

PARAMETERS SUMMARY

An astronaut aboard the International Space Station took this photograph of the strange rounded shapes along the coastline of Zambia's Chilubi Island. The light-toned sand island stands out from the dark waters of Lake Bangweulu.

PARAMETER OVERVIEW

Climatescope's primary goal is to present the public with an almanac of clean energy investment and deployment facts on 55 of the world's most important developing nations, along with 25 Indian states and Chinese provinces. To that end, it takes into account four over-riding parameters, 54 data indicators, and 199 sub-indicators. In all, over 15,000 individual pieces of data were collected over a six-month period that included in-person visits to three quarters of the countries, states and provinces by the Bloomberg New Energy Finance team.

It is the authors' hope that this collection of potentially useful data be put to good use by investors, project developers, equipment makers, academics, policy-makers and others and that www.global-climatescope.org becomes an essential tool for conducting meaningful research.

These data also allow us to draw larger conclusions about activities in these nations and emerging markets more broadly, given that the *Climatescope* countries represent such a large percentage of non-OECD nations overall. Here, we examine some of the higher level trends we see in this year's *Climatescope*.

A clear shift from north to south

2014 brought further proof that clean energy activity is shifting inexorably from "north" to "south", from developed to developing countries. Along those lines, several important milestones were cleared in 2014.

New investment in renewable power generation in 2014 increased significantly in the 55 countries to hit a record annual high of \$126bn – up \$35.5bn, or 39%, from 2013 levels. For the first time, over half of all new annual investment into clean

energy power generating projects globally went toward projects in emerging markets.

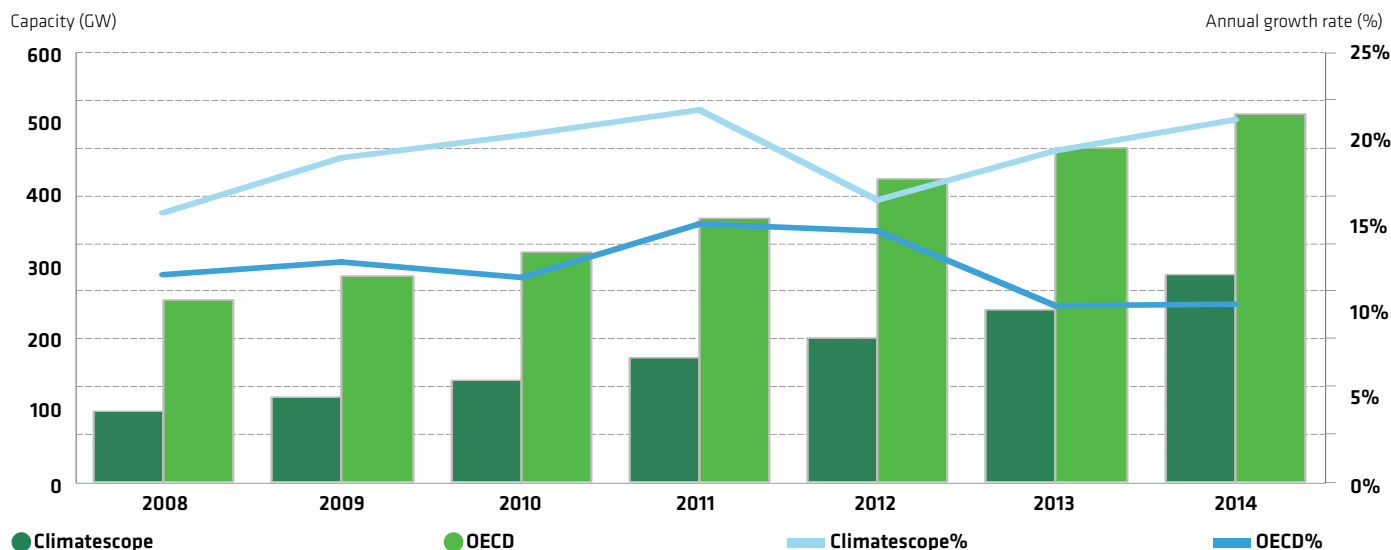
This significant flow of new capital is worth noting within the context of the UN-sponsored climate negotiations scheduled for December 2015 in Paris. Among other topics expected to be on the table at that critical conference: the potential for wealthier nations to invest more in lesser developed countries to help the latter mitigate and adapt to the effects of climate change.

The figure most commonly discussed on the international stage is \$100bn to flow annually from north to south. The *Climatescope* data suggest that more total capital than that moved into clean energy projects alone in these countries in 2014. (*Climatescope* does not seek to quantify investment in other forms of sustainable infrastructure in emerging markets.)

It is notable that the majority of the \$126bn invested in *Climatescope* countries did not emanate from OECD countries. Rather, it was south-south investment within the 55 nations that accounted for \$79bn of the total, with the balance (\$47bn) represented by north-south flows.

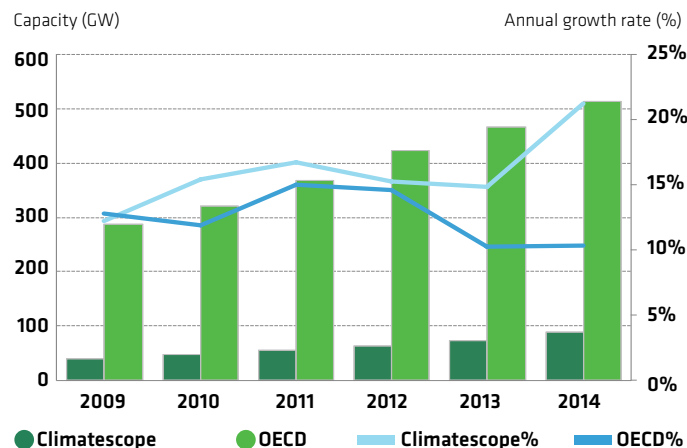
The shift toward emerging economies can also be seen in terms of where clean energy power generating capacity is being built. A total of 50.4 gigawatts (GW) of new clean capacity was commissioned in *Climatescope* countries, marking a 21% uptick from the prior year. For the first time, annual clean energy capacity deployed in emerging markets topped that in wealthier OECD nations. Moreover, on a percentage basis, clean energy capacity is growing twice as quickly in *Climatescope* nations compared to in the OECD.

