

Towards Energy Access in Mozambique

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Webinar Panelists

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Sean Esterly

Hello, everyone. I'm Sean Esterly with the National Renewable Energy Laboratory, and welcome to today's webinar which is hosted by the Clean Energy Solutions Center in partnership with the United Nations Foundations Energy Access Practitioner Network and the Associacao Lusofona de Energias Renovaveis. Sorry about that. It's all ALER—A-L-E-R. And today's webinar is focused on the status of efforts to scale renewable energy in Mozambique.

One important note of mention, before we begin our webinar 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 Centers' resource library as one of many best practices resources reviewed and selected by technical experts. And before we begin, I just want to quickly 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 choose to listen through your computer, please select the "Mic and Speakers" options in the audio pane to help eliminate and feedback and echo. And then, if you choose to dial in by phone, simply select the "Telephone" option and a box will display the telephone number and audio pin that you should use to dial in. And if anyone's having technical difficulty with the webinar, you may contact the GoToWebinar's Help Desk at the number displayed at the bottom of this slide, and that number is 888-259-3826 and they can help you out there. And if anyone would like to ask a question during the webinar—and we do encourage anyone to do so—we ask that you

just use the "Question" pane to submit it. And if you're having difficulty viewing the webinar materials through the webinar portal, you will find PDF copies of the presentations at cleanenergysolutions.org/training and you may follow along as those speakers present.

And we'll also be posting an audio recording of the presentations to the Solutions Center training page within about a week of today's broadcast. And just a reminder—we're now adding the recordings to the Solutions Center YouTube channel where you'll find other informative webinars as well as video interviews with thoughtfully presented clean energy policy topics. And today's webinar agenda is set around the presentations from our guest panelists. We have Luc Severi, Isabela Cancela de Abreu, Boris Atanassov, Miquelina Menezes, and Guilherme Collares Pereira. These panelists have been kind enough to join us to give us a national overview of the current regulatory framework of the energy sector in Mozambique, its range of renewable energy resources, existing and planned renewable energy projects, marketing conditions, and current efforts around education and training in the sector.

And before our speakers begin their presentations, I'll provide a short and formative overview of the clean energy Solutions Center Initiative, and then, following the presentations, we will have the question and answer session where the panelists will address questions submitted by the audience. And then, following by some closing remarks and a brief survey. And this slide provides a bit of background in terms of how the Solutions Center came to be formed. The Solutions Center is one of 13 initiatives that the Clean Energy Ministerial that was launched in April 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, expert policy assistance, and peer-to-peer learning and training tools, such as the webinar you're now attending.

And there's four primary goals for the Solutions Center. First goal is to serve as a clearinghouse of clean energy policy resources. Second is to share policy best practices data and analysis tools specifically in energy policies and programs. Third is to deliver dynamic services that enable expert assistance, learning, and also peer-to-peer sharing of experiences. And then fourth and final goal is the center tries to foster dialogue on emerging policy issues and innovation from around the globe.

And the primary audience for the Solutions Center is typically energy policy makers, analysts from governments and technical organizations in all countries, but we also strive to engage the private sector, NGOs, and civil society. And this slide shows one of the marquee features that the Solutions Center provide, which is its no-cost, expert policy assistance known as "Ask an Expert". And the Ask an Expert program has established a broad team of over 30 experts around the globe who are available to provide remote policy advice and analysis to all countries at no cost. So, for example, in the area of rural electrification, we're very pleased to have Abraham Ramen serving as

one of our experts. So, if you have a need for policy assistance in energy access or any other clean energy sector, we do encourage you to use this valuable service.

And again—it's offered to you free of charge. So, if you have a question for our experts, please feel free to submit it through our simple online form at cleanenergysolutions.org/expert. Or, to find out how the Ask an Expert service can benefit your work, please feel free to contact me directly at sean.esterly@nrel.gov, or you can give me a call at 303-384-7436. We also invite you to spread the word about this service to those in your networks and organizations. And so now I'd like to go ahead and provide brief introductions for today's panelists that we'll be hearing from, and our first speaker today is Luc Severi, project manager for Energy Access with the United Nations Foundation.

Throughout his career, Luc has worked at Mozambique, Senegal, Liberia, and for several international NGOs and social enterprises including Solar Now and Save the Children International. He's been an active participant in the green and circular economy, working primarily with renewable energy solutions for off-grid, and rural household schools and health centers. And then following Luc, our second speaker today will be Isabel Cancela de Abreau, the executive director of ALER— Lusophone Renewable Energy Association. She has worked with both APRIN and EREC, and this background, combined with her international experience, prompted her to found ALER. And then following Isabel, we will hear from Boris Atanassov, founding director of Green Light in Mozambican based research and develop companies specializing in energy and environment.

Boris has strong experience in developing feasibility studies, business plans, and managing projects within renewable energy, bio-energy, climate financing, and market development. And following Boris, we will hear from Miquelina Menezes, the former CEO of FUNAE. She has a bachelor's in economics and post-graduate degree in business law and is currently a lecturer at the economics faculty in EMU. And then our final speaker today is Guilherme Collares Pereira. Guilherme is the international relations director of A2E—Access to Energy at EDP.

He previously served as director of social innovation at the EDP foundation. He has 28 years of successful business experience with responsibilities at the level of general management, marketing, and commercial and competitive dynamic first-line sectors. And so with those introductions, I'd like to now go ahead and turn things over to Luc for his presentation.

Luc Severi

Hello. Good morning. Let me just move up here. Good morning to all. Bon Dia, Vin Vido—to this webinar which is titled "Towards Energy Access in Mozambique." I'm just gonna provide a little bit of an introduction, some background information to frame this webinar before the presenters will go into more detail on the actual regulatory framework and some of the actions and activities that are taking place today.

