

# Climatescope 2014: Mapping Global Frontiers for Clean Energy Investment

—Transcript of a webinar offered by the Clean Energy Solutions Center on 13 November 2014—  
For more information, see the [clean energy policy trainings](#) offered by the Solutions Center.

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**Sean** Hello everyone and thanks for joining us. I'm Sean Esterly with the National Renewable Energy Laboratory and I just want to welcome you to today's webinar, which is being hosted by the Clean Energy Solutions Center in partnership with the Bloomberg New Energy Finance (BNEF) and USAID. Today's webinar will be focused on the Climatescope 2014 report.

One important note of mention before we begin our presentations is that The Clean Energy Solutions Center does not endorse or recommend specific products or services. Information provided in this webinar is featured in the Solutions Center's resource library as one of many best practices resources reviewed and selected by technical experts

Before we begin, I just want to go over some of the webinar features. You do have two options for audio. You may either listen through your computer or over your telephone. If you do choose to listen over your computer please select the "mic and speakers" option in the audio pane. Doing that will just help eliminate the possibility of feedback and echo. If you choose to dial in by phone please select the telephone option and a box on the right side will display the telephone number and audio PIN you should use to dial in. Panelists, just a reminder that we ask that you please mute your audio device while you are not presenting. If anyone is having technical difficulties with the webinar, you may contact the GoToWebinars Help Desk at the number displayed at the bottom of the slide. That number is 888.259.3826 for assistance.

We encourage anyone from the audience to ask questions at any point throughout the webinar. To do that simply type your question into the “Questions” pane and submit it through there. If you are having difficulty viewing the materials through the webinar portal, you will find PDF copies of the presentations at [cleanenergysolutions.org/training](http://cleanenergysolutions.org/training) and you may follow along as our speakers present. Also, we will be posting an audio recording of the presentations on our training page within about a week of today’s broadcast and we are also adding recordings to the Solutions Center YouTube channel where you will find other informative webinars, as well as video interviews with thought leaders on clean energy policy topics.

Today’s agenda is centered around the presentations from our guest panelists Maria Hilda Rivera and Nico Tyabji. These panelists have been kind enough to discuss the Climatescope 2014 report.

Results of the report suggest that renewable energy technologies can be just as cost competitive in emerging parts of the world as they are in richer nations. In this webinar will review the study’s key highlights and some of its surprising findings.

Now this slide provides a bit of background in terms of how the Solution Center came to be formed. The Solutions Center is one of 13 initiatives of the Clean Energy Ministerial that was launched in April of 2011 and is primarily led by Australia, the United States, and other CEM partners. Some outcomes of this unique initiative include support of developing countries and emerging economies through enhancement of resources on policies relating to energy access, no-cost expert policy assistance, and peer to peer learning and training tools, such as the webinar you are attending today.

There are four primary goals for the Solutions Center. The first goal is to serve as a clearinghouse of clean energy policy resources. Second is to share policy best practices, data, and analysis tools specific to clean energy policies and programs. Third is to deliver dynamic services that enable expert assistance, learning, and peer to peer sharing of experiences. Then lastly, the Center fosters dialogue on emerging policy issues and innovation around the globe.

Our primary audience is energy policy makers and analysts from governments and technical organizations in all countries, but then we also strive to engage with the private sector, NGOs, and civil society.

One of the marquee features that the Solutions Center provides is its no-cost expert policy assistance known as “Ask-an-Expert.” The Ask an Expert program has established a broad team of over 30 experts from around the globe who are available to provide remote policy advice and analysis to all countries at no cost. For example, in the area of Climate Finance and Emission Trading we are very pleased to have Barbara

Buchner, Director with the Climate Policy Initiative (CPI) for Europe, serving as one of our experts. If you have a need for policy assistance in Climate Finance and Emission Trading, or any other clean energy sector, we do encourage you to use this valuable service. Again, the assistance is provided free of charge. To find out if the Ask-an-Expert service can benefit your work please contact me directly at sean.esterly@nrel.gov or at my work number 303-384-7436 or you can also go to the Clean Energy Solutions Center website and submit your questions through there. We also invite you to spread the word about this service to those in your networks and organizations.

Now, I'd like to provide brief introductions for today's panelists. First up today will be Maria Hilda Rivera who is Energy Advisor at USAID and Power Africa. Maria will be introducing the Climatescope project.

Following Maria we will hear from Nico Tyabji. Nico is an associate at Bloomberg New Energy Finance where he coordinates research on Africa for the Global Climatescope project.

With that, I'd now like to welcome Maria to the webinar.

**Maria**

Thanks Sean and thanks so much for everyone participating today. We're very grateful for the opportunity to present the Climatescope findings at the Clean Energy Solutions Center. As Sean mentioned, I am Power Africa Energy Advisor, which Power Africa is a whole of government effort to increase access and generation in Sub Saharan Africa. This year Power Africa joined the Inter-American Bank and the UK Department of International Development and also to Bloomberg New Energy Finance to expand the scope of Climatescope.

So what is Climatescope?

**Sean**

Maria, just to interject real quick. We can't see. Can you pull up your slide? We are just seeing the GoTo Webinar screen on here.

**Maria**

I can't see them.

**Heather**

It's actually Nico working on that. Nico, would you like me to run your deck.

**Nico**

I can't seem to find...

**Heather**

Okay.

**Nico**

The webinar page.

**Heather**

Excellent. I can do that. One moment Maria. I'm sorry about that.

**Maria**

Thanks.

**Heather**

Okay, there we go.

**Maria**

Okay, next slide please. The following one. Thanks.

