

# Building Energy Access Markets: A Value Chain Analysis of Key Energy Market Systems

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## Webinar Presenter

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**Michael Franz**  
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## This Transcript

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## Tim Reber

My name is Tim Reber with the National Renewable Energy Laboratory. Like to welcome you to today's webinar, which is hosted by the Clean Energy Solutions Center in partnership with the United Nations Foundation's Energy Access Practitioner Network, the EU Partnership Dialogue Facility, and Practical Action. Today's webinar is focused on building energy access markets, with a focus on value chain analysis of key energy market systems.

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

Before I begin, quickly go over some of the webinar features. For Audio, you have two options. 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 corruption in the audio pane. Doing so will 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 of the screen will display the telephone number and audio pin you should use to dial in. If anyone is having technical difficulties with the webinar, you may contact the GoToWebinar at 888.259.3826.

If you would like to ask a question, and we ask that you please do, you can use the questions pane, also on the right side of the screen. You may type in your question directly. We have quite a few panelists today, so we asked that when you do ask questions, please try to indicate which panelist specifically you'd like to answer your question. Or if more than one, you can indicate that as well.

If you are having difficulty viewing the material for 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 the speakers present. Also, an audio recording and the presentation will be posted to the Solution Center training page within a few weeks and will be added to the Solution Center YouTube channel where you will also find other informative webinars and video interviews with thought leaders on clean energy policy topics.

Today's webinar agenda is centered around the presentations from our guest panelists, Michael Franz, Charlie Miller, and Christopher Service. These panelists have been kind enough to join us today to showcase building energy access markets framework. This publication, developed by Practical Action Consulting, offers policymakers and practitioners a method for designing and delivering intervention that can achieve scale and sustainability and also features a couple case studies.

Before our speakers begin their presentations, I will provide a short informative overview of the Clean Energy Solutions Center Initiative and Jem Porcaro will provide a brief overview of the Energy Access Practitioner Network and Sustainable Energy for All. Then, following the presentations, we'll have a brief question-and-answer session, where the panelists will address questions submitted by the audience, some closing remarks, and closing the short survey.

This slide provides a bit of background in terms of how the Solution Center came to be. The Solution Center is one of 13 initiatives of the Clean Energy Ministerial that was launched in April 2011 and is primarily led by Australia, the United States, and other Clean Energy Ministerial partners. 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 energy policy assistance, and peer-to-peer learning and training tools, such as the webinar you are attending today.

The Solution Center has four primary goals. It serves as a clearinghouse of clean energy policy resources. It serves to share our policy best practices, data, and analysis tools specific to clean energy policies and programs. It delivers dynamic services that enable expert assistance, learning, and peer to peer sharing experiences. And finally, 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 we also strive to engage with the private sector, NGOs, and civil society.

One of the marquee features of the Solution Center is the no cost, expert policy assistance, known as Ask an Expert. The Ask and 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 policy and market design, we are very pleased to have David Jacobs, director at the International Energy Transition, serving as one of our experts. If you have a need for policy assistance and policy and market design or any other clean energy sector, we encourage you to use this valuable service. Again, the assistance is provided free of charge.

If you have a question for experts, please submit it for our simple online form at [cleanenergysolutions.org/expert](http://cleanenergysolutions.org/expert). Or to find out how the Ask and Expert service can benefit your work, please contact Sean Esterly directly at [Sean.Esterly@NREL.gov](mailto:Sean.Esterly@NREL.gov) or at 303.384.7436. We also invite you to spread the word about this service to those in your network and organization.

Now I'd like to go ahead and provide a brief introduction for today's panelists. First up today is Michael Franz. Michael is a Senior Advisor for Sustainable Energy and International Cooperation. His extensive experience in working with donors, European commissions, the private sector, development agencies, and financing institutions towards mobilizing investment in renewable energy and energy access projects. His work centers around the nexus of energy project development, policy frameworks and financing, with the geographic focus on sub-Saharan Africa.

Our second speaker today is Charlie Miller. Charlie is Head of Policy at SolarAid, an international NGO dedicated to eradicating the kerosene lamp for building a market for portable solar light. Charlie Cole chairs the policy-working group at the Global Off-Grid Lighting Association and sits on the steering committee of the Power for All Campaign. He advises governments, aid agencies, foundations, and investors on policy, grant making, and investment in the off-grid energy space.

In our final speaker today is Chris Service. Chris is the Business Developer at Foundation for Whirl Energy Services, a Netherlands-based nonprofit that accelerates socioeconomic improvements in rural communities of developing sub-Saharan Africa through the rollout of a standardized fee-for-service model for world electrification.

And now, with those three introductions, I'd like to go ahead and welcome Jem Porcaro to the webinar for a brief overview of the Energy Access Practitioner Network and Sustainable Energy for All. Jem —

## **Jem Porcaro**

Thanks, Tim. And thanks everybody who's online who made it today. Again, I'm Jem Porcaro. I'm the Senior Director of Energy Access at the UN Foundation and I just wanted to provide a very brief overview, as Tim mentioned, on Sustainable Energy for All and the Energy Access Practitioner Network, just to provide a little bit of context for the presentations that you will hear it later on this morning or this afternoon.

So, with that, next slide. And you can ignore the name on the first slide. I'm not Tripta. That's my colleague. Filling in today. So, I probably don't need to

remind many of you online that a large swath of society still lacks access to modern energy services, both in the form of \_\_\_\_\_ power and clean cooking solutions.

And so, in response to this issue, back in 2011, the UN, including the World Bank, came together to form and launch a new global initiative called Sustainable Energy for All, which was really meant to serve as a platform for mobilizing, coordinating a number of stakeholders, including governments, businesses, civil society, around three interrelated objectives. One was to ensure universal access to modern energy services. The other was to double the rate of improvement in energy efficiency. And the last was to double the share of her new bull energy in the global energy mix, all by 2030.

Obviously, a pretty ambitious set of goals but goals nonetheless that have in fact, since the adoption of Sustainable Energy for All are now set to be adopted within the new Sustainable Development Goals, which are taking the place of the Millennium Development Goals. So, since the establishment in 2011 of SE for All, there's been a pretty good political lean in the sense of having embedded in these three goals within the next development framework for the next 15 years.

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So, since its establishment in 2011—I think this slide is slightly out of date—SE for All has mobilized a number of stakeholders, organizations to work together. In fact, I think they're somewhere in the order of 106 countries, including the \_\_\_\_\_ and the EU, who have partnered with Sustainable Energy for All. Roughly 85 developing countries are now either working on or working towards the development of their own country action agendas and investment perspectives—that are embedding or mainstreaming these three major goals within their own country's development plans and policies. So that's encouraging news in terms of the breadth and scope that SE for All has been able to achieve working with other countries and other governments.

