

Richenda Van Leeuwen Executive Director, Energy and Climate, Energy Access Initiative team, UN Foundation

Christine Heuraux Director of Training Support, Électricité de France (EDF)

Dr. Harald Schützeichel Chairman, SunTransfer Sustainable Off-Grid Solutions; President, Stiftung Solarenergie - Solar Energy Foundation; President, the Global Off-Grid Lighting Association (GOGLA)

Vickie Healey Hello, I'm Vickie Healey with the National Renewable Energy Laboratory and I'd like to welcome you all to today's webinar hosted by the Clean Energy Solutions Center. We are very fortunate today to have a terrific panel of speakers who will be covering the topic of institutionalizing energy training on rural electrification. Next slide, please.

Before we get started, I just have one important note to mention before we begin our presentation and it's a little disclaimer stating that the Clean Energy Solutions Center does not endorse or recommend specific products or services, but the information provided in this webinar today is featured and will continue to be featured in the Solutions Centers Resource Library as one of our many best practices resources that are reviewed and selected by our technical experts. Next slide, please.

Okay, just before we begin also, I'll quickly go over some of the webinar features. For audio, you have two options. You may either listen through your computer or you can listen through your telephone and if you choose to listen through your computer, please select the "mic and speakers" option in the audio pane. By doing so, you will eliminate the possibility of feedback and echo. I would remind our panelists to also please mute your audio devices when you're not presenting in order to again eliminate feedback, echoes, and things of that nature. Then, also, one important note, if you're having any technical difficulties viewing the presentation over the webinar platform, you can contact the GoToWebinars Help Desk at 888-259-3826 and they will be glad to assist you with troubleshooting any issues you're having. If you would like to ask a question, we ask that you use the "questions" pane where you may type in your question and if you are having difficulty viewing any of the materials through the webinar portal, you will find PDF copies of the presentation at <https://cleanenergysolutions.org/training> and you may pull the PDF stuff and follow along as our speakers present. Also, I want to make you aware that an audio recording and copies of the presentations will be posted to the Solutions Center training page within a few days or within a few weeks rather so if you like to go back and review the presentations and listen to the audio recording, you may do so. Next slide.

We have a really great agenda prepared for you today and again, this is focused on off-grid electrification and educational aspects of developing needed capacities to install service and maintain renewable energy off-grid solutions and presented in the range of African context. As you can see, we have a very impressive group of panelists presenting on this topic and before our speakers begin, I'm going to provide a short informative overview of the Clean Energy Solutions Center initiative and then following the presentations that our panelists will present, we will have a question and answer session followed by a very short survey to get your feedback and then we'll wrap up with discussion and a closing remark. Next slide, please.

Okay, this slide provides us a little bit of background in terms of how the Solutions Center came to be. The Solutions Center is an initiative of the Clean Energy Ministerial and is supported through the partnership with UN-Energy. It was launched in April of 2011 and is primarily led by Australia, United States, and other CEM country. The outcomes of this unique partnership include supportive developing countries through enhancement of resources on policies relating to energy access. We provide no cost expert policy assistance and provide peer-to-peer learning, forums and training tools such as the webinar that you're attending today. Next slide.

Okay. So, go over few things about the Solutions Center, we have four primary goals. First, to serve a clearing house of clean energy policy resources. We also serve to share our policy best practices, data, and analysis tools that are specific to Clean Energy policies and programs. The Solutions Center delivers dynamic services that enable expert assistance, learning, and peer-to-peer sharing of experiences, and lastly, the center fosters dialogue on emerging policy issues and innovation around the globe. Regarding our audience, our primary audience is composed primarily of energy policy makers and analysts from government and technical organizations in our country, but we also strive very hard to engage with the private sector, NGOs, and civil society. Next slide, please.

So, a marketing feature, I've mentioned this just briefly but a marketing feature that the Solutions Center provides is our expert policy assistance. We call this service "Ask an Expert" and it really is a valuable service offered through the Solutions Center. We have established a broad team of every thirty experts from around the globe who are available to provide remote policy advice and analysis and this is provided to all countries and we offer it at no cost to the requester. So, for example, in the areas of energy access and rural electrification where this webinar is focused, we are very fortunate to have Ellen Morris who is from Embark Energy in the United States and we also have Ibrahim Rehman from the Energy and Resources Institute in India. So, this gives you a little example of some of the experts that we have on panel who was just in the particular area we're discussing today, but if you have a need for policies business on any Clean

Energy sector, we welcome and encourage you to use this very useful service and again, this assistance is provided free of charge and to request assistance very easy, you may submit your request by registering through our “Ask an Expert” feature at <http://cleanenergysolutions.org/expert>, and we also invite you to spread the word about the service to those on your networks and organizations. Again, some of the broad sectors that we cover include energy access, efficiency, renewables, Smart grid, micro-grid, transportation, and we also have access to some regulations and utility. Regarding on how you can get involved, we encourage you to explore and take advantage of the Solutions Center resources and services including the expert policy assistance I just described. You may subscribe to our newsletter and again continue to participate in webinars. Next slide, please.

So, now, I'd like to just provide a brief introduction of our distinguished panelists. First, we have Richenda Van Leeuwen who is the Executive Director for the Energy and Climate, Energy Access Initiative at UN Foundation. Following Richenda, we will have Christine Heurax, the director of Training Support at Électricité de France. She will discuss on Institutionalizing Energy Training on Rural Electrification and lessons learned from Mali and Burkina Faso. Next slide, please.