So, it is Climatescope's effort that we have been supporting. First, I'd like to start with it is a free tool available to all online. It is an initiative to provide timely, accurate, and actionable data that informs smart investment and policy making with the ultimate goal of mobilizing capital for clean energy in emerging markets.

Climatescope serves an index to measure relative conditions for clean energy development in various nations with a scoring system that goes from 0-5. It's a report that provides detailed descriptions of policy frameworks, financial resources, and markets in developing countries and it also serves as an interactive online tool that allows users to examine the relevant data greater depth through a graphical interface.

Climatescope works as an open-source data resource for NGOs, multi-lateral development banks, and other institutions working in the low-carbon energy development and energy access field that can be used for downloading data for their research and work.

The next slide gets you a little bit of the user interface...next one...of the interface for Climatescope. It's a wealth of information that we hope stakeholders in the clean energy space can make use of.

Now I'd like to hand it over to my colleague Nico from Bloomberg New Energy Finance who will walk you through some of the findings for this year's Climatescope.

**Nico**

Thank you very much Maria Hilda and thank you very much for the Clean Energy Solutions Center. It's great to be able to share Climatescope. I'm Nico Tyabji, an associate of Bloomberg New Energy Finance based in London. I have been closely involved with simply the Africa side of the research for Climatescope. Climatescope also covers many countries in Asia and Latin America. So, this has really been a yearlong research process for us with our colleagues based around the world, from Cape Town in South Africa to Hong Kong and Beijing, all being very closely involved in this process. I would like to take the opportunity to thank our supporters at Power Africa and the UK's Department of International Development and the Inter-American Development Bank for their support.

I'm going to three things really. First, I'm going to talk a bit more about what Climatescope is and what we hope is useful and how we went about it. Then I am going to sort of look at the insights that we've drawn from this research. Then, I'm also going to go into more of a focus on Africa and some of the conclusions and insights we're drawing from Climatescope related to African Countries. The next slide please.

To start out kind of top level, I guess this is what Climatescope is ultimately. It is an index and a ranking of 55 countries. The index that the score is giving to them is really an assessment of the conditions in that country for the scale of the clean energy investments. So, just start out with high-level results seeing what countries are in the top 10. We have China and Brazil up there. I suppose that's not really a surprise and what we've been watching at Bloomberg New Energy Finance over the last 5 years is the emergence of those two countries as global leaders in energy efficiency.

China in particular, for a number of years, has been installing more renewable energy capacity than anybody else and investing more money into it. Maybe some of the kind of bigger surprises would be the presence of three Sub Saharan African countries in the top 10. So, South Africa at number 3, again maybe less surprising than the presence of Kenya and Uganda a bit further down in the top 10. Likewise, Uruguay was quite an interesting development this year. That's a high finishing based on a kind of new rush of investments over the last year or two.

Then, if we look at the sort of bottom 10 we can see that within the countries very different conditions and environments. What we try to do in Climatescope is capture those different conditions in a way where they are still comparable between very different countries, whether it is Venezuela with 30 million people or Suriname with half a million people. Climatescope is a tool that allows us to compare these countries and it presents a huge amount of the data that goes into these scores online and makes it freely available. Next slide please.

So, this year we have looked at the following nations—26 in Latin America and the Caribbean. That is the entire region. The 2014 edition of Climatescope builds on two previous editions in 2012 and 2013, which was exclusively looking at those nations. With Climatescope 2014 we have been able to expand to 19 Sub Saharan African nations and 35 Asian nation states and provinces. That 35 includes 15 in China provinces and 10 Indian states. Next slide please.

If we look at how we actually built Climatescope and what is the data that goes into this, it's really across four different platforms. Firstly, the enabling framework. Secondly, clean energy investment. Then, low-carbon business and clean energy value chains and finally, on the greenhouse gas management activities and carbon market activities. This covers around 195 sub-indicators but those are made up of more than that in terms of individual data points. Essentially what Climatescope does is gather all of those different data points and produce a ranking. Next slide please.

Those four parameters provide a weighting and we make that weighting interactive. For users who have different interests, you can go to the website and actually if you go to the next slide. This just shows that if we

were to say increase the weighting of the clean energy investment parameter, you can see the results changed somewhat. The idea here is really that different users would have different interests. For instance, you may be more interested in the enabling framework if you are interested in seeing what kind of policy regimes have brought about investment or likewise if you are looking more at the investments themselves, you get sort of Uruguay rushing to the top. I'll explain more about why that would be as we go forward. Next slide please.

So, these four parameters—the enabling framework, our kind of default weighting, it gets the most weight. There are 40 dependent variables and that comprises policy and regulation—so specific incentives for clean energy development—but it is also the kind of wider structure of the power market and that is really about looking at the expense of liberalization and the expense of private participation in those markets already. We also look at clean energy penetration, so the level of capacity that is already made up of clean energy. I should point out that our definitions over these Climatescopes have not included large hydro. That's hard hydro above 50 megawatts within the kind of clean energy bracket. That is really for a couple different reasons. One is concern over the environmental effects. The other is when we bring the energy finance into tracking these markets; large hydro is very much an established technology, whereas we are tracking the emergence of new technologies—solar and wind and biofuels and biomass.

Part of the enabling framework is also around price attractiveness, so power prices. Our general approach is that a high power price market signifies high demand, therefore, a market where investors might be looking to enter into. Likewise the expectation for market size, we look at indicators such as power demand and the grade of power demand. The second parameter, clean energy investment, really builds on Bloomberg New Energy Finance's data on the projects that are being built around the world and the funds that are flowing to those projects. So, this process, our research process, is our daily bread. We have a large team of people who are tracking all of these individual projects, likewise, where that investment is coming from. There are different kinds of investors—whether that investment is being sourced locally or it's flowing in from overseas. Part of the financing, we also look at the financing conditions. This includes microfinance. There are several indicators on the cost of debt.