So, first, let me just talk a little bit about the SE for All Initiative, which was founded in 2011 by the UN Secretary General Ban Ki-moon calling on governments and business and civil society to make commitments to action to accomplish the three objectives that you see here on this slide, and which by now, I hope you're all very familiar with. This was specifically done because at that point, and today still, more than one billion people worldwide are without access to electricity, and an estimated billion more have only intermittent access. It's more initial reliability there. So, 2.9 billion people lack access to clean cooking solutions, which is another major problem going forward and in trying to solve poverty worldwide. This is all linked, also, of course, to the sustainable development goals, in particular SDG7 on energy, which underpins the progress on a large number of other SDGs ranging from health, education, gender equality, economic growth, and, of course also, climate action.

The targets that you see here for SE4ALL are consistent with the targets of SDG7, luckily, and of course, which is what we would like to see. And with its huge network of partners across governments, business, international organizations, and so forth, SE4ALL is taking a leading role in supporting the implementation of SDG7 on energy, as well as monitoring and reporting on the progress towards this goal. Then, let me just talk a little bit more about the Practitioner Network. The Practitioner Network is the United Nations Foundations contribution to the SE4ALL initiative. It is a global network of over 2,000 members ranging from SMEs as well as larger clean energy enterprises, but also civil society, government, and academia, operating in today, 170 countries—or actually a little bit more—which was established in 2011 to try and catalyze this delivery of modern energy services, particularly looking at de-centralized solutions for rural electrification. There's also a focus on more market-based solutions looking both at off-grid as well as mini-grid.

So, we facilitate—we work with our members and our partners around the world to try and promote innovation and technology as well as business models, try to convene stakeholders around new partnerships and investment, and we facilitate the development and adoption of quality standards. So, today, the members of the energy access practitioner network have delivered clean, reliable, affordable energy solutions already to millions and millions of people around the world. The International Energy Agency estimates that decentralized energy solutions will be a key part of the solution of providing energy access through that billion people that I mentioned on one of the first slides. The IFC then estimates that individuals who completely don't have reliable access to safe and clean energy are spending an enormous amount annually on forms of lighting that we shouldn't support. So, as I said, with this Practitioner Network, we're focusing on market-led approaches to try and scale mini and off-grid solutions, and currently—and you can access this through the website that I will show again on the final slide, EnergyAccess.org, in our membership directory, you can look up who is active in which countries, who is based on which continent.

So, today we have 70 members who have operations in Mozambique. It doesn't necessarily mean that they're all based in Mozambique, though. But the Practitioner Network—and with this, I'll wrap up—the Practitioner Network is continuing to grow its present in the Lusophone countries, particularly supporting others' activities to promote renewable energy solutions in Portuguese speaking countries and their recently completed renewable energy status report of Mozambique, which showcases the potential in this region. So, this webinar will present an overview of the current regulatory framework of the energy sector, latest developments in rural electrification in Mozambique—amongst others, we have EDP, a Practitioner Network member showcasing innovative mini-grid project. So, just on this slide—which is my final slide—you will see some contact information as well as the website EnergyAccess.org.

And if some of you are tweeting today regarding many of the interesting presentations that are to follow this one, please use the hashtag #Pnwebinar. PN, of course, stands for "Practitioner's Network". And with this, I close my presentation. I thank you and I hope you enjoy everything that is still to come in the next hour and 15 minutes. Thank you.

Sean Esterly Great. Thank you very much, Luc. And we'll turn things over now to Isabel for her presentation. And Isabel, just a reminder, you are—

Isabel Cancela Hello, everyone.

Sean Esterly Yep.

Isabel Cancela Hello? Sorry. I'm just sharing you my screen. Okay. I hope everything is okay.

Sean Esterly Yes. We can see it fine. Perfect.

Isabel Cancela Okay. So, thank you so much, again, for the UN Practitioner Network to have invited ALER to make this presentation and to have focused—to have chosen Mozambique as the focus country of this webinar. My presentation will focus specifically on ALER to present you what is our association, and then afterwards, Boris will follow-up with a presentation of our report for Mozambique. So, ALER is the Lusophone Renewable Energy Association, and Lusophone stands for Portuguese-speaking countries. So, what is our objectives?

Our main objective is to promote renewable energies in Portuguese -speaking countries. We have a commercial aspect, and since we want to facilitate the business opportunities and to support the private sector, but we also have a social perspective, because we want to contribute to the implementation of the new sustainable development goal number seven—"Reduce poverty and ensure universal energy access." We do this through aggregating all the stakeholders, that's why our members are not only companies, but also governments, NGOs, universities—anyone that is interested in this sector. And we want to be the common voice of renewable energies in these Portuguese-speaking countries. And our work is mainly public affairs, so we

do lobby and we support the interest of our members, and therefore, the interest of developing renewables in the Portuguese-speaking countries.

ALER—this is just an overview. You already know the background. Why were we created? Renewable energies, more and more, are the obvious and the most competitive solution, mainly in rural areas in developing countries. In Portuguese-speaking countries, there is a win-win situation since we have both Brazil and Portugal with a lot of experience and knowledge on this area, and we have the Portuguese-speaking countries with a lot of demand for these kind of solutions and a lot of growing energy demands, and we see that there aren't any renewable energy associations in these countries.

So, there is a void to be completed and that's where ALER is located. We want to complete this space that was free. So, the Portuguese-speaking countries? There are nine Portuguese-speaking countries—seven in Africa, then Portugal, Brazil, and East Timor in Asia. So, as mentioned, Portuguese and Brazil are only supporting countries. We take advantage of the knowledge and know-how of the companies and institutions in these countries to apply them in the other countries, and those are Angola, Cape Verde, Guinea de Sow, Equatorial Guinea, Mozambique, Sontoman Prince, and East Timor.

Since it was impossible to cover all these countries at the same time, we have chosen priorities. So, during this year, we have focused on Cape Verde, Mozambique, and Santoman Prince _____. And next year, we will focus on Angola and East Timor. But, just to mentioned, we are not only supporting Lusophone companies or institutions. We support any institution from anywhere, all over the world, as long as the objective is to promote renewables in Portuguese-speaking countries.

