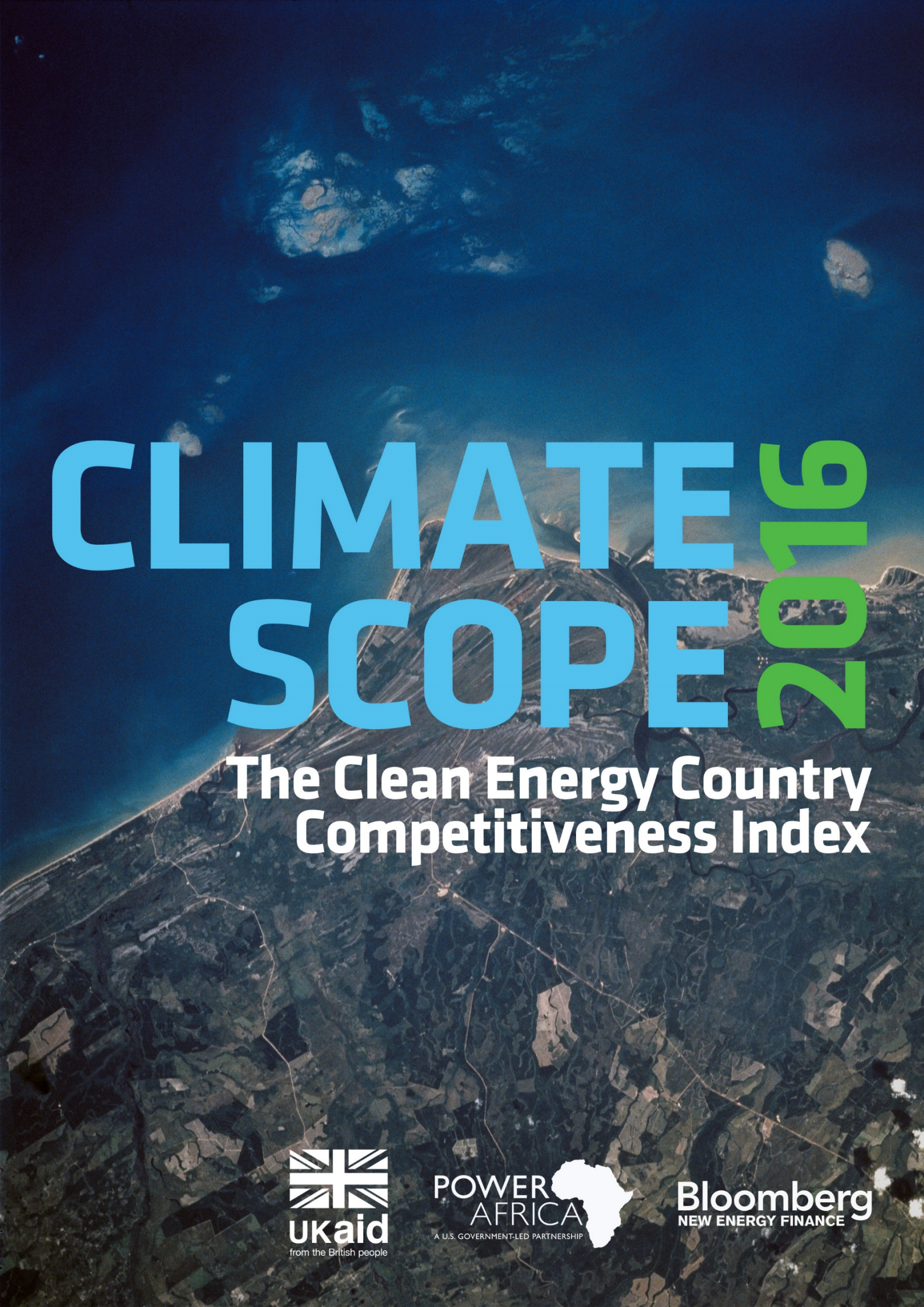

CLIMATE SCOPE 2016

The Clean Energy Country Competitiveness Index

UKaid
from the British people

POWER AFRICA
A U.S. GOVERNMENT-LED PARTNERSHIP

Bloomberg
NEW ENERGY FINANCE

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SECTION 1. EXECUTIVE SUMMARY

Welcome to Climatescope, an assessment of clean energy market conditions and opportunities in 58 emerging nations in South America, Africa, the Mideast, and Asia. This third global release of the project takes into account the extraordinary 12 months of clean energy investment, construction, and policy-making of 2015. It also contextualizes that progress against activity in other, wealthier nations. As in years past, Climatescope scores countries based on their levels of activity and the environments they create to attract further clean energy investment.

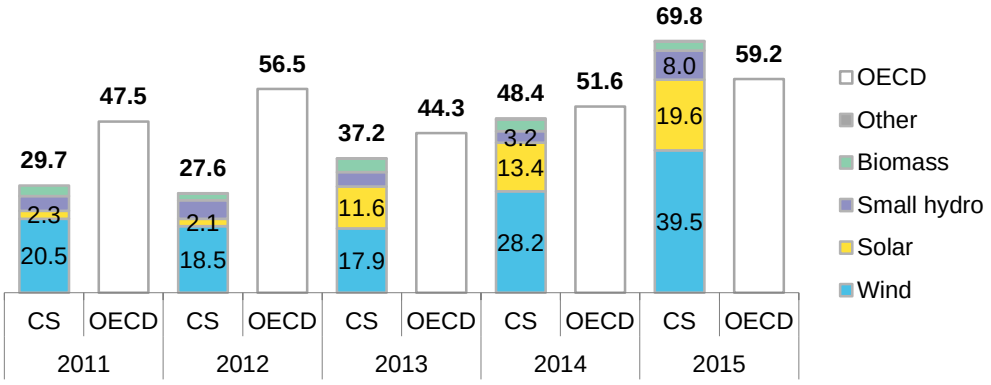
- **The center of the clean energy universe has now shifted decisively from "north" to "south".** Compared to wealthier Organisation for Economic Co-operation and Development (OECD) countries, the Climatescope nations in 2015 cumulatively attracted more investment ($154.1bn vs. $153.7bn) and saw far more clean energy capacity build (69.8GW vs. 59.2GW). China was a large part of this, but lesser developed nations also played a role. Year-on-year, investment growth and deployment growth rates were also far higher in Climatescope nations than in OECD countries.
- **Steep solar equipment cost declines are catalyzing build and driving growth.** Investment in utility-scale solar in Climatescope nations spiked 43% from 2014 to $71.8bn in 2015. Total clean energy investment in Climatescope countries rose $24.8bn with solar accounting for nearly all of that. Photovoltaic (PV) costs are essentially on par with wind and, as recent tenders for power contracts have demonstrated, PV can now out-compete fossil-fuelled projects on price.
- **Equipment cost declines, most notably for solar, along with innovative business and financing models are revolutionizing how energy access issues are being addressed in least developed nations.** No less than 1.2bn people continue to lack sufficient access to energy, but conventional hub-and-spoke responses to this problem are being challenged by a slew of new players focused on "off-grid" or "mini-grid" solutions. Many are privately-funded start-ups who between them had raised over $450m cumulatively through 2015.
- **Spurred by the Paris global climate pact, an unprecedented four out of five Climatescope nations now have national clean energy targets while three in four have set CO2 emissions reduction goals.** That's up from 58% and 22%, respectively in 2014. The UN-organized climate talks galvanized countries to act. However, many now lack specific policy mechanisms to achieve their goals.
- **Wealthier nations are accelerating their funding for clean energy in emerging markets.** Private investors, lenders, and development finance institutions in OECD countries accounted for nearly half of all capital to Climatescope countries (excluding China, where virtually all capital was provided locally). This is up from the roughly one third of capital provided in 2012.
- **Climatescope countries which have seen the highest rates of clean energy penetration are now beginning to encounter integration challenges.** In some nations, wind or solar projects have been completely built – without any associated transmission to deliver power. In others, grid operators have prioritized delivery of electrons from fossil-fuelled plants over those from renewables projects.
- **These improving conditions are reflected in the higher Climatescope scores achieved by the majority of countries surveyed.** The average score across all countries reviewed in the project rose from 1.14 to 1.35 (on a 0-5 scale) while the number of countries scoring above 2 jumped from two to 10. China once again topped the list of all countries. Chile, Honduras, Kenya, Mexico and Uruguay are the top scorers that recorded the most improvement.

SECTION 2. KEY FINDINGS

2.1. THE CENTER OF THE CLEAN ENERGY UNIVERSE HAS SHIFTED DECISIVELY FROM "NORTH" TO "SOUTH"

Climatescope countries in 2015 set a new record for clean energy installations with 69.8GW built, up 30% from the 48.4GW added in 2014 (Figure 1). The 2015 total represents 10.6GW more than the 59.2GW of clean energy built in OECD countries, a group which includes the world's wealthiest nations.

Figure 1: Annual clean energy capacity additions in Climatescope and OECD countries (GW), 2011-2015



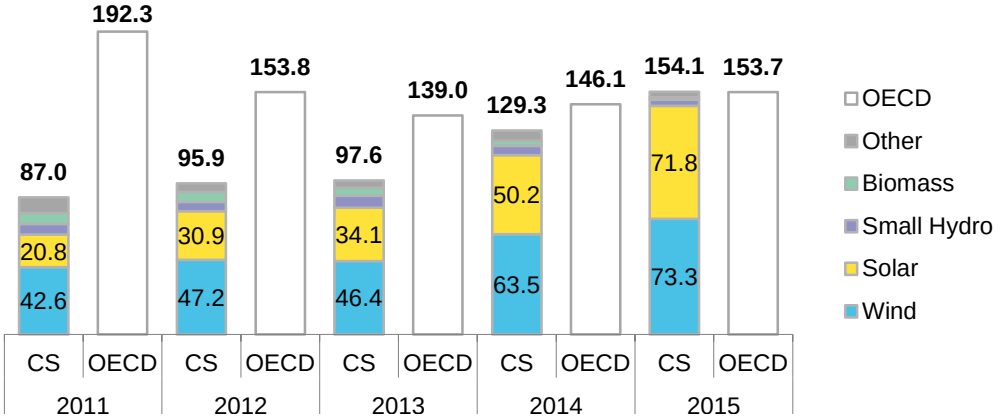
Source: Source: Climatescope 2016 Note: Climatescope and OECD countries account for more than 95% of global annual clean energy capacity additions over 2011-2015. Climatescope figures include three new Middle East and North Africa states added in Climatescope 2016. Chile and Mexico are included in both OECD and Climatescope.

Climatescope countries also for the first time nosed out OECD nations in 2015 to attract more clean energy capital (Figure 2). Investment in Climatescope countries grew 16% from 2014 to 2015 to reach $154bn. In addition, the $147bn invested into new clean energy generation in Climatescope nations in 2015 topped global investment in thermal power generation *worldwide* as recorded by the International Energy Agency.

Solar and onshore wind have historically accounted for the majority of clean energy investment globally and their shares have grown substantially in recent years. Together, these technologies accounted for 65% of new clean energy investment in 2011. By 2015, that had risen to 94%.

Solar saw the largest transformation in its role, growing from 8% of investment in 2011 to just over 46% in 2015. It is also likely to top investment in wind for the first time in 2016.

Figure 2: Annual clean energy investment in Climatescope and OECD countries ($bn), 2011-2015



Source: Climatescope 2016 Note: Climatescope and OECD countries account for more than 95% of global new clean energy investment over 2011-2015. Climatescope figures include three new MENA states added in Climatescope 2016. Projects smaller than 1MW are not included.

It should be noted that the news was not all positive from a climate perspective. In fact, 2015 was also a record for new coal capacity added with 77GW completed in Climatescope countries. China and India contributed 52GW and 19GW of this, respectively, confirming the major role these countries will play in emissions in coming years.

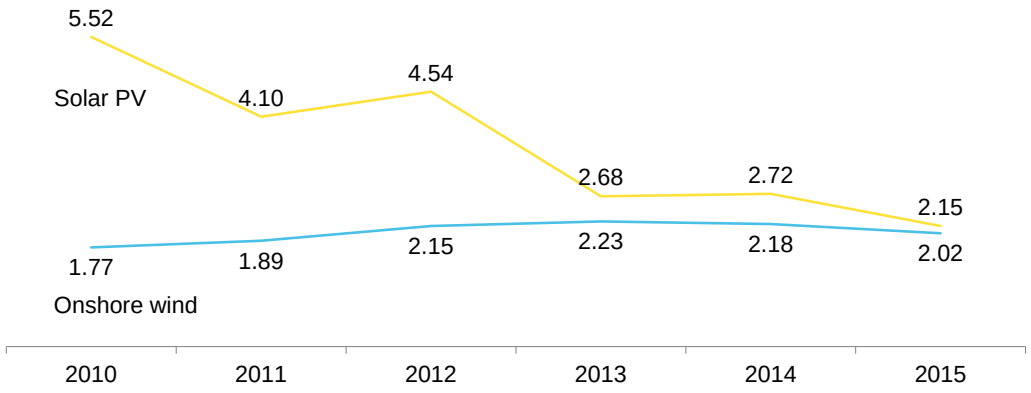
2.2. STEEP SOLAR EQUIPMENT COST DECLINES ARE CATALYZING GROWTH

PV investment in Climatescope countries has grown more than 11-fold since the turn of the decade from $6.4bn in 2010 to $71.8bn in 2015. This jump is also illustrated by installed capacity, which surged from 289MW built in 2010 to 49.3GW constructed in 2015. That latter figure is equivalent to South Africa's generation capacity today.

Among all clean energy technologies, PV has seen its costs fall fastest and furthest over the last decade. This has allowed capital expenditures (capex) for projects in Climatescope countries to drop by more than half since 2010 (Figure 3). It has also allowed PV project developers to sell their power at lower, more competitive rates.

Lower costs have opened new markets. As of year-end 2015, 38 of 58 Climatescope countries had recorded at least one investment in a utility-scale solar PV project. By comparison, just seven had seen such activity as of year-end 2010. Clean energy auctions in countries like Chile, Mexico, and South Africa have resulted in growing volumes of electricity purchased at well below $100/MWh with the lowest coming in Chile at $29.1/MWh.

Figure 3: Average disclosed capex for onshore wind and PV projects in Climatescope countries ($m/MW)



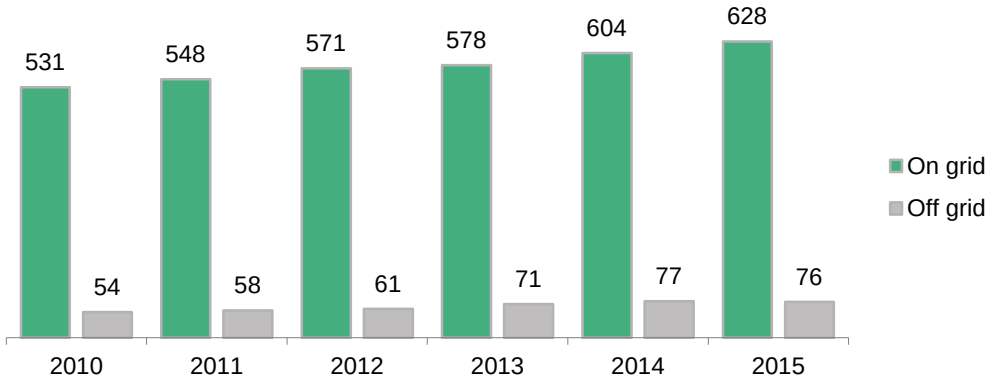
Source: Climatescope 2016

2.3. EQUIPMENT COST DECLINES, MOST NOTABLY FOR SOLAR, ALONG WITH INNOVATIVE BUSINESS AND FINANCING MODELS ARE REVOLUTIONIZING HOW ENERGY ACCESS ISSUES ARE BEING ADDRESSED

Climatescope includes 23 nations classified as “off-grid”, primarily due to their low electrification rates. The 35 others in the survey are considered “on grid” and tend to fall more into what the World Bank would consider a “middle income” category.

The gap between these groups of countries is wide when power generation capacity vs. population is compared (Figure 4). However, the dramatic drop in PV equipment and associated technology costs have sparked a slew of start-ups aiming to address the energy access conundrum from the bottom up. In some cases, these firms distribute pico-scale solar systems, in others they build mini-grids to power small communities. These efforts are, in turn, prompting a reconsideration of how to confront the massive energy access challenge and empower the 1.4bn people whose basic energy needs today remain unmet.

Figure 4: Megawatts of installed capacity per million inhabitants in Climatescope on-grid and off-grid countries, 2010-2015

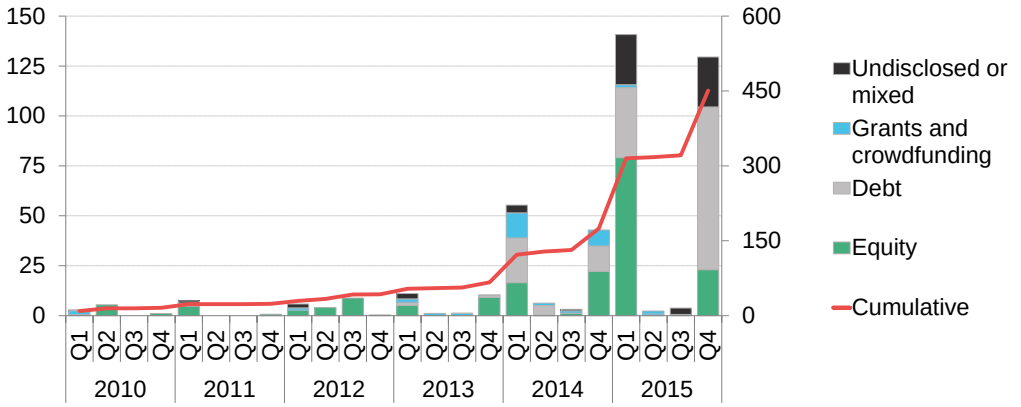


Source: Climatescope 2016

As of June 2015, just under 11m households were estimated to be equipped with pico-PV systems. Typically, these consisted of basic devices to power just a few lights and charge mobile phones. Distribution of such systems has flourished in countries with "mobile money" availability, allowing consumers to pay for their systems or for the power produced over their mobile phones.

Climatescope countries, particularly those in Eastern Africa, are home to some of the world's most successful "pay-as-you-go" solar companies and these have attracted a growing interest from venture capital investors. Off-grid solar companies located in the African markets reviewed in Climatescope have attracted approximately $115m of venture capital investments since 2012, $90m of which was invested in East African countries. Globally, Bloomberg New Energy Finance has tracked $450m of investment into the off-grid renewables sector excluding minigrids through 2015 (Figure 5).

Figure 5: Investment in off-grid solar and intermediaries by asset class ($m), 2010-2015



Source: Off-grid solar market trends report 2016

Capital raised by these firms has accelerated dramatically since the start of 2014, including three quarters in which investment topped $50m. In each of these quarters, it was a single off-grid start-up which accounted for the large majority of funds raised.

Up until 2013, grant and equity capital were mainly available to these firms as most were regarded as too risky to secure loans. Since establishing track records, however, some have been able to tap financial institutions for debt to fund expansion.

Coming years will determine exactly what contribution these newer off-grid solutions can make toward improving electrification rates. In many cases, the use of renewables in mini-grids or standalone system will offer cost-effective ways to provide consumers access to the fundamental energy services they need the most.

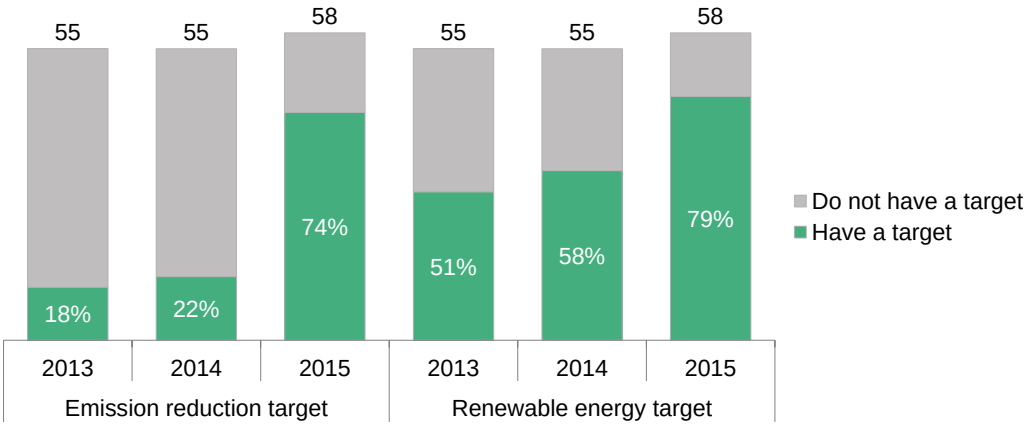
There is hardly a one-size-fits-all answer to the energy access conundrum, however. Distributed renewable energy solutions, including mini-grids, will no doubt prove more effective in some countries than others. As national governments and supporting donor agencies seek to address these issues now, however, they have more options to choose from than just a few years ago. And this is due both to a decline in equipment prices and the ingenuity of start-up players looking to put that equipment to work.

2.4. SPURRED BY THE PARIS ACCORD, FOUR OUT OF FIVE CLIMATESCOPE NATIONS NOW HAVE NATIONAL CLEAN ENERGY TARGETS WHILE THREE IN FOUR HAVE SET CO2 EMISSIONS GOALS

Developing countries, China and India especially, greatly contributed to the successful ratification of the Paris Agreement at the 21st meeting of the parties to the United Nations Framework Convention on Climate Change (UNFCCC) in December 2015. Every one of the 58 Climatescope countries with the exception of Nicaragua was a Paris signatory as of Q3 2016.

More than three quarters of Climatescope countries had set emissions reductions and clean energy targets by year-end 2015, up markedly from 2013 when 18% had such goals and just half had set clean energy deployment objectives (Figure 6). This is a key development in global efforts to mitigate climate change given that Climatescope countries accounted half the world's greenhouse gas emissions in 2012. With the economies of emerging market countries growing at a much faster pace than more developed nations, they are expected to account for the lion's share of future CO2 emissions growth.

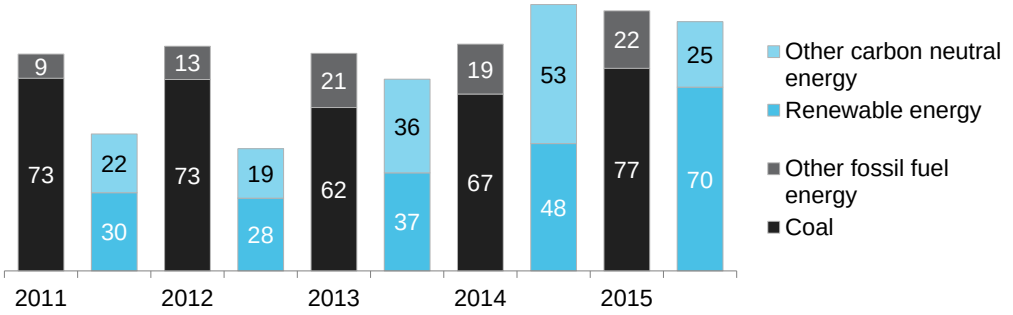
Figure 6: Share of Climatescope countries with emissions reduction and renewable energy targets, 2013-2015



Source: Climatescope 2016

The ambition and implementation of these targets will be all the more important considering the pace at which new fossil generation capacity is being added across Climatescope countries (Figure 7). In fact, as mentioned above, 2015 was a record for new coal with 77GW added in Climatescope countries.

Figure 7: Annual capacity additions in Climatescope countries (GW), 2011-2015

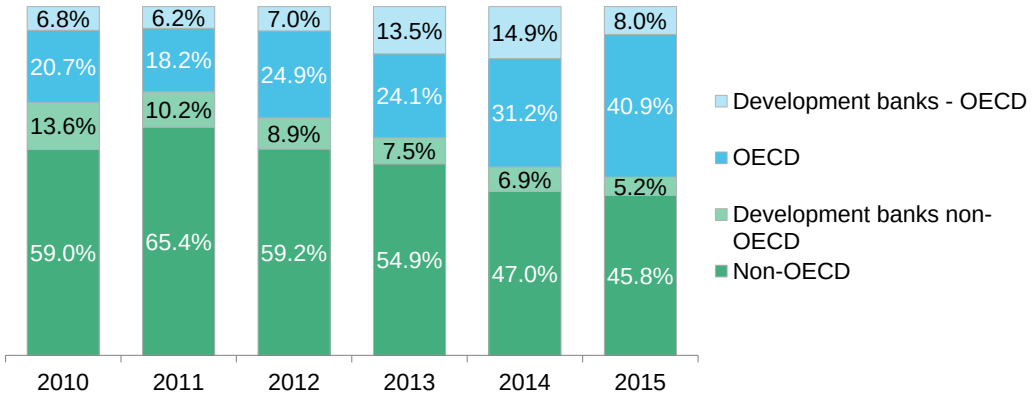


Source: Climatescope 2016. Note: other fossil fuel includes gas and oil; other carbon neutral energy includes large hydro and nuclear.

2.5. WEALTHIER NATIONS ARE ACCELERATING FUNDING FOR CLEAN ENERGY IN EMERGING MARKETS

The majority of capital for clean energy projects in Climatescope nations originates from within the countries themselves. However, financial institutions based in OECD countries do appear to be taking a larger role in financing renewables in emerging markets (Figure 8).

Figure 8: Non-OECD vs OECD share of clean energy investment into Climatescope countries (%, excludes investment in China), 2010-2015



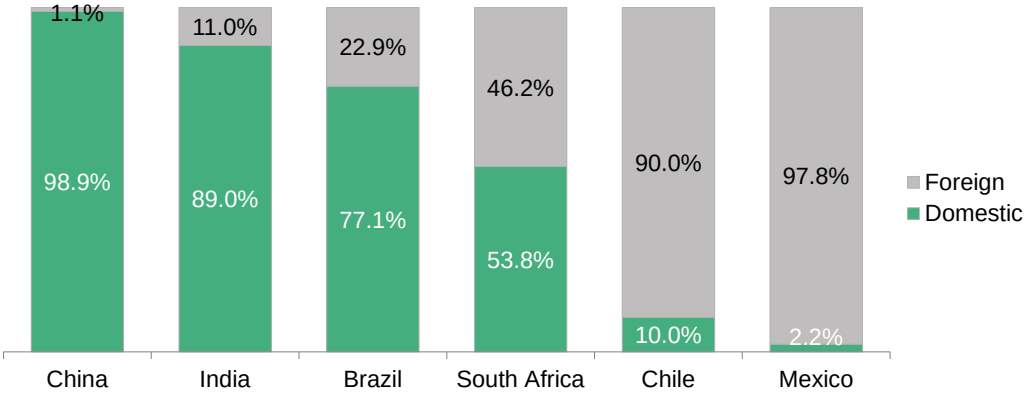
Source: Climatescope 2016 Note: Figures do not include "non-disclosed" deals. 99% of clean energy investment in China is financed from players located in the country.

Organizations based in OECD countries were the source of $54.1bn of the fully disclosed private and public clean energy investment flows into Climatescope countries from 2010-2015 and their share of annual disclosed investment has nearly doubled since 2010. The share of capital from development banks located in non-OECD countries on the other hand has slipped. It is clear that domestic development institutions such as Brazil's Banco Nacional de Desenvolvimento Economico e Social (BNDES) played a crucial role in jump-starting clean energy activity in these countries. Today, they find themselves more often joined by foreign-based players.

The level of foreign capital involved in supporting clean energy varies widely between Climatescope countries (Figure 9). Almost all such investment in China came from banks and within its borders. At the other end of the spectrum, clean energy in Mexico or Chile has been almost entirely funded externally and has included support from some of the world's leading

energy multinationals. Investment in Brazil and South Africa has come from a heterogeneous group of funders.

Figure 9: Domestic vs foreign share of 2010-2015 clean energy investment (%)



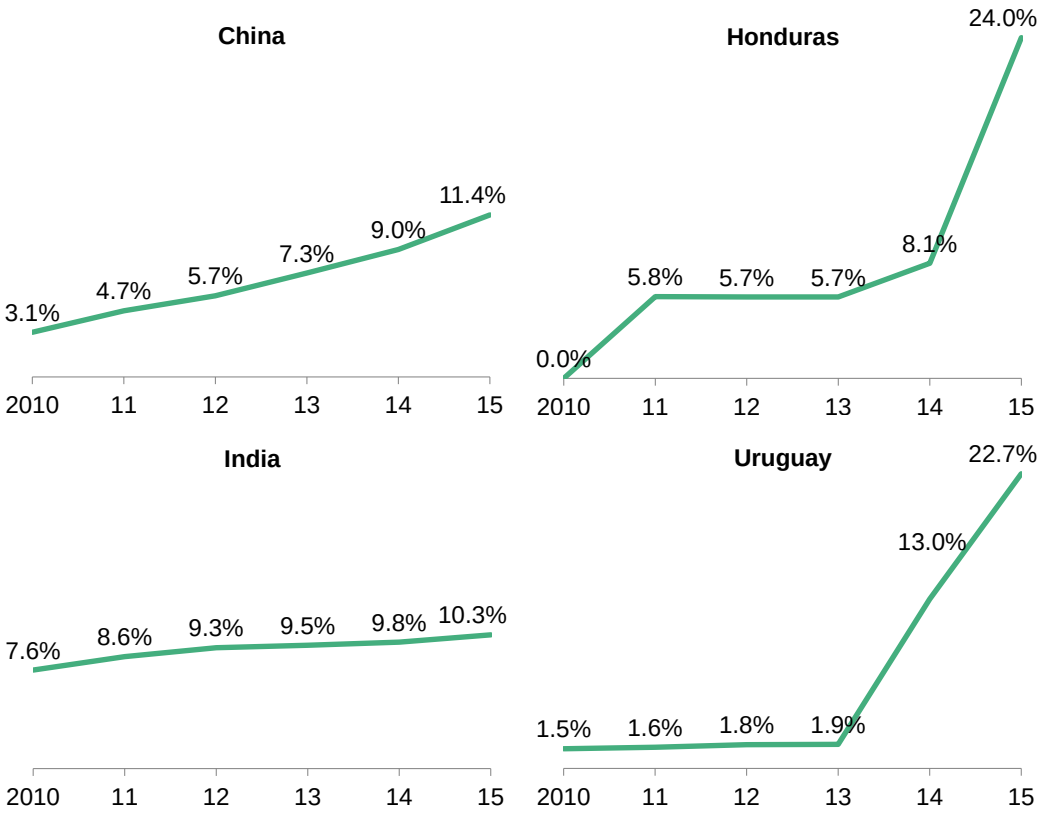
Source: Climatescope 2016 Note: Figures do not include "non-disclosed" deals.

As countries' clean energy markets grow in coming years, further foreign investment will inevitably be required. The government of India has made ambitious pledges to add renewables, for instance, and overseas investors have shown a willingness to deploy capital there.

2.6. CLIMATESCOPE COUNTRIES WHICH HAVE SEEN THE HIGHEST RATES OF CLEAN ENERGY PENETRATION ARE NOW BEGINNING TO ENCOUNTER INTEGRATION CHALLENGES

With record levels of investment and deployment inevitably come some growing pains. The surge in investment seen over the past five years has resulted in unprecedented levels of clean energy penetration, particularly in some smaller Climatescope nations (Figure 10). The sheer pace of the build-out, the shaky nature of a number of grids in these countries, and the intermittency of generation from renewables has contributed to technical and financial challenges.

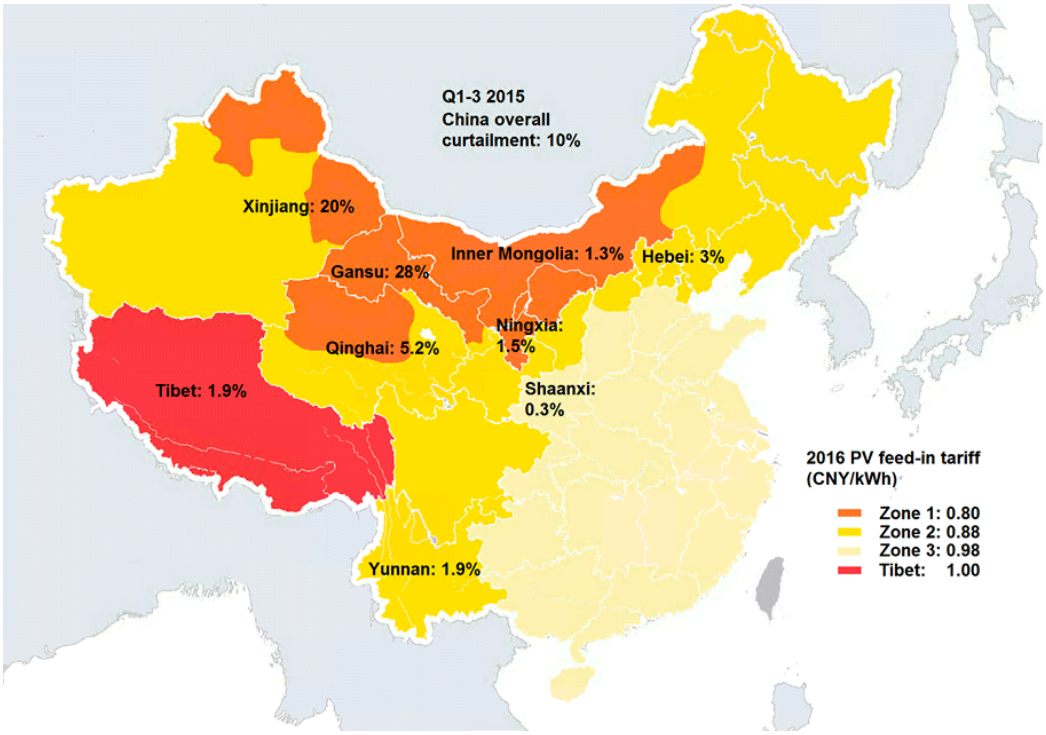
Figure 10: Cumulative share of solar and wind of total installed capacity (%), 2010-2015



Source: Climatescope 2016 Note: Figures do not include "non-disclosed" deals.

Renewable project owners in Brazil, China, India and South Africa have had to cope with issues ranging from relatively minor connection delays, to high levels of curtailment (Figure 11) and payment arrears of more than a year. Such infrastructure-related challenges are hardly unique to emerging markets. In Germany, for instance, construction of vital north-south transmission lines intended to better accommodate renewables is expected to take well over a decade to complete.