Then, on the third parameter, low-carbon business and value chains. What we really are doing here is looking at who is already present in the countries. Who is already poised to be an investor in clean energy. So, this is both equipment manufacturers across the different energy sectors, but also the service providers and financial institutions involved in those sectors.

Then, finally on the carbon side we look at the historical level of offsetting through both the carbon markets but also the voluntary market. We also look at the potential for further offsets and we look at the policy in place within the countries toward emission production. Finally, we look at several indicators based on the engagement of the corporate sector and different companies' income and emissions. The default weighting for these parameters are 40% attributed to the enabling framework, 30% toward the investment indicators, and then 15% each on the value chains and the carbon related indicators. And as I said, those are weightings that the user is able to play with and adjust to their own interests. Next slide please.

One of the adaptations that we've made for the 2014 edition of Climatescope, in order to expand and cover the African and Asian countries, was to include an off-grid and distributed energy. To do so we added several indicators, which I've highlighted here in italics. For instance within price attractiveness, we are not just looking at power prices now. We are also looking at diesel prices and kerosene prices. For those fuels in countries with lower levels of electrification, these fuels may indeed be important indicators of the incumbent generation that would need to be displaced and even at the very micro scale. Thinking of the potential for say investments in say solar, distributed solar, displacing kerosene as a lighting fuel. Likewise, for the market size expectation, we included the electrification rate.

Then, we added two completely new indicators to the enabling framework parameters—one around the regulatory framework of distributed energy. So this really being the policies in place and the regulations in place around being able to build mini-grids and small power projects. Likewise, we looked further at the energy access as policies in place.

On the investment side we expanded our coverage of grants. So we had a lower threshold for the grants that we included in the investment levels within the country. Then we also on the third parameter with value chain we included sectors specific to sort of mini-grids and distributed energy. We wanted to include further indicators for the level of clean energy penetration as far as it related to the off grid sectors. So for instance, to what extent are we seeing the distribution of say solar home systems? We set out to do that. This was one of the real challenges that we found in Climatescope 2014 in that there is currently not very good data on those sectors specifically. In a way I think we sort of redoubled our efforts on the regulatory side but being able to measure the actual distribution of these products and also kilowatt/megawatt tons is something that we are very interested in coming back to and we are having an active discussion with various partners as to how to do that.

Then if we look a little more in-depth on the next slide please, at the regulations that we did look at relating to mini-grids and [inaudible 22:08] protectors, on the distributed energy regulatory frameworks this was very

much about both the ability for investors in these sectors to recover their investments but also what's put in place through the framework put in place by governments. For instance, whether standardized power purchase agreements are available—whether they are long enough to be bankable and whether there are clear rules say on the interconnection of different projects and different grids.

On the energy access policies we look to the presence of rural electrification programs, whether there's a dedicated agency and the targets and plans around that. I wanted to particularly point out an excellent report that we found helpful and spoke with the author of the report by the World Bank titled *From the Bottom Up*, which is an excellent toolkit looking at particularly the regulatory environments of mini-grids. Next slide please.

So, I hope I've given you some idea of what went into Climatescope and now let's look at what we sort of found from that. I'm going to start by looking at some of the global insight but also then look more regionally as well. At a very high level what we found was the growth rates within the Climatescope countries hugely outstripping the OECD countries. I think this is particularly interesting because when you are renewable energy has often been seen as something of a rich country's game. We will hear the stories about how Europe and US is building huge amounts of capacity but when we are sort of thinking about the options for developing countries maybe we sort of lack thinking about clean energy. So what we found sort of here in quantity terms is that the Climatescope countries between 2008 and 2013 added 600 gigawatts (GW) of overall capacity. Sorry, this is to start out looking at the total power capacity. Firstly, a mark of the demand for new capacity in the Climatescope countries adding 600 GW to reach just over 2 terawatts (TW), so a growth rate of a third in total capacity installed. Of course China accounts for a very large amount of it. So, 416 GW was China and China had a growth rate of its own capacity of over 50%. Now, a rather extraordinary barometer of how much that is, is that in 2012 China installed I think around 80 GW of power capacity in total, which is the same as Mexico's entire power sector capacity. Mexico, of course, being 120 million people. Over the same period the OECD countries conversely, added 260 GW, which was a growth rate of around 10%. We are looking at total growth rates in that period for all power capacity was 10% in the OECD countries versus 50% in China and a third for Climatescope countries. Next slide please.

And here we are looking specifically at clean energy and non-large hydro clean energy. The picture is a little bit different if we include large hydro but without it we again see tremendous growth. You can really see that the growth has been both in the Climatescope countries and the OECD countries. The growth rate for that period in Climatescope countries is 143%, for OECD countries 84%, and in that time Climatescope countries added 104 GW versus the OECD countries 113 GW. Now interestingly the clean energy capacity made up around a quarter capacity additions,



total capacity additions, in the Climatescope countries, whereas in the OECD countries the clean energy was 80% of total capacity. So I think we can really see different stories going on there. OECD, you know, are generally an established power sector base upon which there are particularly environmental concerns. There is a new incentive to add clean energy capacity, whereas maybe in the Climatescope countries we are more talking about a general demand for new capacity of which clean energy is part. Now, one of the interesting things is that over those 6 years we've seen an increase in the ratio of clean energy capacity to non-clean energy capacity additions for the Climatescope countries. So for instance in 2013 the Climatescope countries added 37 GW of renewable capacity and the OECD countries added 43 GW. Next slide please.