What do we do? We, first of all, of course we work on knowledge. We want to know the countries and the markets where we operate, as well as the stakeholders. So, that's why we will publish national reports with information about each of the markets, and we have our renewable energy database of publications that I will show you afterwards. And we have a database of contacts—all the institutions working on this area.

Then we do capacity building at several levels—at institutional level—with the governments, at the private sector level, and also helping to create or promote renewable energy associations. Then we also work on representation as we interview kind of the ambassadors of renewable energy in Portuguese-speaking countries. And we do this based on a communication strategy where we send regular newsletters that you are free to subscribe at our website. We have legislation, news, and funding and investment opportunities monitoring service. We organize events and we provide exclusive networking opportunities for our members.

This is our contacts directory. It was launched in September, and this is—you will have a list of all entities, both public and private, that are active in renewable energy sector for each country. You can search by country, type of entity, technology, name of the entity, or name of the contact. And then,

you'll have several types of access. With the technical access, you'll have access to one technical contact—so, the main person in charge—and with executive access, you'll have access to someone from the board of director administrator.

And you can also be a sponsor and then have more visibility with your logo and description of your entity. We already have this available for Cape Verde and Mozambique and we will keep on adding contacts as soon as we start operating in new countries. This is a list [Break in Audio] which stands renewables in English. It's an online database with publications about renewable energies. We want to be [Break in Audio] Wikipedia of renewables, and we want to create a community around it, because it's not only available to download publications, but also to upload.

So, if any of you has any information, any publication about renewable energies in Portuguese-speaking countries, you can just go to our website and you can upload that document. And we also aim to have a close link with universities and other teaching institutions so we can provide scholarships and can promote mobility of students within Portuguese-speaking countries' institutions. We have our newsletter, as I mentioned—over 2,000 contacts. It sends monthly, and we have several sections and it provides up-to-date information of what ALER is doing and what is happening in Portuguese-speaking countries for the renewable energy sector. As I mentioned, we [Break in Audio] three monitoring services—one about news, another one about legislation, and another one about opportunities.

And the idea here is to help our members and to reduce—to save their resources—both human resources and financial resources—because we are doing the work for them so that we don't have to duplicate and do everything. So, it's real-time monitoring here on the news monitoring services. Twice a week we send everything that comes out in online and press media about renewable energies in the Africa and Portuguese-speaking countries. Then we have legislation with them. If any legislation regarding renewables is published, we send the document and the legal notes—a legal abstract—of this document.

And we have here several opportunities, calls for proposals—anything that happens. As mentioned, we also organize events. We support events and we participate as speakers. Just to highlight this one—Energy for Development of CPLP. CPLP stands for the "Community of Portuguese-speaking [Break in Audio]". And, for the first time, they have chosen energy as one of their focus topics. They have organized this conference, but most importantly, they have organized the first Ministerial meeting where they decided to create the energy network of CPLP that will be focused only on renewables and energy efficiency.

Then we have a Renewables Fair in Cape Verde where we presented our reports. Then we have the Congress of Climate Change. We have our conference in Mozambique last week with the results of our study that Boris will show you, and then this webinar. And this is just to give you an example of everything we've done. This is our normal association structure.

These are the types of members. We have four types of members, and then with several categories. For the moment, we have 32 members. We have started with 15. One year ago—actually today is the—we are celebrating our first anniversary.

We have already more than double the number of members, and we have all types of members—utilities, government, NGOs, universities. This is a touristic promoter in Santomin Prince. We have lawyers. You can find Renewable Energy Association—you can find mostly anything. And this is the value offer for our members—mainly in terms of influence because you have direct contact with policy makers, knowledge regarding the information we create and we share, and value, because we create value for the markets and for our members.

And this is our action plan, just to show you how active we've been, mainly, as mentioned, in Mozambique, Santomin, Cape Verde. And we have just, as I mentioned, one week ago, organized our event in Mozambique where we discussed our report that should be published and available as of February next year. Those are my contacts. Boris will now get into the details of the report. But, just to mention, that afterwards, I can give you more information about how to have access to the report and how to become a sponsor and then have more visibility.

Sean Esterly Great. Thank you so much, Isabel.

Isabel Cancela Thank you so much.

Sean Esterly And now we will continue on to the next speaker. We're turning things over to Boris.

Boris Atanassov Thank you very much. I hope that you're able to see my screen.

Sean Esterly Yes, we can.

Boris Atanassov There we go. Thank you very much. So, as mentioned, my name is Boris Atanassov. I'm the director of GreenLight based here in Mozambique. It's my pleasure to present to you an update of the renewable energy sector in Mozambique, which is part of a comprehensive report developed by GreenLight for ALER.

So, what is the Renewable Energy Country Assessment Update Report? It's the most informative and comprehensive report which provides users with quite detailed information about the sector. It focuses on several chapters. The first chapter is the geopolitical context of Mozambique where readers can have absolutely have all the information necessary in terms of statistics—both social, economic, environmental—looking at all the geography and relief of the country to base any decisions either on investment or on project development for the various renewable energy sources. We also look in detail into the regulatory environment.

We look at all the policies, regulations, and all the programs by government in order to facilitate investment or implementation of renewable energy projects in the country. We also provide quite a detailed chapter on all the statistics and technical data of the energy sector. We both look at conventional electrical energy as well as data on the renewable sources such as solar, wind, geothermal, and hydro as well as biomass. We also then compiled quite an extensive overview of the resources and renewable energy projects in the country. This was based on a wide range of interviews and collection of data which allowed us, for the first time, have a clear picture on what is happening on the ground here in Mozambique, which of the projects, and what are the specifications of these projects.

No other research has managed to compile so much data into one report, so we are very, very happy to present this to you. We also look at the economic and financial analysis data. So, mostly looking at what are the financial institutions active in Mozambique financing or supporting the renewable sector. We look at the local banks, the micro credit institutions for smaller projects. We also look at the donor organizations and development organizations and focus as well on the international scene—what are the support programs for Mozambique and the renewable sector.

