

METHODOLOGY

A satellite image of Mexico and the surrounding Caribbean Sea. The image shows a large, dense cloud mass over the Caribbean, with a distinct wave-like or cellular structure. The landmasses of Mexico and the Caribbean islands are visible, with varying shades of green and brown representing vegetation and terrain. The ocean is a deep blue, and the overall scene is captured from a high-altitude perspective.

Mexico - Cool air often follows storm systems passing through North America in the winter and early spring. In some cases, the cool air surges as far south as Mexico, where it encounters the Sierra Madre Oriental Mountains, a long chain oriented roughly parallel to Mexico's Atlantic coast.

OVERVIEW

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) – but not large hydro. While a number of *Climatescope* nations have historically embraced large hydro generation to meet local power needs, the 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 photovoltaic projects can be constructed in as few 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 a 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 third edition, the index comprises 55 data inputs or “indicators”. Each indicator and the parameter it falls under contribute to a country’s overall score but they are not weighted equally (see illustration on pages 32 and 33). Scores range from 0 to a maximum of 5.

All relevant *Climatescope* data is available in aggregated form at www.global-climatescope.org. Questions or comments on the methodology and feedback on data are welcome and should be submitted to climatescope@bloomberg.net.

2014 methodology enhancements

This marks the third year that the *Climatescope* survey has been conducted and the methodology that underpins it has been refined each year. In 2012 and 2013, the research focused exclusively on 26 nations in Latin America and the Caribbean. This year, it was expanded across Africa and Asia to include an additional 29 nations plus 15 Chinese provinces and 10 Indian states. In all, the total number of jurisdictions being surveyed rose from 26 to 80.

A significantly larger, more diverse set of nations inevitably makes quantifying clean energy conditions through data collection all the more challenging. For this year’s *Climatescope*, the methodology behind the project has once again been updated, this time primarily to reflect the wider spectrum of countries be-

ing assessed. All changes to the methodology were proposed by Bloomberg New Energy Finance with the approval of the committee of funders supporting the project (MIF/IDB, UK DFID, and USAID).

Adjusting the parameter weighting

Climatescope consists of four parameters encompassing 55 data inputs, or indicators, all of which are explained in greater detail in the following pages. The final score a country received under *Climatescope* was determined by a weighted combination of its four parameter scores. For 2014, the weighting of these parameters was adjusted slightly from prior years to the following:

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

In the first two years of *Climatescope*, Parameter III was weighted at 10% while Parameter IV was weighted at 20% in a country’s final score. This year, it was determined that Parameter III should receive a weighting of 15% to reflect the growing importance of clean energy value chains in developing countries. This decision was made in part to reflect the changing dynamics of the global renewable energy marketplace. Lesser developed nations now account for a substantially larger share of overall investment than they did when *Climatescope* was first launched two years ago. Thus it was determined that how a country participates in clean energy manufacturing and services should receive greater weighting than in prior years.

Conversely, the weighting for Greenhouse Gas Management Activities Parameter IV was reduced to 15% from 20% in prior years. This was intended to reflect the fact that these programs are not major drivers of clean energy growth in most countries today.

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 a new “off-grid focus” methodology

Climatescope 2014 assessed nations ranging from low income ones to those firmly considered “middle income”. The methodology as implemented in years one and two of the project fit well for the nations of LAC, nearly all of which are considered