So how do we account for these rather dramatic upticks in the level of capacity being stored in the clean energy sectors? Well, largely it's to do with cost. One of the things that we've been asked, that Bloomberg New Energy Finance has been asked to do is track the evolution of the levelized cost of electricity across the clean energy sectors. So, just to explain briefly, levelized cost is a dollar per megawatt hour amount. Actually, I think this chart is missing the unit. Sorry for that. All of these figures are in dollars per megawatt hour. It is essentially an all in cost of generating units of power. That's across a Capex/Opex and then looking at the resourceful core performance for the renewable resources as well as financing indicators. Importantly, this does not include subsidies and it does not include carbon costs. So if you like, this is trying to be as pure as possible when comparing the cost of generation in technologies. I think the major story over the last 5 years has been the way that the cost of solar has come down. That's been a reduction of over 70%.

Now what you see in this chart is the white circles are almost recent levelized cost figures and central scenario, which includes quite western European conditions, so not particularly high capacity factors but pretty good financing conditions. The blue diamonds show the region scenarios that again with variances based on resources and financing conditions as well the cost of the technology themselves. If you see at the bottom those are reference scenarios for fossil fuel and nuclear generation. We really pushing up with solar and wind, in particular, on shore wind in particular in cost competitiveness without subsidy. If we can go to the next slide please.

One of the things we've done through Climatescope is collect industrial, residential, commercial and average power prices. This is putting our kind of global essential scenario solar and off shore wind levelized cost against industrial power prices. We can see that already in many parts of the world it's already cheaper to generate and to purchase your power from renewable sources. Now of course we need to give a nuance to what this means. This does not include system cost. That's a different question really—how you have a functioning and balance power system. I guess the main points is that the changes in the cost of renewable technologies is a

very important dynamic occurring, not just in emerging markets but around the world and we are already seeing the effects of that presenting new challenges to existing business models, utilities, and also for the way that power systems are structured. Some of the reforms that are going on in Europe at the moment are very much around the changing profile of a liberalized power market. We could also show very similar charts for residential power prices, so this being an even simpler kind of question I guess, which is for you as a residential consumer. Does it make sense for you to put solar panels on your roof or not? Increasingly around the world the answer is yes, even without subsidy. I think now in Italy that figure kind of makes sense. Essentially if you have \$10,000 to spare it's a wise bet to put solar panels on your roof. Next slide please.

That's really just to dip into cost changing profiles but of course policy is still fundamental while the economics are improving the power sector is highly regulated. Even worse, liberalized power markets are still very much dependent on the way that regulations are shaped. So, one of the things that we've done through Climatescope is collect a huge number of individual policies, which are available on the Climatescope website in the policy library. We've tracked almost 360 policies in the Climatescope countries since 2006 and about 60% of them introduced since 2011. Most of these are energy market policies so they include feed-in tariffs, auctions, and say renewable energy targets within energy markets and policies. Details of all of those policies are available on the Climatescope website. Next slide please.

When we think about the relevance of policy, this is some data that we pulled together from the Climatescope results. On the y-axis that's the policy score that was attributed to the country. Now, I should explain that within our methodology the way a countries were awarded score for their policy environment was actually done through an external panel of experts. So we had about 50 people, experts around the world, who were involved in assessing and rating on policies of sets of a bunch of parameters. The scores are on the y-axis. On the x-axis we have investments against GDP. I should also explain that for these kinds of indicators in Climatescope we levelized against the country size. For instance, obviously China has invested far more in clean energy than anyone else in the world and so would be off the chart here. So, by relativizing it, levelizing it, that to the country's GDP we were able to kind of compare countries more easily. So you can see there are a few outliers based on that approach. Sierra Leone, for instance, has had really only one clean energy financing, with Addax Clean Energy Plant. That sort of registers very significantly even though the country really has no renewable energy policy to speak of and has a score of really 0 for the policy score. In general, the trend is the higher the policy score the more the investment. Then we can see very clearly a country like Kenya, which was really the early mover in Africa in terms of establishing feed-in tariffs and attracting investments as well. Next slide please.

I wanted to look at a couple of the big trends that we've seen in Climatescope and starting by looking at the different parameters. So to begin with just a reminder, the parameters being the first enabling framework, the second, the clean energy investment, and the third around the value change and presence with businesses in the country, and the fourth is carbon. Next slide please.

If we only look at the parameter I scores, in other words how the country deals with enabling frameworks, we have Brazil finishing at the top. That's very much around the specific incentives and the options that the country has been running for several years. In fact, in its latest option Brazil first had to carve out the solar and it's been able to deliver the lowest solar contracts that we've seen so far at around \$87 per kwh. That's was just last week the results were announced. Another important side in Brazil would be financing that has been made available, the self-financing, by the National Development Bank (NDF). Another side of the enabling framework in terms of price attractiveness is that Brazil has had very high power prices, probably related to drought problems. Then there is, I think, a slightly startling result here that is Rwanda finishing at number 2 on the parameter I above China. So Rwanda beat China! Now this is an interesting case where the levelization really kicks in because Rwanda has a range of policies but really not particularly ambitious ones. For instance, an auction recently for pretty small amounts of solar energy capacity and likewise sort of specific policies in place for small hydro and distributable hydro. Where it's scoring very highly is the relative level of clean energy capacity compared to its overall capacity. So, Rwanda has kind of been thrust up there. It also scored well when it came to the energy access policies and the country has a pretty significant electrification program so this is by no means only related to off grid and had a lot to do with on grid electrification as well. China finished high as well. Kenya and the Dominican Republic also perhaps more surprising to be in fourth and fifth respectively but again there are significant policies in place. Next slide please.