Figure 11: Solar curtailment, Q1-3 2015, and 2016 PV feed-in tariff



Source: Climatescope 2016, Bloomberg New Energy Finance

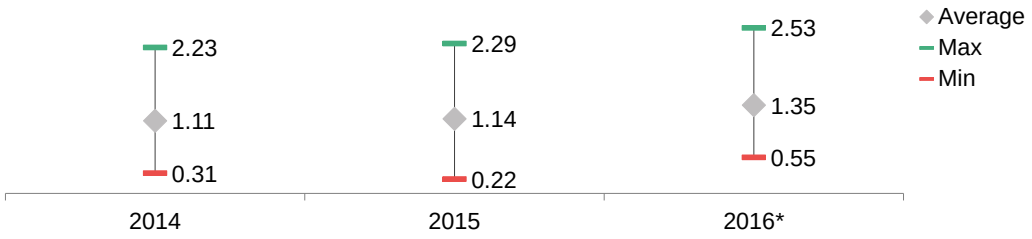
Some of the smaller Climatescope nations have seen the highest levels of clean energy penetration. Honduras and Uruguay, for instance, have 24% and 22.7% of their capacity accounted for by renewables. By comparison, in the much larger economies of China and India, renewables account for 11.4% and 10.3%, respectively. Nevertheless these challenges can arise at both ends of the spectrum if inadequate grid infrastructure exists.

By its very nature, clean energy can pose difficulties for grid operators and liberalized power markets. As wind, solar, and other technologies account for greater market share, better planning will surely be needed to accommodate them.

2.7. THESE IMPROVING CONDITIONS ARE REFLECTED IN HIGHER CLIMATESCOPE SCORES ACHIEVED BY THE MAJORITY OF COUNTRIES SURVEYED

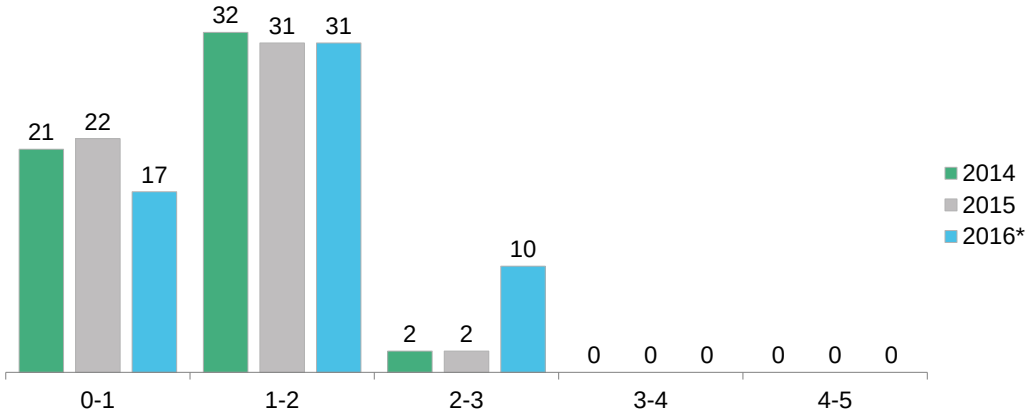
This year's Climatescope marks a notable improvement in investment environment for clean energy in the developing markets reviewed (Figure 12). The average Climatescope score for the countries survey bumped up from 1.14 to 1.35. The number of countries scoring above 2 out of a maximum of 5 has jumped from just two in the 2014 and 2015 Climatescopes, to 10 this year (Figure 13).

Figure 12: Average, minimum and maximum scores of Climatescope countries, 2014-2016



Source: Climatescope 2016 Note: maximum score is 5. 2016 includes three new countries (Egypt, Jordan and Lebanon) which all scored below 2 out of 5.

Figure 13: Histogram of country scores frequency, 2014-2015



Source: Climatescope 2016 Note: 2016 includes three new countries (Egypt, Jordan and Lebanon) which all scored below 2 out of 5.

This performance was largely driven by markedly higher scores on the first parameter which reflects the enabling framework for clean energy investment in the country, and the fourth parameter which focuses on greenhouse gas management activities. The fact that four in five Climatescope countries now have emissions reduction targets and four in five have renewable energy targets has pushed up the scores across these two parameters.

Honduras (up 0.86 between 2014 and 2016), Chile (+0.57), Uruguay (+0.53), Mexico (+0.28) and Kenya (+0.32) have all scored over 2 out of 5 and are among the countries that recorded the most progress since the first edition of Global Climatescope in 2014. Four of the eight new countries to exceed the score of 2 are located in Latin America and the Caribbean. This was generally due to improving enabling frameworks for clean energy in the region and specifically due to greater use of feed-in tariffs and auctions policies.

OVERALL SCORES										
Countries	2014		2015				2016			
	Score	Rank	Score	Δ score	Rank	Δ rank	Score	Δ score	Rank	Δ rank
China	2.23	1	2.29	0.06	1	-	2.53	0.23	1	-
Chile	1.79	5	1.97	0.18	3	2	2.36	0.39	2	1
Brazil	2.17	2	2.12	-0.05	2	-	2.29	0.18	3	-1
Uruguay	1.75	6	1.69	-0.07	8	-2	2.29	0.60	4	4
South Africa	1.92	3	1.91	-0.02	4	-1	2.21	0.30	5	-1
India	1.85	4	1.81	-0.05	5	-1	2.17	0.36	6	-1
Uganda	1.52	7	1.68	0.17	9	-2	2.05	0.36	7	2
Honduras	1.15	32	1.50	0.34	14	18	2.03	0.53	8	6
Mexico	1.57	11	1.72	0.15	7	4	2.02	0.30	9	-2
Kenya	1.73	8	1.74	0.02	6	2	2.01	0.27	10	-4
Jordan	NA	NA	NA	NA	NA	NA	1.87	NA	11	NA
Pakistan	1.36	16	1.53	0.17	13	3	1.87	0.34	12	1
Rwanda	1.20	13	1.41	0.21	17	-4	1.73	0.31	13	4
Indonesia	1.52	10	1.61	0.09	11	-1	1.69	0.08	14	-3
Panama	1.11	28	1.31	0.20	21	7	1.62	0.30	15	6
Peru	1.50	12	1.44	-0.06	16	-4	1.60	0.17	16	-
Vietnam	1.41	15	1.28	-0.13	22	-7	1.56	0.27	17	5
Nepal	1.31	23	1.63	0.32	10	13	1.54	-0.08	18	-8
Tanzania	1.23	21	1.22	-0.01	23	-2	1.53	0.31	19	4
Costa Rica	1.45	14	1.49	0.05	15	-1	1.51	0.01	20	-5
Guatemala	1.10	27	1.40	0.30	18	9	1.49	0.09	21	-3
Colombia	1.33	18	1.39	0.06	19	-1	1.45	0.06	22	-3
Nicaragua	1.37	24	1.14	-0.23	27	-3	1.44	0.30	23	4
Jamaica	0.80	37	0.81	0.01	39	-2	1.41	0.60	24	15
Bangladesh	1.26	26	1.20	-0.06	24	2	1.40	0.20	25	-1
Argentina	1.24	17	1.39	0.15	20	-3	1.39	-	26	-6
Sri Lanka	1.05	34	1.19	0.14	25	9	1.38	0.19	27	-2
Sierra Leone	0.76	43	0.79	0.03	40	3	1.35	0.56	28	12
Ghana	1.15	30	1.07	-0.08	28	2	1.34	0.28	29	-1
Nigeria	1.23	25	1.58	0.34	12	13	1.34	-0.24	30	-18
Liberia	0.91	22	0.91	-	35	-13	1.33	0.42	31	4
Ethiopia	1.25	9	1.17	-0.08	26	-17	1.29	0.12	32	-6
El Salvador	1.12	20	1.03	-0.09	30	-10	1.26	0.24	33	-3
Dominican Republic	1.16	19	1.02	-0.14	32	-13	1.20	0.18	34	-2
Ecuador	0.96	33	1.03	0.06	31	2	1.19	0.17	35	-4
Cameroon	0.65	45	0.56	-0.08	49	-4	1.13	0.57	36	13
Belize	0.98	39	0.81	-0.17	38	1	1.13	0.32	37	1
Senegal	0.89	36	0.86	-0.03	36		1.09	0.23	38	-2
Zambia	1.07	31	0.99	-0.07	34	-3	1.07	0.08	39	-5
Lebanon	NA	NA	NA	NA	NA	NA	1.02	NA	40	NA
Zimbabwe	0.76	42	0.70	-0.06	43	-1	1.01	0.31	41	2
Egypt	NA	NA	NA	NA	NA	NA	0.97	NA	42	NA
Barbados	0.79	47	0.64	-0.14	44	3	0.94	0.30	43	1
Myanmar	0.78	29	0.85	0.08	37	-8	0.90	0.05	44	-7
Bolivia	0.91	38	1.04	0.13	29	9	0.89	-0.15	45	-16
Malawi	0.92	35	1.01	0.09	33	2	0.89	-0.12	46	-13
Botswana	0.62	50	0.59	-0.03	47	3	0.84	0.25	47	-
Mozambique	0.79	41	0.77	-0.02	41	-	0.80	0.03	48	-7
Haiti	0.73	49	0.64	-0.09	45	4	0.78	0.15	49	-4
Bahamas	0.53	53	0.48	-0.05	53	-	0.75	0.27	50	3
Congo (Dem. Rep.)	0.69	40	0.55	-0.14	50	-10	0.74	0.19	51	-1
Cote d'Ivoire	0.83	44	0.71	-0.12	42	2	0.71	-	52	-10
Tajikistan	0.48	54	0.62	0.14	46	8	0.67	0.05	53	-7
Guyana	0.60	46	0.54	-0.06	51	-5	0.67	0.12	54	-3
Trinidad & Tobago	0.54	48	0.57	0.03	48	-	0.63	0.06	55	-7
Paraguay	0.59	51	0.49	-0.10	52	-1	0.62	0.13	56	-4
Venezuela	0.32	52	0.40	0.08	54	-2	0.56	0.16	57	-3
Suriname	0.31	55	0.22	-0.08	55	-	0.55	0.33	58	-3

SECTION 3. PARAMETER SUMMARIES

3.1. PARAMETER I – ENABLING FRAMEWORK

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, levels 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 others were compiled, please see the complete Climatescope methodology**.**

KEY FINDINGS

Climatescope 2016 tracked notable improvements in the enabling framework conditions of the majority of countries reviewed. No less than 46 of the 55 countries reviewed in Climatescopes 2015 and 2016 saw their Parameter I scores rise year-over-year. By comparison, in the 2015 survey, only 26 countries showed improvements from the prior year.

Not only did the number of countries that saw progress rise, but the average level of improvement also jumped. The average per-country gain on Parameter 1 from 2015-2016 was twice as high as from 2014-2015 and, for that matter, from 2013-2014.

The two specific areas where countries demonstrated progress were on strengthened clean energy policy frameworks and power sector structures. Climatescope tracked 28 countries that enhanced laws or regulations to better support renewables. The survey also counted 15 countries that achieved progress in liberalizing the power market, often through the unbundling of state-run utilities. This year's Climatescope analysed for the first time three nations in the Middle East and North Africa region – Jordan, Egypt, and Lebanon. The three achieved mixed results. Jordan made it to the top 4 with a score of 2.31 and ranked 11th overall. For their part, Egypt and Lebanon scored 1.03 and 0.87, reflecting challenging socio-economic and security conditions in those nations in recent years.

AN IMPROVING POLICY LANDSCAPE

Clean energy-friendly policies are becoming ever more common in Climatescope nations. The number of countries in the survey with no such policies on the books fell to just four in 2016[1], down from six in 2015 and eight in 2014. The types and sophistication of policies countries are adopting have also evolved over the past three years (Figure 14).

Four in five Climatescope countries (79%) have now established renewable energy targets compared to half of nations in 2014. A similar number of countries have tax incentives in place to help achieve these goals.

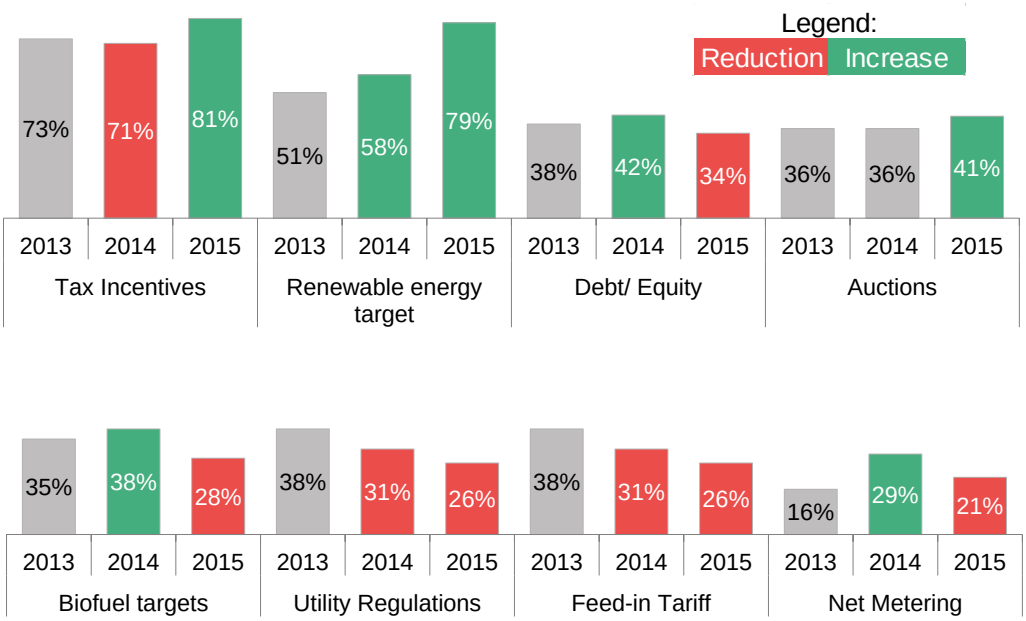
Climatescope 2016 highlights a shift away from feed-in tariffs in developing countries toward reverse auctions in their place. The former allow project owners to sell clean power at a market premium, while the latter invite developers to bid to sell their power at least cost.

The reputation of feed-in tariffs has suffered in recent years in the wake of the European experience. In some EU countries, generously priced feed-in tariffs prompted unexpectedly large

1 The countries with no active legislation are Sierra Leone, Suriname, Trinidad & Tobago and Venezuela.

and sudden booms in renewable build. This, in turn, resulted in ballooning public subsidy liabilities and put considerable pressure on electricity bills or government budgets.

Figure 14: The evolving renewable energy policy landscape of Climatescope countries , 2014-2016, % of countries surveyed



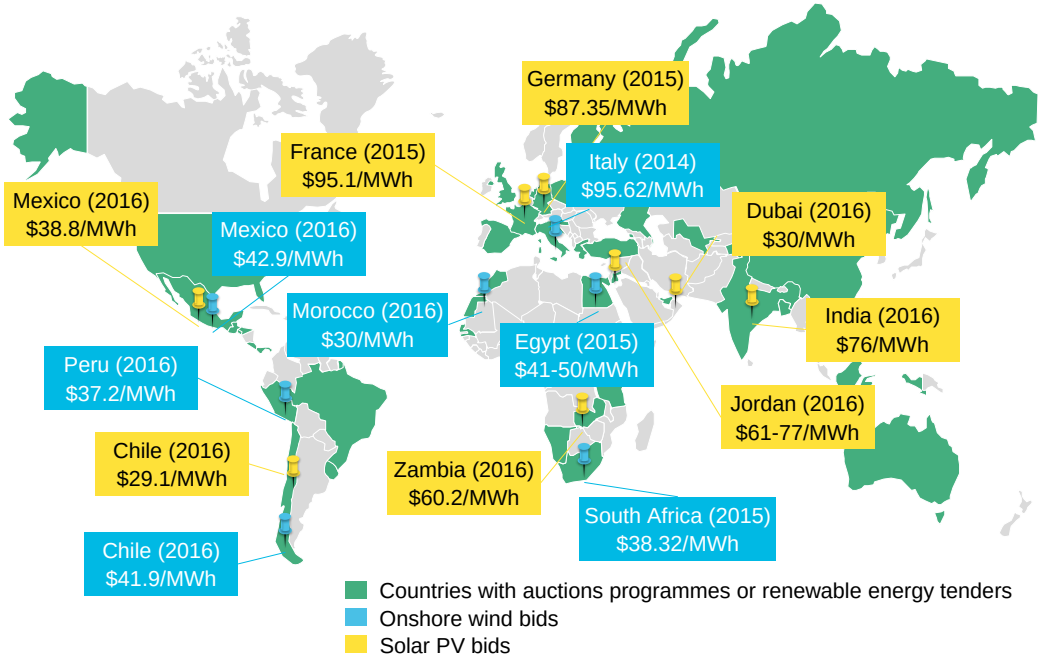
Source: Climatescope 2016 Note: Debt and equity accounts for all direct investment incentives excluding tax incentives such as access to concessional finance or grants. 2016 includes three new MENA countries. Reduction and increase are relative to preceding year.

Climatescope nations tend to be more cash-constrained and the relative development of public finance management may limit capacity to forecast public expenditure that responds to demand. Furthermore, most Climatescope nations lack liberalised wholesale markets and are home to state-owned utilities. All of these conditions make tenders more appealing.

As the introduction of renewable energy targets has become more commonplace, so has the use of tenders and auctions targeting renewable energy specifically (Figure 14). This trend started in Brazil, spread across most of Latin America, and to Sub-Saharan Africa and Asia, where India is home to the largest photovoltaic auction programme in the world. We expect this trend to continue as governments seek to emulate the successes of their peers in securing extremely competitively priced renewable energy through auction programmes (Figure 15).

Not all the policy trends are moving in a positive direction, however. Climatescope found that just a quarter of nations reviewed have utility regulations that favour the development and integration of renewables. Examples of such regulations include mandating purchases of renewable generation and explicit renewable portfolio standards for utilities. Such rules will only grow in importance as more renewable generation is fed into the grid and must compete with and be balanced against other sources. The recent curtailment and payment delays associated with renewables projects in China and India highlight the challenge of rapidly integrating large amounts of clean power to the grid (see the Asia summary and country profiles for more details).

Figure 15: Countries with clean energy tender programmes and select recent lowest clearing prices, H1 2016

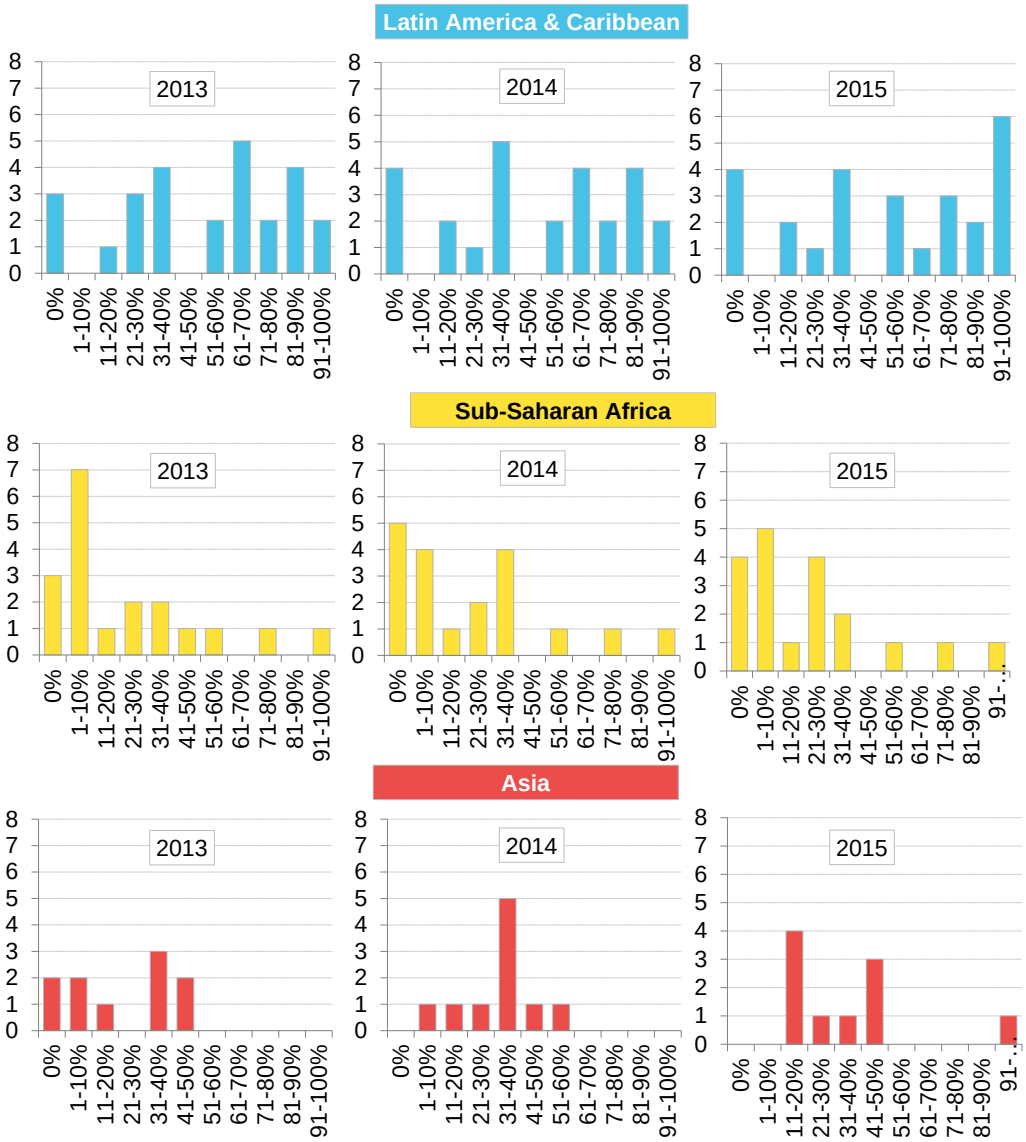


Source: Climatescope 2016 Note: bids are reflective of lowest bid in each country. China's auction programme is currently on hold but may be re-introduced in the near future. Tenders have been used infrequently at a state level rather than nationwide in the US and Australia. Dollar values are nominal and converted using exchange rate on the day of the result announcement.

THE GROWING ROLE OF INDEPENDENT POWER PRODUCERS

The role of independent power producers (IPPs) in generation is growing around the world in line with the growth of distributed clean energy capacity. This is true in Climatescope countries as well. However, the pace of change differs across regions and a number of markets remain entirely closed to IPPs. Figure 16 shows the distribution of Climatescope countries by the share of total installed capacity owned by IPPs for each region. The higher columns stack to the right hand side of each chart, the more important the role of IPPs in the region.

Figure 16: Distribution of Climatescope countries by share of installed capacity operated by IPPs (number of countries), 2013-15



Source: Climatescope 2016 Note: The higher columns stack to the right side of each chart, the greater the role of IPPs in the region.In the MENA region (not charted here), Jordan has the highest share of contribution of IPPs to power generation with 38%, while the sector is dominated by state-owned utilities in Lebanon and Egypt.

The market share of IPPs in Latin America and the Caribbean amounts to more than half of total generation capacity in 15 of 26 countries, far exceeding other regions. This is largely due to the fact that the use of auctions as a means to spur competition and procure least-cost generation is common in the region, including for fossil fuel capacity. Venezuela, Paraguay, Barbados and the Bahamas are the only countries where IPPs do not contribute to generation at all.

The role of IPPs is less clear in Sub-Saharan Africa. Nigeria and Cote d'Ivoire procure all and two thirds of their electricity from IPPs, respectively. Cote d'Ivoire has by far the longest experience with a liberalised generation market in the region and Nigeria has recently completed the liberalisation of its market. The top three is rounded out by Uganda (58%). Tanzania is where IPP contributions have been growing the fastest, increasing from 26% of generation in 2013 to 47% in

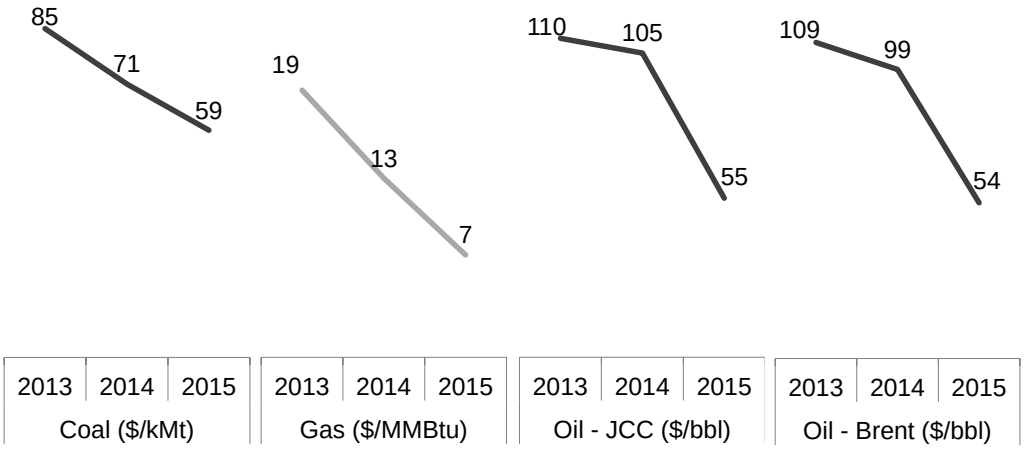
2015. All other power markets in the region tend to be dominated by state-owned utilities. However, countries in the region, including Ghana, Rwanda, Senegal and Sierra Leone, are increasingly implementing power sector reforms to unbundle these monopolies.

In Asia, most of the largest countries have also seen the share of IPPs grow rapidly between Climatescope 2014 and 2016 as a consequence of power sector reform and new capacity procurement programmes such as India's auctions. China has embarked on the most comprehensive power sector reform in its history in an attempt to improve efficiency and manage oversupply while making more room for distributed low-carbon sources. But it is in Pakistan and Bangladesh that the generation landscape is changing quickest, with the share of IPPs increasing from 3% and 1% respectively to around half of total generation in both countries over the past three years.

LOWER COMMODITY PRICES AND LOWER (BUT STILL HIGH) POWER PRICES

The emerging market nations surveyed for Climatescope have felt profoundly the effects of the global energy commodity price crash (Figure 17). Brazil, Colombia, Ecuador, India, Indonesia, Mexico, Nigeria and Venezuela are amongst the world's top exporters of coal, gas and oil, and their economies have suffered. The International Monetary Fund (IMF) recently cut Nigeria's 2016 GDP growth forecast from 2.3% to -1.8%, its lowest in 29 years. Venezuela's GDP contracted 10% in 2015 and is expected to shrink by at least another 6% in 2016. Even the more diversified economy of Indonesia has seen export earnings and government revenues drop.

Figure 17: Select fossil fuel commodity prices, 2014-2015



Source: Bloomberg Terminal Note: select prices are annual averages for Newcastle for Coal, Japan-Korea Marker for LNG, JCC for oil in Asia and Brent for the rest of the world.

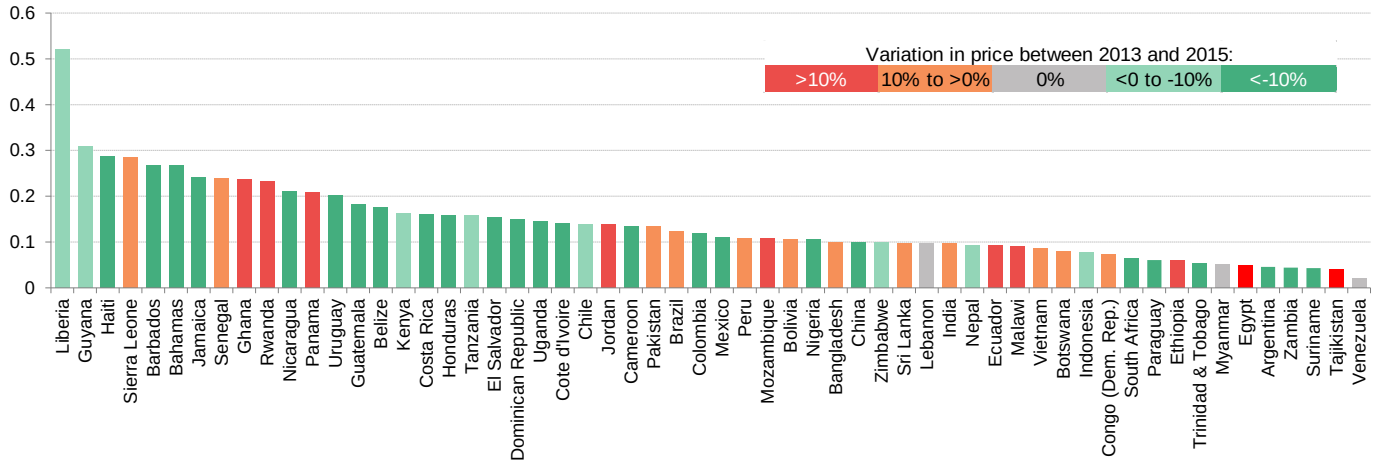
All of this could, in theory at least, put pressure on these governments to curtail their support for renewables. That said, aside from Indonesia (-0.11 on its overall Climatescope score), none of these commodity-rich nations saw their overall Climatescope scores drop in 2016. Climatescope 2017 will paint a clearer long-term picture of any adjustments made.

Conversely, lower commodity prices have provided much welcomed budgetary breathing room for Climatescope's most commodity-import dependent countries. Lower fossil fuel prices have allowed governments and state-run utilities to pass some savings on to consumers in the form of lower retail power rates or to make up some of the accrued losses (Figure 18).

Historically, Climatescope countries with the highest retail power prices have correlated with those most reliant on oil for power generation. So it should come as little surprise that the majority

of these nations saw some of the sharpest declines in retail power prices since Climatescope 2014. Amongst the countries that saw power prices decline (green in Figure 18), the average contribution of oil to total power generation was 35%. The 21 countries with the highest electricity prices and that saw a tariff reduction in 2015 generate half of their power from oil.

Figure 18: Average retail power prices ($/kWh) and 2014-2015 percentage change in dollar value



Source: Climatescope 2016

Even with the recent price declines, electricity remains stubbornly expensive in many Climatescope countries compared to wealthier countries. Across the survey's 58 nations, the average price at which power was sold to the end consumer was $0.14/kWh ($140/MWh) in 2015. By comparison, average retail prices in France and the United States in the same period were around $0.18/kWh and $0.10/kWh respectively.

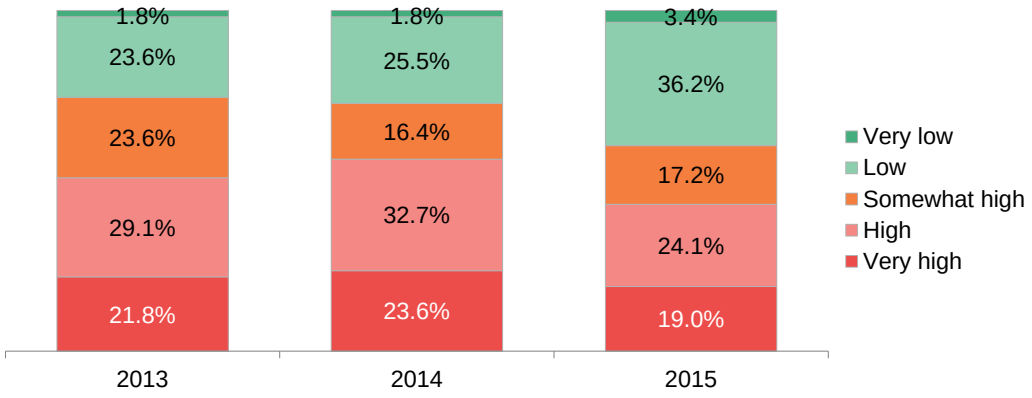
Such high-priced existing generation offers clear opportunities for renewables, however. In 20 countries, retail rates averaged over $0.15/kWh. Meanwhile, solar project developers now routinely bid to sell their power for under $50/MWh on a wholesale basis (Figure 15). While it's imprecise to compare retail and wholesale rates, there is little doubt that clean energy has the potential to offset pricier generation reliant on fossil imports.

In Climatescope countries where consumer power prices tend to be heavily subsidised, lower generation costs have one further potential benefit. In such countries, state-run utilities have historically often been forced to sell power at artificially low rates that came nowhere close to covering their marginal fuel costs. As a result, such utilities would regularly run major deficits.

Lower commodity prices have allowed a number of these utilities to repair balance sheets. This, in turn, has the potential to foster clean energy project development, since one of the key impediments to new project build in Climatescope countries is that development finance institutions and other financiers hesitate to finance new wind, solar, or other projects when they have substantial doubts about the financial stability of the local utility committed to buy the power produced over the long term.

This trend toward off-takers with healthier balance sheets is reflected in Climatescope's off-taker risk assessments (Figure 19).This evaluation included reviewing the off-taker's financials, history of default and payment delays, the presence of sovereign guarantees and risk perceptions amongst existing renewable and non-renewable generators in the country.

Figure 19: Off-taker risk assessment across Climatescope countries, 2014-2015



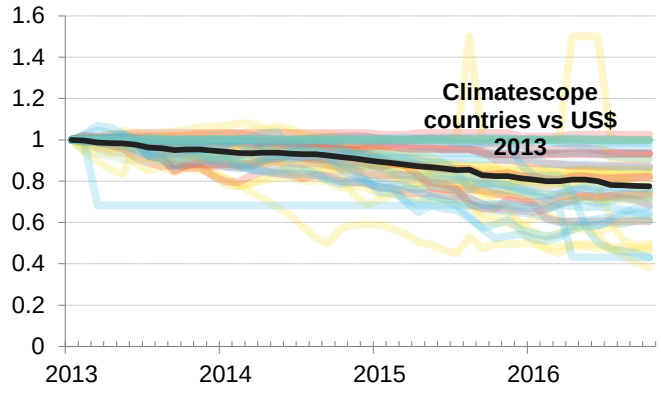
Source: Climatescope 2016

One example of where lower commodity prices have resulted in higher credit-worthiness can be found in Senegal where imported oil accounted for no less than 86% of the country's power generation in 2014, forcing the government to fund a $200-250m tariff deficit that year in order to avoid an increase in retail electricity prices. The drop in crude prices has relieved budget pressure and allowed the government to avoid increasing retail power prices too quickly. This is improving the government and state-run utilities' financial situation. This change, combined with cost declines for renewables, appears to be opening space for renewables development. A total of 150MW of onshore wind and 95MW of solar PV, or 25% of currently installed capacity, secured financing in Senegal between the start of 2015 and Q3 2016.