Our final presenter, is Dr. Harald Schützeichel, excuse the pronunciation, he wears a number of impressive hats including serving as president of Stiftung Solarenergie, which is Solar Energy Foundation and he's also president of the Global Off-Grid Lighting Association, and Harald will speak to us about Institutionalizing Training for Solar Technicians and Entrepreneurs and inform us on lessons learned from Ethiopia. So, with those brief introductions, I would like to turn the webinar over now to Richenda. Richenda, welcome.

R. Van Leeuwen

Thank you very much and thank you again to everybody at the Clean Energy Solutions Center for hosting this webinar. For those of you who are joining for the first time, we have a good cooperation with the Clean Energy Solutions Center and for all the topics and subjects going forward, we also welcome your input and your suggestions. My name is Richenda Van Leeuwen, I'm the executive director for Energy Access here at the United Nations Foundation. Again, for those of you who may be joining us for the first time, UNF is very engaged in the United Nation and World Bank Sustainable Energy for All Initiatives in various aspects particularly in some of the contributions around Energy Access. If you could go to the next slide, please.

We are focusing in the work that I lead on helping to reach the 2030 objective around ensuring universal access to modern energy services that includes an electrification component. It also includes access to clean cooking services. In 2011, as part of our commitment and our support of the Sustainable Energy for All Initiatives -- next slide please -- we launched the energy access practitioner network. We've had a very rapid

growth of this network, which focuses specifically on looking at the contribution of decentralized mini or micro-grids and off-grid electrification solutions and energy services towards contributing to the overall global objective of achieving universal energy access by 2030. We have members now. We have one thousand two hundred members drawn from a hundred and ninety-one countries. They range from startup companies. Some of them eventually back all the way through to large utilities like Électricité de France joining us today. We have members across the supply chain from manufacturers through distribution and installers in very local settings as well. So, we have a very eclectic group of membership. We are technology agnostic. We are looking clearly that a strong push towards using Clean Energy Solutions wherever possible so we tend to focus more particularly on renewable energy contributions towards achieving energy access. We work across the spectrum and many of our partners are engaged in Sub-Saharan, Africa. We have strong membership in many different countries in Sub-Saharan, Africa. We are represented currently in forty-six countries in Africa and hoping actually to have representation in every country in Africa in the coming month. We really focused primarily on market-based and market-oriented sustainable energy applications particularly above-mentioned focusing on mini-grid and off-grid solutions and looking how can we be developing sustainable solutions and sustainable energy services that really benefit communities and household and consumers. We are focusing particularly on the adoption of appropriate new technologies. We advocate around supportive regulatory and policy environments both to off-grid and mini-grid solutions. We focus on innovative financing and business models and really look at dissemination of best practices. So, today's webinar has been organized by us really looking at this dissemination of best practices particularly around the complementarity and the need for an educational approach to the work that we are doing outside or more or right closely tied to the actual distribution and installation operation and maintenance of the solutions and we'll get to that in a moment. The energy access practitioner network operates as the "network of networks." We work in collaboration with many different regional entities such as the African Renewable Energy Association. We work with partners drawn from all over the world and part of the work that we're also doing is sharing many lessons that we have learned as the sector trying to help disseminate them globally where relevant in different contexts. So, not everything will be relevant to everybody, but we're really also trying to look at some of the best-in-cost best practices and help to disseminate those in other context where others maybe struggling with some of the same issues. Next slide, please.

Specifically around training, we have been focusing in the network on standards and in [Indiscernible][0:13:56], we have a working group that has been particularly focused on standards and this webinar, in part, was drawn out of the work of that working group. When we talk about standards, we've been looking very much at product quality and at installation quality and some of you may well have joined this recently for

the webinar that we hosted on the International Electrotechnical Commission standards and looking at some of the new standards that have just been issued for both product design of the lanterns but also around installation and implementation areas, but we are also very much focusing on standard in terms of the human component and the capacity building of the people on the ground, the folks on the ground whether they are the ones who are installing systems or whether they are the ones who are maintaining systems. One of the things that we see still across the sector unfortunately in many countries in many context is something of a struggle to be able to ensure that you have well-trained technicians, ensuring that the human element whether it's electricians whether it's community members whomever is tasked to be able to maintain the system of the time, has the requisite skills and knowledge and capacities to be able to do that. When we're looking at a solar panel and so we're looking at the twentieth plus solution set and we need to be able to ensure that we can install it properly and maintain it over time. For those of us who have been in the sector for a while, we recognize that with the best will in the world unfortunately that a lot of variety and quality around the installation and maintenance of the solution set and at times that has actually undermined the outcome and the experience because sometimes projects have not been sustainable simply because it's fallen apart at the level of the capacity and ability to maintain those solution set. We're really working closely with ranges of practitioners and today it's really practitioner-led but with the example of what a large international utility has been focusing on and then also what a smaller SME and nonprofit organizations had been focusing on and in fact very much how they've been protected which should be looking at the needs to be able to incorporate training and competencies into the core curricula of the countries where they are operating. Again, we strongly support training programs that occur at the local level but ultimately the best way to build capacity in a country context is to ensure that it's embedded in national curriculum, whether it's in a vocational training school, in this country, it would be a community college, or whether it's your apprenticeships or whether it's your some sort of diploma, whether it's training electricians that are already certified, already helping to be the first point of contact for training for a specific area. I'm very excited to have two presentations focusing on different parts of Africa, one sector in East Africa, one joining from West Africa. Today, what we'd really like to do as well is think about more generally the applicability of these examples in your context, in your geography to what extent is there already engagement by ministries of education at the national level or perhaps municipal educators at the regional or local level. We know that there is a lot of work going on around the world in training but again, it's also looking at solving other issues along the way particularly as we know in many many geographies very high youth unemployment and looking at how we can be integrating that educational fee and also solving another problem along the way which is providing opportunities for youth employment. Without further ado, I'm delighted to turn this over to Christine Heuraux from EDF

who will give us some examples from Mali and Burkina Faso. Christine, welcome and thank you very much.

