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ASSISTING COUNTRIES WITH CLEAN ENERGY POLICY

The Current State of Energy Access in India

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Speaker

Sean

Hello everyone. I'm Sean Esterly with the National Renewable Energy Laboratory, and welcome to today's webinar, which is hosted by the Clean Energy Solutions Center in partnership with the United Nations Foundation's Energy Access Practitioner Network. Today's webinar is focused on The Current State of Energy Access in India.

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

Before we begin, I just want to explain 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 go to the audio pane and select the "mic and speakers" option in the audio pane. Doing so we will eliminate the possibility of feedback and echo. If you choose to dial in by phone please also go to the audio pane and select the telephone option and a box on the right side will display the telephone number and audio PIN that you can use to dial in. Panelists just a reminder to please mute yourselves any time while you are not presenting. If anyone is having technical difficulties with the webinar, you may contact the GoToWebinar's Help Desk at the number displayed at the bottom of the slide. That number is 888.259.3826 and they can help you out there.

We do encourage anyone from the audience to ask questions at any point during the webinar. We do keep the attendees on mute so to ask a question of the panelists simply type it into the "Questions" pane and submit it there. Those questions will be presented to the presenters during the Question and Answer session. If you are having difficulty viewing the materials through the webinar portal, we will be posting very shortly PDF copies of the presentations at cleanenergysolutions.org/training. Probably in about a couple hours those will be up there. You can follow along as speakers present. Also, an audio recording of the presentations will be posted to the Solutions Center training page within about a week of today's broadcast and we are also adding recordings to the Solutions Center YouTube channel where you will find other informative webinars, as well as video interviews with thought leaders on clean energy policy topics.

Today's webinar agenda is centered around the presentations from our guest panelists, Mr. Harish Hande, Ms. Gauri Singh, and Mr. Ashis Kumar Sahu. These panelists have been kind enough to join us to explore the residual energy access issues in India by highlighting the current government's efforts to bring modern energy services to the significant Indian population still lacking continuous and reliable access, as well as efforts underway by practitioners to assist in scaling energy access in India via decentralized solutions.

Now before our speakers begin their presentations, I'll provide a short informative overview of the Clean Energy Solutions Center initiative. Then following the presentations is when we'll have the Question and Answer session where panelists will address any submitted by the audience, followed closing remarks and then a very brief survey.

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

The Solutions Center has four primary goals. The first goal is to serve as a clearinghouse of clean energy policy resources. Second is to share policy best practices, data, and analysis tools specific to clean energy policies and programs. And, third is to deliver dynamic services that enable expert assistance, learning, and peer to peer sharing of experiences. nd then lastly, the Center fosters dialogue on emerging policy issues and innovation from 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 that the Solutions Center provides is the no-cost expert policy assistance known as “Ask-an-Expert”. The Ask an Expert program has established a broad team of over 30 experts from around the globe who are each available to provide remote policy advice and analysis to all countries at no cost. For example, in the area of rural electrification we are very pleased to have Ibrahim H. Rehman, Director of the Social Transformation Division at The Energy and Resources Institute, also known as TERI, serving as one of our experts. If you have a need for policy assistance in rural electrification, or any other clean energy sector, we do encourage you to use this valuable service. Again, it's provided to you at no charge. If you have a question for our experts please feel free to submit it through our simple online form at cleanenergysolutions.org/expert, or to find out how the Ask-an-Expert service can benefit your work please contact me, Sean Esterly, directly at sean.esterly@nrel.gov. That's displayed on the slide that you're now viewing or you can give me a call at the number displayed. That number is 303.384.7436. We also invite you to spread the word about this service to those in your networks and organizations.

Now, I’d like to provide brief introductions for today’s speakers. Our first speaker that we'll be hearing from is Richenda Van Leeuwen, Executive Director of the UN Foundation's Energy Access Practitioner Network, a 2,000-strong global network of businesses and non-profits catalyzing primarily market-led decentralized solutions for energy access. After Richenda we will hear from Mr. Harish Hande, Co-Founder of Selco. Doctor Hande earned his doctorate in energy engineering with a solar specialty form the University of Massachusetts Lowell and has an undergraduate degree in energy engineering from the Indian Institute of Technology.

Our third speaker today is Ms. Gauri Singh, Commissioner of Renewable Energy for Madhya Pradesh. Gauri Singh is a career bureaucrat with over 27 years of experience. She has designed and implemented large innovative poverty alleviation programs based on livelihood interventions and has also been the Director, Country Support and Partnerships at The International Renewable Energy Agency known as IRENA. And then our final speaker today is Mr. Ashis Kumar Sahu. Mr. Ashis brings nearly two decades of management experience in diverse sectors, such as sustainable energy, entrepreneurship, development, livelihood management, and microfinance, and has previously worked in SELCO, BASIX, RCDC, Oxfam, Umul Trust, and NALCO. And with those introductions I would now like to welcome Richenda Van Leeuwen to the webinar.

Richenda Thank you very much Sean and good morning or good evening from India. Before we get going I'd also like to say that you can follow the webinar on Twitter either through our Twitter handle @EnergyaccessPN or by using #PNwebinar as well. Next slide please.

For those who are joining us for the first time I would like to give a little bit of background to our work on decentralized energy. The UN Foundation is very closely working with the United Nations Sustainable Energy for All initiative, which is really focusing on three global goals by 2030, including

ensuring universal access to energy services, doubling the global rate of improvement in energy efficiency, and doubling the share of renewable energy in the global energy mix. When we talk about ensuring energy access to modern energy services we're looking at a range of energy interventions including access to the benefits from powering basic electricity as well as improved cooking solutions, heating solutions and others that we will be hearing about a little bit more later in the webinar.

The UN General Assembly Member States have unanimously declared 2014-24 as the Decade of Sustainable Energy for All. Sustainable Energy for All is also one of the proposed new sustainable development goals, which will be adopted later this year. For the first time we're actually seeing that energy is going to be formally recognized and incorporated into our global development metrics moving forward. Next slide please.