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So, within Sustainable Energy for All, one of the resources within this global platform is something called the Energy Access Practitioner Network, and that's a network that the UN Foundation helps run for it SC for All. It is basically a network of roughly now over 2000 practitioners working in the energy access space. This network started in 2011 with roughly 20 members. So we've grown quite rapidly from 22 2000 in a matter of just a few years. The goals or the objectives of the network really are to promote new technologies, innovative financial business models, to provide a platform to convene and connect, arrange the stakeholders around new partnerships as we are doing today. And lastly, to facilitate the development and adoption of new standards.

I should also mention that the core focus of the network is primarily on market lead, centralized energy applications, all with the goal of trying to achieve universal energy access by 2030. Our membership is composed of roughly half of our members are small and medium enterprises. One quarter

are larger enterprises, government agencies, academic institutions. And the other quarter is roughly—are NGOs, international NGOs.

And there you can see where you can get a little bit more information about the network. And I should also just mention that we recently as of a couple days ago launched a new website. So I encourage all of those of you online haven't seen our new website to please check out the URL provided here.

Next slide.

So, with that, I think we just wanted to recognize, it given the energy access challenge and given that many of our members focus on market but approaches, and some of the feedback that we've been hearing from our members who have voiced a need for better access to supply chain and value chain information in the life and market business intelligence data, we very much welcome this presentation where the set of presentations today. Because I think it's beginning to fill a void that many of our practitioners in many of our members have been requesting assistance with.

So, with that, I think I'll conclude and hand it back over to Tim or Michael for now.

**Tim Reber**

Thanks, Jem. That was great. Certainly appreciate it. Without any further ado, then, I guess we'll just move right on into Michael's presentation. Again, if anybody has any questions, feel free to submit them through that questions pane and will get to all the questions at the end. So, Michael, whenever you're ready.

**Michael Franz**

Thank you. Thank you very much. Thanks for the opportunity of making this presentation here. My name is Michael Franz. I work for EUEI PDF and I'm going to present to you today a publication that we develop together and in cooperation Practical Action.

Before we get there, I want to briefly introduce who we are and what we do. EU EEI PDF, which stands for EU Energy Initiative Partnership Dialogue Facility, which was founded in 2005. And we do mostly policy and strategy advisory, policy dialogue, and we support energy market development through various activities. We've been doing many activities. I actually encourage you to go to our website. Almost all the projects that we been doing over the years are documented there. There's plenty of publications.

I should mention, at this point, our donors. This study was also financed by somebody and the EUEI PDF is supported by Austria, the European Commission, Finland, France, Germany, the Netherlands, and Sweden. Were hosted by GIZ and that makes me also add GIZ staff member.

Now, let's go into the content. What I'm going to present today is essentially a publication that we did. It's called "Building Energy Access Markets: A Value Chain Analysis of Key Energy Market Systems. And this is the link where you can download the study. It's quite a bogey document but you can have it in soft copy and hardcopy. But I'm going to get to that.

Let me briefly talk about why we actually did that. I have some questions here that inspired us but it was very much also an encounter, which is symbolic for many of such discussions that we have. It was a conversation about three and a half years ago that I had with one of our donors who is a decision-maker. At that point, they were starting a very large programming exercise for very substantial funds to support energy in the development context and he said, “Michael, we need something to help us understand better how the markets work and where those points are those leverage points, where our interventions can actually make a difference.”

And we went back with that. And, as a result of that, we came up with this product. We studied then extensively existing literature and, of course, a lot has been done. They are fantastic publications out there already. There is also a great study, for example, by AIFC that was done with a similar scope. The difference is, however, that often the recommendations, in terms of, “We need this or we need that or “were too generic.” It was said that we needed an enabling environment or we need a specific element. But it wasn’t exactly clear where it relates explicitly to the way people do business out there in the markets. And that’s what we try to overcome with this.

So, we got together with Practical Action, who are very renowned and have extensive experience in this field, came up with the publication with three objectives. One, to improve the understandings of how markets work and looking at the markets in a systemic way. Then, identifying barriers for market developments and success factors that can be addressed to help develop the markets. And then identify interventions to promote market uptake. In the approach that we followed is we really put the doing-business perspective in the center by focusing on the value chains, by, then, developing and applying a \_\_\_\_\_ framework, and then by applying this framework to five market segments, invalidating it through case studies.

So just to be clear, the target group here, the main target group, is the likes, actually, of ourselves. Me working in a development agency but also our donors—It’s those that design support interventions, those that have an interest in figuring out how to better support markets. Of course, it’s also helpful for people who are doing business in the markets, who want to have a tool that helps them understand the market they are breaking in a more systematic way or anyone else who has an interest. But that is our primary target group.

Let me start off with this because this shows the generic framework that we designed, where we have in the center, the market chain, the value chain, which you could see going from the left to the right. And then we have the enabling environment where we, again, categorize the three factors—And I’m going to explain all these factors briefly. That is on top. And at the bottom, we have another level comprised as inputs, services, and financing. And what we try to highlight here with those various arrows that go up and down is that they are very specific, concrete elements in those levels that relate to specific points in the bayou chain. And that’s where it really becomes interesting because that’s where we then can achieve a greater understanding as to how things actually work.

I want to brief you run you through this. In essence, the value chain in the graphic runs from the left to the right, where you could say on the left, energy or energy products or energy services are being produced and then they travel downstream to the end users eventually, which can apply manufacturing or generation are then distribution by one way or another, retail by one way or another. And eventually, the consumption of energy services or products.

This was the center of the value chain and then what we had down, at the downside of that graph, their inputs that are required by the actors. Those would be concrete, tangible goods. It can be also fuels. We would have services. For example, repair and maintenance service, transport service, training or even information. And then, of course, the various types of finance. And you all would probably appreciate that there's many different types of finance. At the level of the end-user, you would need a specific type of finance. At the level of a company in the value chain, it would be a very different type of finance. That's what we try to capture with this.

And then we have the third level, which is the enabling environment, where we, again, differentiated in political and regulatory factors—the rules of the game, so to say. Then social, there is behavior, cultural practices, cooking practices, for example. And last but not least, \_\_\_\_\_ financial and economic factors, income levels, ability to pay, the level of local economic utility, and so on, so forth.

So if that is up all together, one—And I will illustrate this using an example—one can arrive at the specific understanding how a market segment looks like. But then that is, of course, only the first part. The second part would then be to identify barriers in each market systems. And what we try to do is then we developed a system of highlighting those barriers, of categorizing them. And then, importantly, also of categorizing support interventions. We found this—Or we were hoping that this would be useful because it would have an understanding of a toolbox, if you will, a generic toolbox that many of us, I suppose, will be deploying in their work.

We followed—We distinguished between technical assistance and financial assistance interventions. And then where there is, again, different types that you can do. We can train people on how technical issues. But then the business development training would be something else. Policy support is also technical assistance, as well as advocacy support or awareness-raising support. And then on a financial assistance, you have typical interventions, such as loans, equity, grants, which are quite different, obviously, in nature, or complementary financing instruments.

