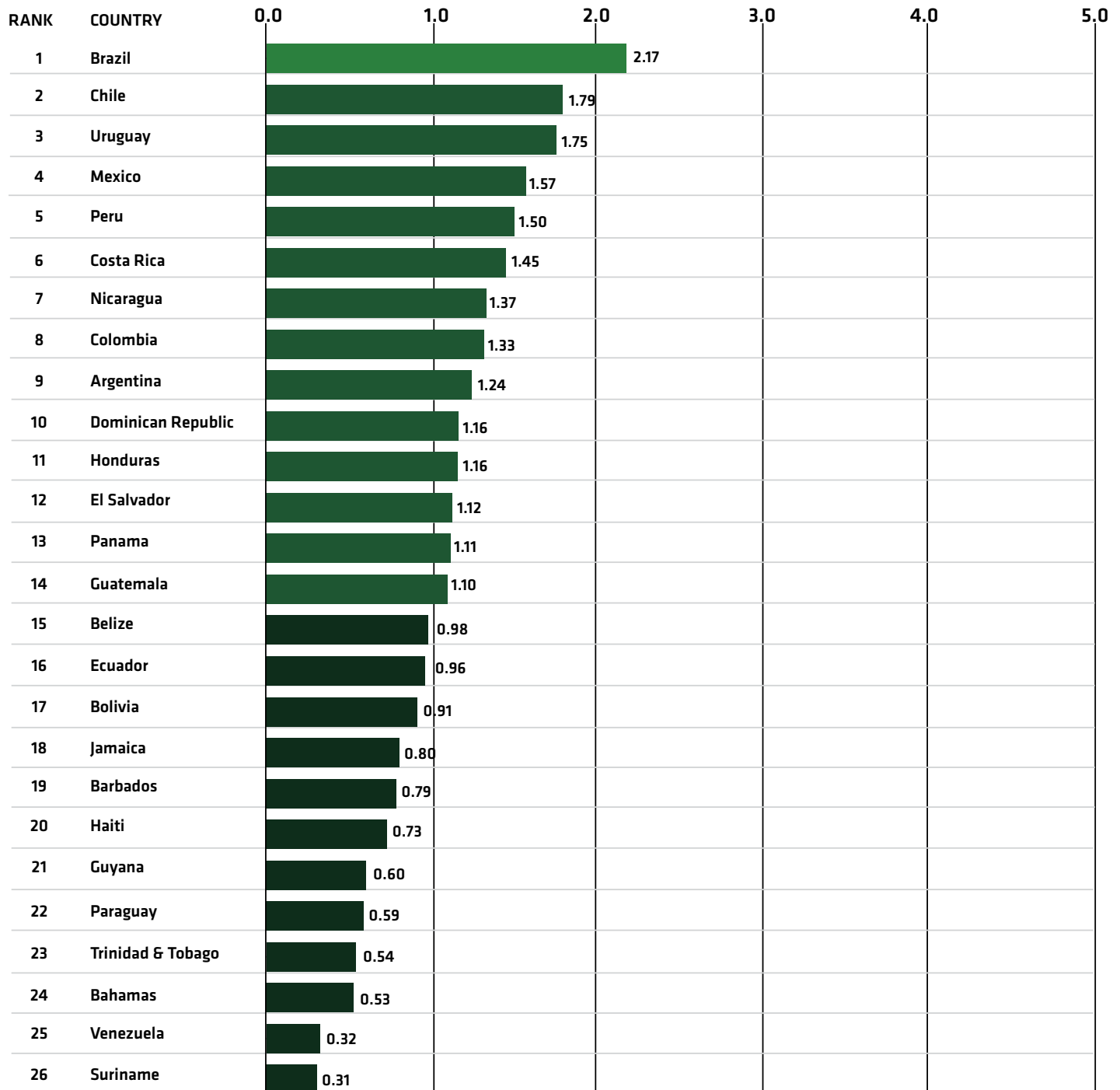
and growing energy demand (up 10.1%). Peru's fourth place finish with a 1.40 score was due to the open nature of its power market, its policies, and strong local demand. Panama's fifth place ranking, with a 1.39 score, was attributable to high spot prices that averaged \$177/MWh and year-on-year demand growth of 4.2%.