CURRENCY VOLATILITY AND THE APPRECIATING US DOLLAR

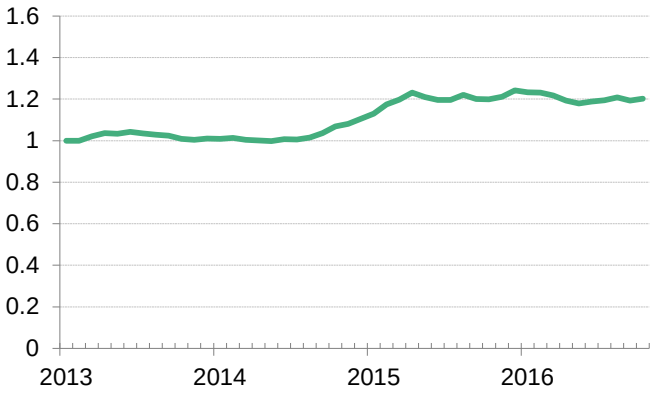
Currency gyrations represent major risk for investors looking to put money to work in emerging markets and in recent years the US dollar has appreciated substantially against many local currencies in Climatescope nations (Figure 20 and Figure 21). This is partly due to the unwinding of unconventional monetary policy measures first introduced by the US Federal Reserve in response to the 2008 financial crisis.

Figure 20: Climatescope currencies vs. the US dollar 2013-2016 (rebased to 1)



Source: Bloomberg Terminal Notes: The black line in Figure 7 represents the average of all Climatescope nation currencies.

Figure 21: The US dollar index (dollar vs other currencies in major OECD nations), 2013-2016



Source: Bloomberg Terminal. Note: the US dollar index spot is measured against Euro (57.6%), Japanese yen (13.6%), British pound (11.9%), Canadian dollar (9.1%), Swedish krona (4.2%) and Swiss franc (3.6%).

The appreciation of the dollar affects Climatescope countries differently depending on the characteristics of their economies and their clean energy markets. Those most reliant on imported goods and services to develop clean energy projects have seen the higher dollar boost local costs.

Only a few countries – namely China and, to a lesser degree, India – currently employ almost entirely domestically-made equipment. Generally speaking, the more domestically-oriented a country's clean energy manufacturing, the less exposure local developers have to an appreciating dollar.

The vast majority of Climatescope's 58 nations rely on trading partners to secure wind turbines, solar modules, and other equipment, however. When US dollar prices for such gear spike unexpectedly due to local currency declines, local project developers are hit.

Efforts to address this include state-run utilities agreeing to long-term contracts, sometimes explicitly denominated in dollars, or local governments essentially agreeing to backstop shortfalls caused by currency changes. While risks associated with currency fluctuations can be shifted to different parties, they cannot be eliminated. For example, South Africa's state-run utility Eskom has signed multiple 20-year power purchase agreements backstopped by the South African government. The arrangement has helped spur just under $16bn in clean energy investment, representing around 9GW of contracts, since the programme was launched in 2011. It has also added $13bn to the South African Treasury's liabilities, the equivalent of around one third of South Africa's foreign exchange reserves as of July 2016, according to Bloomberg.

Risks aside, such long-term commitments to address the currency question have clearly helped clean energy projects get financed and built. Indeed, Climatescope countries where project owners can receive payments in dollars or have their contracts otherwise indexed or insured against currency changes have seen some of the strongest levels of investment to date.

PARAMETER I – ENABLING FRAMEWORK										
Countries	2014		2015				2016			
	Score	Rank	Score	Δ score	Rank	Δ rank	Score	Δ score	Rank	Δ rank
Uruguay	1.71	4	2.04	0.33	1	3	2.55	1	1	-
Rwanda	1.83	2	2.01	0.18	2	-	2.33	0.31	2	-
Panama	1.52	10	1.48	-0.03	13	-3	2.32	0.84	3	10
Jordan	NA	NA	NA	NA	NA	NA	2.31	NA	4	NA
Brazil	2.16	1	1.98	-0.19	3	-2	2.24	0.26	5	-2
Guatemala	1.38	17	1.34	-0.04	19	-2	2.11	0.77	6	13
Chile	1.51	11	1.81	0.30	4	7	1.96	0.15	7	-3
Honduras	1.06	35	1.06	0.01	34	1	1.85	0.79	8	26
India	1.41	14	1.51	0.10	11	3	1.85	0.33	9	2
Nepal	1.36	18	1.44	0.08	15	3	1.83	0.39	10	5
Kenya	1.65	6	1.75	0.11	5	1	1.82	0.07	11	-6
El Salvador	1.39	15	1.27	-0.12	23	-8	1.82	0.55	12	11
Pakistan	1.18	28	1.42	0.24	16	12	1.76	0.33	13	3
Belize	1.24	25	1.21	-0.04	27	-2	1.69	0.48	14	13
Nicaragua	1.64	7	1.53	-0.11	9	-2	1.67	0.15	15	-6
Cameroon	0.76	44	0.65	-0.11	47	-3	1.65	1.00	16	31
China	1.58	8	1.54	-0.04	8	-	1.64	0.10	17	-9
Costa Rica	1.44	13	1.52	0.08	10	3	1.60	0.08	18	-8
Uganda	1.74	3	1.61	-0.13	7	-4	1.60	-0.01	19	-12
Peru	1.34	19	1.34	-	18	1	1.56	0.22	20	-2
Ghana	1.02	37	1.05	0.03	36	1	1.50	0.45	21	15
Ecuador	1.09	34	1.24	0.15	25	9	1.49	0.25	22	3
Senegal	1.12	32	1.18	0.05	31	1	1.48	0.30	23	8
Dominican Republic	1.66	5	1.26	-0.39	24	-19	1.46	0.20	24	-
Bangladesh	1.22	26	1.30	0.08	21	5	1.42	0.12	25	-4
Nigeria	1.18	27	1.48	0.30	14	13	1.41	-0.08	26	-12
Colombia	1.14	30	1.23	0.09	26	4	1.40	0.17	27	-1
Liberia	1.46	12	1.49	0.03	12	-	1.39	-0.11	28	-16
Mexico	0.99	40	1.10	0.11	32	8	1.37	0.27	29	3
Indonesia	1.25	24	1.05	-0.21	37	-13	1.31	0.26	30	7
Tanzania	1.28	22	1.37	0.09	17	5	1.30	-0.07	31	-14
South Africa	1.12	33	1.70	0.58	6	27	1.28	-0.43	32	-26
Ethiopia	1.28	21	1.18	-0.10	30	-9	1.23	0.05	33	-3
Sierra Leone	1.03	36	1.19	0.16	28	8	1.23	0.04	34	-6
Barbados	0.74	45	0.74	-	46	-1	1.20	0.46	35	11
Jamaica	1.13	31	1.09	-0.04	33	-2	1.19	0.10	36	-3
Argentina	1.28	23	1.32	0.04	20	3	1.19	-0.13	37	-17
Sri Lanka	1.01	38	0.89	-0.12	40	-2	1.16	0.28	38	2
Zambia	1.00	39	0.95	-0.05	38	1	1.16	0.21	39	-1
Vietnam	1.38	16	1.05	-0.33	35	-19	1.07	0.02	40	-5
Zimbabwe	0.96	41	0.85	-0.11	42	-1	1.03	0.19	41	1
Egypt	NA	NA	NA	NA	NA	NA	1.03	NA	42	NA
Haiti	0.69	48	0.89	0.19	39	9	1.02	0.14	43	-4
Malawi	1.32	20	1.29	-0.03	22	-2	1.02	-0.27	44	-22
Bolivia	0.65	49	0.61	-0.04	48	1	1.02	0.41	45	3
Guyana	0.77	43	0.78	0.01	45	-2	1.00	0.21	46	-1
Cote d'Ivoire	1.15	29	1.19	0.04	29	-	0.99	-0.20	47	-18
Mozambique	0.91	42	0.84	-0.07	43	-1	0.97	0.13	48	-5
Myanmar	1.56	9	0.84	-0.72	44	-35	0.94	0.11	49	-5
Suriname	0.17	55	0.19	0.02	54	1	0.93	0.74	50	4
Lebanon	NA	NA	NA	NA	NA	NA	0.87	NA	51	NA
Botswana	0.73	47	0.60	-0.13	49	-2	0.82	0.22	52	-3
Congo (Dem. Rep.)	0.74	46	0.55	-0.18	50	-4	0.79	0.24	53	-3
Paraguay	0.63	50	0.49	-0.14	51	-1	0.73	0.24	54	-3
Bahamas	0.40	54	0.36	-0.05	53	1	0.72	0.36	55	-2
Tajikistan	0.44	53	0.86	0.42	41	12	0.69	-0.17	56	-15
Trinidad & Tobago	0.50	52	0.41	-0.09	52	-	0.66	0.25	57	-5
Venezuela	0.59	51	0.15	-0.44	55	-4	0.44	0.29	58	-3

3.2. PARAMETER II – FINANCING AND INVESTMENT

Climatescope's Clean Energy Investment & Climate Financing Parameter (Parameter II) encapsulates nine contributing data indicators. It accounts for the amount and growth of clean energy investment in projects larger than 1MW in each country, the availability of local funds and local financing costs. Parameter II contributed 30% toward each nation's overall score.

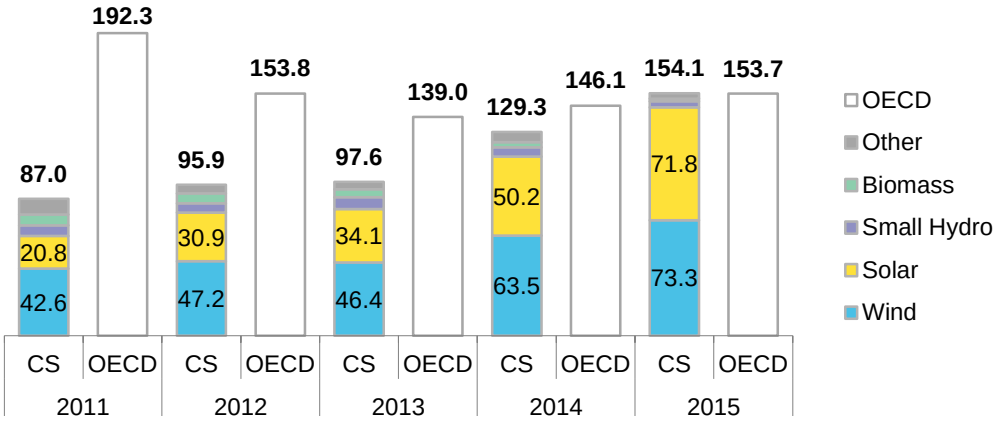
KEY FINDINGS

Investment volumes across Climatescope countries overall continued to climb in 2015 and achieved an all-time high of $154.1bn, up from $129.3bn in 2014. Investment in China, which accounts for three quarters of total Climatescope investment (and about one third of all global investment), grew 28% and helped drive top-line growth. However, activity is clearly spreading to other nations. Excluding China, the 10 countries which saw the highest level of clean energy investment attracted $37.4bn in 2015 compared with $28.2bn in 2013. An impressive 38 of 55 countries reviewed in this year's Climatescope and last year's edition saw their investment scores improve. Amongst the three nations added to the survey this year, Jordan stood out by scoring 1.62 out of a maximum of 5 and joining the top 10 list on this parameter.

CLIMATESCOPE COUNTRIES TOP ALL OTHERS FOR THE FIRST TIME

Climatescope countries for the first time attracted more new clean energy investment than nations member of the Organisation for Economic Co-operation and Development in 2015 (Figure 22). Investment in Climatescope countries grew 16% from 2014 to 2015 to reach $154bn, somewhat below the 2013-2014 jump of 24%. In addition, the $147bn invested into new clean energy generation in Climatescope nations in 2015 topped the $126bn global investment in thermal power generation in 2015 recorded by the International Energy Agency.

Figure 22: Annual clean energy capacity additions in Climatescope and OECD countries (GW), 2011-2015



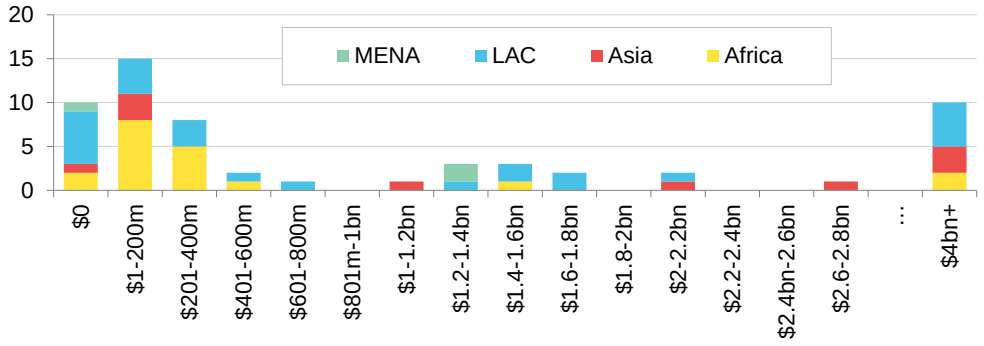
Source: Source: Climatescope 2016 Note: Climatescope and OECD countries account for more than 95% of global annual clean energy capacity additions over 2011-2015. Climatescope figures include three new MENA states added in Climatescope 2016. Chile and Mexico are included in both OECD and Climatescope.

Solar and wind accounted for 46.5% and 47.5% of this, respectively, and other renewable technologies for the remainder. The growth in solar is astonishing given that the technology only attracted $20.8bn in Climatescope countries in 2011 vs. $42.6bn for onshore wind that year. Four years on and solar investment has more than tripled and is likely to top onshore wind for the first time in 2016. Behind this lies a story of cost declines; solar equipment prices are down approximately 90% since 2009.

INVESTMENT PERFORMANCES VARY GREATLY

Climatescope countries collectively had another exceptional year in 2015. Still, there continues to be substantial variation between the countries in which investors are continuously active and the rest (Figure 2). Ten countries[2] in Climatescope saw clean energy investment exceed $4bn between 2010 and 2015. At the other end of the spectrum, ten countries[3] have failed to attract any clean energy investment in projects larger than 1MW at all since 2010 and most countries have seen less than $600m[4] of investment over the 2010-2015 period.

Figure 23: Distribution of countries by clean energy investment, 2010-2015 (number of countries)



Source: Climatescope 2016

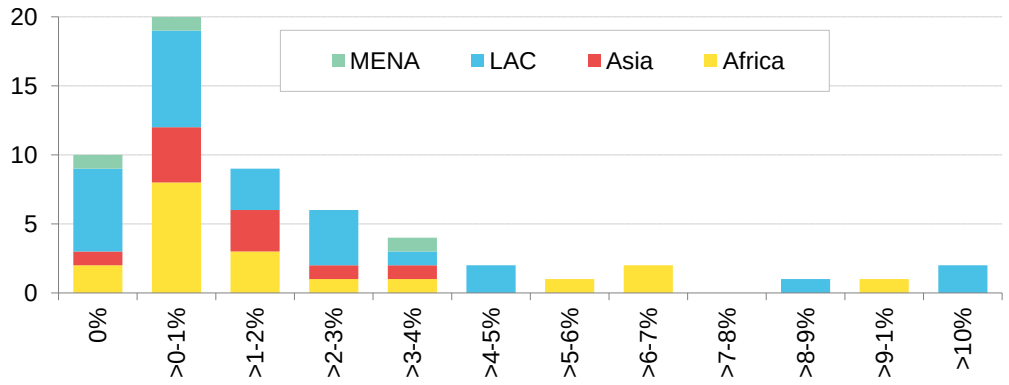
Somewhat understandably, the countries with the smallest economies were also fairly likely to get overlooked by investors. In fact, six of the 10 smallest Climatescope economies were amongst the countries with no investment between 2010 and 2015. Hence it is clear that the absolute level of investment alone is an imperfect indicator of activity.

Looking at investment as a share of the economy size paints a different picture (Figure 24) which is the reason why all quantitative indicators in Climatescope are levelized against a country's GDP and population.

When investment is measured against a country's GDP, Uruguay (8.76% of 2015 GDP), South Africa (5.14%), Chile (4.69%), Brazil (4.23%) and China (3.81%) are the only countries that remain in the top 10. Nicaragua (10.47%), Honduras (10.06%), and Kenya (6.68%) are the other countries with investment in excess of $1bn between 2010 and 2015, completing this ranking. Sierra Leone (9.15%) and Zimbabwe (3.69%) are also in the top 10. However, this is caused by the presence of large one-off bioenergy deals in these small economies. At the other end of the scale, countries such as Nigeria, Indonesia, Colombia, Argentina and Ecuador have seen underinvestment in relation to the size of their economies.

2 China, Brazil, India, South Africa, Mexico, Chile, Indonesia, Uruguay, Peru and Kenya.
3 Bahamas, Barbados, Belize, Democratic Republic of Congo, Guyana, Haiti, Lebanon, Liberia, Tajikistan and Trinidad and Tobago.
4 $600m is the average capex of a 380MW solar plant and a 324MW onshore wind plant in the United States.

Figure 24: Distribution of countries by ratio of clean energy investment as share of 2015 GDP, 2010-2015 (number of countries)



Source: Climatescope 2016

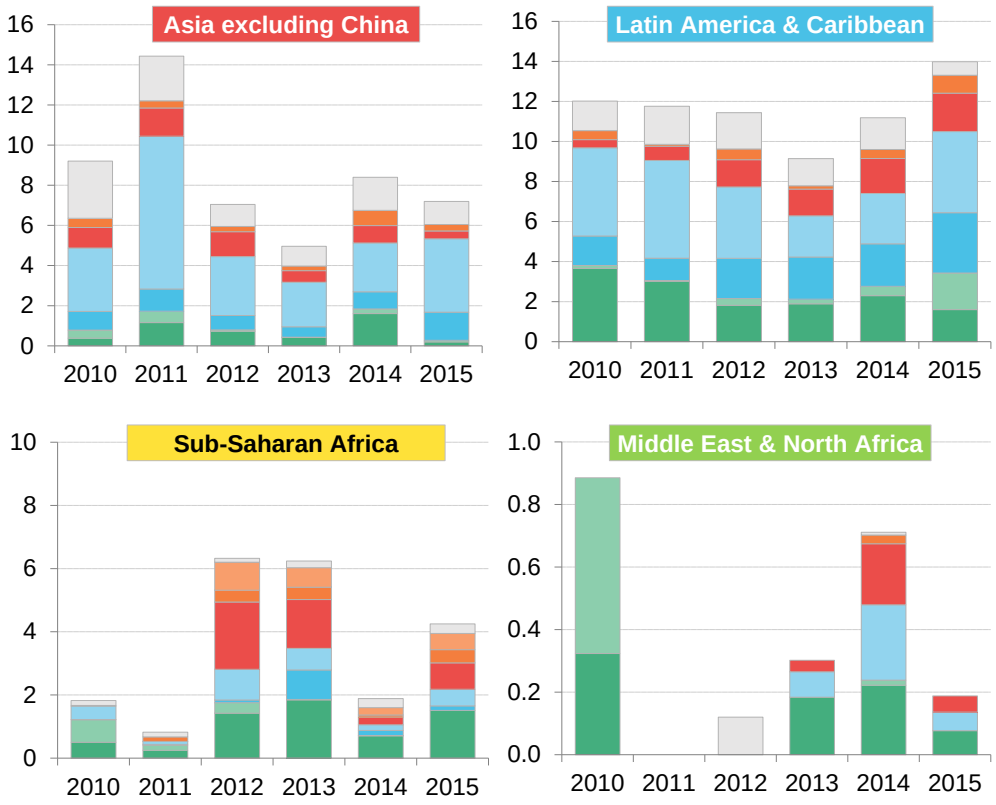
Among those at the top of the list, the performances are not just impressive when compared to other developing countries but also when viewed against the performances of some of the very largest economies. Consider that Honduras, Kenya, Nicaragua and Uruguay have all recorded investment over 2010-2015 that is equivalent to more than 5% of their 2015 GDP, while Germany and China have generated investments equivalent to 3.8% over a similar period.

EVOLVING CLEAN ENERGY INVESTOR TYPES IN EMERGING MARKETS

Bloomberg New Energy Finance has been tracking and categorizing investment flows into the clean energy sector for over a decade. This data allows for a unique look at the evolution of investor types across Climatescope nations (Figure 25).

China is excluded from the below charts due to its sheer size and the large number of projects in the country for which no public data exists on investor type. However, BNEF research has found that the majority of new projects in China are developed by commercial banks and project developers. This marks a shift from the period before 2010, when the development banks were heavily involved. Utilities and private equity funds have had little activity in the country to date.

Figure 25: Climatescope regional renewable energy asset finance by investor type excluding China, 2010-2016 ($bn)



Source: Climatescope 2016. Note: Private equity includes funds and other financial services. Figures do not include "non-disclosed" deals. Sovereign includes all investment by governments, public entities and sovereign wealth funds. Utilities are energy companies involved in other segments value chain segments than project development and operation, and tend to be larger companies than Project Developers.

Project developers have provided around one third of all the capital across Climatescope nations and are by far the largest source of clean energy investment in these nations. Their role is particularly strong in Asia and in the Latin America and Caribbean region, where they have seized opportunities presented by large-scale auction programs in India, Brazil, Mexico and elsewhere.

Latin America is also the region which has seen the most activity from multinational utilities, which have tapped their own balance sheets. However, as in the early years of some mature clean energy markets, utilities' share of clean energy investment is relatively small when compared to that of project developers.

This appears to be changing. Clean energy finance from utilities grew at an average rate of 21% per year from 2010-2015 compared to 9% for finance from project developers globally. Italy's Enel, Brazil's Electrosul Centrais Electricas, Japan's Kyushu Electric Power and Spain's Acciona are among those that have financed over $1.5bn of renewable energy assets in Climatescope countries between 2010 and 2015.

In Sub-Saharan Africa, commercial banks have been heavily involved in South Africa where they have played an active role in financing projects executed under the government's Renewable

Energy Independent Power Producer Procurement programme. Sub-Saharan Africa is also the region where development finance[5] has been prominent (Figure 25).

In the Middle East, development banks have played a greater role as the risks are clearly viewed as too high for many commercial institutions. In Egypt, for instance, the 200MW El Zayt wind farm was financed in 2010 by European sovereign and development institutions, Japan's International Cooperation Agency and the government of Egypt itself. Development finance has been leveraged effectively in Jordan where five of seven clean energy projects to date have involved such institutions, project developers and commercial banks. In a promising sign, the other two projects there were fully financed by their developers in 2015 and 2014, respectively.

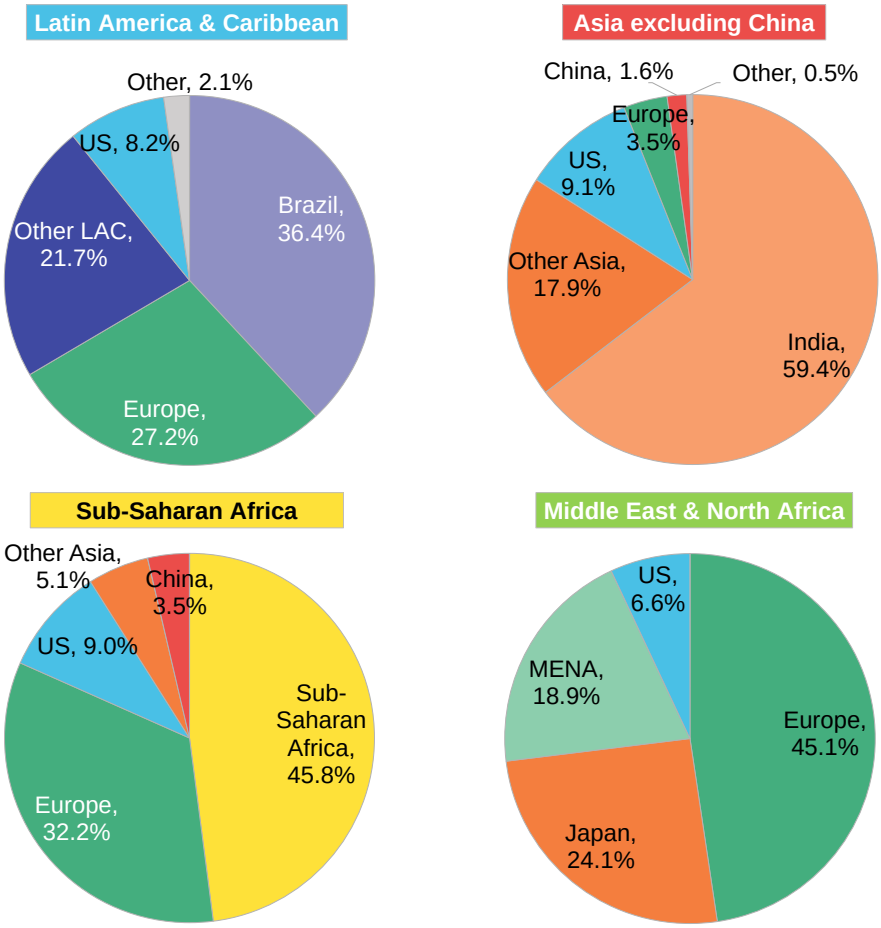
THE IMPORTANCE OF INTRA-REGIONAL, US AND EUROPEAN SOURCES

Intra-regional investment accounted for the largest share of investment in Climatescope countries by far between 2010 and 2015, outweighing extra-regional investment by a factor of two to one. This is mostly explained by financial institutions providing capital to projects located in the country where they are based. However, there has also been significant cross-border investment within regions, particularly Latin America.

In terms of external regions providing capital, Europe deployed the most to Climatescope countries (Figure 26), led by Italy, Spain and the United Kingdom. The US is by far the largest non-Climatescope country source of clean energy investment across all regions.

5 In Figure 4 development finance is included in the development bank category.

Figure 26: Geographical origin of clean energy investment into Climatescope countries (excludes investment in China), 2010-2015



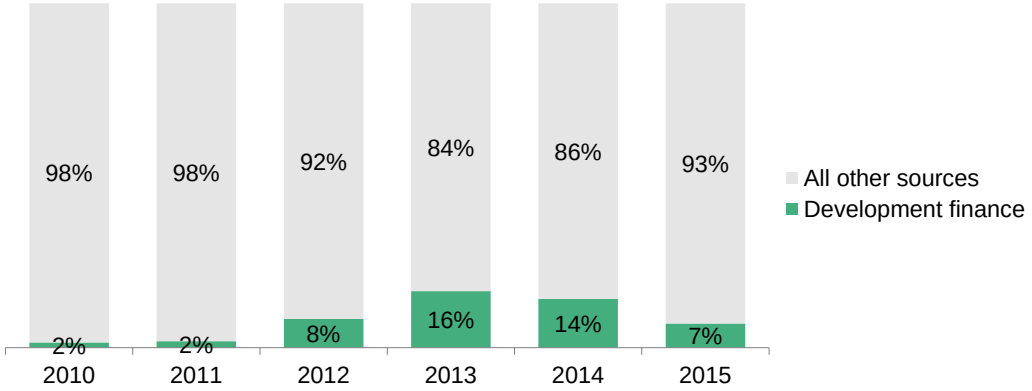
Source: Climatescope 2016. Note: Figures do not include "non-disclosed" deals

In all, $50bn of clean energy investment flowed from developed countries to Climatescope nations between 2010 and 2015. Averaged across the six years, this comes to $8.3bn. It is a far cry from the $100bn per year nations pledged to achieve by 2020 under the accord signed at Copenhagen in 2009.

DEVELOPMENT FINANCE IS INCREASINGLY SUPPORTING CLEAN ENERGY PROJECTS

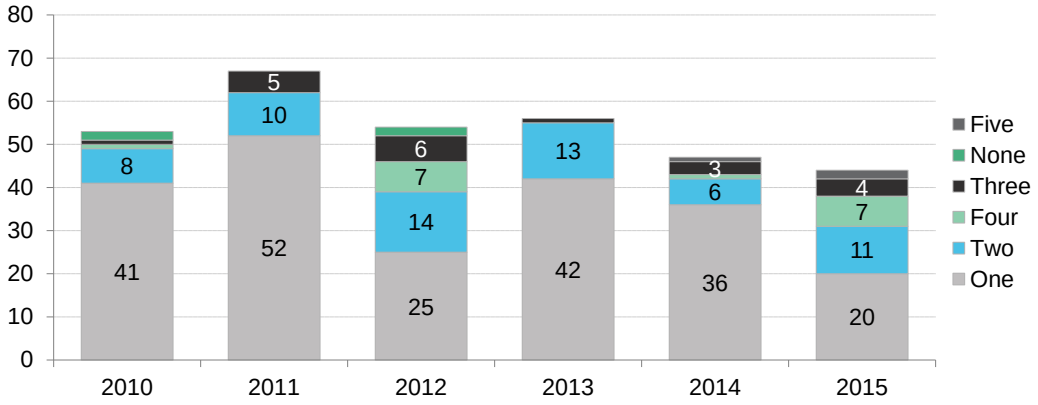
On the other hand, as discussed above, capital is coming from more heterogeneous sources and there are signs that development finance institution funds are leveraging more capital from commercial and sovereign players. The contribution of development finance in Climatescope countries increased considerably in 2012 and 2013, but it has shrunk again over 2014 and 2015 (Figure 27). However, the vast majority of development bank supported projects in Climatescope countries involved at least one other partner organization, showing the role of development institution as facilitators and attractive sources of finance (Figure 28). In the years 2011, 2012 and 2015 up to half of the projects involved development banks and at least two other organizations.

Figure 27: Share of development bank finance against other sources of investment in renewable energy in Climatescope countries (excl. China), 2010-2015



Source: Climatescope 2016 Note: figures do not include non-disclosed transactions and projects in China.

Figure 28: Number (left axis) and total value (bubbles) of projects supported by development banks split by number of partner organisations (excl. China), 2010-2015



Source: Climatescope 2016 Note: figures do not include non-disclosed transactions and projects in China

The largest investments also tend to bring together the financing and expertise of the greatest number of partner organizations alongside development banks. The Karoshoek, Xina and Kaxu concentrated solar power plants in South Africa, the Marena onshore wind project in Mexico, and the Lake Turkana onshore wind project in Kenya are each worth in excess of $800m which involved development banks and six to seven more partner organizations.

PARAMETER II – FINANCING & INVESTMENT										
Countries	2014		2015				2016			
	Score	Rank	Score	Δ score	Rank	Δ rank	Score	Δ score	Rank	Δ rank
Honduras	0.64	29	2.06	1.42	1	28	2.60	0.54	1	-
China	1.28	6	1.46	0.18	5	1	2.19	0.73	2	3
Uruguay	1.77	4	0.89	-0.89	9	-5	2.14	1.25	3	6
Jamaica	0.23	49	0.26	0.03	40	9	2.03	1.77	4	36
Chile	0.82	14	0.93	0.11	8	6	1.92	0.99	5	3
South Africa	1.37	5	0.56	-0.80	24	-19	1.77	1.20	6	18
Liberia	1.88	2	0.43	-1.44	31	-29	1.74	1.31	7	24
Sierra Leone	0.61	30	0.49	-0.11	27	3	1.74	1.25	8	19
Uganda	0.79	17	0.65	-0.14	20	-3	1.63	0.98	9	11
Jordan	NA	NA	NA	NA	NA	NA	1.62	NA	10	NA
Mexico	0.99	8	0.85	-0.14	12	-4	1.54	0.69	11	1
Tanzania	0.72	23	0.48	-0.24	29	-6	1.34	0.87	12	17
Nicaragua	0.76	20	0.53	-0.23	26	-6	1.33	0.80	13	13
Kenya	0.73	21	0.80	0.07	13	8	1.22	0.43	14	-1
India	0.91	9	0.66	-0.25	19	-10	1.19	0.53	15	4
Brazil	0.57	34	0.69	0.12	17	17	1.00	0.31	16	1
Panama	0.88	10	1.30	0.42	6	4	0.97	-0.32	17	-11
Ethiopia	2.05	1	0.53	-1.52	25	-24	0.94	0.41	18	7
Pakistan	0.60	31	0.39	-0.21	33	-2	0.94	0.55	19	14
Vietnam	0.50	36	0.43	-0.07	32	4	0.90	0.46	20	12
Costa Rica	0.69	26	0.79	0.10	14	12	0.84	0.06	21	-7
Bahamas	0.64	28	0.60	-0.04	23	5	0.83	0.23	22	1
Peru	0.78	18	0.70	-0.08	16	2	0.75	0.05	23	-7
Dominican Republic	0.81	16	0.26	-0.55	42	-26	0.73	0.48	24	18
Sri Lanka	0.39	40	0.85	0.45	11	29	0.72	-0.13	25	-14
Guatemala	0.72	22	1.56	0.84	4	18	0.71	-0.84	26	-22
Zimbabwe	0.24	48	0.21	-0.03	48	-	0.68	0.46	27	21
Belize	0.26	46	0.26	-0.01	44	2	0.56	0.31	28	16
Rwanda	1.10	7	0.77	-0.33	15	-8	0.56	-0.21	29	-14
Ghana	0.23	50	0.17	-0.05	50	-	0.56	0.39	30	20
Nepal	0.59	32	1.68	1.09	3	29	0.56	-1.12	31	-28
Lebanon	NA	NA	NA	NA	NA	NA	0.55	NA	32	NA
Bolivia	0.82	15	1.73	0.91	2	13	0.53	-1.19	33	-31
Indonesia	0.72	24	0.88	0.17	10	14	0.51	-0.37	34	-24
El Salvador	1.80	3	0.64	-1.16	21	-18	0.51	-0.13	35	-14
Barbados	0.46	37	0.36	-0.09	36	1	0.50	0.14	36	-
Botswana	0.30	44	0.37	0.07	35	9	0.49	0.12	37	-2
Trinidad & Tobago	0.86	13	0.63	-0.23	22	-9	0.48	-0.15	38	-16
Colombia	0.56	35	0.48	-0.08	28	7	0.45	-0.03	39	-11
Ecuador	0.87	11	0.46	-0.41	30	-19	0.45	-0.01	40	-10
Suriname	0.69	25	0.26	-0.43	41	-16	0.35	0.09	41	-
Egypt	NA	NA	NA	NA	NA	NA	0.35	NA	42	NA
Zambia	0.37	42	0.30	-0.08	39	3	0.34	0.05	43	-4
Haiti	0.40	39	0.24	-0.15	45	-6	0.34	0.10	44	1
Bangladesh	0.78	19	0.66	-0.11	18	1	0.34	-0.33	45	-27
Myanmar	0.26	47	0.33	0.07	38	9	0.33	0.00	46	-8
Cameroon	0.44	38	0.24	-0.20	46	-8	0.32	0.08	47	-1
Guyana	0.87	12	0.37	-0.49	34	-22	0.32	-0.06	48	-14
Mozambique	0.27	45	0.36	0.09	37	8	0.27	-0.09	49	-12
Argentina	0.58	33	0.21	-0.37	47	-14	0.26	0.04	50	-3
Nigeria	0.39	41	1.13	0.74	7	34	0.24	-0.88	51	-44
Venezuela	0.19	53	0.17	-0.02	51	2	0.23	0.06	52	-1
Paraguay	0.30	43	0.26	-0.05	43	-	0.21	-0.04	53	-10
Congo (Dem. Rep.)	0.66	27	0.19	-0.48	49	-22	0.21	0.02	54	-5
Malawi	0.17	54	0.11	-0.05	53	1	0.19	0.08	55	-2
Tajikistan	0.20	52	0.14	-0.06	52	-	0.16	0.02	56	-4
Senegal	0.21	51	0.02	-0.18	54	-3	0.07	0.05	57	-3
Cote d'Ivoire	0.13	55	0.01	-0.12	55	-	0.03	0.02	58	-3

3.3. PARAMETER III – VALUE CHAINS

This parameter employs three indicators to measure local value chain resources available to facilitate clean energy deployment. These seek to take into account the availability of local manufacturers to provide the equipment needed to construct technology-specific projects (Figure 1 and Figure 2), financial firms to provide capital, and service firms to provide assistance such as legal support.