Christine Heuraux

Thank you and thank you also for the invitation and for giving me the opportunity to share the, well, the small experience we have now through a project I will present to you. Just a very short introduction, I would present myself. I am in charge of the capacity building and training in the international development of EDF -- EDF being let's say one of the largest electricity utilities in Europe and even in the world and being also committed to small corporate social responsibility program to access to energy and this is since the mid of the 90s so it means that we have gathered quite a big amount of experience on this access to energy programs, mainly in Africa and it was through these different programs that we notice the need to develop capacity-building programs because although we had money and we had all the technologies to create some rural electrification services companies in Mali, in South Africa, in Morocco, then in Senegal, and now in Botswana, we noticed that the progress was not improvement of the access to energy, was not as fast as we had hoped at the beginning and as one of the big reasons we noticed and we heard from the operator was lack of capacities and of competencies from all the different players. Maybe we can go just throughout the context of the project to the next slide please.

Next. After. Next. Yup. Even the next one. Thank you.

As I told you, we had very long survey on this need of competencies. Although it seems to be of use today, it was not at the beginning and it took quite a long time for us to identify this real fundamental need and it was expressed to us not only through the operators but also through the ministries and through the agencies for rural electrification. For us, just to confirm and to be sure that that was really something to do in that direction, I organized different surveys and different seminars and it all just pointed out that it was really a crucial need and that we had to work on this with the high priority.

Next. Yeah. Thank you.

The reason why we had to work on this, we really very well analyzed the benefits for different families of player on rural electrification. Of course the different operators expressed the need because they would like to recruit and to train their staff, then would like to have qualified officers immediately operational which is not always the case, and they also want to enhance quality services and then to ensure efficiency and profitability in their activity which is really the very first condition to be sustainable and to be operational. The countries themselves which are involved in rural electrification program, they want to ensure better chance of success for their policy and they also are more or less aware that there is a big potential of employment through this new activity. We estimate that about 100 direct jobs are linked for 10 000 customers. They also want to anchor

sustainable development in rural areas and this won't be possible unless the rural electrification programs are made with professional. The schools and training centers also expressed very high interest because they understand all the interest to rise in competence, to enhance a qualifying new sector of activity and to extend their activity and strengthen their attractiveness. The NGOs we are working with different consultants and equipment manufacturers also say that improving the capacity-building and training in that field would give them a clear framework to propose their own offering. Of course all the funders and investors for rural electrification program know that if there is a better qualification, they will secure their investments, they will have a better visibility on complementary support to consent, and they know that the part of this investment they need should be dedicated to this security of the project.

Next slide.

I will present you what the initiative we had through the impulse of the European Union. The European Union launched in the end of 2009 agenda for proposal concerning rural access to energy program and there was a part of this program which could be dedicated to training project. We decided to -- you see the logos of the different partners. Well finance, the European Union, you have the three logos of EDF, AMADER, and SDR, and 2iE.

The next slide you can see the partners of this project, the main partners. The duration is three years and we started in September 2011. We have to work until September 2014. We decided to focus on two pilot countries because otherwise it could have been a little bit too ambitious in which we have chosen Burkina Faso and Mali mainly for the reasons that these countries first are quite advanced in their rural electrification program and second because we knew particularly well the different entities and operators in these countries and we wanted to make sure that we could work quite efficiently and all ready with well identified partners. We have also several associates with the French agency for energy efficiency and environment, ADEME. We have an NGO which is the electrician [Indiscernible][0:26:43] and three rural electrification services companies who are very important because they are let's say the people to whom the project is dedicated to. We wanted to make sure that we have around the table people who are able to tell us this is useful for me or this is not really the priority for me. The support in each country is mainly given by the Ministry of Secondary and Higher Education and by the Ministry of Professional Training. This is in close cooperation of course with the Ministry of Energy but let me point out the fact that the Ministry of Energy is right -- or let's say the client or customer of this program and the ones who are really working with us and making the program possible and effective are the first two ministries I have talked about.

Next slide please.

Let's give the main characteristics of the project. First, the lead is really given to local actors and decision-makers. Of course EDF is, let's say, the pilot of this big project but we are really relying upon the local energy rural electrification agencies about the ministries, about the NGOs, and the operator. We are just more or less helping them to express their needs and to organize the project but we never interfere with what they tell us is priority for them. The second point is that this is a competence-based approach. We didn't want to apply a model made in Europe or elsewhere. We just want to understand and to identify and to prioritize the needs of the local people developing this access to energy programs and to enhance and complete the available offer not to substitute. The other point is that all the work on the curricula and content of training is giving priority to short and practical training because it is also a point we identified as the big necessity. It's not -- we don't need in a big majority engineers or highly-qualified people. The mass of the employees we need for this access to energy program is rather made by low qualification but very good trained people. The priority we are giving also is to training the teachers and the trainers themselves. Also it's a question of efficiency and it is for us very important to have locally the people when the project will be finished that the trainers are in place and well-trained to be able to give or deliver all the competencies needed. Then we give priority to long terms through contracting with the government bodies and avoiding as much as possible too limited and too punctual actions.

In the next slides you will see the four commitments we have taken with the European Union. The first one is the -- R is meaning results -- result number one to be achieved is to identify and to prioritize the needs meaning to make the inventory and to evaluate the existing offering. I will just develop this a little bit later. The second point is to create and to make a catalogue and to make it available to all the operators and agencies so that the offerings in capacity building and training programs are really accessible to everybody. Then, the result number three should be to carry out test training and to implement the education process on the work we are doing. The fourth point is to disseminate and to replicate the action in all countries in Western Africa first, but also even in other part of Africa or maybe as far in the world. Well, then, in the next slide -- okay.