In LAC, 19 countries have at least one type of policy incentive supporting clean energy deployment. Tax incentives are the most common and these range from accelerated depreciation benefits to import duty exemptions. Auctions are the single most popular mechanism used for contracting renewable capacity, with 11 countries having held tenders for clean power contracts. This has included Jamaica in the Caribbean, Belize, Costa Rica, El Salvador, Guatemala, Honduras and Panama in Central America, and Argentina, Brazil, Peru and Uruguay in South America.

Feed-in tariffs (FiTs) for clean energy development are less common in the region, but are still present with Ecuador and Honduras offering the most attractive (highest) rates for developers. Though in Ecuador development has been slow, Honduras has started to attract large-scale photovoltaic project development. While clean energy is already economically competitive in certain parts of LAC, government support is still needed, given perceived country risks, and the need for long-term contracts to secure financing.

## 2014 Global Climatescope scores

### Latin American and Caribbean ranking



Colors show range for overall score

0.0 - 1.00

1.01 - 2.00

2.01 - 3.00

3.01 - 4.00

4.01 - 5.00

## LATIN AMERICA AND CARIBBEAN CLEAN ENERGY POLICY TYPES BY COUNTRY

	Argentina	Barbados	Belize	Brazil	Chile	Colombia	Costa Rica	Dominican Republic	Ecuador	El Salvador	Guatemala	Honduras	Jamaica	Mexico	Nicaragua	Panama	Paraguay	Peru	Uruguay	
Energy target	●	●			●			●					●	●	●				●	●
Feed-in tariff	●			●				●	●			●				●				
Auctions	●		●	●			●			●	●	●	●			●			●	●
Net metering		●		●	●			●					●	●						●
Biofuels blending mandate	●			●		●			●							●	●	●	●	●
Debt/equity incentives				●				●						●						
Tax incentives	●			●	●	●	●	●	●	●	●	●		●	●	●			●	●
Utility regulation				●				●											●	

Source: Bloomberg New Energy Finance

On the distributed energy side, Latin America is the region in the developing world with the largest number of countries to have adopted net metering policies to date. Under net metering programs, consumers may own clean energy systems and dispatch excess electricity back to the grid in exchange for credits. There are today seven LAC countries that have net metering policies in effect: Barbados, Brazil, Chile, Dominican Republic, Jamaica, Mexico and Uruguay. Still, distributed solar deployment has been slow with a lack of financing options, high costs and consumer awareness all posing challenges.

Of the 26 LAC countries assessed by *Climatescope*, half have vertically-integrated power structures, meaning that the same, typically government-owned, entity serves as power generator and utility. This is poised to change as Honduras and Mexico have each embarked on energy reforms aimed at phasing out state-owned monopolies to increase private participation in power generation. This bodes well for further clean energy development in both countries.

Vertically-integrated markets are not necessarily inhospitable to private clean energy development, however. Costa Rica and Uruguay, for instance, have allowed independent power producers (IPPs) to own projects or to sign build-operate-transfer contracts.

Private sector participation in power generation ranges from almost zero in countries such as Paraguay and Venezuela to over 80% in countries such as Guatemala and Panama.

Power prices across LAC can vary widely, from as low as \$0.03-0.06/kWh in countries such as Suriname and Venezuela where fossil resources are plentiful, to as high as \$0.37-0.40/kWh in Barbados and other Caribbean nations where nearly all fuel must be imported. While high prices are onerous to consumers, they offer incentives to shift to cleaner energy distributed systems with fixed costs and other potential upsides. In Barbados and Jamaica, for instance, consumers are permitted to install residential photovoltaic systems and dispatch surplus power back to the grid for a credit off their final bill, via net metering policies.

The LAC region is hungry for electricity, with demand expected to double by 2030, reaching 2,650TWh of power generation, creating considerable future opportunities for developers. In terms of energy access, the situation is considerably less dire in LAC than in other parts of the developing world with the electrification rate across the region at 90%. Conditions are by far the most difficult in Haiti where just 28% of the population enjoys grid-generated power. Nicaragua has the second lowest rate at 76%, followed by Guyana and Guatemala at 82%.