Non-large hydro clean energy cumulative capacity (GW) and annual growth rate (%) in Climatescope countries vs OECD nations, 2008 - 2014



Source: Bloomberg New Energy Finance

Total cumulative power generating capacity (GW) and annual growth rate (%) in *Climatescope* countries vs OECD nations, 2009 - 2014



Source: Bloomberg New Energy Finance

Large hydro continues to play a vital role in supplying power in emerging and developing economies, particularly in Latin America and China. *Climatescope* does not include large hydro projects in its accounting for clean energy as the goal is to focus on technologies that can be deployed more rapidly and have near immediate impact.

When large hydro is included in the overall figures, however, *Climatescope* nations have nearly as much clean generation capacity on line as OECD countries: 777GW compared to 790GW as of year-end 2014. Again, the rate of growth of low carbon energy (inclusive of large hydro) is twice as fast in *Climatescope* countries as in the OECD. When other non-OECD countries (not included in *Climatescope*) are also included, total clean energy capacity including large hydro in these emerging and developing nations exceeds that in OECD countries.

The importance of China

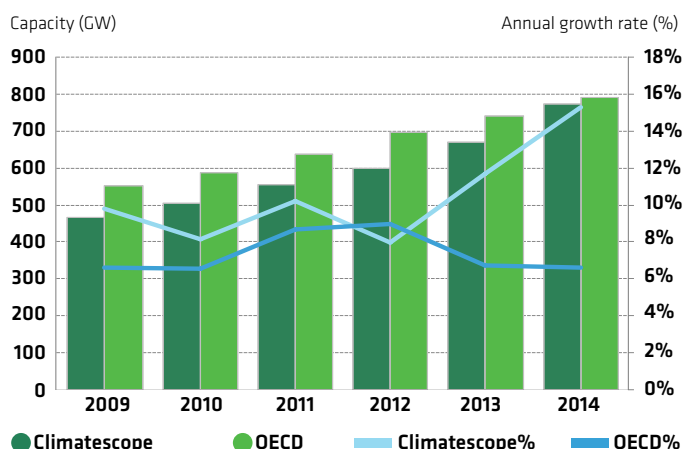
China continues to play a critical role in clean energy's evolution, not just in emerging markets but in all countries. The nation added 35GW of new renewable power generating capacity all on its own – more than all capacity online today in sub-Saharan Africa's 49 nations combined, excluding South Africa and Nigeria¹ – and attracted \$89bn in all types of new clean energy capital.

Subtracting out China's impact, however, *Climatescope*'s other 54 nations achieved important progress in 2014. On a percentage basis, the growth rate for cumulative clean energy installed in these countries spiked to 21.2%, again more than twice the rate of growth seen in OECD countries. In all, the non-China *Climatescope* nations added 15.5GW of new capacity in 2014 compared to 9.4GW installed the year prior – a 64% jump.

1. Sub-Saharan Africa's total power generating capacity amounted to around 87GW in 2014, of which South Africa accounts for 45GW and Nigeria 11GW.

China now appears on track for another very strong year in 2015. Through the first six months of the year, it had deployed an additional 20GW. However, today a considerable amount of clean power produced in China never reaches its destination due to transmission constraints. Through the first half of 2015, 9.5% of all Chinese output from solar projects was "curtailed" due to such bottlenecks. Officials are seeking to address this through new "green dispatch" rules that mandate that clean energy generated gets used by end consumers, but considerable work remains to nationalize this policy.

Clean energy (including large hydro) cumulative capacity (GW) and annual growth rate (%) in *Climatescope* countries vs OECD nations, 2009 - 2014



Source: Bloomberg New Energy Finance

Cost competitiveness for renewables

An estimated 1.3bn people lack acceptable access to energy worldwide. Among some in the development community, the debate over renewables' ability to address this challenge continues; critics insist only fossil sources of generation are inexpensive enough to be cost-competitive in such a context.

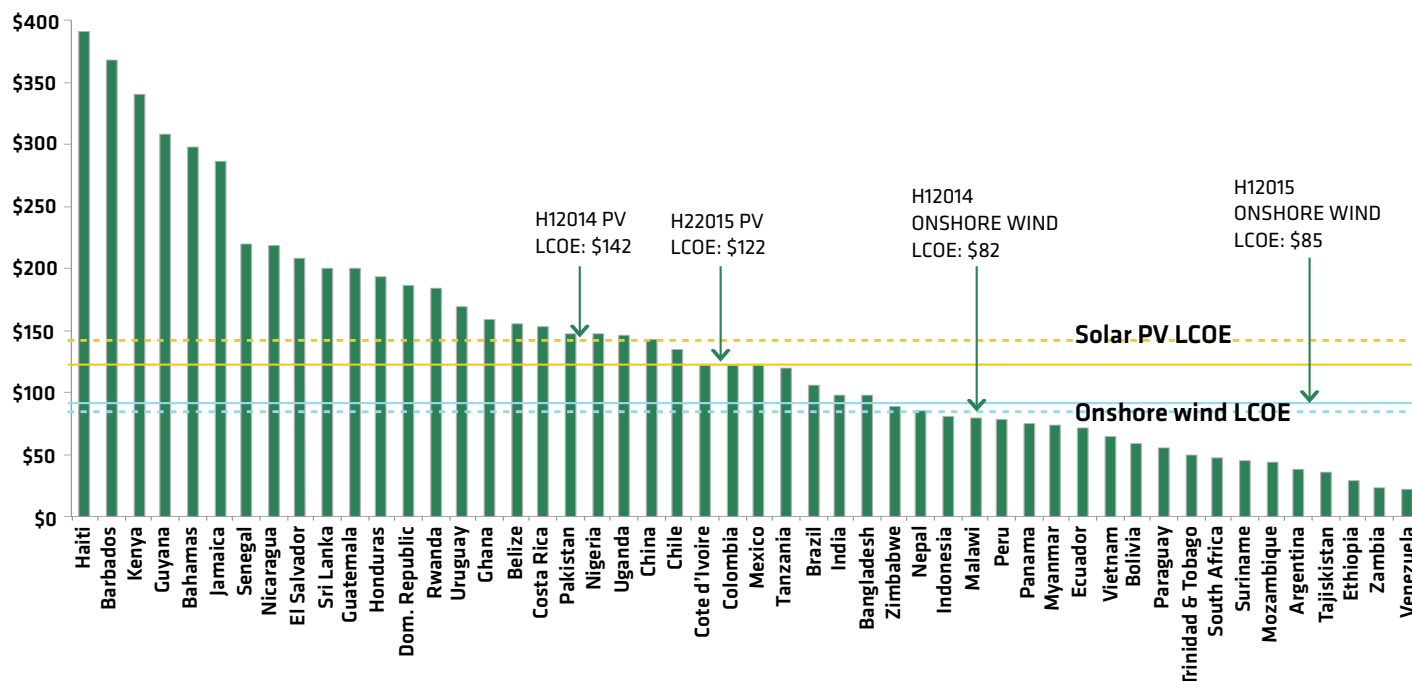
The first global edition of *Climatescope*, released in 2014, illustrated how exorbitantly high electricity prices for businesses and consumers in these nations make renewable generation there more cost competitive. This year's study not only confirmed this but suggested renewables are making further progress.