The Energy Access Practitioner Network, again, for those of you who are new to us, was formed in 2011 as a way to help focus attention on the need for decentralized energy services as part of the suite of solutions for helping us to move towards universal access to modern energy by 2030. Over the last four years we have grown significantly to more than 2,000 members. Collectively, over the years, we have reached 230 million people. Last year they reached 21 million people just in 2014 alone and, as Sean had mentioned in brief, we have a particular focus on market based solutions both in terms of mini-grids as well as completely decentralized solutions and really focusing on energy service delivery at the country level, looking at the need for new technologies, innovative financial and business models, and also serving to help support the kind of connections, partnerships, best practices, and peer to peer learning that can only really come by bringing together those who are delivering energy services at the local level. Again, we'll be hearing from Harish and Ashis and a little bit more about that later in the webinar. Next slide please.

In India we've been focusing on India since we formed the network back in 2011. In fact, Harish Hande from SELCO and SELCO were one of our founding members in the network back in 2011. Why are we doing that? Because India, in terms of a single country, still has the greatest number of people who do not have access to even basic electricity. Then, of course unfortunately, there're also questions around grid stability and, even for those where there is a grid line, it doesn't necessarily mean that they have stable power available through that grid line as well. The international energy agency globally modeled that they expect that decentralized energy solutions of some type will be the pathway to energy access for up to 60% of the 1.2 billion people globally still who don't have access to electricity. Again, for those of you who work in this sector directly then you will know that one of the reasons that we focused particularly also on decentralized energy solutions is the ability to respond flexibly, quickly, and sustainably to the needs of local communities and local customers in their particular context. Again, I'm sure that Harish will be talking a little bit about specific energy services tailored and targeted for livelihood support for education and for better health outcomes as well. Next slide please.

Today we have 440 members in the network who report operating in India, about 130 of which are based in the country, and then we also have very strong support from Indian practitioners who are also delivering energy services in other parts of the world as well. There's a very small south component in the network and we see that the expertise and solutions from India are also very much helping to solve the energy access issue in other parts of the world as well.

We are technology agnostic in the network so there is a range of solution types offered by members. Solar PV certainly is probably the most highly used within the network but we also look at very small-scale solar lanterns all the way to large renewable mini-grids. There's biomass. There's small hydro. There are solar powered water pumps for irrigation and then a very strong focus on tailored solutions for different types of livelihood as well. In India our membership runs from Rajasthan in the northwest all the way to Manipur in the east, as well as strong engagement with southern India as well. We've been working over the last several years to help support the development of an Indian network for the decentralized energy community and we're delighted that Ashis Kumar is joining us today to talk about the newly launched Clean Energy Access Network in India where UN Foundation and the Practitioner Network are founding partners. We've really been working to help support that effort. Next slide please.

There's a great deal of innovation right now in the decentralized energy sector in India. I want to touch very briefly on some of the companies that we are seeing coming up in terms of different approaches by companies such as Boond, Frontier Markets, and Onergy that are focusing on solar pico-grids. Frontier Markets is focusing on really developing local entrepreneurs in Rajasthan and really helping to focus on the sustainability and the after-sales service for clean energy products. Onergy is focusing specifically on renewable energy centers across a wide range of products. Next slide please.

Mera Gao Power in Uttar Pradesh is focusing on very much a low cost microgrid that's providing a range of different energy services to its consumers. Then a couple of others, Naturetech Infra and also Simpler Network are also focusing on pre-payment and really trying to drive down the costs in their particular solutions. With Naturetech it's microgrids. With Simpler it's smaller PV systems. Then others, like OMC Power, are also working on micro-power plants and particularly working very closely with the Rockefeller Foundation's Speed Initiative, which is really looking at scaling up a range of mobile networks and hugs as anchor loads for potential inclusion as small-scale minigrids as well. We're seeing a lot of diversity, a lot of innovation, and we're also really looking at how we can best serve and support the development of a sustainable market in terms of the different entrepreneurs who are working there. We hear very very clearly from these entrepreneurs that access to finance in the right entrances at the right time, in the right levels remains a challenge within the sector as well as some of the policy constraints that others will be talking about on the webinar. I will stop here and just say thank you also to Ashis, Gauri, and Harish particularly for your insights and your presentations this morning. Back over to you.

Sean Thank you Richenda and we'll move along now to Mr. Harish's presentation.

Harish Hi, hi and good afternoon whichever part of the world you're in. Thanks Richenda for that excellent presentation, which I will take as the next step. Just to give a brief, we all know that most of the energy power lies in a country like India and we believe that India also is a macro of some of the world's problems, though also could be a center for solutions in the energy access area. That's why the criticality of whatever solutions that actually come out from different parts of India could easily be replicated in other parts of the world for the 2 1/2 billion people that are in that zone of energy power. We believe that once you talk about energy access and using sustainable energy as a catalyst it actually serves two purposes. Not only it provides the power for energy poverty but we also believe that overall it has a wonderful linkage to poverty, direction of poverty, overall. That is a very very strong statement and catalyst because where else, what else, can have a linkage from having people get out of poverty without actually harming the environment, because the overall discussion today is we have to sacrifice the environment for the development to take place. We have proven by many of the organizations that actually work in the space of energy access that's actually not true. In fact, many of these models have proven exactly the opposite that you can use the environment, in fact, to reduce poverty in many ways. Just to give an example, if you look at the pyramid and especially what people call the bottom of the pyramid, and people paintbrush it as poor. We categorize them into three sectors. There's poor, very poor, and abject poverty. Each of them has different solutions, have different problems with different solutions. For example, you can come up with various financial and technology models for the lighting space in the bucket of poor. When you have to look at very poor and abject poverty one has to link sustainable energy through livelihoods, which is very critical for them to move up the ladder. There are numerous models in the country that actually can show like, for example, if one is able to create a very good solar powered sewing machine, with good market linkages, the people who are in the bracket of very poor and abject poverty there's a direct linkage to sustainable energy and livelihood. This is what we can actually do today. We don't need to wait for five years for any other methodologies of electrical supply. Even if it comes today it's been designed in a way that, okay, the poor would actually have X number of units so you have to put in Y kilometers of wire of electricity of bolts and wire and centralized grid. On top of it you would have, because of supply and demand would never match the erratically and unreliability of electricity, will lead to loss of livelihood of many of the poor. Do you believe that today you can actually design, customize, it to every bracket to how many you can utilize? If somebody has to use a sewing machine, and that's what the capacity and that's what the market engages, one can actually do it.