METHODOLOGY OVERVIEW

I. ENABLING FRAMEWORK

40%

Policy & Regulation	On-grid	Off-grid
Clean Energy Policies	9.6%	6.4%
Power Market Structure	4.8%	4.0%
Distributed Energy Regulatory Framework	0.0%	2.4%
Clean Energy Rural Electrification Programs	0.8%	0.8%
Energy Access Policies	0.0%	1.6%
Policy Barriers	0.8%	0.8%
Clean Energy Penetration		
Clean Energy Installed Capacity	3.2%	3.2%
Growth Rate of Clean Energy Installed Capacity	3.2%	3.2%
Clean Energy Electricity Generation	3.2%	3.2%
Growth Rate of Clean Energy Electricity Generation	3.2%	3.2%
Biofuels Production	1.6%	1.6%
Growth Rate of Biofuels Production	1.6%	1.6%
Price Attractiveness		
Average Retail Electricity Prices	2.0%	0.0%
Average Electricity Spot Prices	2.0%	2.4%
Average Kerosene Prices	0.0%	0.8%
Average Diesel Prices	0.0%	0.8%
Market Size Expectation		
Growth Rate of Power Demand	2.0%	1.2%
Electrification Rate	2.0%	2.4%
Population Using Solid Fuels For Cooking	0.0%	0.4%

II. CLEAN ENERGY INVESTMENT AND CLIMATE FINANCING

30%

Amount Invested	On-grid	Off-grid
Clean Energy Investment	6.8%	8.1%
Growth Rate of Clean Energy Investment	6.8%	5.4%
Fund Sources		
Loans, Grants, Grant Programs	3.0%	3.0%
Local Investment	3.0%	3.0%

Colors show methodology subdivisions and weightings

PARAMETER	WEIGHT	CATEGORY	INDICATOR	ON-GRID NET WEIGHT	OFF-GRID NET WEIGHT
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METHODOLOGY OVERVIEW (continued)

Green Microfinance	On-grid	Off-grid
Number of Green Microfinance Institutions (MFIs)	2.1%	2.1%
Green Microloans	1.2%	1.2%
Green Microborrowers	1.2%	1.2%
Average Cost of Green Microdebt	1.0%	1.0%
Cost of Debt		
Average Cost of Debt	2.6%	2.6%
Swap Rate	2.6%	2.6%

III. LOW-CARBON BUSINESS & CLEAN ENERGY VALUE CHAINS

15%

Value Chain	On-grid	Off-grid
Financial Institutions in Clean Energy	3.8%	3.0%
Value Chains by Clean Energy Sector	7.5%	3.0%
Distributed Clean Energy Value Chains By Sector	0.0%	3.0%
Clean Energy Service Providers	3.8%	3.0%
Distributed Clean Energy Service Providers	0.0%	3.0%

IV. GREENHOUSE GAS MANAGEMENT ACTIVITIES

15%

Carbon Offsets	On-grid	Off-grid
Historic Activity	3.0%	3.0%
Clean Development Mechanism (CDM) Risk	1.5%	1.5%
Future Potential	1.5%	1.5%
Carbon Policy		
Greenhouse Gas (GHG) Emission Reduction Targets	1.9%	1.9%
Country Registry	1.1%	1.1%
Market-Based Instruments	0.4%	0.4%
PMR & NAMA Commitments	1.1%	1.1%
Corporate Awareness		
GHG Global Reporting Initiatives	0.8%	0.8%
Principles of Responsible Investment	0.8%	0.8%
Energy Efficiency Initiatives	0.8%	0.8%
Emission Reduction Policies	0.8%	0.8%
Environmentally Focused Business Training	0.8%	0.8%
Environmentally Focused Think Tanks	0.8%	0.8%

middle income. But less developed nations face substantially different energy challenges, often related to improving basic energy access.

In light of this, *Climatescope* 2014 incorporates a special, augmented “off-grid focus” methodology that includes seven additional indicators, with weightings adjusted in the model accordingly. These additional indicators were taken into account alongside the other “on-grid” indicators for a sub-set of 23 *Climatescope* nations: 18 in Africa, one in LAC, and four in Asia. The goal was to level the playing field so that all countries could be compared in the fairest possible manner against one another in a single 55-country list. In addition, users of *Climatescope* 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. Among the goals of this augmentation to the methodology was to allow countries at very different levels of development to be compared to each other on relatively level ground. However, users at www.global-climate-scope.org may examine these 23 nations on their own if they choose – or the other 32 nations.