## LATIN AMERICA AND CARIBBEAN POWER SECTOR STRUCTURE BY COUNTRY

	Argentina	Bahamas	Barbados	Belize	Bolivia	Brazil	Chile	Colombia	Costa Rica	Dominican Republic	Ecuador	El Salvador	Guatemala	Guyana	Haiti	Honduras	Jamaica	Mexico	Nicaragua	Panama	Paraguay	Peru	Suriname	Trinidad & Tobago	Uruguay	Venezuela
Vertically-integrated monopoly utility		●	●	●					●					●	●	●	●	●			●		●	●	●	●
Unbundled power sector	●				●	●	●	●		●	●	●	●						●	●		●				
Independent power transmission	●				●	●	●	●		●	●	●	●									●				

Source: Bloomberg New Energy Finance

## CLEAN ENERGY INVESTMENT & CLIMATE FINANCING PARAMETER II

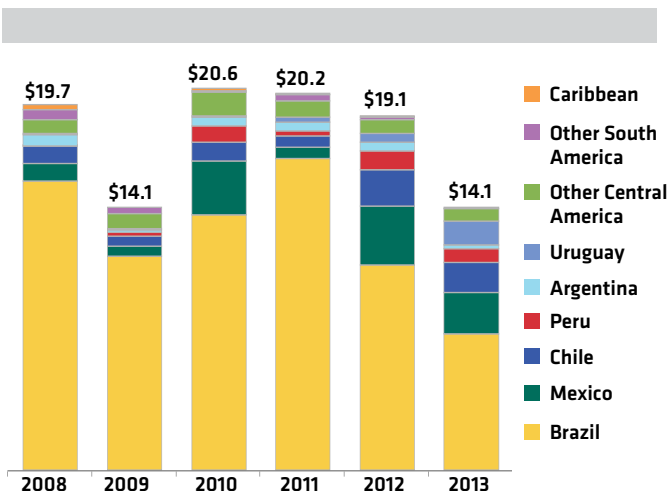
Clean Energy Investment & Climate Financing Parameter II looks at 14 indicators and accounts for the amount of clean energy investment a country attracts, the availability of local funds, the local cost of debt and green microfinance activity.

Uruguay, Nicaragua, El Salvador, Mexico and Bolivia were the top five Parameter II scorers, respectively, among the 26 LAC countries assessed. Uruguay finished first as the country of 3m citizens attracted \$1.3bn in 2013, mostly for wind projects – far higher than in the prior six years combined (\$0.9bn). Nicaragua followed by securing \$128m. Despite a reduction in 2013 investment levels relative to prior years, the cumulative investment in Nicaragua over the seven years of \$1.6bn helped to sustain its high score in this parameter, given the country’s \$27.9bn GDP economy. Nicaragua also fared well on Parameter II thanks to the strong role that green microfinance plays in the country.

El Salvador ranked third, despite attracting no meaningful amount of investment for renewables between 2010 and 2012, it had a surge in 2013 to finance a PV project, receiving high marks on the growth rate of clean energy investment. Mexico, which has undertaken major reforms of its energy sector, was fourth on the list thanks both to the rate of growth of clean energy investment in the country and the relatively low-cost debt available locally. It could potentially see its score on Parameter II rise in future years as its reforms take hold and more investment is deployed in response. Bolivia’s fifth-place finish was almost entirely due to the number of green microfinance institutions operating in the country.