In the other cases we've also seen in many of the schools when people talk about lack of energy or electricity for education, one could provide the education. We have done, for example, in the last one year itself. We've been able to provide more than 250 schools with field education. What we do is we have a very high efficient projector that uses solar power, uses less than 12 watts, has a USB and a wireless phone with class content for 8th, 9th, 10th

and that's right at the doorstep of the school. Where we did not worry—two things. We need not worry about the unreliability of electricity and we also need not worry about the quality of content. That's the whole beauty of sustainable energy. It pushes people, pushes institutions two rungs in the social ladder. Sustainable energy does not cater to one side, for example, lighting but it pushes people, lighting and education, together. The same way you can actually talk in the health sector, you can talk about the lighting sector and in the livelihood sector.

The other perspective that I would like to bring in is when we talk about sustainable energy we keep on hearing as Selco, a 20 year old organization that started in 1995, we have served more than 235,000 households, and more than 5,000 institutions in south India, we have heard that sustainable energy can be expensive for the poor. Mainly, over time, what has happened is 80% of our work has actually gone into financial innovation. What we mean by financial innovation, especially because most of the poor are coming into the informal sector and many of the informals are not people who are like many of us on the webinar or a priority, on a monthly basis. Their cash flow could be, like for example, a tree trimmer or laborer, would be on a daily basis, a patty farmer on a yearly basis, a rural doctor twice a month or it could be a schoolteacher who earns on a monthly basis. The beauty of having is how do we clear financials that match just the cash flow of these different segments and that is where sustainable energy "becomes affordable". It's not through capital subsidies. It's not through discounts. It's through these innovations that will actually have—today when people talk, what is a bad area of sustainable energy? Actually getting rapidly into many parts of India is that we have not looked properly at the needs of the poor. When we have not been able to activate the new technology, sometimes it's a financial lead, sometimes it's a marketing lead, and sometimes it's a business modeling. If we have not been able to create appropriate solutions, holistic, and at their doorstep, the scalability of what we all talk about will not happen. There are multiple solutions to make that happen is how do we reach out to the schools who are at the grassroots of where the problem actually lies? The holistic thinking in the education systems that lead to students being or the potential entrepreneurs of the future or the policy makers actually being more innovative, because this is the sector that hardly any of them have experience about in implementation, we need to come up with different business models, technology models, financial models to make that happen. That's been the focus of an organization, like Selco, for the last 20 years is reach out to that gap. It could be a technology gap in terms of having high-efficient livelihood appliances like solar lighting systems or sewing machines. It could be a financial gap that many of the rural banks are not able to bridge, like how do you push the rural banks to wire a guarantee mechanism to reduce interest rates for the poor so that they can actually own an asset like a solar lighting system or a solar sewing machine. It could be a market linkage where you have quite a bit of the poor communities having a multiple of sewing centers and they're able to do a particular product, whether it is a sari or blankets, that there are markets who will buy it from them that will make the particular income generating product viable for them to actually earn a living. In other cases, who puts all this together with an effective business model? That, in

many of the cases, like in the poor sector, it could be financial, environmental, and socially sustainable.

In cases like health and education we effectively serve the larger good and there's another webinar to look at the group under the US Practitioner Network called the Social Protections Group. It looks at populations completely at one level, like the tribal people affected by climate change, people affected by natural calamities, where fully the financial sustainability of a market cannot be well defined, like for example, working on health issues in tribal, extremely poor tribal villages, who still work under the gamut on partner trading. One cannot define financial sustainability as you and me would define today and so I think there are various models and innovations that still have to be done and I would encourage the younger generation to actually step up a bit and come up with solutions rather than complaining and seeing that how these gaps and these 2 1/2 billion people that are across the south need to be done on a replication basis. Any institutions that are so called successful like Selco cannot scale up fast enough. We need numerous other models that one could go to the website and look at it but today we truly believe that the poor, if established, can be financially sustainable in many ways. For example, I would close my thoughts with one example of saying that we go into tribal communities in the north where these are slaves who were brought in by the Portuguese who earn less than $25 to $30 a month are able to afford $180 solar systems purely because a local bank was able to finance them and a guarantee was provided by us to reduce the risk of the bank, which provided a bank loan for five years. The cash flow was directly linked to the amount of money each of them spent on kerosene fuel. That was enough for them to buy an asset like solar loan—solar lighting, which would last more than 20 years. Today energy access has actually made poor as asset creators, not just simply consumers. That is what we call is the gamut of sustainable living that we talk about, sustainable business models that we're talking about, and sustainability of the Earth beyond. That's what we mean by energy access. With that I will hand over my—this one to the next speaker. Thanks for giving me this opportunity to speak.

Sean Thank you Harish. We will now move onto the next panelist, Ms. Gauri Singh.

Gauri Thank you Sean and good evening to all the participants of the webinar. Thank you very much for this opportunity. I will actually take the discussion forward from where Harish has stopped and in fact he's given a very good very good understanding of, you know the kind of policy framework we need to have to reach out and have the last connectivity. What I'd like to do is maybe start with some statistics, which will give an idea of the direction that Indian, national Indian, policy is going.

Rural electrification has been a key priority for the Government of India and there was in our earlier five-year plan a very ambitious program that had been launched for grid extension with the aim of getting the grid to all of the villages in India. Now, when you're looking at the kind of problem that the country faces, you are looking at least ensuring that there is grid connectivity

to all the villages. But, that actually did take care of the numerous habitations and the way villages in India live, you have a central habitation and then you have smaller habitations around it. When you're look at electrified villages then you're basically look at about 10% of the villages being connected to the grid and you're also looking at the venues of public service, which are the school, the community health center, and the panchayats, that's the local government office, being connected as well. What gets missed out are these outlying habitations that are around the village where the grid actually may not reach. With the fact that, you know, in the country anyway you are looking at peak shortages ranging between 4-10%, and depending on which month you're looking at, this does pose a huge problem in terms of, you know, looking at solutions that would enable at least access to electricity for basic lighting and a few other needs. Could I have the next slide please?