In any case, we put this all together and you are most welcome to look at the publication to see how it turns out. I'm just going to give you a few examples as well. And then we applied this framework to different market segments. And this is actually something that I have come to believe is very important and has also—can also be a source of frustration. In some of the discourse in some of the meetings when the categories that we are talking about are two broad.

And, for example, one is talking about energy markets or renewable energy as such. Whereas, in reality, what we actually have is specific market segments that have demand and supply structures in common, that have rules and regulations in common, that have business models in common. And it's very useful to analyze things at the level of the market segment, which is \_\_\_\_\_ what we tried to do. Because only then will we arrive at the specific understanding of how exactly things come together.

We could have covered more market segments but we chose to go for these, mini-grids, essentially, solar home systems, solar PV lanterns, smaller solar PV systems, biomass cook stoves and fuels, and last but not least, LPG. And then here, on the right side of the screen, you can see the maps that look quite different.

Here's an example. This is how we came—how we described—how we sent out the mini-grid market map, which is essentially describing a market system for mini-grids, where you have the development of the project and then the operations, which entail generation, distribution, and retailing and then the consumption at the level of households, enterprises, public sector in the value chain. And then you have an enabling environment. You have the barriers. Mini-grids are an aspect that does require good regulation and attractive frameworks.

Incidentally, I should mention, at this point, we also have a publication that is looking into this in greater detail. It's called "Mini-Grid Policy" too, in case you are interested.

But anyway, in any case, and then what we try to do is, you can see from this graph is that we tried to explain exactly where, exactly which element becomes relevant. And we did the same for input services and finance.

And just to highlight here, for example, you can see that we distinguished between three types of finance. There is money that is needed in order to hit the mini-grid project off the ground in the first place. There is money needed doing operations, depending on the business model, obviously. But that could be the case. And then there's also money at the level of the end user. Again, that depends on the business model \_\_\_\_\_.

And on the basis of this, this slide here tries to illustrate—It's basically \_\_\_\_\_ from the book, the booklet. So there's actually quite a long list of issues that need to be in place. And then we tried to describe how the interventions could look like and who the responsible actors are and the need. And the color-coding that you can see here corresponds, again, with the type of, with the level identified in the market map.

Again, it would be too much for this presentation to go into detail here. I just want to describe to you how the model works and you're welcome to explore it for yourself. We then had a number of case studies from the mini-grid \_\_\_\_\_, from the solar PV lantern, biomass-cooking stove, LPG \_\_\_\_\_ and so on and so forth. And the two presenters after me, Christopher and Charlie are going to—There representing actors that we are featuring as case studies in this project. They assist in, for example, how based on the interviews that we



had, how the market system map for foundational energy service looks like for solar PV, solar home systems.

And then, were going to hear more about this. I would encourage you, if you have this option, to perhaps print this graph there while our colleague goes through his presentation later so you can see how the one corresponds with the other. And then the same for solar \_\_\_\_\_, which is also operating the pico PV market within—This is the value chain, essentially, the way it's described in various relevant factors in the two levels. Yeah?

So I just want to wrap up and then we can go into the case studies. Just to be clear, we didn't try to come up with a blueprint here. There is no such thing as a blueprint. It's meant as a tool to help understand how markets work, that we can all work with and that we can adapt to our own needs. That also means that it's not perfect and it's subjective to a certain extent. One could have probably renamed some of those boxes. One could have put the arrows in slightly different places in one instance or another. Bu the idea is to, again, not to come up with a blueprint but to help us—give us some tool at hand to better understand.

\_\_\_\_\_ two perspectives, and they came out for my presentation, I hope. That on the one hand, we do need a holistic perspective, that we want to build markets, that we want to achieve dynamic markets development, otherwise, we are not going to close the energy access gap. And that this—\_\_\_\_\_ \_\_\_\_\_, part of Practical Action, called this the complexity that we need to address and he's very right with that, yeah? Unfortunately, in many cases, we need many things to be in place at the same time. And it's important that we have them on the radar and we hope that this framework helps with that.

But at the same time, to have a differentiated perspective, not to be too general, to be specific, to not be afraid of breaking down the complexity into its components, understanding the value chains in their distinct market segments, and their specific barriers, the specific needs and the specific requirements Because only through this we can actually take the big problems, break them down in to manageable problems, which can then be addressed.

Something that we also realized—and I've seen that in our work—We can see similarities between markets. We can see synergies for doing business in Energy \_\_\_\_\_ Development Program, which is run by \_\_\_\_\_, we have seen that there can be great synergies, for example, between cooking stoves and solar lighting products because we're talking about basically the same people at the demand level, the same beneficiaries, similar looking structures and market systems. There can be synergies explored here.

Last but not least, this publication is free to use for anyone. Feel free, also, to request hard copies from us and we'll see what we can do. Thank you very much for your attention. I'm looking forward to questions.

**Tim Reber**

Great. Thanks very much, Michael. Interesting piece of work there. Looking forward to reading the full report. Without any further ado, will just keep moving right ahead. Again, a couple of questions here, but will be putting this

off and addressing them all at the end. So we'll go ahead and handed over to Charlie, who's going to give us a bit of insight into how the framework looks on the ground looking at SolarAid. So, Charlie, whenever you're ready.

**Charlie Miller**

Many thanks. My name is Charlie Miller. I'm representing SolarAid. SolarAid is a UK-based NGO that runs SunnyMoney. SunnyMoney has, for the last three years, been the largest distributor of solar lights by volume in Africa. It's a business that is wholly earned by the charity and wholly grant funded. Its reason for existing is not to make money, necessarily. It's to catalyze the market. It's to go and sell lights in places where no one else is selling them and to create trust and demand and market momentum.

But first, a little bit on our history. Sorry, I'm just trying to get to the next slide here. What's going on?

**Tim Reber**

Charlie, if you try clicking on the slide, it might advance it.

**Charlie Miller**

Oh, okay. So, we built SunnyMoney in 2011, recognizing that there were three kind of key barriers to the growth of the portable solar lighting market. We were saying all this money going into the research and development for new portable solar technologies. We were saying the price coming down dramatically. I think probably in particular, the launch of the d.lite S2—the S1, sorry, back in 2011 or so, was a real game changer in terms of offering a direct replacement for kerosene lamp at around \$10, which was a price point that put modern energy for lighting within reach of people living below \$1.25 a day.

Were probably very distinctive when compared to the other actors in the off-grid lighting market because our customer base, 90% of them, live below \$1.25 a day. And a particular kind of social mission for us, a particular focus for us, is ensuring that even the poorest get access to modern energy products and services. So we are very focused on the affordability issue, both in terms of working with manufacturers to develop cheaper and cheaper quality products and now, more and more, working with developers on building out the pay-as-you-go market segment, which has had traction for a while with wealthier customers. But which increasingly is working is way downwards. We have, for example, an entry-level pay-as-you-go line, which I am going to talk about a little bit later.