Industrial power prices remained stubbornly high in many of the 55 *Climatescope* nations in 2014 even as the "levelized cost of electricity" as calculated by Bloomberg New Energy Finance ticked down 15% year-on-year.² Wind prices have stayed roughly level, but the technology is already price competitive in many emerging markets.

Looking ahead, there is an open question about whether renewables can continue to achieve such progress on costs. The

2. BNEF H2 2015 central case PV LCOE compared to the H2 2014 one. The central case assumes a 17% DC capacity factor, 10% cost of equity, 2% inflation rate, taxes at 35% and straight line depreciation, with global benchmark capex and opex inputs.

Industrial power prices vs levelized cost of electricity for onshore wind and solar, 2014/2015 (\$/MWh)



Source: Bloomberg New Energy Finance

last quarter of 2014 saw a precipitous drop in crude oil prices. While the impact of that decline on power prices was not evident in the annual average figures collected by Bloomberg New Energy Finance, oil has continued to trade in a lower band in 2015. A number of *Climatescope* nations, particularly those in the Caribbean and parts of Africa, are disproportionately reliant on diesel and heavy oil power generation. If lower oil prices produce lower electricity prices, renewables could be impacted.

Clean energy growth despite macroeconomic wind shifts

What makes the progress achieved in 2014 all the more notable is that it took place as a number of countries saw economic growth begin to cool. Average gross domestic product growth across *Climatescope* nations slipped to 5.7% in 2014 from 6.4% in 2013 and the slow-down was most acute in several of the largest nations in the survey. Brazil's GDP growth slid from 2.8% in 2013 to just 0.1% in 2014. South Africa's slipped from 2.2% to 1.5%. Meanwhile, China's fell from 7.4% to 7.1%, according to its official government statistics.

What might explain this contrast between exceptional clean energy growth and somewhat less exceptional macroeconomic growth? First, there is potential issue of timing. In a number of countries, the economic deceleration began toward the second half of 2014. Thus any potential negative impact on clean energy build may have been muted. Instead, the downturn may be felt later. A second, somewhat more optimistic view is that clean energy development is simply becoming a fundamental part of how these countries develop and add new capacity to meet local power demand.

Since the turn of the year into 2015, the economic outlook for Brazil, China, South Africa, and other key *Climatescope* markets has become even more negative. Time will tell if these new, more challenging conditions will put a crimp on further growth for clean energy – or if renewables remain resilient in the face of these new headwinds.

THE CLIMATESCOPE SCORES

As in the first global *Climatescope* released a year ago, this year's country-level results portray nations rapidly advancing along the path toward embracing clean energy development – but with considerable distance yet to travel. The survey scored nations, Chinese provinces and Indian states on a 0-5 basis, taking into account 54 underlying indicators. This year, the average score across all countries came to 1.14. While this certainly represents progress compared to last year's average score of 1.11, it is again indicative of how much additional work remains to be done. While 27 nations saw their overall scores improve year-on-year, 28 saw theirs decline.

Among the best scorers, there was consistency from last year's *Climatescope* with the same nations finishing in the top five, but in a slightly different order. Once again, China scored highest overall with 2.29. Brazil again was second on the list, but did see its score dip slightly. Chile, South Africa, and India rounded out the top five.

On a regional basis, the 10 Asian nations achieved the highest overall average score of 1.40 and were clearly boosted by China's high score as well as India's strong performance. The 26 nations in Latin America and the Caribbean achieved an average score of 1.09 while those in Africa scored 1.06. As discussed above, China saw another record-shattering year in terms of both investment and deployment and for the second year received the highest overall *Climatescope* score, at 2.29. The country was the top scorer on two parameters and finished no lower than eighth on any.

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Repeating its performance from last year's *Climatescope*, Brazil landed 2nd on the list but saw its overall score slip to 2.12 from 2.17. The country's lower showing was primarily due a sharp drop in its score on Enabling Framework Parameter I. This was partly due to slowing economic growth in the country.