For the nations with the least developed power systems in the survey categorised as “off-grid” (see methodology for more details), this parameter includes two additional off-grid indicators , which 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 value chain segments for the on-grid nations and 78 for those in the off-grid category. Parameter III contributed 15% toward each nation’s overall score.

It is important to note that Parameter III measures the presence and absence of specific value chain segments. It does not take into account the volume of actual output occurring locally.

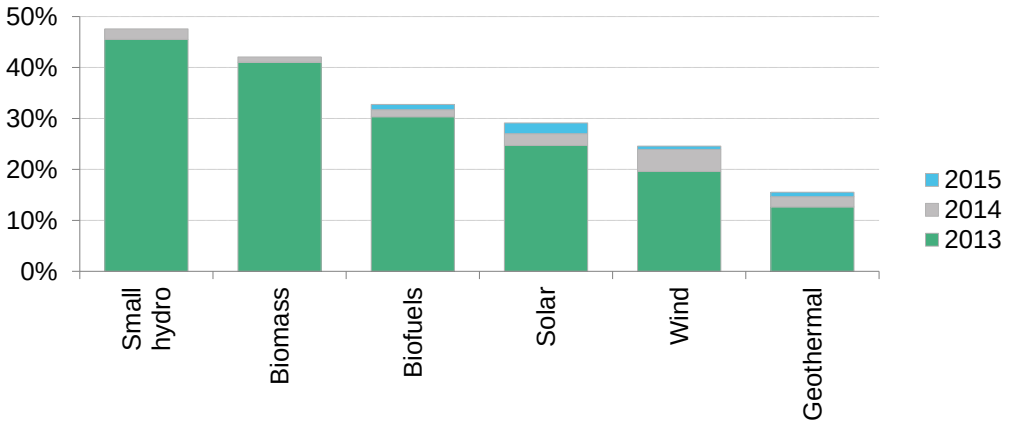
KEY FINDINGS

Climatescope 2016 confirmed that expanding manufacturing chains in the survey’s nations is a slow and laborious process. The average score among all Climatescope nations on Parameter III inched up to 1.98 from 1.96 in last year’s study and 1.94 the year prior. Of the 24 nations that managed to raise their Parameter III scores, half added just a single link to their local value chains.

TECHNOLOGY TRENDS

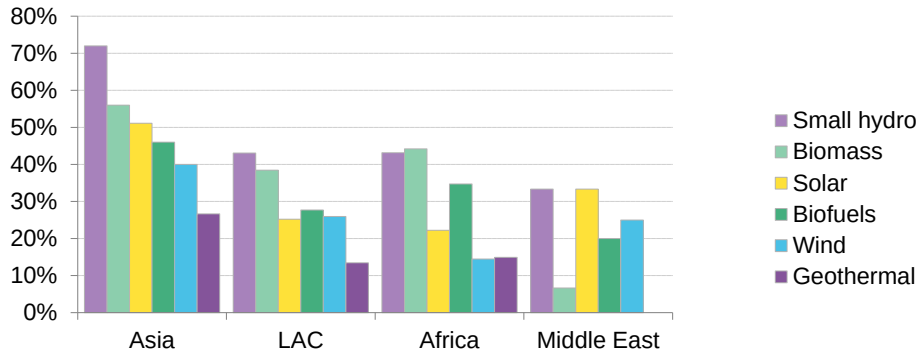
Progress on value chains in 2014 and 2015 combined has been the strongest in the technology-specific sub-indicators for wind, solar and geothermal (Figure 29). Wind and solar have by far been the most dynamic technologies in terms of new investment (see Parameter II summary). The spread and coverage of the geothermal value chain is the lowest of all clean energy technologies. This is linked to the fact that accessible resources are spread less evenly than for other renewables and that the upfront cost of developing the sector is higher.

Figure 29: Level of technology specific value chains penetration for all Climatescope countries as a share of the maximum score for all countries combined, 2013-15 (%)



Source: Climatescope 2016 Note: includes all Climatescope 2016 countries including the three new MENA nations (Jordan, Egypt and Lebanon).

Figure 30: Share of development bank finance against other sources of investment in renewable energy in Climatescope countries (excl. China), 2010-2015



Source: Climatescope 2016 Note: figures do not include non-disclosed transactions and projects in China

From a regional perspective, Asia scores highest across all renewable energy technology value chains (Figure 30). This is not just due to its two giants, China and India, but would also be true if they weren't included. Africa and Latin America and the Caribbean have similar scores overall, although Brazil is contributing to the latter's strong performance on wind. Brazil, Chile, Kenya, Mexico, South Africa and Uganda are the only countries in these two regions scoring higher than three in the value chain parameter. The Middle-East region scores lowest overall. This is explained in part by a small sample of just three countries (Egypt, Lebanon and Jordan) and the moderate activity in the region to date. That said, Jordan is driving the region's performance on solar and all three countries score well on the presence of financial and services firms.

VALUE CHAIN SCORES AND INVESTMENT

As in prior years, China has once again achieved a "perfect" value chain score of 5.0, but India and South Africa are continuing to close the gap with scores of 4.42 and 4.41 respectively. These countries and Brazil, which saw its score rise to 4.35, are also topping the clean energy investment (Parameter II) and capacity addition tables (Parameter I).

The countries which perform the best on Parameter III also tend to be those with the largest economies. Two thirds of the 15 countries with the largest GDP are amongst the top 15 in terms of value chain scores.

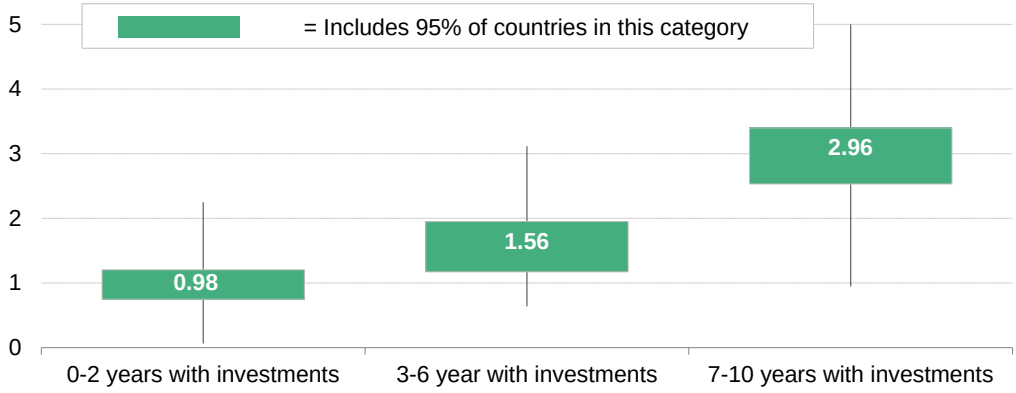
There are some notable exceptions, however. Colombia, Peru, Venezuela, Egypt, Nigeria and Argentina all have low value chain scores relative to the sizes of their economy. In fact, they have some of the lowest levels of investment in clean energy per unit of GDP. This is primarily due to the lack of an enabling environment for renewable energy. Peru is an interesting outlier among this group. It has seen substantial clean energy capacity additions (Parameter I) over the last decade, but 70% of this has been concentrated solely on the technology of small hydro. As a result, it has yet to build out significant value chains for other technologies.

Uruguay, Honduras and Nicaragua are amongst those that have seen the highest level of investment in clean energy per unit of GDP without developing strong local value chains. This can be explained by the small sizes of their economies and their proximity to other, supplier nations.

Climatescope also allows us to explore the relationship between the frequency of investment and the development of a domestic value chain. Figure 31 shows the average value chain score of Climatescope countries divided into groups according to the frequency of clean energy investment over the 2006 to 2015 period. More recurrent clean energy investment has a clear

positive relationship with value chain scores. This is an important factor to take into account in setting government plans for clean energy deployment.

Figure 31: Distribution of country value chain scores (left axis) by years with clean energy investment over 2006-2015



Source: Climatescope

A country that has the ambition to develop its domestic clean energy manufacturing industry may design its targets and support mechanisms so as to ensure that activity is spread evenly or incrementally across years. This could provide the regularity and predictability needed for the renewables sector to thrive. In this respect, auction policies are a particularly powerful tool. Manufacturers and suppliers that are given medium- to long-term certainty over annual auctioned capacity are more likely to develop a local supply base. India, South Africa or Brazil are good examples of markets where the frequency of auctions combined with local content rules have led to a strengthening of the domestic manufacturing and service base.

PARAMETER III – VALUE CHAINS										
Countries	2014		2015				2016			
	Score	Rank	Score	Δ score	Rank	Δ rank	Score	Δ score	Rank	Δ rank
China	5.00	1	5.00	-	1	-	5.00	-	1	-
India	4.10	5	4.10	-	5	-	4.42	0.33	2	3
South Africa	4.34	3	4.28	-0.07	4	-1	4.41	0.13	3	1
Pakistan	4.13	4	4.32	0.19	3	1	4.35	0.03	4	-1
Brazil	4.35	2	4.35	-	2	-	4.35	-	5	-3
Indonesia	3.64	8	3.77	0.13	8	-	4.09	0.32	6	2
Mexico	2.82	15	3.84	1.02	7	8	3.84	-	7	-
Uganda	3.93	6	3.85	-0.08	6	-	3.80	-0.05	8	-2
Kenya	3.67	7	3.62	-0.05	9	-2	3.59	-0.03	9	-
Vietnam	2.99	13	3.19	0.20	14	-1	3.45	0.26	10	4
Chile	3.18	11	3.38	0.19	11	-	3.44	0.07	11	-
Sri Lanka	3.31	9	3.31	-	12	-3	3.12	-0.19	12	-
Nigeria	3.30	10	3.30	-	13	-3	3.02	-0.28	13	-
Argentina	2.83	14	3.55	0.72	10	4	2.95	-0.60	14	-4
Nepal	2.65	16	2.65	-	15	1	2.91	0.25	15	-
Bangladesh	2.57	18	2.57	-	18	-	2.85	0.28	16	2
Rwanda	1.86	25	1.86	-	26	-1	2.63	0.78	17	9
Myanmar	2.22	21	2.60	0.38	17	4	2.37	-0.23	18	-1
Tanzania	3.08	12	2.56	-0.52	19	-7	2.28	-0.28	19	-
Ghana	2.44	19	2.20	-0.25	20	-1	2.25	0.05	20	-
Senegal	2.16	22	1.86	-0.30	25	-3	2.21	0.35	21	4
Ethiopia	2.63	17	2.63	-	16	1	2.12	-0.51	22	-6
Colombia	1.99	24	2.05	0.07	22	2	2.12	0.06	23	-1
Peru	2.05	23	2.11	0.07	21	2	2.11	-	24	-3
Costa Rica	1.79	26	1.92	0.13	24	2	1.92	-	25	-1
Lebanon	NA	NA	NA	NA	NA	NA	1.90	NA	26	NA
Jordan	NA	NA	NA	NA	NA	NA	1.78	NA	27	NA
Zambia	2.40	20	1.99	-0.40	23	-3	1.74	-0.25	28	-5
Malawi	1.62	27	1.44	-0.18	28	-1	1.47	0.03	29	-1
Egypt	NA	NA	NA	NA	NA	NA	1.46	NA	30	NA
Uruguay	1.16	35	1.41	0.25	29	6	1.41	-	31	-2
Honduras	1.42	30	1.48	0.07	27	3	1.35	-0.13	32	-5
Botswana	1.10	37	1.22	0.13	34	3	1.35	0.13	33	1
Mozambique	1.56	28	1.34	-0.22	30	-2	1.34	-	34	-4
Venezuela	0.89	44	1.34	0.45	31	13	1.34	-	35	-4
Haiti	1.43	29	1.32	-0.12	32	-3	1.32	-	36	-4
Zimbabwe	1.27	32	1.04	-0.23	38	-6	1.31	0.28	37	1
Cote d'Ivoire	1.24	33	1.14	-0.10	37	-4	1.29	0.15	38	-1
Panama	1.02	40	1.27	0.25	33	7	1.27	-	39	-6
El Salvador	0.84	46	1.22	0.38	36	10	1.22	-	40	-4
Guatemala	1.22	34	1.22	-	35	-1	1.22	-	40	-5
Cameroon	0.91	41	0.66	-0.25	49	-8	1.14	0.47	42	7
Liberia	1.03	38	1.03	-	40	-2	1.13	0.10	43	-3
Barbados	0.88	45	1.02	0.13	41	4	1.08	0.07	44	-3
Ecuador	0.72	49	1.04	0.32	39	10	1.04	-	45	-6
Nicaragua	1.16	36	0.97	-0.18	42	-6	0.97	-	46	-4
Trinidad & Tobago	0.63	51	0.95	0.32	43	8	0.95	-	47	-4
Sierra Leone	0.91	42	0.86	-0.05	44	-2	0.86	-	48	-4
Dominican Republic	0.89	43	0.71	-0.18	48	-5	0.78	0.07	49	-1
Jamaica	1.03	39	0.78	-0.25	45	-6	0.78	-	49	-4
Congo (Dem. Rep.)	1.32	31	0.72	-0.60	47	-16	0.72	-	51	-4
Bolivia	0.83	47	0.64	-0.18	50	-3	0.71	0.07	52	-2
Bahamas	0.58	52	0.64	0.07	51	1	0.64	-	53	-2
Tajikistan	0.76	48	0.76	-	46	2	0.64	-0.13	54	-8
Belize	0.63	50	0.46	-0.17	52	-2	0.46	-	55	-3
Paraguay	0.20	53	0.20	-	53	-	0.26	0.07	56	-3
Suriname	0.20	54	0.20	-	54	-	0.20	-	57	-3
Guyana	0.07	55	0.07	-	55	-	0.07	-	58	-3

3.4. PARAMETER IV – GREENHOUSE GAS MANAGEMENT ACTIVITIES

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.

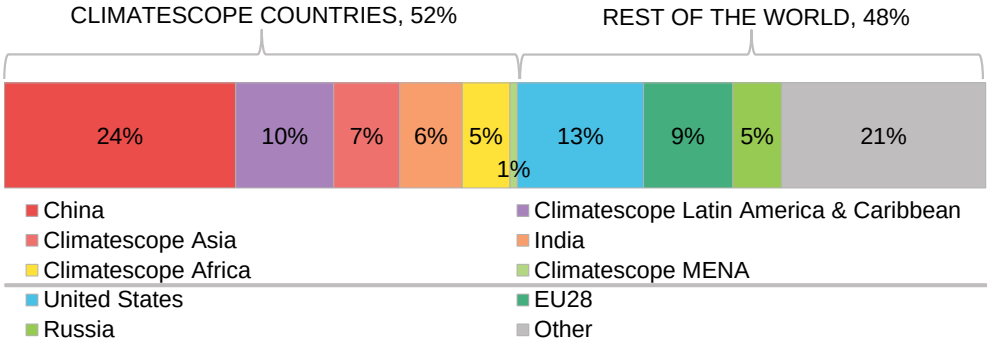
Relevant indicators are arranged into three categories: Carbon Offsets, Carbon Policy and Corporate Awareness. The Carbon Offset category measures what countries have done to develop offset projects and their potential to continue into the future. It holds the greatest weight toward the overall Parameter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

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.

KEY FINDINGS

Across all 58 Climatescope nations, the average Parameter IV score ticked up to 1.56 from 1.36 in 2015 and 1.34 in 2014. This increase is generally explained by the fact that the majority of countries submitted greenhouse gas (GHG) emission reduction targets as Intended National Determined Contributions (INDC) in advance of the COP21 meeting in Paris in December 2015. Assuming countries follow through on promises to improve their mitigation efforts and carbon policies, further score improvements may be expected in coming years. The critical importance of climate change mitigation policies in Climatescope countries is highlighted by the fact that these nations accounted for just over half of total GHG emissions worldwide and China alone for just under a quarter in 2012, the latest year for which complete data exists (Figure 32).

Figure 32: Climatescope countries GHG emissions and rest of the world, 2012



Source: Climatescope 2016, CAIT Climate Data Explorer. Note: Climatescope Asia does not include China and India. LAC refers to Latin America and the Caribbean.

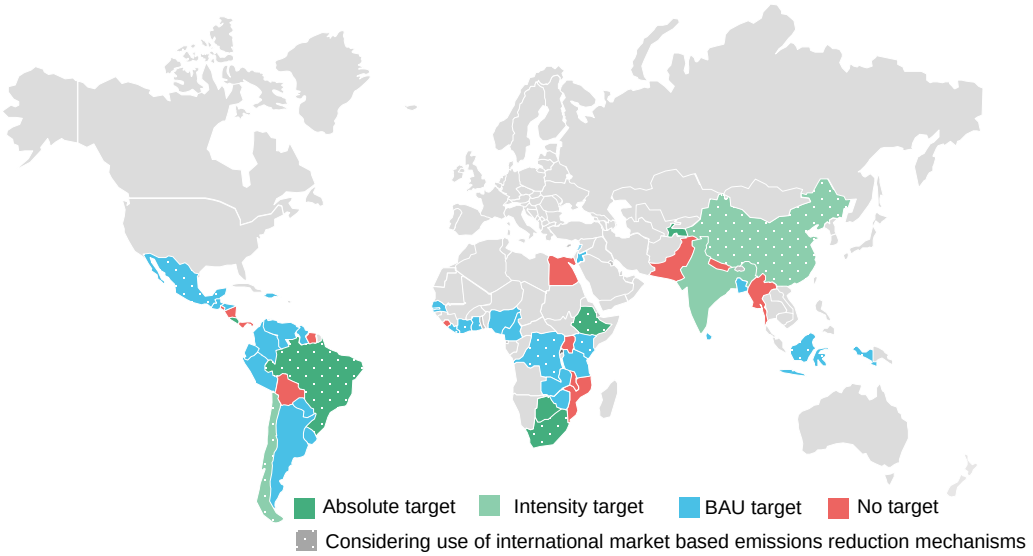
More importantly, Climatescope countries are where emissions are projected to grow most as they encompass some of the most dynamic economies in the world. India for example is expected to more than double its GHG emissions by 2030 under current policy projections. Hence, the implementation of emission reduction policies and the development of carbon offset projects by local governments, the public and private sector, and with the support of the international community, must be a cornerstone of global climate change mitigation efforts.

INTENDED NATIONAL DETERMINED CONTRIBUTIONS (INDC)

In 2015, countries submitted their INDCs to the United Nations to communicate steps they plan to take to address climate change. INDCs include emission reduction targets which can be conditional upon support of the international community, unconditional, or a combination of both. Participation among the 58 Climatescope countries was broad, with 43 nations submitting their INDCs with emission reduction targets (Figure 33). The targets are include three types of commitments:

- **Absolute targets** relative to total actual emissions in a base year and therefore a commitment to an absolute reduction. Six Climatescope countries submitted absolute targets. Brazil, for example, has committed to reduce its GHG emissions by 37% from 2005 levels by 2025.
- **Intensity targets** relative to GHG emissions per unit of GDP. Four Climatescope countries submitted intensity targets. China, for example, has committed to reduce the level of GHG emissions per unit of GDP by 60-65% from 2005 levels by 2030. This would allow for a tripling of emissions from 2005 levels over the period if the economy grows by 5% a year.
- **Business as usual targets (BAU)** relative to a future BAU scenario, which takes into consideration future economic and population growth. A total of 33 Climatescope countries submitted BAU targets. Ivory Coast, for example, has committed to reduce GHG emissions by 28% below its BAU trajectory by 2030. This would allow for around a 150% increase in emissions from current levels.

Figure 33: Emission reduction targets by type and potential use of international market mechanisms

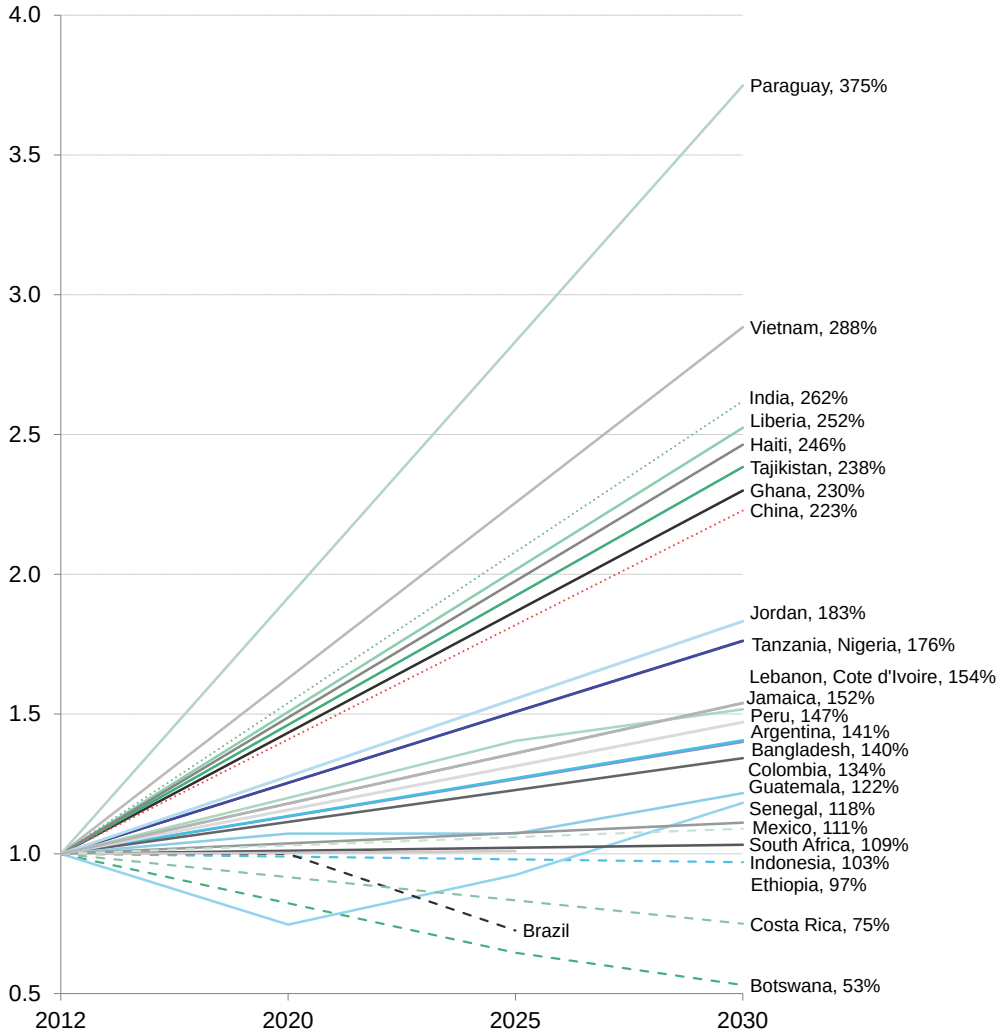


Source: UNFCCC, Climatescope 2016. Note: Rwanda has submitted an INDC in which it pledges to a BAU emissions reduction target. However, the actual target will only be presented in the 2017 Third National Communication Report.

Brazil, China and South Africa are some of the Climatescope countries that have stated they would consider participating in global market based mechanisms to reduce emissions (Figure 33). Currently, the European Union (EU) is the only regional organization in which carbon certificates are traded across countries, but its implementation has come with a number of challenges. The EU has already started collaborating with Australia, California and China on merging their emissions trading markets, however there is no indication that these initiatives will have tangible results in the near future. Nonetheless, it is welcome news that some of the largest countries in Climatescope have expressed their interest to enter such a global market in the future.

Botswana, Brazil, Costa Rica and Ethiopia are the only Climatescope countries that have committed to emit less in the future than they did in 2012. This is explained by the fact that most emerging markets are banking on high emission increases in line with high economic growth projections. China and India are forecasting emissions growth but are committed to reduce the carbon intensity of their economies by 65% and 35%, respectively, by 2030. We estimate that this will represent a 123% increase in China's emissions (or an addition of 13,120MtCO2e) and a 162% increase in India's emissions (4,675MtCO2e) in 2030 compared to 2012. South Africa has set itself the goal of having emissions in the range of 398-614MtCO2e for the period 2025 to 2030.

Figure 34: Climatescope nation Projected change in national GHG emissions relative to 2012 levels (unconditional targets ,2012 = 1), 2012-2030



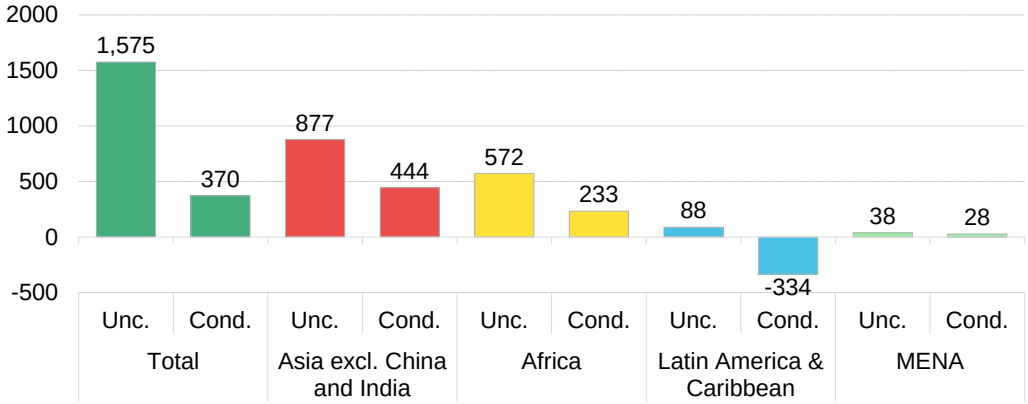
Source: INDCs, Climatescope 2016. Notes: only includes disclosed unconditional targets. Unconditional refers to provision of international development funding for climate change mitigation activities.

THE POTENTIAL IMPACT OF INTERNATIONAL SUPPORT

In addition to unconditional goals, 27 Climatescope countries submitted further emission reduction targets specifically contingent on receiving international support. A key next step in the current international climate negotiations will involve developed countries providing support to developing countries for the purpose of implementing more ambitious mitigation actions. We calculate that with appropriate support, these countries together can cut their emissions by an additional

1,205MtCO2e compared to their unconditional targets (Figure 35). This is equivalent to around 2.6% of the world's total emissions as of 2012.

Figure 35: Emissions increases/reductions under Climatescope countries' unconditional (Unc.) and conditional (Cond.) targets (MtCO2e, relative to base year)



Source: INDCs, Climatescope 2016

The five Asia Climatescope countries which have made emissions reduction pledges (excluding India and China) are also expected to have the most significant rise in emissions over the next 15 years. Collectively, they have committed to cut this increase in half – if financial and technical support is provided. Indonesia accounts for the majority of these emissions. The country has committed to limit its increase to 245MtCO2e by 2030 against 2005 levels unconditionally and to a reduction of 100MtCO2e by 2030 if international support is provided.

The size of Climatescope sub-Saharan Africa's carbon footprint is comparatively small. The 19 countries in the survey account for just 9% of the total emissions from the 58 Climatescope countries overall. Still, African countries in Climatescope are expecting to grow their emissions by 25%, or a combined 572MtCO2e, under their unconditional pledges. Compared with other regions, countries in sub-Saharan Africa are clearer on the level of support they will need to commit to more aggressive emissions curbs. They estimate around $178bn[6] of financial and technical help will allow them to make additional cuts of 339MtCO2e beyond their unconditional commitments.

Latin America and the Caribbean is the only region expected to have absolute emissions reductions in a conditional scenario. This will be mostly led by Brazil, which has one of the largest absolute emissions reduction targets in the world. The country is committed to cut 777MtCO2e unconditionally and 903MtCO2e conditionally by 2025 compared to 2012 levels.

Among Climatescope's three Middle East and North African nations, Jordan and Lebanon have set BAU targets and aim to reduce emissions conditionally by 13% and 30% compared to a BAU scenario, respectively. Jordan has set one of the most conservative unconditional targets among Climatescope nations, which would allow it to grow them from 29MtCO2e in 2006 to 50MtCO2e in 2030. The country aims to reduce emissions by only 2% compared to a BAU scenario. The goal allows emissions to double between 2006 and 2030.

[6] The number refers to Climatescope countries that have disclosed the financial costs for the implementation of mitigation actions.

CURRENT COMMITMENT AND FUTURE POTENTIAL

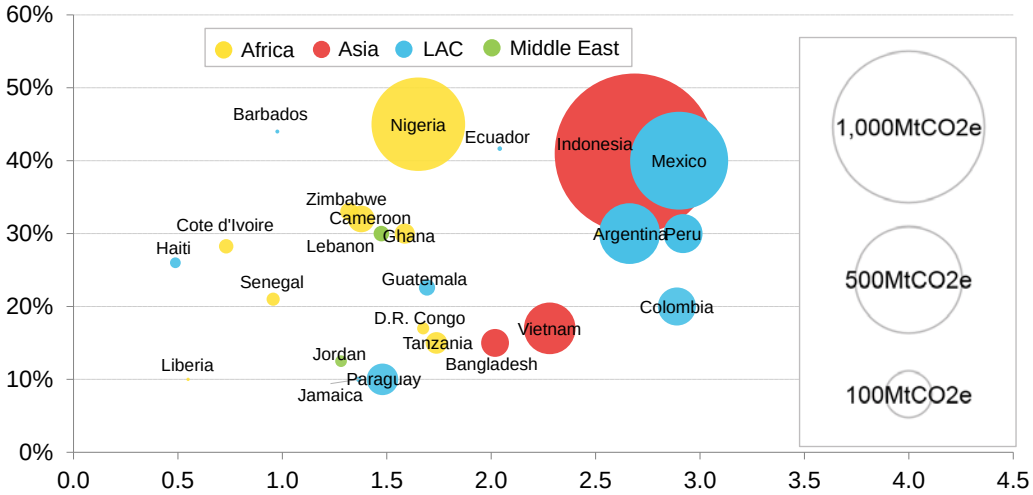
Climatescope Parameter IV scores highlight strong relationships between a country's potential to cut emissions, the GHG management activities already seen in-country (typically through offset projects or other actions) and its current policy structures.

Most carbon reduction activities in Climatescope countries could be more ambitious – with some notable exceptions. South Africa, Chile, China and Brazil have the top four Parameter IV scores and the largest potential to cut emissions. These countries have set non-BAU emissions reduction targets, which tend to be more ambitious and therefore require more robust carbon policy frameworks and successful GHG management activities.

Together, these countries have the strongest carbon offset commitments, largest number of offset projects and a high environmental awareness amongst companies. However, all can still make progress on the introduction of carbon reduction policies. Chile is the only one with a carbon tax on electricity generation, introduced in 2014, of around $5/tCO2 in 2015. South Africa and China have a mandatory and voluntary GHG country level registry respectively, and Chile and Brazil are looking to introduce a similar mechanism. All four countries are members of the Partnership for Market Readiness (PMR), a platform designed to provide support to prepare and implement climate change mitigation policies. Uruguay scores a high 2.74 in Parameter IV and is the only country which combines an absolute target with eight intensity targets focusing on specific gases and sectors. The power generation and beef production sectors have been assigned intensity targets of their own as they contribute most to emissions and are critical to Uruguay's economy. The country is among those with the highest volume of carbon offset projects relative to its size as the government attempts to address issues linked to high methane emissions from livestock.

Charting BAU emissions reduction target ambitions against Parameter IV scores and level of abatement required to meet those targets illuminates which countries have adequate policies in place and which do not (Figure 36).

Figure 36: BAU emissions reduction targets compared to Parameter IV scores (abatement required reflected in bubble size, MtCO2e)



Source: INDCs, Climatescope 2016. Note: Graph only includes countries that have disclosed base year emissions, target year emissions projects and target. "LAC" stand for Latin America and the Caribbean.

For example, Peru, Mexico, Colombia and Indonesia aim to reduce their emissions 20% compared to a BAU scenario (left axis) and round out the top 10 on Parameter IV in Climatescope 2016 (bottom axis). This implies that these countries are further along a pathway to achieve their targets. The high scores result from an above- average number of offset projects in place and a

high level of corporate awareness. All of them count with medium energy efficiency, but lower levels of emissions per capita, which limits their abatement potential.

Nigeria has a relatively ambitious target (left axis) and volume of emissions it has pledged to abate to reach it (bubble size) but it scores below the average for the parameter (bottom axis). This suggests the country has work ahead on emissions reduction.

On the other end, Haiti and Cote d'Ivoire aim to reduce their emission by over 25%, but reached the lowest parameter IV scores. This implies that targets are overrealistic and that governments will need to structure emission reduction policies and carbon offset activities in order to achieve the goals.