Though probably key, too—The other two key areas here, awareness and access, where the areas where we were able to uncover a couple of core innovations that enabled us to achieve the scale that we been able to achieve. Firstly, I think it's well recognized that cost is a major barrier. Affordability is a major barrier. And, indeed, when I speak to policymakers, a lot of the time, that's the issue that they choose to focus on. But the flip side of how much somebody is prepared to pay for something is how badly they want it. So, our model is very much focused on getting trusted members of the local community, in our case, head teachers, to promote solar lights amongst their social networks, amongst the parents of the students in their schools. And talking about, training people to talk about the benefits in terms of increased

study hours, in terms of cost savings, in terms of wellbeing, has proven to be a highly effective way to create demand.

So we have a below-the-line marketing strategy, which is very light on activity is like radio or TV or any of those conventional marketing techniques that are more appropriate to a later stage of market development or tall wealthier customer segment or to a more dense population. Were very much focused on demonstrating products to people face-to-face, having the people do those demonstrations being trusted members of the local community, and enabling people to hear about the benefits firsthand from people they trust. So really, all about that social, peer-to-peer marketing, which proves really effective in this type of environment, rural context.

And then I think the final issue is, was availability, or lack of access. You know, how far did someone have to go to buy a light? And we first discovered are kind of core innovation on this front Mafia Island in Tanzania, where we were trying to get rid of some stuff quickly. And someone had this idea of going around to the schools and working with the head teachers to promote solar lights. And then, we had an idea which was, instead of visiting every school, driving around in a Jeep from village to village, we could bring the head teachers together.

So now, our core, kind of, our first fruits market in an area where there is zero market penetration involves bringing a group of anywhere up to about 100 head teachers together and training them to promote solar lights. They will then go back to their communities and take orders. So, unlike the traveling salesman, I had teacher is able to take payment off a family before delivering the products. And they are able to come and meet us at a central point later on and pick up anywhere from 50 to 100 lights at a time. So, for example, our top-performing head teachers have taken upwards of 2000 lights off us and distributed them, both in their own communities and in surrounding communities.

I guess I would flag that population density is still a big constraint. The number of head teachers that were able to bring together in Kenya or Tanzania is much higher than the number of head teachers that were able to bring together and somewhere like Zambia. So population density is still a real kind of constraint when it comes to making it viable to do this kind of model and to achieve the kind of volumes that you need to make it viable as a business opportunity.

So, yes, the school campaigns are a loss-leading channel. They are not attractive to commercial companies. That's why the work that we do is grant funded. And, as I say, it's not—The goal is not necessarily to become intense and \_\_\_\_\_ ourselves, it's to crowd in others. So, I guess what were really proud of him can yet and Tanzania is that we went to places where no one else was selling lights, preceded those markets we got 3 to 5% of the village using solar lights. They all told their friends and neighbors. That face-to-face experience and that customer endorsement effect created demand on a massive scale. And that was the man that other people were able to serve. So

we created demand and we crowded in a lot of more conventional private companies into those rural markets for the first time.

And I guess, just something to highlight, at this point, is \_\_\_\_\_ from Off-Grid Electric, one of the leading solar-as-a-service companies in Tanzania, and saying they either may have found it much easier to sell a full solar-as-a-service model for large solar home systems in areas where the use of entry level solar lighting is commonplace. So that market-catalyzing affect is not just about creating demand for products, it's also about creating demand for solar technology in general in ride the wave through to full solar-as-a-service models.

And we very much see entry level lighting as a Gateway technology, which paves the way for a much broader range of products and services and establishes trust that creates demand for that whole range of products and services and not, by any means, and end in itself.

So I've already talked a little bit about the school campaigns. The school campaigns, rolling them out in Kenya and Tanzania is what enabled us to emerge as the largest distributor of solar lights in Africa. We've also roll them out in Zambia and Malawi but have had a very different experience. I think in Zambia, because of the low population density, creating demand hasn't been enough to really crowd in other actors to many of the rural areas where were operating. And in Malawi, we have a VAT and tariff policy on solar lights that renders lights unaffordable to many in one of the poorer countries in Africa.

So we thought that we had stumbled across something that could play a big role in catalyzing markets and that hasn't proven to be the case. I think it's well recognize that we've played a significant part in driving the emergence of the Kenyans' and Tanzanians' success stories. But equally, our experience in some other countries has showed us the limitations of that model in isolation. And I've just highlighted some of those other things that need to be addressed if we are to crowd in others, if we are to extend value chains into those more remote, rural areas. Notably, around affordability and just a question of population density and how you really serve those really remote communities in a way that's commercially viable.

We have in our more developed markets, transitioned away from school campaigns entirely now. Head teachers are not the most natural entrepreneurs. And in Kenya for example, about 80% of her lights are now sold through agents. That agent network started out being dominated by head teachers but over time, transition to more naturally entrepreneurial people, like local shopkeepers for example. In that agent network continues to evolve with anyone having the opportunity to become an agent, if they can afford to access our bulk pricing that we offer to anyone.

And what we've seen is quite a bit of turn over at the beginning with agent recruitment but eventually sort of a cream of the crop emerging through regularly achieving sales and regularly coming back to buy more stock. And

now, some of our agents are delivering really very significant volumes and having their own networks of sub agents that they work through.

I guess, just to flag another kind of constraint there is as those agents have got bigger, and we become more and more acutely aware of agent financing as a key constraint, the cost of financing for agents through traditional micro-finance institutions is so high that generally been unable to access finance. And we've been looking at ways to do that ourselves but it's not a core business and obviously, there's significant risk involved. So agent financing is an area where work kind of actively looking for solutions the boat piggybacked on the downstream chain but also outside of that through distributor finance facilities and things like that.

Finally, just this point about driving demand. I think, very similar to the mobile phone market, we don't see off-grid energy as a one-product game. And the value really comes in building a brand that people trust so they come back to you for their second in their third product. And strategically, it's course, what we're doing at the moment. Moving people up the energy ladder. So going from entry-level light to a pay-as-you-go light, moving from entry-level to mid-level, or even to full-solar home systems an full solar-as-A-service.

So, our product mix over time has evolved from being 99% entry level lights took quite a bit less than that were some of these higher-margin—sorry, higher value, higher-margin products that are going to help us to get SunnyMoney to sustainability in the long-term.

I think, just point, I just wanted to flag some of the things that were doing at the bottom end of the market. We're very focused on ensuring that as off-grid energy markets grow, they become more and more inclusive and even more poor people or poorer people—more and more poorer people are able to access modern energy for lighting.

And this is just one example. We've worked with Angaza Design and Green Light Planet to develop the first ever pay-as-you-go study light, which retails for around \$12 or \$13. So a bit more expensive than a conventional study light. But people are able to pay for it in weekly or monthly installments over a period of about three months. And the incentive to repay is quite strong because after three months of repayment, the product is unlocked for three years. So, we don't have to do extensive due diligence, which seeing it produces a significant boost to uptake one were selling these kinds of products in the default rates are acceptable.