So, first point, identify and prioritize the training requirement. It may sound silly, but when we started the project, we noticed that nobody knows exactly what are the different jobs and capacities needed to be a good operator in rural electrification or to be a good legislator in rural electrification or what has been done previously was rather, let's say, pragmatic and well, step by step, but nobody had really identified and made a list, let's say, of what should be implemented as the kind of jobs to perform in rural electrification. So, we have specified all these capacity needs and skills. We have done this with the operators, with the rural electrification agencies, and with all the professional sector concerned by this activity and then we have established a kind of description. You can see that in the next slide.

You can see a kind of -- sorry, it's in French, but for this kind of paper, we can exactly know what is the job function and what are the competencies required, and of course, it's very helpful who is -- the people who are interested for example by joining rural electrification activity. What kind of jobs they could take or make and to do this, what kind of qualification they should obtain.

In the next slide, you have the big functions. We identified three types of functions and jobs and we have described them. They correspond to the main functions required to operate rural electrification. It is more or less exhaustive -- as you know, it's not a very very wide range of capacities that are needed. We identified a scope of functions for the generation activity, then for also distribution activity, and for management and support to the management and this is organized in four skills families that we have selected depending on the type of electrification. We have sites electrified by diesel generators and I must say that in Africa, it still a big majority of them. We have sites electrified by NGV duos solar kit, sites powered by hybrid systems, diesel and solar in most cases and this part is really growing very very fast. We have also interconnected sites, which are quite remote from the national grid, but which have already -- nevertheless connected and it is another approach, which we have to take in consideration. We also have identified future skills required for adapting technical innovations for example with biomass and biofuel increasing. So, we have anticipated this and already described different kinds of jobs that should be related to this and also in order to prepare to these different kits. So, with this kind of maps, let's say of the -- what does it mean being active and being operator in rural electrification? We have now a good orientation and the good possibility to explain to people in which categories they could get the job or to which kind of competencies they should develop exactly.

Next slide, corresponding to this need and to this job, we had to identify who is able to deliver this capacity building and training or professional training. So, I would like to repeat that we aimed at working with existing schools and institutions and enhancing those competencies, not at creating new schools. First, because we are not sure that it would have been -- what's that -- enabled. We would have needed more money, which was not -- and more time, which was not compatible with the duration of the project, but we also are aware that all these technical schools existing in the different countries could be adapted in response to the jobs we have -- to the needs of jobs we had identified. So, we have established a big -- let's say, a big documentation work and the documentation fact sheet has been established and sent by the ministries to the different schools and institutions to motivate their commitment.

You will see on the next slide that we have now -- these are the different formulas we've asked the schools to fill up. So, we have been able to create a catalogue in both countries, in Mali and Burkina Faso, but where

are -- which schools are able to deliver which kind of capacity building training, which could lead to a job in rural electrification?

In the next slide, we also wanted to adopt an evaluation methodology with an agreement with the active ministries concerned just to write the specification and also to work on the very concrete and operational ways with pilot institutions. What decided once more is we avoid all theoretical work. We want to work on the field and with the school and with the operators and that's why in Burkina Faso -- it will be done in Mali in the following next months, but in Burkina Faso, we have already selected six pilot institutions from different levels and in different regions and with these pilot institutions, we will train the trainers, we will see what kind of pedagogical tools and equipment they need, we will implement with them training sessions adapted to rural electrification, and we will elaborate also a public relation policy toward their families and local authorities because we have noticed that people are not really aware about the opportunities of jobs offered by this rural electrification program. So, we also have to communicate about this.

Maybe, I will go directly over the next slide because as you will get the slides, you will have the opportunity to see the different documents and working papers we have created. We have been able to launch in the mid of April the first paper catalogue of the schools existing. We have already registered thirty-two training centers in Burkina Faso and thirteen for Mali and we know that altogether, there are fifty-five training centers in Burkina Faso and thirty five in Mali. So, within -- until October, we should be able to complete our catalogue and to fulfill all the branches of different establishments and the different schools existing in both countries. As we are trained also to be a little bit modern, we have created a website. You'll see the address on the slides and you will be able, well, to connect if you wish and you will see all the rounds of data already gathered on this website.

Concerning next slide, the test training and the implementation of certification process, we have already been able to train -- to make training sessions during two hundred and sixty days in Burkina Faso for seventy trainees. Mainly, we started with maintenance of diesel generators with solar NPV and with management and administration, which is also very very important. Thinking about rural electrification, we automatically think about all the technical work, but we shouldn't underestimate the importance of being able of making a budget, having a commercial activity, making management of the different teams, and so on. It is really really crucial and the operators are very often needing help for this because it's even more difficult than the technical aspect for them. In our work, we systematically evaluate the training sessions directly at the end of the session and six months after just to make sure that what the people have learned is useful on field and so, we go and ask them and we -- it also helps us to improve the content of our own curricula. So, it's very very important for them and we do this systematically and we also have

contracted in Burkina Faso with SONABEL, which is the electricity utility and national electricity company in this country because we wanted to make of this SONABEL a regional center of excellence for rural electrification. So, it means that the national electricity company should be able and is already in several fields of activities and for the different kinds of jobs, it's already in a position to deliver a very good qualification and training program directly useful for rural electrification. We've also have contracted with the local NGO called "TIN TUA" in Burkina Faso. This NGO is operating for illiterate people and giving sessions in local languages and maybe, it will be -- maybe, we can discuss this in the debates, but it's also something -- we have discovered on the field how important it is to be able to deliver all the programs in local countries because not all people are able to speak French or English and we have to adapt to these people.