We then look at the research development that has taken place in the country, as well as academic institutions that focus on the renewables' field. There have been several that have begun implementing programs and master—or better or master or doctoral degrees with programs focusing on the renewables. So, we present these to the reader. And finally, we, during our interview process, obtain several barriers which many of the companies and organizations implementing projects have brought up as obstacles for either upscaling or for growing their projects. So, these barriers are listed, as well as recommendations on how to overcome these barriers, and, as well, what are the government actions to make these barriers—well, to eliminate these barriers and make the country more accessible for the scaling up of the renewable sector.

I'm trying to move into the next slide. It's not working. There we go. So, a little bit about the team and the company behind the report. So, GreenLight is a Mozambican company specializing in renewable energy and environmental consulting field.

We work with project management, research and development, environmental services, as well as climate financing. We have been in the country since 2012, and have implemented several projects both at a national level as well as the regional level. The project team, you can see on your right, is comprised of several different backgrounds in order to deliver a report of the quality and the scope that was necessary. So, the phone side looks a bit into the methodology used for this report. We firstly carried out the literature review, whereby we looked at existing reports and the publications.

We looked at online research articles available for the renewables in Mozambique. We also studied several company profiles which were available

online and had their projects available for us to gather information on. We look at the legal framework, which means all the policies and regulations in the country. We visited the various ministries and collected pretty much everything available for the renewable sector in terms of roles. Then, finally, we looked at the national statistics, both electrical and renewable energy oriented.

We then carried out several stakeholder interviews with several actors with national authorities, private sector, development organizations and donors, NGOs, civil society, economic institutions as well as other members of ALER. This was probably more than 100 interviews carried out either through online surveys when we could meet with the people personally, but mostly face to face interviews or telephone interviews which gave us a very good idea about what is happening on the ground here in Mozambique and what are the future projects which will come about. We then analyze information, develop a draft report, and this draft report circulated amongst a committee of experts that were brought together by ALER. So, the data has been verified, and finally, we hope to submit, within the coming weeks, the final report as well as the Directory of Context for ALER to make use of. So, just to give you a bit of highlights on the renewable energy sector—I think it's always interesting to look at what is on the ground.

Obviously, the report is over 100 pages long, so I cannot summarize the report in 10 minutes, but I'll give you a bit of a summary. So, looking at the regulatory framework of Mozambique, it's quite interesting because I believe that Mozambique has one of the most progressive legal frameworks for the renewable sector. We have several rules and regulations that support the implementation of projects, so we can start with the renewable energy policy and strategy which is quite a detailed document outlining where the country—where the country wants to be within five years' period. And this is a law, which is then obviously renewed every five years with new objectives. We have the re-fit, which is the renewable energy fit in tariff, which has been regulated as of October last year.

That stipulates the tariffs for fitting into grid by renewable energy projects, and that obviously is a mechanism which has been very useful for attracting investment and development in the sector. We also look at the biomass energy strategy, which is a unique document. Looking at biomass is one of the resources that is disappearing most quickly because of the charcoal and the firewood consumption in Mozambique. Just like many African countries, Mozambique is very highly dependent on biomass energy fuels, especially households of a lower income that live day to day using such fuels for cooking purposes. So, the policy looks at how to modernize the biomass energy sector, how to provide renewable biomass resources, and how to make the sector more efficient in order for the forestry resources not to suffer as they do at the moment.

We also have a biofuels energy strategy and policy in the country. This is a policy that's been out since 2008 and provides all the guidelines in order for investors and project developers to be able to invest in the biofuels—so, that's

bio-ethanol or bio-diesel. The strategy also has a sustainability criteria which has been annexed to it. This criteria is very important because obviously, much of the criticism that is associated with the biofuels industry—such as land grab or poor people's access to land or food versus fuel—is then discussed in detail on how to avoid through the sustainability criteria that companies need to adhere to if they are to invest in the sector. We also, in the report, look at the power purchase agreements as well as all the mechanisms one needs to follow in order to be able to register a project as well as to sell the energy to the national utility.

We look at all the energy regulations in the country, and finally, at the fiscal policies as well as what we have in Mozambique, which is the Center for Promotion of Investment—the CPI—which is—it's a body that looks to facilitate foreign direct investment in all sectors, but also has a department focusing on the energy sector as well. So, we discuss this in the report. A bit of a background on the energy profile of Mozambique. So, the total supply of primary energy in the country is over 11,000 kilotons of oil equivalents.

We have electricity production of 17 terawatt-hours and per-capita energy consumption of 453 kilowatt-hours per-capita, which is quite low, compared to other developed nations. We have an installed capacity for energy generation of around 25 megawatts, which is largely due to one of the largest hydro-electric dams in Africa which is the Cahora Bassa hydro-electric dam which supplies energy. And, in fact, it supplies more than 80 percent of its electricity generated to Southern Africa—both South Africa, Botswana, and into other countries such as Botswana, Swaziland, Namibia, and other neighbors. The electrification rate of Mozambique is 25 percent, with most of the households in the urban areas—around 62 percent of households in the urban areas having access to electricity and much less in the rural areas with access to the grid. And we look at the population that makes use of biomass energy as one of the primary energy sources, and official statistics points at 60 percent, but various sources point at over 90 percent as that is one of the main energy sources, especially for cooking.

So, we use this figure as we believe it's more close to reality in Mozambique. I'll give you a little bit of an idea about the current renewable energy mix in the country. We have several sources of renewable energy that feed into the grid. We don't include, in this graph, what is produced by Cahora Bassa—which is the major hydro-electric dam—because that supplies electricity mostly to outside of Mozambique. But we look at all the internal production. That includes wind—obviously at zero percent because we do not have any larger scale wind projects at this moment. We look at traditional biomass, which is the 66.7 percent that I mentioned, which is the official figure. We have modern biomass, which is 9.1 percent. Modern biomass, for example, is bi-gas which is used in the boilers. It is renewable sources of biomass.

It is industrial use of biomass, which is largely of a renewable nature. We look at hydro, and this includes mostly the mini-hydro-electric dams that we have in the country, which is 12.6 percent, and solar, which is at 1.2. So, you can see that there is much scope for scaling up the renewables in the country.