On the clean energy investment funds, the one just before that, we would have Uruguay coming in first when just comes to clean injury investment. Investment secured in 2013 amounted extraordinarily to 2.5% of GDP. That's very much about a country level decision to increase the level of clean energy. Uruguay has held auctions and will see its capacity build out over the coming years as well.

South Africa has attracted \$10.5 billion in 2006. That's very much related to a recent auction program. We've really seen that financing flow in over the last two years and interestingly that \$10.5 billion is not so significant relative to its economy size. Actually where it's done particularly well on the investment parameter was in the local investments, those being a very high involvement of South African banks and other funds in seeing those projects come to fruition and being very engaged in the auction process.

Nicaragua again finishing highly. In fact, Nicaragua finished second and third in the Latin America-only Climatescope over the past couple of years. While it may be surprising to see Nicaragua again up there I guess it's less surprising to us and for those seeing the prior editions of Climatescope. Next slide please.

The presence of low carbon business, I guess it's pretty unsurprising that you find China, Brazil, and India in the top 5. Of course, giant economies really covering most of the different clean energy sectors and service providers with companies based within those countries and China scored a perfect 5. You can find anyone that you need to engage in clean energy in China. Not much of a surprise.

I think South Africa is a very interesting story here. South Africa, as I said, has really seen investment just over the last two years. One of the important aspects of the auction program over the last two years are local content rules. So that's really been the establishment or the beginnings of the establishment base through government policy.

Pakistan at number 4, again, it's a large country but perhaps a little surprising to be in the top 5. Actually, Pakistan is credited with having many players in the off grid sectors. Next slide please.

So when it comes to carbon the outstanding performer was Chile. That's not just about the presence of offset projects. It also has South America's first carbon tax.

In China there's been very significant activity. So while China has been the world's largest emitter it also significant activities to both measure and record and to reduce emissions. Otherwise in the top five all are from Latin America. I think it is quite noticeable that the African countries did not perform quite well on carbon indicators. I think that is a measure of the lower level CDM and other carbon market related activities but it's also a measure of the spacers of carbon policy, if you will. Really the only country engaging significantly on carbon policy on specific measures around cutting emissions—South Africa, which has a proposed carbon tax. It's very much not implemented yet and we will have to see if that indeed comes in in the coming years given that South Africa's generation profile is largely coal-based and given the financial difficulties of the state utility. Next slide please.

So, just to run through what the regional indexes look like. Next slide please.

In Asia we have a lower number of Asian countries so it is a smaller index. We have China and India in the top two positions. In fact, on the website and in the report both of these countries can be expanded so that you can see the performances of individual provinces and states. So there are also province and state rankings. For the Asian countries we had four

that we classified as off grid. They were assessed on the basis of the off grid parameter that I previously introduced. They included Pakistan, Nepal, Bangladesh, and Myanmar. If we could just move to the next slide please.

For Latin American and the Caribbean, Brazil is the clear top runner, followed by Chile which has been a strong finisher for the last couple years. Uruguay really moving up several places since the previous years. Then at the other end of the scale are Venezuela and Suriname not performing well. Venezuela, in particular, is a country where the power sector is not attractive to outside investment and hasn't really seen any. Can we have the next slide please?

I really wanted to focus now on the African countries, which I've been most closely involved in. This is the picture of the Africa index. So South Africa at the top, as you have heard already, followed by Kenya and Uganda with very strong finishes. Both Kenya and Uganda performed well not just on the policy frameworks, though they both have scored well in that. Both actually scored well on value chains. So what we found is that they are already many companies in both those countries working in these sectors, and also service providers.

Ethiopia I think is a very interesting case because it didn't score well on policy or the power sector structure so it's pretty much a state economy really. It is one that has nonetheless been able to attract some investment in clean energy. That is really more through government procurement and direct investment by China, so, Chinese loans and projects that have been constructed, much in partnership with China. However, Ethiopia is a country to keep an eye on because they are very ambitious target and also there are starting to be the first signs private investment. The government has signed its first agreements with independent power producers.

Tanzania at number 5 scored very well for the distributive policies. We will look more in detail at that shortly. An interesting one to look at is Liberia. Liberia is a country that has challenges of course and very much like Sierra Leone are relatively recent post-conflict countries and very low levels of energy access. I think it very interesting that Liberia finishes kind of mid-table really. I think that stands for a couple things. In particular, it's around the very high power prices, very low electrification rate, and also very low proportion of people with access to clean cooking, which is another indicator that we included. This meant that the scores in those areas I guess the idea being that those are all indicators of suppressed demand and people paying too much already. That is a country where I think Climatescope demonstrates the kind of conditions that are there for say off grid or particular distributive energy options. Can I have the next slide please? And the next one again.

Now I want to put out information that is all available on the website from the Climatescope report. I hope to lend some insight as to what is

happening in the African countries. I will start out with at a sort of high level. This is the overall power capacity for 19 Sub Saharan African countries and spanning 77 GW. To give you a comparison, the UK has around 90 GW. Of that 77 GW, well over half is in South Africa. If we extrapolate just the clean energy capacity, we are looking at 2.1 GW in 2013. That will increase this year somewhat. We forecast, for the whole Sub Saharan Africa, a bit over 5 GW of clean energy in the past year. Again, bear in mind that is excluding large hydro. That 2.1 GW for the Climatescope countries is about what UK has installed in just solar, just in 2013. That is a slightly comparison because the UK weirdly has been the largest solar market in Europe but to give you an idea of the amount of stuff we are talking about. In fact the UK has, by the end of this year, roughly the same amount of solar as the whole Sub Saharan Africa has clean energy excluding large hydro. Next slide please.