For the next slide, we have for initial training. My previous slide was on professional training. This one is on initial training. We have signed agreements with the Ministry of Higher Education in Burkina and also with the Ministry of Youth and Professional Training and Employment and with both them, we are working on curricula, which are really included in the national syllabus so that we are sure that it will be more or less forever. It will be updated, but we are sure that when we stop the project, it will remain in the national curricula and this is with the Ministry of Higher Education in Burkina. We have adapted CAP with CAP's low qualification for electrotechnique and we have adapted this to rural electrification for the ministry of vocational training, we have started. It was started this Monday of this week to create, from scratch, a training program specifically dedicated to rural electrification, which would operational in the beginning of next year.

So, next slide, maybe -- and even the next slide. Because of this, we can maybe come back to this during our discussion on the replication and dissemination of the project, but we -- I would like to point out some unexpected challenges to overcome because maybe I gave you the impression that all there is smooth and going very easily which is not always the case. I think we are thinking of [Inaudible][0:45:48], more precisely we are thinking about some difficulties and we would like to improve on this. First, insufficient available data on the offering on different countries. It's very, very difficult to obtain all the information. Second, necessity to adapt training to illiterate non-French speaking trainees. I've always mentioned this. Also, the capacity to quickly mobilize key actors. Just to summarize when we come back maybe next slide, I would like to say that we have not finished this project. We have just made half of it, but already I can tell you what could be disseminated and shared with different countries and different sorts of people interested by this or what has to be. Next please.

All the methodology and all the data are available and transportable without major investment. The skills/jobs identification, the evaluation

method of training institutions, the website; all of these exist and can be shared tomorrow with all the people interested in this project.

Next slide will show what is existing and would need to be adapted, but without giving a very big amount of effort and money. This is for example all the methodology involving the different actors, decision makers, and operators. All the agreements we have signed with the different governments, this is also a basis which could be adapted, but you don't have to recreate the real -- it would be really easy to adapt this.

Then the next side, what should be created so far and could not be really replicated. These, with all the identification country by country of the actors, the decision makers, the schools existing and so on, but once more, the methodology to identify all these and to create for example the catalogues and to complete the website, this is also very easy to -- we don't need to stop from zero.

As a conclusion, the slide would be and the final -- exactly, thank you -- would be just to -- if you remember, I have listed all the interests of all the different players and not benefits for all means also commitments for each. It means that we have to follow up. You will take time to read the slide maybe more precisely afterwards, but I think that we should think about how to improve the methodology and how everybody should commit to this kind of program, not always considering that it's given, it's for free, and we have to take the benefit from this, but we also have to be proactive to gain skills and to secure a sustainable and an efficient methodology for the benefiting countries, which are not only in Africa, once more. Thank you very much for your attention.

Vickie Healey: Thank you very much to Christine as well as Richenda for that excellent presentation. We'll now move on and Harald Schützeichel will be giving us his presentation from East Africa. Thanks, Harald.

Harald Schützeichel: Thank you Richenda and also Christine. It's a really very interesting presentation you made and it's huge what you are doing. Ours is a bit smaller, but I hope it's also interesting. The bulk of the company we have started with our work was Ethiopia, now we are working in Kenya and Philippines as well. We are working as a foundation together with companies because we think that donation money from our foundation should be used to initiate a local solar business. The best successful foundation is to become super flourished to say no longer need for a foundation. When we started, we found several nice pictures and this shows us why we really need to have training for technicians, not only the product information. At product information, you easily can get -- let's say you have a solar lantern, then you read the product manual and then you know what the lantern can do, but if you really think about sustainable energy supply, you need a good technician until you see what happens if the solar panels are not really properly mounted or what we also found very often is that everything is there, but

nothing is working because there's a conflict of interest between environmental protection and solar energy. Another thing we found is that sometimes, technicians think a panel is a panel and it doesn't matter which direction the cells are. Looking at what you mostly or very often can find is that there's an installation but you can be sure this doesn't look very long and it's not really healthy for the end user.

So, finally what we do in Ethiopia since 2004 and it's just one slide, but I think it's important for our understanding which type of planning we are doing. We installed up to now more than twenty thousand solar systems and we provide end-user financing. We have our own microfinance institution in Ethiopia, so we do end-user financing, but we are focused from first day on customer service, maintenance service and end-user training. That's why we established fourteen solar centers in rural areas. In each solar center, we have four or five solar technicians and one finance guy. This ensures that we are really close to our customers. We are now in around eighty three villages which we permanently support with energy. We installed light in schools and in health clinics. That's the standard program of an NGO.

With this approach, financing technology, training, and customer service, you have to think wholistic and it doesn't matter from which point you start, all points are connected. Today, we are thinking about our training institute, which is called International Solar Energy Institute. So, if you think about training, then you also have to think what's after the training. If you train technicians, then they are hopeless or frustrated if they have no chance to get a job or to start their own business. That's why we train only if we can provide -- start-up financing and start-up support for the technicians we train. So finance is immediately included for the time after the training. Also, you need a technology which is not cheap, but has to be risk-free and is doable. You need to ensure that your technicians and your engineers are really customer oriented, which is sometimes for technicians a challenge because they are more technology oriented. So, we have to think about your customer's need, what they need. Last but not least, you have to do a proper management of your overall activity.