PARAMETER IV – GREENHOUSE GASES MANAGEMENT ACTIVITIES										
Countries	2014		2015				2016			
	Score	Rank	Score	Δ score	Rank	Δ rank	Score	Δ score	Rank	Δ rank
South Africa	2.72	6	2.77	0.05	6	-	3.39	0.62	1	5
Chile	3.35	1	3.05	-0.30	3	-2	3.21	0.15	2	1
China	3.06	3	3.24	0.18	1	2	3.06	-0.18	3	-2
Brazil	3.17	2	3.13	-0.05	2	-	2.98	-0.15	4	-2
Peru	2.46	9	2.49	0.03	9	-	2.92	0.43	5	4
Mexico	2.90	4	3.01	0.11	4	-	2.90	-0.11	6	-2
Colombia	2.89	5	2.97	0.08	5	-	2.89	-0.08	7	-2
Uruguay	2.65	7	2.64	-0.01	7	-	2.74	0.10	8	-1
India	2.62	8	2.60	-0.02	8		2.72	0.11	9	-1
Indonesia	2.33	11	2.43	0.10	10	1	2.69	0.25	10	-
Argentina	1.73	15	1.77	0.04	13	2	2.66	0.89	11	2
Kenya	1.74	14	1.74	-	16	-2	2.51	0.77	12	4
Uganda	1.68	16	1.77	0.08	14	2	2.33	0.56	13	1
Vietnam	1.62	17	1.68	0.06	17	-	2.28	0.60	14	3
Costa Rica	2.35	10	2.41	0.06	11	-1	2.18	-0.23	15	-4
Honduras	1.56	20	1.56	-	20	-	2.04	0.48	16	4
Ecuador	1.59	19	1.59	-	19	-	2.04	0.45	17	2
Bangladesh	0.66	43	0.65	-0.01	43	-	2.02	1.37	18	25
Dominican Republic	2.12	12	2.20	0.08	12	-	1.89	-0.31	19	-7
Tanzania	0.97	30	0.97	-	33	-3	1.74	0.76	20	13
Guatemala	1.45	21	1.45	-	23	-2	1.69	0.25	21	2
Tajikistan	0.80	39	0.80	-	39	-	1.68	0.88	22	17
Congo (Dem. Rep.)	0.90	34	1.07	0.17	29	5	1.67	0.60	23	6
Nigeria	0.99	29	1.01	0.02	31	-2	1.65	0.64	24	7
Zambia	1.34	22	1.51	0.17	22	-	1.61	0.10	25	-3
Ghana	1.77	13	1.76	-0.01	15	-2	1.59	-0.18	26	-11
Rwanda	0.67	42	0.67	-	42	-	1.55	0.88	27	15
Sri Lanka	0.08	54	0.58	0.50	45	9	1.55	0.97	28	17
Pakistan	0.81	38	1.30	0.49	24	14	1.54	0.24	29	-5
Egypt	NA	NA	NA	NA	NA	NA	1.54	NA	30	NA
Nicaragua	1.61	18	1.53	-0.08	21	-3	1.52	-	31	-10
Paraguay	1.26	25	1.26	-	25	-	1.48	0.22	32	-7
Lebanon	NA	NA	NA	NA	NA	NA	1.47	NA	33	NA
Belize	1.05	27	1.22	0.17	26	1	1.46	0.24	34	-8
Bolivia	1.33	23	1.21	-0.12	27	-4	1.44	0.23	35	-8
Nepal	1.26	24	1.01	-0.25	30	-6	1.41	0.39	36	-6
Sierra Leone	0.27	52	0.27	-	51	1	1.39	1.12	37	14
Cameroon	0.88	35	0.88	-	37	-2	1.38	0.49	38	-1
Panama	0.91	33	0.93	0.02	36	-3	1.37	0.43	39	-3
Jamaica	1.18	26	1.18	-	28	-2	1.37	0.19	40	-12
El Salvador	0.85	36	0.98	0.13	32	4	1.35	0.37	41	-9
Malawi	1.01	28	1.60	0.58	18	10	1.34	-0.26	42	-24
Ethiopia	0.97	32	0.97	-	35	-3	1.33	0.37	43	-8
Zimbabwe	0.97	31	0.97	-	34	-3	1.32	0.35	44	-10
Jordan	NA	NA	NA	NA	NA	NA	1.28	NA	45	NA
Guyana	0.71	41	0.71	-	40	1	1.07	0.37	46	-6
Botswana	0.39	50	0.36	-0.04	50	-	1.04	0.69	47	3
Barbados	0.56	46	0.56	-	46	-	0.98	0.41	48	-2
Senegal	0.44	47	0.69	0.25	41	6	0.96	0.26	49	-8
Mozambique	0.82	37	0.82	-	38	-1	0.85	0.03	50	-12
Bahamas	0.42	49	0.42	-	49	-	0.77	0.35	51	-2
Venezuela	0.60	44	0.60	-	44	-	0.75	0.15	52	-8
Cote d'Ivoire	0.42	48	0.42	-	48	-	0.73	0.31	53	-5
Trinidad & Tobago	0.59	45	0.50	-0.08	47	-2	0.56	0.06	54	-7
Liberia	0.18	53	0.18	-	54	-1	0.55	0.36	55	-1
Haiti	0.07	55	0.07	-	45	10	0.49	0.42	56	-11
Myanmar	0.71	40	0.21	-0.50	53	-13	0.46	0.25	57	-4
Suriname	0.33	51	0.25	-0.08	52	-1	0.31	0.06	58	-6

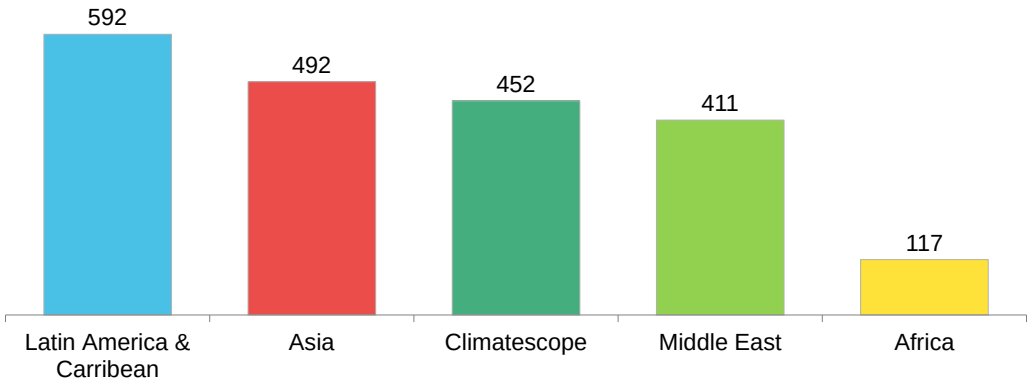
SECTION 4. REGIONAL SUMMARIES

4.1. AFRICA AND THE MIDDLE EAST

KEY FINDINGS

Of the three regions surveyed in Climatescope, Sub -Saharan Africa has by far the least installed generation capacity per capita, highlighting severe shortages and massive unmet demand (Figure 37). In all, the 19 Climatescope countries in the region had a total installed capacity of just over 86GW in 2015, 4.6GW of which are renewables. By comparison, the United Kingdom has over 90GW of total capacity installed and the US over 1,000GW installed.

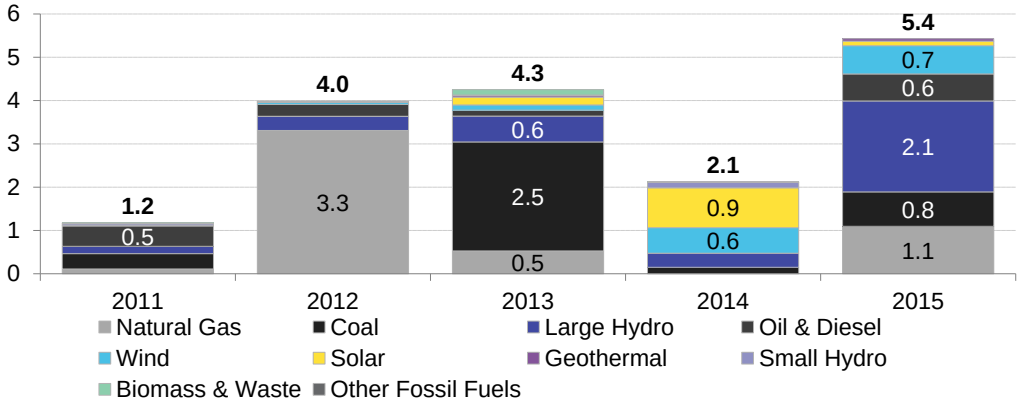
Figure 37: Megawatts installed generation capacity per million inhabitants in Climatescope regions (MW), 2015



Source: Climatescope 2016

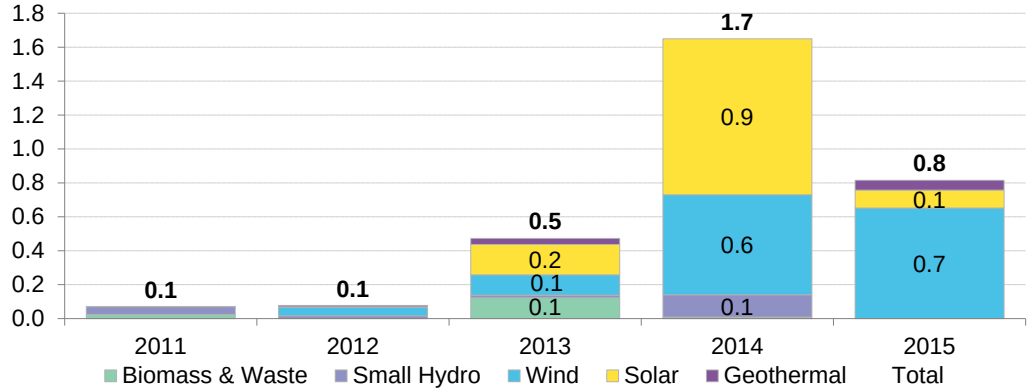
Among sub-Saharan nations, South Africa is the outlier. The country has 845MW of installed capacity for every million inhabitants. It is also home to more than half of the regional Climatescope countries' total capacity and renewable capacity, with 43.7GW and 2.6GW, respectively. Annual capacity additions in sub-Saharan Africa are quite uneven due to the relatively small size of the region's power systems. In fact, the commissioning of a single project or two can have major impact on the region's overall figures for a year (Figure 38 and Figure 39). This explains what would otherwise appear to be a significant slowdown in solar projects commissioning in South Africa, which dropped from 909MW in 2014, a record year for new solar thermal plant connections, to 101MW in 2015. Ethiopia, which commissioned 150MW of onshore wind in 2015, nearly doubling its cumulative wind capacity since 2010, is second only to South Africa in terms of new installations. Kenya's geothermal sector consolidated its standing as a global leader, adding 58MW and raising total installed capacity for the technology to 740MW at the end of 2015.

Figure 38: Total annual capacity additions in Climatescope sub-Saharan Africa nations, 2011 – 2015 (GW)



Source: Climatescope 2016

Figure 39: Annual renewable energy capacity additions in sub-Saharan Climatescope Africa nations, 2011 – 2015 (GW)



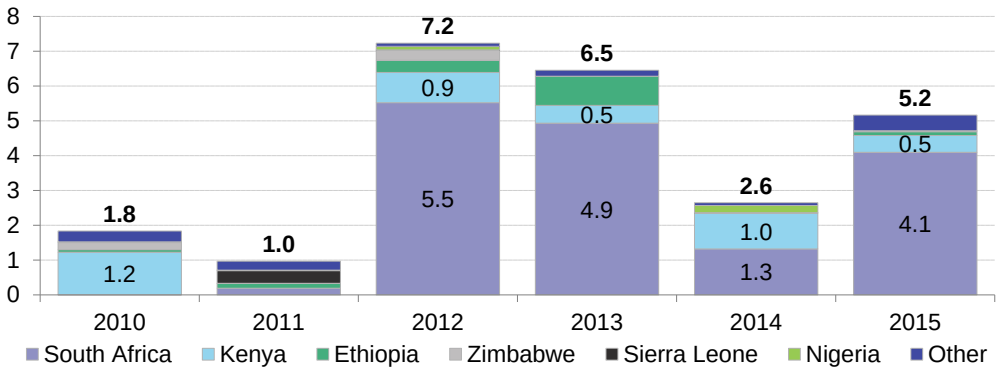
Source: Climatescope 2016

Hydro, large and small, is the carbon-neutral source of electricity on which the continent currently relies most, with just under 20GW of capacity installed, 671MW of which is in South Africa. The overall reliability of generation fluctuates with the availability of water resources and the condition of hydro generators, which is often poor. The average capacity factor for hydro projects in the region stood at 53% in 2015 – far below typical hydro capacity factors, which can top 80%. In countries suffering from drought conditions, capacity factors can be much lower. In Zambia, for instance, hydro accounts for 95% of installed capacity but droughts have meant that, at best, only a third of that capacity was available in 2015.

CLEAN ENERGY INVESTMENTS AND THE RISE OF SOLAR

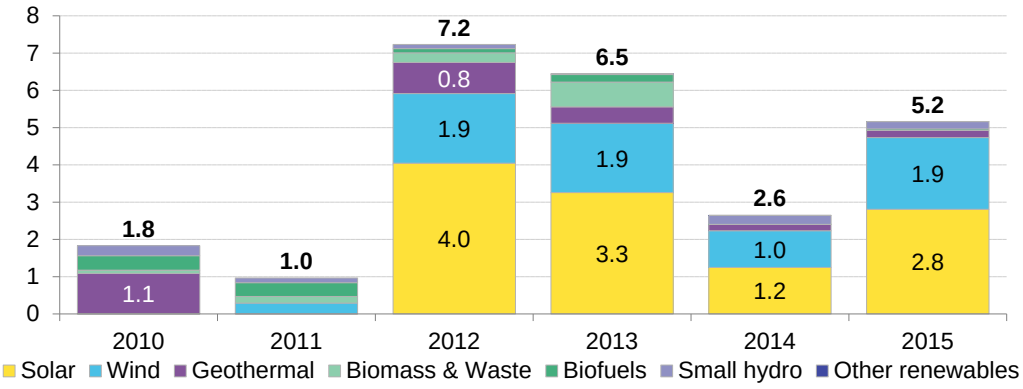
Clean energy investment across sub-Saharan Africa nearly doubled from 2014 to 2015, rising to $5.2bn (Figure 40 and Figure 41). This was largely due to a strong performance from South Africa, where investment recovered from $1.3bn in 2014 to $4.1bn in 2015, closer to the record levels seen in 2012 and 2013. South Africa's landmark deal in 2015 was the $1.1bn 100MW solar thermal Ilangalethu Karoshoek Solar Valley project. Other significant deals included three onshore wind farms and a solar PV portfolio, each financed for $200-400m. These deals confirmed South Africa's status as one of the world's top investment destinations for clean energy.

Figure 40: Sub-Saharan Africa Climatescope clean energy investment by country, 2010 - 2015



Source: Climatescope 2016

Figure 41: Sub-Saharan Africa Climatescope Clean energy investment by source, 2010-2015



Source: Climatescope 2016

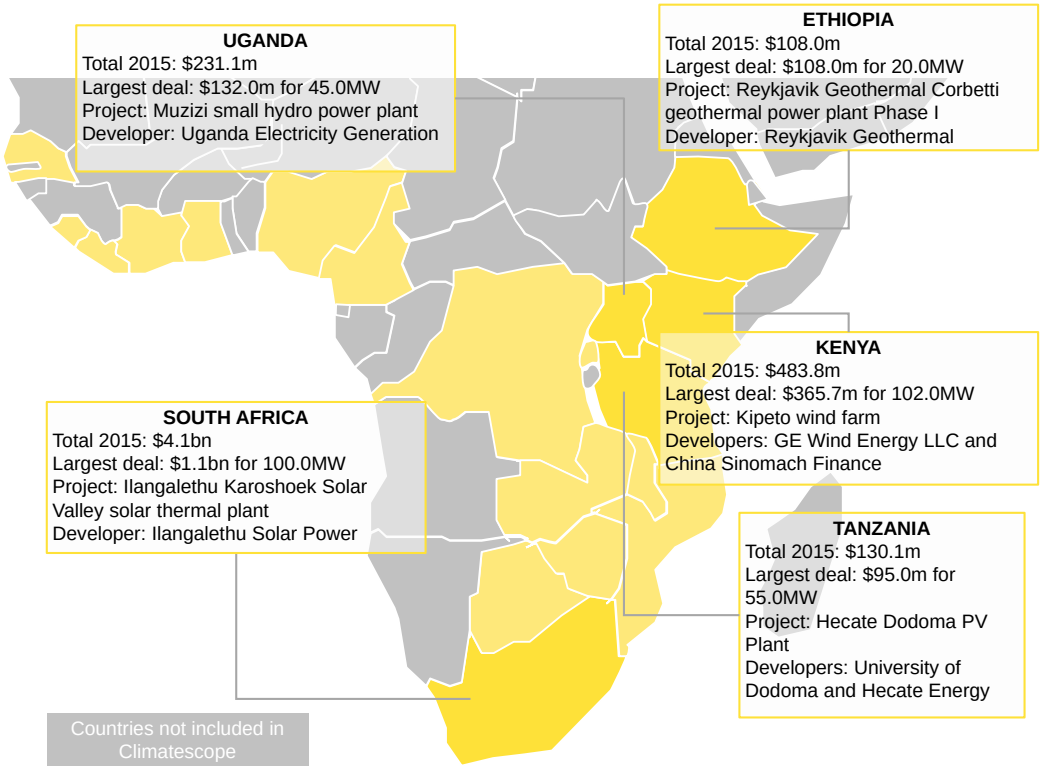
Seven other African countries reviewed in Climatescope attracted new investment in 2015. The $316m financing of the 100MW Kipeto onshore wind farm in Kenya was another record-breaking deal for the country following the conclusion of the $859m Lake Turkana wind project financing in 2014. Ghana, Senegal and Uganda enabled Sub-Saharan Africa to post an all-time record year for new asset finance in the solar PV sector outside of South Africa. Together, they attracted a combined estimated $160m in investment for 110MW of solar PV projects.

All of this marked a remarkable step up for the region, considering just 12MW of solar PV secured financing in 2014 and 56MW in 2013. This acceleration is set to continue in 2016, with 145MW of solar PV already tracked by Bloomberg New Energy Finance as of Q3 (South Africa excluded). Senegal continues to make progress on its pipeline, with 80MW of solar PV and 158MW of onshore wind financed in the first three quarters of 2016.

Activity in Ethiopia's geothermal sector also continued in 2015 with the $100m financing of the first phase of Reykjavik Geothermal's Corbetti power plant. The year 2015 was good for new investment in clean energy across Sub-Saharan Africa, with deals exceeding $95m recorded in four countries outside South Africa (Figure 42). Finally, private equity and venture capital flows into off-grid solar accelerated from 2014 to 2015. Off-grid electrification companies in Kenya, Tanzania and Zimbabwe received approximately $80m in 2015, more than four times the amount

recorded in 2014, confirming the emergence of East Africa as the global leading region in the sector.

Figure 42: Top five clean energy projects financed in Asian countries reviewed in Climatescope, 2015

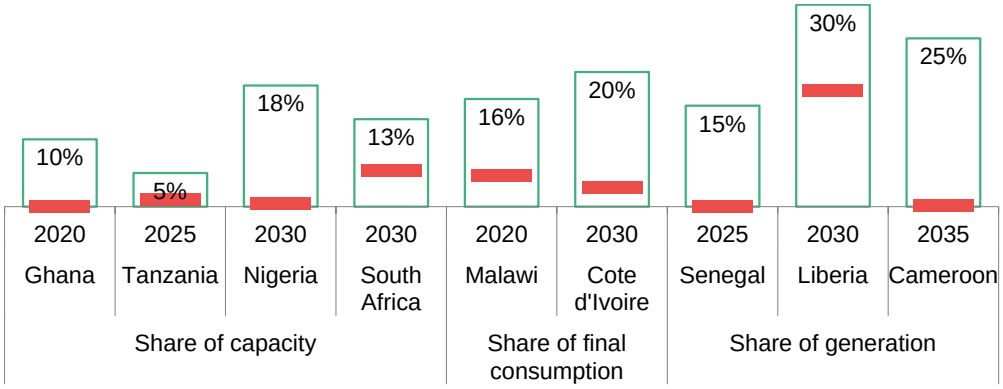


Source: Climatescope 2016

THE ROLE OF RENEWABLES IN GOVERNMENT OBJECTIVES IS GROWING

Clean energy policies are becoming more widely adopted across Sub-Saharan Africa. Fourteen of 19 Climatescope countries from the region have set domestic renewable energy build targets. Specifically, the negotiations that culminated in governments signing the Paris climate pact in late 2015 have prompted African nations to commit to clean energy targets or to update their existing commitments (see Parameter I summary). The overall target levels are ambitious in a number of markets, especially when considering the current contribution of renewables to the power mix (Figure 43).

Figure 43: Select renewable energy targets and 2015 share of renewables in Sub-Saharan Africa

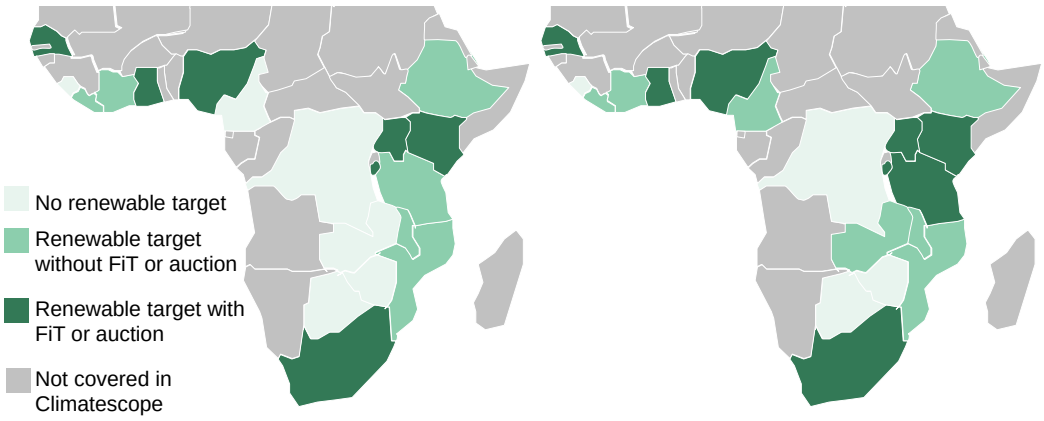


Source: Climatescope 2016

Some targets have also become more sophisticated. For example, the government of Rwanda has been working on an update of its electrification plan that includes a new breakdown of electrification targets by off-grid systems and mini-grids. As before, Rwanda aims to reach an installed capacity of 563MW, up from just over 170MW, and 70% of electrification, both by 2018.

While the overall trend appears positive, there are countries that have not reviewed the ambition of their targets, which remain relatively low. Tanzania only plans to install 100MW of solar, 200MW of geothermal and 200MW of onshore wind by 2025 against a complete power-generating matrix of 10.7GW.

Figure 44: Utility-scale renewables support in Africa, 2013 and 2015



Source: Climatescope 2016

Meeting those objectives will also require governments to establish supporting policies, as well as to ensure the existence of power markets and physical systems to support renewables growth. Nearly two thirds of the sub-Saharan African countries reviewed in Climatescope either have no target, or have targets without feed-in tariffs, auction or other forms of support policies in place to ensure they are met (Figure 44).

Clean energy equipment is partly or completely exempted from taxation or import duties in all Sub-Saharan Africa countries reviewed in Climatescope, with the exception of Sierra Leone. However, actually securing such duty or tax exemptions is often difficult due to poor implementation or corruption. Some governments in the region are now looking to review such

duty exemptions, most notably those in the East African Community, now that activity is accelerating and the associated lost revenue becomes more evident.

There have also been promising examples of countries looking to emulate the successes of South Africa's auction program. Senegal, Tanzania and Zambia are all part of the International Finance Corporation's Scaling Solar initiative, which seeks to support the development of privately funded grid-connected solar projects at competitive tariffs.

The first round of tenders in Zambia was held between January and June 2016 and produced average bids of $67/MWh, with Italy's Enel and a consortium of USA based solar manufacturer First Solar and France's Neoen. Supported by IFC, the tenders offer successful developers risk guarantees and access to concessional financing. Nigeria has also recently committed to using auctions and will be a country to watch in Climatescope 2017.

ENERGY MARKET REORGANISATION IS MAKING SOME PROGRESS AND OFFTAKE RISK IS INCREASINGLY BEING ADDRESSED

Energy sectors in the Sub-Saharan African markets reviewed in Climatescope tend to be dominated by single, and often state-owned, utilities responsible for a large share of generation, as well as all transmission and distribution. "Unbundling" such utilities and liberalizing a country's electricity sector are often challenging, lengthy and politicized processes.

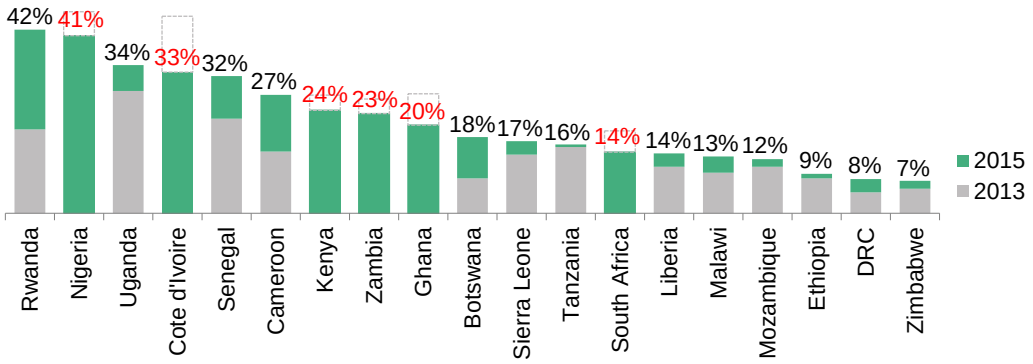
Seven of the 19 Climatescope sub-Saharan Africa countries failed to score any points for taking action on utility unbundling in Climatescope 2016, down from 11 in the 2015 edition. New countries to take at least some action on this front include Cameroon, Mozambique, Rwanda, Sierra Leone and Tanzania. Liberia and Malawi are amongst the countries that have already introduced policies to unbundle the energy sector further in coming years. Cote d'Ivoire, Ethiopia, Ghana, Kenya, Nigeria, Senegal, Uganda and Zambia introduced some level of unbundling as of 2013.

Scores on this indicator demonstrate the progress achieved by Sub-Saharan African countries in improving their power sector structures (Figure 45). Nigeria, Cote d'Ivoire and Ghana are the only countries that scored significantly lower on this assessment between 2013 and 2015.

The financial situation of off-takers in Nigeria has prevented the growth of new generation capacity both from renewable and fossil fuel sources. The government has introduced the Nigerian Bulk Electricity Trading organization to act as a viable off-taker in an attempt to address this.

In Cote d'Ivoire the generation sector has been opened to private sector participation but little has been done to support access to the market for renewables and the state remains heavily involved in the transmission system operator. Similar dynamics have affected Ghana's power sector, where developers have found it difficult to negotiate new PPAs with the government. However, the rising frequency of power outages in Cote d'Ivoire has also helped create a new incentive for solar PV and storage solutions in the residential and commercial sectors.

Figure 45: Sub-Saharan Africa Climatescope nations power market structures scores (% of maximum score, Climatescope 2014 vs. 2016)



Source: Climatescope 2016

Liberalization is focused on the generation market with transmission and distribution almost always in the hand of either a single national utility, or several utilities each with monopolies over specific geographic areas. The role of independent power producers (IPPs) remained relatively stable between 2013 and 2015, averaging 23% of generation across the region. However, the near doubling of IPP generation market share in Tanzania and South Africa over this period, from 26% to 47% and 3% to 6%, respectively, shows how rapidly the situation can evolve.

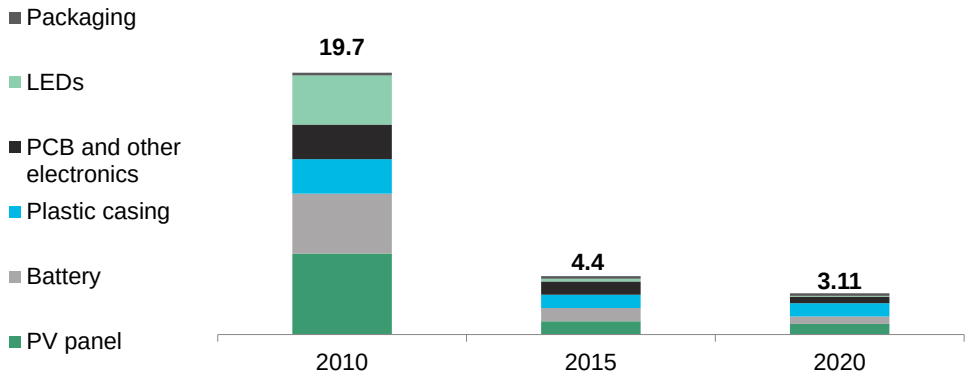
Structural challenges such as offtake risk, abuse of influence by incumbent utilities and political or currency risk continue to limit the growth of IPPs and renewables in the region. However, a number of countries have taken measures to address these challenges, and the average score on the off-take risk indicator for sub-Saharan African nations in the survey has risen from 0.38 in 2014 (against a maximum 2.0 score) to 0.61 in this latest update.

The Nigerian government has created Nigeria Bulk Electricity Trading to act as a single offtaker for all IPPs, as the poor financial health and management of the country's distribution company has caused payment delays. Uganda received support from the International Finance Corporation and World Bank to award two 50MW solar PV project contracts that protect developers from political and currency risk and give access to concessional financing. Senegal and Tanzania are expected to follow suit. Finally, the South African treasury has agreed to assume responsibility for all payments to renewable energy project developers under the country's IPP program in cases where state-owned utility ESKOM cannot. Climatescope scores countries based on the risk posed to project developers by local off-takers, or buyers of their power.

OFF-GRID RENEWABLES ARE MAKING INROADS

Exceptional cost reductions for different components used in off-grid electrification solutions are starting to transform the power sector in Sub-Saharan Africa (Figure 46).

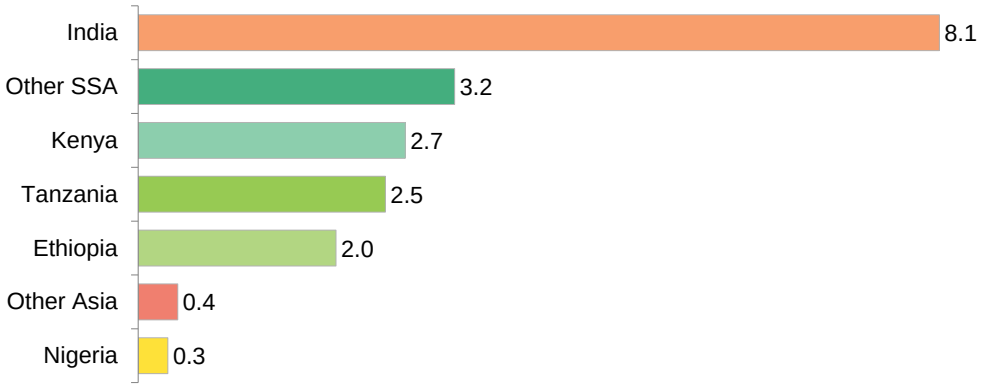
Figure 46: Pico-solar lantern cost development ($ per unit)



Source: Bloomberg New Energy Finance, company interviews, Lighting Africa 2010 report, EERE Solid Stated Lighting Program

Just under 11m households in the region were using pico-PV systems to electrify their homes as of June 2015, typically with solutions sufficient to power a couple of lights and charge mobile phones, according to BNEF research (Figure 47). However, it is also clear that the penetration of off-grid solutions is quite uneven across the continent.

Figure 47: Estimated number of households using pico-PV (millions), June 2015



Source: Bloomberg New Energy Finance, Lighting Global, GOGLA Note: assumes 10% repeat sales, 3% loss, repurchase after 3 years and discounts 80% of unbranded products. Data for Bangladesh excludes solar products sold under the IDCOL program.

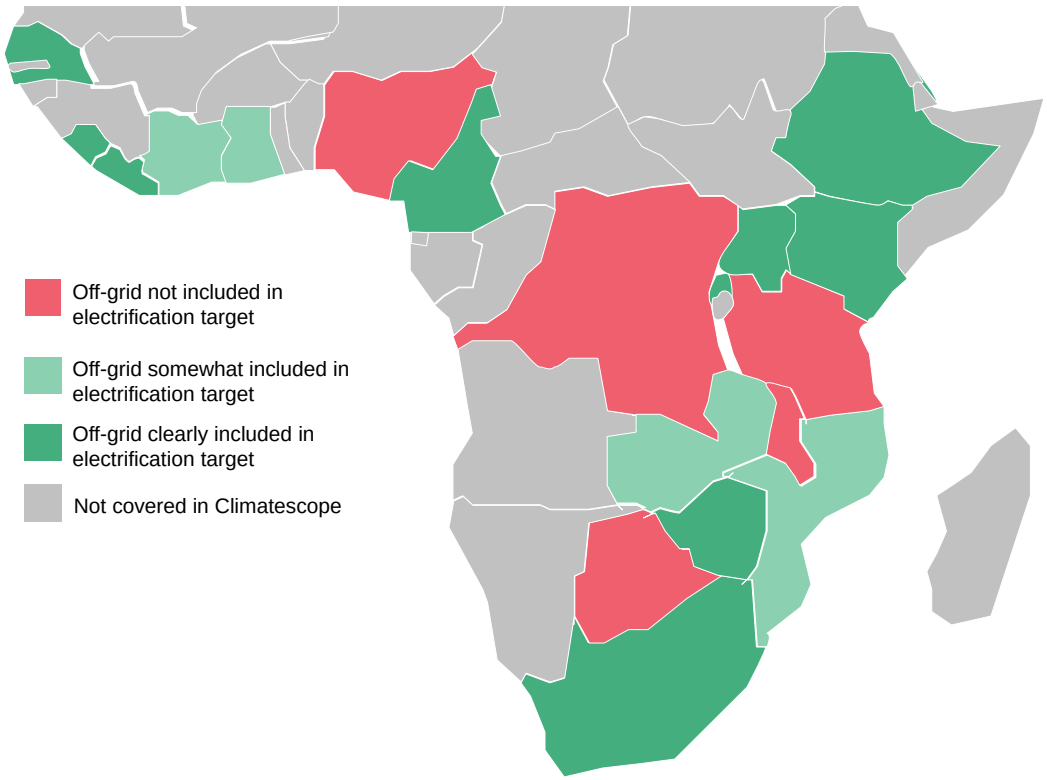
East African nations have seen the highest uptake of off-grid technology, and this includes the Sub-Saharan markets reviewed in Climatescope. This was achieved due in large part to a positive enabling environment combining high mobile phone and mobile money penetration with harmonized taxation schemes favoring renewable energy off-grid technologies applied across all members of the eastern Africa economic community.

The region is home to some of the world's most successful pay-as-you-go (PAYG) solar companies, and they have attracted a growing interest from venture capital (VC) investors. Off-grid solar companies located in the sub-Saharan Africa markets reviewed in Climatescope attracted around $115m of VC investments since 2012, $90m of which was invested in East African countries, primarily into PAYG activities.