To determine which countries would be assessed using the off-grid focus methodology, we devised an initial 0-5 scoring system. Five factors contributed different weightings to this score; those that scored a 2.5 or higher were considered “off-grid focus countries”. Each factor involved a simply binary question that was used to generate individual scores.

Factor	Question	Criteria/score	Data source
Electrification rate	What percentage of a country’s population is not currently connected to the power grid?	A country with a low enough proportion connected received a score of 2.	International Energy Agency
Number of national power outages	How many power outages did the country experience in the most recent year for which there is complete data?	A country with a sufficiently large enough number of outages scored 1.	World Bank
Duration of outages	What was the average length of time a typical grid outage lasted?	A country where outages lasted sufficient durations scored 1.	World Bank
Power transmission losses	What are the typical line losses?	A country where transmission losses exceeded a certain threshold scored 0.5.	World Bank
Human Development Index	How is the country classified in the UNDP’s HDI?	A country classified “Low Development” scored 0.5.	UNDP

Source: *Climatescope* 2014

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 battery banks, mini-wind equipment makers, mini-photovoltaic systems providers, and other similar types of players exist in-country?
- Distributed clean energy service providers: What local developers, pay-as-you go facilitators, insurance providers, and others are in-country?

Other changes

Climatescope 2014 contains three other, relatively minor methodology adjustments from prior years:

- Enabling Framework Parameter I – A new indicator was added to take into account “policy barriers” that potentially limit the deployment of clean energy. In particular, we assessed all countries’ import duties on clean energy equipment.
- Enabling Framework Parameter I – Two additional questions were added for use in the survey to derive the power sector indicator score. These questions were added to give the survey a bit further nuance.

- Clean Energy Investment Parameter II – Average cost of debt indicator reflects inter-bank interest rates. In the past, a survey was conducted to assess the cost of debt of renewable projects. Given the new array of countries and limited financed projects in some markets, the inter-bank interest rate was used as a proxy.

- Clean Energy and Low-Carbon Business Value Chains Parameter III – The value chain segments were streamlined, eliminating a few that were relatively extraneous. In particular, a few categories from the geothermal value chain were rationalized. Also, impact funds were added to the financial institutions indicator.

Scoring approaches

Scoring approaches employed in the first two editions of *Climatescope* were also used for this 2014 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.

- 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.

I. 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 22 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. Five of the 22 indicators were 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, two additional indicators were taken into account: distributed regulatory framework and energy access policies.

Clean energy policies

For the 2014 *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 470 (all are now 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 32 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.

Three to seven 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 (see table below).

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. Some judges assessed more than one policy type due to their knowledge base and willingness to contribute. 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 via an online survey. In the end, each of the policies was reviewed by at least three expert panelists with most having been reviewed by four.

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 panelists.

In cases where a country did not have a specific type of policy, it received no score. For instance, 12 nations have net metering laws and thus received scores for those. The other 43 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) 2013 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 and Chinese provinces analyzed, the overall policy scores for India and China nationally were 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, 12 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 80 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 15 questions posed about each off-grid focus country. These were answered by BNEF analysts after consultations with local officials and private market players in country, state, and provincial capitals.

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. The characteristics, metrics (questions) and scoring for each are shown below.