The training part in our network started in 2007 as a department of our Ethiopian Stiftung Solarenergie - Solar Energy Foundation. We are focused on vocational training. We are not interested and not focused on university level. That's not a coach and a work which we don't want. We want to train technicians who are interested to go in rural areas, stay there, and install solar systems. Our main course is a course which is called Rural Solar Energy Technician. It consists of three modules, which are solar technology, of course that's clear. It's a six-week theory course. Then also management. It's also theory for six weeks and this does mean the bookkeeping, how to manage a small enterprise, what about end-user training, what about thinking for end-user service or how to manage end-user finance. This is thought for solar business in rural areas very important that you are also informed about the management. Then after

this, we do a practical training in our work, in our own network and this takes about three months. So totally, this training has duration of six months, which is very, very long, of course, but after these six months, you have really like-minded and engaged technicians. We find these students in TVETs which are vocational training institutes in Ethiopia. We don't do a basic training in electricity, that's why you have to pass an entrance exam on three topics. One is you have to solve some questions or answer some questions about electronics and electricity to show that you have the skills. Second, you need to know computer because that's important to manage your business. The third is you need to speak English because a lot of manuals and training books are in English writing. After two years' practice and experience, we designed a curriculum which is about one thousand pages and when I say "we" I don't mean our Ethiopian engineers and trainers because these are the experts, the Ethiopians, no white-collared guy or woman is there. It's a training from Ethiopia for Ethiopians and the curriculum is written by our Ethiopian trainers. It's approved by the Ethiopian ministry of education as an official training course and up to now, sixty four Ethiopian students passed this training course.

What, we found out, that's the next slide, solar technician -- or let's say it like this. I'm a man, so I'm mutual and I have to say that the most reliable technicians are the female technicians. The women. Here' you can see two of our solar technicians, who are Mena Hainemaikel, she worked since 2004 and now has a leader management position in our organization. The other one is Haregowoin Amare. She joined our work in 2008 and is now the leading manager for product assembling and quality check. It shows that this is really a job which can be done easily also for women and women have special skills, I guess special for the customer training, customer service, customer maintenance, which is really very, very important.

We are now raising funds to prepare "light version" of our training course because six months is very long and if you go to other countries, then you cannot do a six-month training. The "light version" still includes solar technology and the management. The idea is to have a two-week training in Ethiopia in our area, in our practical work together with our Ethiopian trainers then start the training manual, then one or two Ethiopian trainer is travelling to your area, to your home area, to give you a "start-up-support" that you can start your solar business in your own country. After this of course, there's a time I let the networking and coaching by our Ethiopian experts. Just one slide about what we did as well, we did in the past six years also some train, the trainer courses for other organizations or for other countries. We arranged the course for lecturers of Ethiopian universities, because the universities and the professors and teachers they are very theoretically-oriented and they wanted to know if the theory and the facts are close together or not, so we did information training, what is needed and how solar energy can work in rural areas. We did also several awareness creation for governmental offices. The government offices

that's one experience, I think not only in Ethiopia, they need better understanding about solar technology and I think this is not only the government offices to reach their goals, but also custom. For example, if a custom officer doesn't know what is the solar system you can have several problems by importing the products. We did also courses for Ethiopian Micro Finance Institutions, both about the technology and our experience about [Indiscernible][1:02:37] financing which we are doing since 2006 and yeah some technicians from Kenya, Philippines, Tanzania, and Malawi are already were in Ethiopia and they got a training course, all in all would be trained about four-hundred fifty students participants. Our equipment in Ethiopia are three entities. One, is -- this is our main training area, this is a solar center in Rema which is far away from Addis Ababa. There's a school room and accommodation for twenty-five students because we think if we provide a training about rural electrification then we shouldn't do this in Addis Ababa in the main capital city. So, we should go to rural areas and train the students in these rural areas. We have additionally some training facilities in Addis Ababa because sometimes you only have three days because you invite governmental officers and then it's not possible to bring them to rural areas because they won't go. That's why we also have a small training facility in Addis and we have a high quality test laboratory for panel, batteries, lightings, so we can really show or explain how to test, how to measure, how to ensure the quality of product.

As I said, the main training facility is in Rema. Rema is a village of about ten thousand to twelve thousand inhabitants and they got solar energy in 2005. They refused to get a diesel generator from another NGO and then we will ask if we can install in every household a solar system and we did it together with support of Good Energies Foundation in Switzerland. That's our main area where we can test, where we can train students, where we can test product because these people know solar energy and they are very happy about the system. First of all because it's still running after seven years, all systems are still running and that's why we are focused on what happens after, what happens after installation -- we have to think about length in service, what happens about after, what happens about students, or what happens after the training. We have to think about start of investment. So, every time if you're doing something, you have to think what happens after. On the right side down you see our installer area and there will come another picture, but first a picture about a landscape and then you really can see that this is very exciting, but very rural as well and our technicians who are coming from other areas or from Addis Ababa or bigger cities, when they arrive in Rema they are crying because they say 'We are far away from everything. It's so rural. We can do nothing and what are we doing here?' So, they're crying and get homesick. If they go back after six months, they are crying again because now they are a community, they are together, they feel close to these people from Rema, that's why in our experience, the training is not only about the teacher tells the student, its also -- especially in Rema what inhabitants tell the students, what they need and how to interact between

the customer and our students is -- so they are crying again because now they are separated and they have to go in several rural solar centers.

The next picture shows just a picture of all our Ethiopian technicians which we trained and which are now working in several solar centers. They published a small book in 2009, a training handbook for rural solar energy. Its part of our training course, but this is mainly about the technology, its not that much about the -- and choose a service and choose a finance which should be handbook we are, but preparing now in the next step. So, that's what I wanted to say about our work and our experience in Ethiopia. The main thing for me is, if you do a training, you have think about what you will do after the training and how you can ensure that the students have a job, that they can start their own solar business and also if you start a training please consider and keep in mind that solar technology is not everything. You need to train also customer service and choose a training, and thinking how I can serve customers not only what's the best technology or what's the best technical solution. Thank you very much.