Globally, Bloomberg New Energy Finance tracked $551m of investment in the off-grid renewables sector, excluding minigrids, as of the first quarter of 2016. The potential for off-grid electrification solutions is also increasingly being recognized by the governments of the region. All 19 Sub-

Saharan Climatescope countries have stated targets for improving electrification rates. Among them, 13 have explicitly detailed plans to incorporate off-grid solutions to achieve their goals (Figure 48).

Figure 48: Countries including off-grid solutions in their national electrification targets



Source: Climatescope 2016

The effective level of government support for off-grid solutions still varies greatly across the continent. Rwanda has fully recognized the cost saving potential and application of different off-grid technologies and has established targets for pico-solar system distributions, mini-grids and grid extensions with similarly ambitious budget targets for each. This a marked move away from electrification plans in the region in the past, which have tended to focus heavily on grid extensions.

Cote d'Ivoire on the other hand, has earmarked just under 5% of its rural electrification budget for isolated systems, and the government has made clear that a stronger emphasis will be put on the subsidization of grid extensions and new consumer connections. Coming years will be critical in deciding what contribution off-grid energy solutions will make toward electrification of Sub-Saharan African markets as governments and donor agencies have made access to electricity a top priority.

In many cases, the use of renewables in mini-grids or stand-alone systems offers a cost-effective way to provide consumers access to the energy services they need most, lighting and the charging of low-power devices such as mobile phones. Ensuring that electrification plans are drafted with full recognition of the costs and technological profiles of different solutions will be essential toward ensuring that access scales as quickly – and cost effectively – as possible.

Starting in 2017, the Global Climatescope website will be enriched with quarterly market updates on trends in the off-grid industry.

REGIONAL SUMMARY – AFRICA AND THE MIDDLE EAST										
Countries	2014		2015				2016			
	Score	Rank	Score	Δ score	Rank	Δ rank	Score	Δ score	Rank	Δ rank
South Africa	1.92	1	1.91	-0.02	1	-	2.21	0.30	1	-
Uganda	1.52	2	1.68	0.17	3	-1	2.05	0.36	2	1
Kenya	1.73	3	1.74	0.02	2	1	2.01	0.27	3	-1
Jordan	NA	NA	NA	NA	NA	NA	1.87	NA	4	NA
Rwanda	1.20	5	1.41	0.21	5	-	1.73	0.31	5	-
Tanzania	1.23	6	1.22	-0.01	6	-	1.53	0.31	6	-
Sierra Leone	0.76	16	0.79	0.03	13	3	1.35	0.56	7	6
Ghana	1.15	9	1.07	-0.08	8	1	1.34	0.28	8	-
Nigeria	1.23	8	1.58	0.34	4	4	1.34	-0.24	9	-5
Liberia	0.91	7	0.91	-	11	-4	1.33	0.42	10	1
Ethiopia	1.25	4	1.17	-0.08	7	-3	1.29	0.12	11	-4
Cameroon	0.65	18	0.56	-0.08	18	-	1.13	0.57	12	6
Senegal	0.89	12	0.86	-0.03	12	-	1.09	0.23	13	-1
Zambia	1.07	10	0.99	-0.07	10	-	1.07	0.08	14	-4
Lebanon	NA	NA	NA	NA	NA	NA	1.02	NA	15	NA
Zimbabwe	0.76	15	0.70	-0.06	16	-1	1.01	0.31	16	-
Egypt	NA	NA	NA	NA	NA	NA	0.97	NA	17	NA
Malawi	0.92	11	1.01	0.09	9	2	0.89	-0.12	18	-9
Botswana	0.62	19	0.59	-0.03	17	2	0.84	0.25	19	-2
Mozambique	0.79	14	0.77	-0.02	14	-	0.80	0.03	20	-6
Congo (Dem. Rep.)	0.69	13	0.55	-0.14	19	-6	0.74	0.19	21	-2
Cote d'Ivoire	0.83	17	0.71	-0.12	15	2	0.71	-	22	-7

4.2. ASIA

KEY FINDINGS

Asia, led by China and India, installed far more clean energy capacity in 2015 than the other two regions surveyed by Climatescope. China is of course at the heart of this and it posted another record year despite being in the midst of far-reaching power sector reforms. Taking a cue from Germany and others, China now plans to transition away from fixed tariff-based mechanisms toward market-based incentives for renewables. This follows the trend seen in India where auctions have allowed the procurement of new solar PV capacity at record-low prices.

The growth of renewables has, however, not been free of challenges in China and India. Both are grappling with integrating this new, clean, but variable resource. Each are also confronting costs associated with subsidy programmes.

Other Climatescope Asia countries were hardly idle in 2015 though their performances were overshadowed by the region's two giants. New and important steps were taken to improve market conditions for renewables in a number of these countries, such as measures to improve access to capital for developers. Other efforts have targeted fossil fuel or retail power price subsidies, which can make it challenging for renewables to compete. Support across the region continues to grow for distributed generation, particularly as prices for PV equipment continue to sink. Typically, these have taken the form of new net metering and investment subsidies.

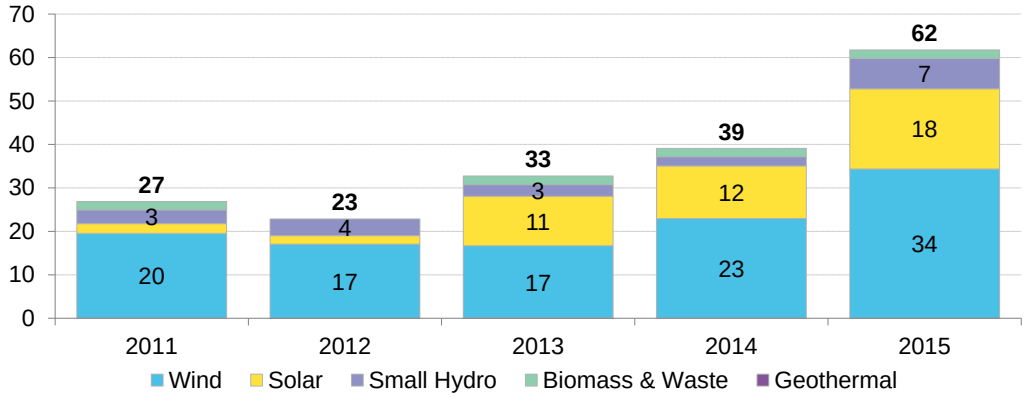
Nonetheless, there continue to be significant obstacles to clean energy's long-term growth in Asia. Integration problems have led to severe episodes of curtailment, with generators suffering from lost associated revenue. The financial well-being of local utilities (power distribution companies) continues to be in doubt, posing credit risks for developers looking to bring new projects on line. Finally, there are subsidies for retail electricity or fossil fuels. These are politically difficult to remove and can fundamentally undermine the economics of renewables.

RENEWABLE ENERGY CAPACITY GROWTH IS UNEVEN

In 2015, Asian nations surveyed in Climatescope set an annual record for new clean energy capacity added. No less than 62GW of wind, solar, small hydro and biomass plants were commissioned during the year – up 60% from 2014. Today, these countries are home to 308GW of renewable energy capacity (excluding large hydro), equivalent to France and Germany's combined total installed capacity.

Still, deployment has been unevenly split across the region. China, the world's second biggest economy, has embarked on what is by far the largest renewables deployment programme in history. It accounted for 90% of the region's new clean energy generation capacity installed in 2015. India was a distant second with 9% (5.6GW), mostly from wind and solar plants. China and India have seen renewable energy capacity installations grow every year since 2013, with onshore wind representing the bulk of the activity but solar accelerating recently (Figure 49).

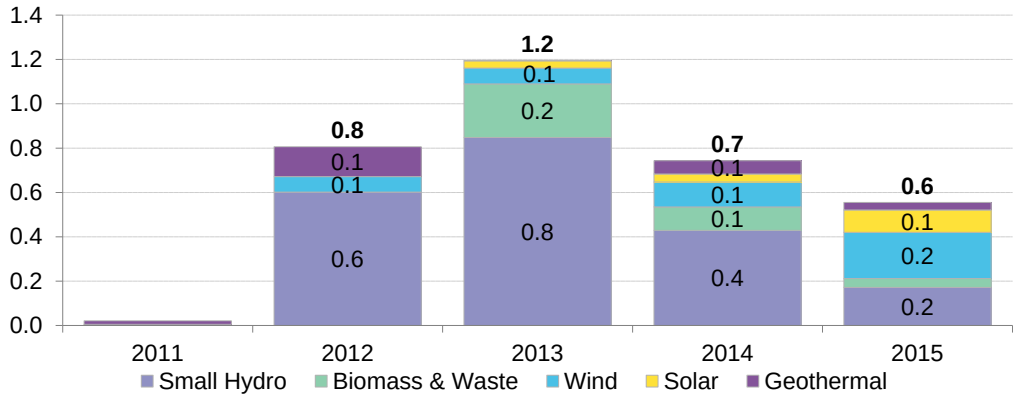
Figure 49: Annual capacity additions in China and India (GW), 2011-2015



Source: Climatescope 2016

Installations in the rest of the Asian countries reviewed by Climatescope have been more irregular, although total new solar and wind have grown each year since 2011 (Figure 50). Pakistan saw the biggest uptick in 2015, with 758MW of mostly wind and solar, approximately five times what got built the prior year. Further deployment is set to continue thanks to new support made available by the Pakistani government in 2015, some of which is support by China.

Figure 50: Annual capacity additions in Climatescope Asia nations, excluding China and India (GW), 2011-2015



Source: Climatescope 2016

Vietnam and Tajikistan doubled their small hydro capacity from 2010 to 2015 while Sri Lanka and Nepal increased theirs by around a third. Finally, Nepal and Bangladesh have made important progress in off-grid clean energy. This is not accounted for in Figure 50, which shows only utility-scale activity.

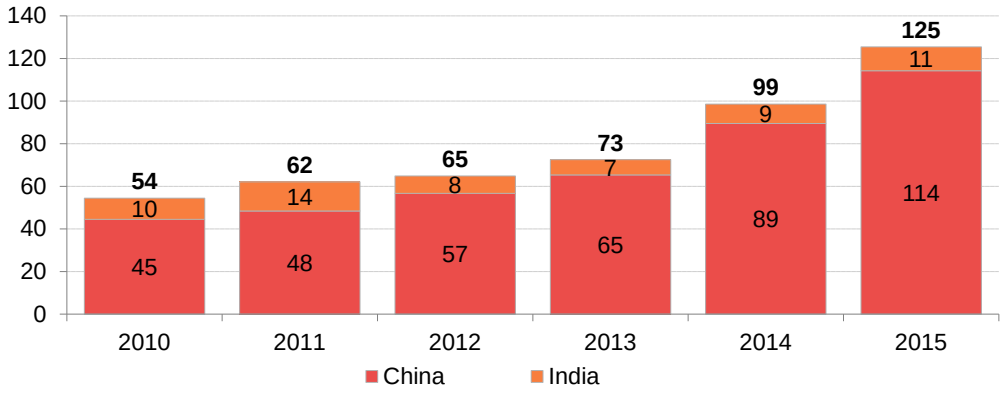
INVESTMENT IS SPREADING TO PAKISTAN

In 2015, the Climatescope Asia countries secured $127bn in clean energy investment, or 82% of that deployed in all the 58 nations surveyed. Asia is the only region where investment has grown every year since 2011.

China and India in 2015 remained the first and second largest renewable energy investment destinations, respectively, and continued to see capital flows grow (Figure 51). For the first time, solar surpassed wind, attracting $64bn, or just over half of total investment. Bioenergy and small

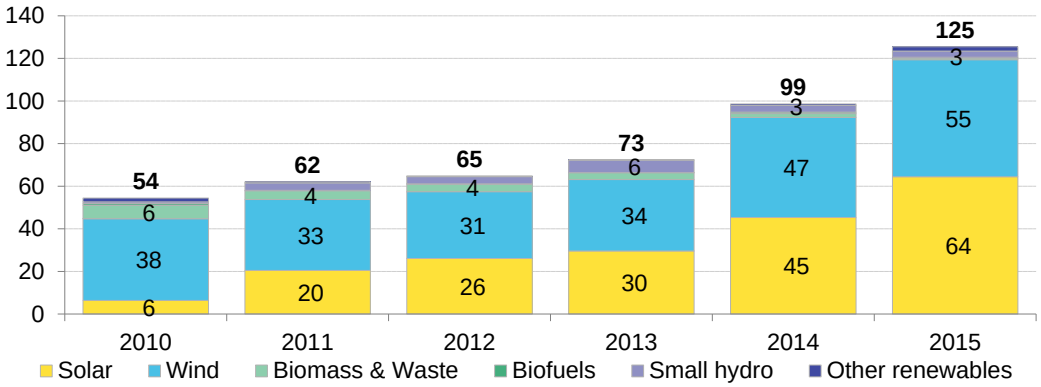
hydro have seen their shares shrink in recent years and accounted for a combined $6bn in 2015 (Figure 52).

Figure 51: Clean energy investment by country ($bn), 2010 - 2015



Source: Climatescope 2016

Figure 52: Clean energy investment by country ($bn), 2010 - 2015



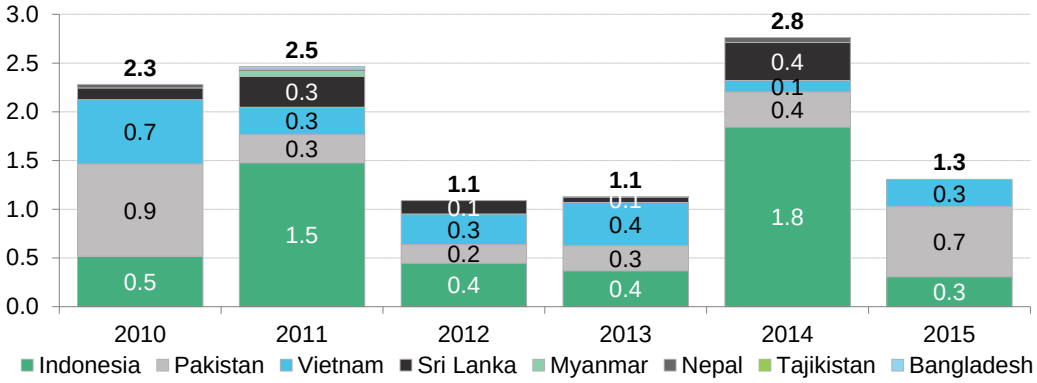
Source: Climatescope 2016

Away from India and China, other Asian nations saw a stark drop in investment, notably in geothermal projects. Total capital deployed in renewables in these countries fell by more than half, from $2.8bn to $1.3bn (Figure 53 and Figure 54).

Pakistan and Vietnam continued to raise their profiles with investors in 2015. Capital deployed doubled from $360m to $719m in Pakistan. In Vietnam, investment spiked to $280m in 2015 from $91m the prior year.

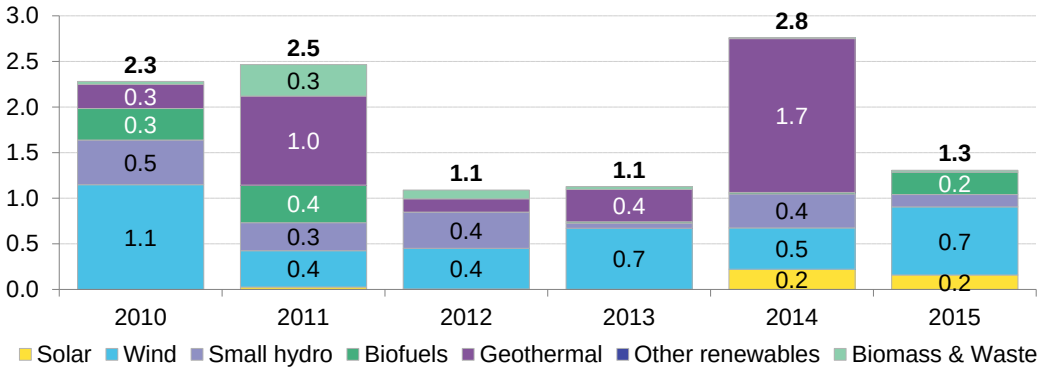
Indonesia, which had one of the highest levels of investment across all Climatescope countries in 2014, with $1.8bn, slipped to $308m in 2015. Indonesia's headline figure was substantially boosted in 2014 by the $1.6bn Chevron Gunung Salak 330MW geothermal plant.

Figure 53: Clean energy investment in Climatescope Asia countries (excluding India and China, $bn), 2010-2015



Source: Climatescope 2016

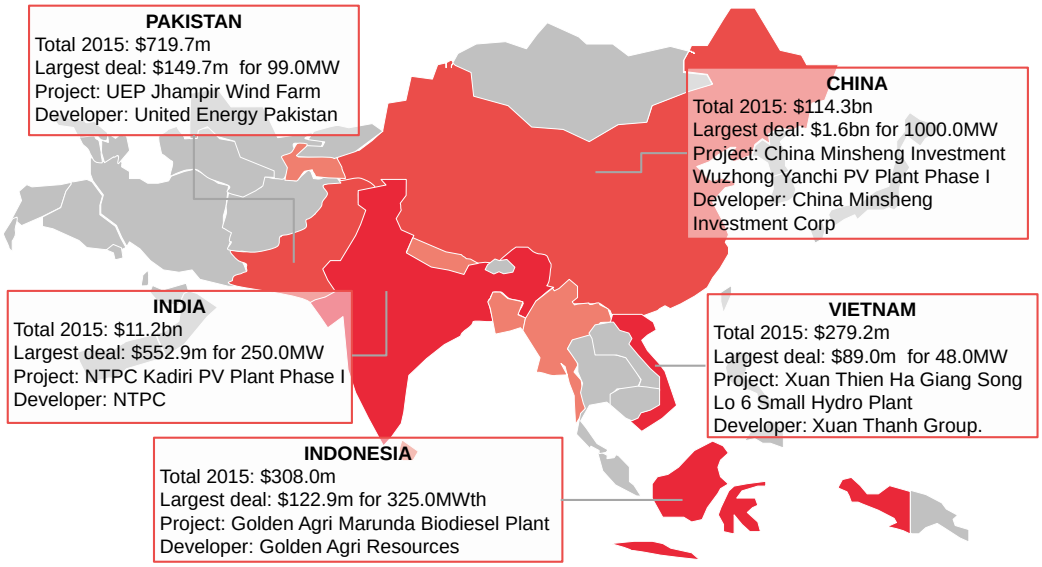
Figure 54: Clean energy investment in Climatescope Asia countries (excluding India and China) by technology ($bn), 2010-2015



Source: Climatescope 2016

On the technology front in 2015, once again solar struggled to exceed 200MW installed in non-China/India Climatescope Asia nations (Figure 6). However, the spread of projects has improved. In 2014, some 98% of solar PV project financings occurred in Pakistan. In 2015, Pakistan still led with just over half of investments in solar but Vietnam took a third and Indonesia the rest. Vietnam and Pakistan are the only countries in which onshore wind projects were financed, confirming their leading role in this sector amongst this sub-group of Climatescope Asia countries. Other countries in the region saw no financings of utility-scale assets in 2015; however, Nepal and Bangladesh continue to have activity in off-grid renewables.

Figure 55: Top five clean energy projects financed in Asian countries reviewed in Climatescope, 2015



Source: Climatescope 2016 Note: each country can only figure once.

POLICY FRAMEWORKS EVOLVE IN FAVOUR OF RENEWABLES OR THEIR INTEGRATION

Asian Climatescope economies are more heterogeneous than those in other regions, with some clearly “middle-income” and others still struggling with the most basic energy access issues. What they shared in 2015 was a growing commitment to renewables.

Most adopted more ambitious renewables targets over the course of the year. Others, such as Bangladesh and Indonesia, were unsatisfied with their first attempts at competitive tenders and reverted to using feed-in tariffs to support clean energy. Still others, including China, are moving in the opposite direction and plan to hold further auctions in coming months.

MORE AMBITIOUS TARGETS FOR RENEWABLES, EMISSIONS

Four of Climatescope’s Asia countries ratcheted their renewables targets up in 2015 or are now in the process of doing so. India adopted the extremely ambitious goal of installing 175GW of renewables by 2022, including 100GW of solar PV. The Vietnamese government presented a more modest rise in its renewable generation target from 4.5% of generation to 6.5% by 2020, primarily to be achieved through solar PV. The target includes 850MW capacity by 2020 and 12GW by 2030. Bangladesh raised its renewable energy capacity target from 2GW to 3.1GW by 2020 with the aim of having renewables account for 10% of total capacity. Finally, Tajikistan’s government approved a new renewable energy programme for 2016-2020 that includes over 63MW of small-hydro projects and 4.3MW of solar to be built over the next five years.

Growing policy ambition on renewables was paired with new greenhouse gas (GHG) emissions reduction commitments made by all Climatescope Asia countries ahead of the UNFCC-organized climate talks in December 2015. China and India, which accounted for 30% of 2012 global GHG emissions and are expected to see the highest absolute CO2 growth of all countries in coming years, ultimately played a critical role in the signing of the Paris accord. China pledged to cut the emissions intensity of its GDP by 60-65% against 2005 levels by 2030, and India by 33-35%.

MIXED EXPERIENCES WITH CLEAN ENERGY AUCTIONS

In 2004, China became the first country in the world to use competitive tenders on a large scale as part of its renewable energy policy regime (well ahead of Brazil's first renewables-specific auction in 2007). China used the auction to contract a sample of onshore wind projects ranging from 200MW to 1GW to establish the feed-in tariff that would be applied to the wider industry. The tariffs set started at $67.2/MWh (CNY 469) in 2003, bottomed out at $66.9/MWh (CNY 448) in 2006, and rose again to $78.2/MWh (CNY 515) in 2007, the year of the last auction.

Feed-in tariffs for wind and solar have since been used to allow China to become the world's largest demand market for both technologies. Now, China is poised to return to using auctions, this time in a much wider manner to minimise costs while maximising growth. The government rolled out plans in June 2016 for more extensive tenders, starting with the solar PV sector.

Separately, conditions for non-regulated power generators have improved in China. The country now allows consumers to sign direct power purchase agreements with clean power projects. Meanwhile, renewable portfolio standards have been set for utilities across all of China's provinces, with the first targets of 5-13% to be met in 2020.

China's newest efforts on tenders follows in the steps of India, where the federal and state auction programmes have led to the largest competitive procurement of solar PV capacity anywhere. The country's National Solar Mission alone awarded over 5GW of solar PV capacity contracts between 2013 and 2016, and the government recently set the extremely ambitious target of 100GW of solar PV installed by 2022, up from 4.4GW in 2015.

India's government is now looking to replicate the successes enjoyed in PV with onshore wind, with around 10GW of new capacity to be auctioned between 2016 and 2019. The feed-in tariff that is currently supporting onshore wind and varies from state to state will continue in parallel. Finally, state-level renewable portfolio standards are under review, with the possibility of ratcheting up their 2019 goals.

The transition towards market-based mechanisms and the competitive procurement of renewables is less clear in the smaller Asian nations examined by Climatescope. Indonesia introduced its first solar PV feed-in tariff only in 2016 and is targeting just 250MW of new capacity following a complicated experience with tenders in 2013. Participants challenged the results of that reverse auction on the basis that bidding requirements and local-content regulations were set unfairly. Bangladesh's tender programme on the other hand generated insufficient interest with around 150MW of projects contracted to date against a 500MW target in the pipeline.

BRIGHTENING CONDITIONS FOR RENEWABLE PROJECT DEVELOPERS

Lack of readily available capital and the risks associated with shaky off-takers are two challenges that have consistently plagued clean energy developers in emerging markets. But 2015 saw financial institutions and governments taking steps to mitigate both.

The Indian central bank added the renewable energy sector to its "priority" list in its lending guidelines to commercial banks. This in turn led to a reduction in its lending rate to commercial banks from 8% to 6.75% from 2014 to 2015 for funds earmarked for renewables. In Pakistan, the central bank made similar efforts specifically to help renewables by mandating commercial banks to provide developers of renewable power projects smaller than 10MW with debt at a fixed rate of 6% in 2015, down from 7.5% in 2014.

These efforts have been paired with measures to reduce off-taker risk. The federal government of India, for instance, has launched a debt restructuring scheme to cut operational losses at the country's state-level power distribution companies ("discoms"). The scheme will also improve their

solvency and ensure portions of their cash flows are ring-fenced specifically to compensate renewables project owners for the power they generate.

Tajikistan has released a new energy sector strategy that calls for the restructuring of state-owned utility Barqi Tojik (BT) and seeks to address the deficit that has accumulated in the energy sector from selling electricity to consumers at prices that are not reflective of cost. Indonesia and Vietnam also took steps to reduce tariff deficits by phasing out some fossil fuel subsidies with an eye toward creating a more level playing field for renewables.

Finally, Indonesia has focused on cutting red tape that has slowed project development, by moving all permitting processes to a “one-stop shop” in an agency set up by the ministry.

GROWING SUPPORT FOR DISTRIBUTED POWER GENERATION

India and Pakistan have joined Bangladesh and Nepal in supportingdistributed renewable energy with an eye toward boosting energy access. Almost all major Indian states had adopted net-metering policies by the end of 2015, and the federal government reinstated a 30% investment subsidy for solar rooftop systems installed by residential and institutional consumers such as schools, colleges and hospitals. In September 2015, Pakistan approved net metering regulations to allow domestic, commercial and industrial owners of distributed solar and wind to sell surpluses generated back to the grid.

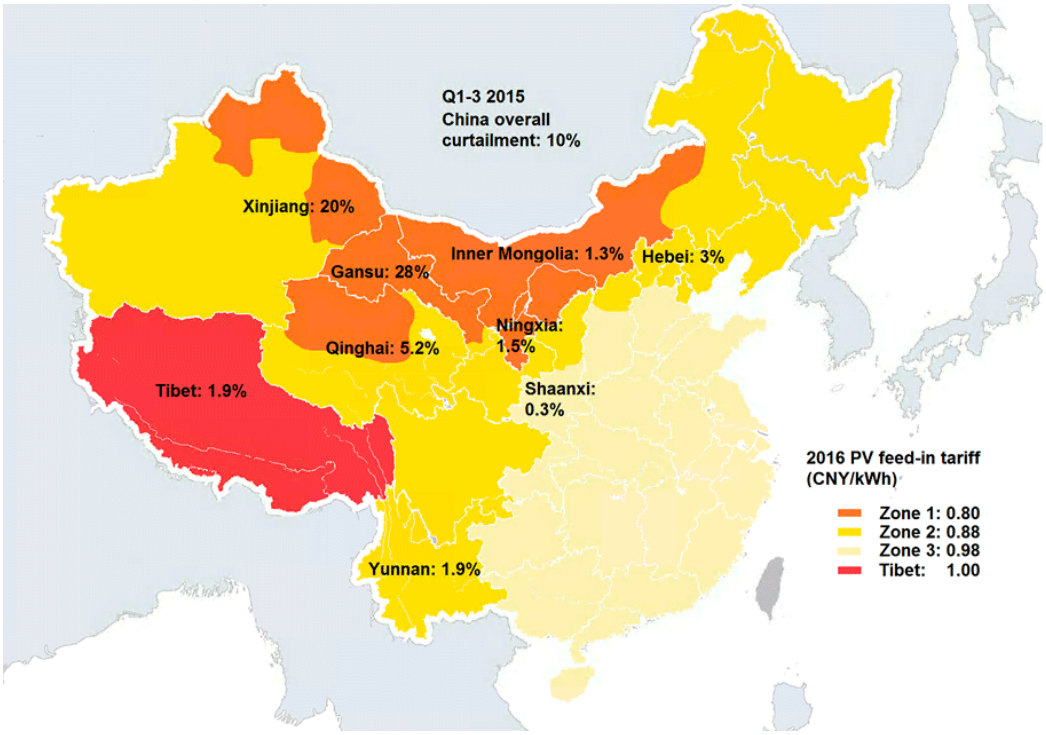
GRID CURTAILMENT, SUBSIDY PAYMENT DELAYS, AND OTHER CONTINUING CHALLENGES

Despite clear progress on certain areas, other challenges continue to plague clean energy in the Asian context. These include curtailment of production from certain renewables projects and non-payment by governments or utilities of certain subsidies.

Grid curtailment of renewable energy in China became more severe in 2015 (Figure 56 and Figure 57). In western provinces such as Gansu, 39% of wind power and 31% of solar PV generation never reached consumers for use. Legislation drafted in 2005 that would clearly prioritize renewables on the wires over fossil-fuelled power remains to be implemented. In what appeared to be progress in 2015, the federal government said utilities would be required to dispatch minimum volumes of renewable energy. However, it remains unclear how this will be enforced.

Curtailment woes have been compounded by subsidy payment delays. As of end-2015, the Chinese government owed solar and wind developers a cumulative subsidy payment of $8.2bn, with some developers awaiting arrears of more than three years.

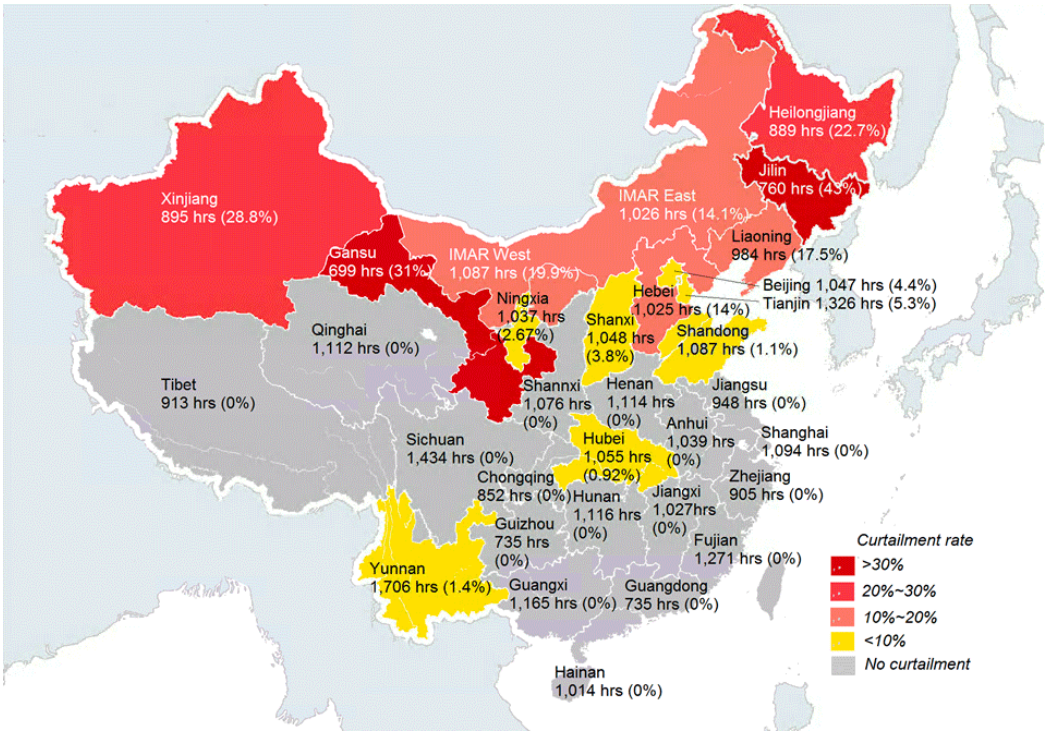
Figure 56: Solar curtailment, Q1-3 2015, and 2016 PV feed-in tariff



Source: Climatescope 2016

Development of long-distance transmission infrastructure to reduce curtailment risk is going full steam ahead in China and represents a definite bright spot for renewables project owners. China says it plans to invest $270bn in such infrastructure over the coming years, including in 11 new ultra-high voltage lines, many of which are already under construction. This is by far the most ambitious programme of its sort in the world and stands to have a transformative effect on the country's power system and its economy more broadly.

Figure 57: China provincial wind capacity factors and curtailment rates in H1 2015, (hr, %)



Source: Climatescope 2016

The first signs of solar curtailment have started to emerge in India, particularly in the state of Tamil Nadu. Seeking to address the problems and preventing more from emerging, India's federal energy ministry has asked central and state electricity regulators to award a must-run status for all solar and wind power plants in the country. However, this has proved ineffective thus far as local officials have largely avoided the edict. As of 2016, the Indian government has started considering additional regulations such as penalties for utilities that fail to prioritize zero-carbon energy.

The poor financial position of utilities in some Indian states has also led to delays in payments to generators for power delivered. Onshore wind developers specifically have suffered through up to one-year delays in payments in the states of Maharashtra, Madhya Pradesh and Rajasthan. Some state utilities have also delayed signing power purchase agreements with new wind projects that are ready to be connected to the grid.

That said, the government's debt restructuring programme is starting to deliver results. Some distribution companies are showing clear signs of repairing their balance sheets. Unfortunately, the financial problems for the discoms run deeper. Poor payment recovery and operational losses caused by subsidized retail electricity are likely to plague these companies for years to come, unless major reform is undertaken.

These structural challenges in China and India will need to be addressed if clean energy deployment is to continue at the pace seen in recent years. Between them, the two countries have 342GW and 30.5GW of new solar and wind capacity under development for which the power system will need to make space. The challenge is all the larger given that many of these projects are due to get built in the very areas that today are seeing significant curtailment.

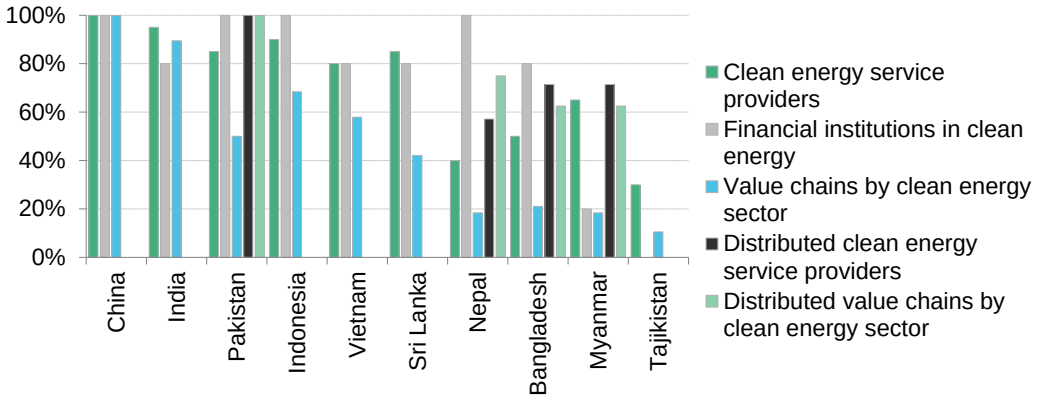
Other utilities in the region will also need to review their balance sheets to accommodate future growth in electricity generation from renewables and other technologies. Off-takers in Nepal, Vietnam and Indonesia have all shown signs of financial weakness in recent years.