So we collected a lot of data on electricity prices. In this slide we have cascaded African countries by power price. Then also showing is the power mix. The slightly paler blue you can see on the countries lower down is the large hydro. We see that those with the lowest electricity prices really being those that have predominantly based large hydro power sectors. Those more reliant on fossil fuels tend to be those with higher prices. You can see Liberia with its power average power prices at \$534 per megawatt hour (MWh). That's probably the highest in the world. It's really up there in the top two or three. You can also see in the middle of this, those countries that are more, that have seen growth of gas capacities, so countries like Nigeria, Ghana, Cote d'Ivoire, that's more middling. There are also countries that slightly buck the idea of old fossil fuels, gas and then hydro, ranking of power prices. In a way South Africa is just a completely different environment because it's got so much more capacity than any of the other countries and more than all of them combined. That \$76 per MWh is very much a repressed power price and one that is causing Eskom, the utility, many financial difficulties. If we could go to the next slide please?

So where does clean energy investment fit into this for Africa? This is what we've seen in the 19 Climatescope African countries since 2008. You can really see the two dark green bars there in 2012 and 2013—that's emergence of South Africa not just as a significant African destination for clean energy investment but a significant global destination for clean energy investment. The dark blue, which is kind of the next biggest, is Kenya, and that is very much based in geothermal investment. So Kenya is the African country that's had the most investments of over \$4 billion in geothermal. Then we can see Ethiopia with the bright red, sort of patchy record, and again very much around the country and sort of the government itself directing what kind of investments it's seeking, a lot of that being publically financed. I should also just add that what we mean by investment here covers the different asset classes from asset finance, so investments in a project, whether that's debt or equity or public market

investment or private equity, corporation or government R&D, and also mergers and acquisitions. Now we have not seen much of those latter types. Most of these dollars here are in asset finance and projects themselves. We have seen some M&N. So, for instance, in 2012 there was quite a large acquisition of a geothermal plant in Kenya, which pushed up that amount for Kenya and for geothermal. Next slide please.

So, if we look at this. It is essentially the same chart but just extrapolating by sector rather than country. You can see that prior to 2012 quite a diverse mix but solar wasn't in there at all. We really have not seen much utility scale solar investment in Africa yet. I think this is somewhat surprising actually because especially over the last couple years there have been so many headlines about giant solar projects being developed in different countries. Actually in terms of dollars invested and megawatts built that remains very low. The big change has been with South Africa's auction program. Most of the billions of dollars invested in South Africa has been in solar and actually specifically solar thermal, which we'll see more of shortly.

So you can see also that geothermal has been an important factor for the region and very much been about Kenya. We expect to see the same kinds of trends continue for 2014. There have been some sizable deals concluded in 2014. A particularly notable one was the Lake Turkana project in Kenya. That adds to the wind capacity. If we could have the next slide please?

This shows South Africa. I have to apologize. That 3.5 is a typo. It should be 4.5 so apologies for that. Again, this is showing those really insignificant levels of energy investments in South Africa until 2012, until the start of renewable energy and the power producer energy program. Now that's over \$10 billion in the last year. If we could have the next slide please?

One of the extraordinary things about the South African auctions is the size of the solar thermal project that has been commissioned. That's really a government decision based on what they are willing to contract, so a \$1.2 billion solar thermal plant financed last year. Again, that's an Eskom project essentially so Eskom is not in good financial health. It's particularly interesting to see a solar thermal plant of that magnitude coming through but likewise with other project developers. If we could just have the next slide?

This is starting from a very low base in South Africa so of South Africa's 43.5 GWh total capacity is 80% coal. Now, South Africa's coal capacity alone is the same as the entire capacity of the rest of the Sub Saharan Africa. There is an awful lot there. We can see that the clean energy, the build out, is less than 1%. With the capacity that has been contracted through the auction programs, we are forecasting that the clean energy

rises to around 8% by 2016. In other words, quite a big shift quite quickly but starting from a very low base. Next slide please.

Then this is just a look at the next largest clean energy market for the Climatescope African countries and Kenya here. Now Kenya is an interesting case because it started geothermal power for several years and is indeed putting renewed emphasis on the geothermal but actually a lot of investment has occurred slightly outside. It's been a kind of stop start process and again around a large geothermal project. If we could have the next slide please?

So outside of investments this shows the clean energy policies that we found among the Climatescope African countries. All of these individual policies are in the Climatescope policy library. I think one of the first things you can notice is that tax incentives are fairly widespread so we tend to see some kind of tax incentives for clean energy being part of wider tax incentives for investments in a lot of these countries. It is really a different question, the extent to which they work in practice. One of the things that we encountered was several project developers. When our researchers went out and talked to the project developers in new countries, several project developers found it very difficult to negotiate actually say getting products into the country that were supposed to benefit from several tax breaks or other incentives not necessarily being implemented in practice, and certainly not necessarily transparently or straightforwardly. Next, most common policy type or energy target so most countries have some kind of specifically clean energy related target—often capacity target but also [inaudible 1:00:38] target. Again, these vary quite wildly in terms of whether they are being used to base wider reforms and other incentive programs. So, for instance in Liberia the target is for 2015 and not one that has really been related to other policy efforts. Finally, the next one is common policy type is debt and equity incentives. This is really around grant programs and supplemented and provided by the government perhaps through development partners. A lot of the debt and equity incentives that we have found were related to rural electrification and in general they were a kind of wide diversity of programs that were actually implemented and money actually being spent on the ground. Conversely, we found that those countries that had feed-in tariffs and auctions, so specific incentives designed to contract new clean energy capacity, by and large once of those plans are in place they are very much sort of capable of mobilizing investment. Obviously we have Kenya, we have South Africa, and Nigeria is a bit of an exception. Feed-in tariff is in force and is available, which does not seem to have been successful in attracting actual investment and I think that is largely around the uncertainty of its very recent and very expensive liberalization program. Couple of very interesting ones—in Ghana and in Uganda both have been incredibly successful at mobilizing interest in solar capacity. So, Ghana through its feed-in tariffs and Uganda through an addition to its feed-in tariff, a kind of top-up tariff on top of the existing tariff, if that