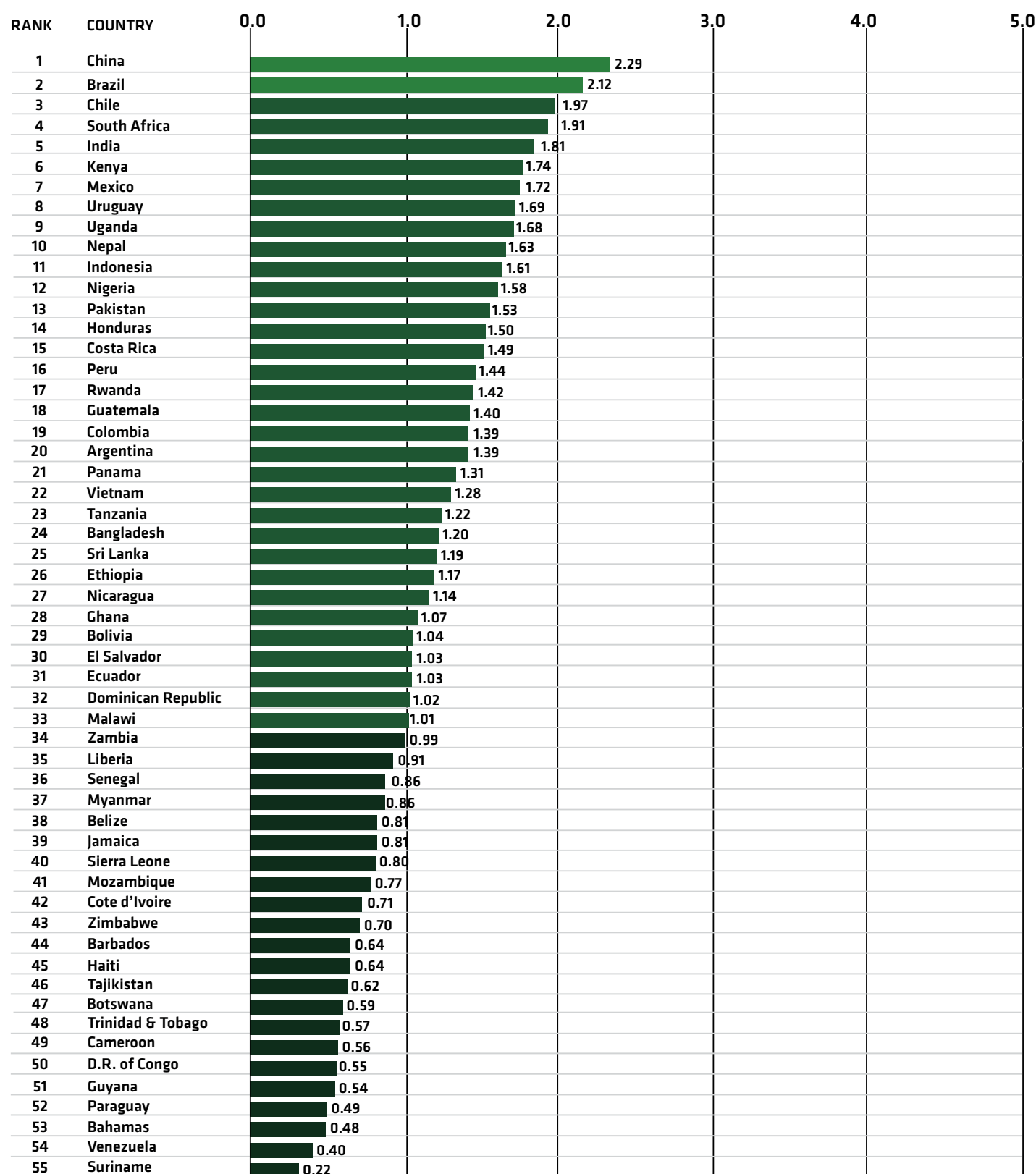
TOP 10 CLIMATESCOPE COUNTRIES

RANK	COUNTRY	SCORE	STRONGEST PARAMETER	WEAKEST PARAMETER	COMMENT
1	China	2.29	III / IV: Value Chains / Greenhouse Gas Management	I: Enabling Framework	Surging investment, new capacity, plus pilot carbon markets put China top of the table
2	Brazil	2.12	III / IV: Value Chains / GHG Management	II: Investment	Continued growth, despite a cooling economy and diminished credit availability
3	Chile	1.97	IV: GHG Management	III: Value Chains	Latin America's solar leader with 12% of all 2014 generation from renewables
4	South Africa	1.91	III: Value Chains	I / IV: Enabling Framework / GHG Management	Continued growth in capacity and investment thanks to power contract tenders
5	India	1.81	III: Value chains	II: Investment	New policy ambitions from the Modi government signal clean energy opportunities ahead
6	Kenya	1.74	I: Enabling Framework	IV: GHG Management	Early mover for policy and investment in Africa, especially for geothermal
7	Mexico	1.72	III / IV: Value Chains / GHG Management	I: Enabling Framework	Energy reforms underway promise opportunities for renewables
8	Uruguay	1.69	I: Enabling Framework	III: Value Chains	Strong clean energy deployment follow strong investment in 2013
9	Uganda	1.68	I / III: Enabling Framework / Value Chains	II: Investment	Innovative feed-in tariff/auction program plus comparatively developed value chains
10	Nepal	1.63	II: Investment	IV: GHG Management	National goals for new hydro development plus a new solar financing

Source: Bloomberg New Energy Finance

2015 Global Climatescope scores

Overall ranking top 55



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

Chile saw its ranking rise one slot year-on-year to third with a score of 1.97, up from 1.79 due to a major jump in its Parameter I score. South Africa sank one slot to fourth but saw its overall score stay approximately level at 1.91. Finally, India rounded out the top five with a score of 1.81.

ENABLING FRAMEWORK PARAMETER I

ClimateScope's 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. Parameter I took into account a wide variety of indicators to compile a final score. This ranged from the macro in the form of overall policy scores for a country's clean energy policy regime, to the micro in the form of kerosene or diesel prices for lesser developed nations. Parameter I contributed 40% toward each nation's overall score. (For more on how this parameter and other were scores, please see the complete *ClimateScope* methodology.)

The average Enabling Framework score across all 55 nations for this year's *ClimateScope* rose to 1.15 from 1.09 in the prior year, indicating that fundamental market and policy conditions across these countries have improved. Still, given that the maximum score is 5.0, substantial work remains to be improve frameworks in these emerging markets.

A key input into Parameter I is the Clean Energy Policies indicator, the one indicator in the entire *ClimateScope* that relies on a degree of qualitative input from 78 outside policy experts globally surveyed by Bloomberg New Energy Finance. The average clean energy policy score achieved across all *ClimateScope* nations rose to 1.25 in this year's study, up from 1.11 last year, suggesting steady progress overall. Thirty countries saw their scores rise on this indicator while 15 saw their decline (10 countries achieved the same score year to year).

PARAMETER I, TOP 5 COUNTRIES

RANK	COUNTRY	SCORE	REASON
1	Uruguay	2.04	Successful reverse auctions for wind power supply contracts have spurred substantial new build
2	Rwanda	2.01	Aiming for 70% clean energy by June 2018 with feed-in tariffs, other incentives
3	Brazil	1.98	Auctions for power contracts continue to offer clean energy opportunities despite economic slowdown
4	Chile	1.81	20% by 2025 renewables target plus exemption from transmission tax
5	Kenya	1.75	Extensive policy framework, also covering energy access, but continued high fuel prices

Among the top five Enabling Framework scoring nations, three are in Latin America with two others in Africa. Uruguay tops the list after seeing a sharp increase in the level of clean energy generation in the country in 2014 and scoring quite well on the Clean Energy Policies indicator. Among South America's smallest nations by population, Uruguay added 469MW of wind and solar in 2013. That, in turn, boosted the country's low-carbon generation figures in 2014 as those projects logged a full year of service. The country appears poised for another strong year in 2015 thanks to another 902MW of renewable capacity being commissioned in 2014.