The opportunity presented by entry-level and mid-level pay you go for our business is it significant, both in terms of addressing affordability and enabling customers to move up the energy ladder. But there are certain kind of key components that we still need to lock down for going to take this kind of model to scale. Notably, the implicit offer of consumer finance involved in delivering services, rather than products. And payment in installments rather than upfront. So I imagine over the next six months to a year, or so, will be

actively seeking the consumer finance partner to help us do that consumer lending. Now that the model has demonstrated its potential, I think.

Also, there's some really interesting areas sector-wide. We've seen pay as you go attracting most of the investment in the interest rate, led by the likes of Off-Grade Electric and \_\_\_\_\_—But increasingly, I think the investors are seeing the opportunity to build on the pay-as-you-go market segment downwards. And it's really, really exciting as I say, both in terms of the solution to the affordability issue and helping people move up the energy ladder.

I won't dwell on this slide for very long. I'm sure that the people let the people on this call are familiar with the idea of an energy ladder. But I wanted to highlight the research that is, out of the Consultative Group Against Poverty and the Global Mobile Association over the last, sort of, year or so, which we presented back at Sustainable Energy for All in New York back in May, demonstrating clear, positive relationships, symbiotic relationships between access to off-grid electrification and access to finance and access to mobile. The data being generated by the pay-as-you-go companies is extraordinary in terms of people being to demonstrate repayment, people de-risking themselves to future lending, people accessing consumer finance an interest rates significantly lower than traditional micro-finance.

And then, similarly, those pay-as-you-go companies, both operating in areas where there is access to mobile and mobile money, which really helps in terms of collecting payments, but equally, a lot of people—For example, in our Malawi test of pays you go, a lot of people experiencing mobile money for the first time as a result of buying a pay-as-you-go light. So the symbiotic relationship, whereby selling these mobile-enabled pay/go products, we can contribute to the development of related markets and benefit from the development of those markets.

In case anyone is in any doubt about the existence of the energy ladder, I just wanted to bring out this slide, which shows Lighting Africa statistics for market segmentation in Kenya over the course of 2014. I think we always knew this would happen but we had never seen any robust evidence that it would happen. But literally, in a six month. Over the course of 2014, we saw the proportion of entry-level products nearly half from 60% to 35%. We saw the proportion of mid-level products double from 26% to 53%. And the emergence of this new market segment, which is pay-as-you-go, which is only going to get bigger in time, since it's attracting most of the investment that's coming into the industry at this time.

So really, very, very exciting developments and were very proud to have played an important role in that through seeding the market with entry-level lights just to get this whole process off the ground. And I think, again, worth emphasizing that we feel we've played a big role, but probably not obvious success in Kenya and Tanzania would've been possible were it not for the 0% VAT and tariffs, which are so critical to making light's affordable. When Kenya's new government came in, I think it was about 18 months ago, they reinstated the VAT and tariffs and all the companies had to put the cost of

their lights up by exactly that amount. So 100% of that VAT was passed on to the consumer.

And then, you know, it was very gratifying to see that when the VAT exemption was reinstating, 100% of all that cost reduction was also passed on to the consumer. So just really, really highlighting the importance of the right policy to be in place to ensure that lights are affordable.

As I said, we really are very proud of what we've done in Kenya and Tanzania. We've tried to do the same thing in Malawi and Zambia and Uganda and the results are much more mixed. I think, as I touched on at the beginning, it just highlights the importance of some of these other factors relating, in particular to affordability but also basic demographic factors, like population density and how important it can be.

We've also, I think, just heard about some of the other really exciting innovations in support for off-grid electrification, notably, the distributor finance facility that the World Bank has been running with the Development Bank of Ethiopia and the fact that they've got a six month waiting list to access that facilitate because it's proven so popular. And really, really fascinated to see that effort to really overcome the finance bottleneck amongst distributors has proven to be really effective as well. So very, very much interested in understanding what these best practices are. And understand during where we are best placed as a market actor to deliver on some of these innovations and overcome some of these challenges. But also, just acutely aware of where it's not our natural world to play in, were others clearly have a big role to play.

So challenges and opportunities. I think we've been victims of our own success to its certain extent in Kenya and Tanzania. We have helped to create demand but in such a price-sensitive market, we've seen a huge influx of non-quality verified in some of the likes. And it's not actually a function of customer awareness of the quality issue. Our agents are saying that they are selling the non-quality products side-by-side with the quality ones and it's simply a function of price. That even though buying the quality light, even a basic entry level light is a step change in somebody's quality of life, saving them 15% of household income. Even buying a non-quality light is still a really good idea when comparing to the alternative of using kerosene, batteries, or candles.

So we've been saying, "You know, maybe we need to state and take a stand for quality. Because otherwise, the poorer customer segment that we serve will have no choice but to buy poorer quality products. Maybe there's a big risk of market spoilage." But I think, until now, we haven't really seen market spoilage having an impact on the market growth rates in Kenya in Tanzania, which, if anything, or accelerating all the time.

So, there's this question around the value of—Well, around quality and the importance of quality and whether markets foliage is really happening or whether a genuine choice between quality an non-quality is something that the market can live with, if you like, for the time being.

We've seen intense competition as a result of crowding in others. The model, as I say, is loss leading, particularly the school campaigns. So we been surprised by the speed with which that has happened and have had to adjust accordingly by going to other areas where people aren't selling lights. For example, in Kenya at the moment, our strategy is very much to move away from the well-served areas and to go to the parts of the country where other people aren't selling lights, focusing on what we are best at.

And then, finally, as I said, the energy ladder, recognizing that affordability is still a major issue amongst our customer segment and recognizing that the real commercial value comes not in the entry-level light but in the customer journey and —

[Break in Audio]

And to deliver much higher levels of functionality for—a higher margins for our business.

And then, finally, just to circle back on the Malawi example, which was the one that was included in the EUEI PDF publication. I think the key thing that we learned there is that our work is really not sufficient in itself. So we've been focusing on how to overcome the affordability issue in Malawi, testing are entry-level, pay-as-you-go products there, in a place that doesn't have a built mobile money market because we think that's what has the greatest potential to unlock volumes and to deliver significantly increased sales and to build up the market to enable even more people to access modern energy for lighting.

And then, relating to that, about 18 months ago, we started looking quite hard at how to do something about the VAT and tariff issue. We very much welcomed the World Bank's efforts to reestablish the Renewable Energy Industry Association in Malawi and were looking at establishing our own kind of pico solar caucus within that, with a specific view to addressing the VAT and tariff issue.

And then, thinking at a global level, as an NGO, we also do other activities to support the market as a whole. \_\_\_\_\_, we are about to embark on a piece of research with UNDP to try and demonstrate to governments that they can save money through—save money and kerosene subsidies through policies that promote off-grid lighting market growth. So trying to make that, kind of, macro-economic argument, that fiscal argument that, counter intuitively, not charging VAT on this technology will actually benefit the balance of payments and not cost anything.