	Characteristic	Metric (Questions)	Yes	Somewhat	No
Distributed energy regulatory framework	Licensing	Is it legally possible to set up a mini grid or small power project?	1.00	0.50	-
	Threshold	Is there a threshold limiting the size of a project that can be developed?	-	0.25	0.50
	Dedicated regulator	Is there one lead actor a developer primarily deals with for regulatory approval?	0.50	0.25	-
	Dedicated team within utility	Does the utility have a one stop shop to lead on the requirements for developers?	0.50	0.25	-
	Light-handed framework	Is the regulatory procedure designed to minimize transaction costs?	1.00	0.50	-
	Cost reflective tariffs	Are tariffs that at least enable developers to recover costs feasible?	1.00	0.50	-
	Duration of tariffs	Are permitted tariffs stable over time?	1.00	0.50	-
	Tariff deregulation	Can power producers structure their tariffs to align them with their business model?	1.00	0.50	-
	Standardized PPAs	Is there a standardized PPA for offtake?	1.00	0.50	-
	Duration of PPAs	Is the PPA of sufficient duration to be bankable?	1.00	0.50	-
	Purchase obligation	For grid connected projects, is the utility obliged to take all output?	1.00	0.50	-
	Interconnection rules	Are there clear rules on the process and standards for connecting projects to the grid?	1.00	0.50	-
	Grid arrival rules	For mini grid projects, are there clear rules for the arrival of the main grid?	1.00	0.50	-
	Quality of service standards	Are there clear quality of service standards for small power producers to adhere to?	1.00	0.50	-
	Financial services provision	Are power producers allowed to offer financial services to consumers?	1.00	0.50	-

Source: Bloomberg New Energy Finance

Clean energy rural electrification

The third indicator in the Policy & Regulation category of Parameter I assess 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 10 questions BNEF analysts asked about individual nations and answered after local consultation. All but one of these were scored in a manner similar to the approach used for the distributed energy regulatory framework indicator. One question simply looked at the amount an individual government has budgeted for its rural electrification program.

The questions are as follows:

	Indicator	Metric (Questions)	Yes	Somewhat	No
Energy access policies	Electrification program status	Is the rural electrification program active, in planning or inactive?	1.00	0.50	-
	Dedicated electrification agency	Is there a dedicated rural electrification agency?	1.00	0.50	-
	Electrification program budget	Annual rural electrification budget levelized against GDP	Levelized score, max = 1.00	-	-
	Energy access targets	Does the country have general energy access targets?	1.00	0.50	-
	Clean energy plan	Is clean energy specifically targeted to promote energy access?	1.00	0.50	-
	Connection grants	Are consumers offered grants to connect to the grid?	0.50	0.25	-
	Generation incentives	Does the country offer grants or other incentives for new small power producers?	1.00	0.50	-
	Tax / duty reductions	Do clean energy related products or services benefit from reductions in tax or duties?	1.00	0.50	-
	Mobile money	Is mobile money technology available to facilitate service payments?	1.00	0.50	-
	Retail barriers	It is possible to retail clean energy products?	1.00	0.50	-

Source: Bloomberg New Energy Finance

Policy barriers

The trade barrier indicator 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.

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, and growth rate of biofuels production.

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.

Twenty-two countries studied for *ClimateScope* were deemed to have notable biofuels production capacity: Argentina, Brazil, Colombia, Costa Rica, Guatemala, Nicaragua, Paraguay and Peru in Latin America; Botswana, Ethiopia, Kenya, Malawi, Nigeria, Senegal, and Zimbabwe in Africa; and China, India, Indonesia, Myanmar, Pakistan, Sri Lanka, and Vietnam. These countries were judged based on all six indicators¹. The remaining set of countries – those with no commercial-scale biofuels production – were assessed based on the first four indicators only; thus the scoring system did not penalize them for not having biofuels production capacity.

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, 2013 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 analyzed 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 2013 (or last year when data was available) in the country's a 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 “average² 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 liter basis in 2013. 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.

1. The India states and Chinese provinces surveyed received the same score on this indicator as their nations as a whole.

2. To determine an average in a country, BNEF would first use whatever average price the local regulator provided. In cases where no such average was published, BNEF would simply take total revenues generated by electricity sales and divide by total kilowatt-hours of consumption in the year. Finally, for countries with multiple classes of tariffs, BNEF would determine averages per class, then average these together.

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.

II. CLEAN ENERGY INVESTMENT AND 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 11 indicators distributed across four categories: Amount Invested, Fund Sources, Green Micro-finance and Cost of Debt. Each of these four categories contributed with varying weights to the overall Clean Energy Investment and Climate Financing parameter score (see figure above).