VALUE CHAIN EXPANSION MOVES SOUTH

Asia as a region has become the world's manufacturing hub, a fact reflected in Climatescope's clean energy value chain scores. The region widened its lead over the other two surveyed on Parameter III with an average score across all Asian nations surveyed of 3.32. That marked a 0.09 improvement from Climatescope 2015 (Figure 58).

This change was largely due to supply chain expansion in India and Vietnam. China continues to achieve maximum scores for having the most complete renewables value chain amongst all Climatescope countries. As China's supply chain matures and labor costs in the country rise, international companies are relocating production lines to South and Southeast Asia. Chinese-owned companies themselves are also expanding abroad, choosing South and Southeast Asia as first locations for overseas manufacturing.

Figure 58: Value chain performance for Asia Climatescope countries, 2015



Source: Climatescope 2016

Other value chain enhancements came from the number of venture capital and funds specialising in clean energy companies and projects in Indonesia, Bangladesh and Nepal.

REGIONAL SUMMARY - ASIA										
Countries	2014		2015				2016			
	Score	Rank	Score	Δ score	Rank	Δ rank	Score	Δ score	Rank	Δ rank
China	2.23	1	2.29	0.06	1	-	2.53	0.23	1	-
India	1.85	2	1.81	-0.05	2	-	2.17	0.36	2	-
Pakistan	1.36	5	1.53	0.17	5	-	1.87	0.34	3	2
Indonesia	1.52	3	1.61	0.09	4	-1	1.69	0.08	4	-
Vietnam	1.41	4	1.28	-0.13	6	-2	1.56	0.27	5	1
Nepal	1.31	6	1.63	0.32	3	3	1.54	-0.08	6	-3
Bangladesh	1.26	7	1.20	-0.06	7	-	1.40	0.20	7	-
Sri Lanka	1.05	9	1.19	0.14	8	1	1.38	0.19	8	-
Myanmar	0.78	8	0.85	0.08	9	-1	0.90	0.05	9	-
Tajikistan	0.48	10	0.62	0.14	10	-	0.67	0.05	10	-

4.3. LATIN AMERICA AND THE CARIBBEAN

KEY FINDINGS

Latin American countries continue to be at the forefront in clean energy development among the nations assessed in Climatescope. Ambitious clean energy mandates and aggressive auctions are driving deployment in the region and allowing wind and solar projects to achieve record low prices. Markets are opening to new opportunities and engagements with the private sector. Investment is reaching new records and markets are adopting innovative finance instruments, like green bonds. Clean energy is opening new frontiers for service providers and equipment manufacturers, expanding the reach of the industry.

Still, the nascent industry faces challenges. Policymakers and energy planning agencies must adjust to the new dynamics presented by renewable projects. Meanwhile, entrepreneurs are learning to navigate macroeconomic and project-level risks. Investors and financiers are adapting to clean energy projects-specific requirements.

This marks the first Climatescope in which Brazil has not secured the top ranking in the Latin America and Caribbean region. The country's score is up over last year but did not rise at the pace of some other Latin America and Caribbean nations. While Brazil remains one of the top 10 global clean energy markets, its macroeconomic and political crisis has taken a significant toll on its renewable energy industry.

This year, for the first time, Chile occupies the first position in Latin America, mainly due to record investment, which jumped from $1.3bn in 2014 to $3.2bn in 2015. Renewables have had a big impact on Chile's power sector, contributing to a drop of wholesale prices but also aggravating transmission congestion issues. With Brazil ranked second, Uruguay rounds out the top three thanks to high participation of renewables in the country's matrix. Uruguay's clean energy market is to a large degree now saturated, but the country still has plenty of work ahead in cutting greenhouse gas emissions.

RENEWABLE ENERGY CAPACITY

Latin America and the Caribbean (LAC) boasts higher clean energy penetration than any region assessed in Climatescope. As of year-end 2015, 12% of the 366GW installed in LAC was represented by biomass, wind, small hydro, solar and geothermal power-generating projects. These sources accounted for 10% of total installed capacity in the Asian countries covered by Climatescope, 3% in African countries and less than 1% in Middle Eastern and North African (MENA)[7] nations. If we include large hydro in the mix, 56% of Latin America's power grid is renewable. However, hydro generation overreliance has brought issues to several countries in the region.

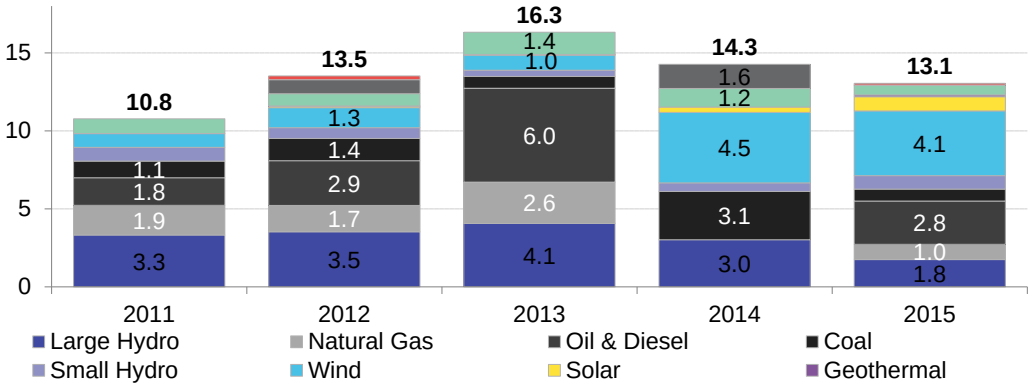
Historically, Brazil, Costa Rica, Uruguay and Panama have all suffered from droughts that have put their power matrices under severe stress. Most recently, Colombia and Venezuela faced crisis due to lower than expected hydro generation.

All of this has moved countries to contemplate energy diversification and support development of non-hydro renewables. This trend accelerated in 2014 (Figure 1 and Figure 2). And in 2015, wind, solar, small hydro, geothermal and biomass plants accounted for half of the 13GW of new capacity added in the region. The bulk came from wind (4.1GW), mostly in Brazil (2.6GW), Mexico (769MW), Uruguay (376MW) and Panama (150MW) and the market is expected to

7 Climatescope covers 10 countries in Asia and 19 countries in Africa and 3 in MENA.

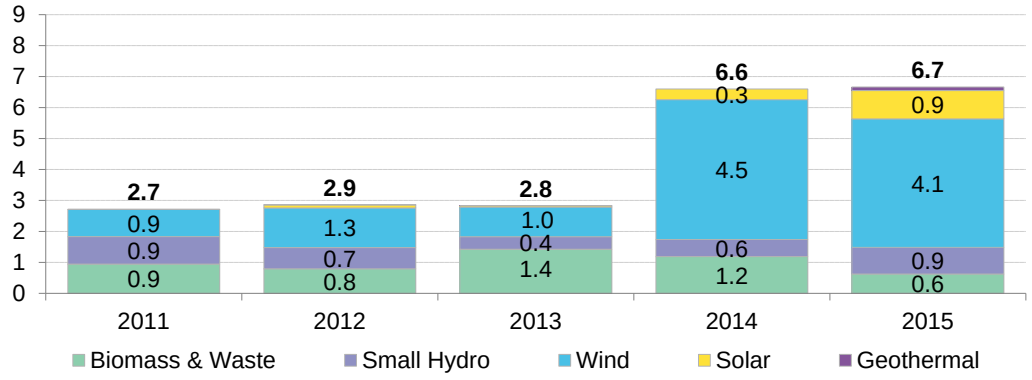
continue growing. In the next five years, Bloomberg New Energy Finance (BNEF) expects 22.5GW of new wind to be added in Latin America.

Figure 59: Annual capacity additions in Latin America and the Caribbean, 2011 – 2015 (GW)



Source: Climatescope 2016

Figure 60: Annual renewable energy capacity additions in Latin America and the Caribbean, 2011 – 2015 (GW)



Source: Climatescope 2016

Solar projects still represent just a small share of commissioned capacity in the region, but this is expected to change in coming years. BNEF foresees 9GW of utility-scale PV installed in Latin America between 2016 and 2018.

Despite the relatively small figures, 2015 set a record for PV capacity added, at 0.9GW. Over 40% of that came in tiny Honduras, driven by a generous feed-in tariff of $180/MWh for plants commissioned by 31 July 2015. Chile was second, with 305MW of solar added.

RENEWABLE ENERGY TARGETS

Latin America and Caribbean governments are stepping up support for clean energy. In 2015, the number of nations with renewable energy targets nearly doubled compared to the year before and included 18 of 26 nations surveyed for Climatescope in the region. This is up from just 10 countries in 2014. The drivers: the Paris agreement and the Intended National Determined Contributions (INDC) submitted to the United Nations in 2015.

Still, targets, compliance and ambition vary substantially among countries. Brazil is sticking to its conservative target as renewables uptake has been extremely successful to date. Peru, on the other hand, has failed to review its renewable portfolio standard, despite the fact it essentially

expired in 2013. Nicaragua has the extremely ambitious target of having renewables account for 91% of consumption by 2027 (up from 50% in 2015).

Finally, there are a number of countries where clean energy development has far exceeded original national targets. Uruguay, for instance, aimed to reach 15% of clean energy installed capacity by 2015 but more than doubled that to 34% last year. The country now aims to meet up to 38% of its electricity needs with wind energy alone by 2017.

CLEAN ENERGY POLICY

Latin America has led the world in its use of auctions to contract clean energy capacity and generation. Back in 2009, Brazil was one of the first to adopt auctions to contract renewables. At the time, this was novel compared to feed-in tariff schemes used in a number of European countries. Today, a total of 13 countries in Latin America and the Caribbean have adopted auctions and tenders as the main way to contract clean power – a trend that is also spreading globally (see Parameter I summary).

Auctions introduce a competitive element that pushes developers to deliver the best price possible under long-term power purchase agreements (PPAs). Clean energy projects are very capital-intensive at the development stage. Long-term contracts provide revenue certainty that helps developers to reduce project risk and improve financing conditions. The auctions have led to steep price declines across the region as developers fight for contracts.

However, auction mechanisms must be closely watched for irrational bidding or, worse still, market rigging. Brazil saw the former with its 2014 solar-specific auctions. Developers bid very aggressively for contracts, offering prices which at the time were feasible but would generate for them only very tight returns.

Shortly thereafter, the Brazilian economy went into a tailspin and its currency collapsed vs. the dollar. Developers that would have achieved narrow returns suddenly found themselves with projects and contracts that could not produce profits. Brazil stands as a cautionary tale of how market conditions can rapidly shift and catch developers – and policy-makers – off guard.

Similar risks could be taken into account in other nations with potentially volatile macroeconomic environments. In this respect, the recent trend toward allowing power purchase agreements to be signed in dollars is a welcome move.

While utility-scale clean energy installations are driven by auctions, net metering policies are helping the nascent Latin American distributed generation market grow. Net metering regulation has significantly increased in the region in the past two years. Currently, 11 countries have net metering policies in place, compared to just seven in 2013.

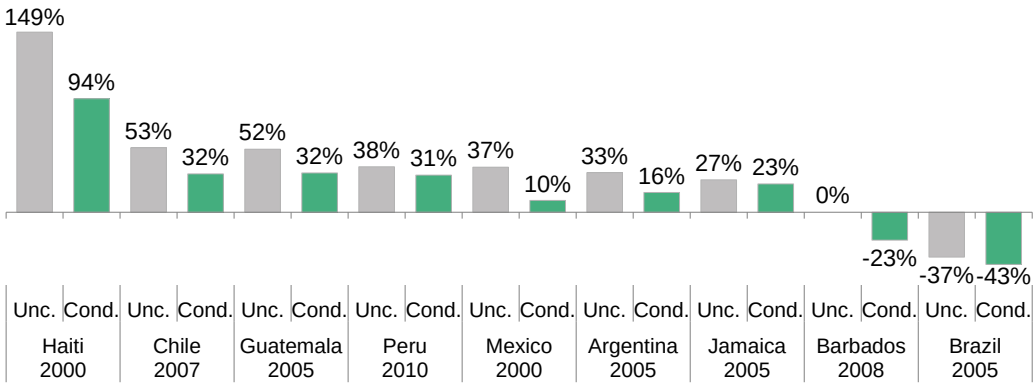
The benefits of self-generation policies are clearly seen in island nations heavily dependent on fossil fuels for energy generation and with high solar irradiation. Four of the six Caribbean islands reviewed in Climatescope have net metering policies in place. This figure is also high in Central America, where four of seven countries have self-generation policies enacted, but low in South America, where Brazil, Chile and Uruguay are the only markets in which users are allowed to sell their excess generation to the grid.

EMISSIONS' REDUCTION TARGETS

Compelled by the Paris talks, last year 24 Latin America and Caribbean countries submitted plans to the UN to address climate change. Among these, 20 included specific greenhouse gas (GHG) emission reduction targets, which are split into three types of commitments:

- **Absolute targets** are relative to real emissions in a base year and therefore are a commitment to an absolute reduction. Brazil and Costa Rica submitted absolute targets. Brazil, for instance, has committed to cut greenhouse gas emissions 37% below 2005 levels by 2025.
- **Intensity targets** are relative to GHG emissions per unit of GDP. Chile and Uruguay submitted intensity targets. Chile, for instance, has committed to cut greenhouse gas emissions by GDP unit by 30% below the 2007 level by 2030. We estimate that this will result in over 50% growth in emissions over the period.
- **Business as usual targets (BAU)** are relative to a BAU scenario, which is projected considering future economic and population growth and therefore result in an increase in emissions in absolute terms (Figure 3). Sixteen Latin America and Caribbean countries surveyed in Climatescope submitted BAU targets. Haiti, for instance, has committed to cut greenhouse gas emissions by 5% below the BAU by 2030. This implies an absolute increase in emissions of 149% by the target year. Targets can be conditional, unconditional or a combination of both. Conditional commitments are subject to international support while unconditional commitments rely on domestic resources alone. Nine countries in the region have disclosed detailed unconditional and conditional targets (Figure 3).

Figure 61: Unconditional and conditional absolute emissions in target year for select Latin America & Caribbean countries (%), relative to base year levels.



Source: INDCs, Climatescope 2016. Note: base year is indicated below country name, target year is 2030 for all countries but Brazil for which it is 2025. Barbados does not have an unconditional target.

Brazil has one of the world's most ambitious targets. The country's commitment to cut greenhouse gas emissions 37% below 2005 levels by 2025 can rise to 43% if the country receives international support. That would translate to 903MtCO2e reduction by 2025 compared to 2005. This figure is three times the amount emitted in 2012 by the 13 Central American and Caribbean countries combined.

Costa Rica is the only country in the region, and one of a handful in the world, that has included a carbon neutral component in its INDC. The carbon neutrality commitment was first announced back in 2007 as part of the country's National Climate Change Strategy. Costa Rica may use its Domestic Carbon Market as a complement to national and sectoral policies for emissions reduction in order to achieve this goal.

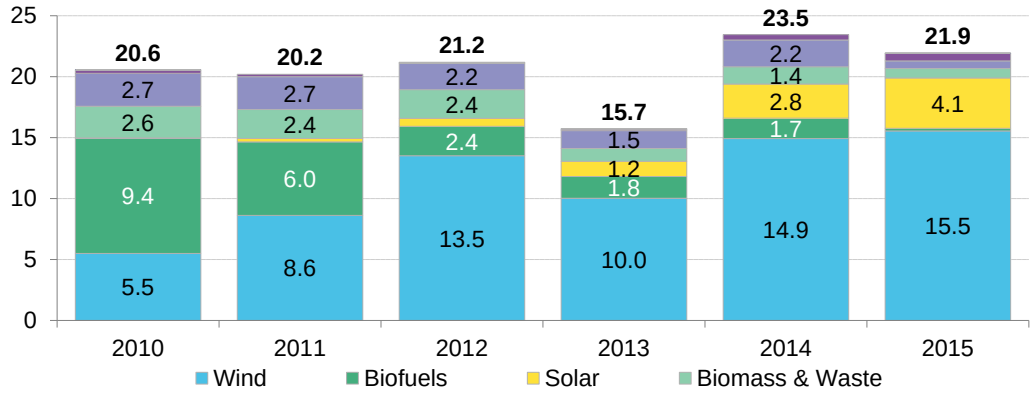
Latin American and Caribbean countries will have to considerably increase the reach of their carbon offset regulations and activities to meet their targets. Currently, only two countries have carbon tax policies in force, both enacted in 2014. Chile has approved a $5/t tax on CO2 and will begin to measure emissions in 2017. Collections of the tax are expected to start the following year. Mexico has introduced a carbon tax on the sale and import of fossil fuels. Additionally,

Mexican-based companies with yearly emissions over 100Mt must provide performance information to the National Register of Emissions and have their annual reports verified by a third party organization authorized by the government.

INVESTMENT

Wind continued to attract the bulk of investment in 2015 with $15.5bn (Figure 4). Activity in solar, which kicked off in 2012, continued to grow steadily in 2015 to reach $4.1bn. Small hydro and biomass have been traditional clean energy sectors in the region. While these technologies did not attract growing amounts of investment, they continued to be relevant given LAC's hydro resources and agriculture production.

Figure 62: Clean energy investment by technology ($bn), 2010 - 2015

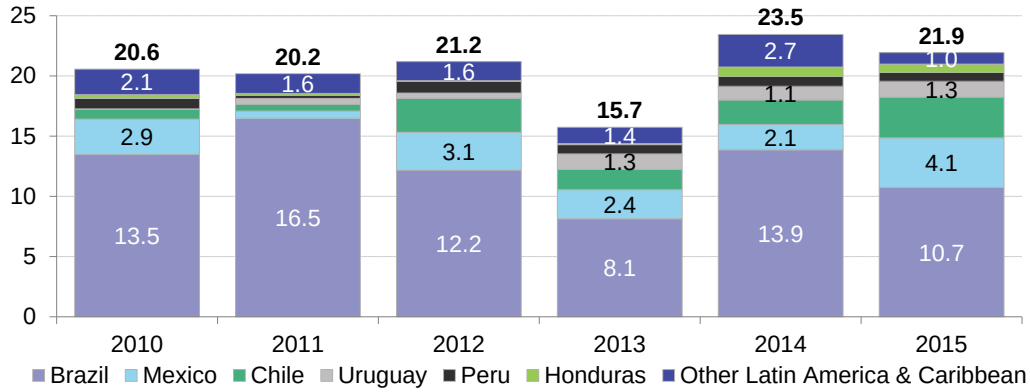


Source: Climatescope 2016. Note: These figures include new investment, acquisition transactions, public market investment and refinancing.

In terms of geography, Brazil, the largest power market in Latin America, continues to lead regionally in terms of amount of investment, registering $10.7bn of new funds for renewables in 2015. However, geographic diversification continues.

Last year, Mexico ($4.1bn) and Chile ($3.4bn) were the second and third largest renewable investment destinations (Figure 5). Much smaller countries have gone through waves of investment given the size of their economies and power grids. For instance, Honduras saw a surge of $675m invested last year and Jamaica received $205m for renewable energy projects, compared to only $3m in 2014. These countries will be unable to sustain such levels of investment on a yearly basis, but their successes in 2015 demonstrate how the clean energy map has expanded. Other notable trends include the entry of new financiers into the region and some financial innovation.

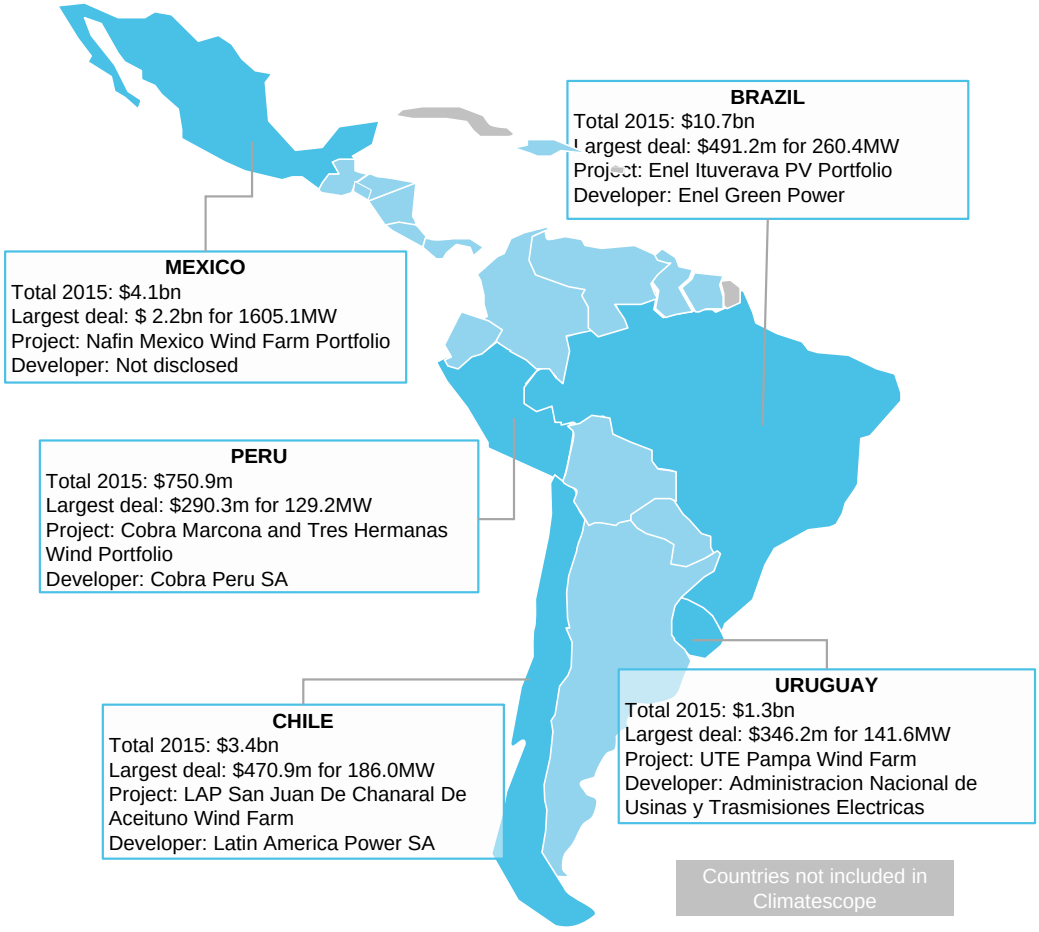
Figure 63: Clean energy investment by country ($bn), 2010 - 2015



Source: Climatescope 2016. Note: These figures include new investment, acquisition transactions, public market investment and refinancing.

Historically, development banks and multilateral institutions have dominated financing of clean energy projects in the region. As the market has grown, international and local private banks have stepped up. As for innovation, one area of growth has been greater use of green bonds. Last year, a major offering in Mexico by development bank NAFIN accounted for most of the clean energy investment in the country (Figure 6).

Figure 64: Top five clean energy projects financed in Latin America & Caribbean, 2015

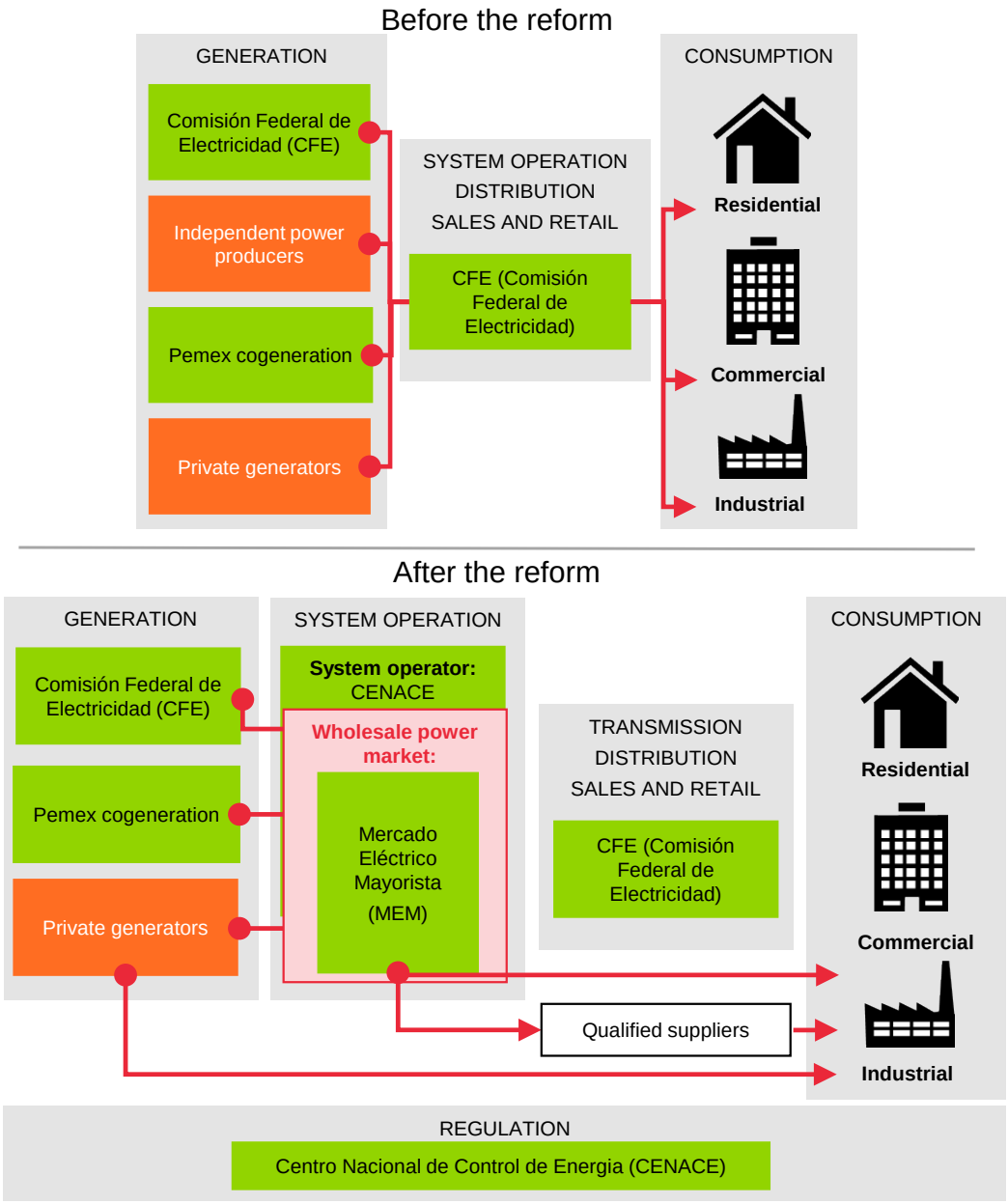


Source: Climatescope 2016 Note: each country can only figure once.

MARKETS IN TRANSFORMATION

The first half of 2016 has been marked by significant policy progress in Argentina, Brazil, and Mexico. Colombia is one of the last markets in Latin America that has yet to open its power sector to clean energy. These are four countries to watch for next year's Climatescope.

Figure 65: Mexico's power market structure, before and after reform



Source: Climatescope 2016

After a decade of nearly no activity, Argentina is angling to become a renewable investment destination. At the end of 2015, the government published a new renewable energy law (27.191). Several months later, the government issued accompanying regulations, marking a turning point for its clean energy industry. The law raised the country's national target to 8% of power consumption by 2017. This will be challenging to reach, since clean energy only represented 2% of 135TWh generated in 2015. The government is aiming to at least contract sufficient capacity to meet the goal the following year.

With an eye toward achieving that, Argentina followed its neighbors in launching a new auction mechanism, which contracted 1.1GW of wind and solar capacity in October 2016. The next renewable energy auction is expected to be held in April 2017.

Brazil's crisis has hurt the country's renewable energy industry primarily through exchange rate volatility. It has also led policy-makers to rethink the structures of energy planning, regulation and financing. Conversations are now underway about strengthening the country's auction system and improving transmission planning and market certainty. Additionally, there is a push to seek new financing options and move away from overreliance on the country's development bank, BNDES.

Mexico is in the process of implementing its energy reform, which should be completed by 2018 (Figure 7). The country's newly introduced auctions have attracted international investors and produced the lowest average tendered prices for wind and solar contracts seen globally. Its nascent wholesale market, which launched at the beginning of 2016, is gaining liquidity. Once it is fully implemented, we expect a new wave of investment in clean energy projects.

Between 2015 and 2016, Colombia endured one of its worst droughts, driven by the 'El Niño' phenomenon. This significantly impaired the country's power matrix, which is 70% composed of hydro plants. We expect that this will lead Colombia to re-consider its grid planning and seek greater diversification in its energy mix, potentially creating new opportunities for renewables.

A CLOSER LOOK AT THE CARIBBEAN

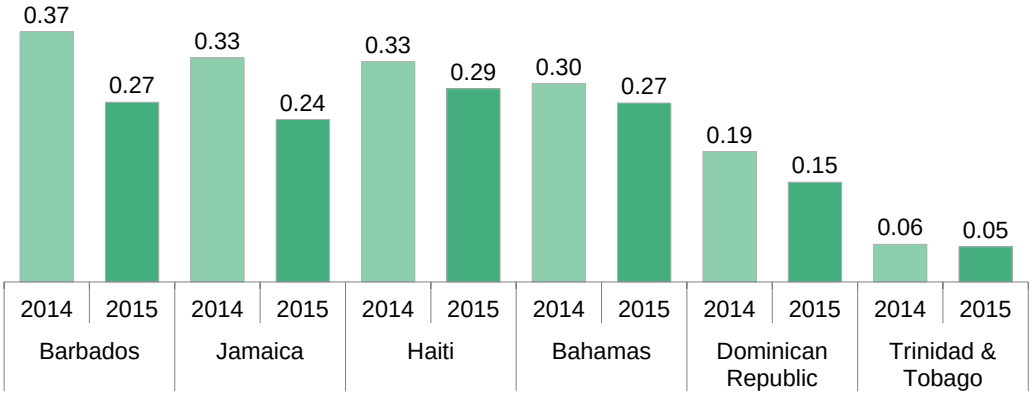
Caribbean island nations remain largely dependent on fossil fuels. However, some are taking important strides toward transitioning to a cleaner energy future.

In 2008, Jamaica became the first Caribbean country to hold a clean energy-specific auction. Its National Energy Plan calls for 20% of generation to come from renewables by 2030. A significant jump in clean energy investment, along with greater value chain penetration, have moved Jamaica up in the Climatescope rankings.

Barbados serves as an example of how well-structured policy incentives can boost demand for distributed renewable energy and reduce utility-scale generation. In 2013, the country published an extensive tax incentive policy to benefit activities related to renewable energy, particularly self-generation. The Barbados net metering regulation has been in force since 2010 and has since been modified to quadruple the program's capacity cap. Solar self-generation systems will soon meet 8% of the country's electricity needs. This has led to a 7% cut in generation from thermal plants, which remain the only source of utility-scale electricity on the island.

Lower prices for oil have prompted substantial cuts in retail electricity rates in the Caribbean and most of Central America, but prices overall remain high (Figure 8).

Figure 66: Average retail electricity price in Climatescope Caribbean countries ($/kWh), 2014 – 2015



Source: Climatescope 2016

Finally, of seven Central American countries, five saw reduced electricity rates in 2015 due to lower fuel prices. Only Panama saw an increase – mainly to cover costs of excessive thermal generation caused by the 2014 drought. Unlike most of its regional neighbors, fuel prices have a small impact in Costa Rica's power tariffs rate, as the country was able to meet 99% of its power demand needs with renewable resources (including large hydro) in 2015.

REGIONAL SUMMARY – LATIN AMERICA AND THE CARIBBEAN										
Countries	2014		2015				2016			
	Score	Rank	Score	Δ score	Rank	Δ rank	Score	Δ score	Rank	Δ rank
Chile	1.79	2	1.97	0.18	2	-	2.36	0.39	1	1
Brazil	2.17	1	2.12	-0.05	1	-	2.29	0.18	2	-1
Uruguay	1.75	3	1.69	-0.07	4	-1	2.29	0.60	3	1
Honduras	1.15	14	1.50	0.34	5	9	2.03	0.53	4	1
Mexico	1.57	4	1.72	0.15	3	1	2.02	0.30	5	-2
Panama	1.11	13	1.31	0.20	11	2	1.62	0.30	6	5
Peru	1.50	5	1.44	-0.06	7	-2	1.60	0.17	7	-
Costa Rica	1.45	6	1.49	0.05	6	-	1.51	0.01	8	-2
Guatemala	1.10	12	1.40	0.30	8	4	1.49	0.09	9	-1
Colombia	1.33	8	1.39	0.06	9	-1	1.45	0.06	10	-1
Nicaragua	1.37	11	1.14	-0.23	12	-1	1.44	0.30	11	1
Jamaica	0.80	16	0.81	0.01	18	-2	1.41	0.60	12	6
Argentina	1.24	7	1.39	0.15	10	-3	1.39	0.00	13	-3
El Salvador	1.12	10	1.03	-0.09	14	-4	1.26	0.24	14	-
Dominican Republic	1.16	9	1.02	-0.14	16	-7	1.20	0.18	15	1
Ecuador	0.96	15	1.03	0.06	15	-	1.19	0.17	16	-1
Belize	0.98	18	0.81	-0.17	17	1	1.13	0.32	17	-
Barbados	0.79	20	0.64	-0.14	19	1	0.94	0.30	18	1
Bolivia	0.91	17	1.04	0.13	13	4	0.89	-0.15	19	-6
Haiti	0.73	22	0.64	-0.09	20	2	0.78	0.15	20	-
Bahamas	0.53	25	0.48	-0.05	24	1	0.75	0.27	21	3
Guyana	0.60	19	0.54	-0.06	22	-3	0.67	0.12	22	-
Trinidad & Tobago	0.54	21	0.57	0.03	21	-	0.63	0.06	23	-2
Paraguay	0.59	23	0.49	-0.10	23	-	0.62	0.13	24	-1
Venezuela	0.32	24	0.40	0.08	25	-1	0.56	0.16	25	-
Suriname	0.31	26	0.22	-0.08	26	-	0.55	0.33	26	-

SECTION 5. METHODOLOGY

Climatescope seeks to bring quantitative rigor to the basic question of what makes a country attractive for clean energy investment, development, and deployment. It seeks to answer this by collecting as much relevant data as possible, then organizing it in a manner that is both easy to consume and empowers users to gain key insights.