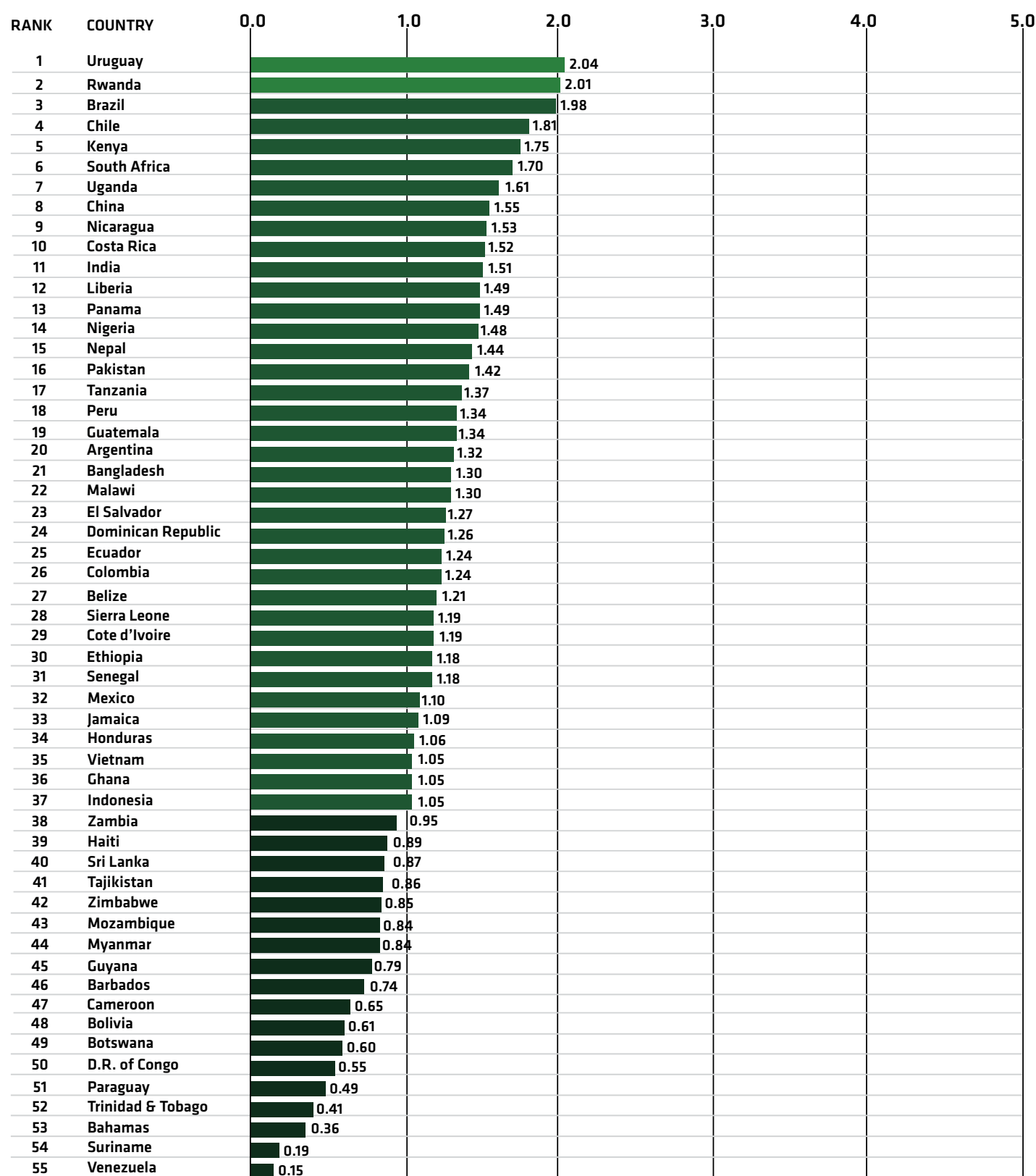
Rwanda continues to be one of Africa's success stories thanks to its ambitious efforts to add 563MW of new clean capacity and achieve energy access for 70% of its citizens by June 2018. The country now boasts sub-Saharan Africa's largest PV project outside South Africa, albeit at 8.5MW, while seeking to foster mini-grid development and pushing for utility reform. Renewables already supply most of the country's power, with 57% small hydro and 6% solar; the rest is mostly diesel, suggesting further potential opportunities.

Brazil scored well on the Enabling Framework parameter, but not entirely for reasons its citizens would cheer. The country fared decently for its clean energy policy regime and for its level of biofuels production (the country is 2nd only to the US on that count). However, its score on this parameter was also boosted by a surge in local power prices in 2014 thanks to a drought that depressed large hydro power generation. Such prices make new clean energy development a more attractive proposition for developers and thus bolstered the country's *ClimateScope* score.

Power prices, both at the industrial/wholesale and residential level, remained stubbornly high in most *ClimateScope* nations in 2014, despite a precipitous decline in oil prices during the last quarter of the year. Crude prices have remained low into 2015 and the impact of that change may well be seen in next year's *ClimateScope* survey of power prices.

2015 Global Climatescope scores

Parameter I 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

It should be noted that most of the nations that finished near the bottom of the Enabling Framework in the previous edition of *Climatescope* remained there once again this year. Still, there were some notable exceptions. Tajikistan, for instance, moved from 52nd on the overall Enabling Framework list to 41st. This was primarily due to the fact that the country growth rate of installed clean energy capacity and generation both rose year-on-year.

CLEAN ENERGY INVESTMENT & CLIMATE FINANCING PARAMETER II

Climatescope's Clean Energy Investment & Climate Financing Parameter II encapsulates 14 data indicators. It 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. Parameter II contributed 30% toward each nation's overall score.

As discussed above, the *Climatescope* countries collectively had an exceptional year in generating new clean energy investment. In fact, the majority of new capital invested in zero-carbon energy projects worldwide in 2014 went toward non-OECD countries.

Still, among the individual *Climatescope* nations there is substantial variation between those countries where investors are clearly active and interested and those where they are not. From 2010-14, one half the countries attracted \$478bn in new capital for clean energy projects while the other saw just \$1.5bn. This comparison is warped somewhat by the massive contributions of China which on its own attracted \$303bn over that time. Still, the gap between the "haves" and "have nots" is wide; 10 nations on the list have between them seen virtually no investment in large-scale projects at all in five years.