The strategy that the government has adopted has really been to look at all the habitations and intensify the grid extension to all habitations where you have a population above 100. The other added feature that has been added on from this year has been something that has actually done quite well for the state, a western Indian state, called Gujarat where the feeder separation actually led to a very judicious roistering of electricity supply. What that meant was that while for the agriculture load it got roistered into slabs during the day, but the domestic load, which basically was lighting load, did not get impacted because of the roistering. This is something that is now being looked at and is being encouraged at the national level, for which there is a lot of high-level support that the government of India is providing to all of the states, this along with strengthening the transmission and distribution network.

Now this has been something that the government has been very keen to do because of the kind of aspirations and the kind of preceding part grows there is desire for villages to have grid parity so this has been a pretty important strategy in terms of the overall frame. Can I have the next slide please?

So, when we're looking at how renewable energy comes into this whole piece, what has happened alongside a very major shift in the way the government is looking at the macro scale as to how renewable energy has to be part of the energy mix, of the complexity mix. You made a course that we started a national solar mission, which had anyway a very ambitious target of around 20,000 megawatts to 2022 but now the level of ambition of getting a large amount of capacity, renewable energy capacity, to supply renewable energy to the grid has been upscaled. Now the government is talking about 100,000 megawatts of solar energy and 60,000 of wind power into the grid along with 115,000 of the other biomass and small hydro, which basically gives you an idea of the scale of ambition of how the government at the national level is very keen to have additional capacity being generated from renewable, which is largely looking at the generations side of things. The decentralized and distributed generation has also been an important feature for the government policy where renewable energy for habitations where grid extension is not feasible so this could be villages, which are on a hill or you need to cross forests to reach those villages. Those are the kind of villages that have been identified for decentralized distributed renewables. The third important aspect

has been that the number of renewable energy based applications that have been developed that are being led by entrepreneurs, as Harish and Richenda both pointed out a large number of entrepreneurs who come into the scene. So, that is not, I would say, it's not the discussion. The level of discussion that needs to be there for encouraging entrepreneurs to create the space and to cover the target, which lies beyond these grid extended villages. I think the level of discussion needs to be enhanced and I think a team that has been formed is actually a good platform to engage with state governments, which is where the action is, and with the national government to get some interventions into the policymaking. Next slide please.

When you're looking at translating, translating the national target into an implementation plan, one really needs to be looking at states. The way the complexity as a topic gets discussed is in India is that this is a concurrent. This is on the concurrent list, which means that the government at both the national level and the government at the province and the state level are responsible for taking the targets over. So the national government sets up a national strategy and larger targets and supports the provinces and states like Madhya Pradesh, where I'm talking, to take forward this whole strategy and convert it into an implementation plan. As I mentioned, there has been a huge trust on grid extension, which has led to a large number of villages in Madhya Pradesh being electrified. The percentage of electrified villages is nearly 95%. There has also been a feeder separation that has led to a much better supply to the rural domestic consumer. Madhya Pradesh also has a very large tribal population and the way the tribal populations and the habitations are placed you have a central village and you might have the population of that village living around 22 to 25 small habitations, which could be as far as 5 to 6 kilometers to the main habitation. This is a fit case to look at how good the large targets and how the national strategy that is getting implemented through grid extension and feeder separation combines good, active policy on how renewable energy applications can actually meet the need of these kind of habitations that will never get the grid. Madhya Pradesh also is a very strong agrarian pathway, very strong agrarian economy and being on a plateau the water levels are quite low and this is also—I mean, there is a huge demand for pumping of water, you know, and pumping of water along with looking at how solutions around drip and sprinklers can get, actually, put together. This is something that for a huge opportunity for solutions coming from renewable energy, which can offer model solutions. Next slide please. So the whole discussion at the level of state like Madhya Pradesh is how do you—Can I have the next slide please?

How do you actually create the conditions whereby, on the one hand, you encourage independent power producers to come in with grid connected renewable energy, but on the other hand you also create enabling conditions for micro grid operators and entrepreneurs and entrepreneurs that are giving solutions for livelihood options.

One of the things that I must add here is alongside this whole space of trying to provide, to get, energy access, is a lot of inventions that are being done on poverty elevation. My own very strong feeling is that the connect between the

large number of initiatives around poverty elevation, and agriculture product with the enhancement, the connect between those initiatives and renewable energy initiatives, which really hasn't been made.

One way of looking at it at Madhya Pradesh is you're looking at a person who needs a solar electric, solar sewing machine and then you're looking at market linkage. The other way of looking at it is that you actually look at the various party elevation initiatives, which are around livelihood, and start addressing their energy needs for energy solutions through renewables, which is something that as a state that is something that we are actively looking at but how can we bridge this gap off demand that is already there in these large number of well mobilized communities that are looking at strong poverty elevation initiatives. How do we actually get solutions to them that enhance their need and increase productivity? That's one of the things that we're actively looking at. The other thing that we're looking at is that there are a large number of subsidies that the government of India gives but there are also subsidies that a state government would give. We are looking at how do you create financial models that can actually leverage the subsidy regime but leverage it in a way that can catalyze are not renewables in the state. I'll give you an example of how we're looking at this kind of a—how we're looking at this. We have, as I've mentioned, we have the grid feeder separation so we've supported the agriculture feeder with the domestic feeder and we are now seeing whether we can actually have a decent realized solar, solar plant, which gets connected to the agriculture feeder, which means that all the pumps, the pumps that would, which are energized by that feeder would be able to draw water during the day and would be fed by solar energy. These are some of the things that we are trying to see or to be able to make sure that, you know, the financial subsidies that are available in the system can work for renewable energy. Can I have the next slide please?

So, finally I want to just add here that there is a huge space available for renewable energy for gaining the, you know, for those services that are being provided by the government in the rural areas. A large number of health centers, you have education centers that are residential, police stations, forest villages, you have panchayats offices, which are—which may have grid connection but do not get the kind of—but may not be able to get six hours or more. Those are the kind of areas and services that renewable energy can definitely have a customized solution for which that is something that government would definitely be willing to support because it serves the purposes of providing better, better services at remote areas.