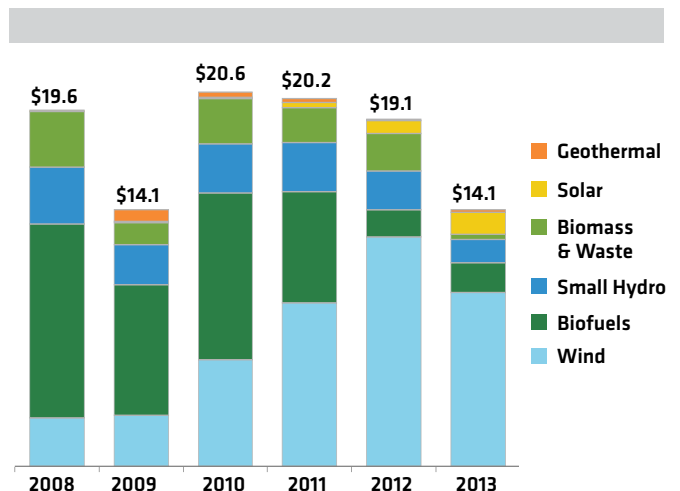
In absolute terms, Brazil, Mexico, Chile and Uruguay secured the most clean energy investment in 2013. However, the clean energy investment indicator (a major input into Parameter II) is

### LATIN AMERICA AND CARIBBEAN INVESTMENT IN CLEAN ENERGY BY COUNTRY, 2008-2013 (\$bn)



Source: Bloomberg New Energy Finance

### LATIN AMERICA AND CARIBBEAN INVESTMENT IN CLEAN ENERGY BY SECTOR, 2008-2013 (\$bn)

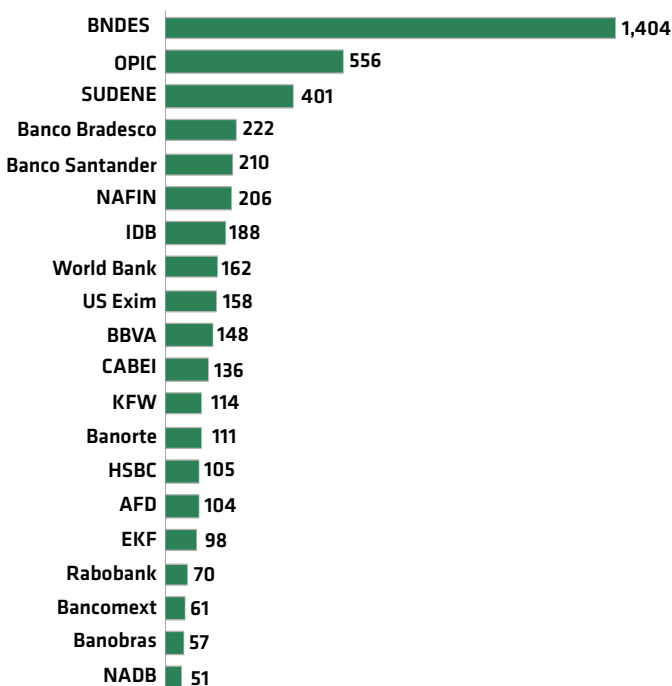


Source: Bloomberg New Energy Finance

calculated on a “levelized basis” – i.e. it takes into account a country’s GDP in the total amount invested in clean energy. In that context, Nicaragua, Belize, and Honduras scored highest.

Across the region, LAC has seen two major trends in clean energy investment, both involving diversification. The first involves where capital has been deployed. Until 2012, Brazil attracted around 70-80% of LAC clean energy investment per year. In 2013, this changed as investment in Brazil decreased and funds went elsewhere, including to Chile, Mexico, Uruguay and Central America. Generally, this should be regarded as good news for the sector as BNEF anticipates Brazil’s clean energy investment will rebound in 2014 while activity elsewhere in LAC will remain strong.

### TOP 20 LATIN AMERICA AND CARIBBEAN CLEAN ENERGY INVESTORS, 2013 (\$m)



Source: Bloomberg New Energy Finance

The second trend speaks to diversification of clean energy sectors. In the past, wind and biofuels attracted the majority of clean energy investment. However, in 2013, solar projects began to attract capital and photovoltaics are rapidly becoming one of the flagship clean energy technologies in the region.

In terms of sources of investment, local players already account for almost half of all new clean energy project finance in the region (\$3.9bn of \$8.2bn in 2013). This is largely due to the dominant role that Brazil’s national development bank Banco Nacional de Desenvolvimento Econômico e Social (BNDES) plays in that country in offering low-rate financing, provided projects comply with relevant “local content” rules<sup>1</sup>. In all, BNDES provided \$1.4bn in 2013 and accounted for 36% of all local funds provided. In Mexico, syndicated loans have become common with state-owned financial institutions Nacional Financiera (NAFIN), Bancomext and Banobras, joining local private banks or subsidiaries of international banks to finance new projects. Other banks have a more regional focus, such as the Central American Development Bank (BCIE), which has financed projects in Guatemala, Costa Rica, Honduras and Nicaragua.