Among the top five scorers, there were some rather intriguing results. Four of *Climatescope*'s smaller nations – Honduras,

Bolivia, Nepal, and Guatemala (in that order) – attained the strongest scores, followed by the largest country, China, in fifth.

It is important to note that several key indicators used to calculate the Parameter II score are "levelized" against a country's gross domestic product. That is, the methodology seeks to take into account and then discount the fact that some nations attract larger volumes of capital simply because they are bigger.

In 2014, Honduras benefited from a notably strong performance on the Growth Rate of Clean Energy Investments Indicator, which accounts for 22.5% of a country's overall Parameter II score (and 6.75% of a country's overall *Climatescope* score). Total clean energy capital deployed there in 2014 was \$823m and has totalled over \$1.4bn since the start of 2010. The country also registered sharp improvement on the Local Investments indicator.

As of the start of the second half of 2015, Honduras has the second most solar capacity installed of any country in Latin America, suggesting it is on track to fare well again in next year's *Climatescope*. Foreign developers such as SunEdison and foreign financiers such as the Netherlands Development Finance Company and others have been active there, but local investment activity has been strong as well.

Bolivia has traditionally seen little zero-carbon energy investment but in 2014, the country fared quite well on Parameter II. In all, \$40.6m was invested in 2014. While this is not a tremendous amount, it produced an exceptionally strong rate of growth compared to historic activity and Bolivia's score was bolstered as a result.

For its part, China was far and away the worldwide leader in attracting new capital for clean energy capital for projects in 2014 and has attracted \$304bn in such investment since the start

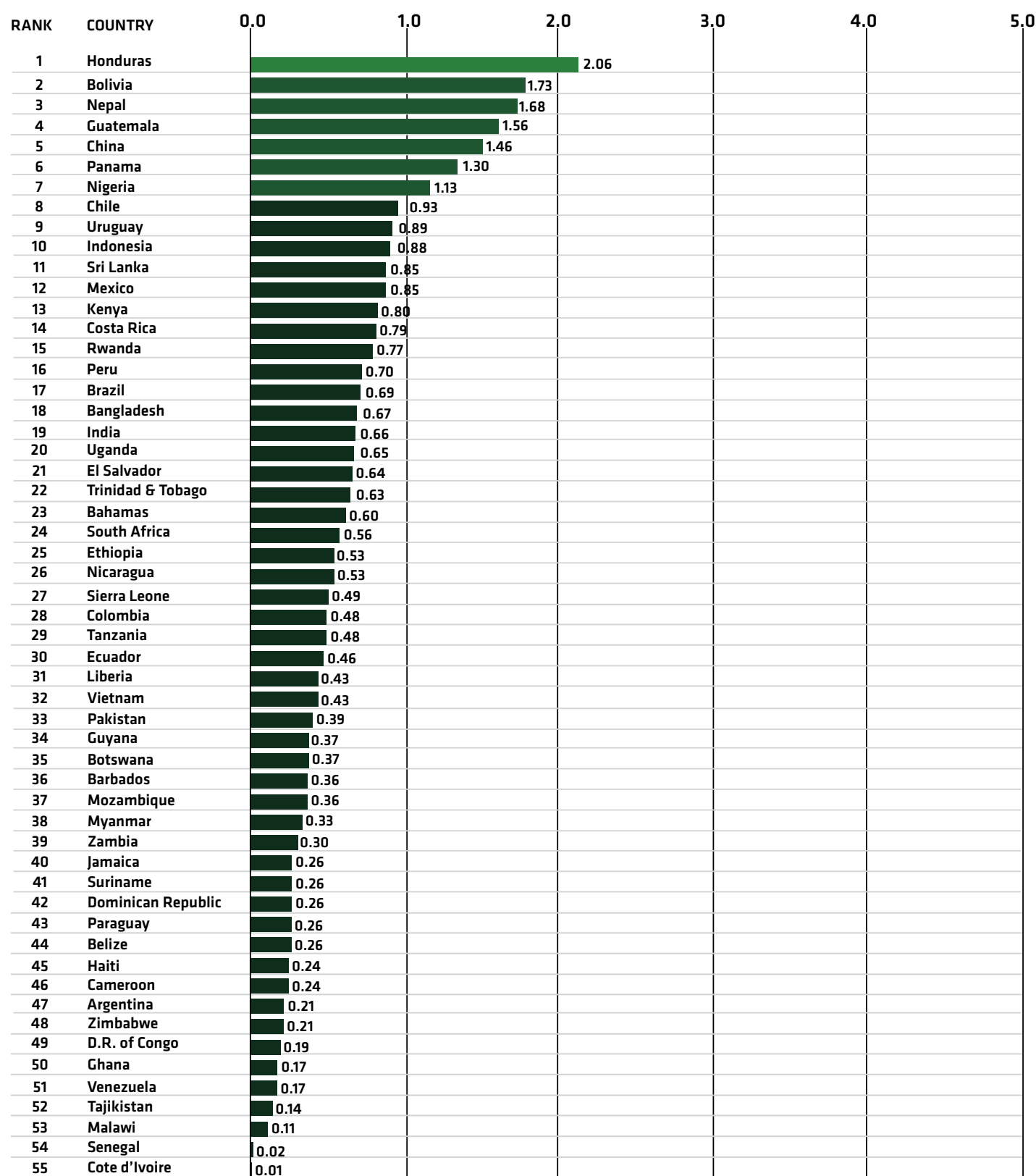
PARAMETER II, TOP 5 COUNTRIES

RANK	COUNTRY	SCORE	REASON
1	Honduras	2.06	Surge in 2014 capital raised (\$823m) boosted country's investment growth rate
2	Bolivia	1.73	Two project financings in 2014 bolstered growth off of low base
3	Nepal	1.68	Comparatively strong availability of local grants and grant programs
4	Guatemala	1.56	A new investment high in 2014 with \$700m into eight new projects
5	China	1.46	The world leader in investment, far and away with \$304bn deployed since 2010

Source: Bloomberg New Energy Finance

2015 Global Climatescope scores

Parameter II 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

of 2010. Even levelized against China's massive \$11tr GDP, this allowed the country to score in the top five on Parameter II. Taking into account all forms of clean energy investment, the country saw \$89bn deployed in 2014 – a record for any country ever as tracked by Bloomberg New Energy Finance.