makes sense, which was auctioned. I think in Ghana there was something like 2 GW of interest expressed around 150 MW of solar capacity the government actually wanted to contract through debt that its budget could handle. In Uganda, I think it was around a GW of interest for only 20 MW of the capacity. If we could have the next slide please?

Outside of the policy incentives we also, as I mentioned, looked at the structure of the power sector and I guess the best way to think of this is a measure of liberalization. For instance, we looked at the expenses on bundling. We looked at the expense of private ownership. We looked at distortions of retail electricity prices. All of those different indicators you can see in the methodology available on the website and one of the very interesting things here, I mean, you can immediately see that Nigeria is the African country that scored most highly in terms of the power sector score and is the country that has been able to mobilize so far pretty much zero investment in clean energy. Now that may change and it is very much around the reforms last year and over the last couple of years shape up but then conversely we have Ethiopia, which is down around a .5 score. Again, that being a very much state controlled power sector yet opening up a little to private investment. There were a couple reforms around contracting services out to consultants to improve service delivery but I don't think there is any indication that the Ethiopian government fundamentally wants to restructure the power sector. I think this begs some very interesting questions around the kind of policy reforms that are required to mobilize investments in clean energy. Next slide please.

So this is a high-level view of how the countries performed on the distributive energy and energy access scores and the first thing is that Tanzania was the stand out performer. This was particularly on the regulatory framework's small projects, and mini-grids. This is really a case of a country that has put a lot of effort into getting rules right. So I think that process has been dated back to 2008 has involved working with the World Bank in particular and it's an ongoing process. So, the standardized power purchase agreement may well be rolled into a kind of wider feed-in tariff but the point is that this has been very successful in mobilizing new projects and investors so that Tanzania now has a power plan of around 60 projects of under 10 MW, by no means just clean energy and I think majority non-clean energy, but nonetheless those rules in place being able to get projects of the smallest scale in a distributive sense. On the energy access side we generally saw much higher scores. I think every country has a rural electrification agency. I think almost every country had a formal plan related to increasing energy access. Go to the next slide please.

I just wanted to finish by looking ahead to what we're doing with Climatescope. Climatescope is repeating for 2015. The aim is very much to continue collecting the most recent data but also building a track record of how these countries' performances change over time. That is something that has only been interesting for the Latin American countries but now

have three years worth of data. So we will be repeating the process for the countries I have been talking about today. We are also actively interested in expanding these to further countries and talking to various further potential partners. So, we're very grateful to our supporters so far and looking to expand so please get in touch if that's something of interest or we're also very much looking for feedback. The aim of Climatescope is to be a useful tool that provides data to a whole range of stakeholders to be practically useful. Please do get in touch if you have any comments on our approach. We are also having quite an in-depth session next month to kind of look at methodology and see how we can refine it. So that would be very helpful to hear from you and also how you're using this tool and how it can be more useful. Next slide please.

This is my email. Please email and I would be very happy to take any questions. Thank you for your attention and thanks again to the Clean Energy Solutions Center.

**Sean**

Thank you very much Nico for the presentation and Maria as well. We'll move along now to the question and answer session. Just a reminder to the audience, if you do have any questions you can submit those through the question pane. I'll go back to the first questions we received and we will work our way through those. One of the first questions, Nico, is it asked if there is a way to change the weightings of individual criteria within the four parameters or can we change only the weightings of the four parameters?

**Nico**

That's not currently a feature on the website so that's something that we obviously can do in our own model but it's not kind of a user feature.

**Sean**

Alright. Thank you. What do you see as and what do the reports show for determinants scaling of clean energy technologies for emerging countries?

**Nico**

That's a great question. (laughter) I think there is a very clean indication from the results we see that while the economics are becoming more and more attractive, there is a place for very specific policy incentives. So you can look at Brazil—an auction program that is delivering the lowest cost clean energy that we've seen in the world. Likewise South Africa. China is a market that is very much reliant on different policies from feed-in tariffs to low-cost financing. So I think there is a strong case for those kind of specific schemes. The other thing that I think is very interesting about that for emerging markets is there is an opportunity there to leap frog what has already been tried out in Europe. So, for instance, the idea of going for fixed feed-in tariffs rather than those that are competitively allocated at the lowest cost or that relate in some way to an existing power market. Those are all things that have been tried out and mistakes have been made, especially in the European countries that first introduced these. Now there is a really good body of evidence over what works.

**Sean** Great, thanks again Nico and next question wants to know what your insights or if the Climatescope report had any insights on the level of interest in financing the complete process and what the attendee meant by that is technology that has not yet been commercially proven, so basically starting from the very beginning and financing the process all the way through?