Foreign financiers also play an important role. Multilateral finance institutions like the Inter-American Development Bank have participated in both financing projects and providing grants to encourage the development of clean energy across the region. Other development finance institutions including the International Finance Corporation, the Overseas Private Investment Corporation and the Japan International Cooperation Agency have also invested in countries such as Chile, Uruguay, Bolivia, Peru and others. Export-import agencies have provided credit in the region, as they finance equipment produced in their native countries. This has included the Export-Import Bank of the United States and the Danish Eksport Kredit Fonden.

Microfinance institutions are also an important source of financing for distributed clean energy systems in the region. A total of 51 organizations reported that they offer loans for clean energy solutions, having executed almost 13,000 transactions, according to a written survey conducted for *Climatescope*.

## LOW-CARBON BUSINESS AND CLEAN ENERGY VALUE CHAIN PARAMETER III

Low-Carbon Business and Clean Energy Value Chain Parameter III assesses through five indicators the availability of local manufacturing and other capacity to spur clean energy deployment. These take into account the presence of local manufacturers, service providers, financiers, and in the case of Haiti, value chain and service providers for distributed generation. The weight of this parameter as it counts toward a nation’s overall *Climatescope* score has been adjusted from last year’s survey. It now has an overall weight of 15%, up from 10% in *Climatescope* 2013. For further details, please refer to the Methodology section.

Larger economies tend to have an advantage on this parameter, as clean energy manufacturers and service providers are more likely to be based in more industrialized countries with more local demand. As a result, the top five countries for Parameter III this year are also some of the larger economies in the region: Brazil, Chile, Argentina, Mexico and Peru. Given the increase of Parameter III’s overall importance on *Climatescope* 2014, these larger economies also benefited on their final score.

As the top finisher, Brazil is home to more manufacturing value chain segments than any other nation in Latin America. This

1. Generally, BNDES requires a generic 60% local content to finance infrastructure projects. For wind projects, it developed a phased road map program so key components of wind plants such as blades, bearings, nacelles and towers are produced locally. The same approach is now being used to develop Brazil’s solar value chain.

is largely a result of Brazil's explicit local content rules, implemented in recent years. The rules mandate that clean energy projects must use certain amounts of equipment manufactured within Brazil in order to qualify for low-rate financing from BNDES. The rules, along with growing local demand, have been effective in driving a surge of new clean energy manufacturing capacity in country. Today, Brazil is the only LAC country that boasts a complete manufacturing value chain for wind. As BNDES officials have added new local content rules for solar, photovoltaic manufacturing could follow a similar path in Brazil.

Close to the other end of this policy continuum is second place finisher Chile, which imposes no tariffs on imported clean energy equipment and does not have an extensive local manufacturing chain, despite strong clean energy capacity growth in recent years. However, Chile does have a complete network of service providers and this allowed it to secure second place on this parameter. Argentina ranked third on the parameter, primarily thanks to a legacy network of manufacturers and service providers from prior years the clean energy sector had higher levels of invest-

ment. Mexico's fourth place is driven by the presence of local manufacturing facilities for wind and solar equipment. Mexico now has the largest photovoltaic module assembly installed capacity in LAC.

Peru came fifth thanks to the presence of project developers and engineering firms for the existing projects in the country and service providers.

Haiti was the only country in LAC evaluated under the "off-grid focus" methodology. As a result, it was assessed on the basis of its value chain of distributed clean energy service providers. *Climatescope* researchers determined there to be at least one company operating in the following distributed energy value chain segments in Haiti: providers of small solar lighting devices, solar mini energy systems, small hydro mini energy systems, and efficient cookstoves. In addition, all distributed energy service provider categories evaluated by *Climatescope* were found to present in Haiti, from specialized retailers to services for pay-as-you-go (PAYG) technology.