Thermal electricity is not available as of this moment; however, we do have sources for its generation in terms of the potential. In terms of the potential production of energy from renewable sources, Mozambique is a large country and has many resources that can be used for the generation of electricity.

We have a total of 23,000 gigawatts of solar potential of which the government has prioritized 1.3 gigawatts. We have an additional 19 gigawatts additional potential for hydro to what is already being exploited, and the government has stipulated that they will prioritize 5.6 gigawatts in terms of projects to be implemented. We have 5 gigawatts potential for wind energy, and 1.1 gigawatts priority projects identified by the government. And we have, in terms of biomass, 98 megawatts—oh, 2 megawatts—sorry—2 gigawatts potential and 98 megawatts priority projects which are prioritized by the government. Geothermal is minimal compared to the rest, as I mentioned before.

Just to give you a bit of an example of the work carried out by FUNAE, which is the national energy fund—FUNAE has developed what is the National Renewable Energy Atlas. It maps out all the potential sites for renewable energy projects. Here, we have two maps. We have one map mapping out the 1.3 gigawatt solar project sites for solar on the left, and on the right, we have the mapping of the 5.6 gigawatt hydro project sites that have been identified as priority by government. This shows you that the whole country in itself has several sites that are applicable for investment and development of renewable energy projects, and much of the groundwork, in terms of the feasibility studies, has already been carried out by FUNAE and is available in the atlas that I have.

You can find the atlas at the website below, which is www.atlastrenovaveis.co.mz. I have about two minutes left. I'm going to quickly look through what other projects that are currently implemented in Mozambique. We look at solar, and in the report, we describe these projects in detail. But we have two large-scale projects that are being implemented of 30 megawatts each and 30 organizations working with smaller scale projects throughout the country.

There are 32 large-scale projects for hydro of over 10 megawatts of which 20 are currently in feasibility phase and the others have been implemented. We have 45 small-scale projects that are implemented throughout the country currently. In terms of wind, we have two large-scale projects over 30 megawatts each which have not yet been implemented, but have the plans to be implemented in the next year in those small scale projects which were identified. In terms of bioenergy, there's quite some interesting developments, such as 11 organizations working with biomass fuels and improved cook stoves. We also look at the 13 organizations working in the biofuel sector, some of them which have advanced and gone quite far along in terms of production, and 6 organizations working with biogas in Mozambique.

And finally, I'd just like to share that there are several research and development initiatives currently taking place in Mozambique, as well as various university courses focusing on the renewable sector. We have quality

and certification laboratories which test for efficiency. For example—we have one for biomass as well as one for solar [Break in Audio] the PD panels and other components. We have several research programs that are discussed in the reports, several technical training initiatives, and a list of workshops and seminars. So, with this, I'd like to conclude.

If you have any questions, please reach me on the email below or during the panel discussion later. Thank you very much.

Sean Esterly

Thank you for the presentation, Boris. And at this point, we're going to go now to Miquelina, who is going to speak to some of the work being done in Mozambique. And Miquelina, just a reminder to un-mute your microphone.

Miquelina Menezes

Thank you. And first, I would like to say that I have not prepared any slides because I was in the _____. But I will share some of the information that I can share. I would like to clarify some issues about the atlas—about the atlas of energy because FUNAE has done this atlas of energy, and the reason was to know what was the potential that Mozambique have in all the renewable energy. But that is a document that shows all the potential and all the renewable, but the government did not decide of what kind of projects are prioritize.

The prioritization was done by the consultant with FUNAE at the time, but that is not an official prioritization. It was what we have done looking for the projects, looking for the feasibility study, looking for the time to do the project. Because, as you know, solar is the quickly project that we can do than to do a project in hydro that will take some time. So, that was the reason that we have done a prioritization and for the feasibility study that was done at that time. Because the feasibility study was not done for all the project, but for some of the projects that we see that can be developed in a short time.

For example, for wind in some of areas like Namacha and Manresa, and Morrumbala, in Mazumbazia --- Manresa and Namache's didn't live with the province. So all these projects we was looking for the feasibility study and, on the wind, looking for it to be close to the grid line of EDM. So, its' only to clarifying these things about this instrument of atlas of energy. I would like also to say that some of the development that the government has done is to use solar systems to electrify schools and clinics, and to electrify them—we call it the _____, but it's the local authorities in the districts and in the localities. That was the main for the government to development these kind of projects, because, as you know, the impact in the schools, the impact in the clinics—it's very high.

And the contributions of the donors are in developing these projects in the rural areas—in very rural areas—where the grid did not reach and where the grid not reach in a short time. And FUNAE has developed some of the electrification of some communities, and that time, we have done SFA and to see that the—this place can be developed in a short time. We can give electricity by solar systems. We can give water by using solar systems. So, that means that the lives of these people have changed.

Sometimes, we think that it's not possible you can change the life of these people, but I, myself, I have seen in all these places that we have put a solar systems in a school, in a village, and for water—the change of these people—it change a lot. And that is important for our country that we have electrified 25 percent with the grid. But we have 14 percent of electrification by renewable energy. That is not shown in the presentation of Boris, but it's 14 percent. So, I think that's a lot of people who has beneficially of this electrification with renewable.

Another issue that for me, it is important to say, is that in the plans—the five-year plans of the government for Mozambique, they show that—I cannot say that it is a prioritization, but it shows that the renewable, it is important, to cover all these places that the grid will not reach. So, it is important to see that there are—how can I say—an interest—how can I say—for the governor of Mozambique to continue, to develop, and to use renewable energy mainly off-grid. Mini-hydro, solar systems—if I can give some examples of mini-hydro that are built in Manica Province by FUNAE and by GIZ that giving electricity, giving water, giving—I don't know to tell in English, but it's newest part for maze and to give the people the opportunity to have their cereals. I don't know to tell you in English, but you understand what I'm saying. So, I think that's important to see—that there are many things that are being done not only by the governor of Mozambique, but the NGOs.