Climatescope ranks countries on their past, present, and future ability to attract investment for clean energy companies and projects. Clean energy is defined as biofuels, biomass & waste, geothermal, solar, wind and small hydro (up to 50MW). While a number of Climatescope nations have historically embraced large hydro generation to meet local power needs, this study focused exclusively on newer sources of low-carbon generation, both because they are often technologically cutting edge and because they can generally be deployed far faster than large hydro projects, which can take years or even decades to commission. By comparison, wind projects can be sited and erected in as little as two to three years. Utility-scale solar photovoltaic projects can be constructed in as little as six months and distributed photovoltaic systems can be added to rooftops in a day or less. In short, these technologies are poised to make – and in many cases are already making – near immediate impact on energy supply and access in the developing world. Climatescope sought to assess how ready these countries are to embrace them.

In this 5th edition, the project includes three new Middle East and North Africa (MENA) countries: Egypt, Jordan and Lebanon.

Climatescope's index once again consists of four overarching parameters. Beneath these parameters are 50 data inputs, or indicators. Some indicators consist of a single data input but many consist of multiple data points that have been synthesized into a single figure. Each indicator counts toward a country's final score but these are not weighted equally. Scores range from 0 to a maximum of 5. The final score a country receives under Climatescope is determined by a weighted combination of its four parameter scores. For 2016, the weighting of these parameters remains as it was in 2015:

- Enabling Framework Parameter I – 40%
- Clean Energy Investment and Climate Financing Parameter II – 30%
- Low-carbon Business and Clean Energy Value Chains Parameter III – 15%
- Greenhouse Gas Management Activities Parameter IV – 15%

The entire Climatescope model can be viewed at www.global-climatescope.org where users are encouraged to adjust the parameter weightings according to their priorities and download the aggregate data available.

ACCOUNTING FOR LESSER DEVELOPED NATIONS THROUGH THE "OFF-GRID FOCUS" METHODOLOGY

As in 2015, Climatescope 2016 assessed nations ranging from lowest income to those firmly considered "middle income". As a result, Climatescope 2016 once again includes a special, augmented "off-grid focus" methodology that includes seven special indicators, with weightings adjusted in the model accordingly. These indicators were taken into account alongside the other "on-grid" indicators for a sub-set of 23 Climatescope nations: 18 in Africa, one in Latin America and Caribbean, and four in Asia. The goal of the off-grid effort is to level the playing field so that all countries can be compared in the fairest possible manner against one another in a single 58-country list. In addition, visitors to www.global-climatescope.org can examine the specific off-grid focus indicators in detail if they choose and compare in isolation the 23 nations that were

assessed using this methodology. To determine which countries are assessed using the off-grid focus methodology, a 0-5 scoring system was once again applied. Five factors contributed at different weightings to this score; those that score a 2.5 or higher are considered “off-grid focus countries”.

Factor: Electrification rate Question: What percentage of a country’s population is not currently connected to the power grid? Criteria/score: A country with a low enough proportion connected received a score of 2. Data source: International Energy Agency

Factor: Number of national power outages Question: How many power outages did the country experience in the most recent year for which there is complete data? Criteria/score: A country with a sufficiently large enough number of outages scored 1. Data source: World Bank

Factor: Duration of outages Question: What was the average length of time a typical grid outage lasted? Criteria/score: A country where outages lasted sufficient durations scored 1. Data source: World Bank

Factor: Power transmission losses Question: What are the typical line losses? Criteria/score: A country where transmission losses exceeded a certain threshold scored 0.5. Data source: World Bank

Factor: Human Development Index Question: How is the country classified in the UNDP’s HDI? Criteria/score:A country classified “Low Development” scored 0.5. Data source: UNDP

The off-grid focus methodology’s additional indicators were specifically designed in consultation with outside experts to assess conditions in developing nations. These indicators fell under Climatescope’s first three parameters but had no impact on Greenhouse Gas Management Activities Parameter IV. They were:

- Distributed energy regulatory frameworks: How well does a country’s local market structure facilitate off-grid or small-scale development of projects?
- Energy access policies: What local policies exist specifically to spur off-grid activity?
- Average local kerosene and diesel prices: How high are these prices and how attractive do they make potential alternative (cleaner) sources of generation?
- Population using solid fuels for cooking: How many citizens would potentially value alternative fuel sources to cook?
- Distributed clean energy value chains: What local mini-hydro and mini-wind equipment makers, mini-photovoltaic systems providers, and other similar types of players exist in-country?
- Distributed clean energy service providers: What local retailers, pay-as-you go facilitators, insurance providers, and others specializing in off-grid and small-scale clean energy services are in-country?

For 2016, the Climatescope methodology for off-grid countries was refined, building on the experience acquire in the previous editions of the index. In addition, six barriers specific to off-grid countries focusing on the challenges to the importing and retailing of off-grid renewable technology products were introduced.

SCORING APPROACHES

Scoring approaches employed in the first four editions of Climatescope were also used for this 2015 edition. These include:

- Indexing – The Climatescope index is based entirely on a 0-5 scoring system, with 5 representing the highest possible score. Using the indexing approach, the country with the maximum output for a given indicator, after levelization in most cases, received the highest score in the index (5).

All other countries’ outputs were mapped relative to the maximum score. This approach was employed on quantitative indicators such as clean energy installed capacity, clean energy

investment and electrification rate. For growth rates, benchmark maximum high score scores were capped at 150% to avoid extremely high rates (e.g. where a small country has added a single, significant project onto a very low base) impacting all nations unfairly.

- Tiering – In other cases, country indicator scores were tiered into predefined quintiles. For example, in the case of the clean energy policies indicator, tiering was used and countries were placed in different quintiles depending on the perceived policy ambition or effectiveness of their clean energy policy framework.

This methodology is better suited than indexing for qualitative assessments such as rating the ease of carbon offset project development. Tiering was also used in cases when the quantitative outputs are based on limited data.

- Simple counting – Some indicators were simply binary and thus countable. In such cases, the country either received a 0 or a 5 score. For instance, one indicator simply sought to take into account whether countries have rural electrification programs using clean energy sources. Those that did received scores of 5. Those that did not received scores of zero.

5.2. ENABLING FRAMEWORK

The Enabling Framework parameter encompasses fundamental structures and market conditions typically required for a given country to attract investment and interest from financiers, project developers, or independent power producers looking to develop new low-carbon projects, companies or manufacturing facilities. It also takes into account how amenable such structures are to the deployment of distributed generation capacity, such as mini-grids, or residential wind or solar systems.

A welcoming enabling framework is one where: a comprehensive, effective and stable set of rules are in place; the power market structure encourages and adequately rewards new market entrants; the private and public sectors foster universal access to clean and sustainable energy in rural or isolated communities; clean energy penetration of the power and primary energy matrices is ever increasing; adequate price signals are available; and growing demand for power and rapid electrification combine to create a substantial market.

A total of 18 indicators serve as the inputs into Parameter I. These fall into four categories: Policy and Regulation, Clean Energy Penetration, Price Attractiveness, and Market Size Expectation. Each category contributed with varying weights to the overall Enabling Framework parameter score. Scoring for Parameter I is completed with 5 indicators applied exclusively to countries which were assessed under the off-grid focus methodology.

POLICY & REGULATION

The Policy and Regulation category includes four specific indicators for all nations in the survey: clean energy policies, power sector structure, clean energy rural electrification, and policy barriers. For nations assessed under the off-grid focus methodology, the scope of the policy barriers was extended and two additional indicators were taken into account: distributed regulatory framework and energy access policies.

CLEAN ENERGY POLICIES

For the 2016 Climatescope, a comprehensive search for relevant policies was undertaken by examining primary source documents and conducting interviews with local policy-makers. In the end, the number of policies being tracked by BNEF for these nations in its online database expanded to 838 from 599 (all are accessible via www.global-climatescope.org). Policies were then divided by type: (1) energy target (2) feed-in-tariff/price premium, (3) auctions, (4) biofuels

blending mandate, (5) debt/equity incentive, (6) tax incentive, (7) utility regulation and (8) net metering.

A review panel consisting of 42 external energy policy experts was then convened to assess the policies. Each expert was assigned the task of examining and scoring a set number of policies of specific types across multiple countries. At no point were panelists asked to assess a country's overall policy framework. This was intended to reduce any potential national bias a panelist might have toward a certain country.

External experts were assigned to review policies for each of the eight clean energy policy types. The experts were asked to take into account six cross-cutting factors when judging a specific clean energy policy. Each panelist was assigned to a specific policy type based on his or her area of expertise, and the panelist then reviewed and scored those policies. For each policy they reviewed, expert panelists assigned "high", "medium" or "low" scores corresponding to the six cross-cutting factors. The high, medium, and low scores were then translated into numerical values of five, three and one, respectively. Participation was done remotely and all scores were submitted electronically. In the end, each of the policies was reviewed by at least three expert panelists. Each policy then received a "raw" policy score – the average score for each of the cross-cutting factors given by all experts assigned to judging the policy in question. From these scores, an overall raw clean energy policy score per country was derived by adding the scores assigned by panellists.

In cases where a country did not have a specific type of policy, it received no score. For instance, 18 Climatescope nations have net metering laws and thus received scores for those. The other 40 nations without such policies received no net metering score. Thus countries that have established policies in a given area were rewarded while those that have not were, in effect, penalized. A policy "equalizer" consisting of two subcomponents – comprehensiveness and political risk – was included in the methodology. Comprehensiveness was defined as the level of completeness of a country's overall policy framework – the number of different policy types it has vis-à-vis its peers. The comprehensiveness metric was obtained by assigning each country a relative score based on how many policies were available in that country out of a possible maximum of eight. Scores were then benchmarked against one.

The World Bank's Worldwide Governance Indicators (WGI) 2015 index was used to address the question of political risk. This index covers six overarching political and country risk-related factors – voice and accountability, political stability and absence of violence, governance effectiveness, regulatory quality, rule of law, and control of corruption. The six components of the WGI score were averaged to obtain the final political risk metric. The political risk subcomponent score was then added to the comprehensiveness score rank to derive a final policy equalizer per country. A nation's equalizer was then multiplied by its raw country policy score to derive a final clean energy policy score. It should be noted that in the cases of the Indian states, the overall policy scores for India was applied.

POWER SECTOR STRUCTURE

A fundamental assumption underlies the power sector structure indicator: a liberalized power market is more conducive to attracting investment in renewable energy development than a tightly controlled market. This indicator seeks to gauge the degree of liberalization in a country's power market.

To derive the power sector score, 15 specific questions were asked about a country's power market, with possible scores of low, medium, and high per question with a maximum possible score for any country of 5. As these questions were relatively non-qualitative, Bloomberg New

Energy Finance conducted primary research on the power market structures for all 64 countries, states and provinces and assigned the scores on each question for each.

DISTRIBUTED ENERGY REGULATORY FRAMEWORK

Climatescope examined some of the core regulatory characteristics related to enabling off-grid, mini-grid and small power project activity. This was done through a series of 17 questions posed about each off-grid focus country. These were answered by BNEF analysts after consultations with local officials and private market players. Countries received a score on each question. The total score was benchmarked among the off-grid focus countries to derive a score for this indicator.

CLEAN ENERGY RURAL ELECTRIFICATION

The third indicator in the Policy & Regulation category of Parameter I assesses the efforts of nations to expand access to power to the rural poor using clean energy technologies. This also applied to previous years and thus formed part of the score for all countries. Scoring on this indicator was binary: countries with rural electrification programs that promote clean energy received a 1 while others received a 0.

ENERGY ACCESS POLICIES

The energy access policies indicator was applied only to countries analyzed under the off-grid focus methodology. Like the distributed energy regulatory framework indicator discussed above, this indicator relied on a series of 14 questions BNEF analysts asked about individual nations and answered after local consultation. All but three of these were scored in a manner similar to the approach used for the distributed energy regulatory framework indicator. Two questions simply looked at the amount an individual government has budgeted for its rural electrification program and one of question looked at the base upfront cost for a new grid connection for a household near the grid.

POLICY BARRIERS

The trade barrier indicator for all countries was based on data from the World Trade Organization on the average import duties levied by each Climatescope country on a range of clean energy products. These covered nine categories of products across the solar, wind and hydro value chains: inverters, solar lanterns, PV cells and modules, wind towers (of iron or steel), wind turbine blades, wind gearboxes, wind and hydro generators, hydraulic turbine parts. The duties were averaged by sector and then benchmarked against the other countries on the index. Lower overall duties achieved higher scores on the indicator, as higher duties raise the cost of bringing clean technology into the country and contribute to making growth in these sectors harder. In 2016, the barrier indicator was expanded for off-grid countries with six new elements: the presence of diesel or kerosene subsidies; the import duty and VAT rate charged for off-grid products and how they compare to those for other energy carriers; and the presence of other barriers to the retail and import of off-grid products.

CLEAN ENERGY PENETRATION

This category consists of six distinct indicators that seek to measure shares of clean energy installed capacity, shares of clean energy generation and levels of biofuels production, as well as the associated growth rates for each. Again, note that our definition of clean energy here does not include large hydro (50MW or greater), nor does it include nuclear power. These indicators are: clean energy installed capacity, growth rate of clean energy installed capacity, clean energy

electricity generation, growth rate of clean energy electricity generation, biofuels production capacity, and growth rate of biofuels production capacity.

Each of the three Indicators related to growth rates contributed 20% to the Clean Energy Penetration category score, and had a net weight of 3.2% toward the overall Climatescope score. Each non-growth energy indicator held a 15% weighting of the category score, with a 2.4% net weight, while the biofuels production indicator held a 10% category weighting, with a 1.6% net weight for the overall Climatescope index.

In 2015, the method for calculating a country's final clean energy capacity rate score was tweaked slightly. Until 2014, this score was derived using the indexing approach (with the highest scorer receiving a 5 and all other nations scored against that country on a graduated basis). Last year, however, the high scorer benchmark was capped at 150%. There was a simple reason for this: one country that prior to 2014 had virtually no clean energy capacity saw a jump in one year of 289%. Having all other countries benchmarked against this 289% would have badly hurt the scores of them all (even nations that had posted otherwise remarkable growth rates of 100% or more). As a result, a cap of 150% was used for this particular benchmarking/indexing exercise. A similar 150% cap on the benchmark was placed on the clean energy electricity generation for the same reason.

Data for all six indicators comprising the clean energy penetration category were derived from primary sources, including websites and publications from energy ministries, power market regulators, system operators and utilities. Whenever possible, 2015 data were employed for Climatescope. Growth rates were calculated based on changes between the latest two years for which data were available.

PRICE ATTRACTIVENESS

The price attractiveness category of indicators takes an accounting of local electricity prices and, in the case of countries being analysed under the off-grid focus methodology, the price of fuels used to power small-scale generators. The general principle: higher priced energy markets are generally more attractive for clean energy development and deployment as clean energy is all the more cost-competitive. In all, BNEF collected data on the following four classes of electricity tariff in every country where it was available:

- Spot – The average price paid in 2015 (or last year when data was available) in the country's liberalized market where electricity is traded
- Residential – The average price paid by citizens
- Commercial – The average paid by "commercial" users as classified locally by regulators
- Industrial – The average paid by "industrial" users as classified locally by regulators

The final price attractiveness score was derived in one of two ways depending on whether a country was assessed under the off-grid focus methodology or not. In the case of those that were not, a combination of the above electricity prices was used to determine a score. In the case of the off-grid focus countries, electricity prices plus the prices of two other sources of fuel were taken into account.

First, for the on-grid focus countries, two electricity prices were used to determine a price attractiveness score: the average spot price in the country and a composite "average retail price". The spot price was derived simply by taking the average seen over the course of a year (all times of day and year included) in a given market. The second was derived by taking the average of the residential, commercial, and industrial prices seen in that country over the prior year to determine the retail price. Each of these scores were then given equal weighting toward the final price attractiveness score. Many countries do not have spot markets for electricity trading, however. In

those countries, the retail price alone was used to determine the price attractiveness score. Finally, for off-grid focus countries, additional fuel sources for distributed power generation and lighting were taken into account: kerosene and diesel. BNEF collected average prices for these fuels on a US dollar per litter basis in 2015. Again, the guiding principle was that higher priced fuel makes a market more attractive for investors as renewables become all the more cost-competitive. BNEF then used the indexing approach to determine 0-5 scores. The country with the highest prices received the highest score (5). All other nations were then benchmarked against that nation.

MARKET SIZE EXPECTATIONS CATEGORY

Markets poised for growth are attractive to clean energy investors. Recent strong growth in power demand, a high percentage of the population without access to reliable electricity, or a high number of citizens reliant on solid fuels for cooking all potential opportunities for clean energy deployment. The Market Size Expectations category sought to measure countries with such characteristics through three indicators, two of which applied to all nations surveyed and one specifically intended to take into account conditions in lesser developed countries.

The clean energy electrification indicator assessed electrification levels in a country. The nation with the lowest such rate was considered the benchmark and received a mark of 5, with all others then receiving scores mapped relative to the maximum. The power demand growth rate indicator examined the last five years of growth in electricity demand in a country, again with countries benchmarked against a high scorer of 5.

Finally, for the off-grid focus countries, the population using solid fuels for cooking indicator employed data collected by the Alliance for Clean Cook Stoves to determine what percentage of a country's population could potentially be served with clean cook stoves or other technology that could allow them to cook using cleaner fuels instead of solid fuels.

5.3. CLEAN ENERGY INVESTMENT & CLIMATE FINANCING

Few investors are comfortable with being the first to invest in a new technology or a new region. To rank a country's ability to attract low carbon investment, it is important to assess its achievements in that regard to date. The Clean Energy Investment and Climate Financing parameter tracks historic investment activity in a given country while laying out financing conditions for future commitments. In all, Parameter II comprises 9 indicators distributed across three categories: Amount Invested, Fund Sources and Cost of Debt. Each of these three categories contributed with varying weights to the overall Clean Energy Investment and Climate Financing parameter score. The green microfinance indicator which was part of the Climatescope methodology in the past was removed in 2016.

AMOUNT INVESTED

The Amount Invested category consists of two indicators related to historic financial commitments to low-carbon companies and projects: cumulative clean energy investment and clean energy investment growth rate. The timeframe used was 2011 to 2015. The category contributes to 51% of the score for this parameter. Data sources employed in the category were drawn from BNEF's proprietary Industry Intelligence database – the world's most accurate database of clean energy and carbon investment activity. The database contains detailed information on funds invested in clean energy projects larger than 1MW and technologies, grants, venture, private equity and corporate finance transactions, and project financing. The Amount Invested methodology follows that employed in Climatescope 2015.

CUMULATIVE CLEAN ENERGY INVESTMENT

The clean energy investment indicator of the Amount Invested category includes four metrics related to the investment type: asset finance, corporate finance, venture capital and private equity investment. All three investment-type metrics were aggregated to derive the total cumulative clean energy investment figure. Data points underlying these metrics are available online for the purpose of external analysis.

Note that the total clean energy investment indicator accounts for cumulative commitments from 2011 through 2015. Investment commitments follow different orders of magnitude because of the variation in the size of the 58 Climatescope countries. Thus, countries were ranked for this indicator based on the value of total clean energy investments as a percentage of GDP to ensure standardization. Once investments were benchmarked by the size of the economy, countries were ranked using the indexing approach. The country with the highest share of cumulative clean energy investment relative to the size of its economy was set as the benchmark with a score of 5; all other country scores were derived based on their relative position to 5.

CLEAN ENERGY INVESTMENT GROWTH RATE

Similarly, the growth rate for the clean energy investment indicator took into account the same five-year period and was based on compound annual growth rates. Scoring was also derived by using the index approach with the country with the highest compound six-year annual growth rate receiving the maximum score of 5. Since 2015, the maximum growth rate used in the indexing is capped at 150%. There was a simple reason for this: one country that prior to 2014 had seen virtually zero clean investment technically saw its growth rate hit 583% in 2014 thanks to a small level of investment in the year. Having all other countries benchmarked against this 583% would have badly hurt them all (even nations that had posted otherwise remarkable growth rates of 100% or more). As a result, a cap of 150% was used for this particular benchmarking/indexing exercise.

FUND SOURCES

The sources of funds category contributed 26% to the Parameter II score. Its two unique indicators – loans grants and local investment by local players – each made up half of the parameter weight and contributed 3% apiece to the overall Climatescope score.

LOANS AND GRANTS

The methodology employed to track loan and grants commitments remained the same as employed in the first four editions of Climatescope. Data were gathered using primary sources and BNEF's proprietary Industry Intelligence database. Standardization was achieved by comparing fund source commitments to GDP. Scoring was determined based on the index approach.

LOCAL INVESTMENT BY LOCAL PLAYERS

Only total new investments were used in the analysis of this indicator. Investment into small distributed projects was not considered. The total investment data for each country was then filtered by investor domicile to derive the dollar amount committed in any given country by investors domiciled in the same country. The score for this indicator was obtained by taking the ratio of dollar amount committed by local players for local projects over total clean energy investment at a national level. The country with the highest ratio received the maximum score of 5 and was considered the benchmark.

Investors were classified by the country in which they are registered in all instances except where a non-governmental agency was deemed to hold a stake of 50% or greater in the ownership structure of the investor. In such cases, the majority stakeholder's domicile was applied. In cases where specific investors in a project could not be identified, the value of the deal was considered to be "unknown" for the purpose of this analysis.

To illustrate the methodology, consider the 2012 $130m financing of the 100.8MW Satara wind farm in Panama. In this specific transaction only $41.42m – not the entire financial commitment to the project – was recorded toward the total value of investments by local players for Panama.

COST OF DEBT

Financing conditions in a given country are fundamental for developers and investors alike. The cost of debt category is made up of two indicators related to financing conditions for utility-scale renewable projects or investments into low-carbon manufacturing capacity or firms. These indicators are average cost of debt and average swap rate by country; each contributed equally to the overall category score. Each indicator had a 2.6% net weight toward the overall Climatescope score. Data on the average cost of debt available to project was sourced from the lending interest rate dataset form the World Bank and from information gathered from developers. Where data was not available, the country's central bank rate was used.

This category also included an indicator reflecting swap rates in each of the countries. A swap rate is the borrowing rate between financial institutions and was deemed to be the closest proxy for the cost of debt per country. The country with the lowest swap rate was assigned a score of 5 and all other country scores were determined by indexing their rate to that of the benchmark country. Swap rate data per country were taken directly from the Bloomberg terminal.

5.4. LOW-CARBON BUSINESS & CLEAN ENERGY VALUE CHAINS

A nation's ability to attract capital and accelerate low-carbon energy deployment is partly contingent on how many segments of key value chains it has in place. Parameter III sought to take this into account. It included three indicators, with an additional two indicators related to distributed energy companies for the off-grid focus countries.

SERVICE PROVIDERS

A well-developed local presence of service providers for the low-carbon economy, including firms involved in legal and marketing services, project development and ancillary services is imperative to propel and sustain the development of clean energy. Points were given if the country had at least one provider in each sub-sector. For the off-grid focus countries, a separate indicator for those service providers specifically related to distributed clean energy is taken into consideration.

SECTOR VALUE CHAINS

The clean energy sector value chains indicator tracked the presence of six distinct sector value chains – and their subsectors – in each country, biofuels, biomass & waste, geothermal, small hydro, solar and wind. Combining all segments yielded a maximum possible score of 40 points per country. Nations were awarded 1 point per segment they had in place. A strong manufacturing base is imperative for attracting investment and producing the necessary equipment to help expand clean energy capacity. For the off-grid focus countries, we added a separate indicator for those companies that operate within the distributed clean energy sectors.

FINANCIAL INSTITUTIONS

The financial institutions indicator tracked how many types of financial service providers such as banks, corporate finance institutions, investment funds, impact funds and private equity and venture capital funds invested in the low-carbon sector. Primary research was conducted to assess if at least one of these four types of financial institutions was active in a given country. Each type of lender could receive at most 1 point. Thus 5 points were the maximum for this indicator – a sign that the country has the ability to supply funds needed for the industry to grow. This indicator contributes 25% to the overall Parameter III score.

5.5. GREENHOUSE GAS MANAGEMENT ACTIVITIES

The Greenhouse Gas (GHG) Management Activities parameter aims to assess the status, risk and potential for carbon offset project activity in a given country. Favourable actions and conditions for this parameter included: a solid track record of commissioned Clean Development Mechanism (CDM) or other offset projects; high success rates for projects seeking CDM accreditation; ample opportunities for further offset project development; forward-looking federal or state-level policies or actions aimed at curbing GHG emissions; and progressive actions from private sector players to adopt projects and measures to reduce carbon footprints. A total of 14 unique indicators serve as inputs into Parameter IV. These 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.

CARBON OFFSETS

The Carbon Offsets category comprises three distinct indicators assessing the historic activity of CDM and other offset project types in a given country, the risk projects will fail to gain CDM accreditation or approval, and offset project potential considering existing capacity in each country to support further project development. Each indicator contributes with varying weights in turn to the category, parameter and overall score. Each country's Carbon Offset category score was derived by multiplying a "raw" score for each indicator by that indicator's weighting, then aggregating the three final scores.

HISTORIC ACTIVITY

The historic activity indicator investigates whether a country has CDM projects or other types of voluntary offset projects in place. It also assesses the depth of a country's current project pipeline by tracking sectors covered by these offset projects as well as the volume of current and expected credit issuance.

While several offset project schemes exist, data was gathered from the main three: the UN CDM, the Verified Carbon Standard and the Gold Standard. The data for these three schemes were more comprehensive and reliable than the data available on projects in other programs. Still, the CDM represented the vast majority of projects in place for almost all countries.

Metrics captured for this indicator include the number of credit scheme types, projects and sectors available in each country, and the volume of credits issued or expected to be generated by offset projects. The score awarded for each of these four metrics was binary: a country could receive either 1 or 0. Each metric was categorized as "above or equal average" or "below average" compared with the region as a whole. A country was given a score of 1 for each metric considered above average. The maximum mark a country could obtain for this indicator was therefore four.

For example, Brazil had 409 carbon offset projects, which means 0.00000097 per tonne of CO2 equivalent in 2013 while the average across all countries was 0.00000141. Thus Brazil received a score of 0 for the metric assessing number of projects because it had a higher CO2 profile than the average. A separate example: 2,206,277.2 credits were recorded as having actually been issued or expected to have been issued for projects in Chile, which means 0.03 credits per tonne of CO2 equivalent. Meanwhile, the Climatescope average for this metric was 0.03 credits per tonne of CO2 equivalent. Thus Chile received a score of 1 for meeting the regional mean.

CDM RISK

The CDM risk indicator assessed the likelihood that CDM offset projects in a given country fail to get commissioned or otherwise fail to gain accreditation or local approval. It also took into account the average processing time for project registration within CDM. Given the limited data available for other offset project types for the purposes of this analysis, CDM project risk was tracked exclusively. The CDM risk indicator incorporated three distinct metrics: (1) the average number of failures per active CDM project, (2) the average number of restarts per CDM project, and (3) the number of days it takes for a project to successfully complete the registration process. The scoring system for the first two metrics – number of project failures and restarts – followed the scoring system used for the metrics in the carbon offsets historic activity indicator. Each country was categorized as above or below average compared with all other Climatescope nations, provinces and states. Above average geographies received 1's and below-average nations received 0's. This calculation was done separately for both the number of project failures and number of project restarts.

The metric assessing CDM registration processing times examined two distinct phases of project development to measure how swiftly or slowly countries moved to bring projects to completion. The metric first took into account phase I, the period from when a project submits a letter to a host country government for approval until when it completes validation, and phase II, the period from when the project moves from validation to when it gets officially registered in the CDM.

The average number of days taken to complete the two phases of the CDM registration process for all Climatescope countries was calculated. From this, an average among all for each phase was then derived. The above/below average scoring system was then applied. If the average number of days taken for projects to be awarded validation for phase I and registration for phase II fell below the regional average, the country in question received a score of 1. Those with above-average durations received a zero. The standard deviations from the first and second phases for each country were then compared with the average standard deviations for each phase across all Climatescope countries, provinces and states. If the standard deviation for phase I fell below the regional average, the country was awarded an additional mark of 1 and vice-versa if it fell above the average. The same process was applied to phase II.

Six was the maximum score a given country could achieve in the CDM risk indicator, comprising the aggregated scores from failures, restarts, phase I duration, phase I standard deviation, phase II duration and phase II standard deviation. The CDM risk indicator has a 25% weighting toward the Carbon Offset category and a 1.5% impact on a country's overall Climatescope score.

POTENTIAL FOR DEVELOPING EMISSION OFFSET PROJECTS

The project potential indicator assessed opportunities for developing emission offset projects in a given country. Carbon intensive economies – those with high emissions per unit of GDP, or those highly inefficient in their use of energy generally – have significant abatement opportunities. This indicator aims to assess the size of this opportunity by examining three metrics:

- Abatement potential from energy efficiency, measured by the energy use per kilogram of oil equivalent per $1,000 GDP
- Anthropogenic methane emissions
- High global warming potential gas emissions from nitrous oxide (N2O) and three main types of fluorinated gases hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (SF6) measured by ktCO2 emissions from 2010.

Each country could receive a 1 or 0 score per metric, allowing a total maximum for this indicator of three points. Using the indexing approach, the country with the maximum output for a given metric received the highest score in the ranking for that metric. All other countries' outputs were mapped relative to the maximum score. The final indicator score was derived by summing the metric scores. This indicator had a 25% impact on the Carbon Offsets category and a 1.5% impact on a country's overall Climatescope score.

CARBON POLICY CATEGORY

The carbon policy category of Parameter IV sought to evaluate public policies and initiatives Climatescope countries have undertaken to reduce greenhouse gas emissions. This category covers four broad but interrelated indicators that answer the following questions:

- Did the country submit an Intended National Determined Contribution (INDC) with emissions reductions targets?
- Does it have a greenhouse-gas (GHG) registry?
- Does it have or is the country planning to develop market-based instruments to cut GHG emissions?
- Is it an "implementing country participant" of the Partnership for Market Readiness (PMR) or has it committed to the Nationally Appropriate Mitigation Action (NAMA) policies and actions?

These four indicators measure if a country has implemented or legislated specific emission reduction policies, and if so, what actions have been undertaken. Each of these indicators contributed a different weight to the overall Carbon Policy category and thus had a varied net weight on the overall Climatescope index.

The INDC emissions reduction target indicator was added in 2016 to reflect on the commitments made by countries at the United Nations Framework Convention on Climate Change meeting in Paris in December 2015. It has the strongest contribution to the carbon policy category score with a weight of 42%. One was the maximum score a country could achieve on this indicator. The mark consisted of two metrics: Business as usual (BAU)/intensity targets and absolute targets. If a BAU or intensity goal is in place, the country obtained a mark of 0.5; if an absolute target has been announced, the country obtained a mark of 1. The GHG country registry indicator accounted for 25% of the Policy category score. The maximum points a country could receive on this indicator was three based on the following: if a country is planning to establish a GHG registry it received 0.5 points, if a country has a voluntary registry in place is got 2 points, and if a country has a mandatory registry in place it got the maximum of 3 points.

The PMR & NAMA indicator was also responsible for 25% of the category score. It incorporates two metrics accounting for three points each: the World Bank's Partnership for Market Readiness (PMR) and the Nationally Appropriate Mitigation Actions (NAMA) registry. If a country is officially an "implementing country participant" of the PMR – a forum for collective innovation and actions to support capacity building to scale up climate mitigation – and has one or more projects under preparationstage, it received 2 points. If the country has at least one project implemented in the programme it received 3 points. Additionally, if the country has at least one NAMA project in the implementation stage it got the maximum of 3 points. If it has one or more projects in the development stage, the country received 2 points.

The GHG market-based instruments was the least significant indicator within this category, with a mere 8% weight. The maximum a country could obtain in this indicator was 1 whereas it received 0.5 points if it has plans to develop an emissions trading system and/or a crediting mechanism.

CORPORATE AWARENESS

Accounting for 30% of the Parameter IV score, the Corporate Awareness category evaluates the level of environmental awareness among companies in a given country. It covers six independent indicators pertaining to voluntary corporate actions, each of which was equally weighted at 17%:

GLOBAL REPORTING INITIATIVE

The GHG Global Reporting Initiative indicator investigated whether companies in a country voluntarily reported their emissions to the Global Reporting Initiative (GRI), using the initiative's online database. The number of companies in Bloomberg's Environmental, Social and Governance (ESG) database was used as a proxy for the total number of companies in a given country. The indicator score was derived by dividing the number of companies reporting to the GRI by the total number of companies in a given country (i.e., those listed in the ESG database). The maximum ratio for the region was obtained by compiling the same dataset across all countries. If the country ratio was greater than the maximum ratio for all, the country received 1 point; if it was lower, it received 0.

PRINCIPLE OF RESPONSIBLE INVESTMENT

The Principles of Responsible Investment indicator assessed how many asset owners in a given country are represented among the signatories of the UN's Principles for Responsible Investment (PRI) – a network of investors working to put into practice the six voluntary and aspirational principles. The PRI database was used to count the number of asset owners, investment managers and professional service partners who signed up to the initiative. The same scoring method used in the GRI indicator was applied to the Principles indicator. The maximum point a country received was 1 if its maximum ratio fell above the maximum ratio for all countries.

ENERGY EFFICIENCY INITIATIVES & EMISSION REDUCTION POLICIES

The energy efficiency initiatives and emission reduction policies indicators each looked at how many companies reported dedicated initiatives based on the Bloomberg ESG database. The number of companies reporting energy efficiency or emission reduction initiatives to Bloomberg's Environment, Social and Governance database (ESG) was counted. The data was levelized by dividing the number of companies reporting these initiatives by the number of active companies in a given country on the Bloomberg terminal. These fields in the Bloomberg terminal are maintained by a team of outsourced vendors, contracted by Bloomberg. The team combs annual reports and sustainability reports, looking for any of the following three indications to determine whether a company is serious about its energy efficiency initiatives: the initiatives merit more than a passing mention in the annual or sustainability report; there is more than one initiative related to energy efficiency; there is numeric metric associated with the initiative (e.g., quantified goal).

CAPACITY BUILDING: ENVIRONMENTALLY FOCUSED BUSINESS TRAINING & THINK THANKS

These two indicators were binary. Primary research was conducted to trace if there was at least one environmentally-focused business training program in place and think tank. The country received the maximum score for each of these indicators if it had one of these entities.

ABOUT US

Contact details

support.bnef@bloomberg.net

Ethan Zindler	Project director
Dario Traum	Project manager
Luiza Demôro	Lead analyst
Sara Giordano	Project coordinator
Lilian Alves	Project coordinator, LAC
Ashish Sethia	Project coordinator, Asia
Maggie Kuang	Project coordinator, Asia
Nico Tyabji	Project coordinator, Off-grid
Itamar Orlandi	Project coordinator, Off-grid
Jon Moore	CEO, BNEF

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