LOW-CARBON BUSINESS AND CLEAN ENERGY VALUE CHAINS PARAMETER III

Low-Carbon Business and Clean Energy Value Chains Parameter III employed three indicators to measure the availability of local manufacturing and other similar types of capacity to spur clean energy deployment. These seek to take into account the availability of local manufacturers to provide the equipment needed to construct projects, local financial firms to provide capital, and local service firms to provide assistance such as legal or other services. For lesser developed nations, this parameter used the augmented off-grid focus methodology to take into account the availability of technical assistance and service providers in value chains specifically related to distributed clean energy. In all, *Climatescope* sought to account for no less than 63 segments of these value chains. In the case of nations deemed sufficiently "off-grid", a total of 78 value chain segments were assessed. Parameter III contributed 15% toward each nation's overall score.

It is important to note that Parameter III measures where certain value chain segments are present. It does not take into account the volume of actual output occurring locally.

Expanding manufacturing chains can be a slow and laborious process. Thus it could come as relatively little surprise that

Climatescope tracked only an incremental change in the value chain segments present in the 55 countries from 2013-2014. Overall, the average score among all nations on Parameter III moved to 1.96 in the latest survey from 1.95 the year prior.

Among the four *Climatescope* parameters, Parameter III saw the widest gap between the highest and lowest scorer. This is because to a large degree, scoring is impacted by a country's size. Larger nations tend to have larger volumes installed and this, in turn, makes the market more demanding of locally-made goods. This demand can be driven by economics as, for instance, it can be far less costly to procure multi-ton wind turbine in-country than from overseas. Or it can be driven by policy through so-called domestic-content rules that simply mandate or incentivize local projects to use locally-made equipment.

The same countries that achieved the highest Parameter III scores in the 2014 edition of *Climatescope* have returned. China has once again achieved a "perfect" score of 5.0 due to the fact that the country is home to manufacturers in every one of the 63 segments surveyed across each of the sectors (wind, solar, biomass & waste, biofuels, geothermal, and small hydro).

Not reflected in these scores is the growth seen in certain countries in terms of number of plants operating in certain manufacturing sub-segments and overall growth. For instance, India had a PV cell manufacturing plant on line as early as 1999 but commissioned at least four more in 2014. India has had a domestic-content rule that has compelled project developers to use locally-made equipment. This has accelerated local growth in manufacturing while raising complaints from overseas suppliers.

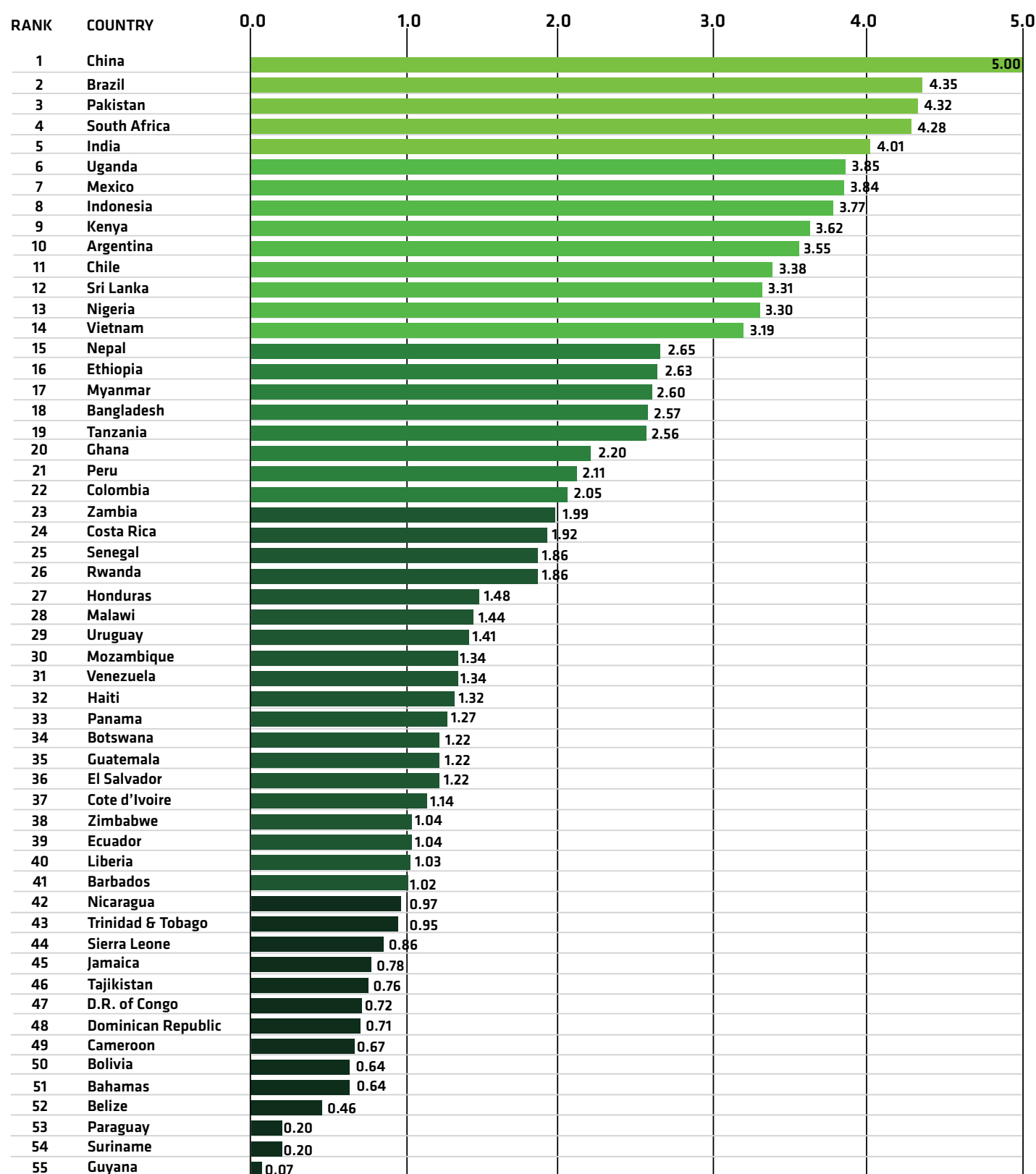
PARAMETER III, TOP FINISHERS

RANK	COUNTRY	SCORE	REASON
1	China	5.00	Home to every value chain segment assessed for Climatescope
2	Brazil	4.35	Building out wind and solar manufacturing, in part so projects can meet local-content requirements
3	Pakistan	4.32	Some manufacturing segments locally in every clean energy sector except geothermal
4	South Africa	4.28	Home to more clean energy equipment manufacturing than elsewhere in sub-Saharan Africa
5	India	4.01	Growing producer of photovoltaic equipment for in-country use thanks partly to domestic content rules

Source: Bloomberg New Energy Finance

2015 Global Climatescope scores

Parameter III 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

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 indicator inputs. Parameter IV contributed 15% toward each nation's overall score.