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 2006 to 2013.

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 and technologies, grant programs and grants, venture, private equity and corporate finance transactions, and project financing. The Amount Invested methodology follows that employed in *Climatescope* 2013.

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 2006 through 2013. Investment commitments follow different orders of magnitude because of the variation in the size of the 55 *Climatescope* countries. Thus, countries were ranked for this indicator based on the value of total clean energy investments as a percentage of GDP in purchasing power parity 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

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.

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.

Similarly, the growth rate for the clean energy investment indicator took into account the same seven-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.

Fund sources

The sources of funds category contributed 20% to the Parameter II score. Its two unique indicators – loans, grants and grant programs and local investment by local players – each made up half of the parameter weight and contributed 3% apiece to the overall *Climatescope* score.

The methodology employed to track loan, grants and grant program commitments remained the same as employed in the first two 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.

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.

Green microfinance

Green microfinance is playing an increasingly important role in the deployment of clean energy and energy efficiency technologies in the developing world. Considering its nascent but growing relevance, this category has a weight of 18% toward Parameter II. A total of four indicators comprise this category, including: number of green microfinance institutions operating in a given country, total green microloans disbursed in a given country, number of green microborrowers per country and average cost of green micro debt. Each of the four indicators contributes a different weight to the overall Parameter ranking. Together they make up 5% of the overall *Climatescope* score.

Information on microfinance that is specifically ‘green-oriented’ typically is not readily available. As a result, a specific survey was conducted of microfinance organizations to gauge their level of involvement in this area. Data from this survey are used in all four indicators comprising this category.

III. LOW-CARBON BUSINESS AND 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, we added a separate indicator for those service providers specifically related to distributed clean energy.

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 hy-

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 from the World Bank. 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.

dro, 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.

IV. GREENHOUSE GAS MANAGEMENT ACTIVITIES PARAMETER

The Greenhouse Gas (GHG) Management Activities parameter aims to assess the status, risk and potential for carbon offset project activity in a given country. Favorable 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 13 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% apiece³.

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.

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 four: the UN CDM, Verified Carbon Standard and Gold Standard. The data for these four 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 0.000000000097 per 100ktCO₂ in 2013 while the average across all countries was 0.000000000141. 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 0.0000003 credits per 100ktCO₂. Meanwhile, the *ClimateScope* average for this metric was 0.0000003035524 credits per 100ktCO₂. Thus Chile received a score of 1 for meeting the regional mean.

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

3. Indian states and Chinese provinces surveyed for some Parameter IV indicators simply received the same score as their nations overall. In others, specific research was conducted on their performance on individual indicators. And in still others, no scores were given.

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 four metrics:

- Abatement potential from energy efficiency, measured by the energy use per kilogram of oil equivalent per \$1,000 GDP
- Potential for Reducing Emissions from Deforestation and Forest Degradation in Developing Countries (REDD), measured by forestry abatement potential per hectare combined with a REDD-readiness score
- 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 four 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

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 (see figure on the

right) that answer the following questions:

- Does a country have emissions reductions targets?
- Does it have a greenhouse-gas (GHG) registry
- 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 GHG emissions reduction targets indicator made the strongest contribution to the carbon policy category score with a weight of 42%. Five was the maximum score a country could achieve on this indicator. The mark consisted of two metrics: regional and national targets. If a regional goal is in place, the country obtained a mark of 2; if a national target has been announced, the country obtained a mark of 3; if both are in place, the country obtained the highest mark of 5.

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 it 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. If a country is officially an “implementing country participant” of the World Bank's PMR – a forum for collective innovation and actions to support capacity building to scale up climate mitigation – but is still only in the expression of interest phase, it received 1 point; it got 2 points if it is already in the preparation phase and 3 points if it is in the implementation phase. Additionally, if the country has at least one NAMA initiative being implemented, it received a score of 1.

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%:

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 data-set 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.

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.

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).

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 a score of 1 for each of these indicators if it had one of these entities.