There are a lot of NGOs working on small projects on the renewable energy and other organizations like GIZ to develop the renewable energy. For me, the problem is the cost, as you know, the cost of solar systems, and the time of having hydro—that takes two or three years or four years, perhaps, to have a hydro working and supplying energy. And I would like to say, again, that we have a lot of donors working on the renewable energy looking for renewable energy. We have the World Bank, the Algerian Corporation, the Seoul Korean on the other—Indian and other countries that are working with the government of Mozambique. Some link it to FUNAE on the renewable energy.

I would like to give you an example of the operation that we have with Seoul Korean. It's the biggest project that we have now in Mozambique. It's three—I don't know—[Foreign language] that are supplying electricity to three districts in Niassa Province with solar systems. And each is about a half megawatt about. And all these districts are having the supply off the solar systems.

And it's make a difference of these people and we are using the prepayment for the people to pay. It's a prepayment, so that means that the people are paying for the... The experience shows that there is no problems with the payment if the conditions are there. Because sometimes, we discuss about the capacity of payment, but if we can supply quality energy with quality—the people can pay. It's another example of a project that we done with the EEP—that the people, to have the system installed in their house—they need to pay.

And they have paid. And they are paying by installments every month, but really, they are paying. I'm not sure if I have given an overview of the

situation of the concrete projects in Mozambique, but I try to do that. Another issue that I would like to speak about is about the legislation. That is one of the lack—to have the—all the legislation for renewable energy.

But I'm sure that _____ of energy and renewable resource will work on it during this time because it's important. It's important to have the strategy for energy—that includes renewable—energy, to establish the goals of renewable energy, because it's not established in any place. So, that's important to have—the strategy of energy. Not the strategy for renewable energy, but the strategy for energy. Because you will have an overview of all the potential in Mozambique—not only renewable, but all other potential, all other capacity that can be supplied by gas and with other—these big hydro that it's in projects to be _____.

So, I would like to say, "Thank you for this opportunity." If somebody has any questions, I will be available. I did not put my email, but I can send my email if any question, anybody wants to make more questions. Anything—I will be available. And thank you, everybody.

Sean Esterly

Thank you very much, Miquelina. And if anyone does have any questions for Miquelina, you may submit those through the GoToWebinar and we'll ask them during our question and answer session, or we can always email them after the webinar, as well. And so now we'll turn to our last presenter, Guilherme. Go ahead.

G. Collares Pereira

Well, hello. Good afternoon, and good morning to some of you. So, thanks for the organizers that have also—I salute my colleagues, the previous speakers, and all those who are participating on this webinar. So, very, very briefly, just let me introduce you to EDP. We are an international integrated energy player with a global footprint present in 14 countries, 3 continents, and nowadays, we have nearly 12 million customers.

But I want to drive you through these access to energy journey where everything begun some years ago, 2008, when we were approached by UNHER to requesting our company for the nation to buy food for the refugees in the Horn of Africa in a few camps they have down there. And our answers was, "Not at all food or money for that." But we brought in this access to energy solution, and at the end, we managed to invest something like 1.5 million euros on a solution, electrifying the nearly 14 schools, 4 hospitals, all the offices of the NGOs, the headquarters of the United Nations, and really, a bunch of other projects we have done down there. So, we did learn a lot with this initiative, but immediately, we start thinking and acting differently. So, moving from donation to venture philanthropy, and venture philanthropy to self-fueled business, where, I would say, we are nowadays.

So, EDP—very much committed with SE4ALL since its creation in 2011, as I already informed. And so later on, in 2014, UNEP—the environmental program of the United Nations—just had this fantastic idea to demonstrate the commercial viability of a mini-grid—a clean energy mini-grid—in a remote, rural area. UNEP selected six Southern African countries. Unfortunately, by that time, Mozambique was not on the list, but we managed to persuade

UNEP and its response _____, Mister Dean Cooper, to bring in Mozambique to this picture. And so, since then, we put together these, I would say, public/private/international partnership just inviting and bringing in everybody—all the stakeholders there—that we need in the future to have in policy _____ in order to replicate these projects.

So, within the UNEP criteria, we select a village in the remote [Break in Audio] and we group in the Niassa Province. Sorry—I forgot completely to show my slides. So, we went to Niassa Province to a small village, Titiman, after, of course, having studying, analyzing quite a few other possibilities, other villages in the country. There's a long study, but I'll make it very, very short. So, Titiman was selected.

This is another view, more or less, where we are. [Break in Audio] And we went [Break in Audio] as we always do, with all those things for—with things with—this is a [Break in Audio] huge difference. So, we [Break in Audio] obviously, is the [Break in Audio]

Sean Esterly

Hey, Guilherme, sorry to interrupt. We seem to be having an internet connection issue from your end. It's breaking up quite a bit.

G. Collares Pereira

...poles down there, as in 500 people, and we build a solution to telling that we would bring energy services. [Break in Audio]

Sean Esterly

Hey, Guilherme, we're having some internet connection issues from your end. We're losing your audio and having a lot of trouble hearing you. It seems to have just started in the last minute. And it seems we may have lost our connection all together now.

G. Collares Pereira

...to have terms of the legislations that this project needs in respective regulation as well. So, going back—going on—there's a problem there? Okay. So, here, very, very, very, briefly, I think that _____ presentation will be supplied to all of you listening. So, the technology model here—it's a combination of solar and biomass—100 kilowatt peak with solar with 60 kilowatt peak biomass.

It's very interesting, because for the very first time, we're also making this very _____. We're learning still. We're going, as our objective, going to burn the cotton residues, transform them into pellets, and then gasify them and have energy. This is quite interesting, because the farmers—cotton producers of—sorry. I forgot completely to mention—we have with us, and this is really crucial for this project and for its success—a Mozambique company, one of the major cotton producers in the country, and they know very well the area.

They know there for many decades, the family of the farmers, and they buy cotton to these—to our future customers. But they are now going also to buy the cotton residues. Before, farmers, by law, had to burn them open air, and sometimes, even spending money to put some kerosene in it to assist to help the burning off of the residues. And now, those residues are going to be bought by _____, the local [Break in Audio] to help them to reduce their

electricity bill. _____ how it works, and so we did it fine talking with them, with this families, the future customers.