**Nico** That's a very interesting question. I think in general, certainly related to the African countries that I've spent the most time look at, we don't see so much of that kind of investment. There are kind of isolated companies in different African countries. I'm thinking of a very advanced electronics company in Ethiopia is one that has attracted some venture capital funding. By and large we have pretty good insight into that from the kind of financing flow, so VC and private equity into earlier stage technologies and I think generally what we're seeing, certainly in Africa, is less of that kind of financing so it being much more project based. Now as far as Climatescope goes, I think the focus is does any way stay more on the project level? We're talking more about capacity buildout because the way the model is structured is around that kind of investment and policy-wise likewise. We don't look particularly in-depth into say research programs sponsored by governments.

**Sean** Nico, getting back to that Climatescope report, how did you go about assigning weights while calculating the index among parameters?

**Nico** For the overall weightings that was really a decision taken by the steering committee so between us at Bloomberg New Energy Finance and our partners in the UK and US governments and the Inter-America Development Bank. It's a tricky issue. I mean it's a kind of arbitrary decision and it changes the way that these countries line up. So, we did actually this year change the weighting. It was previously for the Latin American nations 40% the enabling framework, 30% for investment, 20% for the value chain, and 10% for carbon and we actually leveled the value chain and carbon 15% each. I think that conversation, from memory, was at least an hour long debate but a very interesting one because I guess the subject matter is what do we think is important in terms of the conditions for attracting further investment. On the other hand, while it's somewhat arbitrary, I guess it's also one that can be played with easily. So the idea is not to say this is what we think is important. The idea is just to be able to present the data in a certain way that can be used.

**Sean** Great and can you elaborate more on the debt/equity incentives and how do the debt/equity incentives differ from the carbon market?

**Nico** Sure, so, debt and equity incentives we're really talking about any money being put up that doesn't come from a specific incentive program like a feed-in tariff. It's not going to be a generation-based payment for output. This covers really a wide range of grants, soft loans, and differs from the carbon market mechanisms in that the carbon market mechanisms would be like a carbon tax, an emissions trading system, and then the credits that you can generate from carbon markets as well.

**Sean** Great, and Nico a bit of a broader question but what are your recommendations for the practical use of the elements highlighted by the Climatescope report?

**Nico** Great question. The first and foremost thing that we hope to achieve with Climatescope is getting a conversation going. We've had some very interesting follow-ups over the last couple years from the Latin American region where countries or governments really have been interested in where they finish on Climatescope and why. And that's really been a platform for workshops bringing together policy makers and investors and project developers as well. So, for instance, we've held workshops in Nicaragua at the request of the government and informed those processes. For us this is a fantastic outcome and we hope that the wider Climatescope 2014 can be used in similar ways. Then, going a bit deeper into the data that is provided, the aim is for Climatescope to be a data resource that currently doesn't exist. So rather than those investors who are interested in finding out what a power price is in Liberia and hunting and trolling to figure out which data resource to go to, we really want Climatescope to be a place where you can go to and find that easily. You can know that that data point has been carefully collected through a research trip and through the most up-to-date data sources out of that. The third way is that we really want policymakers to be able to engage on both the policy front. So, looking at what kind of policies seem to be working. Looking at what policies neighboring countries have and what effect those have but also being able to take something of an investor perspective on Climatescope. I think the way that Climatescope presents a lot of data is one where those more vested in policy can sort of understand a bit more about the perspective of investors and low carbon businesses.

**Sean** Great and you mention that the African countries are scoring well on energy access in terms of having plans in place. How are they doing in terms of implementing those plans and what areas, in general, are they weakest in?

**Nico** Great question. I'd say we don't have particularly comprehensive data on implementation and that relates to one of the areas we've found most challenging and perhaps this also relates to where those kind of weaknesses are, once a program is established the reporting on how that's doing. For instance, where we wanted to find out there's a particular program around the distribution of solar home systems, or this kind of thing, we found it very difficult to find out how that was doing. There are sort of notable exceptions I guess. I mentioned I think Rwanda seems to be a country where a very ambitious electrification plan has been established and seems to be in motion.

**Sean** Good, and the last question I have received so far, Nico, asks—if a country is interested in being included in the study, how should they go about expressing their interest? Should they email you?

**Nico** Yes, please. That would be great to hear. Our only limitation is in terms of supports so there is no reason that we chose to exclude any country and we'd be delighted to expand this research further.

**Sean** Great, well in regard to that question Nico's email address is still displayed on that slide so if there are any countries that are interested go ahead and email him there. That is the last question that I have received. So now I'd just like to, before we wrap up, move on to a quick survey we have for the attendees and so Heather if you could go ahead and display that first question for us.

The question is—the webinar content provided me with useful information and insight. Great and the next question please. The webinar's presenters were effective. And the final question is—overall the webinar met my expectations. There we go. Sorry, that final question is—overall, the webinar met my expectations.

Great, thank you for answering our survey and on behalf of the Clean Energy Solutions Center I would just like again to thank Nico and Maria and also our attendees for participating in today's webinar. We very much appreciate everyone's time and I do invite attendees to check the solutions center website if you would like to view today's slides and listen to a recording of today's presentation as well as any previously held webinars. Just a reminder—give us about a week to get the recording of the webinar up on the site. Additionally on there you can find information on upcoming webinars and other training events and also a reminder we are now posting all of our webinar recordings to the Clean Energy Solutions YouTube channel where you can also find other videos up there. We also invite you to inform your colleagues and those in your networks about the Solution Center's resources and services including the no cost Ask-an-Expert policy support. With that I hope everyone has a great rest of your day. We hope to see you again at future Clean Energy Solution Center events and this concludes our webinar.