On my last slide, I just want to add just a couple of sentences on micro grids. This has been an area in the state where we are working on very actively. We are looking at how we can encourage micro grids through entrepreneurs who have operators that are actually local and can—but also come with specifications that are grid compliant, which can support not just lighting but loads for at least some agriculture pumps or at least drinking water because drinking water pumps are a big issue here as late. The way we are looking at supporting entrepreneurs is trying to enable business models and also support financial innovations. So, very much getting into a framework that can allow

entrepreneurs to work without creating a bias, which government subsidy normally does but trying to make it more flexible to look at, you know, some kind of ways that we can support the financing aspect.

That's pretty much from my side and I just want to thank you for listening.

Sean Great, thank you very much Ms. Singh and we are moving along now to our final presenter, Mr. Ashis Kumar.

Ashis Thanks, thanks. Thanks Sean and thanks for the opportunity too from the Practitioner Network. Good morning and good evening to all the people who are viewing wherever you are. So, I think Harish and Gauri did a pretty good context as to how, why, CLEAN was formed and what it is supposed to do. I'll sort of start presenting one fact that because we're talking about energies, so most of the energy and most of it is used for utility for most of it actually is controlled or provided by the generation or distribution. It's all mostly controlled or provided by the government and it is. So, and as I think Harish and Gauri said that despite the best efforts of government it's a significant population of India have actually been left behind and will not have access to it because of the difficulties of this that they share. Despite, I mean, again, some of these ambitious targets that have been taken up, which I think, to some extent, address the generation issue but I think the access is really important to distribution. I mean, I think distribution is still going to remain a major challenge in spite of having a lot of generation, which might happen in some other area where energy might or might not be needed. As Gauri also mentioned thought there are numerous enterprises, diverse models, who are trying to address this energy access challenge and these enterprises would actually like to compliment or aid the government in this 24 by 7 aspiration for power to all the people who do not have access to energy.

So why exactly were we formed? I guess Harish set up the challenge of these enterprises based on they also endured or non-government organizations for Indian access case. So most of this enterprise/NGOs have been developed with some challenges but what all of them also realize is the common challenges regarding interacting with the government, regarding interacting with the financial sector such as investors, banks, and how would we face some of these common challenges. That's one of the reasons we were formed. How do we form—how do we—how do those enterprises actually come together and sort of work with the system development so that the enterprises can actually try. So we need to have some collective to present our voice to the persons involved. And also, we developed a platform for sharing and learning. Here are some of the reason why the Clean Energy Access is formed. What is the approach? The approach is we bring all stakeholders together where the members of the enterprise actually play a significant role. It's a sort of bottoms up, practitioner and members driven network. I guess Ms. Gauri said that in her presentation. So we are technology agnostic by which I mean we have enterprises who are solar, wind, who are wind hydro, who are wind biomass, who are all trying to cook stoves more importantly. The other thing, which I think often is missed out, missed out, on in energy access issues is that energy is actually much beyond electricity. There are

many things beyond electricity, beyond solar. I mean it's not only about solar. It's not only about the electricity so though I think the government statistics suggested that around 33 to [inaudible 51:43] profitable monitor of the population have access to electricity much more, in fact, maybe double that number actually do not have access to clean cook stove cooking. Cooking is also a major major issue. So how do we also see that? Along with cooking is also a bias towards underserved regions, which is finally not and there is an Indian and an Indian enterprise network but we are saying that how do we sort of give strategy to north India, east India, northeast India, where actually in central India where actually most of the energy access challenge lies. I think that also, as you will see that most of the enterprises in this sector are actually pretty small and medium and most of them except for one exception where it started years back, but most of the other enterprises in this sector are actually not more than 3 to 5 years old. In that sense, most of them are pretty small scale, pretty medium scale, and as I said pretty [inaudible 52:40].

And so what is it that we want to do? We can form some kind of, in the last quarter of, last quarter of last year, so depending on who you talk to and meet we are talking, in a sense, about 2 to 3 month old institutions.

What do we want to do? Of course, the major, one of the major, issues is how do we sort of speak and engage with the government and engage with the policy makers? How do we influence or engage with the policy makers? What is it that we want? I mean, subsidy is probably a wrong word now though, I guess, some of the sectors will benefit by subsidy but what we are looking for more is policy certainty or policy predictability so that the enterprises do not have to change their business models depending on changes that happen on policy. So we want some certainty and predictability. We want to engage with policy makers, bureaucrats, ministers regularly as part of our organization as a representative of the enterprises who are in this sector. The other thing that we want, I mean, so at the moment is that you are implementing government programs because they are in this energy access space where government is also engaged. So there are some of these programs that need certification. So how do we make these certifications go medium or small enterprises so it is easier for market for grow. As I said, we do need small and medium enterprises for the sector to thrive. Now the other challenge that the sector faces is access to finance and we see access to finance actually at two levels. I think Harish mentioned mostly about the access to finance from the consumer point of view, which I will also teach upon but there is also a challenge to access to finance from an enterprise point of view. Because most of most of the enterprises are small and medium, they do face challenges in raising equity or debt for scaling up from the moment they have to move beyond one or two villages, they have to move toward a district level or state level so their own finances actually are unsound. Their own financing they got from friends or family.

So financing, raising equity, is significantly critical and more so because this is a new district of the state and if you have known you are in this sector it does not give you standing with the banks. So, I mean, you may profit and make returns but they are modest. In this case, it becomes much more

important. The other important factor is actually debt. I mean because again, most of this sector is small and medium they have significant challenge in raising debt. Right, so we are looking at finances which expect modest returns and is completely patient with the enterprises who sort of ride tidal wave work ups and downs that enterprises go through. I think Harish has mentioned how most of India views the financing so how do we as a sector engage with financial institutions, banks, renewable banks, microfinance institutions? How do we engage with them so that there is money flowing from banks because most of the systems that are bought by customers are actually bought through credit—credit? So, the financing options should actually be choices to end users and not vendors because the more choices we give to users that are how the quality and all that will be assured. We do meet bankers. We do banker awareness. We're also saying how we also access some of the government schemes like DRI, which is a different area of government that has finance. There is a chart credit card. How can we access some of this government schemes and programs for practicing energy products or services? As I said, access to finance also needs to move much beyond solar. Right, there is, of course, this new policy around CSR. It is Corporate Social Responsibility. It is that we will also be able to devote some money from CSR towards access to finance, which is not yet a priority in most of the sales.