And with that, I think, I would just like to touch on the core question that Michael answered right at the beginning. Why are 80% of the solar lights sales taking place in just three countries? I mean, if we were to highlight two or three really key drivers of that, we would say the zero VAT and tariffs was one and the product demonstration and scale, which we were able to help with in Ken's a in Tanzania really did help to pave the way for everything that came after it. And to help overcome that affordability issue by making people want lights more and be prepared to pay more for them. And then the



distributor finance facility, which has clearly catalyzed a lot of businesses and help people achieve a lot more sales over in Ethiopia.

I think probably one of the concerning patterns is that, as the off-grid lighting industry gets more and more dominated by pay-as-you-go companies, those companies require certain level of claim density in order to operate. It's really extraordinary what they're doing and the level of energy access they're delivering two people who have not been able to access that kind of energy before. But there is a kind of—There is a market concentration effect that's happening as a result of the emergence of pay/go.

And I think, in particular, everybody's so focused on being industry led, responding to the demands of the market actors, that we're seeing a divergence of what we're hearing from customers who are operating in countries, who work in countries that are not attractive to commercial players, like Malawi. They're telling us one thing. And then the industry players that are talking about the various and those more developed markets are really saying something quite different.

So I guess a key focus for us going forward and something would be keen to see integrated into the use of this kind of framework EUEI PDF has developed is the voices of those in energy poverty themselves. When they're in an area that industry is not actively seeking to enter is there are just so many barriers they will actually have something quite different to say compared to the main off-grid lighting companies. So that divergence in that concentration is very fascinating.

With that, I'll close. I think I probably talked a little too long. But many thanks.

**Tim Reber**

All right, great. Thanks so much, Charlie. Some really great work you guys are doing there and got quite a few questions. Hopefully, will have some time to get to. If not, will send those along and let you answer those by email. But in the meantime, will move right onto Christopher, who is going to tell us about Foundation for Rural Energy Services. Chris —

[Crosstalk]

**Chris Service**

Yes, good afternoon again. Yes, can you hear me?

**Tim Reber**

Yep.

**Chris Service**

Excellent. Yes, good afternoon, everyone. Firstly, Charlie, thank you for your presentation. Very interesting to hear what you guys are doing and also the focus you had on the energy access ladder, which I think is a critical part, which is often overlooked in many aspects of the industry.

So today, I'll be introducing FRES and our experience with decentralized energy access in sub-Saharan Africa. I know Michael's value change analysis focused on the case study in Molly, so I'll present a little bit about that experience as well.

So, who are we? We're a Netherlands-based foundation looking to accelerate rural electrification in sub-Saharan Africa. The reason we do this is, obviously, for socio-economic development purposes. So our mission is essentially to provide electricity to rural, off-grade areas of developing countries, principally by the use of solar energy.

How we do this in practice is by establishing local utility companies in rural areas. So we going to the country, establish a local commercial company, higher the general manager and then together, we roll out standardized fee-for-service business model, which is essentially design to be replicate a bulk, scalable, and ultimately sustainable as well. It's a commercial approach with a focus on households and small enterprises in terms of our market segmentations I guess the energy access ladder. We're looking to provide electricity to those beyond basic lighting. So were not talking to the poor of the poor, but the slightly better off for, if you will. So we are looking to support income generating activities and productive use activities.

Before I go any further, a quick shout out to our industry spoke person. So the Alliance for Rural Electrification is based in Brussels and represents the decentralizing sector by supporting its members with target efficacy in facilitating access to funding. A quick example of this would be they recently had a—They launched a call for proposals with the OPEC Fund for Development and are in the implementation phase of that. But I would encourage anyone who is interested to know more about the energy access in Africa or Asia or developing countries in general to get in touch with \_\_\_\_\_ as well as the Practitioners Network to discuss these issues.

So, just a quick summary of where we are, the scale we are working, and which countries, and what we've achieved today. So FRES, in a nutshell, is working in five countries. We've got five companies and the countries \_\_\_\_\_ supplied with roughly 230 local staff, who in turn contract work to another 98 staff. We have a customer base combined of 33,000 people, 33,000 customers, be them businesses, institutions, and households. And in total, I think we have 3.3 megawatt of installed solar capacity.

Just a bit of a fine-tuning on the evolution of the customer base since our establishment, 2001. As you can see, \_\_\_\_\_ customers remain our core customers. And from 2006, you can see the evolution of mini-grid customers coming through.

Again, the installed solar capacity follows that of the customers. And what you will see is there was a dry patch from roughly 2006 two 2010, where there was really an absent of funding. And we use that time to do a lot of market research and which countries wanted to operate and where we wanted to go to from there. From 2011, we decided to expand and started up three new companies in 2008, 2011, and 2012 in Burkina Faso, Uganda, in Guinea-Bissau. And with that, comes the growth that you see in the PV capacity and the customers.

So, getting into the details, FRES business model, as I mentioned, where of the-four-service business model, which essentially is providing electricity as a

service, rather than selling it as a product through solar home systems or solar lights. Key elements of the model is it's a commercial model. It's designed to create a profit where it's affordable to the end-user but it's also sustainable to the local company. So local companies are maintaining ownership of the systems. Therefore, installation, maintenance, and most essentially replacements of key components, such as charge controllers, most importantly, batteries—So the key element of that is if the lights go off, if the battery shuts down, then you know who to call and I will come and replace it.

So the customer essentially pays a monthly fee, starting from six euros for the entry-level and that gives them access to electricity with no extra hidden fees, for example maintenance if the battery breaks. We're there to replace it at no extra cost.

Another key element of the business model is the local ownership and with that, I mean we employ locals, we train locals so that the full sweep of activities from installation, marketing, management of the company and its solar home systems, and all the technical specs maintain at the local level.

This is just a quick overview of where FRES works in the value chain. So we essentially are involved from the initial research, be it from our own initiation or at the request of governments onto \_\_\_\_\_ research, market research, and essentially, the development of a business plan. With that in mind, we search out the financiers and get to the point where we can implement and monitor and adjust the company as necessary.

So the technologies. We operate two-core technologies, solar home systems, in many-grades. Solar home systems remain our core product. They're modular by design. So with our entry-level system it's an 80-watt peak system, up to a 320-watt \_\_\_\_\_ system. And to give you an idea of where most of the customers sit, it's generally in the range of the second tier \_\_\_\_\_, which would be 160-watt peak. I'll tie on to the idea of growth and demand a bit later but we have seen significant growth from when we started in 2001 until today's current level.

The other technology we use his mini-grids. So, at the moment, were operating 10 mini-grids, specifically in Mali. Seven of them are hybrid, two, 100% PV, and one, diesel only. The system capacities range from 50 kilowatt to 150-kilowatt peak. And, as I'm sure you're all aware, with mini-grids comes some limitations I'm where you can work. So the target market is densely populated, rural areas, which have diverse economic activities, which can support high uses of electricity.

So the tariffs. I guess the key principle that we want to take out from FRES' tariffs is looking to balance commercial and social drivers. Although our local companies are commercial by nature, we ourselves are a nonprofit. So that in itself means that were looking to have more on the social aspect of that. But essentially, we want to make sure that were affordable to our market. And when you're working, as Charlie mentioned, in the areas where there isn't really an established electricity or solar energy market and you really need to be accepted and affordable.