### LATIN AMERICA AND CARIBBEAN SOLAR AND WIND VALUE CHAIN

	SOLAR								WIND								
	Project Development	Engineering	O&M	Polysilicon/ingots	Wafers	Cells	Modules	Inverters	Balance of Plant	Project Development	Engineering	O&M	Turbines	Blades	Gearboxes	Towers	Balance of Plant
Brazil	●	●	●				●	●	●	●	●	●	●	●	●	●	●
Mexico	●					●	●	●	●	●			●		●		
Caribbean	●	●								●	●	●					
Central America	●	●								●	●	●					
South America	●	●	●							●	●	●					

Source: Bloomberg New Energy Finance

### GREENHOUSE GAS MANAGEMENT ACTIVITIES PARAMETER IV

Greenhouse Gas Management Activities Parameter IV takes into account carbon offset project activity, level of policy support for carbon emissions reduction, and local corporate awareness of carbon issues through a total of 13 indicators. In the 2014 *Climatescope* edition, the weight of Parameter IV as it counts toward a country's overall score was reduced to 15% from 20% in the past two years of the survey. For more details, please refer to the Methodology section.

The countries that scored relatively high on this parameter have made advances in all three categories assessed by the report. Chile had the highest overall parameter score due to high marks on GHG offset projects relative to total emissions and progress with Nationally Appropriate Mitigation Action (NAMA) programs. Brazil and Mexico followed in second and third place due to their national emissions reduction targets and high corporate-level commitment to emissions reduction and energy efficiency activity. Colombia and Uruguay also received relatively strong marks



for their GHG offset projects and advances with NAMAs finishing in fourth and fifth on this parameter, respectively.

The largest emitters in LAC are Mexico with 444m tons of CO2 emitted in 2010 (the latest year for which World Bank data is available), followed by Brazil with 420m tons and Venezuela with 202m tons. Still, these nations' shares of total emissions are a far cry from those of Asia's largest emitters, China and India. Mexico and Brazil's combined annual emissions represent just 8% of the sum of China and India's. A major contributing factor: Mexico and Brazil have considerably cleaner power generating fleets than China and India which rely heavily on fossil fuels for power generation.

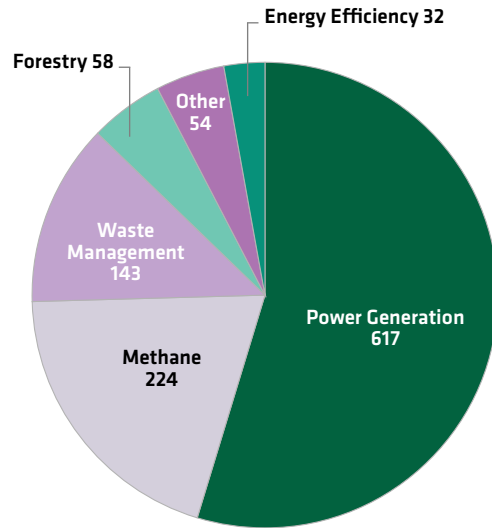
LAC Climatescope countries continue to make advances on emissions reduction activities. All 26 nations are signatories to the Kyoto Protocol and eight have explicit reduction targets on their books – up from five in 2012. Among the most ambitious countries is Costa Rica, which aims to become carbon neutral by 2021. While Costa Rica's power matrix already sources 78% of its 2.7GW installed capacity from low-emission sources (including large hydro), it still will be challenging to achieve the target. Mexico and Chile have approved carbon taxes, which create a cost for coal power generation.

In LAC, there are a total of 1,128 GHG emission reduction projects registered under three standards: Clean Development Mechanism (CDM), Verified Carbon Standard (VCS) and Gold Standard. The UNFCCC's CDM hosts most of the projects, with 85% of the total registered under this standard. Most projects in Latin America are power generation and methane projects.

Countries that scored highest on the corporate awareness indicators are usually the larger economies in the region, as they are home to several multinational companies.

## LATIN AMERICA AND CARIBBEAN GHG OFFSET PROJECTS BY SECTOR

1128 GHG projects



Source: UNEP Risoe, Bloomberg New Energy Finance