The other weight is around skills and capacity building. It stays in the energy sector so it's going. We face this challenge of how do we get the right kind of people, where are they based, how do they fit in this organization? We, as an association, would like to work on skills and capacity building by identifying gaps, by doing pilot training. We do not want to become a training institution but once we do; pilot training and develop this so that we can make this available as a source and training institutions can take them over. The other thing that skills and capacity building challenges actually across technicians to sales persons to entrepreneurs and they cross technology. The other thing that we want to improve is how to we have selling of skills, selling of capacity across sector. As an association, which is technology agnostic, we believe that we are sort of well placed to do capacity building, which cuts across sectors. How do we mobilize arks sectors for financing, for skills, and other challenges that enterprises face. The other issue we would like to get on later is establishing a certification agency for training institutions who are getting into providing skills and capacity building solving for this sector. That's also our consideration and we would like to become that.

The fourth group of challenges around technology and what I mean by technology challenges [inaudible 59:01] sort of want to say. How do we so that—a lot of innovation. A lot of models that are happening in isolated areas, many of them are actually happening within the country, within India, because it's such a diverse land but there are also changes that are happening outside. How do we ensure that some of these innovations actually get out of the boundaries of the R&D labs and get to practice, get to field operations? The other challenges that we in the sector face are testing. At the moment you are trying to access some government scheme or find financing you need to have some means of testing. Most of the technology sector actually is highly

centralized so we do want make this decentralized. How do we also ensure that some of this testing actually becomes low cost and they can pick a self-test for certification. Then the other issue for the sector in which we are going and is so vital is can we have some charter of minimum quality assurance to the consumers who buy this energy product and so that's why we would like to operate. If we have to go beyond scaling you have some standards, some standards, and how do we have those minimum standards? How do we have those minimum benchmarks, which can be erected in some cases but we can sort of stick to. Will the enterprises stick to? How do we also source strong components? How do we know a credible supplier? Those are some of the things that we want to work on.

Lastly, this is called information and networking and this is doing part of the directory as part of that. These—I mean, across sectors, how do we share learning, share comments? What we are trying to do with, actually, there are three or four things, in this year and we will continue to do on an annual basis, we're planning to bring out the directory of all stakeholders in this sector who are interested in access to energy. We also want to work with them, and not just in our industry, as to—there was this target that ended up in the government by 2022. Sadly enough, we have been arming the sector [inaudible 1:01:18] 150 kilowatt hour. So, now we are planning on a strategy of how we can actually achieve 2000 megawatt-hours by another 7 to 8 years. We do also want to bring out a sort of status report of grid energy status report, which is the first one. Of course, we have this date but then it becomes an annual, an annual affair. The other thing, of course, which all associations do, we are no different than that, is that we would like to have an annual event, we would like to complement our own people, so we need to have some awards around certain type area. So this is what we want to do and I will sort of stop there. Though it's strictly to pave the way in India specific but I had this addition got inserted, India is so diverse and there are so many other models, technologies, innovations, financing developed. So we do want to become a global international institution for this internal energy. I will stop there. Thank you.

Sean Great, thank you very much and thank you to each of the panelists for those presentations. We'll move along now to the question and answer session. Just a reminder to all of our attendees if you have any questions for the panelists you can submit those through the question pane and I will ask them to them at this point.

So we did receive a number of questions. Some of them are for Mr. Harish. I don't know if he is still with us on the line but I will present those questions and—

Harish I'm still here.

Sean Oh, great. Thank you! So, starting with the first question. It was directed to you Harish and it asks—could you please share Selco's criteria to provide services to the poor villages? How many houses are the minimum required?

Harish We do not have a minimum required in terms of—what we do is organic and in many of them we have [inaudible 1:03:28] particularly in one state of India and in [inaudible 1:03:32] villages. [inaudible 1:03:38] for local banks and in many over the last few years we have started with one house and moved to the neighbor's house to supply all the houses in these villages. So, we start with one [inaudible 1:03:53] more with the institutions to have a campaign to work with the local banks to have [inaudible 1:04:03] complementing workshops where the clients actually come in and the banker is [inaudible 1:04:10]. We start with one house and then we move to multiple houses. In some villages, we have done 10%, 20%, and 100%. Thanks.

Sean Thank you Harish. We did have a little bit of trouble hearing you. You're audio is breaking up a little bit but we'll move along now to the next question. The next question is - what is the definition of electrification under the Indian programs for purposes of determining whether goals have been met or not? This question is for anyone.

Gauri Yeah, maybe I'll take this Sean. The definition that is commonly being used is if at least 10% of the households in that habitation have been connected to the grid line. It also—the bridge should also enable connections to the various government offices, which might be in the shape of public health centers or a school or a panchayats center, which is basically the local governance center and it should also provide connections to the people who live below the—below the poverty line. So once those criteria are meet then the village is considered electrified.

Sean Great, thank you very much. The next question we have is asking about different types of microgrids. They are wondering what each of your opinions are on approach to microgrids, whether there are advantages or disadvantages to having distributed microgrids, meaning that the power sources are at individual homes or having more of a smaller scale, centralized microgrid where you have the power source in a specific area for a community and then distribution network to the different households.