So with that in mind, customer tariffs are designed to be financially sustainable at scale and not to be making a profit in the short term. In some—I will mention that in some of our countries, governments do regulate tariffs, particularly with regards to mini-grids. That’s something to keep in mind.

In the case of solar home systems, the customer will pay a fixed fee, be it by week, by month, or per season, depending on if you’re a farmer or the shop owner, for instance. It starts at six euros for the S1, the 80 W peak system, and will go modularly up from there. Payment is generally, in principle, particularly in West Africa, done by cash. Although we do accept mobile banking, which is very common in, for instance, East Africa.

In the case of mini-grids, tariffs are essentially tied to consumption. So along with a fixed monthly fee for the connection, customers are charged a euro—the of 38 cents per kilowatt-hour. All mini-grid customers are also connected to prepaid meters in tariffs do include a provision for lighting.

So, moving on to our experience in Mali and what was presented in the value chain analysis, our local company there is Yeelen Kura. It’s been operating since 2001 when it was established through a joint venture between the energy companies Nuon and EDF. From 2004, FRES has been managing this on behalf of Nuon and in 2008, ownership was officially transferred over to FRES and the staff trust fund of Yeelen Kura.

It is currently the only company that is operating mini-grids. As I mentioned, there are 10 mini-grids and we have seen significant growth and beyond the growth we’ve seen, there is a large unserved demand, you could say as well. We work closely with Amada with the Rural Electrification Agency of Mali and we have implemented a number of programs with them.

We are also in ongoing tariff negotiations with them. In general, it’s going well. But you could say that the tariffs are more on the social than commercial side in Mali, even with our \_\_\_\_\_ and our partnership with international agencies. But we have had good results in increasing the tariff in the last few years and we’re working with Amada to sort of show them, “What is the tariff that you really need to produce the financial sustainability of your company and ultimately, the scaling of the industry in Mali?”

There’s also, I think, has been a real win in Mali is our ongoing cooperation with a grid company, a Dutch grid company called Aliada. They work with us to essentially optimize the operating of the grid. As many of you know, national grids in Africa suffer gridlocks of up to 20% or 30% and in implementation, are mini-grids were no different. So, we’ve worked very well with them to restructure the grids, in terms of where are the high-energy users? Work and we better serve them with different cables or simply moving them? And today, it’s been very successful were seeing great reductions down to, I believe, 12% and 15% of last year.

The customer base is 6300 as of June 2015. I think that may in fact be in error in the slide presented on the website. Just to keep that in mind.

And this is just a wee point I wanted to mention, and this is something that Charlie posted very highly on. It was the Energy Exist Letter. In the case of mini-grids, you see this graph, which will show the electricity consumption per customer from 2006 to 2014. In short, were looking at roughly 10% to 15% growth annually period were seeing much higher consumption during the day, which is, in fact, a good thing to be—Our systems were actually designed for higher use in the nighttime. So, we did, in fact, have larger battery banks. But the positive about this that the consumption profiles in general are more complement tree to the solar energy sources. So it's looking more positive for the ongoing projects in terms of increased capacity without the added expense of large battery banks.

We have—Due to the large increase in demand, we have implemented active demand-side management strategies. And I think it's a critical element to address this when you're developing a project. Bear in mind that once you're there for the long term, you really need to manage the demand but also plan for it. I think it's often a \_\_\_\_\_ effect when it comes to funders and even project developers. So ultimately, we're there to support this growth. Were there for socioeconomic development. So you need to be able to design a project, which caters for this.

Just briefly, I'll touch on what we consider factors that have influenced our success today. At its core, we believe our business model is a key approach to that. As I mentioned, commercial, sustainable, and replicable—That's based over many years of looking at what components we use, how long we want the battery to last and to basically streamline what we do, which includes using PV, which is a rather robust and proven technology, to make sure that it is scalable, that were actually developing something that does incorporate its local—the local setting, in terms of how you market to the local community, what stakeholders you need to get involved with. But in its core, it's scalable.

And were looking to, obviously, grow as much as we can and we think a commercial approach to that is one element for that. And the second is fee-for-service. For the market segmentation that we're looking to support, they simply can't afford to buy a system. So providing electricity as a service and an affordable service is a key element of that.

Maintenance and replacing guarantees are also a critical element of our model. As I mentioned, were not there for the short term, were there for the long term. So, as Charlie put it, to demonstrate what is possible in these regions, to provide, I guess, real case studies that prove that solar PV can be accepted by the community and, in a sense, pave the way for other operators to come forward. As I mentioned, were looking to support productive use activities. So electricity, beyond basic lighting and helping people develop income-generating activities.

Another key element is the governance model that FRES employed. So every local company has a Board of Directors, a three-person team that monitors the performance of the company on a monthly basis with four key business indicators. Each company is, of course, required to present a business plan for the coming five years on an annual basis. And with that in mind, there is

ongoing communication between the Board of Directors FRES and the local company.

Risk management is another critical element. And I think it's important when you're working in these industries is to focus on what you're good at and managing what you're not good at, looking for the key partners that you need at the local setting, for example. Or who you need at the international setting as a lobbying partner, for example, if things get difficult. One example would be the coup d'état in Mali in 2012. When something like that happens anger using, for example, donor financing, the financing often gets blocked due to political situations such as that. So with a lot of strong lobbying support, we were able to get the money that we had already invested. So I think risk management has definitely been a critical element in our success in working with the technical and legal partners that we need to make sure that collectively we were all getting the job done, even if we don't have the expertise in-house.

And procurement policy. We operate a centralized procurement policy here at FRES. In the key element of that is the bulk purchasing. We have higher purchasing power with our suppliers as well as that we are able to dictate with our technical specifications exactly what components we want. We want high-quality components that will last in the field. Because, ultimately, you're working in areas which are remote, not hugely densely populated. And so, when a battery breaks, you don't want to be going out there every year, every two months, for example. You want a battery that will last five years. And in that sense, you can keep your operational costs as low as possible and ultimately be more effective at what you're doing.

As I mentioned earlier, local ownership is a key element and making sure that local employees are trained and capable of doing what they do. Today, that has largely been focused on technical capacities but we are seeing an ongoing need to have more managerial focus and training in the future. I think it's something I touch on a bit later but finding qualified staff in some of these remote, rural locations is a difficult challenge to overcome when it comes to making these companies work. Local ownership is a key element in terms of getting buy-in from your local stakeholders, be them national governments, local authorities, or, ultimately, the community.

We have partnered with a number of organizations from financial onto technical, legal, fiscal, financial—As I mentioned, this is part of a risk mitigation policy, particularly in the case of technical. We're a small team here, six of us here in the Netherlands, and we work with a lot of paid, mainly unpaid volunteers will help us with our technical capacities, legal and financial as well.