Relevant indicators are arranged into three categories: Carbon Offsets, Carbon Policy and Corporate Awareness. The Carbon Offset category measures what countries have done to develop offset projects and measures their potential to continue into the future. It holds the greatest weight toward the overall Parameter IV score at 40%. The other two categories account for 30% apiece.

Across all 55 *Climatescope* nations, the average Parameter IV score ticked up to 1.36 from 1.34 the year prior. Once again, this suggests room for considerable improvement in

future years and hopefully these scores will rise in the wake of the UN-sponsored climate negotiations scheduled for December 2015.

The appearance of China, the world's largest CO₂ emitter, atop this table may surprise some. However, it is worth noting that *Climatescope* methodology does not measure countries' emissions or reduce their scores when these are high. Rather, it seeks to take into account efforts launched explicitly to reduce future emissions.

It is largely for this reason that China fares well and scored highly in the prior edition of *Climatescope* (3rd last year). The country has been credited for establishing province-level cap-and-trade programs and registries for counting emissions. In November 2014, China declared for the first time its plan to curb overall CO₂ emissions growth by the end of the next decade.

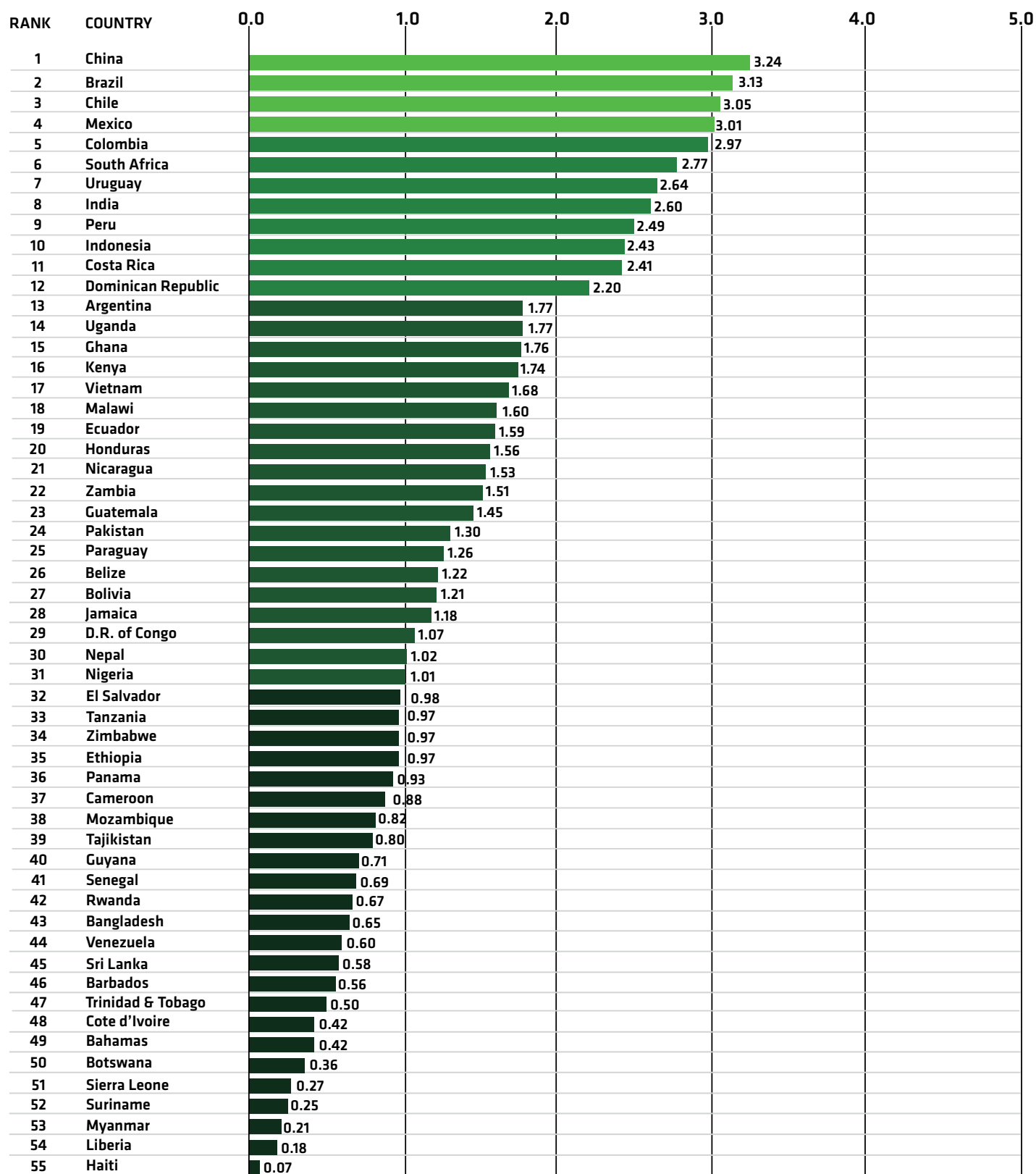
PARAMETER IV, TOP FINISHERS

RANK	COUNTRY	SCORE	REASON
1	China	3.24	World's largest CO ₂ emitter scored well due to registries and reduction targets, plus provincial cap-and-trade
2	Brazil	3.13	Has 423 offset projects registered and a comparatively large number of corporates with GHG efforts
3	Chile	3.05	Has 121 offset projects registered internationally
4	Mexico	3.01	National GHG reduction target seeks 30% cuts by 2020 and 50% by 2050
5	Colombia	2.97	Member of the Partnership for Market Readiness with 72 offset projects under development

Source: Bloomberg New Energy Finance

2015 Global Climatescope scores

Parameter IV 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