We work with them—the future tariff—that we were willing—not only were willing, but also able to pay. So, this system will be a prepaid system, and we are confident, because there are different levels of [Break in Audio] services. [Break in Audio] say just for an example, the very first basic level of [Break in Audio] can have two lamps, two bulbs, and one phone charger. And on the second, we'll have [Break in Audio] lamps and other utilities, other appliances. So, [Break in Audio] study, and with them, organized the different levels of tariffs we put [Break in Audio] they can honor. Of course, [Break in Audio] at the stage, where we all are [Break in Audio] through the commercial viability, the [Break in Audio] with [Break in Audio] to the families we will manage.

[Break in Audio] also, the [Break in Audio] for replacement, okay? Finally, because I'm running out of time, we are talking 1.7 million euros' total investments. And so this cap-ex fully subsidized will manage to have a mix of private equity, our own money. EDP is investing 500 K—half a million euros—on this project to get together with _____, who's investing 200,000 euros. We will have other participation. Donors word here, as you probably have seen on the first slide, the logo of EEP.

This program is formed by Finland, U.K., and Austria. Those agencies and also from OFID—the Outback Fund for International Development. So, those two organizations—they also placed roughly one million euros. And finally, the governor of Mozambique via the Ministry of Environment—they are going to invest 190,000 some euros. So, at this very moment, where are we?

So, this is two long but very fruitful, I would say, years—2014 and 2015. Their two-year are now ending. [Break in Audio] different initiatives and the steps we had to follow with this fantastic collaboration with UNEP, with the Mozambique government, with the EDM and FUNAE, with universities I did not mention we will have also working with us in the future. _____ University, and we area also expecting to have the University of Finland with us as well to follow-up. And why do we have everybody on board?

Because it's variant. We are very confident it will result—it will work well. [Break in Audio] will demonstrate the viability of this project. And so, with all the [Break in Audio] for [Break in Audio]. There's no more excuses to escalate and to replicate these projects not only in [Break in Audio] not only in Mozambique, but also, [Break in Audio]. And to do that, [Break in Audio].

Sean Esterly

Hey, Guilherme, sorry. I'm gonna have to cut you off there. Your audio is not working at the time. I think it's due to internet connection. And to our attendees, sorry about that.

We do have people who are kind enough to present from all over the world, so occasionally, we do have some internet connection issues, which was cutting in there. But I do want to let you know that we'll be making those slides that Guilherme was just speaking to available on the Clean Energy

Solutions Center training page so that we can go through those later. And now, Stephanie, we can go to the question and answer slide. We're gonna go ahead and proceed to the question and answer session. Again, my apologies for having to cut off, but again, I think audio was not working most people.

So, if you do have any, I do ask attendees to kindly submit those into the question pane and I can ask those to our panelists right now. And the first question that we did receive came in. It ask, "So, are energy projects, for the most part in Mozambique, do they have an energy buy from the government? So, is there financial support from the government or are they basically co-financed or donated?" So, what are the main financial streams for energy projects in Mozambique? And this question's for anyone.

Miquelina Menezes I guess I can start. I can say that the projects that are developed within Mozambique right now are financed by some of the donors, and some of the projects, by the state budget. And there are some contribution, as I said, from the people living there in these areas, but the contributions is so small that they're not representing a big issue for these projects. But all the projects are financed by the donors and by the state budget, some of them.

Boris Atanassov Maybe I can jump in quickly. I think it's also important to note that traditionally, a lot of the projects were financed through donor support because the country has been developing from what was one of the poorest countries to what today can be a country where people can afford to pay for their electricity. So, we are seeing more and more private sector entities coming in and bringing in projects whereby they are commercial. We see this with the EDP project that was mentioned by Guilherme, and we see this with many other project developers that we have interviewed during the report process.

Sean Esterly Great. Thank you both for the response. And unless anyone has anything else, we'll move along to the next question. Great. And this question is regarding SE4ALL's work.

It asks—it has to do with tier one energy—so, access for energy for the extreme poor, including handicapped, elders, et cetera. "With SE4ALL's focus on market-based solutions, is there room in the discussion for a pro-poor, aid-based perspective to address an entrenched energy poverty of the highly vulnerable so that those unable to participate in market-based solutions aren't left out of the conversation?" And Luc, I believe this question was directed to SE4ALL. If you could speak to it.

Luc Severi Yeah. So, if you just quickly repeat the question just so that I know what the exact question is?

Sean Esterly Yeah. Definitely. So, it's asking—it's about tier one energy access for the extreme poor, including handicapped, elders, et cetera. "With SE4ALL's focus on market-based solutions, is there room in the discussion for a pro-poor, aid-based perspective to address the entrenched energy poverty of the highly vulnerable so that those unable to participate in market-based solutions aren't left out of the conversation?"

Luc Severi

Well, I don't want to speak on behalf of the whole SE4ALL campaign, which is much larger than what UN Foundation is representing. So to that end, I think the focus is definitely on the market-based solutions, because that—it adds a level of sustainability to what we're trying to achieve—long-term sustainability to make sure that what is actually being implemented, that stays there. And that we don't end up with just a large range of projects that then one component breaks down, that the system stops working. I think there's definitely recognition that market-based solutions have a limit as well, and particularly when we look to more socially oriented sectors—so, say maybe in the health sector, maybe in the education sector, in public services such as public lighting. Having a business case is just a little bit more difficult today.

That doesn't mean that it's impossible and that doesn't mean that we shouldn't continue to look for it, because it adds to that sustainability. So, I think it's a "Yes" and a "No" or something in between, if that answers the question.

Sean Esterly

Yeah. Great. Thank you very much, Luc. And I would like to open this question up to the other panelists in case they have any recommendations on how those at the lower end of the tier one energy users can gain access. All right.

Perhaps we can come back to that question later, then. We'll move on then to the next question from the audience, and it asks, "What specific efforts are the donor communities working on? Are there any program names?"