Ashis If okay, I can take this. I think most of the microgrids, which have been done in India, are anywhere between 100 watt to—some of them are actually 10 kilowatts. They are basically centralized—I don't know if they are in a village or in a common property, which could be a school or a panchayat and then they're basically wired up to, wired up to their houses. Most of the solar panels and the batteries will be centrally located. The other part is that microgrids are not only solar. There are also microgrids, which are biomass based, which actually use biomass as a source of those microgrids and the other thing is that because some of them are really small or really large. The ones that are 100 watt would cover something like 5 or 10 houses and will provide you basic lighting or probably [inaudible 1:07:46]. Whereas, at the other end some of these microgrids actually provide you all the powering needs for your appliances. So some of these microgrids, which are being now implemented, which are 20 kilowatt, 25 kilowatt, which again cover maybe just 100 to 150 households where you can actually run your televisions, some of your small motor requirements like fans or mixes and some of the

microgrids are again experimenting with the fact that there is something called an anchor load, which is basically enlarged—large power building item, which could be a telephone tower or it could be—what do you call a, flow mill. Those are the ones that some of the [inaudible 1:08:39] and this would also be solar. Some of them would actively come in the larger base load and whatever is left out of the anchor load will go to the houses. Depending on the model, depending on some of the affordability of communities where it was established, they made the choices as to how much power they can consume that they use. Does it answer the question or, I mean, there are other issues around policy and all that but I don't want to touch it at this point in time.

Sean No, thank you very much. I think that addresses it. We'll move on to the next question now. Our attendee wants to know if the 15 megawatts of biomass energy that was referred to includes any expansion of the small scale anaerobic digestion that has been used in India for years and if not, why not, and could you please specify where to find any information on anaerobic small scale anaerobic digestion for renewable energy?

Ashis Well, again, I'm not sure. I again am not sure but I think there are just one or two enterprises who just about trying to do feasibility studies on anaerobic digestion. I haven't come across people who have actually implemented anaerobic digestion in India and I'm really not sure so if I'm given some time. I know the person so I will get back with more.

Gauri Okay, maybe I can just add here. There have been—I mean, what, in the Indian context, was and still is very popular is the small biogas, as we call it, which is a two cubic meter installation that provides light and clean cooking gas to the family but what has happened over the recent years is also a large number of entrepreneurs who started taking up larger installations, which can go up to even 200 cubic meters. I've seen some, which are in the range of around 85 to 100 cubic meters, which can provide either the normal side of it, which is to provide gas and the heating solutions but you can also have a duel fuel engine and you can actually convert biogas into complexity. It's probably not as efficient as if only if you provide biogas for cooking or heating purposes but still there are a large number of entrepreneurs that are now getting into that. The third area that entrepreneurs are getting into is that our telecom regulator in India has actually mandated that all the new towers that are coming up in rural areas. The mandate is that at least 50% of them should have their electricity source as renewables, which means it has opened up a huge area because we have over 500,000 telephone towers in India and they are growing every year. There are entrepreneurs that are looking at biogas with a consortium of bacteria that can actually digest very different kinds of agriculture residuals to create biogas and feed it to the telecom towers. I do know that there is some, at least a largish pilot level this has been tried in being able to hook up with these telecom towers.

Sean Thank you very much Gauri. The next question, just really quick—is there a place where people can access a list of solar providers in India?

Richenda This is Richenda. I can speak to that in terms of those that we've got within the International Energy Practitioner Network. If you go to our website, energyaccess.org, we do have a global directory of the 2,000 members that we have in the network, including those 130 that are based in India and you can sort through that. We're actually re-launching our website next month and we will have more features to be able to disaggregate not only by country but more by technology and approach as well so please use that as a reference until the Clean Network has built out its website more broadly, which I'm sure they will be focusing on a deeper dive into different entrepreneurs and enterprises working across India.

Ashis Yeah, I'm developing a directory so we will come up with in a month or so. This will also have a directory in place for our website. The other place to actually go is the [inaudible 1:14:27] website that [inaudible 1:14:39] renewable energy website, which actually have a lot of enterprises listed under areas with various technologies and which could be very useful. They do have about—I think at last, when I saw it last, they had some 400 to 450 enterprises in one of their lists.

Sean Thank you everyone. Moving on to the next question. In terms of policy, Ms. Gauri Singh elaborated on some of the approaches undertaken by the state of Madhya Pradesh. How do individual measures taken by states come together at the country level?

Gauri So, this is an interesting question because the way that it actually happens is that the larger framework of policy and targets actually get set up at the national level and then each state would be looking at putting together an implementation plan, which is customized to addressing the needs of the particular state. Now, what does happen is, and this is something that there is a huge discussion on, is that at the government of India level, because the funding flow is mostly with government funding and the states are sometimes short of funds. A lot of initiatives get framed at the national level, which the states feel are sometimes they get too straightjacketed and leave no room for the kind of innovation that states are looking to do for addressing their particular needs. The discussion that is now happening is how does the policy framework at the national level create only a broad framework, rather than tying up the implementation plan into some kind of straightjacket? Hopefully that's the kind of direction that the policy making move to. On the other hand, if the state takes up an initiative with its own funding and if it's a successful initiative then it does get showcased at the national level and may actually get adopted at the national level for a broad-based support. So it's like a two way kind of attraction but more centered towards the flow of funds and flow of push coming from the center to the state and much fewer are going from the state to the center but it is a two way attraction.

Sean Thank you Gauri. As we are starting to run a little bit close to our time limit and we have quite a few questions, maybe we can try to just keep the answers as brief as possible so we can get to as many of these questions as we can. The next question asks—if there has been any effort to address the quality

assurance issues on the development of home electricity systems? This is for any of the panelists.

Gauri Ashis, you want to take that?

Ashis Sean, could you repeat the questions?

Sean Yeah, I can repeat the question. We did loose Harish. He is on travel and he had to drop off the line unfortunately but the question was—have there been any efforts to address quality assurance on the development of home electricity generators?

Ashis Um, yeah, there are a point which are going—I mean actually, yeah, when MRE came out with this [inaudible 1:18:55] scheme so they basically sort of came out with some of these benchmarks that the systems would have on all the components. You had to get it with a testing center and come out successful to be able to access some of those schemes. There are those things, which have been sort of driven by government. The other thing, which is barely happening is around this is some of them like the initial programs, which is done by [inaudible 1:19:30] are still working on developing some of those benchmarks and standards and parameters, mostly around lanterns—solar home lanterns. As I said, we also want to, CLEAN as an institution, want to work on some of these benchmarks and parameters but more as a self-regulating thing than anything else so that we, as an association, and the members can actively assure certain minimum quality many are selling on their own.