So some of the challenges and the lessons learned. Despite the hype, there still I would say insufficient financing available for the necessary scale up. Of course there are, I think, since the declaration of \_\_\_\_\_ aid for Sustainable Energy for all, we have seen these capital markets open up somewhat. But I think, in general, it could be argued that a lot of the funding is \_\_\_\_\_ for demonstration, innovation, pilot projects, and really needs to be a focus on the

scale up as well for those people who have proven that they have a model that works and the real bottleneck is financing.

With that in mind, there is still a need for public support grants to act as a risk mitigation mechanism, particularly if you want private sector involvement. And I think what I also want to mention is in recent years, there's been a real focus on the development and the opportunity of mini-grids in particularly Africa as the solution to energy access. Of course, mini-grids have a place and we've had good success with them, but they do come with their own challenges. And I think the financing is flowing for mini-grids. That's fine. That's great. But as long as it's not coming at the expense of other technologies, such as solar home systems or solar light. Each has its place but by no means are they taking both are the other. They operate in different markets, complementary as they are.

Some of the challenges in the operational side. Sustainable tariff structures are a key element. When I say this, I particularly mention mini-grids because from a political perspective, as soon as your operating a grid, you do come into it a lot more difficulties, lot more hurdles. In some countries have dealt with them. Some are trying to deal with them. And some—They really are a block for people to go in there and actually operate them.

Another key challenge for us is non-payment, be it soft ways to mitigate that, through education in strong controls or using technology such as prepayment to combat that. What we have seen is in general—I don't know if it's our companies or if it's a regional thing. But we have seen higher payment rates in West Africa. I will say that.

Another challenge is managing the growth and demand. Most of the mini-grids in solar home systems—Of course, increased demand shows that you're doing a good job in a sense. But it also comes with higher investment costs and higher strain on your systems. And managing that growth but also planning for it with your financial partners is also a key challenge.

And as I mentioned earlier, a qualified staff is another key challenge. One of the opportunities that we see —

**Tim Reber**

Chris, sorry to interrupt but due to time, would it possible to wrap up in the next minute?

**Chris Service**

Yep. No problem.

Very quickly, I think energy-efficient appliances are where we really need to hit in terms of managing this growth in demand. There's a huge opportunity for it to reduce our costs but also to enable access to the end user. The currently the distribution channels aren't well defined. And I will move on.

Just very briefly, the next steps for FRES is establishing a new company in Cameroon. We undertook market assessment this year and hope to have that in the coming months. Mini-grid operations will commence in Guinea-Bissau, either at the end of this year or next year. Apart from that, there is an ongoing

focus on optimizing the financial performance of our companies as well as the technical and \_\_\_\_\_ performance of the mini-grids.

Quick shout out to our sponsors and partners. And with that, questions.

**Tim Reber**

All right. Thanks so much. And again, sorry for kind of rushing things along. We did want to give Michael just a couple minutes here to provide some wrap-up in tying everything back together. So Michael, if you could give it to maybe two minutes and no more than that so we have time for at least a couple of questions, that be great.

**Michael Franz**

Yeah, will do—Will try to do. Thanks to both presenters. I think what came up very clearly is how they, with quite different models operating, actually in different market segments, deal with the specific situation and how they addressed the specific challenges. I think the \_\_\_\_\_ that Charlie used, that both of them actually have catalyzing effect in the geography, in the market segment that they're operating.

In terms of how we present the case studies in our publication, I think, actually, both presentations, in fact, enriched the analysis of the case studies to the extent that \_\_\_\_\_ some additional things could be added there. But that's what I mentioned earlier. The model can accommodate that and still make recommendations. What I found very interesting to see is how the SolarAid value chain ropes in different actors. Whereas, FRES for the mini-grid market essentially—You called it full cycle or vertically integrated value chain.

I think also another aspect that came out very clearly, that I found very relevant in Christopher's presentation is the aspect of the mini-grid \_\_\_\_\_ productive use. It's also often mentioned in the context of anchor business clients, ABC model, as being very important for a good revenue base for mini-grid projects. But then, of course, also the fact that may be one can say that—Whereas, in mini-grids and in the SolarAid market segments, you have the complexities of your business model and of your client side that you need to deal with. And, of course, in the SolarAid market for PV, you have two regulatory complexity of EAT and of the quality issues and the governance of the quality. But then the problem, the challenge of mini-grids is that you're dealing with also all kinds of additional regulations that must be in place and that need to be addressed somehow.

Last but not least, what Christopher said in the end—the space. I think that's really important and that's something where still awareness could be greater and needs to be built that when it comes to electrifying rural areas, bringing electricity to those that don't have electricity yet out there. There is a space for all the technologies that are there. There is a space where it makes more sense to extend the grid. There is a space for mini-grids. And there is a space where neither the grid nor mini-grades makes sense. And where there is a space for stand-alone systems, which could be solar home systems or lanterns. There is even going to be geographical overlap.

I have worked for many years and lived for many years in East Africa myself. I have seen some places where there still was the grid and there are still some



people in those communities that use solar PV home systems or solar lanterns there's nothing wrong with that. It depends on the affordability and what is appropriate. And we also see—And that's what makes life so interesting I suppose—For both those who do business in those market segments, as well as those who want to govern and regulate it, as well as those who need to support this, the boundaries are shifting. They're in constant flow, depending on technological innovation, depending on also business innovation that we see. It was mentioned the pay-as-you-go systems, which have certainly pushed boundaries very dramatically.

I would like to leave it at that and also, I'm looking forward to questions or comments. Thank you.

## **Tim Reber**

All right. Thank you very much, Michael. And again, thank you to all of our panel and I do apologize. I don't think we have time here to hit any questions. Although we did get quite a few questions from the audience. What we will do is we can send those questions out to all of our panelists with email addresses for all of the attendees and let the panelists follow up individually on those questions and email responses to you directly. So don't worry, we will do our best to make sure your questions get answered. Just unfortunately, we don't have time here.

So with that, will just move right on into a quick survey. If you would go ahead and please answer the question you see there.

And the next question coming up.

And one last poll question.

All right. That concludes the survey. And again, I'd like to just extend a big thank you to all of our panelists. Despite running out of time for questions, I think we had some great content here. The sheer number of questions indicates that it was successful. So anyway, I just like to thank everybody again as well as the attendees for participating in the webinar today. Again, attendees, if you'd like to check out the Solution Center website, you can view the slides as well as find a recording of today's webinar which should be posted, hopefully, within the week. You'll also find information on other Solution Center webinars and resources on the Solution Center website as well.

Additionally, the recording will be posted to the Clean Energy Solutions YouTube channel, where you'll also find recordings of various interviews with thought leaders on clean energy policy topics. We invite you to inform your colleagues and those in your network about the Solution Center resources and services, including our no-cost policy support. And with that, we ask that you all enjoy the rest of your day or the evening, as the case may be, depending on where you are. We look forward to seeing you again at future Clean Energy Solution Center events. Thank you very much.