Vickie Healey

Hello everyone this is Vickie Healey again and I just want to thank Christine, Harald, and Richenda for these outstanding presentations. They were very interesting and we've had a lot of nice comments from the audience stating that they are very pleased with the presentation and the quality, so thank you very much. With that we've reached our time for questions and answers, so I encourage the audience if you have questions for any of our panelist to just type those question into the question [Indiscernible][1:09:29] function and I'll be happy to present your questions to Harald, Christine, and Richenda. But based on that I do have a question that came in specifically for you Christine and you may have addressed this in one of your later slides, but can you share with us where the training materials could be found related to the solar-diesel hybrid system.

Christine Heuraux

Just to make sure, the question is whether we have already some materials for the hybrid system capacity building?

Vickie Healey

Where they can find the hybrid.

Christine Heuraux

For now, we are developing all this. You may have seen that among the partners of the project, there is the engineer school called 2iE which is based in Ouagadougou and they are conducting a project on the hybrid systems, also with the financing of the European Union and we are developing this with them. Let's say it's on process. It doesn't -- we have by EDF also existing materials on this and we are working on the adaptation for the need of these countries. We are working with this also very in close cooperation with AMADER, the rural electrification agency of Mali, is now seeing that they developed -- until now their access to energy program mainly with diesel generator and due to the strong climbing of the prices of fuel in the last months and they don't expect these trends to be different in the next year. They are going to commute

very rapidly and strongly to hybrid system. They will need absolutely to have very efficient and very rapidly programs on hybrid system. Just give us a little -- a few months more. We intend to develop this and to test to make the first testing session this autumn, let's say in September or October.

R. Van Leeuwen This is Richenda just to add that maybe we can also do -- as they develop that, we can do a followup Webinar to be able to share those training materials when they are produced.

Christine Heuraux As soon as we have already tested and evaluated a curricula we will load them on the website where you have seen the address on one of the slide -- you will get the address very easily.

Vickie Healey Great, thank you, and Richenda I love the idea of having a followup Webinar once the materials are produced so thank you for offering that and we'll talk offline about that later, but I think that's a terrific idea. Let's see, a second question comes in from a representative from the Observer Research Foundation in Mumbai. The question is they would like to know if there are any plans in the pipeline so to speak to conduct such training programs with partners in India.

Christine Heuraux Well very good and interesting question. I have not mentioned and so you give me the opportunity to tell this now, that we have found a partnership, a MOU with the World Bank to disseminate and replicate this project in other part of the world and so it will be -- we have to organize the list of the countries where it would make sense and where it would be possible to replicate this project and thank you we speak about India. It's really a project we have to think about and if Indian partners think that it could make sense, I think we would be happy to contribute.

Vickie Healey Terrific, thank you Christine. Harald, this next question is for you, regarding the Ethiopian case and the question is what is the cause of the solar kit and how much does it represent on customer monthly income and how long is the average finance. So, that's really three questions in one and I'm happy to repeat if you like.

Harald Schützeichel The solar system we are using is not the cheapest one because we think that customer should get a risk-free installable product. Unfortunately the quality is not cheap, so our system in Ethiopia what we are also selling in Kenya and Philippines, is about two hundred US dollar FOB and this includes -- for starter, it's a four LED, lights, mobile charging, and a car charger connection to connect to other things. The LEDs have a very good brightness of about a hundred twenty lumen, but only one watt power consumption. So, what we do is we check the household and the income of the household and see if that's a household which could afford this. They have to pay twenty-five percent at the time of installation and then the period for the loan is up to three years. Up to three years. Mainly, the end-users choose a loan for one year, then it's already repaid.

Vickie Healey That's great. Thank you so much. I'm receiving questions very quickly here. So I would like to take a moment to ask our panelists if we're not able to get to all of the questions that our attendees are asking, would you be open to allowing me to send you emails after the webinar to address some of these questions that we might not be able to get due to our time constraint?

Harald Schützeichel Yeah, of course. Of course.

Vickie Healey Okay. Thank you. Let's see here. The next question is regarding the electrification technology you're using. Your presentation states that you're using solar PV for electrification. But are you considering other technologies such as solar thermal candling system and/or wind system?

Harald Schützeichel For whom is it? For me?

Vickie Healey I think that could be for both of you actually to address the technology used.

Harald Schützeichel Ladies first.

Christine Heuraux Oh thank you. [Laughter] So, the answer is yes, but as you can guess, there is a huge work to do and so we are starting with the most urgent and what is already needed and used on field. So we don't exclude anything and we will be very happy to work on wind and to mini hydro and so on, but as it is not yet given in the two countries and it's not the technologies used in the two pilot countries we are working with, Mali and Burkina, we'll set this up for a little bit later, but of course, it will be part of the project. Of course, any opportunity of working with countries where these technologies or other technologies are used would be a good motivation for us and a very good opportunity to think about elaborating the corresponding curricula.

Harald Schützeichel My answer is very simple. No. We are focused on solar energy. So we are not experienced in water, wind, or whatever and we would like to focus on solar because this technology, to make it sustainable and doable and to do a good customer service for this technology, is challenging enough for our small power.

Vickie Healey Great. Thank you both.

R. Van Leeuwen I'm sorry. If I can just answer it, this is Richenda for the larger broader practitioner network. We work with all approaches and technology. So, as we also discover other curricula that may be ready and used in other parts of the world that relates specifically to wind or small hydro, we will be sharing those more broadly with the practitioner work.