Sean Great, thank you very much and what is the imagined role for energy efficiency in the energy access conversation, especially when providing energy service such as lighting, fans, sewing machines, smaller appliances?

Gauri Let me speak to that. There is a very strong campaign that is also going on in energy efficiency and there is an organization called the Bureau of Energy Efficiency in India that basically steers this whole discussion and also supports this whole program at the national level. What they have come up with is they have come up with a star rating, which looks at higher stars as more efficient appliances, and fans have actually been an area of focus for them as well. They have been able to also do the rating of the fans. LED light is a hugely important campaign that they are steering and they are focused to look at how standard and, you know, lights, LED lights with good specifications, can be made available to consumers and they are actually making efforts aggregating the demand and driving down the cost of LED bulbs.

Richenda If I may add to that as well since I know that Harish has left the webinar, I want to say that Selco foundation and Selco labs are doing some very interesting work looking at some of the appliances that are used by their customers in terms of making a livelihood and then seeing whether or not they can drive increased efficiency in the appliance. For example, in the sewing machine and some of the agricultural machinery whether or not they can use a more efficient motor, they can help to drive efficiency in the

application for that particular context as well. A lot of that is more boutique at this point but there is some very interesting learning coming out from that that I think could be readily adopted across the sector in India.

Sean Thank you Richenda and Gauri. Next question again for all the panelists, what are some of the recommendations on methods to finance these types of programs? What is needed to get commercial bank financing?

Ashis Maybe I can take this—maybe Gauri and I. As I said, there are two kinds of financing, which is required and both are applicable for the sector to develop and go beyond whatever level they are. So at the enterprise level we need it would be debt and at the moment somebody has to go beyond the money we have raised, which they can only do so much if covering a year or two. The money they need beyond that they need [inaudible 1:23:45]. I think it's not only about the energy sector but the moment you are talking about small and medium enterprises and the cost increase for small and medium enterprises pays this challenge of raising equity because most of them do not have capital. Sorry, most of them don't have collateral, which most of the financial institutions ask for. So, that's one level of challenge. The other real challenge is around again within the enterprise sector. The other challenge is around how do we raise capital, which is pretty long term because this sector does not give you returns very quickly? This is like an interest secured or [inaudible 1:24:30] sectors. How do we get money, which is being really really patient? Any money that actually the sector wants looks beyond the 5 to 7 year scale, the 5 to 7 year kind of range. And, as I said, at the moment we are talking about returns and all that so you do have to have modest expectations of return. So, any infrastructure you can really see in any country so they cannot give you supernormal profit. So sometimes maybe a high security rate [inaudible 1:25:02]. That's the kind of enterprise side. The other side is finally around financing the customer. This is a huge huge role foundations, bankers, can take and as I think many people know things have to—eventually we'll have to move beyond subsidy. At the moment we have to move beyond subsidy so we have to attract commercial capital and at the moment we are talking about commercial capital. How do we—this sector is still considered risky so how do we reduce this perception? We have these guarantees. Can we do margin financing? So, a lot of financial innovations can happen, which is around those, you know, community financing. So that's what I just, the sector is, looking for.

Richenda Yeah, if I could just very quickly add to that as well two other things as well? I think there's a need among investors to really focus on incentivizing the sales service. We still see it as a lot of focus on front installation, rather than actually ensuring the whole supply chain and the lifetime solution is that the incentives are appropriately matched there. Second, I would also say that we like to think and we've been promoting broadly, globally, on energy access the idea of commercial returns in this sector and I think appropriately to a large extent but at the same time we do need to recognize that there is still very much a tradeoff between looking for a strong commercial return and looking for a strong social return and so really we need to look at those types of investors. If they are focusing on investing for impact, they really need to

appropriately look at what kind of social return is that they are investing in it and not only looking at a sort of strong financial return because I think that we are seeing some confusion in this sector about when we're looking at impact investment what it is that we're really talking about.

Sean Esterly

Great, thank you everyone. Unfortunately we are out of time. So we'll have to begin wrapping up the webinar. My apologies to any attendees if we did not have time to address your questions. What I will do is I will take any of those questions and email them to the panelists so you should be hearing back from them in the next week or two.

With that I would like to move on now to a quick survey that we have for our attendees. It's just three quick questions to help us evaluate how we're doing. That first question or statement is—the webinar content provided me with useful information and insight. Then just click on which answer represents your opinion—strongly agree, agree, not sure disagree, or strongly disagree. The next one—the webinars presenters were effective. Then the final system—overall the webinar met my expectations.

Thank you very much for answering our survey and on behalf of the Clean Energy Solutions Center, I'd like to thank each of our panelists again and also our attendees for participating in today's Webinar. We very much appreciate everyone's time and I do invite attendees to check the Solutions Center web site if you'd like to view or download the slides. They should be all posted now. Just a reminder we'll be posting a recording of today's webinar within about a week of this broadcast. Additionally on the website, you will find information on upcoming webinars and other training events. Just a reminder we are also posting recordings to the Clean Energy Solutions Center You Tube channel, so please check that out. We also invite you to inform your colleagues and those in your networks about Solutions Center resources and services, including no-cost policy support. With that I hope that everyone has a great rest of your day and we look forward to seeing you again at future Clean Energy Solutions Center events. This concludes our webinar.

Thank you all. And now, before we take our quick survey, I'd like to provide the panelists with an opportunity to provide any additional or closing remarks you'd like to make before we close the webinar.

Thank you again to the panelists. Now we'd like to ask our audience to take a minute to answer a quick survey on the webinar you viewed today. We have five short questions for you to answer. Your feedback is very important to us as it allows us to know what we are doing well and where we can improve. Andrew, can you display the first question please? Thank you for answering our survey. On behalf of the Clean Energy Solutions Center, I'd like to extend a hearty thank you to all of our expert panelists, and to our attendees for participating in today's Webinar. We've had a terrific audience, and we very much appreciate your time. I invite our attendees to check the Solutions Center web site over the next few weeks if you would like to view the slides and listen to a recording of today's presentations, as well as previously held webinars. Additionally, you will find information on upcoming webinars and other training events. We also invite you to inform your colleagues and those

in your networks about Solutions Center resources and services, including no-cost policy support. 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.