Isabel Cancela

Yes. Can you hear me?

Sean Esterly

Yeah. Go ahead, Isabel.

Isabel Cancela

Okay. Thank you. Boris can give a better overview. We cover this topic in our reports. Just to give you an example—in terms of a donor based program, we have ENDEV—Energizing Development.

It's a program coordinated by GIZ—so, the Germans, but it also has a [Break in Audio] of other institutions. And they've been working in mini-hydro power plants in Maneeka, as Miquelina Menezes has mentioned. They also have improved cook stoves, but that's one of the key projects in Mozambique. Maybe, Boris, you want to go into it a bit further?

Boris Atanassov

Thanks, Isabel. So, over the years, there have been several programs, I think. ENDEV, as Isabel has mentioned, is the most active one at this point in terms of supporting both the solar and the mini-hydro as well as cook stove component. But you have programs that, at the moment, are being developed, such as that of DIFED, and you have—which potentially be—just trying to see how much information I can give out on these programs as they have not been launched yet. But you have several programs being cooked up by the African Development Bank, by the World Bank, as well as by DIFED, as I mentioned, and other development and donor organizations.

We have another actor in Mozambique, which is SNV, which is the _____ Development Agency. They have been very strong in supporting renewable

energy projects, especially with a focus on private sector. So, there have been supporting companies developing projects and also, in terms of scaling up technologies, to bring clean energy to poorer communities. So, much has been happening and we see more and more collaboration between donor-based organizations with private sector organizations in order to make whichever initiative they have selected to be more amplified, as such, to have a greater reach. Thank you.

Miquelina Menezes Perhaps I could add—there are a lot of programs on renewable. The Belgium population has a big program last year and it's they're building a new program for the next four or five years. The World Bank, and, as I mentioned, the Seoul Korean, they have a—this project was built in Niassa Province and there are other projects in _____. And there are, for example, also not directly doing projects on renewable, but make a contribution for the renewable energy as the Norwegian Embassy here in _____, they have financed a study for the private sector in the renewable energy and their strategy for maintenance for Sunai on the renewable.

So, the Indian Corporation—with Indian Corporation, the governor of Mozambique has built the solar plant in Belland here in Maputo, so there are a lot of programs on renewable.

Sean Esterly Great. Thank you again, everyone. We'll move on to the next question in light of the time. It asks, "Is there a database for a list of energy efficiency measures that have been identified to be successful or have been successful in Mozambique?"

Miquelina Menezes Can you repeat the question, please?

Sean Esterly Yeah. The question asks if there's a database or list of energy efficiency measures that have been identified as successful in Mozambique. And maybe, if there's not a database or a list, you could speak through your own experience of energy efficiency measures that have been successful in Mozambique.

Miquelina Menezes I can—

Boris Atanassov Go, Miquelina, please.

Miquelina Menezes I can say that the Ministry of the Energy [Break in Audio]. I don't know if they have some examples, but I hear last meeting that we have that they have done some examples on industry and they have very good results on this. But, on the other hand, EDM was working on a very large program of efficiency—energy efficiency—with not only in the buildings, but also with the—many with lamps for the normal consumers using these lamps that are—I don't know to tell you in English. That it's a low consumption. So, with this program, they have done—they have made a study on that.

And I think that they are continuing doing this study about the efficiency of energy. It's what I say I know.

Boris Atanassov

Thanks, Miquelina. Just to add another interesting initiative—the Mozambique Housing Fund, together with FUNAE, is currently implementing an interesting project that we have the pleasure to work with, and that is building two model houses whereby renewable energy and energy efficiency measures will be part of the construction and the finishing's of these houses. And these houses will be available for households or for people looking at new homes from the housing fund to be able to adopt such efficiency measures such as efficient appliances, lights—but not only in the energy sector in the energy field, but also looking at water efficiency and looking as well as the construction material which is more ecological, as well as the positioning—how to make use of the natural ventilation to shade from direct sunlight. So, it is very interesting project and the two houses will be complete next year. So, that's, I think, a pioneering project which now the housing fund can make use of all these concepts in these further projects.

Just to give you an idea about the housing fund—they have a mandate to build 35,000 houses for the next five years. So, these two model houses will be very good start to that process in terms of energy efficiency measures. Thank you.

Sean Esterly

Thank you, Boris and Miquelina. And now, in light of time, we will have to move on to wrap up the webinar. I know that there's a number of questions we haven't been able to get to, so what we do in this case is I will save those questions and email them to our panelists and they'll respond directly to the attendees via email. So, if you ask a question and we didn't get to it, my apologies. But look for a response sometime in the near future through email so that we can address it.

And so now, I'd like to go ahead—and we do have a very brief survey for our audience today. We ask that you just take a moment to answer some quick questions that we have for you. I'll go ahead and display the first one. And you can answer right within the screen. The question is, "The webinar content provided me with useful information and insight."

Great. Thank you. And the next question... And the third question... And then, just a couple of "Yes" or "No" questions for you real quick.

And then the last one. Great. Thank you very much for answering our survey. We do appreciate it and appreciate the feedback as well. And so now, on behalf of the solution center, I would just like to thank all of our expert panelists for joining us today from all over.

We do appreciate your time, and we also appreciate the attendees' time for joining us today. I do invite attendees to check the Solutions Center website if you'd like to view those slides and listen to a recording of today's presentations, as well as any previously held webinars. It will take us about—the slides should be up in a day or two, or possibly even later today. And the recording will take about two or three days to be posted, so please feel free to check back as much as needed. Additionally, just a reminder, we're now posting webinar recordings to the Clean Energy Solutions Center YouTube channel.

And we also invite you to inform your colleagues and those in your networks about Solutions Center resources and services, including the no-cost policy support. And just a reminder—for any unanswered questions, we will be sending those via email to the panelists and hopefully will have some response to you shortly. So, with that, I hope everyone has a great rest of your day and we hope to see you again at future Clean Energy Solution Center events. And this concludes our webinar.

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