Vickie Healey Great. Excellent. Thank you Richenda. That's very good to know and share. Our next question is again for you Harald regarding microfinance institutions in Ethiopia. The question is: Are there any microfinance

institutions in Ethiopia or finance PV system beyond your our microfinance and if there are not, do you know why that is?

Harald Schützeichel If you speak about Ethiopia, you speak about a very interesting country and microfinancing in Ethiopia is a challenge by itself because this country is not really democratic. So, the few microfinance institutions which are in Ethiopia mainly are driven controlled, heavily controlled, by the government. So far, they don't have that much hard currency that they can do a significant job in the solar sector. Some of them are interested but then there's a lack of finance. What we found in Kenya and Philippines is that MFIs mostly are focused on lanterns still, which is a good start but not enough because what we see in both countries, Kenya and Philippines, and also in Ethiopia is that the customer needs energy, power, TV, switches; solar home systems, and it would be great if MFIs start now to think more and more in these products as well. The challenge is it needs more working capital then I guess that's why mostly the MFIs are still focused on small lanterns.

Vickie Healey Alright. Thank you. Thank you Harald for that great answer. Christine, the next question is for you. The question is: Could you tell us how do you go about looking at the issue of what comes after issues related to work opportunity of trainees, use of skills, retention in rural areas and operators? There is also the issue of relevant institutions in the available environment. So considering those examples of issues, what do you see beyond working in that sort of environment?

Christine Heuraux I am not so sure to understand the...

Vickie Healey The question.

Christine Heuraux ...the main...

Vickie Healey The main question? I think what the requester is asking is what comes after -- the trainees have developed the use of work skills. How do you retain these people that had been trained in the rural areas to continue to work on the systems?

Christine Heuraux Oh. Mm-hmm.

Vickie Healey Things to that.

Christine Heuraux Okay. What we intend to do and this is the main objective of the work we are starting with the pilot schools we have selected for example. We will not only work with the school as they are. We are going to make very close partnerships between these schools and the local operators of our electrification and just to come back to the very good point said by Harald about you don't have only to train people; you have to make sure that afterwards, they are able to make a job out of it. So, it's exactly what we intend to do with partnership between the operators and the local, the rural schools so that for example, we open the station and the training station

for pupils who are then sure that they would get a job locally but to maybe also in other regions in other parts of the country if they want. One of the main -- one of the also objectives we have is that young people could stay in the village or in the rural areas with the real perspective of developing the activities, of getting a good job and of acting also social promotion. So that's one. Also, I mentioned the program we will be starting, the public relation and external communication towards the families, towards local refugees and the respond people who are in charge of the communities because we also have to give information about what is feasible or what is possible. So it's not only training people. I think it's very close to what Harold mentioned in his presentation. It's also working on all the environment of this training and when we selected the six schools in Burkina, one of the criteria was to be sure that in these areas, the rural electrification policy of the government is progressing quite well and that they are all ready as a priority zone of extension of the program because then we can be sure that this will create a good -- this will boost let's say the demand for qualification and qualified people. Little by little, when the program will be extended to the other parts of the other regions separate from Burkina, we will progress with the schools exactly the same way. The same for Mali, where as I told previously, now we know that they will switch to the hybrid systems. So, we will first focus on the schools which are close to the region while the [Indiscernible][1:26:23] will implement hybrid system so that we know that the people that will be trained with these new technologies are automatically able to use their new qualification. So it's not only the training in itself. That's how I now understand the question. It corresponds to the question. It's working also with and for an environment of this training session.

Vickie Healey

Okay. Thank you so much, Christine. Again, we have many more questions than we have time to answer and we're coming down to the last few minutes of our webinar. So to those of you who did some questions in, but we don't have time to answer, I will make sure to send these out to our panelists so they can respond to you through email. So again, apologies for not able to accommodate everyone on the phone, but we will make sure your questions are answered. So with that, I think we can now move on to our short survey and just to let you all know that we just want to ask you a little bit about -- just three short questions on how we did because your feedback is very important to us to allow us to continue to improve our webinar series and presentations to you. So the first question if you'll just take a couple of sec -- we'll take a couple of seconds to allow you time to answer is: Was the webinar content provided to you -- was it useful information and provided to you with insight? You can just click on the little radio buttons next to the answers.

Vickie Healey

Okay. Oops. Thank you. Next question: The Webinar's presenter was effective.

Vickie Healey

Okay. Next question please.

Vickie Healey

And our third and final question: Overall, the Webinar met your expectations.

Vickie Healey

Great. Thank you to everyone who participated on our survey. We very much appreciate that. So with that to wrap up, on behalf of the Clean Energy Solutions Center, I'd like to extend a very hearty thank you to Richenda, Christine, and Harald for sharing their knowledge and expertise with us today. You've been outstanding panelists and I can't thank you enough for presenting to our audience. I'd also like to say thank you to our attendees for participating in today's Webinar. You've been a great audience. We very much appreciate your time and you have submitted some really terrific questions. I absolutely appreciate all of those. I invite you all to check back to the Solutions Center website over the next few weeks if you like to view the slides and also listen to a recording, an audio recording of today's presentation. You can also view and listen to previously held webinars. Additionally, you'll find information on upcoming webinars and other training events and we also invite you again to inform your colleagues and those in your network about the Solutions Center Resources and Services including the no-cost policy support that I mentioned in my opening briefing.

So with that, I wish you all to have a great rest of your day and we hope to see you again at future Clean Energy Solutions Center events. This concludes our webinar.